



# **Bicycle Master Plan**

## **Colorado State University**

# Acknowledgements

This document was developed through a collaborative process involving University staff from numerous departments, faculty, students, and the City of Fort Collins.

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# Introduction

Colorado State University (CSU) has demonstrated a commitment to a sustainable transportation system by developing separated bicycle facilities, closing streets for use by bicycles and pedestrians, offering popular bicycle education programs, partnering with the City to build the Mason Trail extension, and more. While these actions demonstrate a strong commitment to sustainable transportation, there remains a need for an overall plan to organize and guide the growth of the bicycling system at CSU. This Bicycle Master Plan (the Plan) was created to fulfill that need. This Plan will guide CSU's bikeway development over the next decade as to become a more bicycle friendly campus and to achieve the goals of improved safety, sustainability, and health.

Providing improved bicycle facilities for the University's 25,600 on-campus students and 6,400 employees is directly related to improving public safety, reducing injuries resulting from crashes, ensuring efficiently and ease of movement, improving public health, and meeting sustainability targets.<sup>1</sup>

The Plan analyzes existing conditions, including current policies, programs, and infrastructure, while providing best practice examples of programs and facilities at peer institutions. These recommendations aim to meet the project's goals while improving the user experience through the development of the bicycle network. This Plan also recognizes that improving existing bicycle facilities, adding new facilities where needed, and providing more educational opportunities to the campus community will

improve safety for all modes of travel even as the number of bicyclists increases.

## Plan Purpose and Goals

This Plan is intended to help the University increase bicycling on campus as a way to enhance campus sustainability and reduce demand for automobile travel and parking. The Plan provides clear vision and guidance to improve the bicycle environment on campus while also aligning with the City of Fort Collins Bicycle Master Plan (Fort Collins Bike Plan). Specifically, this plan:

- Prioritizes investments to the built environment;
- Equips CSU to apply for North Front Range Metropolitan Planning Organization funding in partnership with the City of Fort Collins (City);
- Guides programmatic investments for education, enforcement, and encouragement;
- Recommends data collection measures to support ongoing investment in the bicycle environment at CSU;
- Informs Master Plan updates and decisions about placement of new buildings and open spaces on campus; and
- Provides guidance for accommodating bicycles on campus in new residences, office and educational buildings, and parking garages.

## Improve Sustainability

In 2008, CSU announced its intent to “seek environmental solutions that include making CSU carbon neutral in a rapid timeframe.”<sup>2</sup> Subsequently, CSU signed the American College and University Presidents Climate Commitment, whereby the University agreed to set carbon neutrality as a long-term climate goal. The original 2010 Climate Action Plan began the process of defining a path for CSU to

<sup>1</sup> CSU is the largest employer in Fort Collins with an estimated 6,400 employees, of which 1,600 are faculty, 2,500 are administrative professionals, 1,900 are state-classified personnel, and 400 are other salaried employees.  
<http://www.colostate.edu/features/facts-figures.aspx>

<sup>2</sup> Climate Action Plan.

[http://www.fm.colostate.edu/sustain/downloads/Climate\\_Action\\_Plan\\_Update-2-20-2013.pdf](http://www.fm.colostate.edu/sustain/downloads/Climate_Action_Plan_Update-2-20-2013.pdf)

achieve climate neutrality and the most recent update, The Climate Action Plan Update in February 2013, offered goals and updates to the original plan.

This Bicycle Plan advances Goal 4.11 to reduce single-occupancy vehicle commuting by 5 percent. Alternatives to single-occupancy vehicle commuting can reduce greenhouse gas emissions, improve air quality, and encourage healthy walking and cycling habits, thereby advancing the University's goal of becoming a climate neutral campus.

The Sustainability Tracking, Assessment & Rating System™ (STARS) is a self-reporting framework for colleges and universities to measure their sustainability performance.<sup>3</sup> In February 2014, CSU was granted a gold STARS rating, the highest rating granted to any University (platinum is the highest designation). Transportation factors such as the University's campus fleet, commute mode split, bicycle sharing, bicycle and pedestrian plans, facilities for bicyclists, car sharing, mass transit programs, and other programmatic elements fit into the STARS scoring. CSU earned 6.8 of 12 possible points in the 2014 scoring. They lost points on the campus fleet and student/employee commute modal split, which can be directly improved through the recommendations to the bicycle network proposed in this Plan.

### Attain Platinum Bicycle-Friendly Designation

The national Bicycle Friendly University (BFU) program, created and run by the League of American Bicyclists, recognizes applicants for improving bicycling conditions on campus. The program scores universities in the following five areas, colloquially known as the "Five E's":

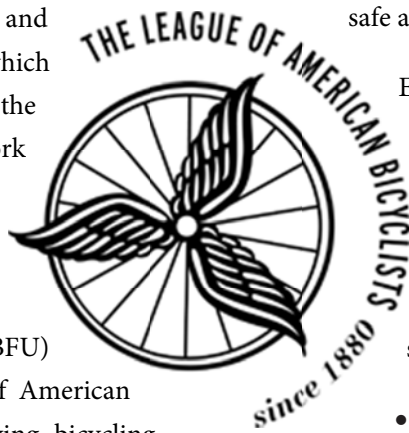


Figure 1 Existing Bicycle Lane on Campus

1. Engineering: Create safe and convenient places to ride and park a bicycle.
2. Education: Give people of all ages and ability levels the skills and confidence to ride.
3. Encouragement: Create a strong bicycle culture that welcomes and celebrates bicycling.
4. Enforcement: Ensure safe roads for all users.
5. Evaluation and Planning: Plan for bicycling as a safe and viable transportation option.<sup>4</sup>

Each of the Five "E's" calls for changes to the campus bicycle environment to promote holistic improvements. There are currently 100 BFUs across the country. A small number of CSU's peer institutions in the Mountain West region have attained the silver or higher designation, including:

- Arizona State University (Gold)
- University of Montana (Gold)
- Northern Arizona University (Silver)
- University of Arizona, Tucson (Silver)
- Boise State University (Silver)

<sup>3</sup> Sustainability Tracking, Assessment & Rating System. Feb. 25, 2014.

<https://stars.aashe.org/institutions/colorado-state-university-co/report/2014-02-25/>

<sup>4</sup> Definitions from The League of American Bicyclists,

<http://www.bikeleague.org/content/5-es>

- University of Utah (Silver)
- Utah State University (Silver)

In 2011, the League of American Bicyclists (LAB) designated CSU as a BFU at the silver level. Reviewers based this designation on the University's efforts and commitment to support bicycling as well as the campus' potential growth. The application included an update on the University's bike trail to connect south and main campus, investment in additional bike parking, policies and ordinances for end of trip facilities, efforts of the Bicycle Advisory Committee, success of the Bicycle Education and Enforcement Program (BEEP), and the number of rides, races and fundraisers that take place on campus. CSU should reapply for a new BFU designation in 2015 with the goal of attaining a platinum designation. Only two Universities have attained that status: Stanford University and the University of California-Davis. The LAB states that platinum universities "usually show excellence across the board. [They have] a comfortable and safe bike network, excellent bike parking, great bike education programs, a supportive police force and just people on bikes everywhere."<sup>5</sup>

## Study Area

The study area for the Plan includes the Main Campus and two satellite campuses: South and Foothills. The Main Campus is located in central Fort Collins and is bordered by four major arterial streets: Laurel Street to the north, Lake Street to the south, College Avenue to the east, and Shields Street to the west. This Plan focuses on how to improve bicycling on the Main Campus due to the high concentration of students, classrooms, and other academic facilities. However, recommendations to improve bicycling conditions on the satellite campuses are also included in this Plan.

The South and Foothill Campuses are an important part of the bicycling network, but improvements on these campuses will affect fewer riders than on Main Campus. The Foothills Campus is located approximately 2.5 miles from CSU's Main Campus, on the west edge of the city. The Foothills Campus is home to several research facilities and the Centers for Disease Control Borne Infectious Disease Lab. The South Campus is located just south of the Main Campus and is bordered by the Sherwood Lateral to the north, Drake Road to the south, Centre Avenue and Gillette Drive to the west, and Bay Road and the Mason Trail to the east.

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<sup>5</sup> The League of American Bicyclists. <http://bikeleague.org/content/process-0>

# Plan Process

The development of the Plan was managed by CSU's Parking and Transportation Services Department and involved a steering committee, advisory committee, and robust public involvement conducted concurrent with the City's Plan.

## Steering Committee

A steering committee of students, faculty, and staff was formed to guide development of the Plan. The committee was composed of City staff, Facilities staff, Police Department staff, Housing and Dining staff, Parking and Transportation staff, community members, and students (a full member list is provided in the acknowledgements section of this document). The committee participated in four workshops. A description of each workshop follows.

### Workshop 1

The first workshop focused on providing committee members with an overview of roles, the current CSU bicycling context, the anticipated Plan focus and key topics, and the relationship of the Plan to other University and City efforts.

### Workshop 2

The second workshop provided information on existing conditions, previous planning efforts, initial observations about bicycling on campus, and potential opportunities for improving bicycling on campus. Additionally, information gathered from the WikiMap (described below) was presented. At the conclusion of the presentation, the group discussed problem areas for bicycling including, but not limited to South Drive, the West Elizabeth Street and South Shields Street intersection, the East Elizabeth Street and South College Avenue intersection, the West Lake Street and Centre Avenue intersection, and the Oval.

### Workshop 3

At the third workshop, committee members were presented with draft infrastructure recommendations for the Main Campus and reviewed the City's draft bicycle network recommendations. Valuable feedback was received about the following areas:

- the West Laurel Street and South Mason Street intersection;
- West Pitkin Street;
- a north-south route near the Oval;
- the South Meldrum Street and West Laurel Street intersection;
- South Shields Street;
- West Plum Street;
- Remington Street;
- South Loomis Avenue; and
- Center Avenue.

### Workshop 4

Committee members were presented with draft recommendations for bicycle parking, a recommended bicycle counting program, infrastructure recommendations for the Foothills and South Campuses, and initial cost estimates for infrastructure recommendations. The committee helped clarify assumptions and gave feedback on recommendations. As a result, refinements were made to the recommendations; these are reflected in this Plan.

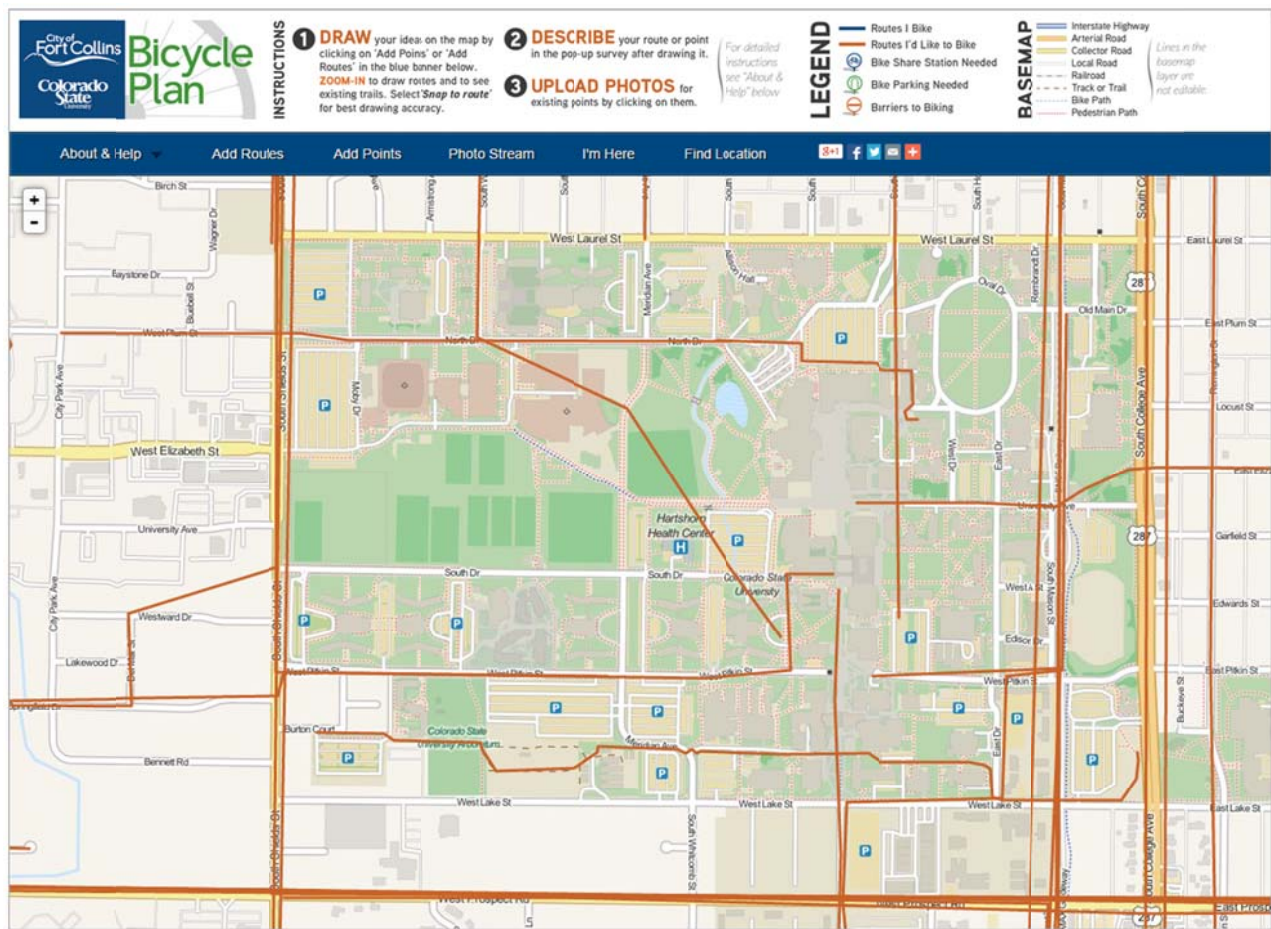


Figure 2 "Where I'd like to ride" Hand-Drawn Routes from WikiMap

## Online Interactive Map

Infrastructure recommendations were informed by feedback from an online interactive map, or WikiMap, which collected geographically-specific feedback. The map was created in conjunction with the City Bike Plan. Over 400 registered users were asked to identify routes they already ride, routes they would like to ride, barriers to bicycling, locations where bike parking is needed, and potential bike share station locations. The map was prominently featured on the project website and in the Fort Collins Bike Plan's documents and website.

The WikiMap highlighted that cyclists use the Spring Creek Trail and Mason Trail as well as Overland Trail and West Elizabeth Road. The arterials that border campus, including South Shields Street and South College Avenue, as well as intersections such as South Shields Street and West Prospect Road, were noted as barriers to bicycling.

Additionally, WikiMap users indicated that South College Avenue (a north-south arterial) and Laporte Avenue and West Drake Road (east-west arterials) are corridors that people are interested in bicycling.

### Example Comment

West Lake and Center Road: "With the mix of 4-way stop, high vehicle traffic, high pedestrian traffic, high bike traffic, and general disregard for following the rules of the road for most parties involved, this intersection is pretty undesirable."

### Public Open Houses

Two open houses were held as part of the Fort Collins Bike Plan process. Both included focused information about the CSU Bike Plan and activities designed to gather feedback on existing bicycling conditions and proposed

recommendations. The first Open House sought input about existing conditions on and near campus while the second Open House sought input about specific intersections and travel corridors. There were 236 attendees at the first open house and 114 at the second. Notable preferences about preferred corridors for north-south and east-west travel include:

- South Shields Street was noted as the most critical north-south route that should be created first in the City's proposed 2020 Low Stress Network.
- West Pitkin Street was noted as the most critical east-west route that should be created first in the City's proposed 2020 Low Stress Network.
- South Shields Street was noted as the north-south protected bike lane that should be created first in the City's Full Build Vision.
- West Drake Road was noted as the east-west protected bike lane that should be created first in the City's Full Build Vision.

The following four intersections were indicated as most in need of improvement at the edge of CSU's campus:

1. West Elizabeth Street and South Shields Street (43 percent)
2. East Elizabeth Street and South College Avenue (19 percent)
3. West Lake Street and Center Avenue (16 percent)
4. South Meldrum Street and West Laurel Street (15 percent)

# Existing Plans and Programs

This chapter includes a review of existing campus transportation plans and policy documents, including summary of bicycle parking inventory and use and a description of other bicycle-related programs and resources on campus. This information was used to understand aspects of bicycling on campus that are working well and challenges and barriers on campus to inform the development of recommendations.

## Plans and Surveys

The following plans and studies that impact transportation and bicycle travel on campus were reviewed and are summarized below:

- Student Housing Survey
- CSU Parking and Transportation Master Plan
- CSU 2020 Plan
- Stadium Construction Plan
- City of Fort Collins Bicycle Master Plan

### Student Housing Survey

CSU annually conducts the Student Housing Rental Survey which asks students about their housing preferences and travel behavior via an online questionnaire. The 2014 survey had 758 respondents of which 65 percent listed their personal car as their primary mode of transportation for commuting to campus. Just under a quarter (24 percent) of all students surveyed listed biking as their primary mode of transportation to campus, followed by bus/transit at 20 percent, and walking at 19 percent. When asked how important bicycle storage and parking are when selecting student housing, nearly 25 percent said that it is extremely important (up from 19 percent in 2013) with an additional 22 percent stating that it is very important.

### CSU 2020 Plan (Campus Master Plan)

The CSU 2020 Plan is the Campus Master Plan that identifies infrastructure needs for intended expansion of the student population. The Plan forecasts a significant increase in bicycle mode share by 2024 with a target of 30 percent of students and 9 percent of faculty and staff accessing campus by bicycle. It is expected that 18,000 bicycle parking spaces will be needed on campus to accommodate future growth. This Plan will become an appendix to the Master Plan (to later be approved by the Master Plan Committee).

### CSU Parking and Transportation Master Plan

A survey conducted as part of the Parking and Transportation Master Plan showed that bicycling is the second most popular mode of travel to and from the campus, though only 8 percent of trips are made by bicycle. While the mode split for bicyclists is much lower than for driving, approximately 38 percent of respondents live within three to five miles of campus meaning that a greater bicycling mode split could be captured by improving the bicycling environment on and around campus and by providing additional bicycle education and encouragement initiatives.

The Master Plan supports increasing bicycle infrastructure and increasing travel options for non-auto modes of transportation. The plan aims to reduce the amount of parking space supplied to students and employees in the future, thereby encouraging students to bike or walk to campus instead of driving. Providing a safe, comfortable, and intuitive bicycling network is important to enable this shift.

### Stadium Construction Plan

Hughes Stadium, built in 1968, is CSU's outdated football stadium located roughly three miles west of campus and adjacent to the Horsetooth Reservoir. The University is considering several options for the future of this stadium with the ultimate goal of relocating the stadium to Main Campus. If the stadium is relocated to the CSU campus, it

would be located at the southern edge of campus along West Lake Street and Meridian Avenue to the east.

According to a September 2014 letter written by University President Dr. Tony Frank, there are four options to be considered before making a final recommendation to the Board in December 2014.<sup>6</sup> The four options are (1) to maintain Hughes Stadium, (2) to modernize and improve the stadium to keep it functioning until a new stadium can be built by 2050, (3) to phase the current planned stadium in the proposed on-campus location, or (4) to rebid the existing stadium plan as a public-private partnership. Although the future of Hughes Stadium is not certain, this Plan has assumed that options three or four will be undertaken and that Hughes Stadium will be decommissioned and an on-campus stadium will be constructed.

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<sup>6</sup> Frank, Tony. "Recommendation on CSU Stadium." Sept. 25, 2014, accessed October 6, 2014. <http://president.colostate.edu/campus-messages/2014-9-25-stadium.aspx>



**Source: CSU, Stadium Site Plan Update**

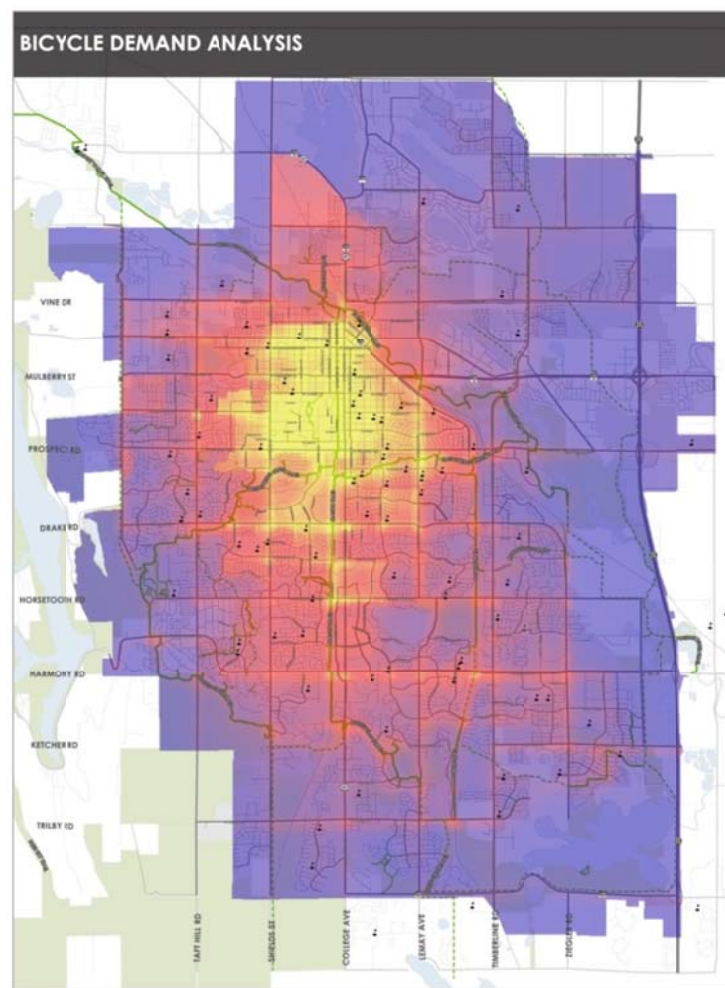
## City of Fort Collins Bicycle Master Plan (Fort Collins Bike Plan)

The Fort Collins Bike Plan was developed concurrently with this Plan. CSU is the largest employer in the City, is home to thousands of students, and serves as a primary activity center for all residents, employees and visitors. In fact, the bicycle demand analysis performed for the City's plan revealed that the area around CSU Main Campus has the highest expected demand for bicycling in Fort Collins (see **Figure 4**).<sup>7</sup>

Many of the streets bordering campus, such as South Shields Street and South College Avenue, were classified as high-stress in the analysis of bicyclist comfort level completed for the Fort Collins Bike Plan. This means that they are not appealing to the widest range of bicyclists which may include students who have not ridden a bicycle since they were children.

The bicycle network developed for the Fort Collins Bike Plan includes all of the streets bordering the Main Campus as well as many that feed into it. The City Plan's 2020 Low Stress Network was developed to take advantage of existing low-stress streets that form an alternative network to the high-stress arterial streets. One critical low-stress route in the City network runs directly through campus on West Pitkin Street. This route provides an alternative through route to high-stress West Prospect Road and will be made feasible for low-stress riding through a series of spot improvements at offset intersections, such as at South Shields Street. Other low-stress routes through CSU's campus, such as West Laurel Street, Shields Street, Mason Street, Meridian Avenue, and Center Ave, are shown in **Figure 5**.

Fort Collins Bike Plan's Full Build Vision provides a pathway toward implementation of a world-class bicycle network. This network focuses on improvements to high-



**Figure 4 Fort Collins Bike Plan Bicycle Demand Analysis**

stress streets that will require more complex studies and design, and a higher level of investment.

<sup>7</sup> Fort Collins Bike Plan, Network, Policy, and Program Recommendations, November 2014



and residence hall racks are checked at the end of the academic year. Impounded bicycles can be recovered by owners at CSU PD.

### Ram Guards

To address locations on campus that experience circulation issues, CSU employs students to work the Ram Guards program which is housed within the Police Department. Ram Guards control traffic at highly-congested locations such as Meridian Avenue and South Drive and address wrong-way bicycle riding on South Drive. Ram Guards are funded by the University Parking & Transportation Services from parking revenue.

### RamBassadors

Similar to the Ram Guards program, the RamBassadors program employs students to improve bicycling on campus. RamBassadors are employees of Parking and Transportation who perform educational outreach to other students about bicycling on campus. For example, at the beginning of the academic year RamBassadors are stationed near the dismount zone on Main Campus to hand out literature about bicycling on campus and to conduct bicycle counts. This peer-to-peer encouragement and education has been successful at CSU and should continue. Like Ram Guards, RamBassadors are funded by the University Parking & Transportation Services from parking revenue.

### Bicycle Registration

To facilitate campus policing and provide some security for bicycle owners, CSU requires for all bicycles ridden or parked on the CSU campus to be registered with CSU PD, though visitors are exempt. Registration costs \$10 per year and is completed online or submitted in-person at the BEEP Office at the Campus PD. The registration decal, known as a CSU bicycle license, must be placed on the bicycle and is valid for as long as the decal numbers are legible. Campus PD, who manages the registration program, estimates that approximately 50 percent of bicycles on campus are registered.



Figure 7 Bicycle Registration Sticker on Campus

### Bicycle Theft

Bicycle registration has steadily increased since 2009 and has proved instrumental to tracking and recovering stolen bicycles. There were 4,792 bicycles registered in 2013, up from up from 4,544 four years prior. Campus police track bicycle theft as well as traffic and behavior-related violations. As of 2014, there were approximately 180 reported bicycle thefts per year, which is estimated to be about 1.7 percent of the bicycles parked on campus.

Figure 8 shows the total number of bicycles stolen and recovered between 2009 and 2013. Thanks to bicycle registrations and the BEEP, bicycle thefts are falling while recovery rates are rising.<sup>10</sup>

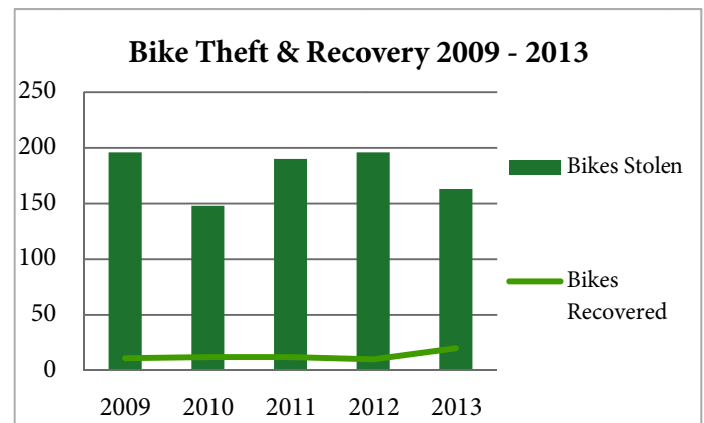


Figure 8 On-Campus Bicycle Thefts and Recovery Rates

<sup>10</sup> Although there is not complete data for 2014, in the first quarter of the year there were three bikes stolen, of which none was recovered.

## Fort Collins Bike Library

The Fort Collins Bike Library is operated by the City between April and mid-December. The Bike Library allows residents and visitors to check out a bike from their any of their five locations and return them at any of the six drop-off locations. To rent a bike, one can make a reservation online, complete a waiver form either online or in person, and put down a \$150 deposit. It costs \$10 per day to rent a bike, however, if a bike is returned before closing to the same location from which it was rented, it is rented for free of charge. The Bike Library's new satellite location at CSU's Surplus Property Department (at 201 West Lake Street) has twenty bicycles that are available to rent on a first-come, first-served basis from 9:00 am to 1:00 pm on weekdays.<sup>11</sup>

## Get Back on the Bike Program

CSU was awarded with a nearly \$20,000 Kaiser Permanente Walk and Wheel grant to create a program to help faculty and staff become more comfortable riding a bike to work.<sup>12</sup> The program, Back on the Bike, is intended to help CSU employees who want to bike to work assess their health, tune their bicycles, acquire safety gear, and learn tricks to travel in traffic and overcome other safety or comfort obstacles through personalized travel training. To qualify, faculty and staff must be at least 50 years old, live within a Fort Collins zip code, and want to commute by bicycle. The Back on the Bike program will offer two annual faculty and staff travel training programs including:

- A survey of all eligible employees
- Health assessments administered by the Recreation Center
- Free bicycle tune up and safety gear

- Hands-on travel training and bicycle skills development
- Monthly training and discussion group
- Online participation tracking system
- The opportunity to recruit other eligible employees

## Traffic Law Enforcement

Traffic laws are enforced by BEEP CSOs and sworn CSU PD officers. In 2013 there were a total of 1,599 citations issued for 1,856 violations (some citations had multiple violations). The most-cited offence was for disobeying a traffic control device (674 infractions) followed by riding without required registration (652 infractions). The third and fourth most-ticketed offences were riding in the dismount zone (212) and riding the wrong way on the road (185). There are no clear trends in the number of citations issued between 2009 and 2013.

## Existing Support Facilities

### Fix-it Stations

The BEEP provides a number of self-service bicycle fix-it stations on campus that include air pumps and an assortment of tools to help bicyclists repair flats and complete basic tune-ups. Current locations include the following:

- Parking garage
- Morgan Library
- Recreation Center
- Academic Village
- Recycled Cycles in the Lory Student Center has an air hose (available 24/7) and tools to borrow during their open hours that are also free to use
- The Institute for Learning and Teaching (TILT)
- University Center of the Arts

<sup>11</sup> Novey, Madeline. "Fort Collins opens bike library at Colorado State." The Coloradoan. June 8, 2014. Accessed Oct. 24, 2014.

<http://www.coloradoan.com/story/news/local/2014/06/08/fort-collins-opens-bike-library-colorado-state/10201399/>

<sup>12</sup> Grant to CSU helps faculty, staff bike to work." Today @ Colorado State.

June 24, 2014. Accessed Oct. 24, 2014. <http://today-archive.colostate.edu/story.aspx?id=10210>

## On-Campus Bicycle Shop

ReCycled Cycles is a full-service bicycle store and service shop located on the north side of the Lory Student Center. The bicycle shop serves as a campus-wide resource for bicycle services and contributes to the on-campus bicycling environment.

## Program Recommendations

- CSU should continue to support bicycle encouragement and enforcement programs including the BEEP, RamBassador, and Ram Guards programs that foster greater dialogue between road users and enforcement. In addition to educating and enforcing bicyclist behavior, these programs should also address pedestrian behavior, as to increase respect for bicycle-only facilities and proper etiquette for shared spaces.
- CSU should continue to require bicycle registration and look for new ways to increase compliance given the success of the bicycle registration program in returning stolen bicycles and enforcing bicycling rules.
- CSU should continue to offer bicycle education in the form of orientations and safety seminars for incoming students to foster a safe and vibrant bicycling environment on campus.
- In addition to the programs previously summarized, CSU should continue with other successful programs such as its partnership with the Brave New Wheel bicycle shop to provide instruction about the use of Fix-It stands. The University may consider offering regular drop-in hours at Fix-It stands to provide students, faculty, and staff more options to service their bicycles.
- CSU should seek out new and creative ways to engage the ReCycled Cycles bicycle shop in other campus bicycle programs.
- When the University updates its Climate Action Plan in 2015, a bicycle-specific goal should be included. This could include a mode share target or targets associated with bicycle parking or counters, and should be coordinated with the Climate Action Plan team.



# Existing Bicycle Environment

## Bicycle Network

Currently bicyclists are utilizing a diverse network of streets with no accommodations, streets with bicycle lanes, parking lots, shared use paths, bicycle only paths, and in some instances sidewalks to navigate campus. Bicycle lanes vary in width from five to eight feet. Sidewalks are typically six feet in width and are utilized by bicyclists to close network gaps to access campus buildings or to transition to the City street system. Some sidewalks have been widened to twelve feet to operate as shared use paths. These are demarcated with a centerline and the Ram bicycle symbol.

A more recent iteration of the bicycle network is the conversion of some former streets into separated bicycle and pedestrian paths. These separate paths are designed to operate as two-way facilities with six foot bicycle lanes.

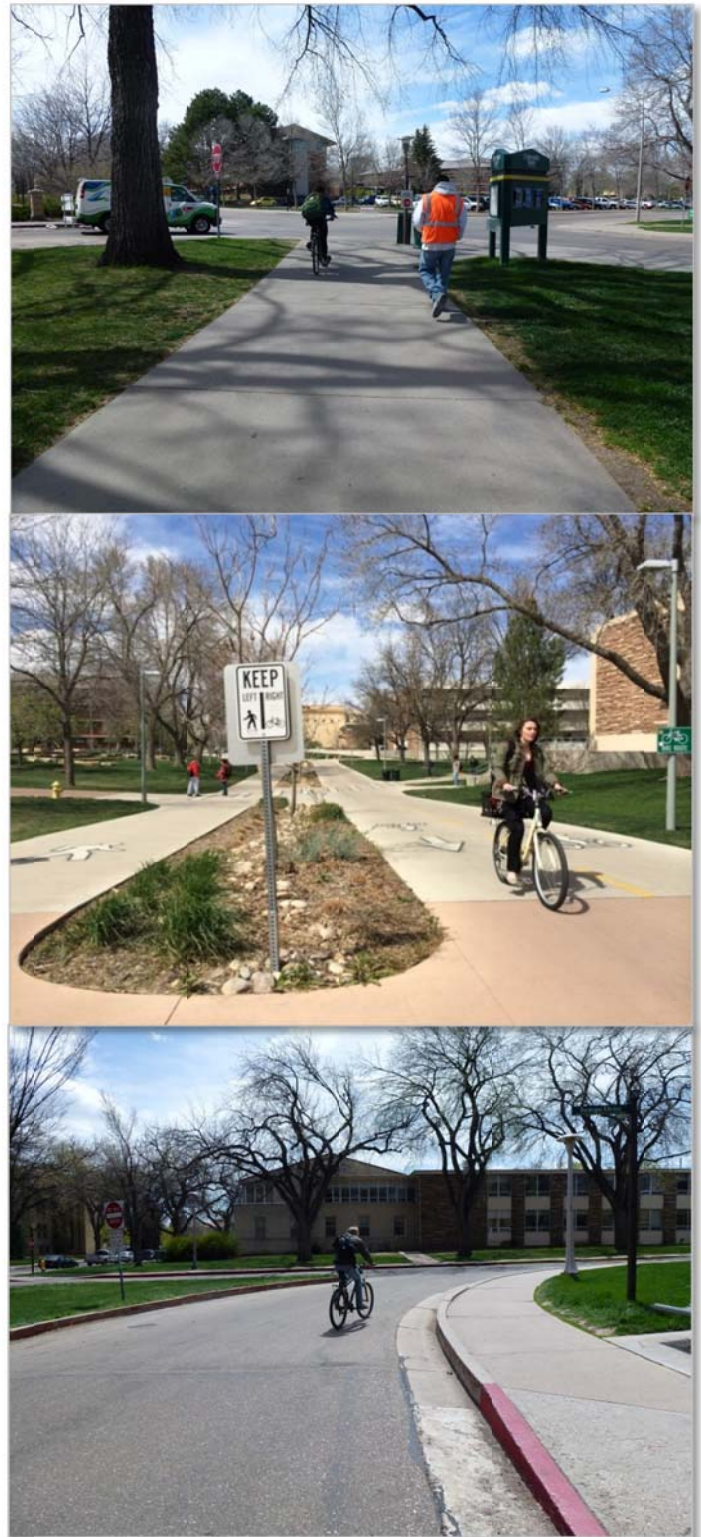
## Main Campus

This section presents the existing bicycle network on and in the immediate vicinity of the CSU Main Campus. Existing travel patterns, gaps, and barriers were identified based on information collected from direct observations in the field, input provided by the public via the WikiMap and online surveys, project steering committee meetings, staff interviews, and previously completed studies.

**Figure 9** displays the existing network of bicycle facilities on and in the immediate vicinity of the CSU Main Campus. The network consists of the following facility types:

- On-street bike lanes, sharrows, and parking lot routing;
- Streets closed to auto traffic;
- Off-street shared paths; and
- Off-street bicycle-only paths.

There are a number of streets not open to bicycle traffic and there is a “dismount zone” on the Center Avenue Mall where bicyclists are required to walk their bicycle.



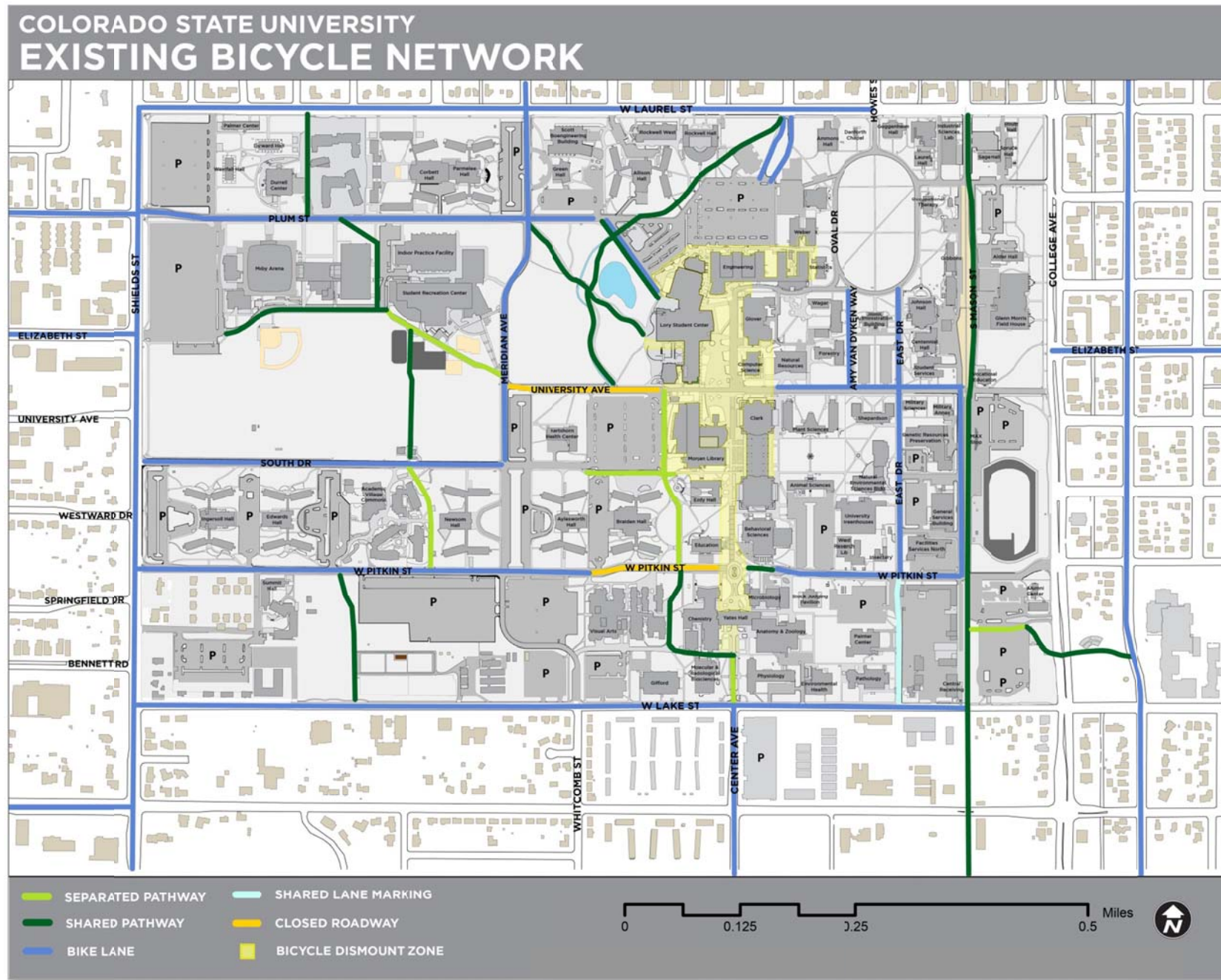


Figure 9 Existing CSU Bicycle Network



Figure 10 A Bicyclist Walks his Bike in the Dismount Zone

### ***Vehicular Travel Routes and Patterns***

Motor vehicle travel routes through the campus are generally disconnected to discourage this type of travel through campus. Through traffic is directed to peripheral streets including West Laurel Street and West Lake Street at the northern and southern boundaries of campus, and

South Shields Street and South College Avenue at the western and eastern boundaries. The one direct route through campus is the north-south East Drive/West Drive/Oval Drive route.

Input from the project WikiMap showed the travel patterns of respondents in Fort Collins including on and through the CSU campus. The WikiMap was available to all Fort Collins residents as part of the City's Bicycle Master Plan update. The results show that approximately 20 percent of all identified bicycle travel routes in Fort Collins include a trip through the CSU Main Campus. Many of these routes continue through campus and do not have a destination at CSU. A snapshot of routes through campus is shown in **Figure 11**. A cordon study was completed as part of the CSU Parking and Transportation Master Plan to determine travel patterns to and from campus. The study found relatively even splits among bicycle traffic entering and exiting campus from all four directions, with slightly less traffic to and from the east.

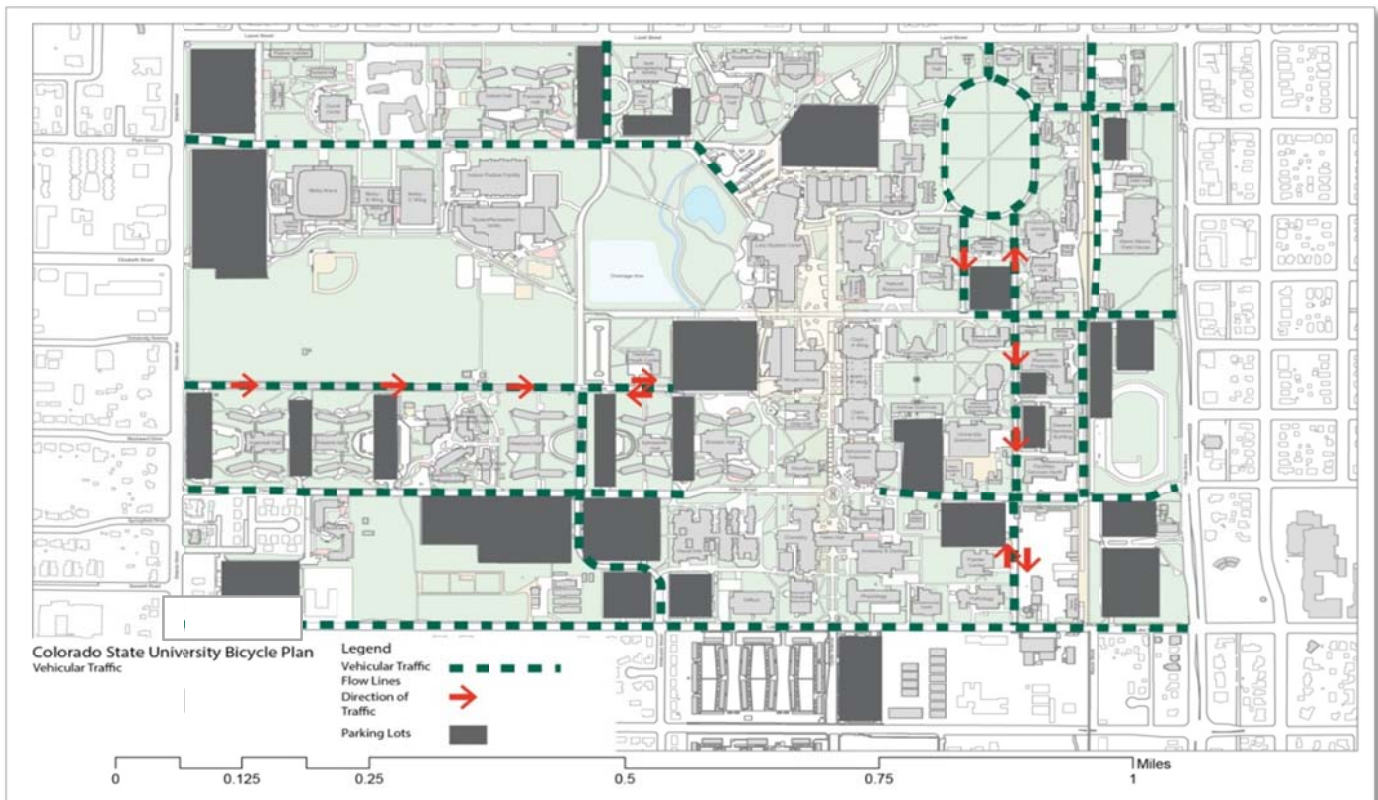


Figure 11 Vehicular Travel Routes on CSU's Main Campus



**Figure 12 Bicycle Dismount Zone near the Lory Student Center**



**Figure 13 View of Braiden Drive**

The primary north-south routes through campus are on South Loomis Avenue / Meridian Avenue and the Mason Trail. The west side of Oval Drive is also a heavy north-south route for campus-based bicycling trips. West Lake Street and West Laurel Street on the edges of campus are the primary east-west routes, along with West Pitkin Street through campus, the latter being impacted by the dismount zone on the Center Avenue Mall bisecting the route.

### ***Main Campus Network Successes***

CSU has progressively planned for bicycle transportation on campus, and was one of the first Universities to support a separation of bicycles and pedestrians in a dense campus environment. Overall, the campus offers good conditions

for bicycling on campus and reasonable conditions on the periphery of the campus. CSU has begun to create pedestrian- and bicycle-only corridors through the campus center by closing internal streets (such as Braiden Drive). These corridors remove the opportunity for conflict with motor vehicles, demonstrate a commitment to active transportation, and serve as key corridors within the bicycle network.

The following locations are examples of facilities that are functioning well within the bicycle network.

#### Mixed-use Path at South Meldrum Street

This wide, shared-use path running southwest from the intersection of South Meldrum Street and West Laurel Street provides good access to the campus. Bicyclists and pedestrians respect each other's space and travel volumes are low enough to limit conflicts.

#### Braiden Drive Bicycle and Pedestrian Paths

This bicycle path and parallel pedestrian path on the former Braiden Drive (running north from West Pitkin Street) provides clearly separated areas for both modes. Most users were observed respecting the separation and bicyclists generally slow down to avoid conflicts with pedestrians at the two crosswalks that cross Braiden Drive.

#### Lory Student Center Plaza Dismount Zone

The Lory Student Center Plaza, bordered by the Center Avenue Mall, University Avenue, the Library, and the Computer Science buildings serves as a dismount zone for cyclists. While the plaza is often crowded, especially in between classes, the area functions well due to education and enforcement of the dismount rule. While this area works well on the whole, offering a parallel corridor where through bicycle traffic would not need to dismount would decrease congestion in this area while reducing travel time and inconvenience for bicyclists.

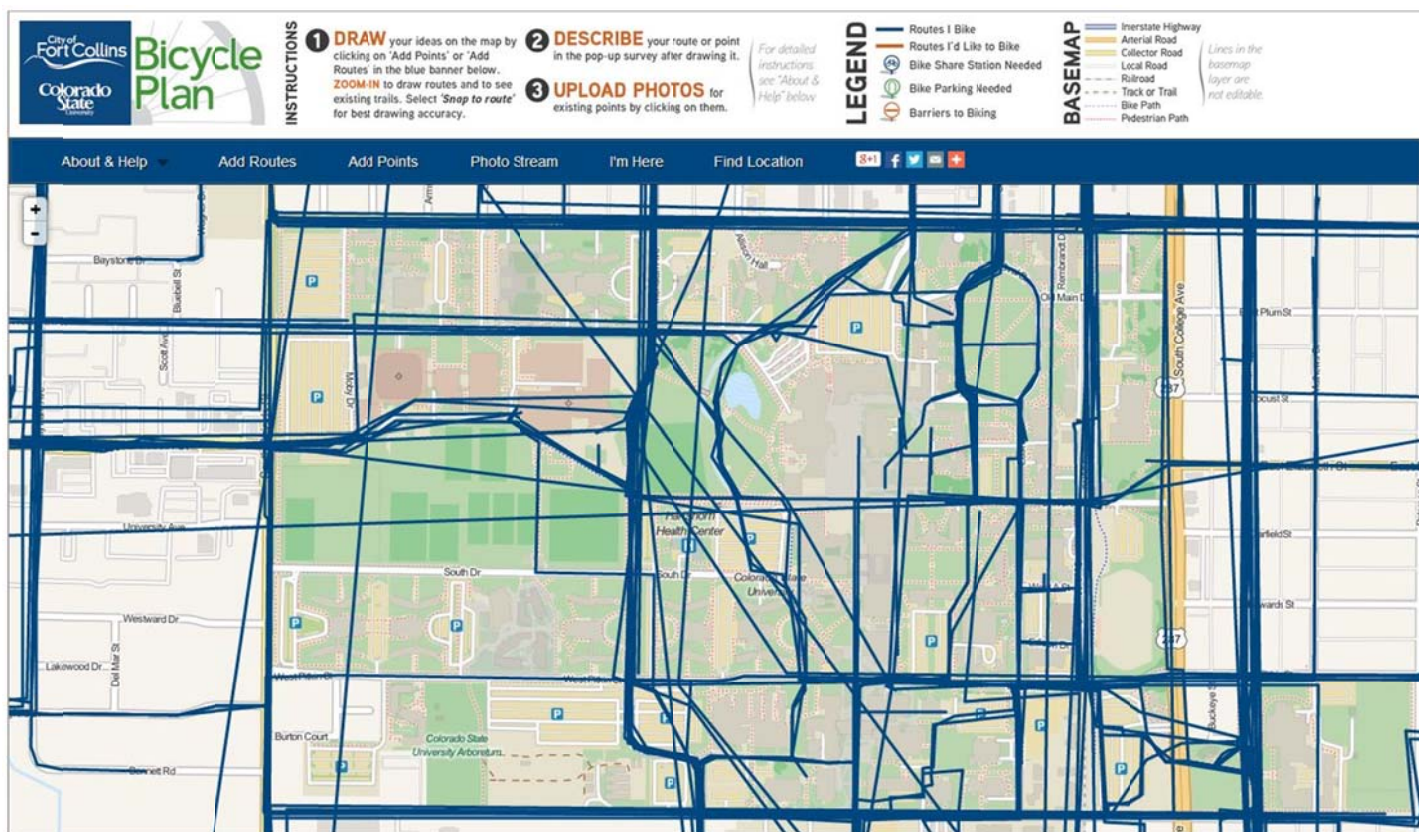


Figure 14 Travel Routes through the CSU Campus Identified on the WikiMap

#### Separated Bicycle and Pedestrian Paths (Student Recreation Center to Meridian Avenue)

The separate bicycle and pedestrian paths running diagonally between the Student Recreation Center and Meridian Avenue functions well due to its separation of travel modes. Bicyclists are able to travel efficiently without fearing conflicts with pedestrians or vehicles.

#### ***Main Campus Barriers***

The following barriers to the bicycle network were informed by the online WikiMap, online survey, and public comments at open house events conducted as part of the Fort Collins Bicycle Master Plan update. This public feedback, combined with field observations made by the project team and discussions of existing barriers and challenges with CSU staff, stakeholders, and the project steering committee, have informed the following analysis.

Bicycling at CSU is generally good, but a lack of cross-campus connections (both north-south and east-west) and safe crossings from Fort Collins into campus are barriers to great bicycling. The following section outlines the barriers to developing a strong bicycle network at CSU.

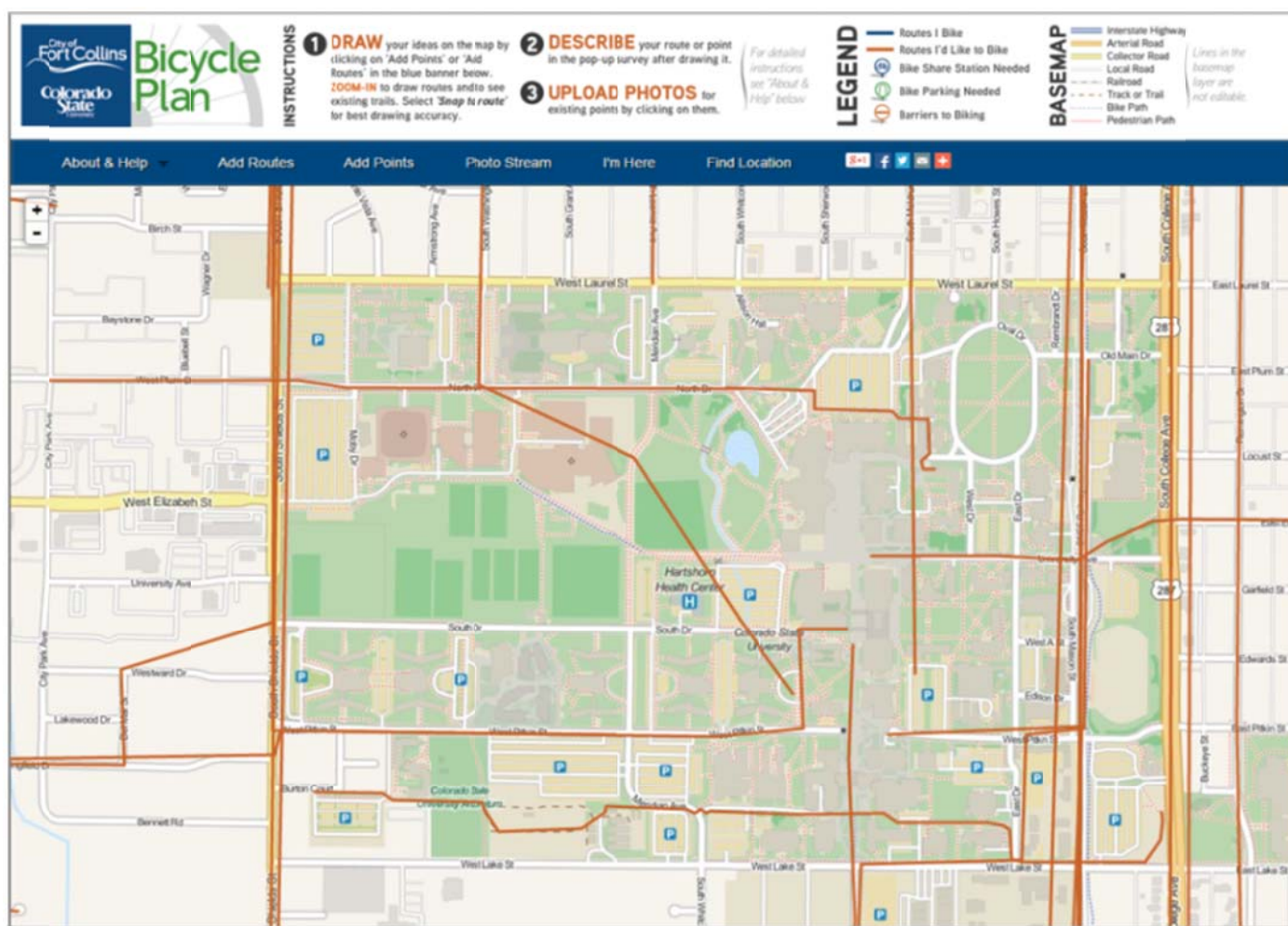


Figure 15 “Routes I’d Like to Ride” Identified on the WikiMap

### ***Improved North-South Connections through Campus***

With the Center Avenue Mall dismount zone running through the heart of campus, there is a need for better north-south connections that parallel the Mall to allow bicyclists to travel quickly and efficiently without needing to dismount from their bicycles.

### ***Improved east-west connections through campus***

Bicyclists on campus are interested in east-west travel movements that are direct, efficient, and safe. As evidenced above (see **Figure 15**), there is a need for improved east-west connections through campus, in particular on North Drive, West Pitkin Street, and University Avenue.



CSU's campus is bordered by four major arterial streets – West Laurel Street to the north, West Lake Street to the south, South College Avenue to the east, and South Shields Street to the west. These four streets act as a barrier to safe and comfortable bicycling and are therefore four of the biggest barriers to a complete bicycle network for CSU.

The South College Avenue and East Elizabeth Street intersection was highlighted as an important campus connection that feels uncomfortable for users. The bicycle turn movements are neither intuitive nor clear. For example, the eastbound bicycle lane on East Elizabeth Street does not align with the bicycle lane on South College Avenue. For pedestrians, there is no crosswalk on the south leg of South College Avenue which leads to unauthorized crossings (jaywalking) and a diminished travel environment.

South Shields Street is the western border of CSU's campus that divides the residential area of west Fort Collins and the campus. Users cite feelings of unease and lack of safety while riding along or crossing South Shields Street. This corridor, and nearly every intersection along it, has become

City Police Department crash data show that South Shields Street has a high concentration of bicycle crashes, of which approximately 40 percent involve bicyclists riding on the sidewalk. Sidewalk riding typically occurs when riders feel unsafe riding directly on the street, though sidewalk riding is still dangerous, especially at access points such as driveways and intersections. Improving conditions along South Shields Street would encourage more lawful riding which would likely reduce sidewalk riding and other crashes.

The West Lake Street and Center Avenue intersection at the southern edge of campus is dysfunctional and unsafe for bicyclists and pedestrians. This is a high-volume bicyclist and pedestrian entrance to campus from the south and a key connection to South Campus. High volumes of automobile traffic are present, especially at times when many are accessing or leaving the Lake Street Garage. The current all-way stop control allows bicyclists and



pedestrians to proceed southbound when drivers yield, but this can result in long wait times for drivers during class change periods. Queued lines of automobiles create sight line hazards for bicyclists and pedestrians crossing through the intersection as well.

#### West Laurel Street

West Laurel Street, bordering the north edge of campus, lacks bicycle lanes between Remington Street and midblock between South Mason Street and South Howes Street. The abrupt end of the bicycle lane at the intersection of Remington Street leads to unclear merging, which can be stressful to bicyclists and motorists alike. Additionally bicyclists traveling east or west are not detected by the traffic signal at the intersections of West Laurel Street and Remington Street and West Laurel Street and Central Avenue. Without automatic detection, bicyclists must wait until a motor vehicle arrives in order to make a lawful crossing; this is impractical during less busy times of the day and many bicyclists run red lights as opposed to waiting for the signal.

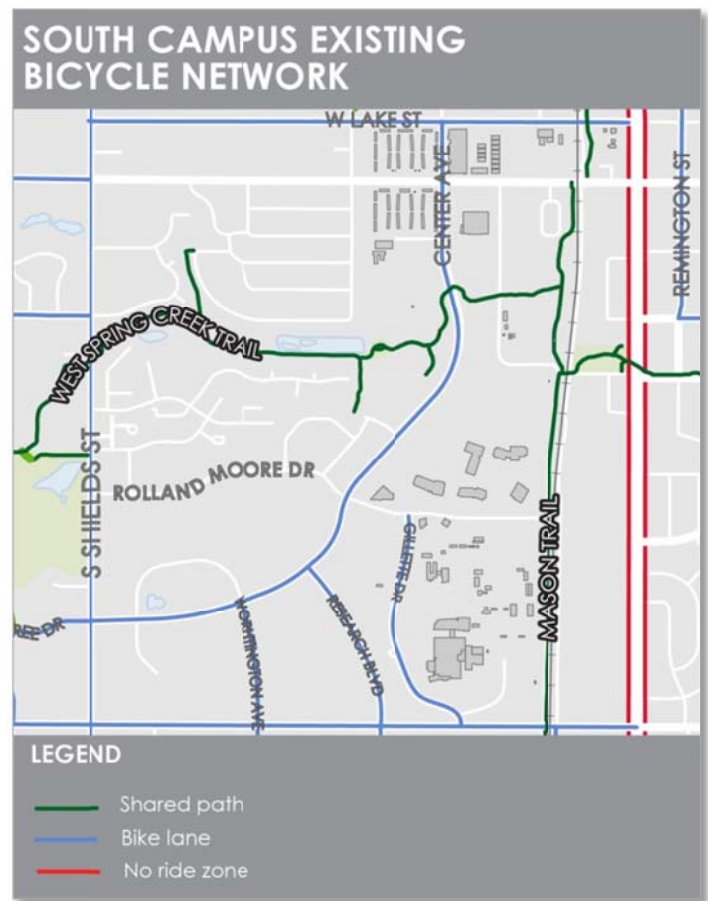
#### West Prospect Road

West Prospect Road is an east-west street on the south side of campus that is narrow and carries large volumes of motor vehicle traffic. It is a high-stress route for bicyclists, but few continuous suitable alternatives exist. The City is currently studying West Prospect Road as part of the West Central Area Plan.

## South Campus

### *Network*

The existing bicycle network at South Campus includes bike lanes along Center Avenue and Research Boulevard on the western and southern borders of campus and the Mason Trail shared-use path (depicted in green in **Figure 18**) on the east side of campus. There is a lack of bicycle facilities within South Campus which acts as a deterrent to bicycling.



**Figure 18 South Campus Existing Bicycle Network**

### *Successes*

A new pedestrian and bicycle bridge was completed in spring 2014 to cross the Burlington Northern Santa Fe railroad tracks and Mason Trail. This bridge links South Campus with the shopping center to the east while also providing a direct connection to South campus and the MAX BRT stop situated between the two.

### *Barriers*

There are few east-west routes on South Campus. The campus bicycle network is constrained by railroad tracks running just east of the Mason Trail. Even with the new bridge to connect South Campus to the shopping center across the railroad tracks, there is still a need for enhanced connections to the Mason Trail and MAX BRT. Additionally, existing bicycle parking should be more accessible and readily visible to visitors.

## Foothills Campus

### Network

There are no dedicated bicycle facilities today on the Foothills Campus (see **Figure 19**). Students, employees and visitors access the campus through two main entrances at Laporte Avenue and Rampart Road. Laporte Avenue provides access into the northern portion of Fort Collins and is a direct connection to downtown. It runs along the northern edge of campus and has 4' shoulders where some bicyclists ride today, whereas others share the road with automobiles. Rampart Road is a 24' street which bicyclists share with automobiles and does not connect across Overland Trail at the eastern edge of campus. There is no sidewalk on either street. Some traffic to Foothills consists of large vehicles that deal with animal movement and may be particularly uncomfortable to encounter when sharing the road as a bicyclist.

Additionally, there are no bicycle connections between the northern and southern portions of the Foothills Campus. The current unpaved road that provides vehicle connection is steep and rutted, feasible for bicycling only by strong riders on bicycles suited for this type of terrain.

### Successes

Staff members do bike to Foothills Campus and make use of existing parking facilities, especially in the northern half of the campus. The proximity of campus to recreational riding on unpaved trails means some staff members also bring bikes to campus for this purpose, even if they do not use them to commute to work.

### Barriers

The lack of connection between the northern and southern parts of campus presents a major barrier for bicyclists. Comfortable bicycle facilities should be installed to allow for users to reach their destinations on both halves of campus. Overland Trail, while it does have bicycle lanes, is a high-stress route and a gap in the bicycle network for many users. Additionally, the gap in the Foothills Trail, an unpaved shared path, limits access for recreation purposes and limits connections to campus.



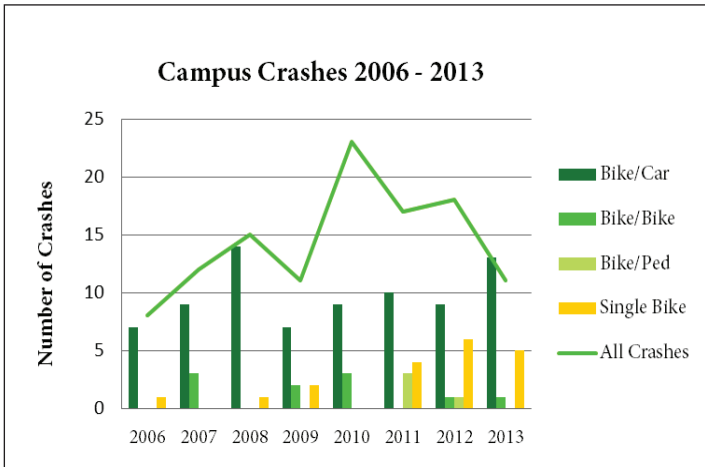
**Figure 19 Foothills Campus Existing Bicycle Network**

As improvements are made to the City's bicycle network that make access to this area better, more staff and visitors are likely to make the trip to the Foothills Campus by bicycle.

## Bicyclist Safety

Crashes involving bicyclists are recorded by the CSU PD. Data for the period from January 2006 to February 2014 showed a total of 123 crashes for an average of approximately 15 crashes per year involving bicyclists. Approximately 66 percent of the crashes involved a motor vehicle. Of these crashes, CSU PD deemed bicyclists to be at fault in 34 percent of instances and the driver at fault in 54 percent of instances; fault was not determined for the remaining crashes. Very few pedestrian-bicycle crashes were reported (only five incidents) with most of these

involving a bicyclist and a skateboarder.<sup>13</sup> See **Figure 20** for a visual representation of all campus crashes in this period; the graph only displays those crashes on campus, which is an underrepresentation of all crashes within the vicinity of campus.



**Figure 20 Campus Crashes Between 2006 and 2013**

*Note: The “All Crashes” figure includes bicycle-car, bicycle-bicycle, bicycle-pedestrian, bicycle-only, and car-pedestrian crashes.*

The project team also studied bicycle crashes reported on the periphery of the CSU campus. These are recorded by the Fort Collins Police Service. For the period between 2006 and 2013, a total of 115 bicycle-related crashes were reported.<sup>14</sup> It is unknown how many crashes involving bicyclists go unreported. Notable findings include:

West Elizabeth Street, from City Park Avenue to South Shields Street has the highest concentration of bicycle-related crashes in Fort Collins. Almost half of these are driveway-related and the motor vehicle driver was attributed at fault in 75 percent of these incidents.

South Shields Street along the edge of the campus also recorded a high crash concentration. Approximately 40 percent of these crashes involved bicyclists riding on the sidewalk.

CSU PD should work with the University’s bicycle community and the Fort Collins Police Department to improve on-campus bicycle crash reporting. Improved crash reporting can be used to track trends in crash rates as well as the environmental and behavioral contributing factors to each crash. This information, in combination with information about other enforcement activities (such as ticketing) should inform the University’s enforcement, education, and transportation programs.

## Existing Wayfinding

Wayfinding helps people orient themselves and find their destinations in unfamiliar settings. Unfortunately, the existing wayfinding on and to campus is very limited. The exception is the wayfinding that has recently been added to the Mason Trail. Wayfinding signage is needed to create a welcome and comfortable bicycling environment that removes the uncertainty about traveling by bicycle or on foot. With new ways to get around campus such as the MAX shuttle and bicycle network improvements recommended with this Plan, complete signage will appeal to students, visitors, and new riders alike.



**Figure 21 Existing Mason Trail Wayfinding**

<sup>13</sup> Skateboarders are considered pedestrians by CSU PD.

<sup>14</sup> For these figures, both on- and off-campus crash statistics include those crashes reported to CSU PD or the Fort Collins Police Service.

## Bicycling and Transit

CSU's Main Campus and South Campus are very well served by transit, especially with the recent additions of MAX Bus Rapid Transit and the Around the Horn service, a campus-focused route offered by CSU in partnership with Transfort. Foothills Campus is served directly by one Transfort bus line and some with adjacent stops. It is likely that transit takes the place of bicycling for many commuter trips close to campus, especially during poor weather.



**Figure 22 Display at Lory Student Center Teaching How to Transport Bicycles on Buses**

Transit can also be combined with bicycling to extend the reach of the bus and MAX Bus Rapid Transit system. MAX stations feature ample bike parking, and they are a main focus of the City's proposed automated bike share system. Additionally, all Transfort buses have racks that accommodate up to three bicycles and MAX buses are fitted with racks that accommodate up to four bicycles.

# Bicycle Network Recommendations

## Principles of Network Recommendations

The following four principles were used to develop the bicycle network recommendations in this Plan:

- Reduce conflicts between street and path users to improve safety;
- Increase bicyclist comfort;
- Provide more bicycle connections; and
- Improve perimeter campus bicycle access.

### Reduce Conflicts

Separating bicyclists from pedestrians is the most effective method to reduce conflicts between these modes. Due to space and financial restraints, however, developing bicycle-only facilities is not always practical or possible. In that case, it is possible to develop shared facilities for bicyclists and pedestrians where there is limited pedestrian traffic, mostly in areas farther from the center of campus. Conflicts between bicyclists and automobiles occur mostly at intersections, so improvements to help reduce these conflicts are centered there.

### Increase Bicyclist Comfort

Bike lanes are the only current on-street bike facility on campus. These provide space on the roadway, but are minimal facilities. Bicyclists who are more averse to sharing space with automobiles may not ride these routes today, so providing more comfortable facilities may help increase ridership.

This plan recommends upgrading bike lane facilities to buffered bike lanes in the short term and protected bike lanes in the long term. The merits of these facility types are discussed below.

### Provide More Connections

Bicyclists on the Main Campus today string together some routes that do not have dedicated bicycle facilities. This plan helps to formalize those routes with facility recommendations which will enable connected bicycle travel throughout campus. The existing dismount zone is a major barrier to north-south travel, so provision of parallel routes was very important to network development. On South Campus, the Mason Trail is a high-quality connection to the rest of Fort Collins, but access to it is limited; providing a connection to this was a focus.

### Improve Campus Access

The Main Campus is surrounded by four high-volume, high-speed arterial roads. Improving connections across these high-stress streets was very important to the development of this bicycle network. Recommended intersection improvements help facilitate existing bicycle movements and make them more predictable, and some provide for greater physical separation of bicyclists from automobiles. These intersection improvements will need to be implemented in coordination with the City.

All of these considerations led to the bicycle network described in this section of the Plan. This vision for an ideal campus bicycle network can help guide CSU's master planning efforts and routine street maintenance work, eventually leading to a set of campus facilities that make bicycling the obvious and easy choice for a large portion of students, staff, faculty and visitors.

## Facility Toolbox

The following treatments are referenced throughout the Plan. This section provides a definition specific to the context of this Plan with suggested minimum and/or typical dimensions where appropriate. The following treatments are considered part of a toolbox that the University can utilize to enhance the bicycling network on and around the CSU campus. The following treatments have been used successfully in cities across the United States.

## Bike Lane

A bike lane designates a portion of a roadway with pavement markings and signs for the exclusive use of bicycles. Bike lanes may vary in width, but should never be less than 4 feet in total width, exclusive of a gutter on curbed roadways. Bike lanes may be wider on campus where volumes of bicyclists are higher. Bike lanes are one-way facilities, and generally are located to the right of other travel lanes.



Figure 23 Existing Bike Lane on Campus

## Contra-flow Bike Lane

A contra-flow bike lane is a bike lane designed to allow bicyclists to ride in the opposite direction of one-way motor vehicle traffic. They convert a one-way street into a two-way street: one direction for motor vehicles and bikes, and the other for bikes only. Contra-flow bike lanes should meet the same minimum standards as regular bike lanes.

## Buffered Bike Lane

Buffered bike lanes are created by striping a buffer zone between a bike lane and the adjacent travel lane and/or parking lane. The buffer creates a more comfortable operating environment for bicyclists by creating additional space between bicyclists and passing traffic or parked vehicles. Buffered bike lanes typically create sufficient space for bicyclists to operate side by side if desired or to pass slower moving bicyclists without having to encroach on adjacent travel lanes. Buffered bike lanes are typically a minimum of

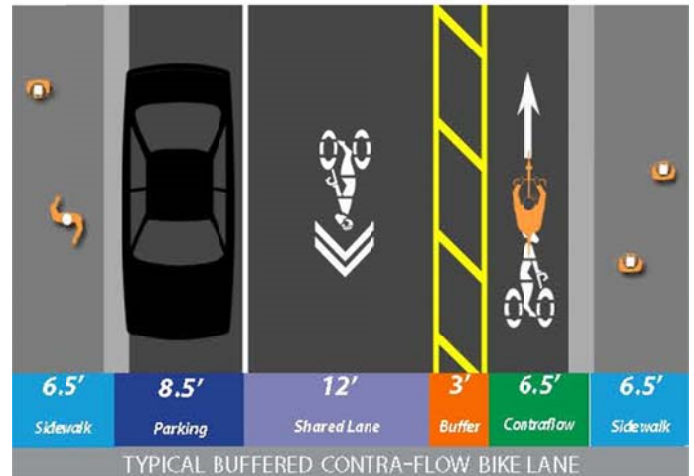


Figure 24 Contra-flow Bike Lane Typical Section

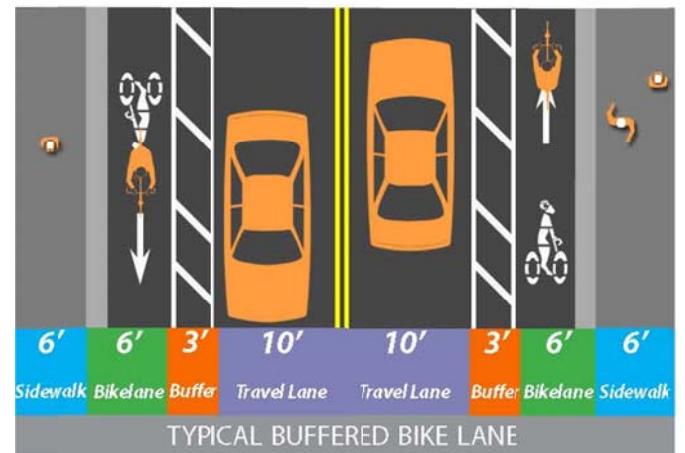


Figure 25 Buffered Bike Lane Typical Section

7 feet in total width, including a 2 foot buffer. The bike lane or buffer may be wider, and buffers may exist on both sides of the bike lane.

## Protected Bike Lane

A protected bike lane is physically separated from both the street and the sidewalk and is intended for the exclusive use of bicyclists. A protected bike lane may be constructed at roadway level, sidewalk level, or at an intermediate height. Protected bike lanes can be provided in either one-way or two-way configurations. One-way protected bike lanes typically vary between 5 and 10 feet in total width. Bi-directional protected bike lanes typically vary between 8 and 11 feet in total width.

## Shared Path

A shared path is a two-way facility that is physically separated from motor vehicle traffic and is designed to accommodate pedestrian and bicycle traffic. A shared path is located in an independent alignment from a roadway, generally crossing roadways at right angles.

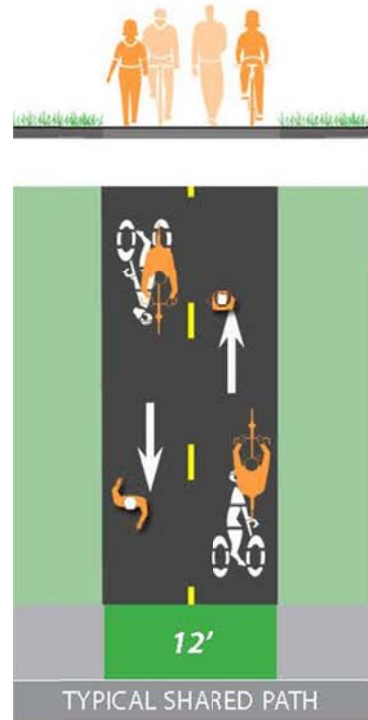


Figure 27 Protected Bike Lane Typical Section

## Separated Paths

Separated paths are two-way facilities that are physically separated from motor vehicle traffic while also separating out bicycle and pedestrian traffic. These facilities that have a portion dedicated for pedestrians and an adjoining portion for bicyclists, with enough space to accommodate two-way bicycle traffic

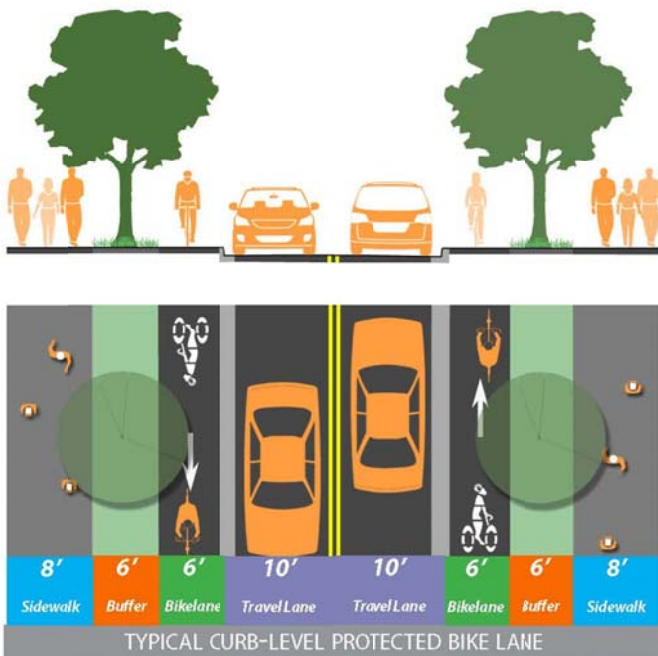


Figure 26 Shared Path Typical Section

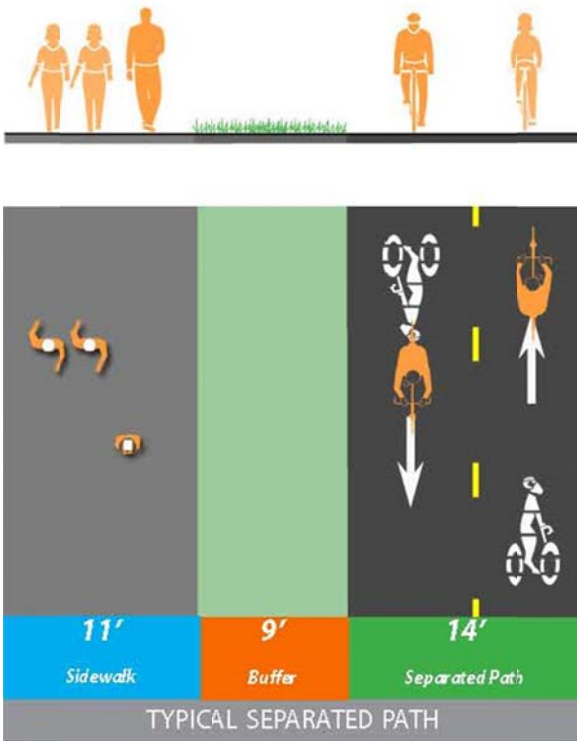


Figure 28 Separated Path Typical Section

### Parking Lot Paths

Parking lot paths are striped as to delineate a separate bicycle facility. These enable bicyclists to safely travel within a parking lot and onto their destination without directly mixing with motor vehicle traffic.



Figure 29 Parking Lot Path in Lot 575

### Two-way Sidepaths

Short sections of two-way sidepaths are a recommended treatment where one of the streets in an intersection has an offset alignment. This configuration often necessitates a bicyclist riding on a major street which may or may not have bicycle facilities for a short stretch of time. A two-way sidepath enables the bicyclist to ride in a protected space adjacent to the major road to reach the continuation of the street. This treatment is most often paired with the addition or upgrading of which allows for crossing the major street without conflict. This signal may detect or be actuated by a bicyclist's presence.

### Intersection Treatments

Intersection improvements can enhance bicyclist safety by eliminating or raising awareness of potential areas of conflict between motorists and cyclists or between cyclists and pedestrians. Most intersection improvements will require additional study to determine the preferred improvement. This section provides guidance for intersection and mid-block crossing treatments to supplement the American Association of State Highway Transportation Officials (ASHTO) Guide, National

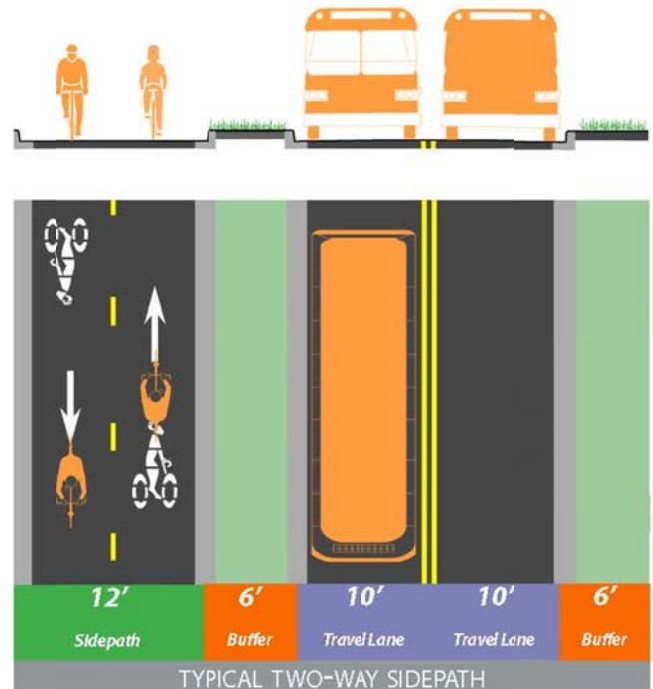


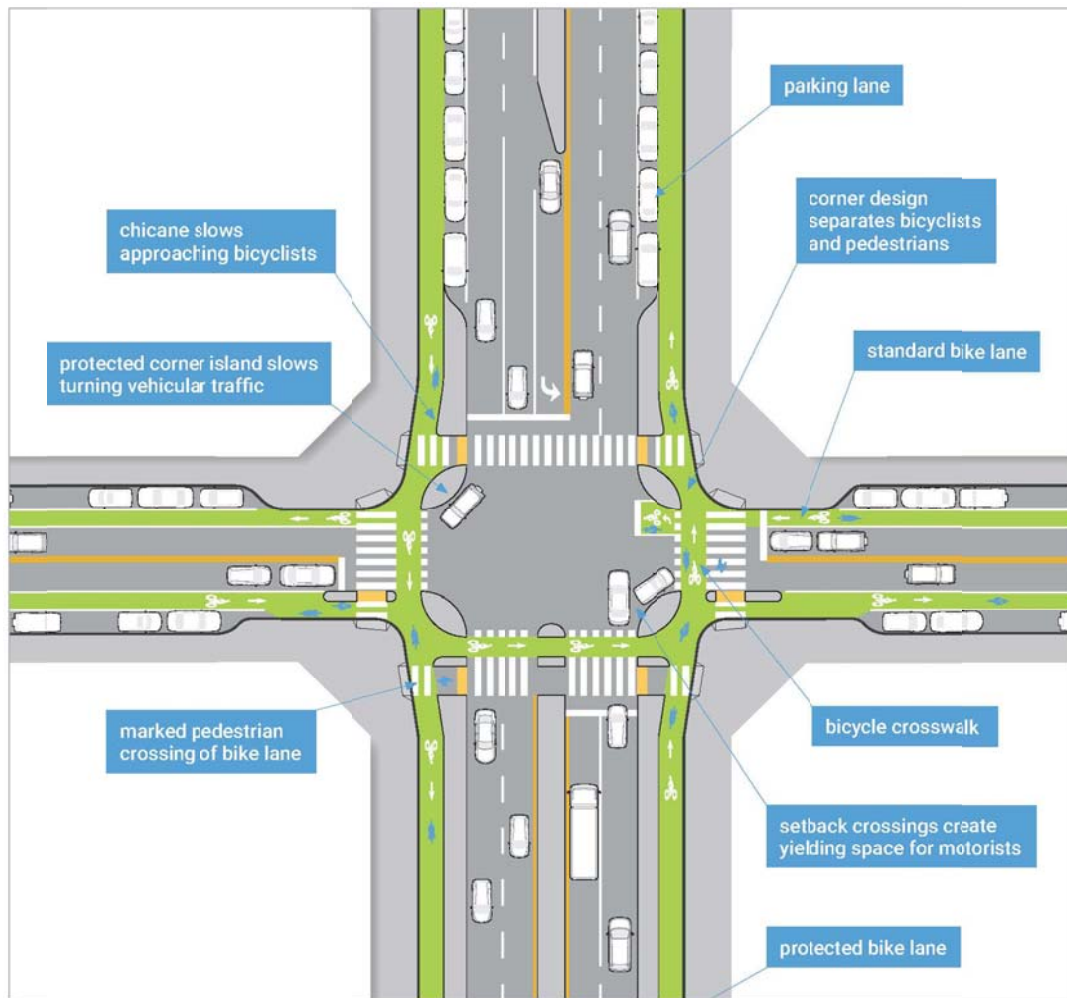
Figure 30 Two-way Sidepath Typical Section

Association of City Transportation Officials (NACTO), and Manual on Uniform Traffic Control Devices (MUTCD) guidance.

### ***Dutch-style Intersections***

This design treatment, also called a protected intersection, is recommended for implementation at intersections that include protected bicycle lanes. The design of protected intersections is evolving and will require pilot designs to determine the appropriate geometric and operational characteristics for Fort Collins and CSU. The design approach will be different for street level versus curb protected bike lanes. The following are principals for protected intersection design:

- It includes island-protected waiting areas for bicyclists that:
  - Reduce turning radius for automobiles slowing their turning speeds to 10 mph or less to improve yielding
  - Allow bicyclists to queue in front of crosswalks providing a head start over motorists
  - Allow bicyclists to wait outside of other through or right turning bicyclists minimizing their delay
  - Require bicyclists to slow on the approach to the intersection reducing their approach speed to less than 10mph reducing the likelihood of surprising a turning motorist



**Figure 31 Dutch-style Intersection Depiction**

- Create space for bicyclists to turn right-on-red minimizing their delay
- Create clear pedestrian and bicyclists crossing areas
- Allow for the creation of bicycle crosswalks parallel to pedestrian crosswalks
- Provide bicycle signals at signalized intersections
- Incorporate two-stage left turn queuing space

Bicycle traffic may be separated from auto traffic by signal phasing as well through provision of a leading interval or protected phase. The combination of these features reduces the ambiguity inherent in current on-street and sidepath bicycle facility design and improves overall safety and comfort of bicyclists. Design treatments will vary based on available right-of-way and unique intersection geometric and utility constraints and needs.

### ***Traffic Calmed Intersections***

Traffic calmed intersections are designed to physically slow down or reduce vehicular traffic and to improve safety for pedestrians and bicyclists. The specific treatments vary by intersection, traffic volumes, right of way, and existing travel speeds. It is often a combination of engineering, enforcement, and encouragement tools that create a traffic calmed intersection. These include:

- Education to community neighbors about traffic and safety issues for all road users.
- Police presence and/or enforcement of the speed limit and rules of the road.
- Radar speed sign to display drivers' speeds as compared to the posted speed.
- High visibility crosswalks including special pavement markers, signage, and flashing lights.
- Restriping travel lanes to be narrower to naturally slow traffic by reducing the shy distance.
- Curb bulb-outs narrow the roadway width at the intersection and shorten the distance that pedestrians must cross.

- Traffic mini-circles to slow vehicle speeds at intersections and deter through traffic.
- Raised intersections are flat, raised areas covering entire intersections with ramps on all approaches and often with brick or other textured materials on the flat section. This intersection treatment will slow traffic and draw attention to pedestrian safety.

### **Signal Treatments**

Signalized intersections allow bicyclists to cross arterial streets without needing to select a gap in moving traffic. Traffic signals make it easier to cross the street, though it is important to make improvements to reduce conflicts between bicyclists and turning vehicles. When evaluating warrants for the potential installation of new traffic signals, it is important to note that bicyclists may be counted as pedestrians or vehicles to satisfy the MUTCD warrant.

### ***Bicycle Signal Head***

Bicycle signal heads can provide more clear direction to bicyclists crossing signalized intersections that they may enter an intersection. This is particularly important at locations where bicyclists may be provided an advance or exclusive phase. At locations (typically trail crossings) where cyclists are expected to follow pedestrian signals, under present law and timing practices, bicyclists may only “legally” enter the crosswalk during the solid WALK portion of the signal, but the solid WALK portion is significantly shorter than the entire WALK time. This often results in bicyclists disobeying the flashing DON'T WALK portion of the cycle which can lead to them being caught in the intersection during the change interval. Providing bicycle signals allows for a longer display of green as compared to the walk signal, which significantly improves compliance with the traffic control. Further, the MUTCD states explicitly that pedestrian signals are for the “exclusive use of pedestrians.” Bicycle signals can be designed to call a green signal phase through the use of loop detectors (or other passive detection such as video or radar) or push button. Bicycle signal heads and a separate bicycle signal phase should be considered at intersections and trail crossings with very high volumes of cyclists or locations

where it is desirable to provide separate phasing for the bicyclists.

The MUTCD has no provision for bicycle signals; however bicycle signals were issued interim approval for use by FHWA in December 2013.



**Figure 32 Bicycle Signal**

### ***Signal Timing and Bicycle Detection***

Section 9D.02 of the 2009 MUTCD states: “On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists.” Accommodating bicyclists at actuated intersections is a relatively cost-effective way

to make significant strides to improve the safety and level of service provided to bicyclists. Bicyclists need more time to start up and to clear intersections so green times should be adjusted accordingly. To calculate minimum green times for bikeways, refer to the AASHTO guidelines.

## **Main Campus Network Recommendations**

Network recommendations were crafted in consideration of the University’s goals of facilitating bicycle travel throughout campus to become more sustainable and bike-friendly. Recommended projects fall into three broad categories, for which various treatments have been discussed in the Facility Toolbox section:

- On-Street Facilities
- Off-Street Paths
- Intersection Treatments

The recommended network for the Main Campus is shown in **Figure 33**. The recommended on-street facilities provide a higher level of comfort than existing bike lanes. New shared paths formalize bicycle connections and provide dedicated space for bicycle travel, and new separated paths make connections in high-pedestrian volume areas of campus where avoiding conflict between these modes is paramount. Intersection treatments standardize the interaction of bicyclists, pedestrians and drivers to reduce conflict.

Overall, this suit of projects aids in both through bicycle connections and short, on-campus trips between building destinations. Numerous discrete projects comprise the Main Campus network recommendations, and each is detailed in Appendix A.

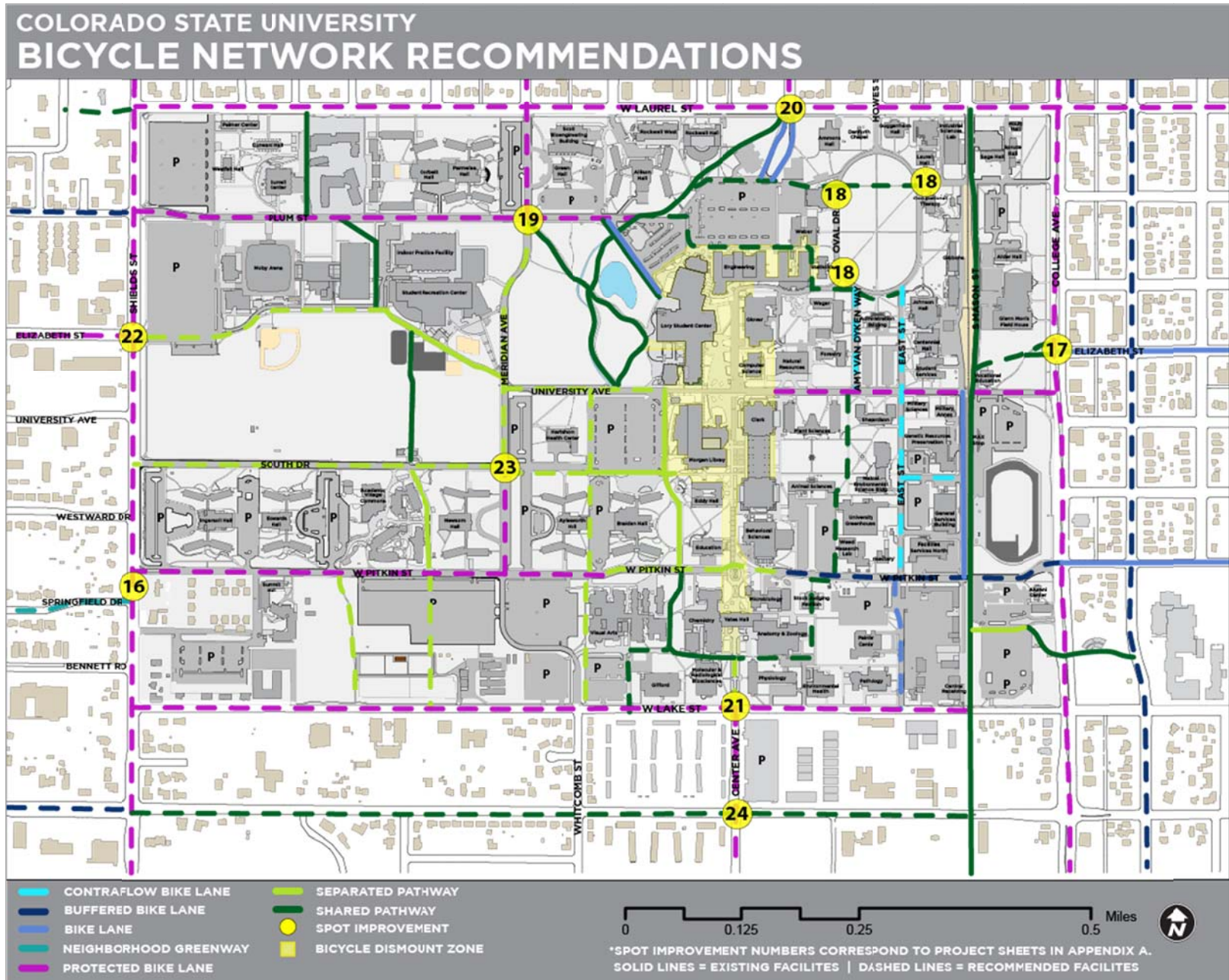


Figure 33 Main Campus Bicycle Network Recommendations

## Foothills Campus Network Recommendations

Recommendations on the Foothills Campus accommodate bicycle trips to and within campus (see **Figure 34**). The addition of facilities on the two main entrance roads helps visitors reach their destinations and connects the campus to the overall Fort Collins bicycle network. The addition of an on-campus north-south connection provides a critical bicycle link between these two areas. Several discrete projects comprise the Foothills Campus network recommendations, and each is detailed in Appendix A. Additionally, the Bella Vira mixed-use development

planned just east of the Overland Trail is an opportunity for future collaboration and network development.

As a longer-term goal, the University should collaborate with local jurisdictions to develop a recreational trail that can serve students, employees, and the public in connecting the Foothills Campus to open space.



**Figure 34 Foothills Campus Bicycle Network Recommendations**

## South Campus Network Recommendations

Recommendations on the South Campus accommodate bicycle trips to and within campus (see **Figure 35**). The addition of east-west facilities on the inner roads will help bicyclists reach their on-campus destinations. Additionally, recommended facilities here would better connect the campus to the Mason Trail. Several discrete projects comprise the South Campus network recommendations, and each is detailed in Appendix A.

## Wayfinding Recommendations

CSU should create a plan to address campus-wide wayfinding needs. A first step in this process should be for the University to adopt the City's wayfinding guidelines (where applicable), as presented in the Fort Collins Bike Plan, to create seamless and cohesive routing between CSU and the City.

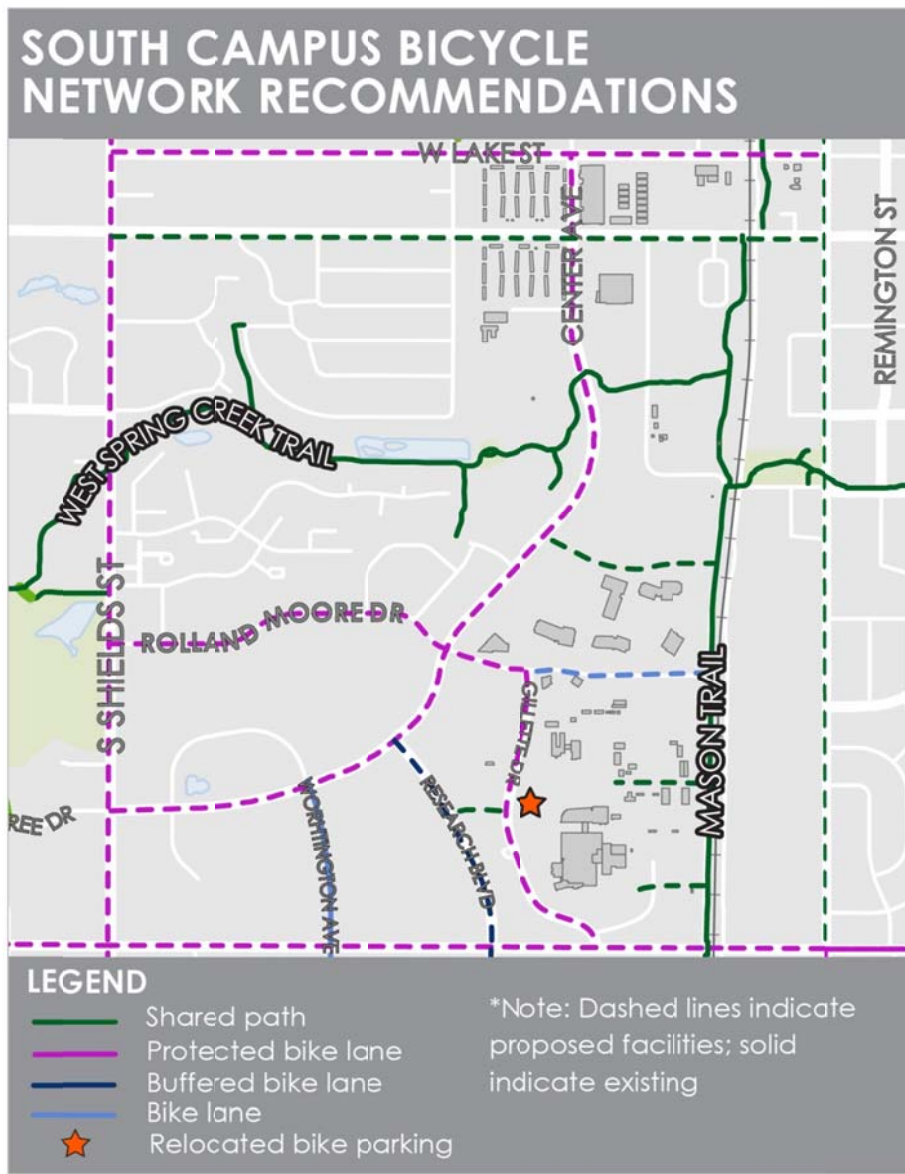


Figure 35 South Campus Network Recommendations

# Bicycle Parking

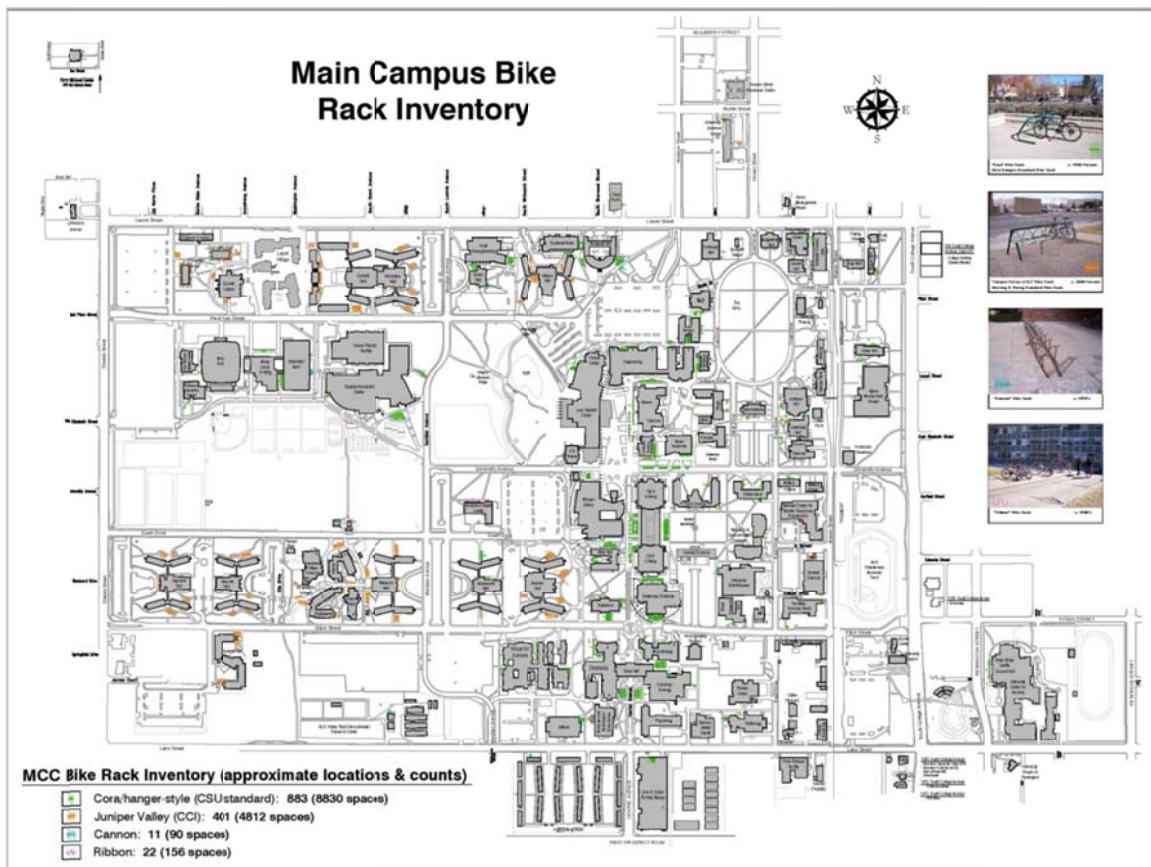
## Existing Bicycle Parking

There are an estimated 14,200 bicycle parking spaces on the main campus and 1,100 spaces at CSU's satellite campuses (see **Figure 37**). In general, these racks are well distributed and are available at or near every major campus building. The majority of bicycle parking is uncovered and distributed throughout campus, including within the dismount zone. There is some covered bicycle parking provided in breezeways, under building overhangs, and inside the Lake Street Parking Garage.

Campus policy restricts bicycle parking on anything other than a bicycle racks such as railings, benches, or trees. Those bicycles parked illegally are impounded without notice; students can recover their bicycles at no charge, but must pick them up from the campus PD.



**Figure 36 Full bike racks at Corbett Hall residences**



**Figure 37 Main Campus Bicycle Rack Inventory**

Source: CSU

## Parking Occupancy and Policies

While a formal bicycle parking count was not completed as part of this study, based on field observations and discussions with staff, peak bicycle parking usage is roughly 75 percent of total capacity. This means that during peak periods of usage, which varies depending on the building type, there are approximately 10,650 bicycles parked on campus. The peak periods for residence halls and academic buildings are opposite from one another – racks are full during the day at academic buildings and at night for residential buildings. Observations also confirm that at some residence halls and academic buildings the racks are frequently full at peak times, indicating that existing bicycle parking is inadequate at certain locations.

Residence halls are equipped with outdoor bicycle parking to meet parking needs for up to 80 percent of occupants. The Housing and Dining Services department has observed high occupancy of bicycle parking at residence halls—anecdotally, up to 95 percent of parking is occupied—though they have received very few complaints about a lack of parking. Students are allowed to park their bicycles inside residence halls, though are not allowed inside of classrooms or other enclosed campus buildings. A new pilot project at the Laurel Village residential development will have a dedicated bicycle room when it opens in fall 2014.<sup>15</sup>

While the University has built a high number of outdoor parking spaces, the parking supply does not fully meet all of the needs of bicycle users, and is not well positioned to meet future needs. As student populations grow and staffing level increase, bicycle use and adequate, reliable, and secure parking will need to grow as well. To ensure that bicyclists can find convenient bicycle parking, supply will always need to be one step ahead of demand.

## Existing Parking Types

The University currently uses four types of racks:

- “Cora” bicycle racks (Main Campus standard bicycle rack, see **Figure 38**)
- “Juniper Valley” bicycle racks (Housing and Dining Services standard bicycle rack)
- “Cannon” bicycle racks (from 1970s)
- “Wave” bicycle racks (from 1980s)

As the Cannon and Wave racks age and rust, the University has chosen the Cora and Juniper Valley racks as replacements because of their high capacity and high level of mobility.



**Figure 38** Cora-style bicycle racks on the South Campus

## Bicycle Parking Best Practices

Examples of bicycle parking most appropriate for college campuses are described below. The appropriate type of parking for each location varies based on available space and the duration for which bicycles will be parked.

### Basic Bicycle Parking

At minimum, bicycle parking consists of an immovable, anchored object that a bicycle can be locked to using any type of lock. Basic bicycle parking is best suited for short-term use. On college campuses, basic parking usually takes the form of metal racks. A recommended list of racks is available in the Association of Pedestrian and Bicycle Professionals (APBP) *Bicycle Parking Guidelines*, 2<sup>nd</sup>

<sup>15</sup> Bicycle racks are located in the Lake Street parking garage.

Edition. Bicycle racks should be installed so that they provide adequate access aisles on all sides.

### Covered Bicycle Parking

Covered bicycle parking consists of racks with a covering to protect the bicycles from precipitation. Most often, this is a simple roof or canopy, either a separate structure constructed to cover the racks, or part of a building's structure. Covered parking helps prolong the life of bicycles and reduces their deterioration due to exposure to natural elements.



Figure 39 Boulder County Secure Bicycle Parking Shelter

### Secure Bicycle Parking

Secure bicycle parking can take many forms. It can be provided with bike lockers, outdoor bike shelters or cages, or indoor bike parking rooms. The advantages of secure bike parking include:

- Surveys show that bicyclists would be more likely to ride if secure bike parking is provided.<sup>16</sup> This might be particularly important for CSU staff and faculty.
- It is well suited for longer-term bicycle storage, especially if it is also situated to protect bicycles from precipitation.

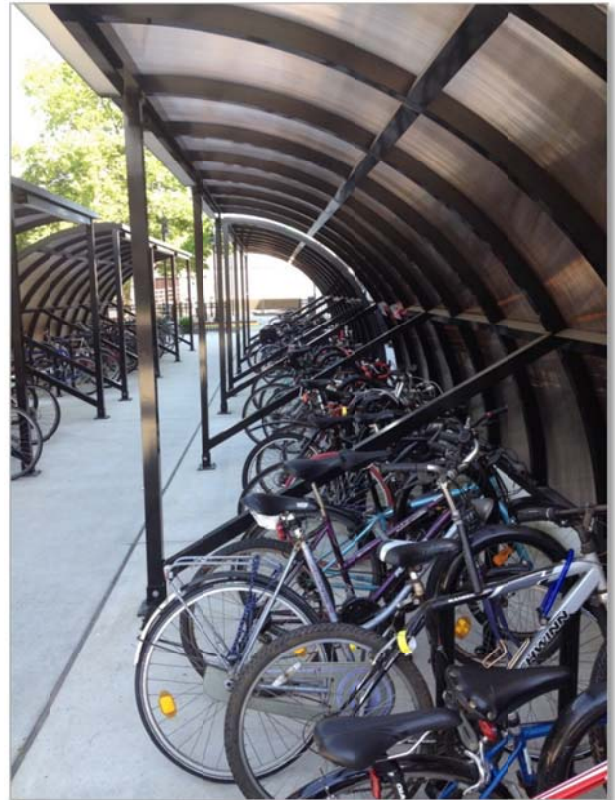


Figure 40 Example of Covered Bicycle Parking

<sup>16</sup> A February 2014 survey conducted by the Regional Transportation District in Denver found that secure bicycle parking is the single biggest factor that would influence a decision to ride.

Secure outdoor bicycle parking should be implemented in highly-visible and highly-used locations across campus. These locations should include, but not be limited to:

- Near buildings with high demand for indoor bicycle parking but no space for indoor parking;
- Near entrance points to the dismount zone;
- Near buildings with long-term bicycle users (offices, laboratories, residential);
- In parking garages; and
- Under building overhangs or awnings with existing bicycle parking.

Like the indoor parking rooms, space and demand will dictate the rack type chosen for the facility. If the space is utilizing existing overhanging space (such as the breezeway under the Clark Building), the rack type will be dictated by the space. If placing the rack in an open area, where space is not a major issue (such as University Avenue east of the dismount zone), a modular outdoor bicycle parking shelter can be utilized.



Figure 41 Bicycle parking outside Student Recreation Center

## Other University Practices

Bicycle Friendly Universities (BFUs) are evaluated by the League of American Bicyclists on the provision of adequate bike parking. This assessment pertains to the supply, type and location of parking, as well as any policies governing inclusion of parking in campus construction. Neither Platinum-level BFU (University of California, Davis and Stanford University) has a stated policy to include indoor or covered bike parking as part of construction projects, which might be due to their temperate climates. They do provide some covered parking, and Stanford has two bike cages in parking garages that are very well utilized. Both universities have an ample supply of standard, outdoor parking and continually evaluate whether enough parking is provided in high-use areas of campus.

Nearly all Gold-level BFUs provide some type of covered bike parking, either in the form of bike lockers, cages located in parking garages or sheltered outdoor racks. A larger number of these universities are located in areas with inclement weather, such as the University of Minnesota, University of Oregon, and Oregon Health and Science University. The University of Washington has embarked on perhaps the most aggressive schedule of building indoor bike parking for new university residences buildings with a goal of providing parking for 30 percent of residents, a large majority of it indoors. Ideally, these bike rooms are isolated in the building allowing for restricted access and higher security. All are located near an at-grade or ramped entrance and are accessible only to students who register their university ID cards as bike parkers. The recommended bike parking standards in this Plan, presented in Bicycle Parking Recommendations, would place CSU at the forefront of providing campus bike parking, sending the message that promoting bicycling is an important community value.

## Summary of Bicycle Parking Needs

The bicycle parking recommendations are based on five categories of bicycle parking needs: weather protection, security, long-term options, availability, and effective equipment. Each category is described below.

- *Weather Protection:* Based upon typical Colorado weather patterns of considerable snow in the winter, hot sunny summers and considerable sun and dry air throughout the spring and fall seasons, bicycles stored outside without covers are subjected to harsh impacts from the elements. Lubricants will dry out, chains will rust, and plastic parts become brittle and prone to breakage. Bicycle parking should provide protection from the elements whenever possible.
- *Increased security:* While bicycle theft does not appear to be a major problem at CSU, secure bicycle parking is still necessary to ensuring a positive and effective bicycle environment at CSU.
- *Increased capacity at select locations:* It is clear from student experience and observation that some bicycle parking locations are often full, or nearly full at residential halls and racks surrounding the dismount zone. In general, it is desirable for every bicycle parking location to be at least 10 percent vacant at peak use so that users can always be guaranteed a parking spot.



Figure 42 University Avenue East of the Dismount Zone

## Bicycle Parking Recommendations

In order to address the bicycle parking issues previously noted, CSU should make the following programmatic and infrastructural changes to bicycle parking.

### Overall Bicycle Parking Types

The CSU Master Plan has developed twelve building categories to represent the variety of uses on campus. Using these typologies, bicycle parking recommendations were developed based on best practices and an understanding of CSU's needs.

**Table 1** depicts the different building types and the recommended parking facilities for each. More specific parking recommendations are included in the following section.

		Basic Bicycle Parking	Covered Bicycle Parking	Secure Outdoor Bicycle Parking	Indoor Bicycle Parking	Shower Facilities	Maintenance Facilities
Building Typology	Classrooms	○	○	○			
	Instructional Lab	○	○	○	○		
	Research Lab	○	○	○	○	○	○
	Office	○	○	○	○	○	○
	Study/Stack	○	○	○			
	Athletics	○	○	○	○	○	
	General	○	○	○	○	○	
	Shop/Storage	○	○	○			
	Health	○	○	○		○	
	Veterinary	○	○	○	○	○	○
	Housing	○	○	○	○		○

Table 1 Bicycle Parking per Building Typology

## 1. Create Secure and Covered Outdoor Bicycle Parking

The dismount zone and the areas near residential facilities are prime locations for secure outdoor bicycle parking due to high demand. Replacing existing racks with secure bike shelters, similar to the Boulder County Bus-then-Bike shelter,<sup>17</sup> would accomplish two things: free up space in the dismount zone and along its edges for other uses, as the shelters provide more capacity per area; and provide weather protection for bicycles. CSU should provide at least 50 percent of the bicycle parking at the entrance points to the dismount zone as secure bicycle parking. Providing adequate secure bicycle parking near the dismount zone will also free up the standard bicycle parking for short-term use.

## 2. Change Bicycle Parking Restrictions

CSU currently prohibits bicycle parking within University buildings. Due to this restriction, all campus bicycle parking racks are located outside, most with minimal or no protection from the elements. Bicycles stored outside are more vulnerable to theft and vandalism as well as the harsh elements of Colorado's weather. Changing the University's policy to allow bicycles to be parked in designated locations indoors would enable for the provision of secure, protected parking.

This policy change would enable the University to provide indoor bicycle parking rooms in campus buildings, either as a retrofit project or for new construction. Indoor bicycle parking rooms should be focused on residential facilities and office buildings where long-term parking is in high-demand. Ideally, indoor bicycle parking rooms would have dedicated building entrances with secure access to the rooms themselves. Providing an entrance that is close to or on a bicycle facility will minimize conflicts with pedestrians providing the most convenient and easy access for bicycle users.

<sup>17</sup> To date, the shelters have cost approximately \$65,000 to install, including materials.

## 3. Retrofit Existing Buildings with Bicycle Parking

CSU should survey students, faculty, and staff about bicycle parking needs in their primary building as it would help create a standard for the amount of parking to place in a given building type. Adding an additional 40 percent to the stated demand for indoor bicycle parking should be the goal for indoor parking for an existing building. For example, if surveys show demand for 25 indoor parking spaces in a given building, then 30 racks would be the goal for the indoor parking. This goal responds to the demand of the users, provides room for growth, and would cover users who did not respond to the survey.

## 4. Construct Bicycle Parking at New Buildings

**Table 2** outlines the recommended parking quantities and types of bicycle parking based on a variety of measures (residential, employment, and visitation rates). The proposed parking rates were informed by APBP parking guidelines, national experience, and existing parking quantities at CSU. They represent aggressive and visionary numbers that would help CSU achieve a greater number of students and staff bicycling. With the development of new on-campus construction, CSU should adhere to the following bicycle parking requirements:

Number of spaces	Per Residents	Per Employees	Per Daily Visitor
Indoor Bicycle Parking			
1	1.25	5	N/A
Outdoor Covered Bicycle Parking			
1	N/A	5	10
Basic Bicycle Parking			
1	N/A	N/A	10

**Table 2 Recommended Quantities of Bicycle Parking**

### *Develop Design Standards*

In anticipation of new on-campus development, CSU should modify its existing design standards to incorporate the parking recommendations included within this Plan.

## **5. Add Special Event Bicycle Parking**

To encourage higher bicycle ridership to special events and sports games, CSU should provide a combination of basic bicycle parking and special event bicycle valet parking. Valet parking may be staffed by volunteers.

## **6. Augment Bicycle Registration to Include Parking Questions**

To keep up with the changing demands of bicycle parking on campus, questions about bicycle parking behavior and preferences should be asked as part of the bicycle registration process. This will help keep an active conversation on campus about the effectiveness and use of current infrastructure and any demands for changes to the bicycle parking program.

## **7. Bicycle Parking Utilization Study**

CSU should complete a campus-wide bicycle parking use study to best understand how the existing parking is used. If the existing facilities are close to or at maximum capacity, additional capacity should be added. For racks that are underused, the University should consider relocating these to locations where they will be more heavily utilized. For example, the bicycle racks around the Anatomy/Zoology Building are located on the northeast side of the building and are hidden by a grove of trees. These racks could be relocated to the main entrance of the building to provide more parking at an area with higher demand.

# Implementation and Evaluation

## Infrastructure Implementation

The infrastructure and program recommendations described in previous sections provide a set of projects that will move CSU's vision of becoming a world-class bicycling University. While improving bicycling is a clear community priority, implementation of these recommendations will necessarily occur over time commensurate with available resources. The purpose of this chapter is to provide guidance in the phasing and funding strategies to realize the University's vision.

CSU is in the process of implementing new or upgraded bicycle facilities at several locations, including buffered bike lanes on West Plum Street and Meridian Avenue, a new bikeway on a closed portion of West Pitkin Street, and contraflow lanes on East and West Drives. Considering the low costs and high impact of bike lanes and other paint-only projects, the University should continue to pursue all paint-only projects in the near term.

The following implementation prioritization is based on each project's potential to preserve the travel corridor and increase safety, with regard to planning-level cost estimates and data collection needs.

## Project Prioritization

Recommended projects, as detailed and numbered in Appendix A, were scored in relation to the following five metrics: safety improvement, corridor preservation, project complexity, importance for data collection,<sup>18</sup> and cost minimization.

The projects that score highest across all five categories are recommended to be implemented first. As shown in **Tables 3 through 5**, there are seven high priority projects, fifteen medium priority projects, and ten low priority projects.

As funding becomes available or as the campus needs change, project implementation priorities should be reevaluated.

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<sup>18</sup> For example, projects at proposed bicycle counter locations are given a high priority, projects that are adjacent to counter locations are of medium priority, and projects that are not close to bicycle counters are rated the lowest priority.

Project Number	Project	Long-term Construction Cost Estimate	Improves Safety	Preserves the Corridor	Project Complexity	Essential for Data Collection
2	East Elizabeth Street - University Avenue Path	\$51,000	Medium	Medium	High	High
17	College Avenue & Elizabeth Street Intersection	\$18,000	High	Low	Medium	Medium
9	Oval Drive at Admin Building	\$51,000	High	Medium	Medium	Low
22	Elizabeth Street & Shields Street; Parking Lot	\$376,000	High	Low	Medium	High
12	Pitkin Street (East Portion)	\$33,000	Low	Low	High	High
19	Plum Street & Meridian Avenue Intersection	\$18,000	High	Low	Medium	Medium
3	East Drive & Amy Van Dyken Way	\$38,000	High	Low	High	Low

Table 3 High Priority Projects

Project Number	Project	Long-term Construction Cost Estimate	Improves Safety	Preserves the Corridor	Project Complexity	Essential for Data Collection
4	Oval Drive to Transit Depot Connection	\$101,000	High	High	Low	Low
21	Lake Street & Center Avenue Intersection	\$310,000	High	Low	Medium	Medium
16	Pitkin-Shields-Springfield Intersection	\$310,000	High	Low	Low	High
20	Meldrum Street & Laurel Street Intersection	\$103,000	High	Low	Medium	Medium
14	South Drive	\$1,090,000	High	Low	Medium	High
15	Southwest Campus Bikeways	\$152,000	Low	High	High	Low
5	Laurel Hall to Transit Depot Connection	\$126,000	High	High	Low	Low
25	South Campus East-West Path	\$240,000	Medium	High	Medium	Low
18	Oval Drive Crossings	\$37,000	Medium	Low	High	Low
32	Rampart Road Extension	\$6,000	Low	Low	High	Low
31	Foothills Trail Connection	\$70,000	Medium	Low	Medium	Low
27	Gillette Drive to Research Boulevard Path	\$228,000	Medium	High	Low	Low
11	Pitkin Street (West Portion)	\$3,039,000	Medium	Low	Medium	High
23	South Drive & Meridian Avenue Intersection	\$207,000	High	Low	Medium	Low
6	Plum Street	\$2,502,000	Medium	Low	Medium	High

Table 4 Medium Priority Projects

Project Number	Project	Long-term Construction	Improves Safety	Preserves the Corridor	Project Complexity	Essential for Data
13	Lake Street	\$5,004,000	Medium	Low	Low	High
1	North-South Pathway	\$240,000	Low	High	Low	Low
28	Rampart Road	\$360,000	Medium	Low	High	Low
24	Center Avenue & Prospect Road Intersection	\$1,000,000	Medium	Low	Low	Medium
29	Foothills North - South Path	\$540,000	Medium	Low	Medium	Low
7	University Avenue	\$1,501,000	Medium	Low	Medium	Low
10	Meridian Avenue	\$1,501,000	Medium	Low	Medium	Low
8	University Avenue	\$1,001,000	Low	Low	Medium	Low
30	Laporte Drive	\$125,000	Low	Low	Low	Low
26	South Campus Bike Lane Upgrades	\$12,510,000	Medium	Low	Low	Low

Table 5 Low Priority Projects

## Cost Estimates

Construction cost estimates shown in **Tables 3 through 5** were developed by measuring quantities associated with each recommended project, identifying pay items, and establishing rough per-mile costs. Unit costs are in 2014 dollars and were developed based on historical cost data from the Colorado Department of Transportation, the University of North Carolina Highway Safety Research Center - Costs for Pedestrian and Bicyclist Infrastructure Improvements Report, the City, and other sources such as RS Means. The costs shown are construction costs only, and do not reflect other costs that may be associated with a complex project. The costs are intended to be used for long-range planning purposes and thus, a 30 percent contingency was applied to each project.

The cost estimates do not include costs for planning, surveying, engineering design, right-of-way acquisition, full roadway reconstruction, addition of closed drainage systems, mobilization, or future maintenance. Construction costs will vary based on the ultimate project scope and economic conditions at the time of construction.

## Funding Strategy

In order to implement the recommendations in this Plan, the University will need to evaluate and establish funding for bicycle programs and infrastructure. This funding strategy considers a range of approaches to obtaining funds for implementation:

- Work with the City, the North Front Range Metropolitan Planning Organization (NFRMPO), and Larimer County to fund and implement bike projects that are mutually beneficial. Leveraging agency funds will be especially critical to developing the bicycle network at the border to the Main Campus.
- Partner with private developers, health organizations, and non-profit organizations for funding and implementation of bike projects and programs.

- Identify those projects that are eligible for and would compete most successfully for federal grants.
- Pursue non-governmental grant opportunities.

## Funding Sources

There are a variety of funding mechanisms available for bicycle improvement projects and programs. Below is a list of potential local, state, federal, and non-governmental funding sources along with the types of bicycle projects and programs that are applicable to each funding source.

### City Funding Sources

- Building on Basic (BOB) – Fort Collins voters approved Building on Basics (BOB), a quarter cent sales and us tax that extends from January 2006 through December 2014. Fort Collins Bikes currently receives \$125,000 each year towards implementation of the Bike Plan. The City has a ballot initiative for fall 2014 for BOB 2.0, a tax renewal. If voters approve it, FC Bikes intends to apply for \$500,000 per year beginning in 2016 to be used toward implementation of the Fort Collins Bike Plan projects and programs.
- Keep Fort Collins Great (KFCG) – In November 2010, Fort Collins voters passed Keep Fort Collins Great (KFCG), a sales tax to fund critical services for the community between 2011 and 2020. KFCG has been important funding to source Fort Collins Bikes in the past and is expected to continue as a source for bicycle project implementation funding.

### Federal Funding Sources

- Congestion Mitigation and Air Quality Improvement Program (CMAQ) – funds may be used for either the construction of bicycle transportation facilities or non-construction projects related to safe bicycle use.
- Transportation Alternatives Program (TAP) – This federal funding program authorized under the federal transportation bill, Moving Ahead for Progress in the 21<sup>st</sup> Century (MAP-21) provides

funding for transportation alternatives including on- and off-road bicycle facilities and regional trail programs.

#### Federal Transit Administration (FTA) Grants –

- Transit grants such as Urbanized Area Formula and Capital Investment can be used for improving bicycle access to transit facilities.
- Hazard Elimination and Railway-Highway Crossing Program – This program is a set aside from the Surface Transportation Program (STP) specifically to correct locations that are unsafe, and these funds may be used to address bicycle safety issues.
- FASTER safety – this state funding source can be used for adding shoulders when combined with a surface treatment project.
- FASTER Transit – This state funding source can be used for bicycle amenities such as bike racks, lockers and bicycle parking at multimodal stations or enhanced modal connections such as trails and bicycle lanes providing access to major transit stations that would enhance transit ridership.

#### Other Funding Sources

- Kaiser Permanente Grants – Kaiser Permanente offers Walk and Wheel grants to help communities to be more bike-friendly by planning and designing safer, healthier, and more accessible transportation options.

## Evaluation

CSU should begin tracking bicycle metrics including ridership, mode-share, bicycle facilities, bicycle parking, crash data, theft, facility implementation status, and a catalog of program efforts. This tracking and the reporting of results can be used as a tool to applaud the University's successes, demonstrate a need for continued funding and support, and to justify any programmatic changes.

## Bicycle Counting Program Recommendations

Understanding the value in tracking bicycle ridership and changes over time will help the University to maintain and develop their active transportation program. Based on best practices and an understanding of existing conditions and needs, a draft plan for bicycle count implementation was completed (see Appendix C for the draft recommendations memorandum).

Draft counter location recommendations were finalized in conjunction with this Plan's recommended projects. **Figure 43** shows the final recommended locations for conducting bicycle counts.

### *High Priority Locations*

**Table 6** shows the top four highest priority locations for the installation of continuous (permanent) count devices. These location recommendations aim to capture travel to and from Main Campus, travel within Main Campus, and travel between South Campus and Main Campus.

### *Next Steps*

The University should conduct a formal field assessment of each location to examine the facility parameters (e.g. facility widths, equipment mounting location and heights, identify obstructions or other limitations), and develop detailed site/installation plans. Both the permanent and short-duration count locations require detailed planning and evaluation to ensure that the sites are suitable for productive data collection that effectively captures bicycle and pedestrian travel patterns and meets the parameters of the selected technology.



Map ID	Location Description	Existing facility type	Context	Recommended Bicycle Counter Technology
1	Elizabeth Street, west of Shields Street	On-street bike lanes	Major bicycle route from the west; potential high bicycle volumes accessing campus from housing to the west of campus. High crash location with the City.	Inductive loop counters (2)
4	Path from Laurel Street to Transit Center by Rockwell Hall	Designated separated bicycle path with high pedestrian use	Entry point to campus from North; probably less bicycle traffic than Mason Trail to the east. Good capture point on diagonal route to transit	Combination passive IR/Inductive loop counter (1)
7	Mason Trail, south of Pitkin Street	Shared use path	Potential to capture significant northbound bicycle traffic from south of campus and intercampus-travel between central and south campuses. This location would provide a good contrast for traffic counts before and after the implementation of the City's planned improvements (such as the two-way sidepath to connect Pitkin and Springfield) and the CSU decision to open up the walk zone at this point. This count location will capture nearly all campus traffic entering from the east.	"Totem" - Feedback inductive loop counter (1)
8	West Pitkin Street, east of Center Avenue Mall	On-street bike lanes	Major east-west route through southern part of campus; currently split by walk zone, but planned bicycle facility will increase the attractiveness of the route.	Inductive loop counters (2)

**Table 6 High Priority Bicycle Counter Locations**

*Note: A bike counter at the Mason Trail, south of Lake, would capture through traffic, campus traffic, and high ridership of the Mason Trail. This counter location was considered but not recommended because the Mason Trail counter (south of Pitkin Street) would likely capture a greater change in bike ridership as City and campus improvements are completed.*

## Summary and Next Steps

Completing the bicycle network by providing improved bicycle facilities will improve public safety on campus, ensure efficiency and ease of movement, improve livability and quality of life, meet sustainability targets, and promote healthy, active lifestyles. With safer, better-connected bicycle infrastructure and a more robust bicycling environment for the CSU community, bicycling will become a more attractive mode for a larger portion of the campus community.

As enrollment increases and the campus evolves to fit the increased need for classrooms, offices, housing, and other support facilities, this Plan can to be used as a guide for future bicycle network and programmatic developments.

## Continued Collaboration

The value of the recommendations presented in the previous chapters hinges on the University's ability to coordinate staff and resources to implement this Plan.

Continued collaboration across campus departments will be crucial to bringing this plan to fruition. The Plan should be reviewed and updated every five years to ensure completion and adaptive changes to the bicycle network.

Building upon the collaborative process between the City and CSU in developing individual Bicycle Master Plans, the University should continue to work closely with the City on safety, enforcement, and engineering measures, especially as it concerns the intersections leading into campus.

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