LINKING TAHOE:
Active Transportation Plan

TAHOE METROPOLITAN PLANNING ORGANIZATION
TAHOE REGIONAL PLANNING AGENCY

lake Tahoe

FINAL
March 2016

ACKNOWLEDGEMENTS

This update to the Lake Tahoe Active Transportation Plan, formerly the Bicycle and Pedestrian Plan, is a collaborative process that includes robust community stakeholder and staff participation. All play an important role in shaping the vision and developing the content of these documents.

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TABLE OF CONTENTS

APPENDICES:

Please note only two appendices are printed in hard copy with the plan - Appendix A: Lake Tahoe Complete Street Resource Guide and Appendix H: Existing & Proposed Project List. All other appendices are available online, www.tahoempo.org/ActiveTransportationPlan

A. Lake Tahoe Complete Street Resource Guide (printed with plan)

B. 2015 Community Outreach Report (online only)

C. Lake Tahoe Bicycle & Pedestrian Monitoring Protocol (online only)

D. Lake Tahoe Unified School District Safe Routes to School Master Plan (online only)

E. 2015 Fact Sheets (online only)

F. Maintenance Responsibilities Chart and Plan Template (online only)

G. Environmental Findings (online only)

H. Existing & Proposed Project List (printed with plan)

I. Adoption Resolutions (to be added after adoptions take place)

LIST OF FIGURES & TABLES

FIGURES:

TABLES

REFERENCE LIST

Advocacy Advance. (2014). *First Mile, Last Mile: How Federal Transit Funds can improve access to transit for people who walk and bike.*

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GLOSSARY: ACRONYMS AND DEFINITIONS

2010 BPP: The 2010 Lake Tahoe Bicycle and Pedestrian Plan

Active Transportation:

Transportation that does not rely entirely on a car to travel between origin and destination. This can include walking, biking, skateboarding, roller-skating, cross country skiing, using public transit, or driving to an intercept lot, parking, and then using another form of travel.

AMBBR: America's Most Beautiful Bike Ride

ATP: Active Transportation Plan

The 2015 Survey: 2015 Active Transportation Plan Survey

Active Transportation Network:

The facilities such as shared-use paths, bike lanes, bike routes, sidewalks, and intersection designs that promote safety and convenient travel for bicycling and walking and other forms of active transportation. The network can include on-street and off-street facilities that appropriately integrate with the roadway and existing and planned land-use design.

Bike Share:

A transportation program, ideal for short distance point to point trips providing users the ability to pick up a bicycle at any self-serve bike station and return it to any other bike station located within the system's service area.[1]

BPTAC: Bicycle & Pedestrian Technical Advisory Committee

CalTrans: California Department of Transportation

CDC: Center for Disease Control

CIP: Capital Improvement Program

CMAQ: Congestion Mitigation and Air Quality Improvement Program

Complete Streets:

Complete streets are streets for everyone**.** They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. Complete streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.[2]

CSLT: City of South Lake Tahoe

CTC: California Tahoe Conservancy

[1] Pedestrian and Bicycle Information Center, 2015
[2] Smart Growth America, 2015

DMV: Department of Motor Vehicles

EIP: Environmental Improvement Program

FAST Act: Fixing America's Surface Transportation Act

FHWA: Federal Highway Administration

First and Last Mile:

Transit systems usually involve some multi-modal connection in order to get a person from point to point. This is referred to as the "first-and-last mile" problem. In order to encourage more ridership, transit needs to provide safe, accessible, and convenient options that enable point to point connections. Biking and walking can be a simple solution to encourage access to transit because active transportation can be more convenient than other modes.[3]

FLTP: Federal Lands Transportation Program

GIS: Geographic Information Systems

HSIP: Highway Safety Improvement Program

ICE: Intersection Control Evaluation

IVGID: Incline Village General Improvement District

Level of Traffic Stress (LTS):

An analysis that measures the ability for active transport users to travel between origin and destination without using links that exceed their tolerance for perceived safety and that do not involve an undue level of detour. There are four levels of traffic stress. LTS 1 is suitable for children; LTS 2, represents stress that most adults will tolerate; LTS 3 & 4 represent greater levels of stress.[4] Tim Blagden, Executive Director of the Bike-Walk Alliance of New Hampshire, explains, "Low-stress streets that connect to places people want to go are the beginner slopes of bicycling."

LTBC: Lake Tahoe Bicycle Coalition

LTUSD SRTS Master Plan: Lake Tahoe Unified School District Safe Routes to School Master Plan

MAP-21: Moving Ahead for Progress in the 21st Century

Multi-Modal Level of Service (MMLOS):

Multi-modal level of service analysis is a method for assessing how well an urban street serves the needs of all users. The method for evaluating the multi-modal level of service estimates the auto, bus, bicycle, and pedestrian level of service on an urban street using a combination of readily available data and data normally gathered by an agency to assess auto and transit level of service. The MMLOS user's guide was published as NCHRP Document 128.

MTUCD: Manual on Uniform Traffic Control Devices

[3] Advocacy Advance, 2014
[4] Mekuria, Furth, & Nixon, 2012

NDOT: Nevada Department of Transportation

NHPP: National Highway Performance Program

NHS: National Highway System

NTPUD: North Tahoe Public Utility District

Quality of Life in the Tahoe Region:

Provides for a unique identity and a sense of "place" for Lake Tahoe residents and visitors where they can walk, bike and play.

Sharrows:

"Sharrow" is short for "shared lane bicycle marking." This pavement marking includes a bicycle symbol and two white chevrons and is used to remind motorists that bicyclists are allowed to use the full lane. Sharrows are also used for wayfinding and to correctly position the bicyclist.

SHSP: State Highway Safety Plan

SRTS: Safe Routes to School

STP: Surface Transportation Program

Support & End of Trip Facilities:

Facilities that accompany bicycle and pedestrian infrastructure such as bicycle parking, benches, transit shelters, water fountains, showers, and lockers.

SWITRS: Statewide Integrated Traffic Records System

RTP: Regional Transportation Plan, *Mobility 2035.*

TAMBA: Tahoe Area Mountain Bike Association

TAP: Transportation Alternatives Program

TCPUD: Tahoe City Public Utility District

TDM: Transportation Demand management

TMDL: Total Maximum Daily Load

TMPO: Tahoe Metropolitan Planning Organization

TRPA: Tahoe Regional Planning Agency

TTD: Tahoe Transportation District

USEPA: United States Environmental Protection Agency

USFS: United States Forest Service

VMT: Vehicle Miles Traveled

Vulnerable Road User Law:

A Vulnerable Road User is a person who is not protected within a vehicle while on the roadway, such as a pedestrian or bicyclist. Vulnerable Road User laws increase protection for bicyclists and other road users who are not in cars. They are relatively new and states have chosen to protect vulnerable road users in a variety of ways. This includes usually involves harsher penalties for the violation of existing laws when that violation impacts a defined set of road users or the creation of new laws that prohibit certain actions directed at a defined set of road users.[5]

Washoe County RTC: Washoe County Regional Transportation Commission

[5] The League for American Bicyclists, 2015

CHAPTER 1: INTRODUCTION

Lake Tahoe's quiet forests, expansive meadows, and sunny beaches invite and attract all types of outdoor enthusiasts and promote an active lifestyle. Lake Tahoe is a favorite playground not only for the Region's 55,000 residents[1], but also visitors from Central and Northern California, Nevada, and around the world. The Tahoe Regional Planning Agency (TRPA)/Tahoe Metropolitan Planning Organization (TMPO)'s Regional Transportation Plan (RTP) and Active Transportation Plan (ATP) serve to help protect this beautiful natural environment by providing a framework for a comprehensive multi-modal transportation system.

Bicycling, walking, and other forms of active transportation are important methods of travel that promote healthy lifestyles, improve air quality, boost the local economy, and enhance community character. Active transportation includes any method of travel that does not rely entirely on a car to travel between origin and destination. This can include walking, biking, skateboarding, roller-skating, cross country skiing, using public transit, or driving to an intercept lot, parking, and then using another form of travel. The TRPA/TMPO seeks to increase active transportation through an improved, expanded, and community-driven bicycle and pedestrian network.

Meyers Bikeway, Sawmill Pond Connection. Photo: Mike Vollmer

1.1 PLAN OVERVIEW

The *Linking Tahoe: Active Transportation Plan* presents a guide for planning, designing, constructing, and maintaining a regional active transportation network that includes innovative infrastructure, support facilities, and awareness programs. The infrastructure network includes on-street bike facilities such as bike lanes, bike routes, and intersection designs that promote safety and convenient travel for bicycling and walking. The network also includes offstreet, shared-use paths and sidewalks that appropriately integrate with the roadway and existing and planned land-use design. The ATP outlines goals, policies, and actions that support implementation of high priority projects and guides long-term planning that will transform Tahoe's transportation system. To support this process, the plan includes analysis of current conditions, provides data for future projects, and outlines levels of project priority. To help ensure feasible implementation, the ATP identifies potential funding sources and recommended designs to encourage consistent and safer access for all roadway users.

[1] U.S. Census Bureau, 2010

Plan Vision - Complete Streets

This plan seeks to improve the environment and quality of life in the Tahoe Region by increasing safe and convenient bicycle and pedestrian travel. Through a complete streets approach, this plan promotes transportation projects that accommodate the needs of all travelers when designing transportation improvements on and off-roadways. Complete streets are designed and operated to facilitate safe, comfortable, and efficient travel for roadway users of all ages and abilities such as pedestrians, bicyclists, transit riders, motorists, commercial vehicles, and emergency vehicles. A complete streets approach also supports economic vitality by designing for aesthetic improvements, place-making, and by building natural partnerships between private, public, and community entities. This vison can be realized by creating a high-quality environment that makes active transportation more appealing than driving in the Tahoe Region and beyond.

The Kahle Drive Vision: US Highway 50 and Kahle Drive intersection.
Designed by Design Workshop as part of a TRPA On Our Way grant to Douglas County

Plan Development and Approval Process

The 2016 Active Transportation Plan is an update to the 2010 Lake Tahoe Region Bicycle and Pedestrian Plan. To develop the plan, staff undertook over six months of public and stakeholder outreach. TRPA/TMPO also met with the Bicycle & Pedestrian Technical Advisory Committee (BPTAC) every six weeks to collectively develop and review the plan's goals, policies, actions, and project criteria. The BPTAC is made up of federal, state, local, and advocacy representatives. After all community and stakeholder feedback was consolidated and integrated into the plan, TRPA/TMPO went back to each local jurisdiction to vet all recommendations with a specific focus on new infrastructure locations and actions related to goals and policies. Agency stakeholders were also invited to participate in "Transforming Tahoe's Transportation: A Workshop on Completing Our Streets." This 1.5-day workshop brought regional implementers together to reimagine our roadway system, discuss challenges and opportunities, and conceptualize improvements for Lake Tahoe roadways. Recommendations within this plan and the *Lake Tahoe Complete Street Resource Guide* (Appendix A) illustrate much of the information discussed at the workshop.

TRPA/TMPO released a draft of this plan for public comment on January 15, 2016 with a 30-day comment period. The comment period closed on February 16, 2016, and comments were incorporated into the plan as appropriate. The Tahoe Transportation Commission is expected to recommend the plan for approval on March 12, 2016, and the TRPA/TMPO Governing Board is expected to adopt the plan on March 23, 2016.

Overview of Public Outreach

Public input is an essential part of creating a strong active transportation plan that guides funding, planning, and implementation of the existing and future active transportation network. **As the Region continues to focus on improving multi-modal transportation options, understanding users - who they are, how they act, what their needs are, and why, is critical.** Comprehensive public participation, both in the form of community member and agency stakeholder feedback, is the backbone of a successful active transportation plan. TRPA/TMPO met with all local jurisdictions during the development of this plan and solicited detailed guidance from the Bicycle & Pedestrian Technical Advisory Committee, through regular meetings.

TRPA/TMPO conducted extensive outreach throughout Lake Tahoe and its surrounding areas to gain public input on the existing and future active transportation network. Activities included community gatherings, association presentations, booths at events, and a survey that was available both online and in hard copy from March 2015 to June 2015. Staff collected feedback that clarified current active transportation trends, specific locations that are working well or are in need of improvements, and gathered qualitative crash data to supplement law enforcement reporting. Additionally, the data collected helps identify the types of infrastructure that users are interested in seeing constructed in the Lake Tahoe Region and provides guidance for project prioritization.

TRPA/TMPO marketed input opportunities through flier distribution, advertisements in print and online newspapers, social media, organization list-serves, and targeted mailings. Brochures, posters, and magnets were produced and distributed to the public through these many forums. TRPA/TMPO sought to reach a wide variety of demographics throughout the Region. Because the Latino community makes up over 20 percent of the total regional population, TRPA/TMPO translated all outreach materials into Spanish, offered translation services at community gatherings, attended Spanish-speaking parent teacher association meetings at three different elementary schools, and hired Vaca Consulting to conduct door to door outreach in the North Shore Latino community to increase workshop attendance and conduct survey completion. Detailed analysis and documentation of outreach can be found in the *2015 Community Outreach Repo*rt, Appendix B.

Community Outreach Highlights:

- In total, 630 people signed-in at stakeholder and community meetings between January and July 2015.
- Participants identified closing connectivity gaps that limit the ability to get from one destination to another as the top priority for active transportation planning.
- Participants identified shared-use paths that are completely separated from roadway traffic as a preferred infrastructure design. This was in response to a general question about preferred infrastructure and not specific to any one location.
- The most common biking routes identified by survey participants were US Highway 50 from Sierra Tract through Stateline (South Shore), the Pope Beach bike path (South Shore), and State Route 89/State Route 28 from Tahoma to Dollar Point (West and North Shores). The most common transit routes used by survey respondents in combination with bikes are TART State Route 89 and TART Mainline.

Left: South Shore Community Gathering. Right: Transforming Tahoe Transportation Workshop.

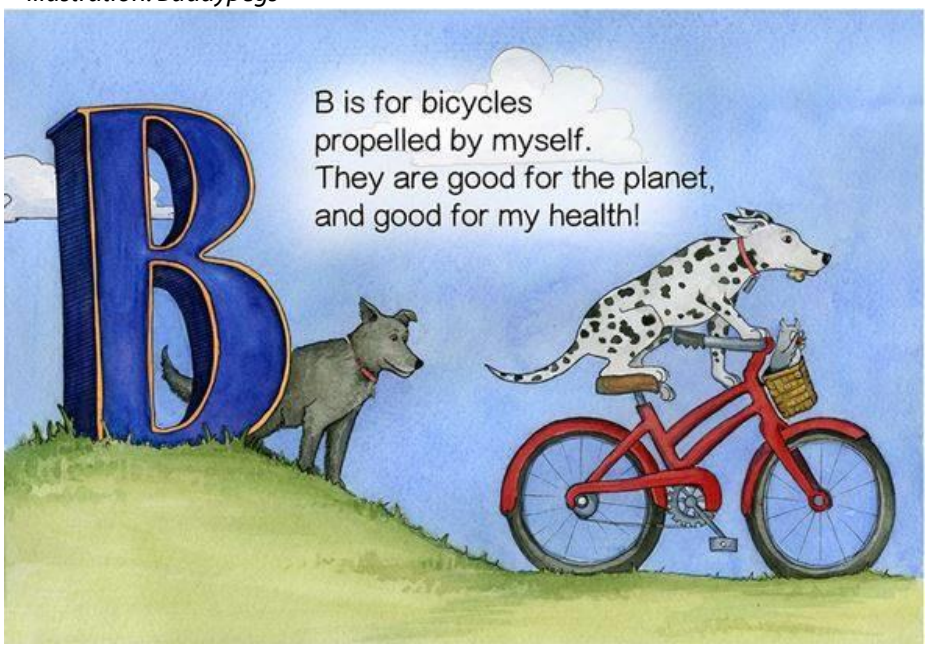
Planning for the Five "E's"

Encouraging community members to use active transportation to reach their destinations relies on a variety of components. The League of American Bicyclist promotes the use of the "5 E's" when seeking to change behavior by getting people out of their cars and onto their bike or other modes. This plan touches on each of the 5 E's, which are described below.

- *Engineering* includes offering safe and convenient infrastructure by altering the roadway through physical changes to the road and adjacent areas, such as rethinking the width of vehicle lanes, the addition of bicycle lanes, shared-use paths, enhanced crosswalks, and adding bicycle racks. This plan offers a variety of engineering solutions in the *Lake Tahoe Complete Street Resource Guide*, located in Appendix A, or as highlights in Chapter 4: Network Recommendations.

- *Education* expands people's understanding of how to use infrastructure and the benefits associated with increasing active transportation use. This plan offers a variety of methods for community members, schools, law enforcement, and government agencies to provide educational opportunities and increase awareness.

Illustration: Buddypegs



- *Enforcement* assists in reminding roadway users of their legal rights, the rules of the road and encourages safety between user types. This plan lays out methods where partnerships between schools, police, governments, and advocacy groups can help keep our streets safe.

- *Encouragement* to use active transportation and sustain that activity helps keep momentum growing for biking and walking as primary travel modes. Group activities like the Lake Tahoe Bike Challenge help users find camaraderie and an overall sense of moving towards the same goal. This plan outlines encouragement opportunities in Chapter 5.

- *Evaluation* of how a transportation system is working, who and how many people are riding and why, is an important measure in active transportation planning and implementation. Use of data can help create user friendly, safe networks, and supports grant applications and other funding opportunities. TRPA/TMPO assists in evaluating our system through the development and implementation of the *Bicycle & Pedestrian Monitoring Protocol*, collision reporting, the 2015 Community Outreach Report, and in documenting performance measures so we can continue to improve.

How to Use this Plan

This plan should act as a guidebook and resource for multiple stakeholders. Below is a roadmap that explains what readers should expect in each section.

Chapter 1: Introduction

This chapter introduces the plan with a brief overview of public outreach, the review and approval process, and the organization of the plan. The physical study area, the multiple agency roles and responsibilities, and the many policies and plans that govern the Region's land-use and transportation system development are explained. Finally, the chapter provides local and international research on the benefits of active transportation.

Chapter 2: Needs Analysis

This chapter explains terminology used in the active transportation field, such as user type and infrastructure type. Also illustrated are current conditions related to land-use, infrastructure, current use patterns, estimated volume, and multi-modal connections. The chapter includes a discussion of current challenges and solutions to safety, connectivity, implementation, and maintenance issues. Users will find this information helpful when identifying and substantiating the need for projects.

Chapter 3: Goals, Policies & Performance Measures

This chapter sets the policy framework for decisions that impact active transportation in the Lake Tahoe Region. Goals, policies, and performance measures should be considered when making land-use decisions, during public and private project development and implementation, in forming partnerships, and when considering maintenance and funding expenditures. Readers should use this section as a resource during project development, design, implementation, and long-term maintenance. This chapter also highlights some notable projects implemented over the last five years in the Lake Tahoe Region.

Chapter 4: Network Recommendations

Recommendations for the active transportation network are divided into the six corridors shown in Section 1.1. Each corridor contains references to relevant local plans, proposed network infrastructure including locations for intersection improvements, additional infrastructure considerations not currently proposed, and corridor-specific data such as crash analysis. This chapter also highlights five complete street designs that should be considered during project development at Lake Tahoe. Users should refer to this section when planning current and future projects.

Chapter 5: Programs

This chapter contains current and proposed methods that should be implemented to increase active transportation through encouragement, education, evaluation, and enforcement programs. School districts, law enforcement, local jurisdictions, and advocacy groups will find this section helpful in forming partnerships, securing volunteers, and supporting awareness of active transportation.

Chapter 6: Implementation Plan

This chapter outlines the actions that partners can undertake to assist in the implementation of this plan's recommendations. This section also contains cost estimates, project prioritization criteria, and funding strategies. Readers should refer to this section when implementing the plan's goals and policies and developing and implementing projects.

Description of Appendices:

Appendix A, *Lake Tahoe Complete Street Resource* Guide and Appendix H, *Existing & Prioritized Project List* are printed in hard copy with the plan. All other appendices can be found on the TMPO website.

A. Lake Tahoe Complete Streets Resource Guide

This resource guide was produced from federal, state, and local standards and includes recommendations from the "Transforming Tahoe's Transportation: A Workshop on Completing Our Streets," sponsored by the TRPA/TMPO and facilitated by Alta Planning + Design, the FHWA, and Caltrans for all agency implementers in November 2015.

B. 2015 Community Outreach Report (Online)

This report is a study derived from public participation and community input on the existing and desired active transportation network. TRPA/TMPO collected data through a variety of methods including community gatherings, public workshops, informational booths at local events, and the 2015 Active Transportation Plan Survey. The first section of the report captures data from the 2015 survey. The second section covers public participation data gathered from community meetings, agency stakeholder meetings, local events, and awareness and encouragement programs between January 2015 and July 2015.

C. Lake Tahoe Region Bicycle & Pedestrian Monitoring Protocol

The Protocol builds on previous bicycle and pedestrian monitoring efforts and improves the understanding of active transportation use in the Lake Tahoe Region. The protocol establishes a clear and consistent approach to collecting bicycle and pedestrian volume data. By implementing the protocol, TRPA/TMPO, in partnership with local jurisdictions, creates an ongoing monitoring program that tracks changes in active transportation volumes in a consistent manner.

D. Lake Tahoe Unified School District Safe Routes to School Master Plan

This document outlines recommendations for the Lake Tahoe Unified School District's schools using the "5 E's" approach. Districts without a local SRTS plan can reference this document as a guide when pursuing programs for their districts.

E. 2015 Fact Sheets

Responding to community and stakeholder needs, the TRPA/TMPO and its partners developed three fact sheets to assist in educating, promoting awareness, and offering solutions to identified active transportation challenges. The 2015 Fact Sheets are:

- Three-Feet for Safety Act
- Reducing User Conflicts on Shared-Use Paths
- Rules of the Road

F. Maintenance Responsibilities Chart and Plan Template

Developed by partners for use in the State Route 28 Corridor Management Plan, project applicants should use this template when submitting permits to TRPA and local jurisdictions for project review and approval.

G. Environmental Findings

This appendix documents that the TRPA/TMPO Active Transportation Plan meets all environmental requirements for the California Environmental Quality Act, National Environmental Policy Act, and TRPA.

H. Existing & Prioritized Project List

This appendix lists all completed projects and prioritizes proposed projects.

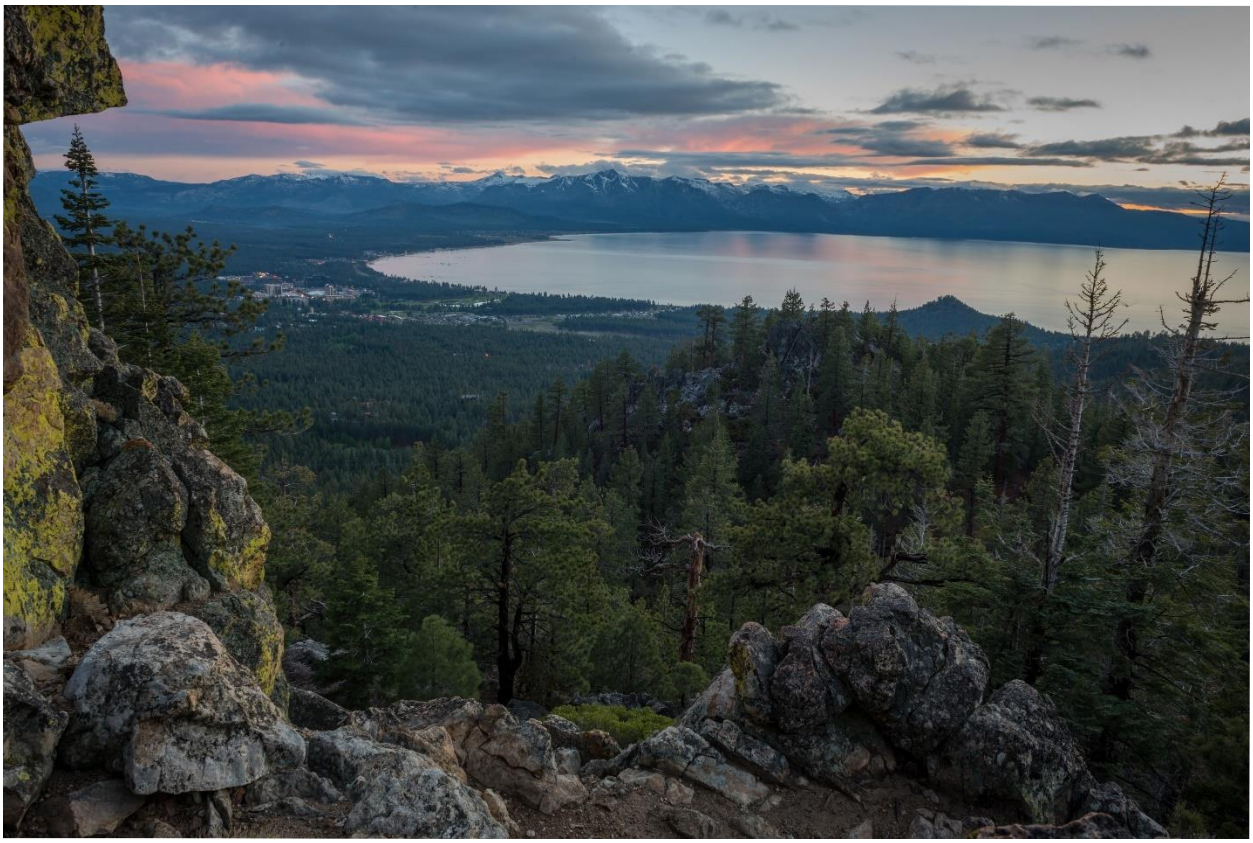
I. Resolutions (County & City resolutions supporting implementation of planned projects)

This appendix documents local jurisdiction adoption of the Active Transportation Plan and will be added after the plan is adopted

Meyers Road Safety Audit: Pioneer Trail & US 50 Intersection. Photo: Morgan Beryl

1.2 STUDY AREA

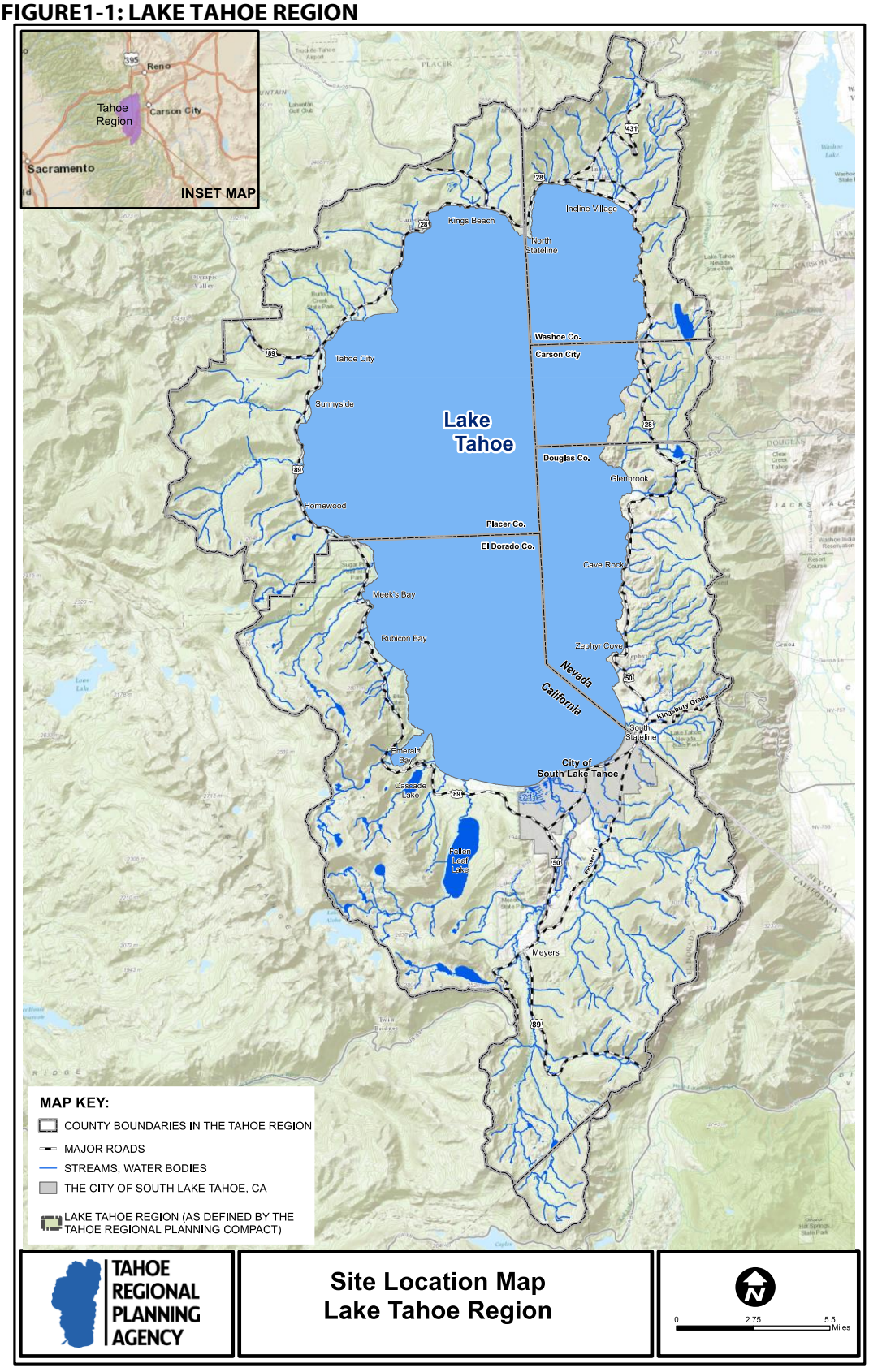
The Lake Tahoe Region is located on the California-Nevada border between the Sierra Nevada Crest and the Carson Range. Approximately two-thirds of the Region is in California and one-third is in Nevada. In total, the Region comprises about 501 square miles including the waters of Lake Tahoe, which measures 191 square miles. Lake Tahoe is the dominant natural feature of the Region and is the primary focus of local environmental regulation seeking to protect and restore its exceptional water clarity. The Region contains the incorporated area of the City of South Lake Tahoe and portions of El Dorado County and Placer County in California, and Washoe and Douglas Counties and the rural area of Carson City in Nevada. The Region is within the Fourth Congressional District of California and the Second Congressional District of Nevada. The TRPA is a separate legal entity governed by a body of seven voting delegates from California and seven voting delegates from Nevada. There is also a non-voting federal representative to the Governing Board. The TRPA Board, with the addition of a representative from the United States Forest Service, serves as the TMPO Board. In the State of California, TRPA serves as the Regional Transportation Planning Agency.



View from Castle Rock. Photo: Tom Lotshaw

Most of the area can be characterized as rolling to mountainous terrain with limited areas of level terrain along the North and South shores of the Lake. Approximately 90 percent of the land in the Region is publicly owned. Some 78 percent is managed by the U.S. Forest Service (USFS) and the balance by state and local agencies. The California Department of Transportation (Caltrans) District 3 designates the Tahoe Region as a "protected land" in their 2014 *Complete Streets Implementation Plan: Partnering with Communities on Complete Streets*. These areas are rural compact towns, and are located in lands protected for open space or natural resource. The focus of these towns is tourism and recreation. A local example is Tahoe City on State Route 28.

FIGURE1-1: LAKE TAHOE REGION



TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features. The material on this map was compiled using the most current data available, but the data is dynamic and accuracy cannot be guaranteed.

Corridor Connection Planning

As part of developing the Regional Transportation Plan, the TRPA/TMPO is partnering with the Tahoe Transportation District (TTD) to conduct corridor planning. Agencies throughout the Region and the public are participating in the corridor planning process to create holistic projects that serve all current and future users of the transportation system. Corridor Plans are expected to be complete by 2018. The eight individual corridor plans (encompassing six corridors around the Lake plus two inter-regional entry corridors) will address multi-modal transportation solutions, environmental improvement, safety for all roadway users, support for economic vitality, quality of life, and accelerated delivery of projects and services. Some examples of the specific concerns that corridor plans aim to address are peak-period congestion, inadequate transit service, active transportation and vehicle conflict, lack of funding for infrastructure and maintenance and insufficient safe, environmentally responsible parking. Figure 1-2 illustrates the six corridors within the Region. This plan uses the corridor connection plan framework for organizing data and illustrating existing and proposed infrastructure.

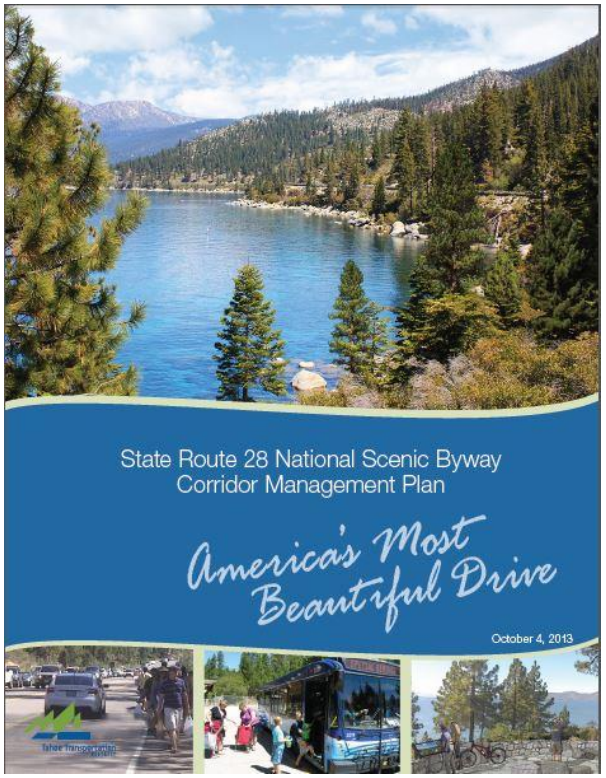
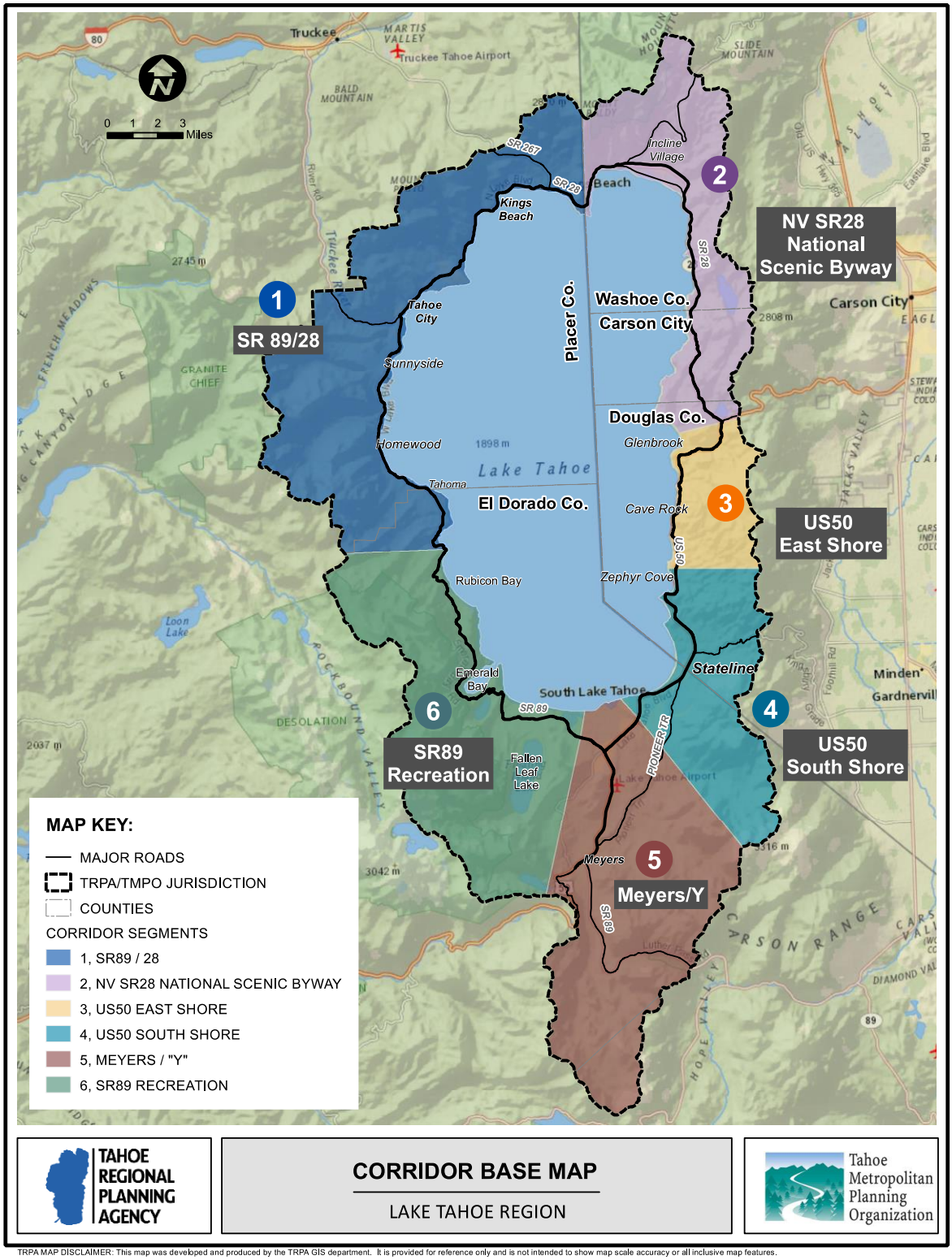
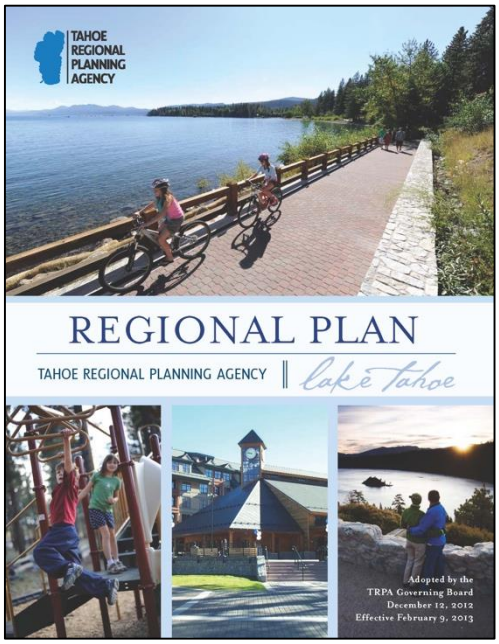


FIGURE 1-2: LAKE TAHOE REGION CORRIDORS



TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

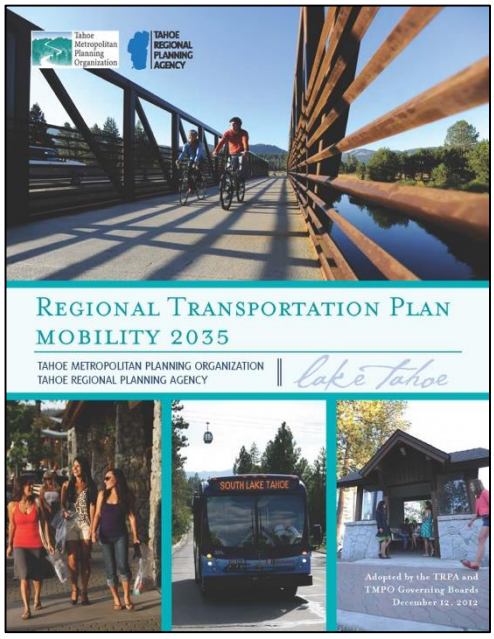
Agency Roles & Responsibilities



Implementation of the ATP is a multi-agency collaboration, and the ATP fulfills multiple agency requirements. As the TMPO document, the ATP is incorporated by reference into the TMPO Regional Transportation Plan and meets federal requirements for active transportation planning. The ATP is also part of the TRPA Regional Plan. Projects listed in the ATP are eligible for federal, state, and local grants. To apply for these grants, in most cases local jurisdictions will need to formally adopt the ATP. Adoption should take place shortly after the plan is approved by the TRPA/TMPO Board.

The primary responsibility for construction and maintenance of the active transportation network lies with local jurisdictions, including counties, the City of South Lake Tahoe, public utility districts, state transportation agencies, regional transportation districts, and public lands agencies. Private developers also play an important role in implementation of the network by providing easements and constructing and maintaining segments that are adjacent to their property.

Input from the public, advocacy community, and other associations are also an essential part of project implementation. The content within this plan is intended to assist and guide the project implementation process.



The TRPA/TMPO's primary role is to carry out the goals and policies located herein, and incorporate regulations into TRPA's Code of Ordinances. The TRPA/TMPO will have an active role in the implementation of certain policies, such as working with private developers to accommodate active transportation into their project plans. Other policies direct the TRPA/TMPO to annually report on plan implementation and provide data for regional project analysis. Finally, there are many instances where the TRPA/TMPO will have an advisory role through collaborating with partnering agencies to encourage implementation of projects and programs that support realization of a complete transportation network.

TABLE 1-1: AGENCIES & RESPONSIBILITIES

AGENCY TYPE	AGENCY	RESPONSIBILITY				
		Planning	Design	Construction	Maintenance	Funding
FEDERAL	US Forest Service	X	X	X	X	X
	Federal Lands	X	X	X		X
STATE	Caltrans	X	X	X	X	X
	Nevada Department of Transportation (NDOT)	X	X	X	X	X
	California Tahoe Conservancy (CTC)	X	X	X		X
	California State Parks	X	X	X	X	X
	Nevada State Parks	X	X	X	X	X
LOCAL JURISDICTION	Counties	X	X	X	X	X
	City of South Lake Tahoe	X	X	X	X	X
PUBLIC UTILITY DISTRICTS	North Tahoe Public Utility District (NTPUD)			X	X	X
	Tahoe City Public Utility District (TCPUD)	X	X	X	X	X
REGIONAL TRANS. DISTRICT	Tahoe Transportation District (TTD)	X	X	X		X
METRO-PLANNING ORG.	Tahoe Regional Planning Agency / Tahoe Metropolitan Planning Organization (TRPA/TMPO)	X				X

Associated Plans, Policies, & Codes

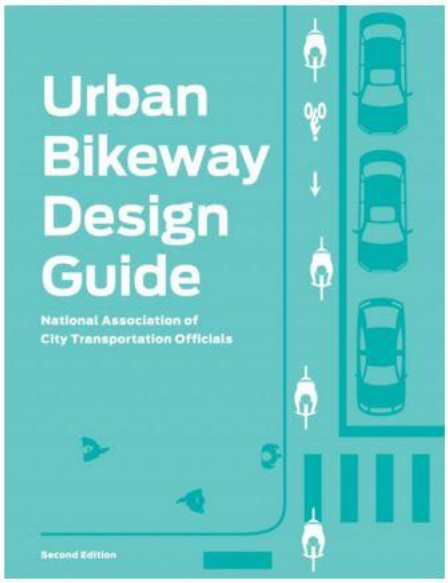
To ensure this plan meets all requirements and is consistent with other planning efforts, a large number of relevant plans, policy documents, and codes were reviewed and incorporated. Described below are some of the most often cited documents that affect active transportation planning.

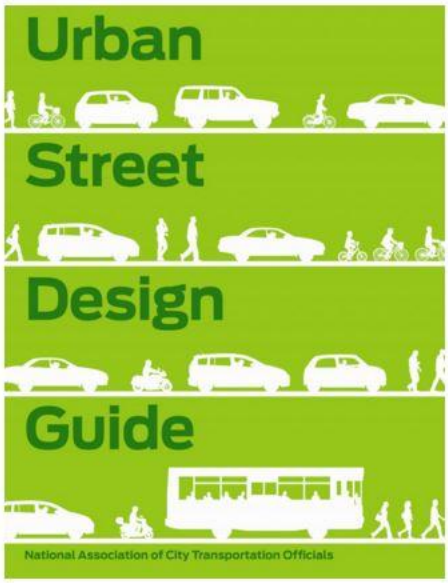
FEDERAL:

Moving Ahead for Progress in the 21st Century (MAP-21), signed by President Obama in July 2012, MAP-21 contains a variety of active transportation programs including the Transportation Alternatives Program (TAP), which consolidates the Safe Routes to School Program (SRTS) and the Regional Trails Program. TAP promotes and funds projects that provide active transportation infrastructure on the roadway, along abandoned railroad corridors, for school populations, and recreational trails.

In December 2015, the Fixing America's Surface Transportation (FAST) Act recently updated MAP-21. The FAST Act is a five-year bill that impacts active transportation through an increase in funding and updates to policy. Changes include making nonprofits eligible for funding, inclusion of complete streets language, and institution of a new safety education program. The FAST Act also renames the TAP to the Surface Transportation Program (STP) Setaside. For more information on the differences between MAP-21 and the FAST Act, check out the League of American Bicyclists website.

Manual on Uniform Traffic Control Devices (MUTCD) defines standards used by road managers nationwide to install and maintain streets, highways, bikeways, and private roads open to public travel. The Federal MUTCD is published by the Federal Highway Administration (FHWA). The most current MUTCD is the 2009 edition, last amended in May 2012. The FHWA supports design flexibility through their 2013 memo "Bicycle and Pedestrian Facility Design Flexibility" where they refer planners and engineers to guides published by the American Association of State Highway and Transportation Officials, the National Association of City Transportation Officials, and the Institute of Transportation Engineers.





STATE - *California:*

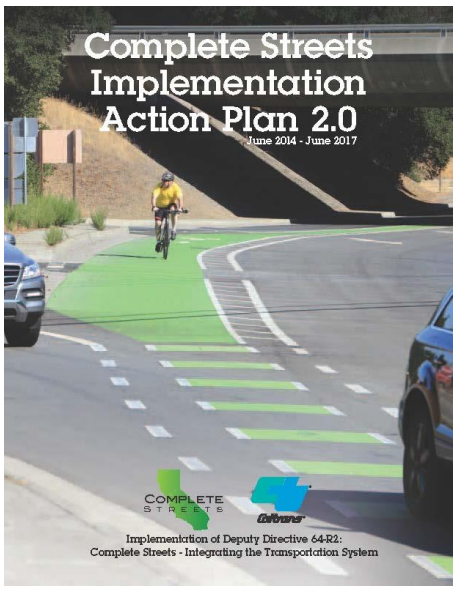
California Active Transportation Program (California ATP), signed by Governor Brown in 2013, consolidates existing federal and state transportation programs, including the TAP, Bicycle Transportation Account, and State Safe Routes to Schools, into a single program with a focus to make California a national leader in active transportation. The California ATP is administered by the California Department of Transportation Division of Local Assistance, Office of Active Transportation and Special Programs. The program offers grant funds for projects that:

- Increase the proportion of trips accomplished by biking and walking,
- Increase safety and mobility for non-motorized users,
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas (GHG) reduction goals,
- Enhance public health,
- Ensure that disadvantaged communities fully share in the benefits of the program, and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

Deputy Directive 64-R2, first signed in October 2008 and renewed in 2014, directs Caltrans to implement complete streets.

"The Department provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and products on the State Highway System."

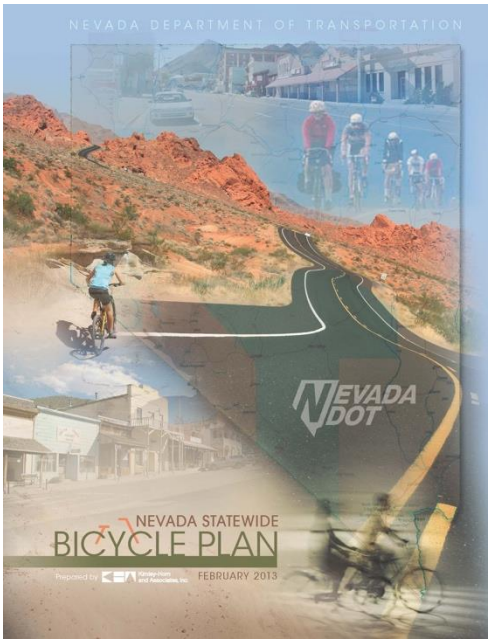
To implement this directive Caltrans published the *Complete Streets Implementation Plan 2.0* in June 2014.



California Highway Design Manual, Chapter 1000: Bikeway Planning and Design, 6th Edition was most recently revised in July 2015. This manual, along with the California MUTCD, identifies specific design and signage standards for active transportation facilities. Design Information Bulletins, such as the 2015 bulletin number 89 on Class IV Bikeway Guidance should also be reviewed during project design.

2014 Caltrans Memorandum "Design Flexibility in Multi-Modal Design" provides for flexibility in design through experimental project processes. The memo identifies design documents such as the National Association of City Transportation Officials' "Urban Street Design Guide," "Urban Bikeway Design Guide," and the Institute of Transportation Engineers' "Designing Urban Walkable Thoroughfares" as important resources when considering designs that accommodate all users.

STATE - *Nevada:*



The Nevada Statewide Bicycle Plan, published in February 2013, includes policies, standards, and performance measures to increase active transportation use and improve safety through its "Zero Fatalities" initiative. All design recommendations in the Nevada Statewide Bicycle Plan utilize federal standards found in the MUTCD.

Nevada Strategic Highway Safety Plan (SHSP), published in 2006, was developed to save lives by addressing the frequency, rate, and primary factors contributing to fatal and severe injury crashes in Nevada. The plan identifies five critical emphasis areas, including seatbelts, lane departures, impaired driving, pedestrians, and intersections that represent the greatest opportunity to save lives and reduce the number of severe crashes and injuries. The plan also identifies critical safety strategies in the areas of enforcement, education and emergency service, in addition to engineering improvements. Using these strategies, the plan's goal is to reduce Nevada traffic fatalities and injuries in half of 2008 numbers by 2030. The plan was updated in 2010 and 2011.

The Nevada Department of Transportation also produces a variety of guidelines that apply to active transportation facilities on roadways, including the Road Design Guide, Standard Plans/ Specifications for Road and Bridge Construction, Landscape and Aesthetics Master Plan, and the US395, West US50, SR28, SR207, and SR431 Landscape and Aesthetics Corridor Plan.

REGIONAL:

Tahoe Regional Planning Agency Bi-State Compact

Article I(b) of the compact established TRPA's responsibility to establish environmental threshold carrying capacities. TRPA adopted thresholds for the Region in Resolution 82-11 in 1982. The thresholds cover various environmental components of the Tahoe Region, including air and water standards that are linked to transportation.

In addition, the Compact states that the goal of transportation planning shall be:

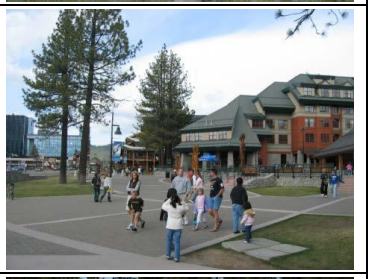
a) To reduce dependency on the automobile by making more effective use of existing transportation modes and of public transit to move people and goods within the Region.

b) To reduce to the extent feasible air pollution which is caused by motor vehicles.

TRPA Regional Plan & Regional Transportation Plan (Mobility 2035) contains general transportation goals and policies, many of which relate to active transportation. These are the backbone of the more specific goals, policies, actions and performance measures found in the ATP.

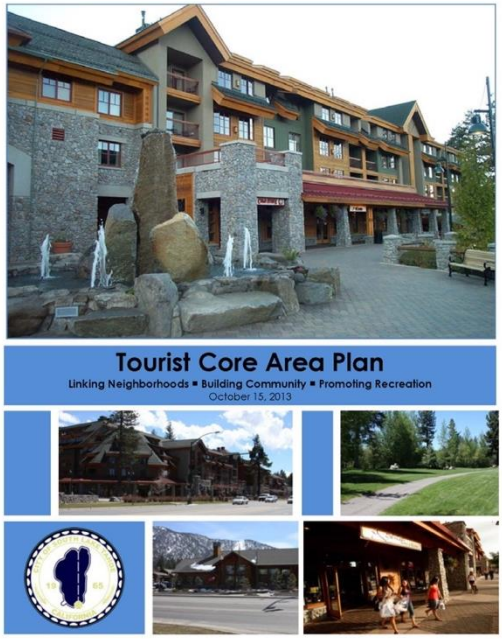
The TRPA Code of Ordinances implements the TRPA's policies by informing public and private project permitting. Relevant transportation code sections include:

Transportation Code Affecting Bicycle and Pedestrian Facilities
August 21, 2013

Code Description	Section	
Bicycle Path Coverage Waiver *	30.4.6.D.3	
Accommodation of Bicycle and Pedestrian Facilities in Projects	65.3	
Bicycle and Pedestrian Facility Maintenance Plan	36.5.5	
Traffic and Air Quality Mitigation Program	65.2	
Vehicle Level of Service Exemption	Policy T-10.7	

*Code section 30.4.6.D.3 is currently not recognized by Lahontan Regional Water Quality Control Board.

LOCAL:



Plans for Specific Geographic Areas within the Region

After adoption of the 1987 Regional Plan, over 170 different plans were adopted for certain geographic areas. These include plan area statements, community plans, and other detailed specific or master plans. With adoption of the 2012 Regional Plan, local, state, federal, and tribal governments are encouraged to adopt area plans to supersede the older plans. Area plans must be found in conformance with the Regional Plan. Some examples of adopted local area plans include the *2013 Tourist Core Area Plan* and *Tahoe Valley Area Plan* for the City of South Lake Tahoe and the 2013 Douglas County *South Shore Area Plan*.

1.3 BENEFITS OF ACTIVE TRANSPORTATION

Active transportation provides multiple benefits to Lake Tahoe communities by reducing air pollution and traffic congestion, meeting greenhouse gas reduction targets, and improving the local economy and public health. Beyond these tangible benefits, biking and walking are pleasurable and relaxing outdoor activities that residents and visitors seek out and enjoy. Increasing active transportation is critical for meeting the TRPA goals of attaining environmental thresholds and reducing dependency on the private automobile.
To help quantify the benefits of active transportation the TRPA/TMPO compiled data from Tahoe surveys and global research. Some findings include:

NV Stateline to Stateline Bikeway. Photo: Mike Vollmer

- The built-out active transportation network is estimated to reduce Vehicle Miles Traveled (VMT), a TRPA/TMPO air quality threshold indicator, by 8,500 miles on a peak summer day.

- Overnight and day visitors who travel to Lake Tahoe primarily for cycling purposes bring an estimated $6 million to $23 million in local direct expenditures annually to Lake Tahoe communities.

- Neighborhood design, including proximity to multi-modal transportation systems, is directly related to physical activity levels. Improving the built environment through traffic calming, connectivity and support facilities encourages active transportation as a convenient and preferred method of transport. This increases physical activity levels related to overall health.

Environmental Benefits:

Shared-use paths have impacts on multiple environmental threshold areas including air quality, water quality, soils, wildlife, and recreation. The overall impacts appear to be either positive or neutral for each of these threshold areas.

Vehicle Miles Traveled (VMT) is a TRPA **air quality** threshold indicator. VMT is linked to emissions of nitrogen oxides, particulate matter, hydrocarbons, and greenhouse gases. Shared-use paths can both reduce VMT (as people shift from their cars to biking and walking) and contribute to VMT (as some may elect to drive to a path as a recreation amenity). To quantify potential impacts, LSC Consultants, with assistance from Alta Planning and Design, developed a Tahoe Bicycle Trail User Model that accounts for both the vehicle trip generation and reduction attributable to bicycle facilities. Estimates from the model indicate that when the full network is constructed, biking and walking trips will reduce VMT by approximately 8,500 miles on a peak summer day. This translates into a reduction of approximately 1,400 metric tons per year of carbon dioxide, a key green-house gas.[2] Lake Tahoe paths with greater

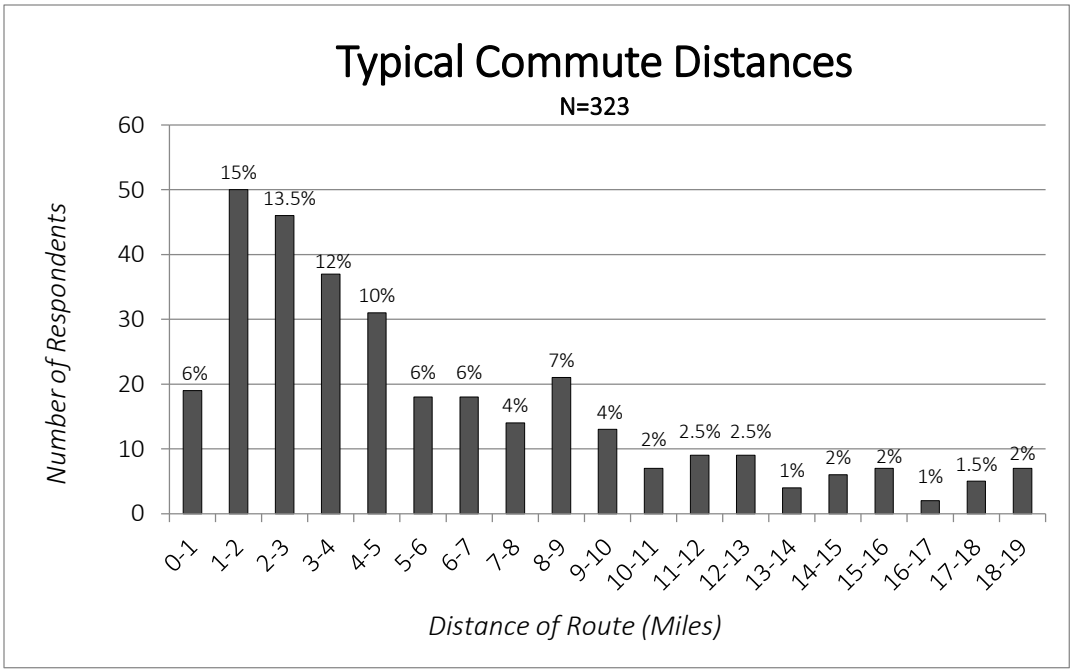


Figure 1-3: Typical Commute Distances. Source: 2015 Active Transportation Plan Survey

[2] *U.S. Environmental Protection Agency, 2010*

proximity to population centers and popular destinations have the greatest potential to reduce VMT. When a connected, safe, and convenient network is in place, research indicates that short car trips, which have high emission rates per mile due to cold vehicle starts, are substituted with active transportation trips. A 1 percent shift from short car trips to active transportation can reduce fuel consumption by 2 to 4 percent.[3] Short trips are typically three miles or less, which is the typical average commute by Tahoe residents as reflected in 2015 Community Outreach Report, Appendix B.

The Lake Tahoe Total Maximum Daily Load (TMDL), a program of research dedicated to identifying and reducing the primary sources of **water quality** degradation in Lake Tahoe, did not find that shared-use paths negatively impact water quality by generating fine sediment particles (FSP) in urban runoff. While paths in sensitive areas can impact stream environment zones (SEZ) and must be mitigated to allow ecosystem function to continue, these paths are not associated with the same runoff impacts as roadways due to the lack of road sanding and heavy vehicle use. Although the primary TMDL strategies focus on reducing urban runoff FSP through treatment of roadway runoff, advanced vacuum sweeping techniques and application of alternative roadway abrasives, mobile sources such as automobiles, buses, and boats predominantly produce nitrogen that is transported and deposited on the lake surface through atmospheric deposition. Shared-use paths can reduce VMT and hence the load of nitrogen to the atmosphere from mobile sources. Over time, shared-use paths and bicycle lanes may also positively affect water quality by reducing the need for impervious surfaces such as additional vehicle lanes or parking spaces and by reducing the amount of cars on the road.[4]

Chimney Beach. Photo: Mike Vollmer

Shared-use paths have a positive impact on the TRPA **recreation** threshold**.** Paths provide excellent non-auto access to Lake Tahoe's recreation destinations and serve as recreation attractions. Even though biking or walking on a path sometimes involves a car trip, biking or walking as a recreation activity is generally considered to impact environmental thresholds less than other recreation activities such as boating, jet skiing, driving around the Lake, and off-roading. Paths could have adverse impacts on **wildlife** and **sensitive plant species** and are not permitted in wildlife protection areas or buffer zones unless proven mitigation measures are implemented.

[3] *Litman, 2015*

[4] *California Regional Water Quality Control Board & Nevada Divisions of Environmental Protection, 2010.*

Equity Benefits:

Multi-modal infrastructure provides transportation options for those who cannot afford a car or are unable to drive due to age or disability. Public funds are disproportionately used for roadways that accommodate drivers, with only 1.5 percent spent on active transportation.[5] Typically, large portions of the population are unable to drive due to a variety of reasons. On average, anywhere between 20-40 percent of people may not have access to or be able to drive a car.[6] The 2012 Regional Transportation Plan, as shown in Table 1-2, illustrates the percentage of Lake Tahoe residents that are transit-dependent or part of historically underserved communities.

	Latino	Filipino	Zero-car households	Seniors (65+)
South Lake Tahoe	31%	4%	8%	10%
Stateline	33%	4%	N/A	8%
Kings Beach	56%	0%	N/A	6%
Incline Village, Nevada	18%	0%	N/A	18%
Sunnyside-Tahoe City CDP, CA	5%	0%	N/A	11%
Tahoe Vista CDP, CA	25%	0%	N/A	10%

Table 1-2: Transit Dependent and Historically Underserved Populations. Source: 2010 Census

Question 11 in the 2015 the Active Transportation Plan Survey asked respondents if they typically have a car available for their use. Only 3 percent indicated they do not have access to a car. Of those responses, 52 percent indicated it was due to unaffordability.

Additionally, the 2010 census indicates 20 percent of the Lake Tahoe Region population is age 18 or under. This is a significant part of the population that must rely on our multi-modal system or depend on other drivers for transportation.

Improving multi-modal infrastructure provides transportation options for those that depend on its safety and functionality while also serving those who prefer to use active modes by choice. Lake Tahoe residents primarily travel by car (84 percent), however, 58 percent of survey respondents noted they would prefer to travel by foot, bike, or transit.

[5] Railstotrails.org
[6] Litman, 2015

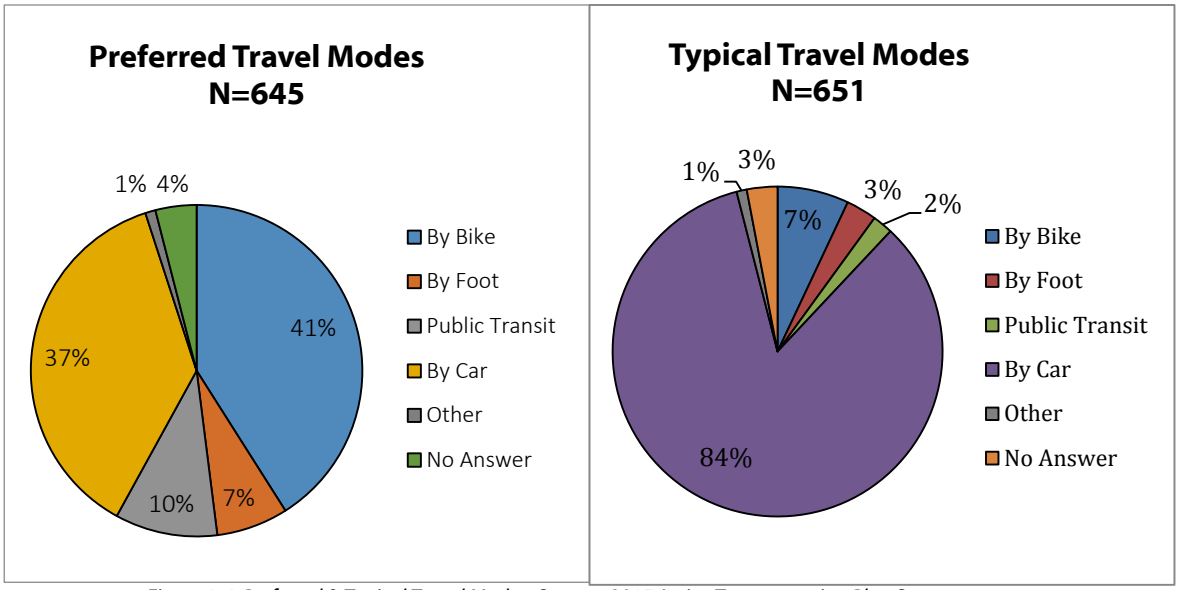


Figure 1-4: Preferred & Typical Travel Modes. Source: 2015 Active Transportation Plan Survey

Economic Benefits:

Bicycle paths provide many economic benefits including increased direct expenditures at local businesses, increased property values and employment opportunities, and personal savings from reduced vehicle use (or the need to own a car at all). Increases in transportation efficiency through multi-modal options also reduce costs related to roadway rehabilitation, support facility needs and potential property damage due to vehicle collisions.

Safe and convenient bicycle infrastructure increases the draw of the Region to visitors and residents, encouraging those interested in living a recreational and healthy lifestyle to extend their stay and spend more money. Approximately 13 percent of visitors surveyed in a North Carolina Northern Outer Banks study stated that their average visit duration was three to four days longer due to the excellent bicycling opportunities.[7]

Catering to these characteristics in visitors is a focus for many businesses, organizations and agencies in the Region. Media campaigns recognize the economic benefit to businesses by attracting active, health-minded people to Lake Tahoe. Surveys show that Lake Tahoe bicycle paths and bicycling events, such as America's Most Beautiful Bike Ride (AMBBR), an event with over 3,500 registered riders, attracts users with relatively high disposable income.[8]

Harrison Avenue. Photo: Tom Lotshaw

[7] Lawrie, 2004
[8] Lake Tahoe Bike Coalition, 2009

Lake Tahoe-specific research indicates:

- 56 percent of AMBBR survey respondents have incomes over $100,000 and 75 percent have at least a college degree. Of those, 27 percent spent more than $2,500 on the purchase of their bicycle.

- Out of the 662 respondents for the 2015 Active Transportation Plan Survey, roughly 62 percent indicate they ride their bike in general, and of those, 27.5 percent have an income of $100,000 or higher.

- Tahoe-specific studies estimate 188,800 people visit Tahoe annually to take advantage of cycling opportunities and make average daily expenditures of approximately $124.[9] Multiplying these expenditures yields an estimate of roughly $6 million to $23 million per year related to active transportation.

National research on the connection between active transportation users and high **direct expenditures** continues to grow. A recent study in Portland, Oregon illustrated that customers who frequent businesses by bicycle spend $10 more per month than customers who arrive by vehicle. Multiple countries, such as Canada, Germany, Switzerland, and the United States support this research, showing that though active transport users often buy less per visit to restaurants, bars, and convenience stores, they typically frequent businesses more often, giving them more opportunities to purchase items that may not be on the shopping list.[10] A survey conducted in Bern, Switzerland indicates businesses profited almost $2,000 more per square meter of bicycle parking than vehicle parking. [11]

East Shore Kayakers. Photo: Mike Vollmer

Employment opportunities increase when multi-modal transportation is accessible and offered as a convenient method of travel. Lower-income people who depend on public transportation systems are more able to access educational and employment opportunities. This increases the quality and quantity of the low wage labor pool for service-oriented industries, which is the predominant employment in Lake Tahoe.

Multiple recent studies illustrate the positive economic impacts on **property values and real-estate sales.** In 2010, Vancouver, British Columbia reported 65 percent of Realtors used nearby bicycle facilities as a selling point for properties. North Carolina found that the 40 homes adjacent to the installation of a new bikeway rose by $5,000 or more in value. Further, the urban advocacy blog, *This Big City*, noted that in a list of 39 elements homebuyers list as important decision-making factors,

[9] TRPA, 2009.
[10] York Common Cents, 2012
[11] Szczepanski, 2013

accessible bike infrastructure was listed as number three.[12] Many studies conducted over the last two decades throughout the United States, including Boulder, Colorado and Omaha, Nebraska, note that surveyed residents believe existing or planned bicycle infrastructure will or has positively impacted their property values.[13]


Tahoe City

There are other personal user economic benefits of active transportation such as job creation and overall savings from fuel consumption, car payments, maintenance, parking, and car storage. Savings from these sources can free up discretionary income and allow both residents and visitors to spend more in Lake Tahoe communities.[14]

Health Benefits:

Increasingly, the health benefits related to active transportation are being recognized by health professionals, urban planners, and policy makers. Funding opportunities for active transportation are tied to how projects illustrate production of health benefits for community members, such decreasing adult and youth obesity and blood pressure. Federal and state policies seek to increase physical activity not only for direct health benefits to constituents, but also because healthier people produce cost savings and reduce strain on the health care system. Annual per capita health cost savings from physical activity have been found to vary between $19 and $1,175, with a median value of $128.[15]

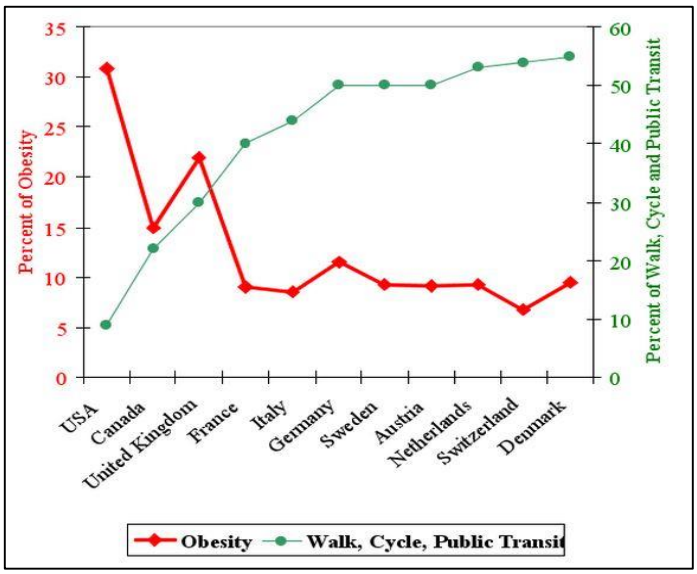


Figure 1-5: Obesity vs. Activity. Source: Bassett et al

Reliance on the automobile, often due to the layout of the built environment, has led to a lack of physical activity in the United States. Multiple studies indicate that areas with unconnected, "sprawl" land-use patterns and low multi-modal transportation have the highest obesity rates (Figure 1-5).

Other issues related to inadequate physical activity can include heart disease, diabetes, osteoporosis, dementia, and mental health. The 2012 Barton Community Health Needs Assessment prioritizes mental health and dementia as two priority focus areas for South Lake Tahoe residents. There is research that indicates consistent walking and biking reduces appearance of dementia and long-term cognitive decline.[16] Additionally, exercise, social interaction, and sunlight have been identified as the most effective treatment for mental illness, particularly depression.[17] In general, a

[12] Green, 2013
[13] Racca & Dhanju, 2006
[14] FHWA, 2015
[15] TRPA, 2009.
[16] Litman, 2015.
[17] Owen, 2015

sense of higher overall well-being has also been connected to the amount of time people spend in active transport in comparison to time in vehicle transport.[18]

The U.S. Center for Disease Control (CDC) recommends 22 minutes of moderate physical activity per day for adults. Active transportation is one of the most effective ways to achieve this goal. That is why the CDC has instituted the Healthy People 2020 program focusing on promoting walking and biking. In South Lake Tahoe, roughly 58 percent of residents consistently meet the recommended physical activity levels, which is above national and state averages.[19] This percentage illustrates the importance of physical activity to Lake Tahoe residents. Offering infrastructure that provides opportunities for increased biking and walking can be considered a critical element of meeting physical activity goals.

Enhanced Community Character

One goal in the Regional Transportation Plan is to support a region that offers the ability to walk, work, and play within our communities. Tahoe residents have called for walkable, mixed-use town centers with reliable and convenient public transit, and streets that encourage biking and walking. A balanced transportation system can help to preserve and enhance the character of communities in the Region and provide a unique identity and a sense of "place" in each community. These goals are supported by recent reports and studies. A report by The National Association of Realtors found that there has been a 25 percent increase in walking to destinations since 2001. The association also found that millennials prefer walking to driving by 12 percent, and prefer short, active transport commutes to work and recreation.[20]

"Mountain Beach Loop"
Created by Design Workshop

[18] Litman, 2015.
[19] Barton Health, 2012
[20] National Association of Realtors, 2015

CHAPTER 2: NEEDS ANALYSIS

This chapter discusses how the existing transportation network functions and makes recommendations for improved infrastructure. High-use routes are shown through qualitative and quantitative data. Future use is estimated based on the Bike Trail User Model. This chapter also identifies common barriers to active transportation found throughout the Region. Strategies are offered to initiate solution-oriented problem-solving that can assist in continuing to create a convenient and safe network for bicycling and walking.

2.1 EXISTING CONDITIONS

In Lake Tahoe, the active transportation network serves many purposes. **Infrastructure such as shared-use paths, bike lanes, and sidewalks are both recreational resources and year round transportation modes for a recreation based economy.** When planning and designing projects, implementers must consider the needs of different user groups and how they *intuitively interact* with existing land-uses. Some important questions to consider are:

- Where do people want to go?
- Which way are people going already, even without existing facilities?
- How can all roadway users meet their needs safely, without conflict or excessive delay?

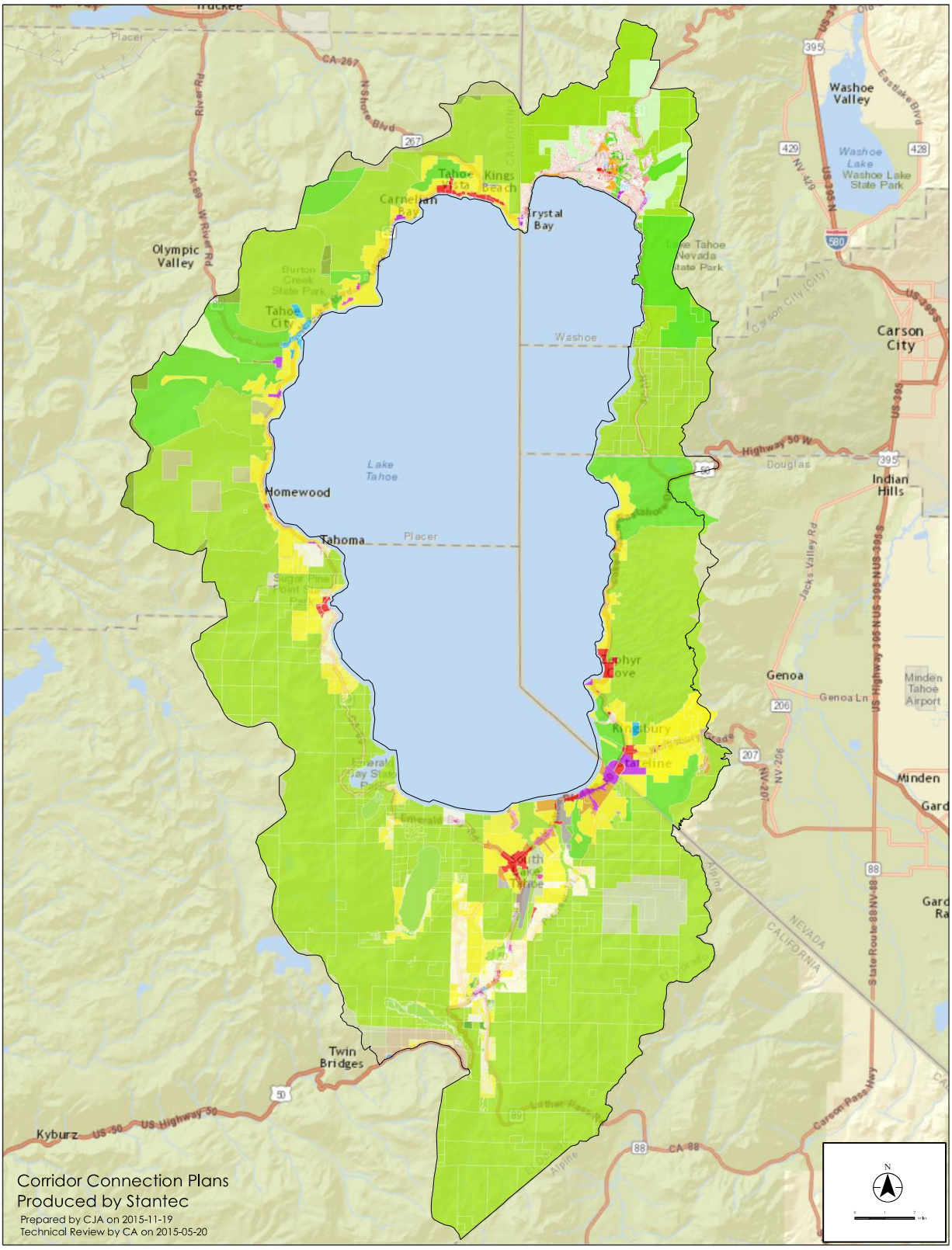
Common Infrastructure & Users Found at Lake Tahoe

The Lake Tahoe Region weaves a variety of infrastructure types together to create its active transportation network. To get from origin to destination, a bicyclist may take a bike route to a shared-use path to a bike lane. In many locations no designated active transportation infrastructure is present. Existing land-use, such as shops, restaurants, and homes dictate where people want to go. The type of infrastructure available prescribes, in part, how people will choose to get to their destinations. Figure 2-1 illustrates the locations of commercial centers and where the majority of people live throughout the Region.

Mid-block crossing without infrastructure. Photo: Mike Vollmer

FIGURE 2-1: REGIONAL POPULATION DENSITY AND COMMERCIAL CENTERS

(See legend on following page.)




Legend
TRPA Boundary
SR89/28 - Placer County Zoning
Residential
Commercial
Commercial/Public Service
Tahoma Commercial
Tahoe City Commercial
Tahoe Vista Special Area
North Star
Kings Beach Industrial/Commercial/Public Service
Upper Ward Valley Recreation
Burton Creek Area Conservation
Open Space
Forest
Timberland Production
Water Influence
NV SR28 - Washoe County Zoning
Medium Density Rural 1 du/5 ac
High Density Rural 1 du/2.5 ac
Low Density Suburban 1du/ac
Medium Density Suburban 3 du/ac
High Density Suburban 7 du/ac
Low Density Urban 10 du/ac
Medium Density Urban 21 du/ac
Neighbhorhood Commerical
General Commercial
Tourist Commercial
Parks & Recreation
Public Services
General Rural
Open Space
Roads
Water Bodies
US50 East Shore - Carson City Zoning
Conservation Reserve
US50 East Shore - Douglas Co. Zoning
Tahoe Mixed Use
US50 East Shore - Douglas Co. Zoning
Commercial (C)
Managed Resource (M)
Public Service (P)
Recreation (S)
Residential (R)
Tourist (T)
US50 South Shore - Douglas Co. Land Use
Residential (R)
Commercial (C)
Public Service (P)
Recreation (S)
Managed Resource (M)
US50 South Shore - Douglas Co. Zoning
Multi-Family Residence 6.01-16 Dwelling Units/Ac*
Mixed Used Commercial
Neighborhood Commercial
Tahoe Mixed Use
Tahoe Commercial
Tahoe - Tourist
Tahoe Resort Recreation
Tahoe - Recreation
Public Facility
Forest Range, 19 Acres; Forest Range, 40 Acres
US50 South Shore - City of South Lake Land Use
Low Density Residential
High Density Residential
BJ/AT CP
Neighborhood Commercial
Town Center
Special District
Tourist
Recreation
Conservation
Meyers Y/SR89 Recreation - El Dorado County Zoning
Exclusive Agricultural
Commercial/Office
Tahoe Planned Commercial
Tahoe Commercial
Industrial
MCP-1
MCP-2
MCP-3
MCP-4
MCP-5
Tahoe One Family Residential; Residential; R1A; R3A
Residential 5/10
Residential - 20
Residential - 160
Tahoe Two Family Residential
Residential Multi-Family
Tahoe Resort Residential
Planned Development
Recreation Facilities
Tahoe Agricultural
Timberline Preserve Zone
Tahoe Transportation Corridor

The main types of bicycle and pedestrian infrastructure currently in place in the Lake Tahoe Region are described below.

- **Shared-Use Path (Class I)**

  A shared-use path is a completely separate trail for active transport users. The path is recommended to be 10 feet wide and provide for two-direction travel.

- **Bike Lane (Class II)**

  Bike lanes are striped six feet wide lanes and provide one-way travel on a shared roadway with vehicles.

Sharrows, Tahoe City.

- **Bike Route (Class III)**

  A bike route is a shared roadway typically located on low-volume and low-speed streets. Signs and painted "sharrows" assist with wayfinding and show the preferred location of the biker within the roadway.

- **Sidewalk**

  Sidewalks are at least five feet wide and offer pedestrians a separated way to travel along the street network.

- **Marked Crosswalk**

  Painted markings that span a roadway to indicate where pedestrians have the right of way. Crosswalks can be accompanied by traditional signals or stop signs.

- **Pedestrian-Activated Flashing Beacon**

  Lights, accompanied by signage, that flash when activated by pedestrians when they want to cross a street. Cars are required to stop when lights are flashing.

Pedestrian-Activated Beacon, Lake Tahoe Boulevard. Photo: Mike Vollmer.

Existing Network

A list of all existing projects can be found in Appendix H, *Existing & Proposed Project Lists*. Table 2-1 illustrates existing mileage by jurisdiction and class.

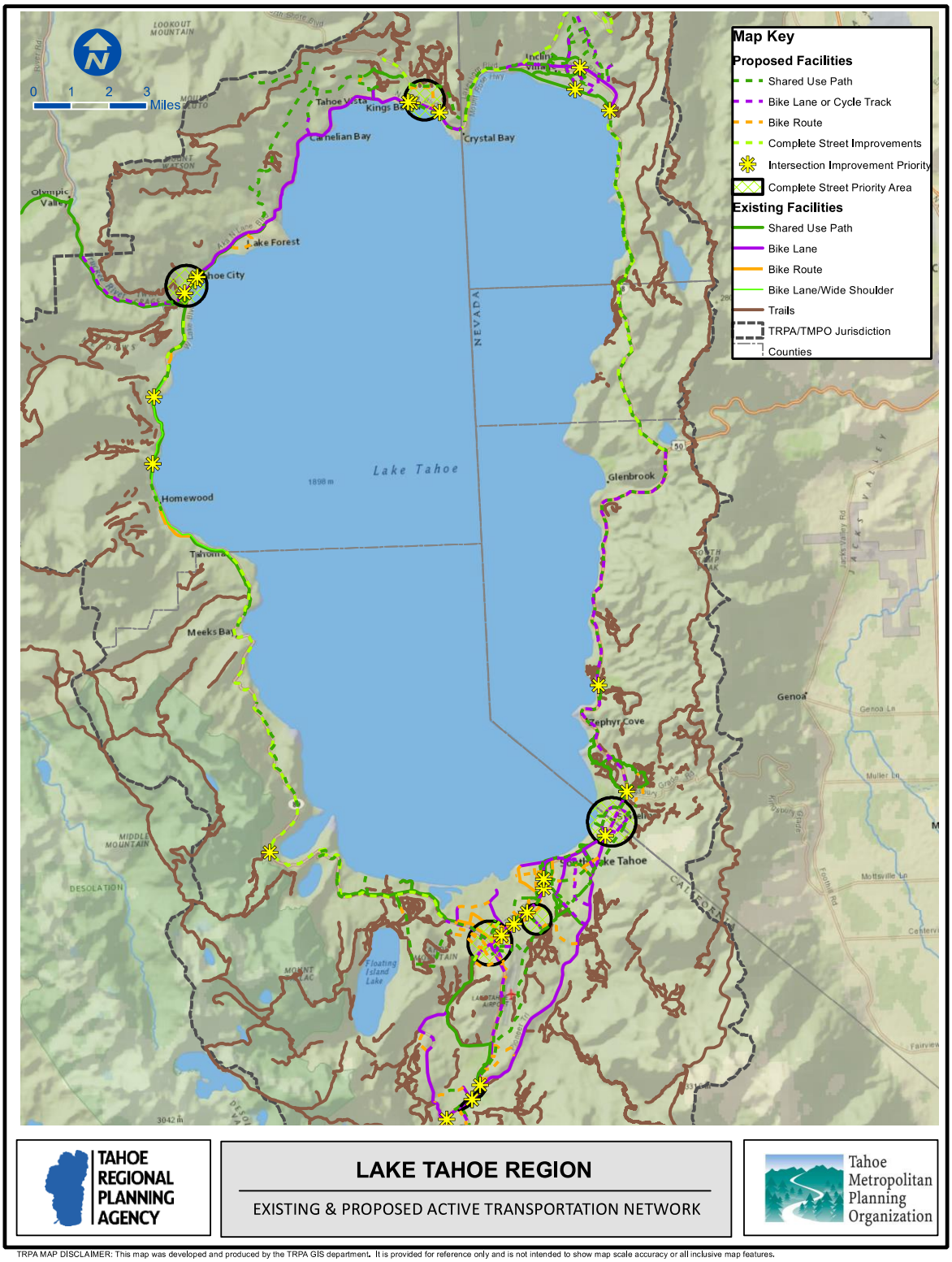
Table 2-1: Existing Facility Mileage. Source: TMPO

Jurisdiction	Path Class I	Bike Lane Class II	Bike Route Class III	Sidewalk	TOTAL
El Dorado County	11	6	0	0*	**17**
City of South Lake Tahoe	8	15	8	12	**43**
Placer County	20	11	2	4	**37**
Douglas County	5	1	0	3	**9**
Carson City	0	0	0	0	**0**
Washoe County	7	4	0	3	**14**
TOTAL	51	37	10	22	**120**

**El Dorado County sidewalk is roughly .06 miles.*

Viking Way and Lake Tahoe Boulevard. Photo: Mike Vollmer

FIGURE 2-2: REGIONAL EXISTING & PROPOSED ACTIVE TRANSPORTATION NETWORK MAP



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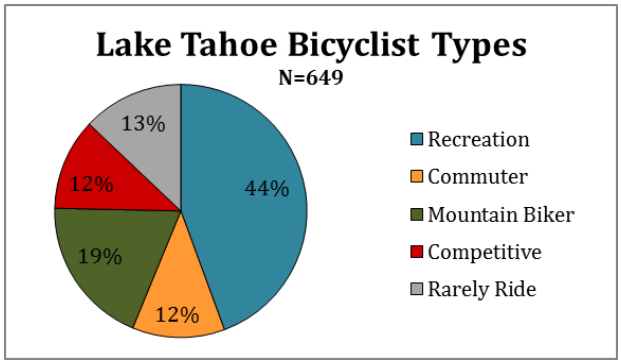
Described below are the different types of users seen on the active transportation network. These are generalizations and people may find they fall into multiple categories depending on the day or the activity they are conducting.

- **Recreational:** Mostly bike or walk for fun or exercise
- **Commuter:** Mostly bike or walk to get to places like work, school, or shopping
- **Competitive Cyclist:** Mostly bike for training in competitions
- **Mountain Biker:** Mostly ride on mountain bike trails, sometimes using the street network

Figure 2-3: Lake Tahoe Bicyclist Types. Source: 2015 Active Transportation Plan Survey



The 2015 Survey asked respondents to identify the "type" of bicyclist they consider themselves to be if they bike in Tahoe. Respondents were only allowed to choose one category and the results are shown in Figure 2-3.

Multi-Modal Connections

A complete transportation network offers multiple methods of travel to residents and visitors. A major component to successfully encouraging people to get out of their car and use active transportation or public transit relies on offering a convenient, timely, comfortable, and safe system. Multi-modal connections help reduce barriers to active transportation, such as long distances, physically challenging topography, or a lack of active transport facilities. Additionally, multi-modal systems must consider "first and last mile," which is how people get to and from pick-up and drop-off points to their destinations.

Some marks of a strong multi-modal system include:

- Transit stations are accessible by biking, walking, and driving
- Quality and sufficient parking is available for cars and bikes
- Transit stations have a protected waiting area with support amenities such as benches, bathrooms, and water fountains
- Buses have sufficient bicycle carrying capacity
- Transit is timely and convenient
- Ticket prices are affordable
- Long stretches of connected active transportation facilities

TRANSIT:

Transit service provided through the Tahoe Transportation District on the South Shore and Tahoe Area Regional Transit (TART) on the North Shore addresses many of the above characteristics and continues to improve its services and facilities. Services include year-round fixed routes, para-transit, and seasonal shuttles. Many transit stops have bike racks and shelters and are accessible by all modes. Figure 2-5 (on page 2-10) illustrates the regional multi-modal system, including major transit stations, routes, waterborne transit, and intercept lots. For more detailed information on the transit system, please refer to the Tahoe Transportation District (www.tahoetransportation.org) or the Truckee North Tahoe Transportation Management Association (www.laketahoetransit.com).

Tahoe City Transit Center. Photo: Bruce R. Damonte

To assist transit providers in meeting the needs of multi-modal riders, the 2015 Survey asked respondents a variety of questions regarding transit use with their bikes. The *2015 Community Outreach Report* contains significant data on respondents' use of public transit and how often they use transit with their bicycles. Figure 2-4 illustrates which routes are most often used in combination with bicycles.

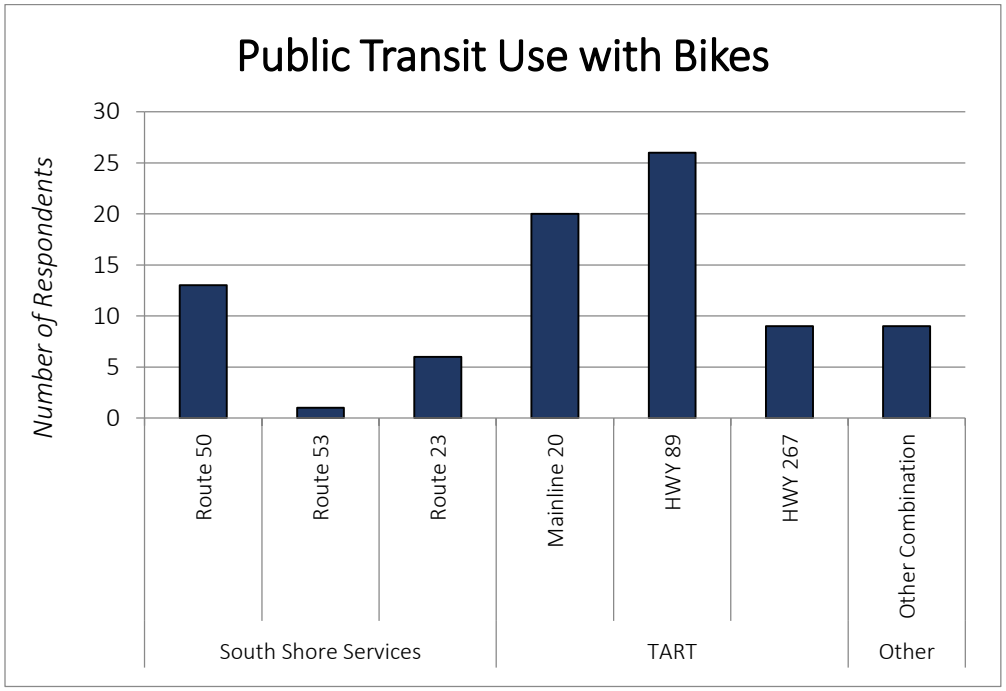


Figure 2-4: Public Transit Use with Bikes. Source: 2015 Active Transportation Plan Survey

Bike racks on TART bus

Respondents were also asked whether buses typically have sufficient carrying capacity for their bicycles or adequate bicycle parking at bus stops. Eleven percent of respondents indicated buses seldom have space for their bikes, and 47 percent said bus stations do not have adequate bicycle parking. This information can be valuable for transit providers when determining priorities for improvements.

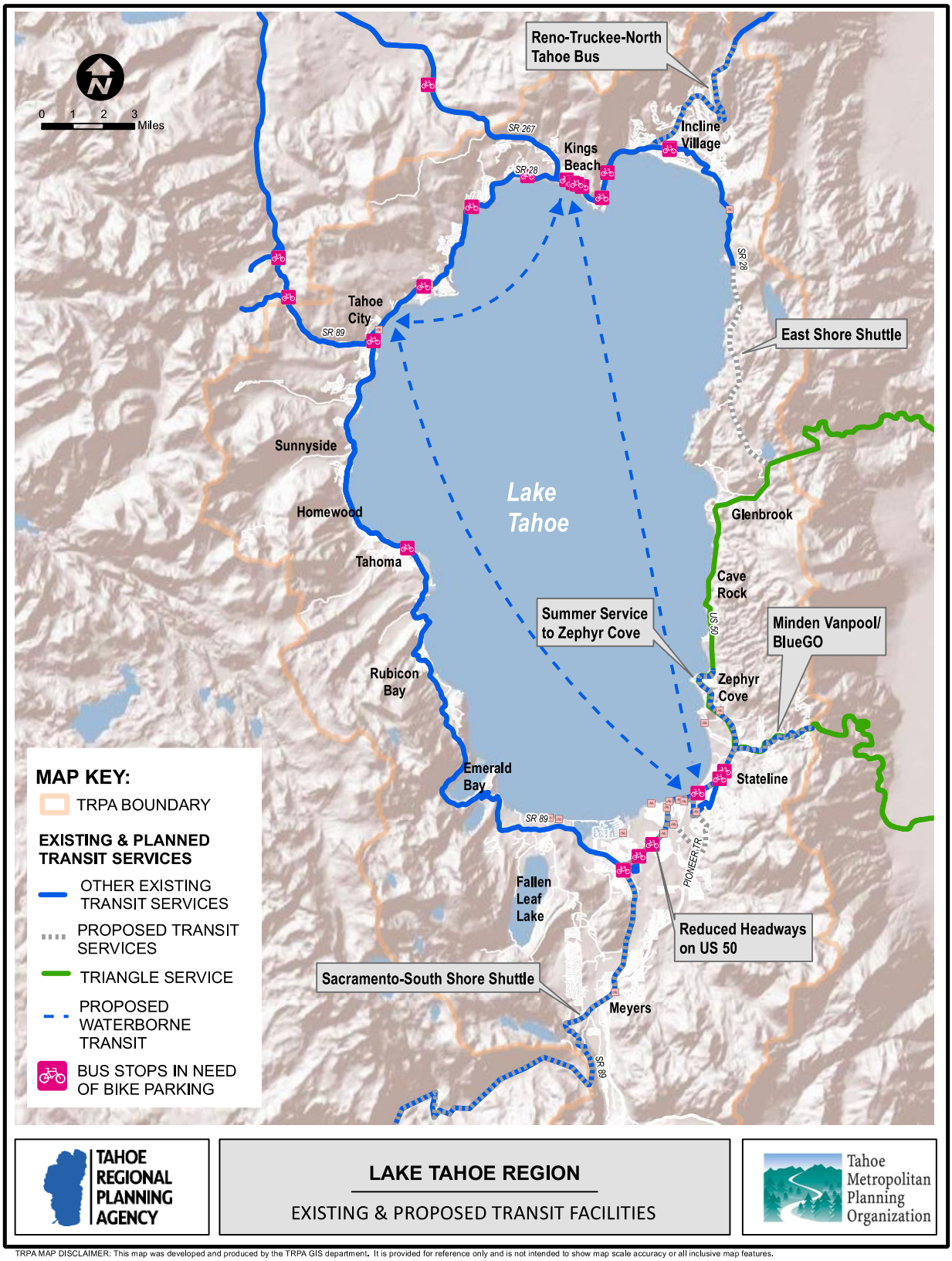
Multi-modal recommendations in the Community Outreach Report:

- TART Highway 89, TART Mainline, and South Shore Route 50 are the routes with the most multi-modal riders and should be prioritized for bicycle carrying capacity increases.

- Transit stops most in need of bike parking are the Tahoe City Transit Station, the "Y" Transit Station, all transit stops in Kings Beach, and the transit station at Southwood Boulevard and State Route 28 in Incline Village.

Tahoe City Transit Center. Photo: Placer County

FIGURE 2-5: EXISTING & PROPOSED TRANSIT FACILITIES



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Regional Bikeways

Long stretches of connected active transportation infrastructure enable users to travel long distances by bicycle. The Lake Tahoe Region has a variety of trails that connect users through entire towns or provide access across town. Regional bikeway connections serve residents who live on one side of town but work on the other, or visitors who want to explore large swaths of Tahoe by bike. Many regional bikeways already exist, are programmed for construction over the next few years, or are still in the planning phase.

Once all of our regional bikeways are connected, these trails will make up the **"Lake Tahoe Bikeway"** which is a collaborative vision of the public and local, state, and federal agencies, known as the Lake Tahoe Bikeway Partnership. Once complete, the Lake Tahoe Bikeway will allow users a continuous shared use path around the entirety of Lake Tahoe. In North Lake Tahoe, multiple local, state, and federal agencies are working to construct a 40 mile connected paved path known as the "**Resort Triangle**" that will join the communities of Kings Beach, Tahoe Vista, Tahoe City, Alpine Meadows, Squaw Valley, Truckee, Martis Valley, and, Northstar in a continuous loop of shared use path. The portion of the Resort Triangle between Tahoe City and Tahoe Vista will also be a segment of the Lake Tahoe Bikeway allowing connection between the two regional pathways.

LAKE TAHOE REGIONAL BIKEWAYS:

Nevada Stateline-to-Stateline Bikeway
Proposed to extend over 30 miles, TTD manages this bikeway project that will eventually connect the Nevada state line on the North Shore to Stateline, Nevada on the South Shore. The bikeway is being constructed in phases. The "South Demonstration Project" currently offers users a trail from Round Hill Pines to Laura Drive. The next trails to be constructed will connect Incline Village to Sand Harbor State Park and Laura Drive to Stateline. The rest of the project is in the planning phase. Local jurisdictions and the USFS will manage and maintain the bikeway once constructed.

NV Stateline to Stateline Bikeway: Round Hill Pines Photo: Mike Vollmer

Meyers Bikeway. Photo: Mike Vollmer

Meyers Bikeway
Completed in 2015, this major connection of 5.8 miles provides users with a continuous shared-use path from the west edge of Meyers to Viking Way in South Lake Tahoe. Construction of this path was a partnership of many agencies, including El Dorado County, the City of South Lake Tahoe, and the U.S. Forest Service (USFS). The Meyers Bikeway is made up of various paths including the Pat Lowe Trail, Sawmill Pond Trail, and Lake Tahoe Boulevard Trail.

South Tahoe Greenway

The Greenway, a projected network of 10 miles, has long been planned by the California Tahoe Conservancy (CTC). The path is envisioned to stretch from Meyers to the California state line, along the southeastern edge of the city. This project will be built in phases. The first phase was constructed in summer 2015, connecting Herbert Avenue to Glenwood Street. California Active Transportation Program funding awarded in 2015 will allow two more phases to be built, connecting residents in the Sierra Tract neighborhoods to Lake Tahoe Community College.

South Tahoe Greenway. Photo: Morgan Beryl

South Tahoe Bikeway. Photo: Morgan Beryl

South Tahoe Bikeway & Pope/Baldwin Beach Bike Path

Active transportation users can currently ride from mid-town South Lake Tahoe all the way to Baldwin Beach on a nearly eight-mile connected network of shared-use paths and bike routes. The Pope/Baldwin Beach Path is maintained by the USFS. It was upgraded in 2015 to meet modern design standards and was rerouted to create safer conditions with reduced user conflict. The South Tahoe Bikeway connects to the USFS maintained Pope/Baldwin Beach Path and brings users through half of the city, passing residences, commercial areas, meadows, and recreational amenities. The Bikeway is planned for further extension between 2016 and 2017.

West Shore Bike Path

One of the oldest bikeways in the Region, this bikeway offers 8.4 miles of gorgeous views along the West Shore of Lake Tahoe. The path connects users from Tahoe City to Sugar Pine Point and will soon extend to the Meeks Bay Campground thanks to a 2015 California Active Transportation Program award. The original path was constructed by Tahoe City Public Utility District (TCPUD). The Meeks Bay connection will be constructed by TTD. TCPUD maintains the entire bikeway. As near–term projects are completed, the West Shore Bike Path in combination with the Lakeside Trail and Truckee River Trail (described on the following page) will create a continuous 19-mile network.

Lakeside Trail & Truckee River Trail

This path network completed in 2011 by the TCPUD spans the entire length of Tahoe City and connects users to Squaw Valley Mountain Resort along the Truckee River. The path is just over 6 miles long. It offers recreational opportunities and allows users to travel to opposite ends of town without using the street network. These trails are part of the soon-to-be continuous 19-mile trail network mentioned on the previous page.

Lakeside Trail

Lakeshore Path

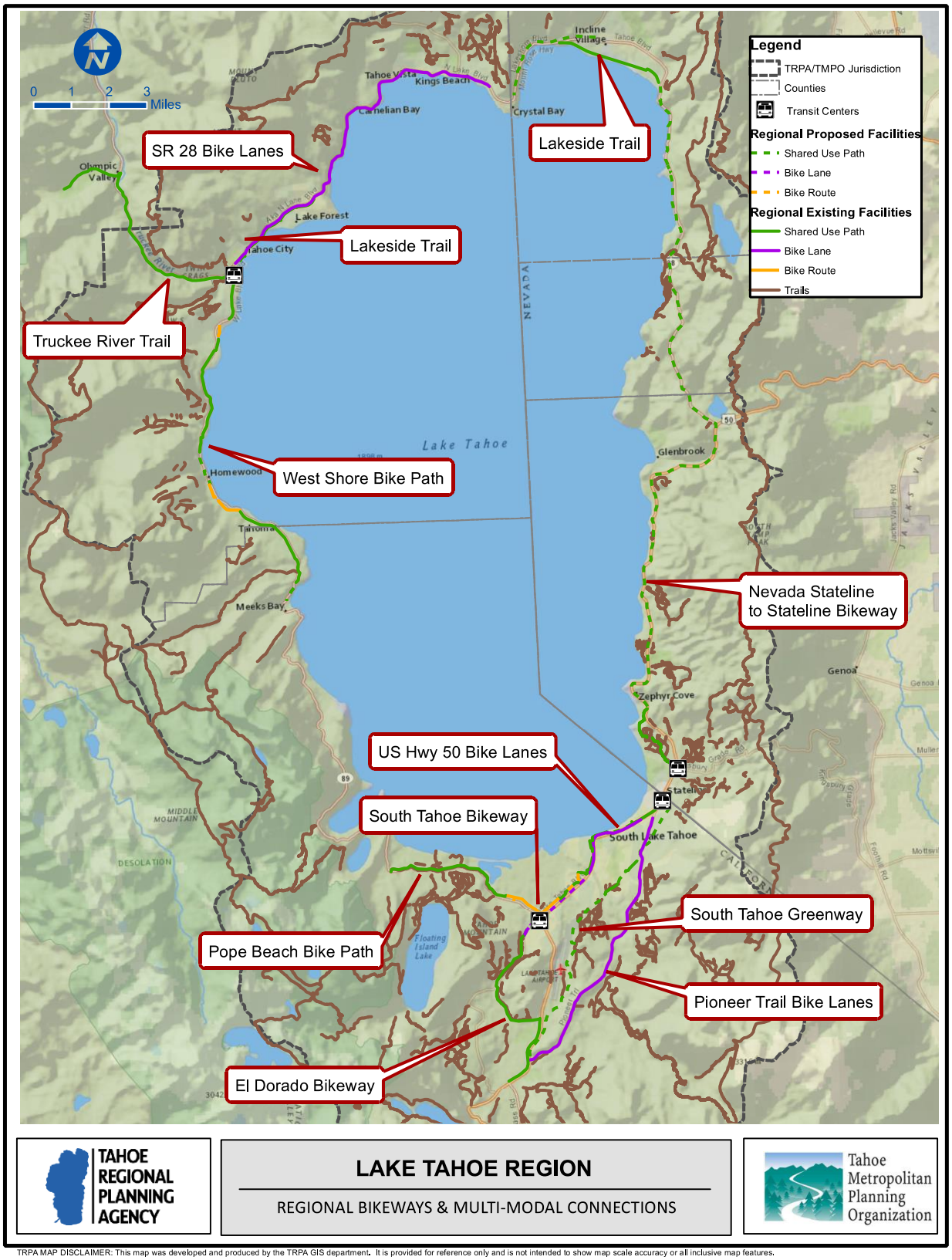
Connecting one side of Incline Village to the other, this path sees the heaviest use in the Region, according to the TRPA/TMPO *Summer & Fall 2015 Data Collection Report*. Spanning roughly 3.5 miles, the path is highly recreational, though it also connects visitors and residents to local commercial areas. This path was upgraded in 2012.

On-Street Network:

Continuous on-street bicycle infrastructure also acts as a regional bikeway for bicyclists. Many sections of US Highway 50 and State Route 28 have continuous bike lanes. These state highways act as main streets for City of South Lake Tahoe, Tahoe City, Kings Beach, and Incline Village. They serve commuters and competitive cyclists. Other major streets with bike lanes, like Pioneer Trail in South Lake Tahoe, also act as main thoroughfares for bicyclists. In some areas, bike lanes are in need of maintenance, including consistent restriping, widening, continuation through intersections, and repaving.

Lake Tahoe Boulevard bike lane. Photo: Mike Vollmer

FIGURE 2-6: REGIONAL BIKEWAYS & MULTI MODAL CONNECTIONS



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Current Use Patterns

Active transportation trips are not easily measured or projected for an entire region without extensive data collection efforts. To better understand where people are going and how they are getting there, TRPA/TMPO worked with local partners to analyze historical data, conduct 2015 summer and fall counts, and analyze the 2015 Survey responses. Implementers should use conclusions found in these reports to inform their infrastructure designs and project priorities. Figure 2-7 illustrates all TRPA/TMPO monitored locations for 2015 by facility type. Additional locations were monitored by Douglas County and TCPUD. For more detailed analysis, refer to the *Summer & Fall 2015 Data Collection Report* located on the TMPO website and the *2015 Community Outreach Report* (Appendix B).

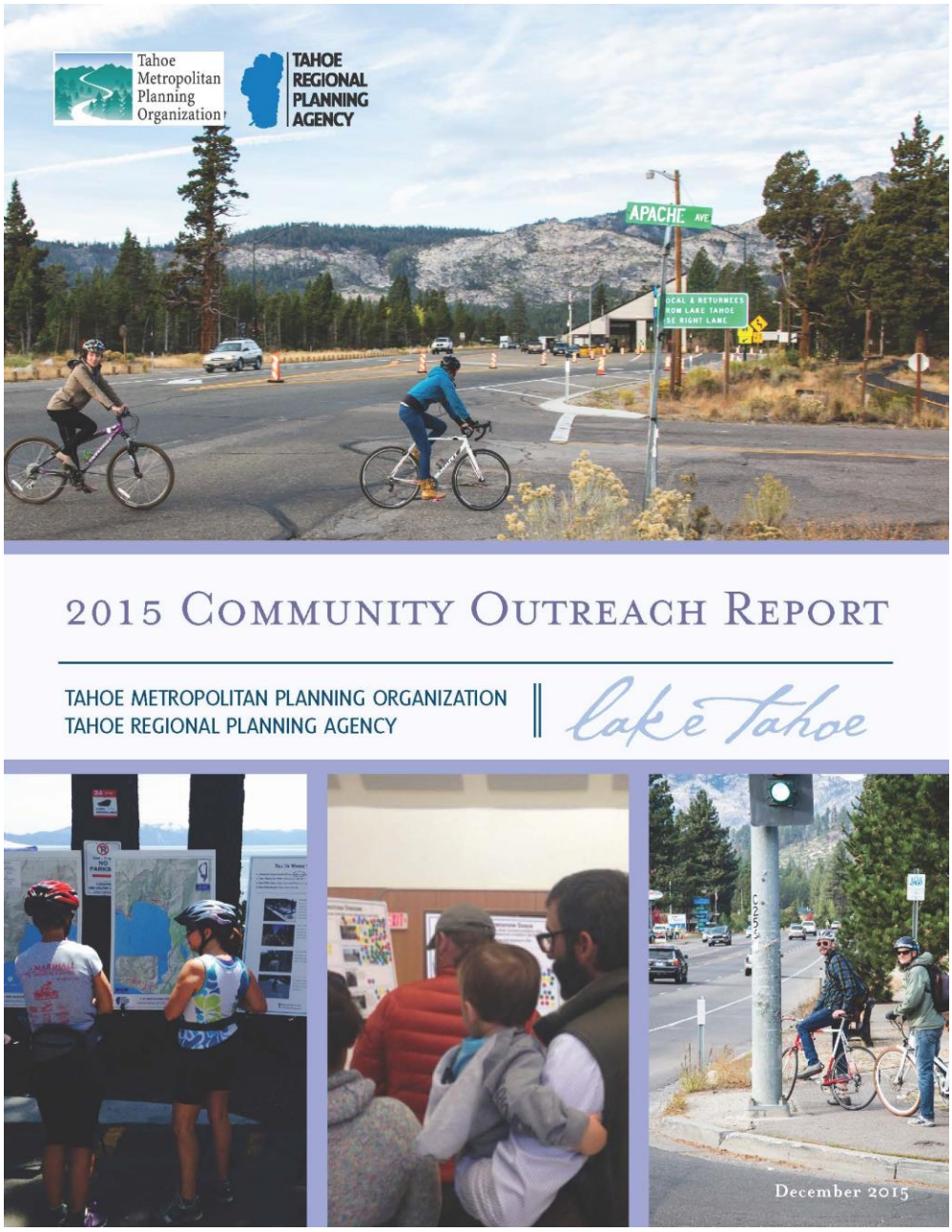


FIGURE 2-7: 2015 TRPA REGIONAL MONITORING LOCATIONS

**Note: Additional locations were monitored in 2015 by TCPUD and Douglas County.*

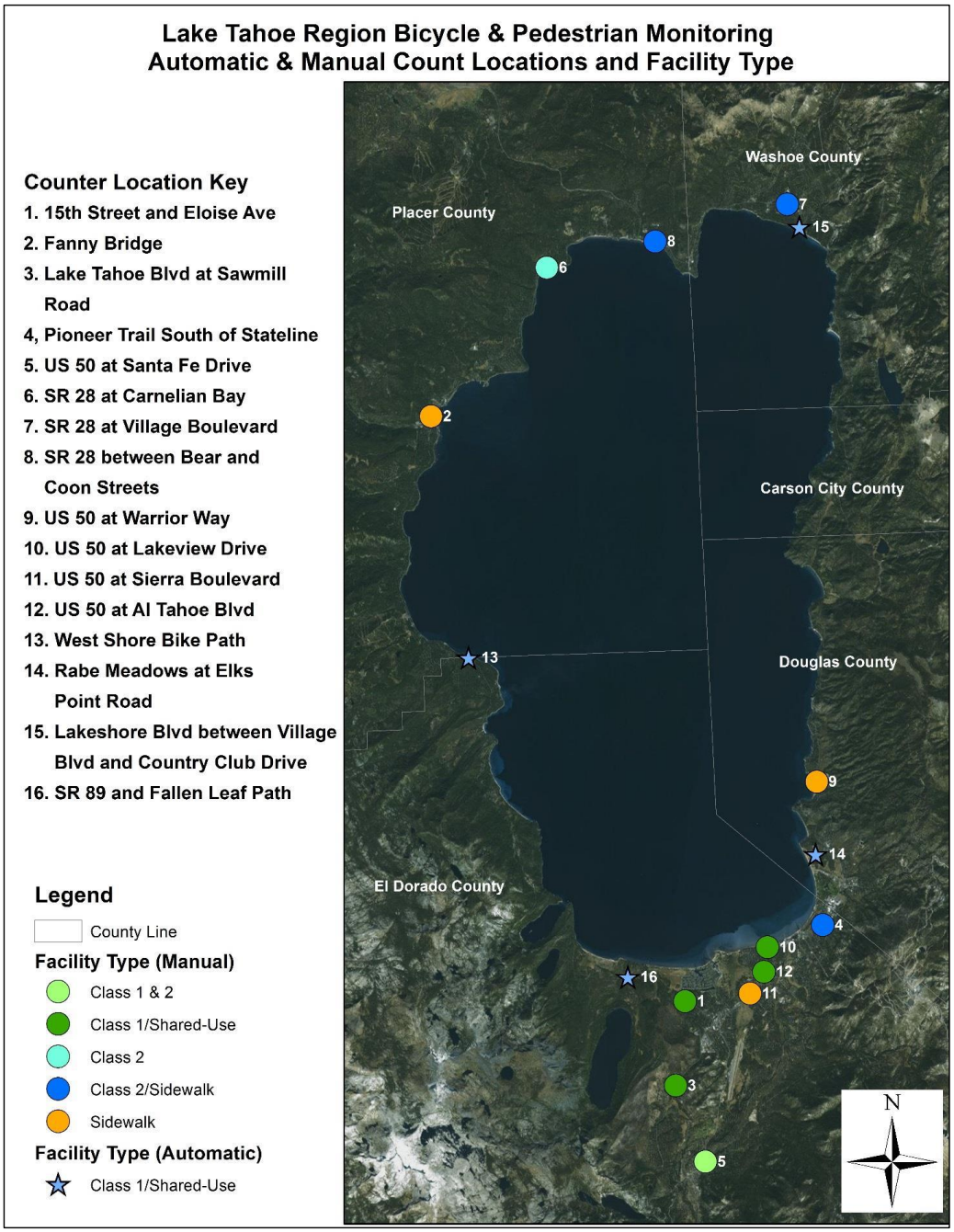


Figure 1. 2015 Summer and Fall Manual and Automatic Count Locations

The data collected in 2015 presents the following conclusions:

1. The presence of high quality facilities influences active transportation usage, while low quality or lack of infrastructure discourages use. When designing projects, agencies should consider implementation of the most up to date, comprehensive infrastructure to encourage increased use.

2. Currently, shared-use paths have the highest use in the Region and are preferred by the community. Shared-use paths accommodate more varieties of user types including less-experienced and recreational bicyclists, pedestrians, the disabled, and faster commute oriented bicyclists. When designing projects, feasibility for a shared-use path should be considered rather than a curb adjacent sidewalk.

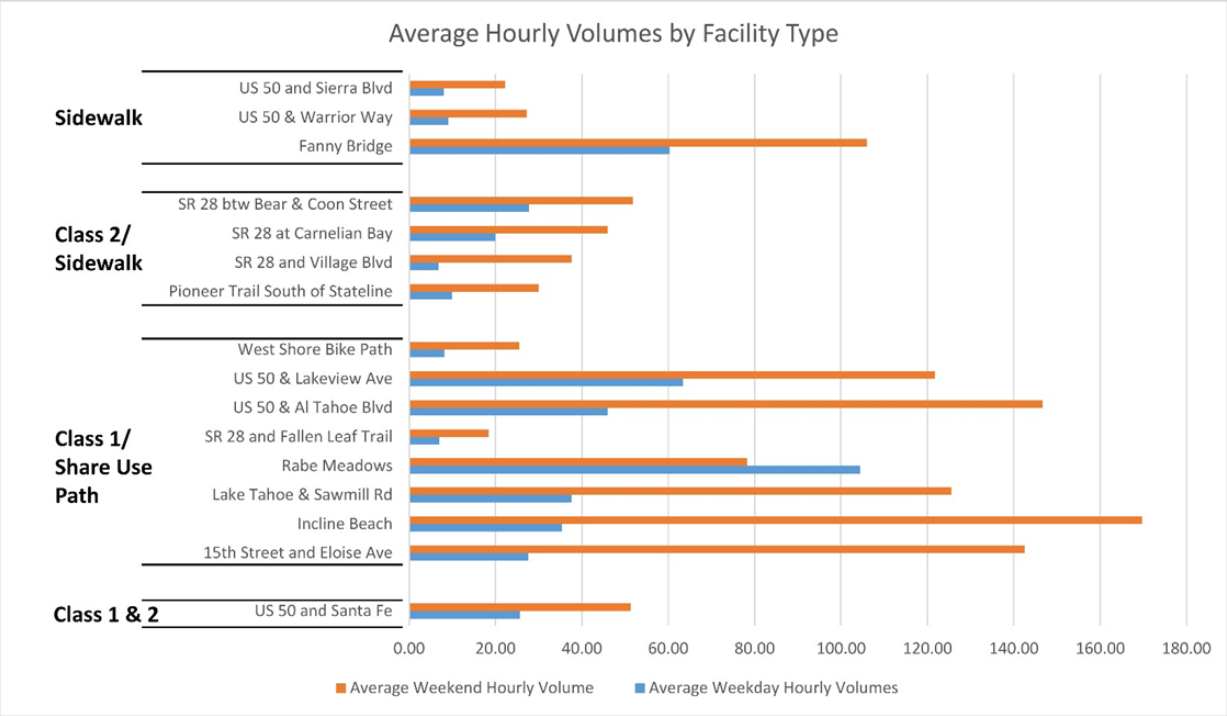


Figure 2-8: Average Hourly Volumes by Facility Type. Source Summer & Fall 2015 Data Collection Report

3. Trails located farther away from commercial centers are predominantly traveled by bicyclists, while locations closer to commercial centers have higher pedestrian activity. Pedestrian and bicycle use varies based on infrastructure type, but both are influenced by commercial activity. We see our highest volumes of pedestrian activity in commercial centers where sidewalks exist and bike activity in commercial centers that are connected to shared-use paths. Though regional connections facilitate long distance commuting, the average commute distance that encourages people to actively transport is 3 miles or less. Project priorities should focus on closing gaps and providing connections to commercial, in-town recreational amenities, and residential locations.

Locations	Average Pedestrian Hourly Volume	Average Bicyclist Hourly Volume
15th Street at Baldwin Path	6.50	59.42
Al Tahoe at US 50	23.42	52.17
Fanny Bridge	49.42	30.75
Lake Tahoe Blvd at Sawmill Road	3.58	13.00
Pioneer Trail	66.33	29.42
US 50 at Santa Fe Drive	5.83	13.00
SR 28 at Carnelian Bay	17.17	11.50
SR 28 at Village	28.08	7.67
SR 28 between Bear and Coon	67.33	12.25
US 50 at Lakeview Drive	35.08	47.75
US 50 at Sierra Blvd	13.67	20.50
US 50 at Warrior Way	4.92	7.83

Table 2-2: Average Pedestrian and Bicyclist Hourly Volume by Location. Source Summer & Fall 2015 Data Collection Report

4. The Lakeshore Path in Incline Village sees the highest use of all locations, regardless of infrastructure type, as shown in Figure 2-9. This data supports the need for improvement at the intersection of Lakeshore Boulevard and State Route 28. Further, the path is likely to experience increased use as the shared-use path to Sand Harbor is implemented.

5. State highways are heavily used by bicyclists even where infrastructure does not exist, such as along State Route 89 on the West Shore, and State Route 28 on the East Shore. Figure 2-10 illustrates survey respondents' most common routes.

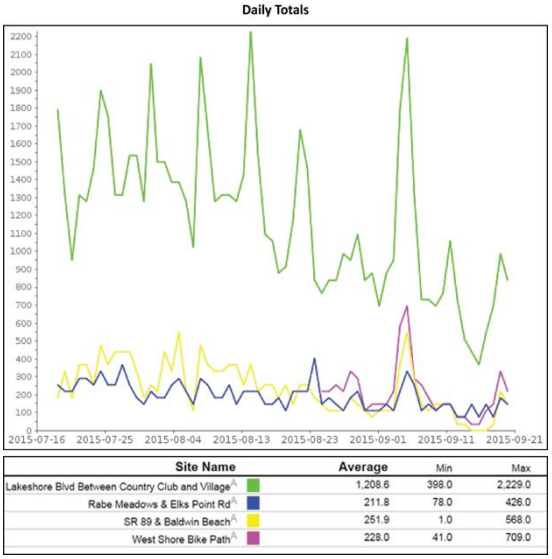
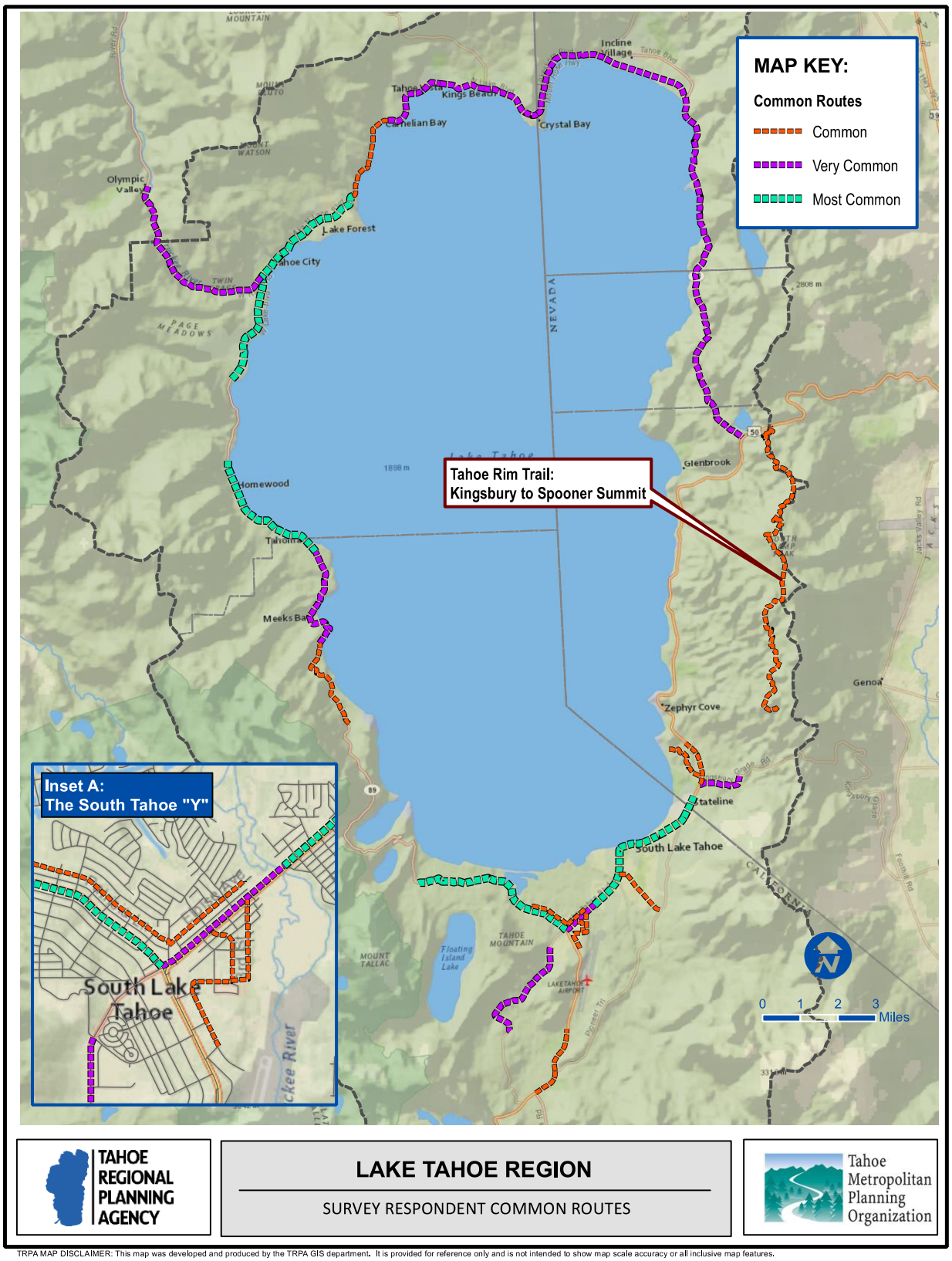


Figure 2-9: Automatic Counter Daily Totals. Source Summer & Fall 2015 Data Collection Report

FIGURE 2-10: REGIONAL SURVEY RESPONDENT MOST COMMON ROUTES



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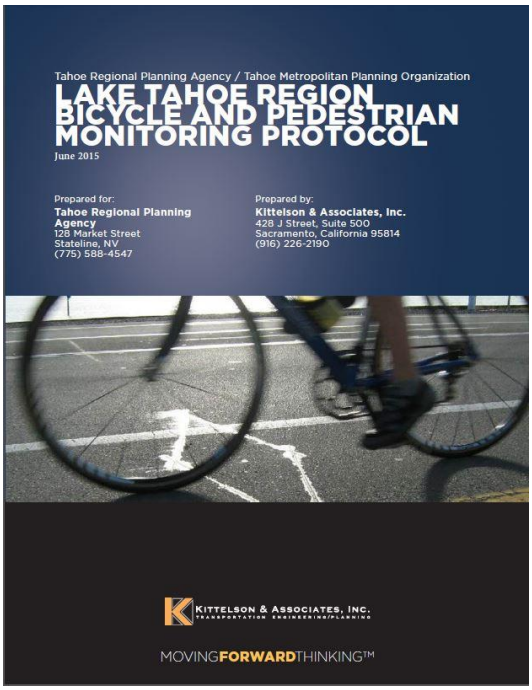
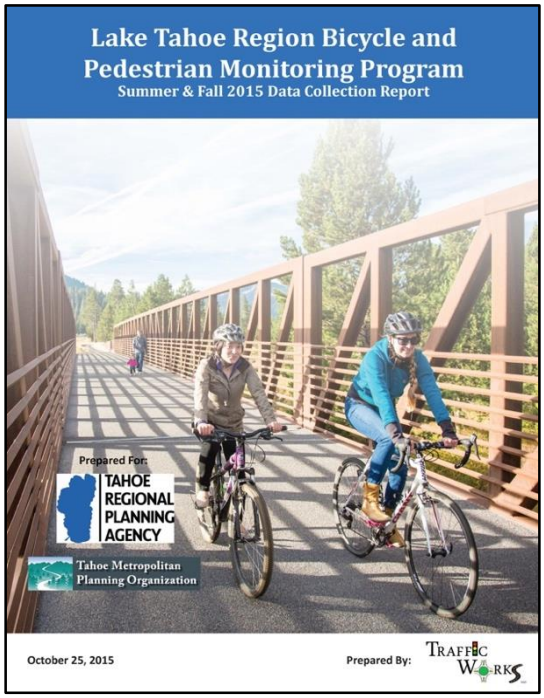
Estimating Future Volumes

Future active transportation trips will depend on multiple factors, including population, employment, climate, land-use development, and active transportation network build-out. For many years, TRPA/TMPO has maintained a transportation model that estimates future vehicle trips based on land-use scenarios. For the 2010 Bike and Pedestrian Plan, a bike trail user model was developed to predict regional active transportation rates and expected use of individual facilities. TRPA/TMPO began validating the Bike Trail User Model with the 2015 monitoring efforts. Over the next several years, TRPA/TMPO will continue to collect data to validate and update the model for the 2020 Regional Transportation Plan and Active Transportation Plan. As the official *Lake Tahoe Bicycle and Pedestrian Monitoring Protocol* (Appendix C) is implemented and extrapolation factors are determined, the model will become more sensitive to seasonal variation. For more information on the protocol, see Chapter 5, Section 5.4 Evaluation.





Using the model, TRPA/TMPO estimated future daily and annual use for the complete regional network. This estimate assumes a high quality, well maintained network of Class I shared-use paths on all major corridors where use is most common in the Tahoe Region. The model yielded an estimate of approximately 40,000 trips on the entire network on a peak summer day and almost 6 million annual trips assuming no winter path maintenance at complete build-out. The estimated 40,000 daily trips represent a four-fold increase over current active transportation rates on Class I shared-use paths. Assuming the same rates of commuting that were reported in the 2007 TRPA/Tahoe Coalition of Recreation Providers surveys, approximately 40 percent of these daily trips would be for commuter purposes.

2.2 CHALLENGES & STRATEGIES

Although Lake Tahoe offers many regional bikeways, multi-modal connections, and on-street facilities, barriers to active transportation still exist. Challenges that discourage active transportation and the development of projects to improve active transportation infrastructure include safety, gaps in connectivity, and the high cost of operations, maintenance, and implementation. This section discusses these challenges, and offers strategies to alleviate barriers.

Safety


Photo: Mike Vollmer

A bicycle and pedestrian network that people feel safe using is a high priority in active transportation planning and could be a key factor in getting people out of their cars and onto the active transportation network. Safety can be measured in many ways, such as through crash statics, Level of Traffic Stress (LTS), or qualitatively. TRPA/TMPO collected crash data from state and local agencies, as well as anecdotal data through community outreach. TRPA/TMPO analyzes safety by identifying multiple crash site locations and by cataloguing locations where users feel comfortable or uncomfortable along the network. State and local crash data is provided by the agencies listed in Table 2-3. TRPA/TMPO conducts surveys to gather qualitative safety information.

2010-2014 Crash Report:

Multiple agencies are involved in active transportation-related crash reporting, as indicated in Table 2-3 below.

AGENCY TYPE	AGENCY NAME	RESPONSIBILITY		
		Responds to Crash	Records	Submits to State Collection System
State	California Highway Patrol (CHP)	X	X	X
	Nevada Highway Patrol (NHP)	X	X	X
Local	Barton Memorial Hospital		X	
	CSLT Police Department	X	X	X
	Douglas County Sherriff	Only upon request	X	X
	El Dorado County Sherriff	Only upon request	X	X
	Placer County Sherriff	Only upon request	X	X
	Washoe County Sherriff	Only upon request	X	X

Table 2-3: Agencies Responsible for Crash Reporting. Source: TRPA/TMPO

Accurately reporting crashes is essential for identifying safety needs. **Anecdotally it was identified that current bicycle and pedestrian crash reporting contains data gaps**. During 2014 and 2015, TRPA/TMPO, the Community Mobility Workgroup, and the Lake Tahoe Bicycle Coalition worked with agencies to collect data and discuss where and how reporting can be more robust.

Crashes may not always be accurately reported due to technical difficulties with recording systems, staff availability, injury severity, and non-reporting by victims. Recently, the City of South Lake Tahoe Police Department made progress in overcoming technical recording issues associated with how and what kind of data is inserted into computer databases.

Table 2-4 illustrates crashes reported to the states of California and Nevada. Crashes are separated by jurisdiction and injury severity. In some cases, data from 2014 may not be complete because state officials are still updating databases with 2014 information.

Jurisdiction	Total Crashes*	Pedestrian	Bicycle	Injury	Fatal
El Dorado County, CA	9	3	6	9	0
City of South Lake Tahoe, CA	25	11	14	25	1
Placer County, CA	59	20	39	57	2
Carson City, NV	0	0	0	0	0
Douglas County, NV	8	5	3	5	4
Washoe County, NV	4	2	2	2	0
Total	**105**	**41**	**64**	**98**	**7**
Accident Rate:	**7.00%**	This number is derived by dividing the total number of active transportation collisions between 2010 -2014 in California (93) by the total collisions on the California side of the Region over the same period of time (1305).			
*The sum of injuries and fatalities may be higher or lower than total accidents because sometimes the number of people in the party was greater than 1 or an injury did not occur.					

Table 2-4: Reported Crashes between 2010 -2014. Source: SWITRS/NHP

Some intersections have been the site of multiple crashes as indicated in Table 2-5 (on the next page), with the locations of highest crash occurrence highlighted in orange. The table also compares officially recorded crash sites to qualitative data collected from the 2015 Survey. Respondents were asked to identify locations they felt were in need of improvement and why. Crash information, along with community and stakeholder feedback, was used to identify intersection improvement location priorities, which are shown by corridor in Chapter 4, Network Recommendations. All intersections in the Region, however, could benefit from active transportation improvements.

Table 2-5 identifies several locations where complete street improvements are currently underway or planned. These include the Tahoe City "Wye" as part of the **SR 89/Fanny Bridge Community Revitalization Project**, State Route 28 and Chipmunk Street as part of the **Kings Beach Boardwalk/Gateway Project,** and Stateline & US Highway 50, as part of the **US 50/South Shore Community Revitalization Project.** Further, State Route 28 and Bear and Fox streets have recently been improved as part of the **Kings Beach Commercial Core Project**.

NUMBER OF CRASHES			TYPE OF INTERSECTION		COMMUNTIY IDENTIFIED	REASON
Location	Bicycle	Pedestrian	Signalized	Unsignalized		
Pioneer Trail & Moss Rd, CSLT		2		√	1	Long wait time & High vehicle volumes
SR 28 & Agatam Ave., Tahoe Vista		2		√		
SR 28 & SR 89, Tahoe City		3	√		15	Do not feel safe, Does not have a crosswalk, High vehicle volumes, Distance is too long, & Wait time is too long.
US 50 & Stateline, CSLT		3	√		1	
SR 28 & Bear St., Kings Beach	2			√	9	Do not feel safe & High vehicle volumes
SR 28 & Chipmunk St., Kings Beach	4			√	2	High vehicle speeds
SR 28 & Fabian Way, Dollar Point	2			√		
SR 28 & Fox St., Kings Beach	2			√	7	High vehicle volumes & speeds, Small waiting area
SR 28 & Grove St., Tahoe City	2			√	9	High vehicle volumes
SR 28 & Old County Rd., Incline Village	3			√		
SR 89 & Granlibakken Rd., Tahoe City	3			√		
SR 89 & Oak St., Homewood	2			√	2	
TOTAL:	20	10	2	10	**46**	

Table 2-5: Intersection Crash Index. Source: SWITRS/NHP; 2015 Active Transportation Plan Survey

TRPA/TMPO sought to collect qualitative crash data that can supplement recorded police data over the four-year period from 2010 to 2014. Survey respondents were asked whether or not they had experienced a bicycle- or pedestrian-related crash between 2010 and 2014. In total, 22 respondents noted they had experienced a crash between those years, of which 14 incidents were unreported. Table 2-6 summarizes crash data recorded from the California Statewide Integrated Traffic Records System (SWITRS), the Nevada Crash Database, and the 2015 Survey. Crash locations are depicted by corridor in maps in Chapter 4: Network Recommendations.

Total Bicycle & Pedestrian Crashes: 2010 -2014						
Reported By:	2010	2011	2012	2013	2014	**Total Collisions:**
SWITRS	17	16	23	19	18	**93**
NHP	1	3	4	4	0	**12**
TRPA/TMPO Active Transportation Plan Survey	Collected for consolidated 4-year period, indicates only non-reported collisions					**14**
Total Collisions:	**18**	**19**	**27**	**23**	**18**	**119**

Table 2-6: Total Bicycle & Pedestrian Crashes, 2010-2014. Sources: SWITRS, NHP, 2015 Active Transportation Plan Survey

Barton Memorial Hospital began recording active transportation-related injuries in 2012. TRPA/TMPO conducted outreach to Incline Village Community Hospital to clarify if they also recorded transportation-related injuries. The hospital indicated that it does collect this information, but does not consolidate it into any report for public consumption. Barton data is provided below and is compared to data available in SWITRS for the City of South Lake Tahoe, El Dorado County, and Douglas County during the same time period. Hospital data does not include area codes, so this

comparison assumes records only include injuries from the Barton Hospital identified primary service area for Lake Tahoe, including the City of South Lake Tahoe, El Dorado County, and Douglas County. Table 2-7 highlights the discrepancy between the number of crashes reported to the state and the number of actual active transportation-related injuries treated by Barton Hospital.

SWITRS & Barton Memorial Hospital Crash Data Comparison: 2012 - 2014				
Year Reported & Agency:	2012	2013	2014	**Total Collisions:**
SWITRS	12	3	4	**18**
Barton Memorial Hospital	24	16	21	**61**

Table 2-7: SWITRS & Barton Memorial Hospital Crash Data Comparison, 2012 -2014.Sources: Barton Memorial Hospital & SWITRS

Designing for Safety:

Perceptions of safety directly influence people's choice to use active transportation. Poor sight distance, high vehicle volumes and speed, lack of lighting, and lack of infrastructure may cause people to choose to drive even though they may prefer to make their trip by biking or walking. The 2015 Survey asked respondents why they felt locations they indicated were in need of improvement. Their answers are illustrated in the figures below. The issues relayed in the figures, such as not feeling "protected from traffic," should be used as design criteria when designing future projects or reconfiguring roadways.

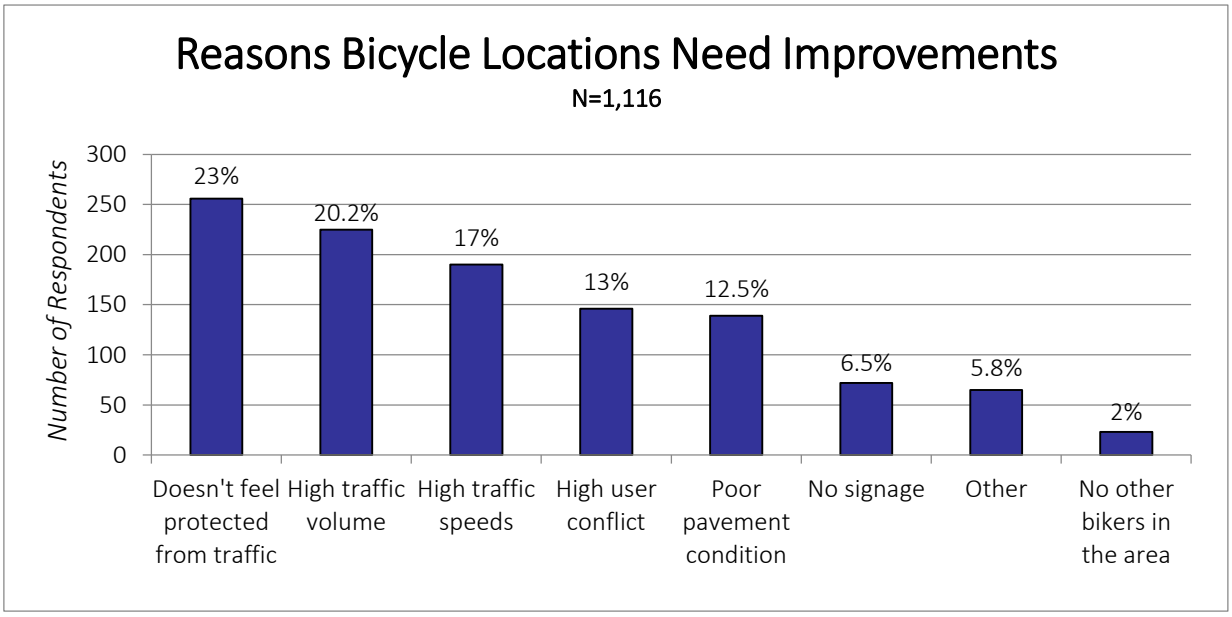


Figure 2-11: Reasons Intersections Need Improvements for Bicyclists. Source: 2015 Active Transportation Plan Survey

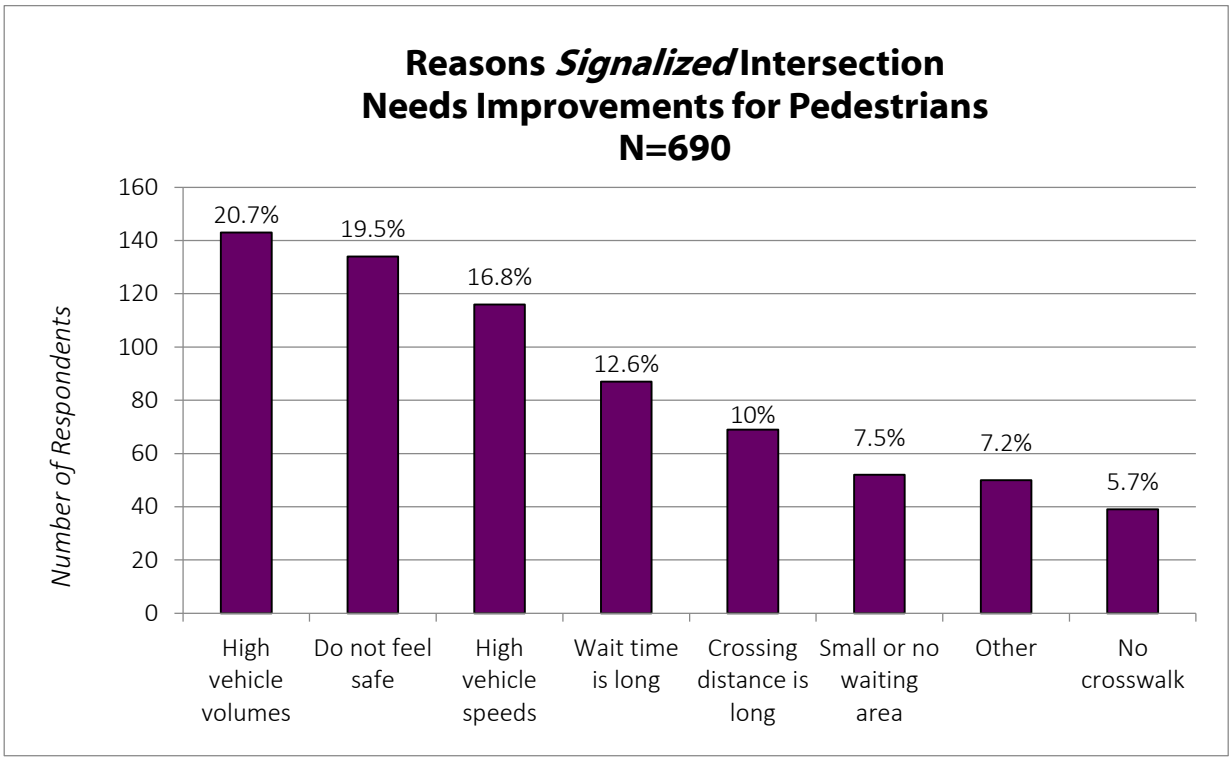


Figure 2-12: Reasons Signalized Intersections Need Improvements for Pedestrians. Source: 2015 Active Transportation Plan Survey

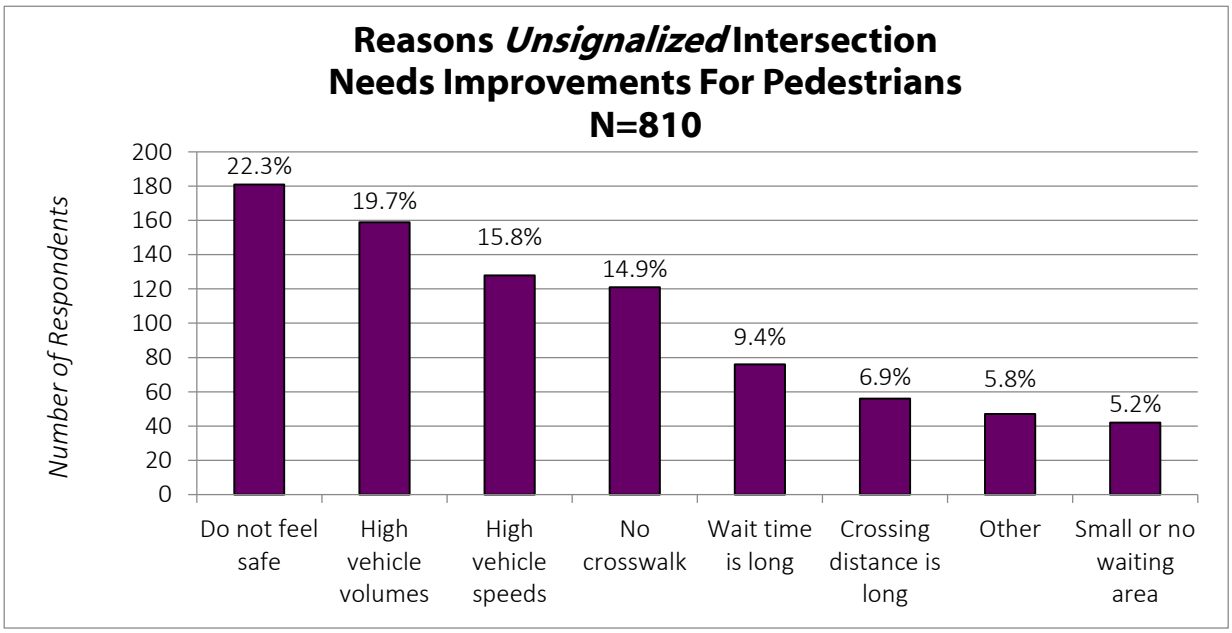


Figure 2-13: Reasons Unsignalized Intersections Need Improvements for Pedestrians. Source: 2015 Active Transportation Plan Survey

Safety - Challenges & Strategies:

The sections above illustrate three clear safety challenges. These challenges are listed below, and include recommended strategies as possible solutions.

- **ACCURATE CRASH REPORTING**

  Strategy:

  - *Encourage all crash victims to report incidents to police*. Some ways to encourage this behavior are through education campaigns that inform people how to report, such as calling hotlines. An online self-reporting tool could be developed to support increased reporting. Hospitals can also encourage victims to report their incident to law enforcement.
  - *Ensure law enforcement records all active transportation-related crashes, regardless of injury severity, and includes those records in their report to the state*. This may entail altering the way law enforcement collects information, or may require updating technological systems to coordinate with state systems.

- **"HOT SPOT" LOCATIONS IN NEED OF IMPROVEMENT**

  Strategy:

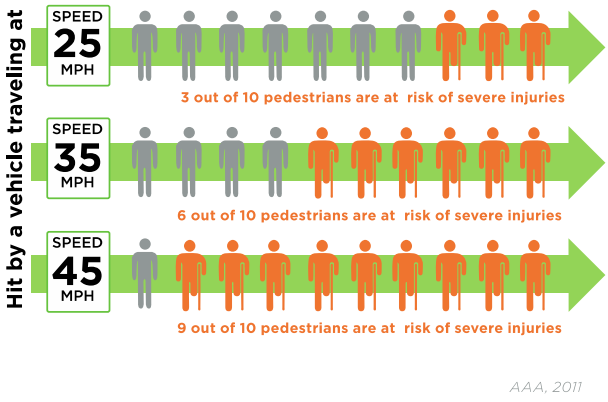
  - *Use 2010-2014 Crash Report and intersection priority locations to prioritize locations for improvement*. Priority locations should be added into capital improvement programs and included in private and public projects, where appropriate.

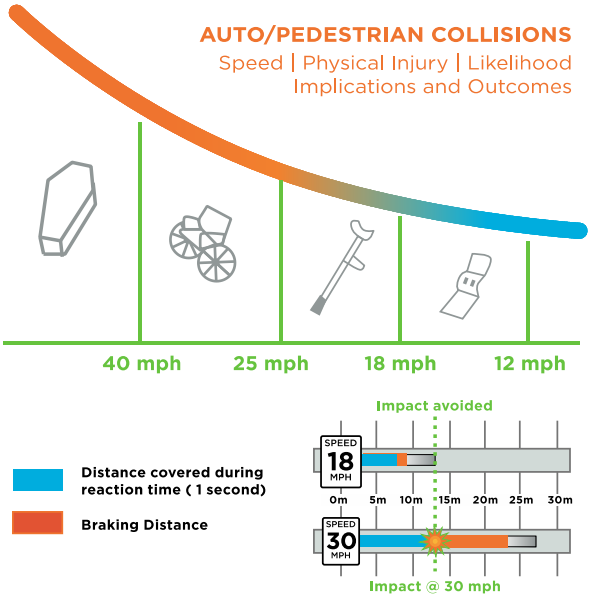
3rd Street & US 50 Intersection, vehicular left turn movement. Photo: Mike Vollmer

DESIGN FOR SAFETY

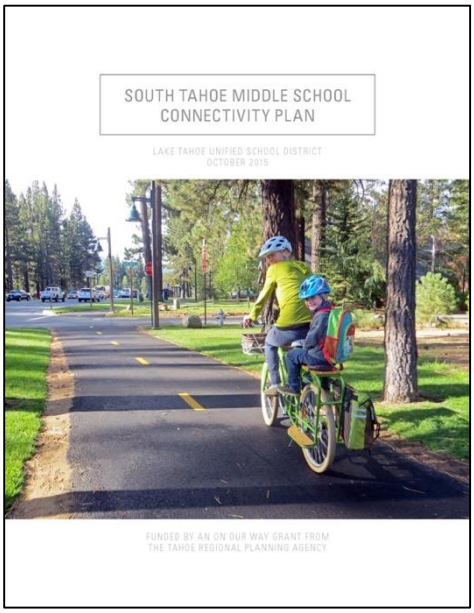
Strategy:

- *Design projects for the safety of all roadway users.* Use the data collected in the 2015 Survey to identify community-perceived risks to safety and design projects to address those issues. Lake Tahoe-specific issues that can be improved through design include lighting crosswalks, decreasing the distance between controlled crossing opportunities, reducing crossing exposure (Distance), and adding designated on-street infrastructure in uphill sections of roadway.





Connectivity



Gaps in connectivity impact a variety of user types in different ways. These differences are explained and analyzed as Level of Traffic Stress, which measures the ability for active transport users to travel between origin and destination without using links that exceed their tolerance for discomfort and that do not involve an undue level of detour. For a family of riders, parents may only feel comfortable taking their children on shared–use paths because they are completely separated from vehicular traffic. If a family cannot take the path from origin to destination, they may choose to drive even if they would prefer to bike. More experienced riders may be more comfortable riding in bike lanes with traffic, but may choose not to ride because bike lanes are not well maintained, are poorly designed, or inconsistent. If sidewalks do not extend the entire distance of a common commute or do not exist at all, and pedestrians are forced to walk along the road, they, too, may decide to drive. In many cases, people do not have transportation choices, as explained in the equity section in Chapter 1. At the 2015 Active Transportation Plan community gatherings, attendees were asked to identify top priorities for active transportation planning. *Connectivity is the top priority*.

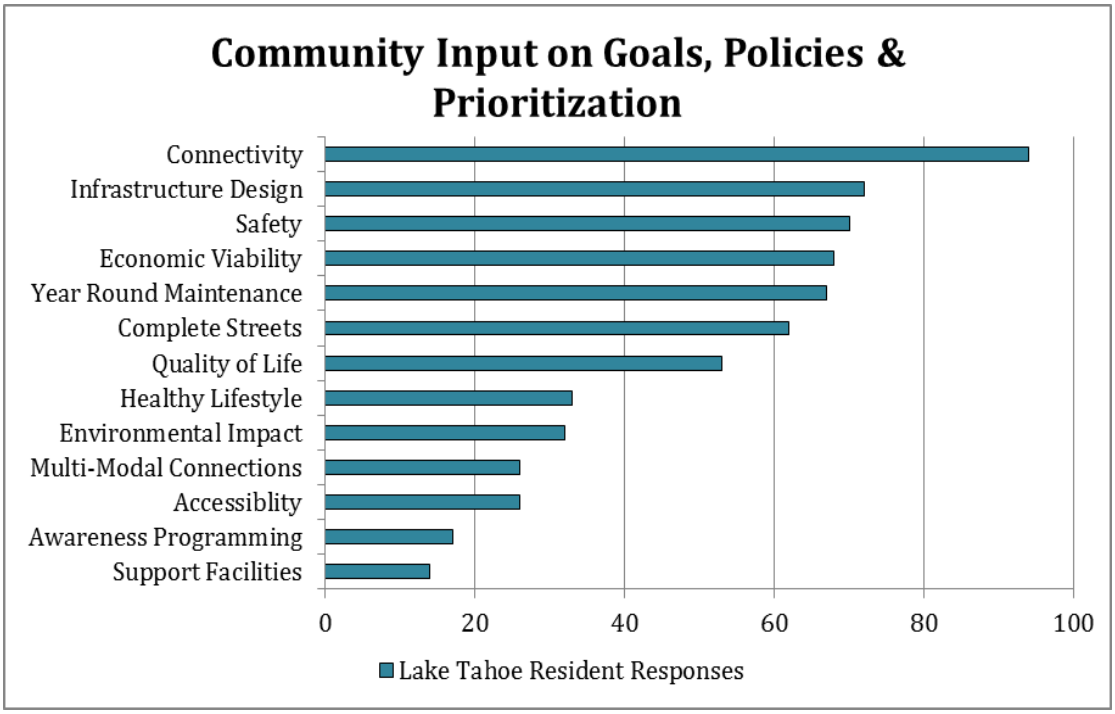


Figure 2-14: Community Input on Goals, Policies, and Priority. Source: 2015 Community Outreach Report

Connectivity - Challenges & Strategies:

The Lake Tahoe Region has a few key locations that sever the active transportation network and act as barriers to increased use. This list is not exhaustive, but identifies locations that are major gaps in regional connectivity as of 2015. These locations include:

Location	Status	Improvement	Project Lead
South Tahoe "Y" to Trout Creek	Programmed for Improvement 2017/8	Bike Lanes & Sidewalks	Caltrans
Al Tahoe Boulevard, from US 50 to Johnson Boulevard	Programmed for Improvement 2017	Bike Lanes, Shared-Use Path, Sidewalk, Intersection	City of South Lake Tahoe
SR 89 from Cascade to Meeks Bay	N/A	Bike Lanes & Shared -Use path	N/A
Kings Beach to Crystal Bay	N/A	Shared-Use Path	N/A
Crystal Bay to Incline Village	Planning for Improvement	Shared-Use path	Tahoe Transportation District & NDOT
Incline Village to Round Hill Pines.	Programmed and planning for improvement 2016 - Onward	Shared-Use Path	Tahoe Transportation District & NDOT
SR 28 & US 50 (Nevada)	N/A	Bike Lanes	NDOT

Table 2-8: Regional Gaps in Connectivity. Source: TMPO

Gaps in Connectivity are illustrated by the following physical infrastructure issues:

- Lack of infrastructure
- Discontinuous infrastructure
- Aged facilities that no longer feel safe
- Intersections that do not accommodate all user types
- Lack of wayfinding to direct users to a preferred network

Strategies to improve conditions and reduce connectivity gaps can involve small efforts such as installing wayfinding signage or large scale construction projects. Implementing agencies should prioritize closing network gaps by placing these projects on their capital improvement program lists. Recently, the City of South Lake Tahoe and El Dorado County have installed wayfinding signage on their trail systems through funding provided by Measure R and Measure S. Placer County, in coordination with the North Lake Tahoe Resort Association, has created a wayfinding manual to assist in the implementation of a comprehensive wayfinding network. Washoe County, as part of a TRPA/TMPO On Our Way Grant Program, is also creating a Signage Master Plan for the State Route 28 Corridor. These are great starts to assisting users on regional trails. The street network could benefit from similar efforts.

West Shore Wayfinding. Photo: Alta Planning + Design

- For regional connectivity gaps, implementation of **large scale projects** may be necessary. These projects can be done in phases, such as first adding bike lanes and later providing a Class I shared-use path when funding is available. Interim projects can help close gaps more quickly at reduced costs. Constructing interim projects may allow more robust planning, outreach, and funding analysis to be conducted while still meeting the short-term needs of the community.

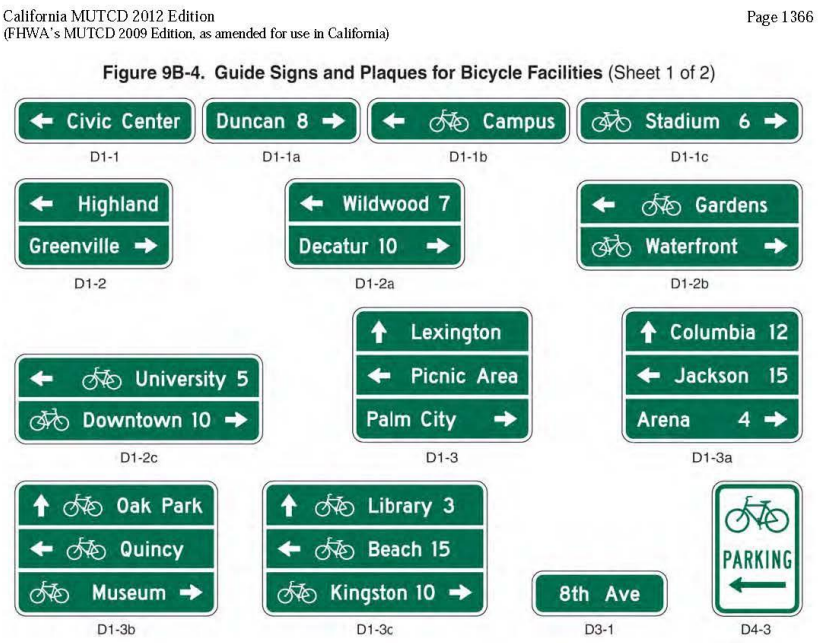
- For more localized connectivity gaps, **wayfinding signs** are a small improvement that can generate a large benefit. Tourists and residents may not understand that the Lake Tahoe network is comprised of various types of infrastructure, such as bike lanes that connect to bike routes that connect to a shared-use path. Wayfinding offers people recommendations about preferred routes, provides destination and distance information, and acts as a key landmark in case of emergency.

Strategies for improving wayfinding include:

- Be Consistent and use the 4 "D's"
  - Distance
  - Direction
  - Destination
  - Duration

- Integrating wayfinding into structures in the public right-of-way, such as bus shelters, permanent trash cans, and other street furniture. Information must be accessible to people with disabilities.

- Install signs to direct users in the right direction, especially at route decision points.



Constructability

Project construction in the Region has accelerated thanks to the efforts of governmental agencies, funding awards, and advocacy groups. Multiple-resource benefits are also realized as more water quality projects include complete street improvements. Some examples of multi-benefit projects are Caltrans' work on US Highway 50 and State Route 89, and the City of South Lake Tahoe's Greenbelt. Projects anticipated to be completed by 2018 include:

US 50 Water Quality Improvement Project

Location	Improvement	Project Partners	Year of Construction
Al Tahoe Safety and Mobility Enhancement Project	Roadway realignment, Shared-Use Path, Bike Lanes, Sidewalks, Intersection Improvements	Caltrans & City of South Lake Tahoe	2017
SR 89 / Fanny Bridge Community Revitalization Project	Roundabouts, Bike Lanes, Shared-Use Paths, Crossing Improvements, Water Quality Improvements	TTD, Caltrans, TCPUD, and Placer County	2016/2017
Nevada Stateline to Stateline Bikeway (Incline Village to Sand Harbor)	Shared-Use Path, Parking Improvements	TTD, Washoe County, NDOT	2017
US 50 (Trout Creek to South Tahoe "Y")	Bike Lanes, Sidewalks, Intersection Improvements, Water Quality Improvements	Caltrans & City of South Lake Tahoe	2017
West Shore Bike Path Extension (Homewood & Meeks Bay)	Shared-Use Path	TTD, TCPUD, Caltrans, & Placer County	2016/17/18
South Tahoe Greenway	Shared-Use Path	CTC & City of South Lake Tahoe	2018
Kings Beach Commercial Core Revitalization Project	Roundabouts, Sidewalks, Bike Lanes, Water Quality Improvements	Placer County & Caltrans	2016

Table 2-9: Near Term Regional Project Implementation. Source: TMPO

Agencies still face many challenges moving projects into implementation, including a limited construction season and limited funding, and the difficulty of managing traffic control during peak summer travel times. Delaying projects that improve safety can result in preventable injuries or fatalities. One of the goals of this plan is to help agencies identify ways to deliver cost-effective projects to more quickly meet the needs and values of the community.

Implementation – Challenges & Strategies:

- **HIGH BUILDING COST**

  Strategies:

  - *Be Opportunistic:* Look for nearby or similarly timed projects and identify opportunities to expand the scope to include complete street improvements.

  - *Resurface and Repurpose:* If a roadway is programmed for resurfacing, revisit the street striping to include painted active transportation infrastructure.

  - *Bundle Funds:* Be creative with funding sources by planning ahead and diversifying sources.

  - *Design/Build vs. Construction Manager at Risk vs. Design/Bid/Build:* Cost savings can occur when contractors are brought on board for projects before they have reached 100 percent design. These methods give contractors an opportunity to provide feedback on the implementation challenges they foresee and creates buy-in to implement the project as envisioned.

Round Hill Pines Path Construction. Photo: TTD

PUBLIC SUPPORT

Strategies:

- *Interim Treatments:* During planning and outreach phases, construct low-cost, interim treatments that reflect future project plans. This gives the community a chance to understand the new infrastructure, give feedback, and improve the area in the short-term without large costs. Interim projects give staffers the opportunity to refine and rethink issues to implement better long-term projects. Some examples of interim treatments include:

    - Signs
    - Signal phase readjustment
    - Painted roadway markings
    - Street furniture (planters, benches, tables)
    - Superficial construction
    - Part-time closures

Jackson Hole, WY. Painted Curb Bulbouts. Photo: Alta Planning + Design

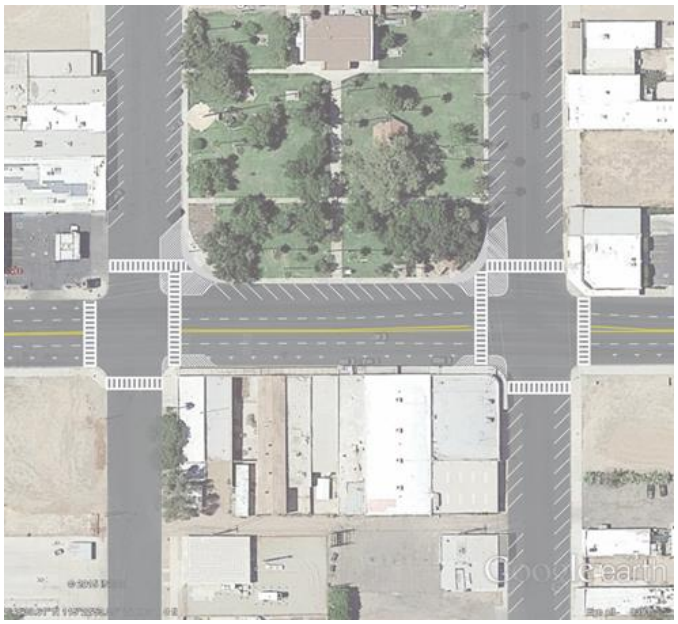
- *Phased Implementation:* Similar to interim treatments, phased implementation gives the community a chance to understand the project and experience benefits. As the project draws closer to completion, public support and desire for the project will be stronger.

Original Alignment

Phase 1: Painted crosswalks & roadway realignment

Phase 2: Painted Curb Bulbouts & Realigned Crosswalks

Phase 3: Bulbouts made permanent



Example supplied by Alta Planning + Design at the Transforming Tahoe Transportation Workshop

Maintenance

A major component of a healthy transportation network is maintaining and upgrading infrastructure so it is comfortable and safer to use. Some paths and on-street infrastructure in Lake Tahoe were implemented prior to current standards and best practices, or are weathered and need refurbishment. Many local agencies are taking the lead in upgrading the current trail system through refurbishment of pavement, expansion of width, and rerouting trails to reduce user conflict and heighten conflict awareness.

Banff, Canada – Cycle Track. Photo: Shay Navarro

Many on-street network upgrades are also needed. In many cases, bike lane striping is faint on the roadway, as agencies restripe at the end of summer and snow removal operations throughout the winter significantly degrade quality. Bike lanes throughout the Region are often minimum width and do not contain some updated design features such as buffers (painted or physical), cycle tracks, and intersection treatments. Table 2-10 highlights the high-priority facilities that are in need of upgrade as of 2015. The annual Active Transportation Plan Implementation Report will continue to update priority facility upgrades and report on facilities that undergo improvement.

Location	Improvement	Project Partners
Pioneer Trail	Bike Lanes (buffered)	El Dorado County & City of South Lake Tahoe
SR 89 & West Shore Bike Path	Crossing	Caltrans, TCPUD, TTD, and Placer County
Eloise Bike Route	Pavement Resurface	City of South Lake Tahoe
US 50 (CSLT)	Bike Lanes	Caltrans & City of South Lake Tahoe
SR 28 (Tahoe City, Kings Beach)	Bike Lanes	Caltrans & Placer County
Various paths around Incline Village	Refurbish path and bring up to current standards	Washoe County

Table 2-10: Facilities in Need of Upgrade. Source: TMPO

Operations & Maintenance - Challenges & Strategies:

"Transforming Tahoe Transportation: A Workshop on Completing Our Streets" included a robust brainstorming session, presentations, and panel discussions on the challenges associated with maintenance. Strategies used in other locations to overcome similar issues were presented as case studies. More detailed information can be found in Appendix A, the *Lake Tahoe Complete Street Resource Guide.*

ONGOING MAINTENANCE COST

Strategies:

- *Public-Private Partnerships:* The Town of Truckee, Placer County in Kings Beach, and the City of South Lake Tahoe all employ this method. Facility and assessment districts are created when local government and businesses enter into an agreement where the government invests capital funds to build complete street improvements and add value to commercial centers while business owners pay fees to assist in ongoing maintenance. Local examples include the Kings Beach Benefit Assessment District and the Park Avenue Development Maintenance Association.

Flush Curb. Photo: Alta Planning + Design

- *Surcharge on Property Taxes:* This tax can only be implemented by a vote by property owners, per Proposition 218 (for California). Taxes are used for transportation-related maintenance, including refurbishment and snow removal.
- *Design with Maintenance in Mind*: Include maintenance staff during design phase. Maintenance staff understands available resources. They can offer design strategies to alleviate known maintenance limitations.

SNOW REMOVAL

Strategies:

- *Design for Snow Removal:* Design ingress and egress that is wide enough for existing equipment, delineate and defend hardscape, and provide capacity for snow storage on site.
- *Identify Primary Routes*: Not all facilities in the network are appropriate for snow removal. Use count and common route data to identify which routes are most heavily used and for what activity, such as commuting to work or recreation. In some cases, paths may be more appropriate for packing snow and providing cross country ski routes. For commute locations, schedule operations so that ideal conditions occur between 7 a.m. and 7 p.m., with added emphasis on peak travel times of 7-8 a.m. and 4-5 p.m. Begin snow clearing after two inches of accumulation.

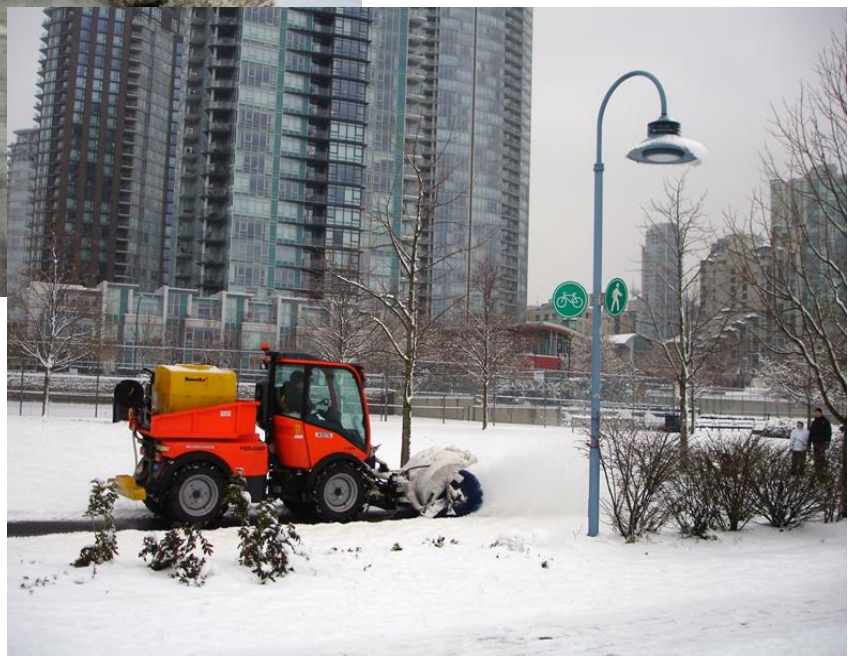
- *Get Creative with Equipment*: Create smaller snow plows out of old Jeeps that can remove snow from trails, bike lanes, sidewalks, and pedestrian refuge islands.

TORT LIABILITY

Strategies:

- *Utilize Federal and State Design Flexibility:* Both the FHWA and Caltrans have released memos that direct local jurisdictions to utilize design and funding flexibility in multi-modal design.
    - Caltrans, 2014: "Design Flexibility in Multimodal Design"
    - FHWA, 2013: "Bicycle and Pedestrian Funding, Design, and Environmental Review: Addressing Common Misconceptions."
    - FHWA, 2015: "Revision of Thirteen Controlling Criteria for Design" (Docket No. FHWA- 2015-0020).

Salt Lake City – Buffered Bike Lane
Photo: Alta Planning + Design



Vancouver, BC
Photo: Alta Planning + Design

CHAPTER 3: GOALS, POLICIES, & PERFORMANCE MEASURES

The goals, policies, actions, and performance measures in the Active Transportation Plan provide specific direction on how TRPA/TMPO and partnering agencies, organizations, and private entities can work together to improve the active transportation network and increase use. The policy framework reflects and provides solutions to current opportunities and challenges. Implementation actions associated with the policies below are located in Chapter 6: Implementation Plan, Section 6.1 "Actions."

3.1 GOALS

The goals provided below expand on the more general transportation goals set forth in the Bi-State Compact, the TRPA/TMPO Regional Plan, and the Regional Transportation Plan, *Mobility 2035*.

- Increase connectivity by completing the active transportation network.
- Improve safety for bicyclists and pedestrians.
- Increase and support consistent project implementation through technical assistance and funding.
- Increase encouragement and awareness through implementation of the "5 E's."

Kingsbury Grade. Photo: Tom Lotshaw

3.2 POLICIES

Policies provide direction for partners on how to meet goals. The policies often outline critical activities in which partners are already engaged as part of their day-to-day work. Once the TRPA/TMPO approves the Active Transportation Plan, the policies in this section will become part of the Regional Plan and will be implemented through the Code of Ordinances, the transportation department's overall work plan, and through agreements with partnering organizations. Policies, and associated actions are captured in matrices within each section. Many policies are fulfilled by multiple actions, and in some cases new specific actions were not identified as needed to fulfill each policy because they are already a part of daily activities.

SECTION 1: NETWORK DESIGN

1.1 Accommodate the needs of all travelers by designing and operating roads to provide for safe, comfortable, and efficient travel for roadway users of all ages and abilities, such as pedestrians, bicyclists, transit riders, motorists, commercial vehicles, and emergency vehicles.

1.2 Continue public/private collaboration in developing, funding, and implementing a complete Class I/shared-use path network around Lake Tahoe.

1.3 Design "low stress[1]" facilities to close gaps in the active transportation network by connecting facility types, removing barriers, and creating equitable infrastructure for all roadway users.

1.4 Through location-specific, flexible, and context-sensitive approaches, collaborate with agency stakeholders and community members to determine design solutions that meet requirements and incorporate best practices based on international, national, and state standards for active transportation.

1.5 Balance the needs of all roadway users when considering intersection improvements and impacts to level of service. Encourage implementing agencies to evaluate project design alternatives through methods other than and/or in addition to vehicular Level of Service (LOS) such as reduction in vehicle miles traveled (VMT), number of increased active transportation trips, Multi-Modal Level of Service (MMLOS) and Level of Traffic Stress (LTS).

1.6 Utilize design flexibility and pursue "experimental status" when adherence to published standards is not feasible or where different standards would provide safety, economic, environmental, social, or connectivity benefits.

1.7 Construct, upgrade, and maintain active transportation facilities along major travel routes as part of all roadway improvements. In constrained locations, all design options should be considered such as restriping, signalization, and narrowing travel lanes.

1.8 Support and encourage local jurisdictions and school districts in removing barriers to active transportation planning, facility design, and implementing projects and programs.

1.9 Incorporate applicable Best Management Practices (BMPs) into facility and maintenance design to support environmental and financial sustainability.

[1] A "low stress facility" is infrastructure that attracts less-experienced users who may have fear of using active transportation as a method of travel.

Section 1: Network Design Policy Action Matrix

Policy Number	State	Regional	Local	Private	Community	Actions
1.1	X	X	X	X	X	1.B
1.2	X	X	X	X	X	1.A
1.3	X		X	X		1.B
1.4	X	X	X	X		1.B
1.5	X	X	X			1.B
1.6	X		X			1.B
1.7	X		X			1.C
1.8	X	X	X		X	1.D
1.9	X	X	X			

SECTION 2: FACILITY MAINTENANCE

2.1 Every effort should be made to maintain the year-round use and condition of active transportation facilities, including making sure connections are not blocked during snow removal or are quickly made available through clearing. This also includes maintaining and upgrading infiltration devices, clearing snow, sweeping, and re-striping where needed during the season and before major cycling events. State agencies should provide timely highway maintenance in the spring of each year.

2.2 Prior to permit issuance, all projects containing active transportation facilities are required to submit a Maintenance Responsibilities Chart and Plan. These plans will clarify roles for annual and capital infrastructure operating and maintenance and identify funding needs and possible sources. This information will be included in approved permits. See Appendix F, for *Maintenance Responsibilities Chart and Plan Template*.

2.3 Encourage local jurisdictions to plan long-term operations and maintenance activities for existing and future facilities by requesting use of available Air Quality Mitigation Funds.

Section 2: Facility Maintenance Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community	Actions
2.1	X		X			2.A
2.2	X	X	X	X		2.B
2.3		X	X			2.C

SECTION 3: MULTI-MODAL CONNECTIONS

3.1. Create convenient intermodal connectivity which considers first and last mile facility needs and connects all modal options by providing necessary infrastructure, and schedule coordination.

3.2. Encourage local jurisdictions to work with public and private entities to analyze the amount of space devoted to motor vehicle parking and bicycle parking on existing and planned projects to ensure that space is allocated appropriately for all vehicle types.

3.3. Maximize bicycle carrying capacity on all transit vehicles, prioritizing high-use multi-modal routes, reflecting current state policy, and using best available technology.

3.4. Encourage jurisdictions and other maintenance agencies to identify opportunities for efficient and innovative parking strategies that reallocate roadway space to provide for the active transportation network.

Section 3: Multi-Modal Connections Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community	Actions
3.1		X	X	X	X	3.A
3.2		X	X	X		3.A
3.3		X	X			3.B
3.4	X	X	X			3.A

SECTION 4: PROJECT IMPLEMENTATION

4.1 Support agencies Region-wide in adopting complete street policies and resolutions.

4.2 Actively pursue funding for priority projects, programs, and maintenance in collaboration with partnering agencies, private entities, and community groups.

4.3 If construction impacts an active transportation route, projects must adhere to the appropriate MUTCD which requires the implementing agency to provide alternate routes and safe accommodations for all modes.

4.4 Incorporate segments of the proposed active transportation network into new and redeveloped commercial, tourist, multi-family, public service, and recreation projects consistent with this plan. Implementation of the facilities will be conducted through construction, easements, or in-lieu fees as appropriate to the scale of development per the TRPA Code of Ordinances, section 65.3.2.

4.5 During project planning and permit approval, identify and address the need for support and end-of-trip active transportation facilities including bicycle parking, water fountains, benches, and restrooms at commercial, tourist, recreational, transit, lodging, and government centers.

4.6 Consider additional facilities where connections to the existing network or end-of-trip facilities are needed and adopt into the plan as appropriate.

4.7 Projects should go forward regardless of where they are on the priority list when an opportunity or eminent loss of an opportunity makes implementation favorable or necessary.

Section 4: Project Implementation Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community	Actions
4.1		X	X			4.A
4.2		X	X		X	4.E
4.3	X		X			
4.4		X	X	X		4.B, 4.F
4.5		X	X	X		4.C
4.6		X	X		X	4.D
4.7		X	X		X	

SECTION 5: EDUCATION, ENCOURAGEMENT, EVALUATION, AND ENFORCEMENT PROGRAMMING

5.1 In collaboration with law enforcement, school districts, and community groups, educate roadway users about their legal rights and responsibilities through education and encouragement programming.

5.2 Through public/private partnerships, continue to prioritize and implement consistent Region-wide wayfinding and path etiquette strategies.

5.3 Evaluate active transportation trends and project effectiveness through bi-annual implementation of the Lake Tahoe Bike & Pedestrian Monitoring Protocol in partnership with local and state jurisdictions.

5.4 Annually evaluate implementation of active transportation goals and policies and report on benchmarks.

5.5 Update the Active Transportation Plan every four years to identify new facility improvements and programmatic opportunities.

5.6 As new mobility technologies emerge, partnering agencies should analyze data and determine if regulation or new design considerations are necessary to accommodate all users and continue to support increased mode share.

5.7 Encourage all state and local law enforcement agencies to develop and implement an enforcement program that reduces behaviors that act as barriers to safe active transportation, including parking restrictions, wrong-way bicycle travel, distracted driving, drunk driving, 3-foot laws, and other known crash-inducing behaviors.

5.8 All active transportation projects and improvements should consider including permanent monitoring and detection infrastructure such as inductive loops, passive infrared, and signal detection systems.

Section 5: Education, Encouragement, Evaluation, and Enforcement Programming Policy Action Matrix:

Policy Number	State	Regional	Local	Private	Community	Actions
5.1		X	X		X	5.A
5.2		X	X	X	X	5.B
5.3		X	X		X	5.C
5.4		X				5.D
5.5		X				
5.6	X	X	X		X	4.E
5.7	X		X			5.E
5.8	X		X			5.C

3.3 PERFORMANCE MEASURES

Setting performance measures for plans, projects, and programs is crucial when determining where funding, infrastructure improvements and other resources should be directed. The TRPA/TMPO Research and Analysis Department, in coordination with other TRPA/TMPO departments and agencies throughout the Region, manage robust monitoring efforts that track progress. Active transportation performance measures are aligned with appropriate TRPA/TMPO Environmental Improvement Program (EIP) and Regional Plan targets and thresholds as well as broader targets set by the federal and state governments. A variety of online tools exist to help illustrate progress, including the EIP Project Tracker (www.conservationclearly.org/tracker) and the Sustainability Dashboard (http://www.ltinfo.org/).

2010 Performance Measure Evaluation

By monitoring effectiveness, agencies can be adaptive and flexible, ensuring progress. The 2010 Bike and Pedestrian Plan defined five benchmarks. The 2010 benchmarks are listed below, with analysis measuring regional progress over the last five years. This plan replaces the 2010 benchmarks with new performance measures that conform with the 2012 Regional Plan, follow national best practices, and utilize the most accurate and consistent data available. The analysis of some of the 2010 benchmarks reflect the impacts of a declining population, and data that may contain some accuracy limitations because of the way it is collected and distributed.

Benchmark 1: Double the percentage of commuters who bicycle or walk to work from 3.8 percent of all employed residents to 7.6 percent of all employed residents per U.S. Census data by 2023.

Analysis 1: The number of employed commuters who walk or bicycle to work decreased by 0.05 percent. The 2000 census estimates 3.8 percent whereas the 2010 census estimates 3.3 percent.

Benchmark 2: Increase the percentage of residents and visitors who bicycle and walk to commercial and recreation destinations from 16 to 25 percent in the summer, and from 13 to 20 percent in the winter, by 2023. By 2030, increase to 30 percent in the summer and 25 percent in the winter.

Analysis 2: The percentage of residents and visitors who walked or biked to commercial or recreation destinations decreased by 1 percent between 2010 and 2014 in the summer, and increased by 1 percent between 2008 and 2012 in the winter.

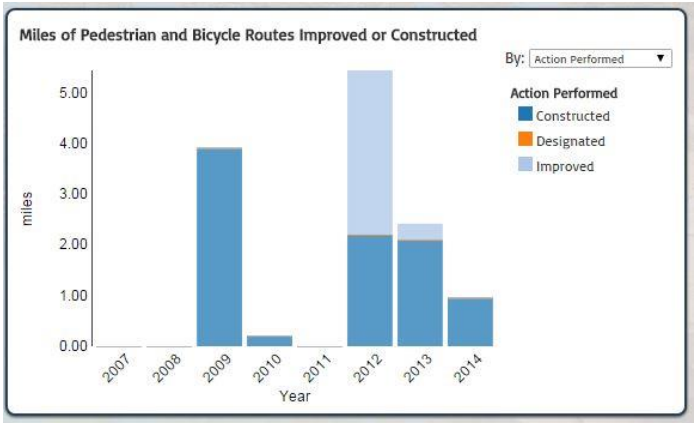


Figure 3-1: Miles of Network Constructed, 2010 -2014. Source: EIP Tracking Tool

Benchmark 3: Implement 20 percent (approximately 45 miles) of all recommended facility improvements within five years (by 2015).

Benchmark 4: Implement 40 percent (approximately 90 miles) of all recommended facility improvements within 10 years (by 2020).

Analysis 3 & 4: Since 2010, 37 miles of facilities have been implemented, 18 percent of the total recommended facility improvements. In total, 120 miles of facilities exist region-wide.

Benchmark 5: Decrease the bicycle and pedestrian accident rate.

Analysis 5: The 2010 plan explains that to analyze this benchmark, a comparison of the rate of pedestrian- and bicycle-related collisions in relation to overall collisions within the Region should be made. In 2010, the overall rate of active transportation collisions in comparison to overall collisions was estimated at 10 percent. This number is derived by dividing the total number of active transportation collisions between 2004 and 2008 in Placer County and El Dorado County (139) by the total collisions on the California side of the Region over the same period of time (1,373).[2] The current rate is estimated at 7 percent. This rate is derived by dividing the total number of active transportation collisions on the California side of the Region between 2010 and 2014 (93) divided by the total California side collisions over the same period of time (1,305). Nevada data is not included in this estimate because overall vehicle collisions for the 2004-2008 time period were not available previously.

2015 Performance Measures

To align transportation performance measures across the many planning efforts conducted region-wide, this plan is adopting the 2012 Regional Plan performance measures related to transportation and new performance measures that are anticipated to be part of the 2016 Regional Transportation Plan. These measures and a brief analysis are listed below. Baselines and methods are provided and should be used for comparison during the next Active Transportation Plan update, which is planned for 2020.

The measures listed below are not the only way the effectiveness of the plan will be monitored. The goals and policies put forth in this plan are accompanied by implementation actions in Chapter 6, Section 6.1. The actions contain benchmarks that provide timelines for estimated implementation. The annual Active Transportation Plan Implementation Report, included in the TRPA Annual Report will address progress of the performance measures below as well as the implementation actions associated with policies.

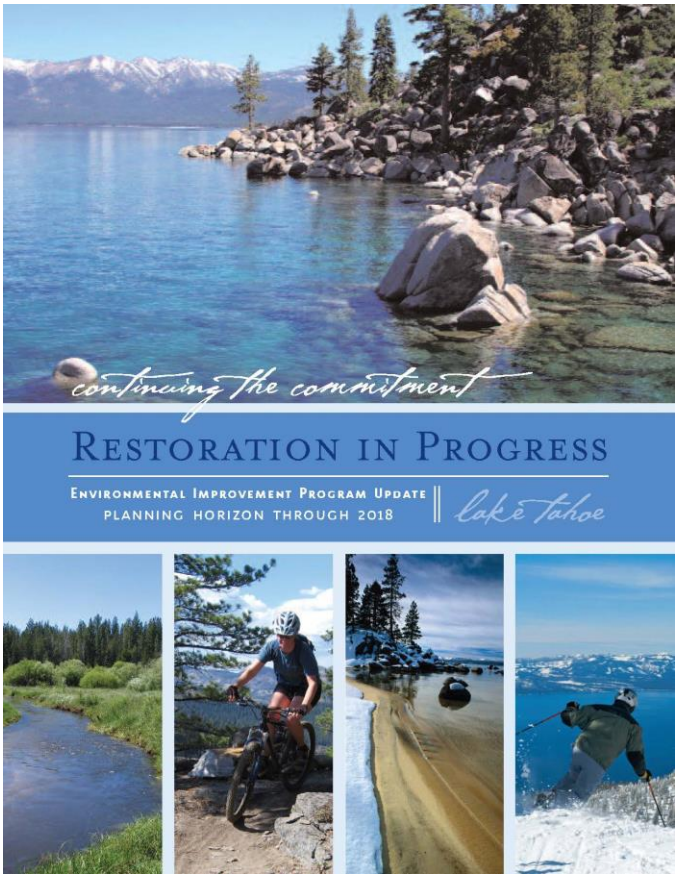
[2] This number differs slightly from what was reported in the 2010 plan because the estimate has been updated with best available data.

Performance Measure 1 (RP #5): *Increase percentage of all trips using non-automobile modes of travel (transit, bicycle, pedestrian).*

Analysis: Non-auto mode share at Lake Tahoe is measured by intercept surveys at commercial and recreation sites in winter and summer. Using a detailed, longstanding monitoring protocol to collect this data, non-auto mode share is reported every two years in the TMPO's *Transportation Monitoring Program Report*. The two-year cycle alternates updates to summer and winter mode share which are individually calculated every four years. The current baseline for non-auto mode share is 19.07 percent. TRPA/TMPO set an increase target of 0.25 percent by 2016. The 2012 Regional Transportation Plan suggests non-auto mode share should increase 3 to 5 percent to meet greenhouse gas reduction targets. An evaluation of this performance measure will be made in 2016.

Performance Measure 2 (RP #6): *Decrease automobile vehicle miles traveled (VMT) per capita (excluding through-trips).*

Analysis: The Regional Transportation Plan's main strategy to reduce greenhouse gas emissions is to reduce VMT by increasing access to active transportation facilities and multi-modal connections. Thus, a reduction in VMT should directly reflect an increase in active transportation access and use. TRPA/TMPO set a decrease target of 1 percent by 2016. An evaluation of this performance measure will be made in 2016.



Performance Measure 3 (RP #7): *Accelerate pedestrian and bicycle improvements.*

Analysis: The 2012 Regional Plan set a target of 4.5 miles of improvements per year. This benchmark has been met as of 2014, with an average of 6 miles per year. The level 2 target seeks to increase the construction average to 9 miles per year by 2020.

Performance Measure 4 (RTP 2016 Performance Measure): *Decrease serious injuries per vehicle mile traveled for bikes and pedestrians.*

Analysis: In 2016, the Regional Transportation Plan will incorporate new performance measures that are consistent with measures used by other California and Nevada MPOs. New performance measures related to safety include serious injuries and fatalities (also see Performance Measure 5) for bikes and pedestrians per vehicle mile traveled. In 2014 there was only one reported serious injury for bicyclists and pedestrians in the Tahoe Region, therefore, with a VMT estimate for 2014 of 1,974,000[3], this metric is effectively zero. As noted in other places in this document, reporting of bicycle and pedestrian collisions is not always accurate. This measure is reported for 2014 only for consistency with the RTP.

Performance Measure 5 (RTP 2016 Performance Measure): *Decrease fatalities per vehicle mile traveled for bikes and pedestrians.*

Analysis: In 2014 there were no reported fatalities for bicyclists or pedestrians in the Tahoe Region, therefore, this metric is zero. As noted in other places in the document, reporting of bicycle and pedestrian collisions is not always accurate. This measure is reported for 2014 only for consistency with the RTP.

Taylor Creek. Photo: Mike Vollmer

[3] This number is rounded and is the estimate for 2014 available by November 30, 2015. This number may be updated in future documents, such as the 2016 Regional Transportation Plan.

3.4 NOTABLE ACCOMPLISHMENTS

Since 2010, many active transportation projects all over the Region have broken ground and are providing commuting and recreational opportunities. Funding, implementation, and ongoing maintenance of these projects are the joint effort of many agency partnerships.

Snow Creek Restoration Project. Photo: Tom Lotshaw

Shared-Use Paths: In total, **6.5 miles** of path have been constructed since 2010.

- Meyers Bikeway: *El Dorado County, City of South Lake Tahoe, and U.S. Forest Service*
- Lakeside Trail: *Tahoe City Public Utility District*
- Nevada Stateline to Stateline Bikeway: *TTD, U.S. Forest Service, Douglas County, NDOT*
- Snow Creek Restoration Project: *Placer County*
- South Tahoe Greenway, Phase 1: *California Tahoe Conservancy*

Bike Lanes: In total, over **22 miles** of bike lanes have been added since 2010.

- US Highway 50: *Caltrans and City of South Lake Tahoe*
- State Route 28, Tahoe City "Wye" to Kings Beach: *Caltrans and Placer County*
- Apache Avenue: *El Dorado County*
- Lake Tahoe Boulevard: *El Dorado County*
- Lake Parkway: *Douglas County*

Sidewalks: In total, over **7.5 miles** of sidewalk have been constructed since 2010.

- Pioneer Trail: *City of South Lake Tahoe*
- Lake Parkway: *Douglas County*
- Incline & Oriole Way: *Washoe County and Incline Village General Improvement District*
- US Highway 50: *Caltrans and City of South Lake Tahoe*
- Kings Beach: *Placer County and Caltrans*

Enhanced Crosswalks: In 2014 and 2015, the Region saw three new pedestrian-activated beacons installed in El Dorado County, and in Incline Village by Nevada Department of Transportation. More are planned for Camp Richardson in South Lake Tahoe and Tahoe City.

- Sawmill Pond and Lake Tahoe Boulevard Intersection: *El Dorado County*
- Two (2) mid-block crossings along State Route 28 between Country Club and Village Boulevard: *Nevada Department of Transportation*

Roundabouts: Nevada Department of Transportation, Caltrans, Placer County, and Washoe County

Of special note are the Region's first roundabouts, which are located in Kings Beach and just outside of Incline Village. Roundabouts reduce traffic congestion, lower speeds, reduce pedestrian exposure, and add aesthetic value to communities.

Kings Beach Roundabouts. Photo: Placer County

CHAPTER 4: NETWORK RECOMMENDATIONS

This chapter provides in-depth details and recommendations for each corridor in the Lake Tahoe Region. Through review of existing plans, community outreach, agency stakeholder professional expertise, and previously programmed projects, each corridor illustrates proposed active transportation routes and infrastructure. This chapter is made up of six sections that contain:

- Physical Geographic Description
- Context Relevant Plans & Studies
- Additional Corridor Considerations
- Existing & Proposed Infrastructure Map
- Crash Analysis Map
- Corridor Project List and Cost Estimates
- A complete street improvement rendering produced as part of "Transforming Tahoe Transportation: A Workshop on Completing Our Streets."

4.1 PROPOSED NETWORK

The proposed network is comprised of planning and design level projects. Projects are included in the planning level project list if they live in planning documents (such as area plans), but have not yet begun in depth project development. Design level projects are further along in project development and could be undergoing design, environmental review, or are ready for construction. More information and recommendations regarding planning and design level projects is provided below.

Planning Level Projects:

Alignments found in this plan are conceptual. As the Region progresses towards the implementation of complete streets, pre-determining location-specific infrastructure or routes may not be the best solution to meet the needs of all users. Infrastructure type and route recommendations found in this

plan should be used as a catalyst for project development and for programming into TRPA's EIP and local jurisdiction's capital improvement programs (CIPs).

Some areas on the *Existing & Proposed Infrastructure* maps are displayed as priority complete street improvement areas or stretches of highway. These locations are chosen based on residential and commercial density, lack of existing active transportation infrastructure, and existing plans for redevelopment. These designations do not exclude any other area from considering complete street improvements. All projects within the Region should consider improving the streetscape to increase safety, economic vitality, and mobility for all users.

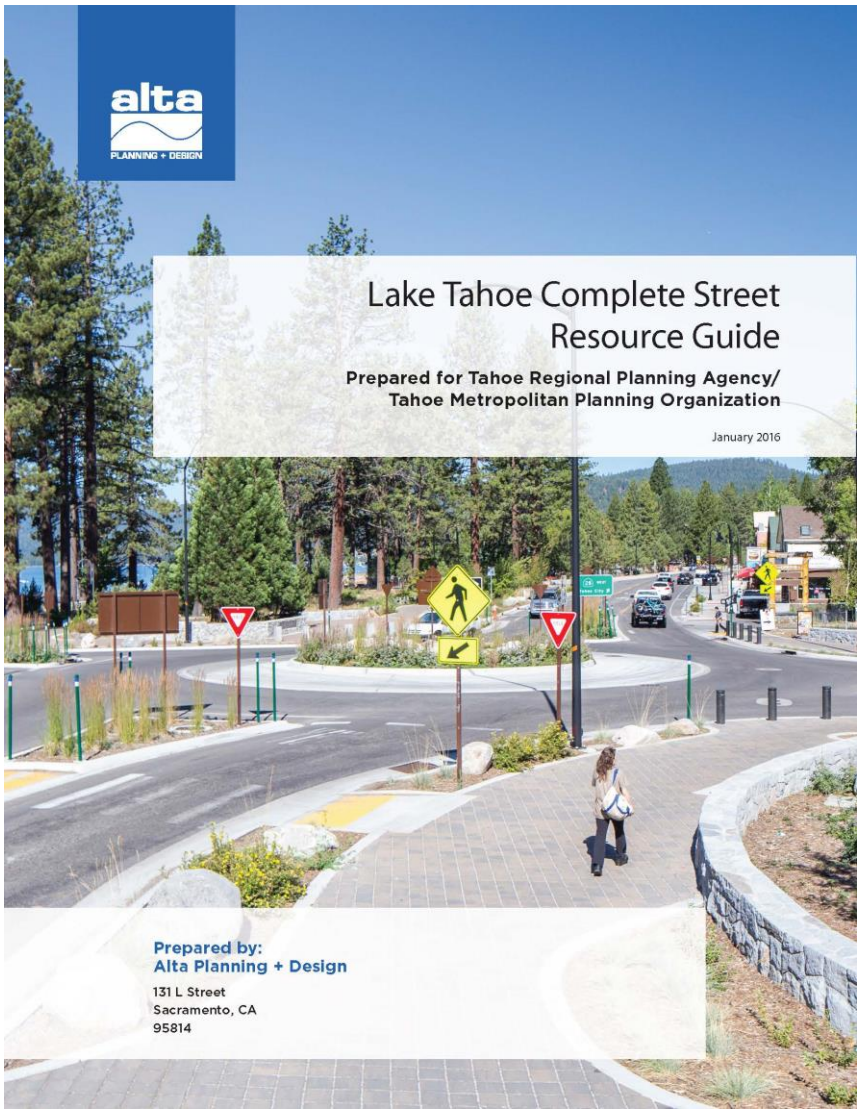
To provide increased capacity for active transport, this plan also recommends shared-use paths in all appropriate locations rather than sidewalks. Shared-use paths are wider, made of asphalt, and provide a greater barrier from traffic, as they require a five-foot separation from the roadway. Sidewalks are typically adjacent to the roadway and only five feet wide. TRPA/TMPO will continue to track the construction of sidewalks as part of its performance measure reporting system.

Design Level Projects:

During project design, implementers should review alternatives that seek to meet all user needs by increasing safety, addressing connectivity gaps, and considering constructability. Intersection Control Evaluation (ICE) is quickly becoming a national method for designing the most appropriate, cost effective, and complete infrastructure projects. According to FHWA, ICE is a process that several states are adopting and implementing to improve overall performance of their intersections. The key action in the ICE process involves screening all possible alternatives for an intersection project. After the initial screening, a performance-based analysis looks at the safety, capacity, operations, cost, footprint, and right-of-way impacts to understand the value of each alternative. Public and political considerations are also part of the process. Ultimately, the preferred alternative that holistically addresses the project goals is selected and the process and decision are documented in a short report or matrix. When evaluating choices, the preferred alternative may not always be the traditional design or traffic control. The ICE process has been developed and implemented in Minnesota, California, Wisconsin, and Indiana.

Kahle Drive Vision. Prepared by Design Workshop. TRPA On Our Way Grant, Douglas County

Appendix A, the *Lake Tahoe Complete Street Resource Guide* updates the 2010 Bike and Pedestrian Plan's Appendix A: *Design and Maintenance Recommendations*. The new resource guide builds on previous recommendations by updating design and maintenance best practices and recapping stakeholder feedback, next steps and actions associated with the "Transforming Tahoe Transportation: A Workshop on Completing Our Streets." Five infrastructure designs are highlighted here as priority considerations for the Region. These designs are chosen based on stakeholder input and community interest. Although each project is location-specific, the five highlighted designs illustrate an ability to improve safety, increase active transport use, increase economic vitality, and address common active transportation barriers in the Region.



BICYCLE INTERSECTION DESIGN

BIKE BOX

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

Discussion

Bike boxes are considered experimental by the FHWA. They should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

References

- NACTO. Urban Bikeway Design Guide. 2012.

Application of green pavement coloring addressed in:

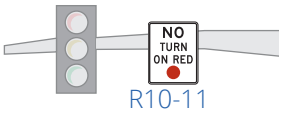
- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

Design Summary

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.



R10-11

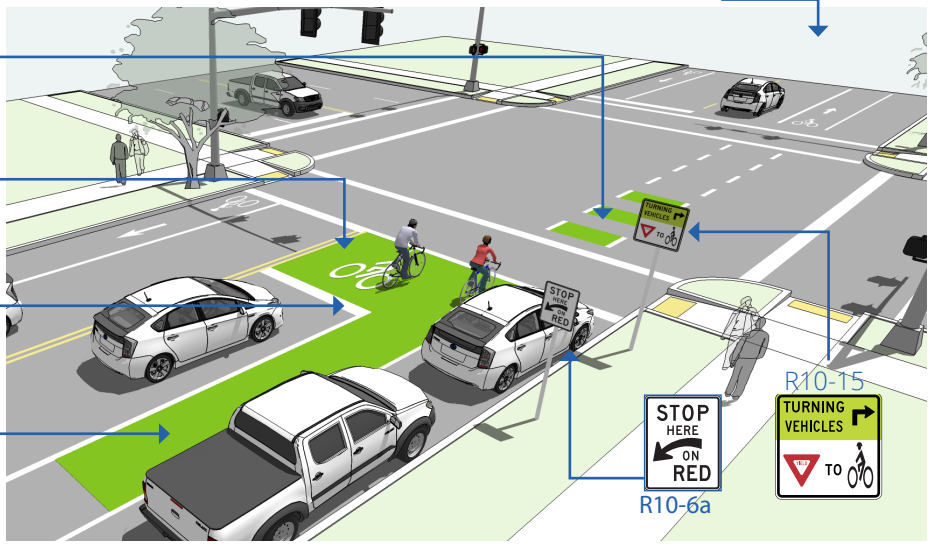
No Turn on Red restriction for motorists

May be combined with intersection crossing markings and colored bike lanes in conflict areas

Colored pavement can be used in the box for increased visibility

Wide stop lines used for increased visibility

If used, colored pavement should extend 50' from the intersection



R10-15

R10-6a

ON-STREET BICYCLE FACILITY DESIGN

BUFFERED BIKE LANE

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. Buffer striping is called Preferential Lane Longitudinal Markings in Section 3D.02 the MUTCD. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

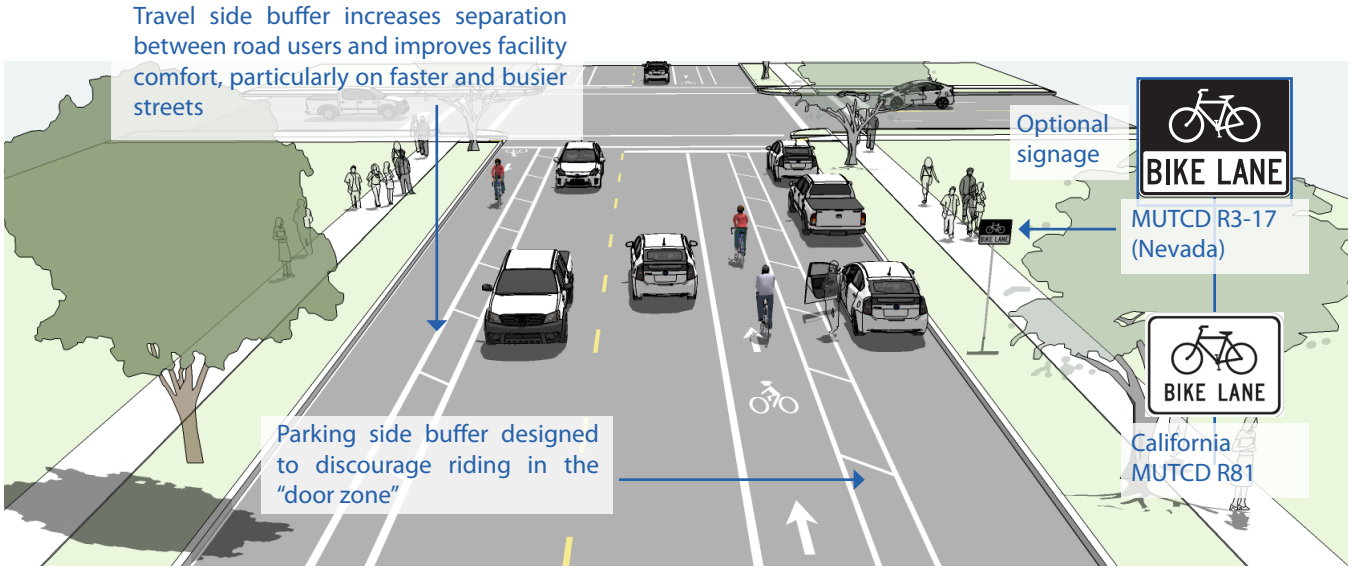
Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

This treatment is appropriate for school zones.

Design Summary

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.



References

- FHWA. Separated Bike Lane Planning and Design Guide. 2015.
- NACTO. Urban Bikeway Design Guide. 2012.
- Caltrans. MUTCD. 2014.

Cost

- Bike Lane: $5,000 - $10,000 per mile

INTERSECTIONS WITH SMALL STREETS

The California and Nevada Vehicle Code requires that motorists yield right-of-way to pedestrians within crosswalks. This requirement for motorists to yield is not explicitly extended to bicyclists, and the rights and responsibilities for bicyclists within crosswalks is ambiguous. On crossings of minor streets, design solutions should resolve this ambiguity where possible by giving people on bicycles priority within the crossing. Where this is not possible, the design should create conditions and slow speeds that encourage safe interactions in the case of a user error. Determination of priority between streets and paths can be found in the TRB Highway Capacity Manual (2010),

Benefits

Crosswalk markings establish a legal crosswalk at areas away from intersections (MUTCD Section 3B.18).

Motorists decrease speed in the vicinity of marked crosswalks and crosswalk usage increases with the installations of crosswalk markings (Knoblauch, 2001).

Motorists are statistically more likely to yield right-of-way to pedestrians in a marked crosswalk than an unmarked crosswalk (Mitman, 2008).

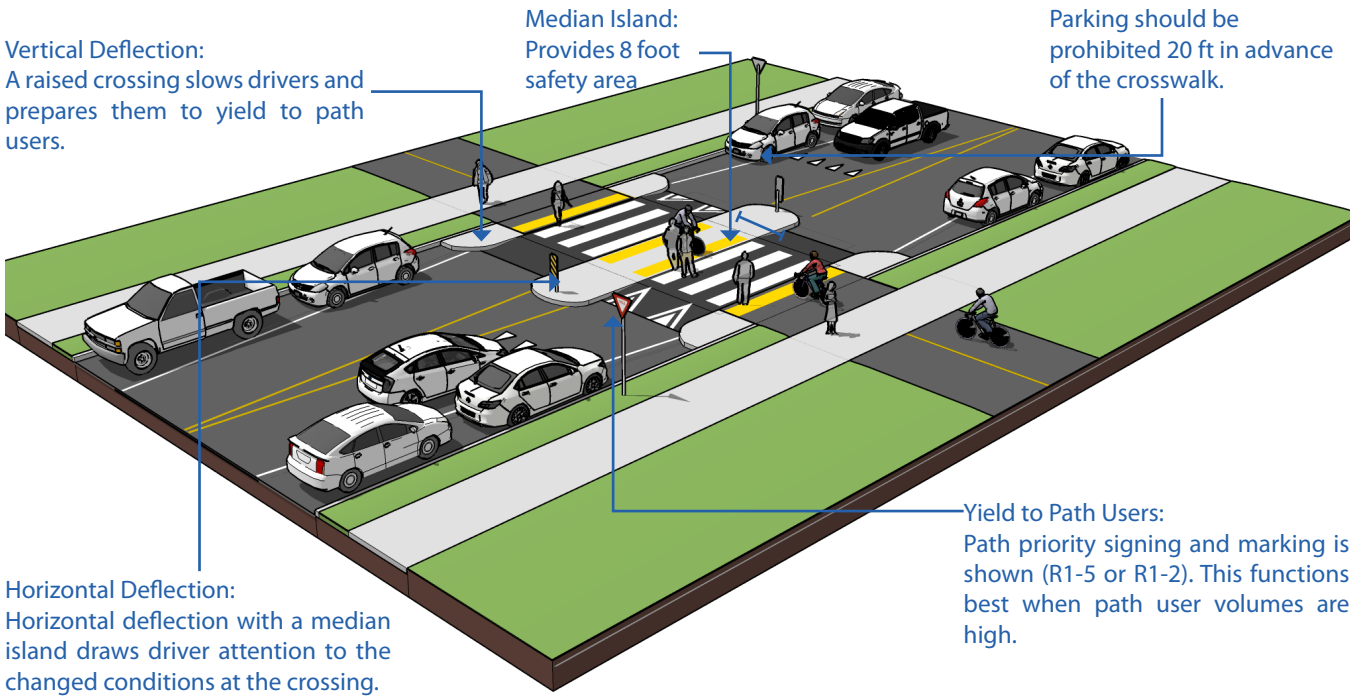
Discussion

Geometric design should promote a high degree of yielding to path users through raised crossings, horizontal deflection, signing, and striping.

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

On high speed and high volumes roadways, crosswalk markings alone are not a viable safety measure. This supports the creation of more robust crossing solutions (Zeeger, 2001).

Path Priority Crossing



Design Summary

Crossing Geometry

In Nevada, parking is prohibited within 20 feet of any marked crosswalk.

A median safety island should allow path users to cross one lane of traffic at a time. The bicycle waiting area should 8 feet wide or wider to allow for a variety of bicycle types.

Raised crossings should raise 4 inches above the roadway with a steep 1:6 (16%) ramp. The raise should use a sinusoidal profile to facilitate snow plow operation. Advisory speed signs may be used to indicate the required slow crossing speed.

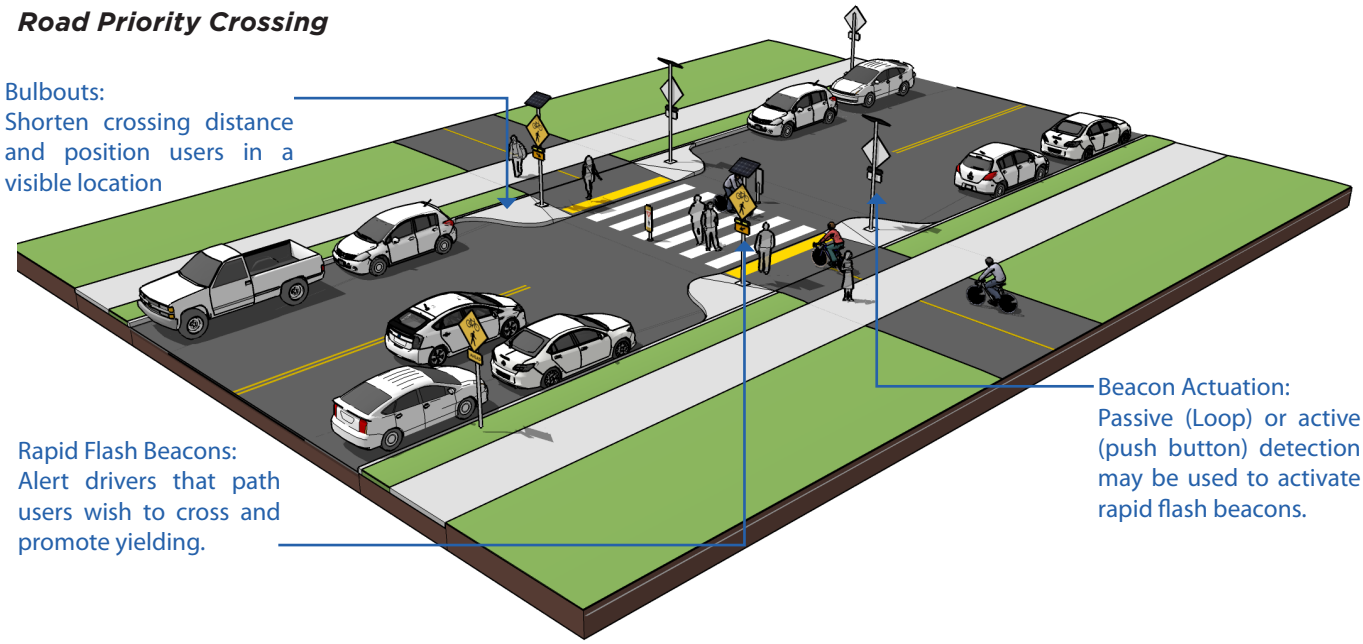
Markings

High-visibility crosswalk markings are the preferred marking type at uncontrolled marked crossings (FHWA, 2013). Transverse lines are "essentially not visible" when viewed from a standard approaching vehicle. (ITE, 2010)

Stop or Yield lines may be used on the roadway 20 ft. in advance of crosswalks when right-of-way priority is given to path users (CA MUTCD 3B.18). A yield line must be paired with a Yield (R1-2) or Yield Here To Pedestrians (R1-5) sign.

In roadway Yield to Pedestrians (R1-6) signs may be used along the centerline point of a crosswalk.

Road Priority Crossing



References

- Caltrans. California Highway Design Manual (CAHDM). 2015.
- Caltrans. California Manual on Uniform Traffic Control Devices (CAMUTCD). 2014.
- ITE. Pavement Marking Patterns Used at Uncontrolled Pedestrian Crossings. 2010.
- Mitman, M.F., Ragland, D.R., and C.V. Zegeer. The Marked Crosswalk Dilemma: Uncovering Some Missing Links in a 35-Year Debate. 2008.
- Knoblauch, R., M. Nitzburg, and R. Seifert. Pedestrian Crosswalk Case Studies. 2001.
- Zeeger, C., J. Stewart, and H. Huang. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations. 2001.
- NDOT. Standard Specifications for Road and Bridge Construction. 2014.

Cost

- Striped crosswalks costs range from approximately $100 to 2,100 each.
- Curb extension costs can range from $2,000 to $20,000 depending on the design and site condition.
- Rapid flash beacons costs can range from $15,000 to $60,000 depending on the number of beacons.

MARKED/UNSIGNALIZED MID-BLOCK CROSSINGS

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions. When space is available, using a median refuge island improves user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 opportunities to cross per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons, and excellent sight distance. For more information see the discussion of active warning beacons.

This treatment is appropriate for crossings located in school zones.

Design Summary

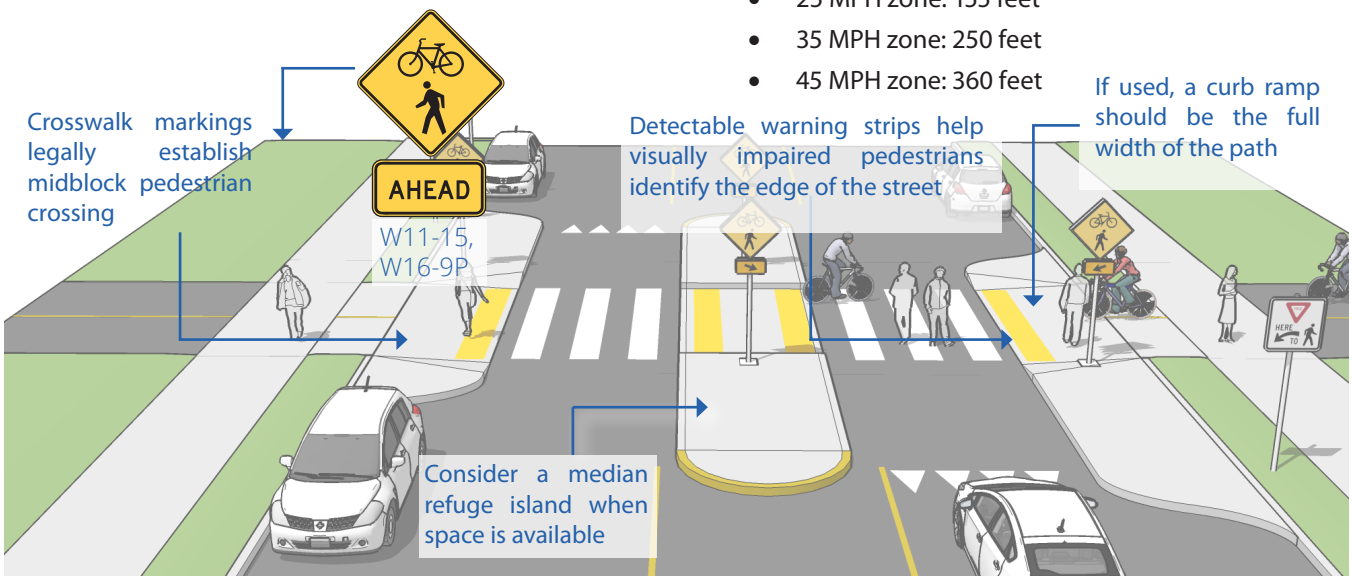
Maximum traffic volumes

- ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed: 35 MPH

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NDOT. Process for the Evaluation of Uncontrolled Crosswalk Locations. 2014.

Cost

- Signage: $125 each
- Marked Crosswalk, $550 each
- Stop limit bars/yield teeth: $200-$530 per set
- Median Refuge Island (optional): $8,500 - $33,000 each

SHARED-USE PATHS

CAUSEWAYS

Causeways or "burm" type path construction may be used to minimize disturbance of water flow in stream environment zones. Paths are elevated above wet ground using a permeable fill material as a base. Path edges incorporate small boulders or a rock riprap to contain the permeable fill. Geotextile mats and other construction materials such as geocells can be incorporated to ensure a stable base on which asphalt or concrete paving may be applied. The path should be built up to an elevation no greater than 30 inches above natural grade.

Design Summary

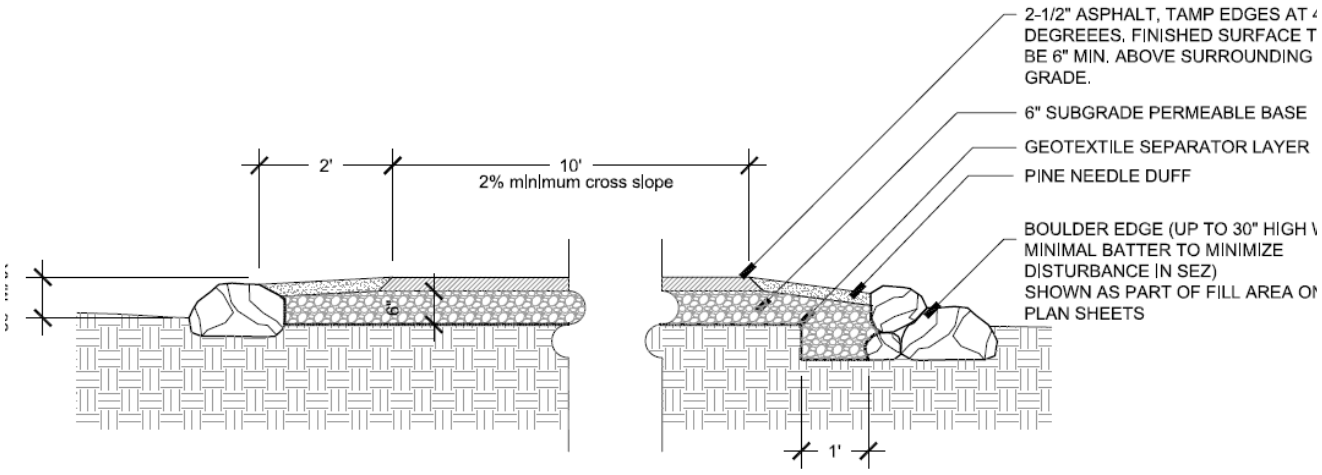
Design Criteria

Design criteria for causeways should meet AASHTO and Caltrans design recommendations for paved shared-use paths.

Base

Path construction and detailing depends on water table and surface flows through site. A stable base for paving must be established while allowing for water flow under path. Base materials should be designed so as not to be compromised by future water flows. Firm mineral soil, coarse-grained soils or granular material, or small, well-graded angular rocks are needed for fill.

It should be noted that AASHTO recommends 42" high railings on any structured path.



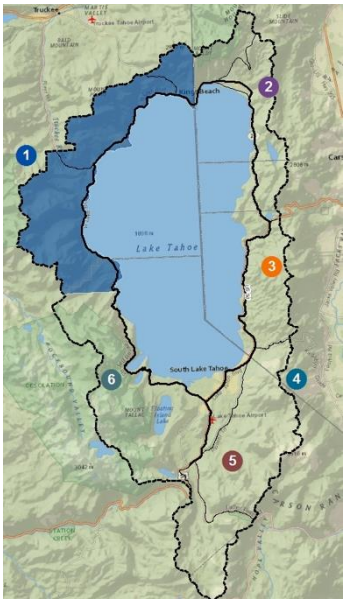
References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- United States Forest Service. Trail Construction and Maintenance Notebook. 2007.
- Caltrans. Highway Design Manual. 2015.

Cost

Dependent on surface type. Native surface and decomposed granite surfaces are less expensive than paving. Paved applications would include the typical cost of a paved path plus the riprap edge support.

CORRIDOR 1: STATE ROUTE 89 / STATE ROUTE 28



Physical Geographic Description: This corridor starts at the northern boundary of Sugar Pine Point State Park and reaches to the California/Nevada state line in Crystal Bay. The corridor includes both Placer and El Dorado counties, and contains the Tahoma, Homewood, Tahoe City, Carnelian Bay, and Kings Beach areas.

Context Relevant Plans & Studies:

- North Lake Tahoe Community Wayfinding Signage Design Standards Manual
- North Tahoe Parking Study (2015)
- Tahoe Basin Area Plan (Draft)
- Tahoe City Mobility Improvement Study (Draft)
- Tahoe City Road Safety Audit (2015)
- Fanny Bridge / SR 89 Community Revitalization Project

Additional Corridor Considerations:

Community Input: All recommended needs collected during the community outreach process for this plan were reviewed by Placer County representatives and are included in the proposed infrastructure map for State Route 89 and State Route 28.

Utilizing Existing Studies: To further the implementation of complete street infrastructure in the corridor, Placer County should capitalize on the many studies recently conducted in collaboration with regional and federal partners (Road Safety Audit, Parking Study, Tahoe City Mobility Plan).

New SR 89 Bridge & Bike Trail. Rendering: Tahoe Transportation District

FIGURE 4-1: CORRIDOR 1 NORTH, EXISTING & PROPOSED INFRASTRUCTURE

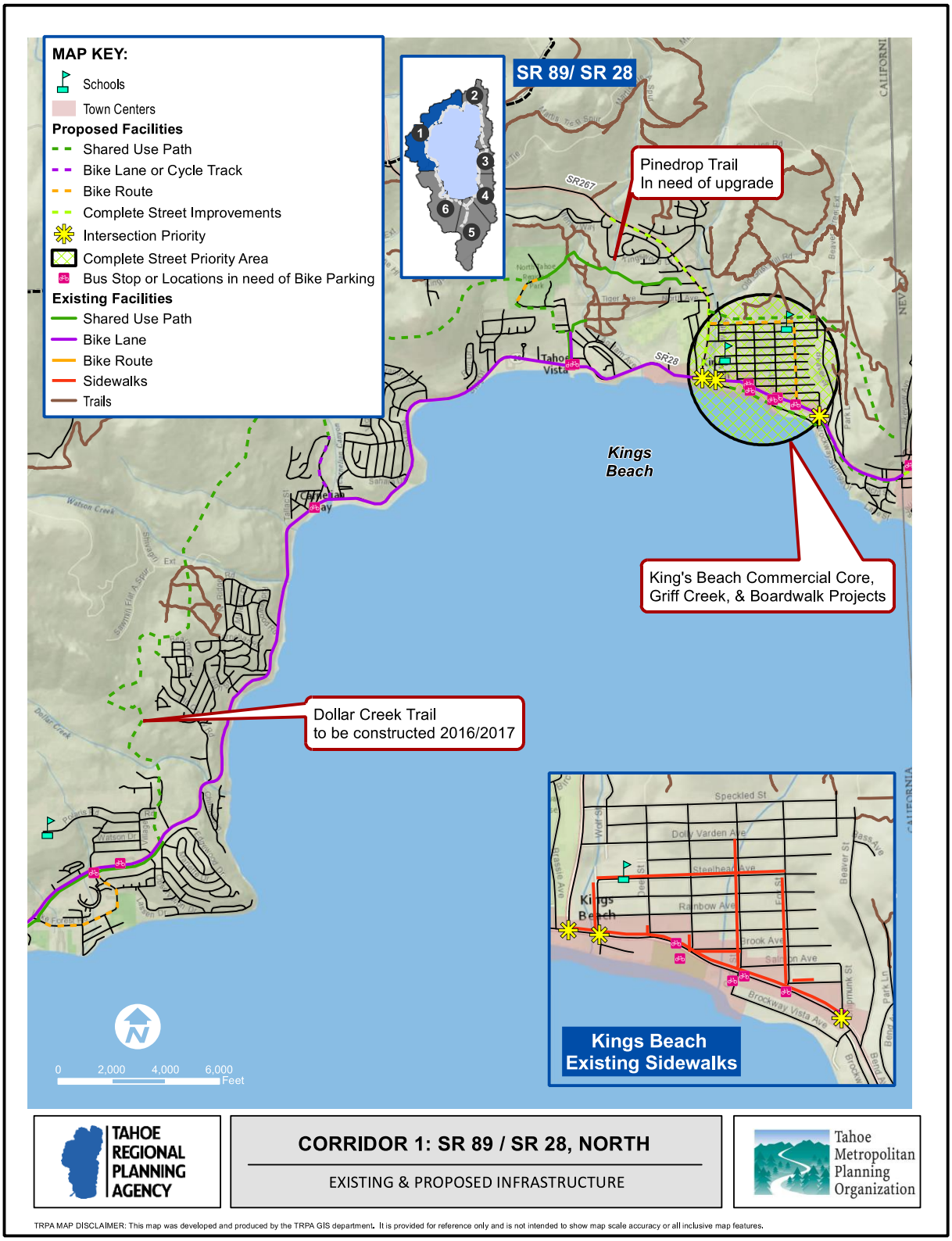


FIGURE 4-2: CORRIDOR 1 SOUTH, EXISTING & PROPOSED INFRASTRUCTURE

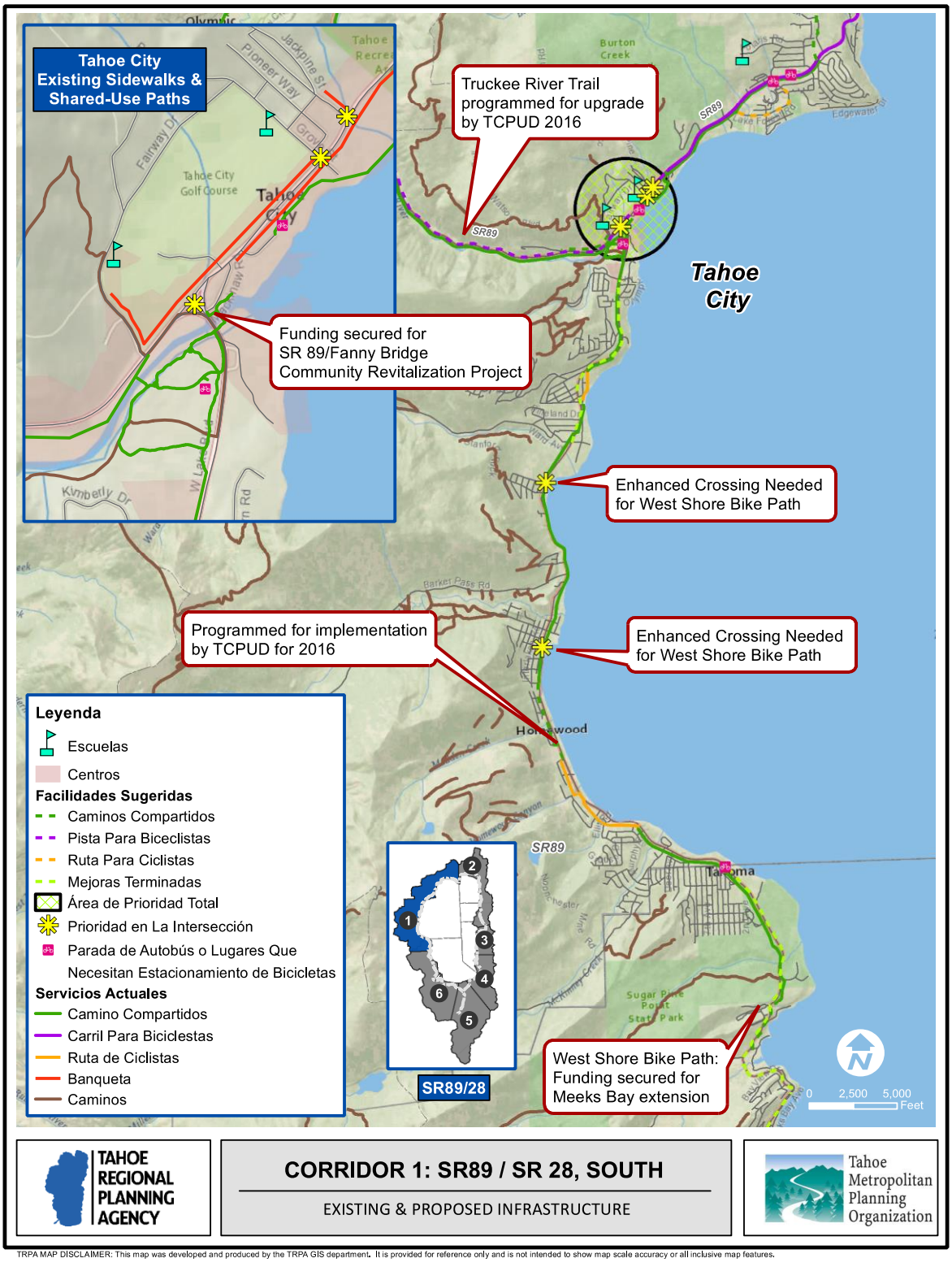


FIGURE 4-3: CORRIDOR 1 NORTH CRASH ANALYSIS

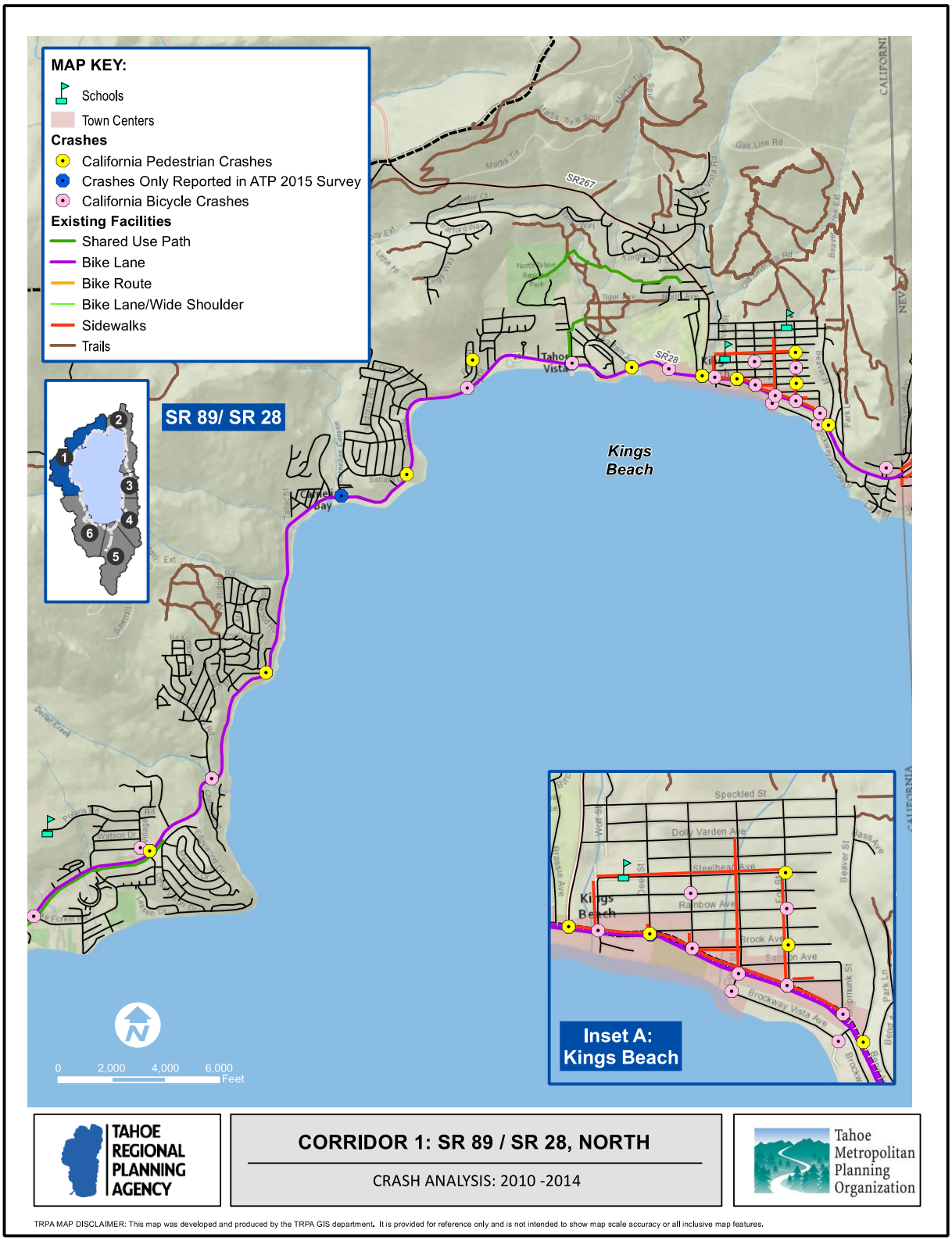
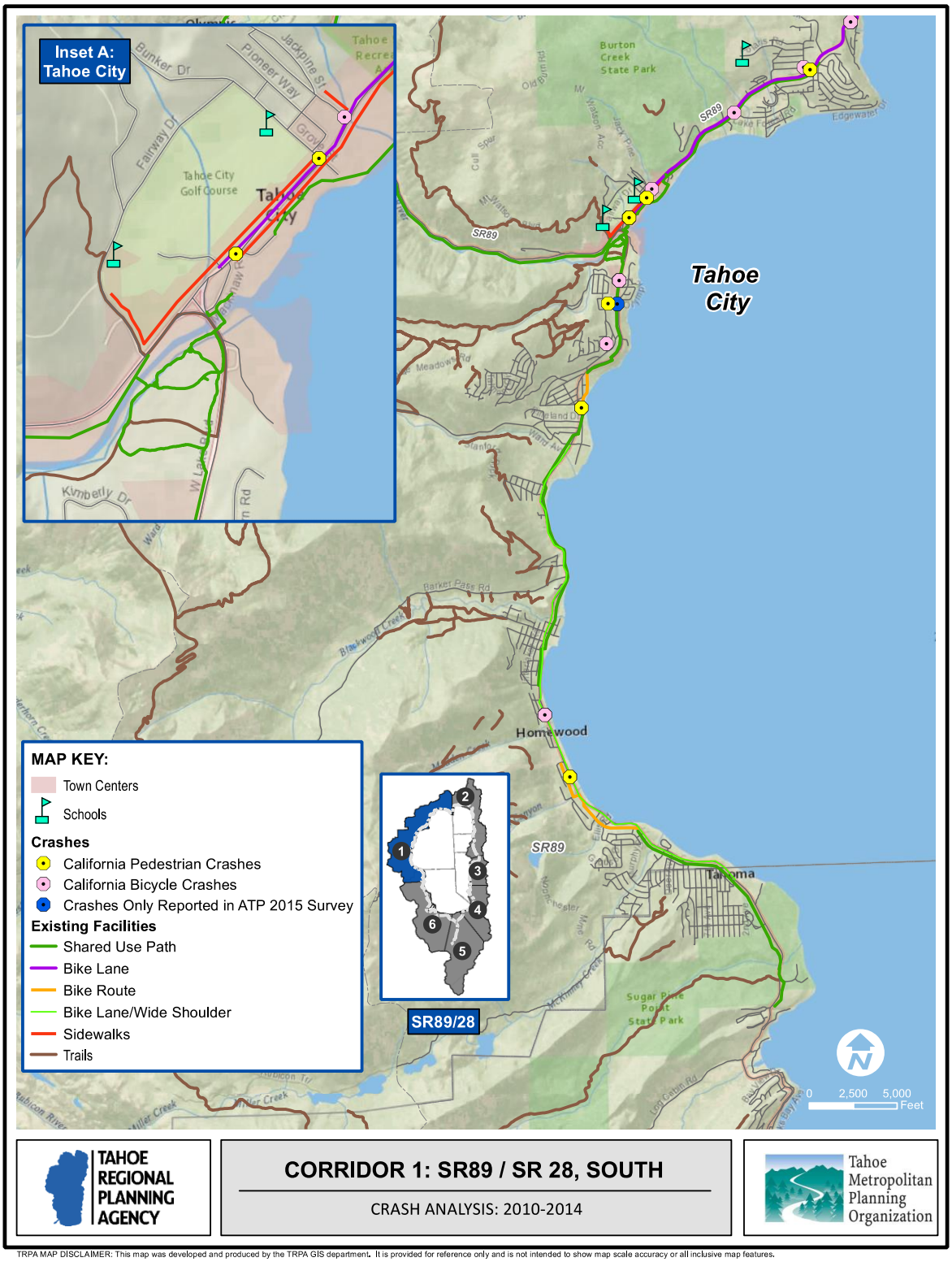


FIGURE 4-4: CORRIDOR 1 SOUTH CRASH ANALYSIS



CORRIDOR PROJECT LISTS:

Table 4-1: Corridor 1 Design Project List

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
West Shore Bike Trail Extension & Improvements - Homewood	TCPUD	C-I / Shared-Use	$1,804,000	1	Placer County
North Tahoe Regional Bike Trail	Placer County	C-I / Shared-Use	$15,800,000	4.4	Placer County
Dollar Creek Shared-Use Trail	Placer County	C-I / Shared-Use	$4,385,000	2.3	Placer County
West Shore Bike Trail Extensions & Improvements - Sugar Pine to Meeks Bay	TTD	C-I / Shared-Use	$3,600,000	0.6	El Dorado County
TOTAL:			**$25,589,000**	**8.3**	

Table 4-2: Corridor 1 Planning Project List

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Lakeside Bike Trail Phase 2C - Mackinaw to Commons Beach	TCPUD	C-I / Shared-Use	$225,000.	0.2	Placer County
Brockway Vista Multi-Use Trail	Placer County	C-I / Shared-Use	$2,190,000	0.7	Placer County
National Avenue Shared Use Path	Placer County	C-I / Shared-Use	$750,000	0.5	Placer County
North Tahoe Regional Bike Trail Connector (Carnelian Woods Ave to Trail)	Placer County	C-I / Shared-Use	$1,245,000	0.8	Placer County
Summit to Lake Trail	Placer County	C-I / Shared-Use	$7,000,000	3	Placer County
Brockway Vista Multi-Use Path Extension	Placer County	C-I / Shared-Use	$2,430,000	0.8	Placer County
State Route 267 Complete Street Improvements	Placer County / Caltrans	Corridor Revitalization / Complete Streets	$9,570,000	3.2	Placer County

SR 267 to Stateline Shared-Use Path	Placer County	C-1 / Shared-Use	$3,400,000	1.9	Placer County
SR 89 North Shared-Use Path	Placer County	C-I / Shared-Use Path	$266,000	0.6	Placer County
State Route 89 Bike Lanes (Tahoe City "WYE" to Basin Boundary)	Caltrans	C-II / Bike Lane	$36,000	4	Placer County
Carnelian Woods Bike Lanes	Placer County	C-II / Bike Lane	$4,700	0.5	Placer County
Placer County Bike Route System	Placer County	C-III / Bike Route	$7,866	2.3	Placer County
TOTAL			**27,124,566**	**18.5**	

Table 4-3: Corridor 1 Priority Intersections:

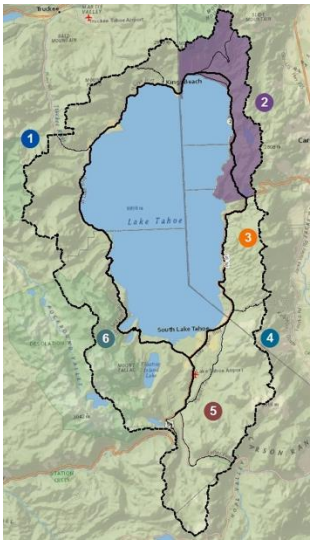
Project Name	Lead Implementer	Jurisdiction
Chipmunk Street & SR 28	Caltrans	Placer County
Secline Street & SR 28	Caltrans	Placer County
SR 267 & SR 28	Caltrans	Placer County
West Shore Bike Path (Sequoia Ave) & SR 89	Caltrans / TCPUD	Placer County
West Shore Bike Path (Chinquapin Way) & SR 89	Caltrans / TCPUD	Placer County
Grove Street & SR 28	Caltrans	Placer County
Jackpine Street & SR 28	Caltrans	Placer County

Please see the following to page for a conceptual rendering produced as part of the Transforming Tahoe Transportation Workshop. Participants were asked to evaluate mobility challenges in the Tahoe area and provide recommendations for improvements. The renderings, provided by Alta Planning + Design, illustrate near-term complete street options. The location for Corridor 1 is the intersection of State Route 89 and the West Shore Bike Path.

Existing conditions


Street lighting
Rectangular Rapid Flashing Beacon
Visible waiting area for trail users
High visibility crosswalk

CORRIDOR 2: NV STATE ROUTE 28 NATIONAL SCENIC BYWAY



Physical Geographic Description: This corridor includes State Route 28 starting from the intersection with US Highway 50 in the southeast to the state line in Crystal Bay. This corridor is located in Washoe County and Carson City. Incline Village, Sand Harbor State Park, and parts of State Route 431 are located in Corridor 2.

Context Relevant Plans & Studies:

- Mount Rose State Route 431 Corridor Management Plan
- State Route 28 Corridor Management Plan
- Incline Village Commercial and Tourist Community Plans
- Washoe County Master Plan

Additional Corridor Considerations:

Community Input: Stakeholders suggested a variety of bike routes that at this time have not been included because they currently do not connect to any facilities. However, these bike routes should be analyzed by the appropriate implementing agency to determine feasibility and need as adjacent facilities are planned.

Proposals include:

1. Bike Route along Wassou/Tuscarora Road – Crystal Bay
2. Bike Route along Logpole Drive, Incline Village

Utilizing Existing Studies: To further the implementation of complete street infrastructure in the corridor, partners should continue implementation of the State Route 28 and State Route 431 Corridor Management Plans.

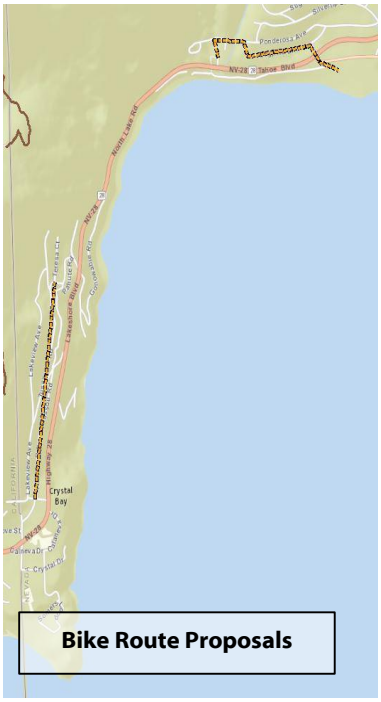


FIGURE 4-5: CORRIDOR 2 EXISTING & PROPOSED INFRASTRUCTURE

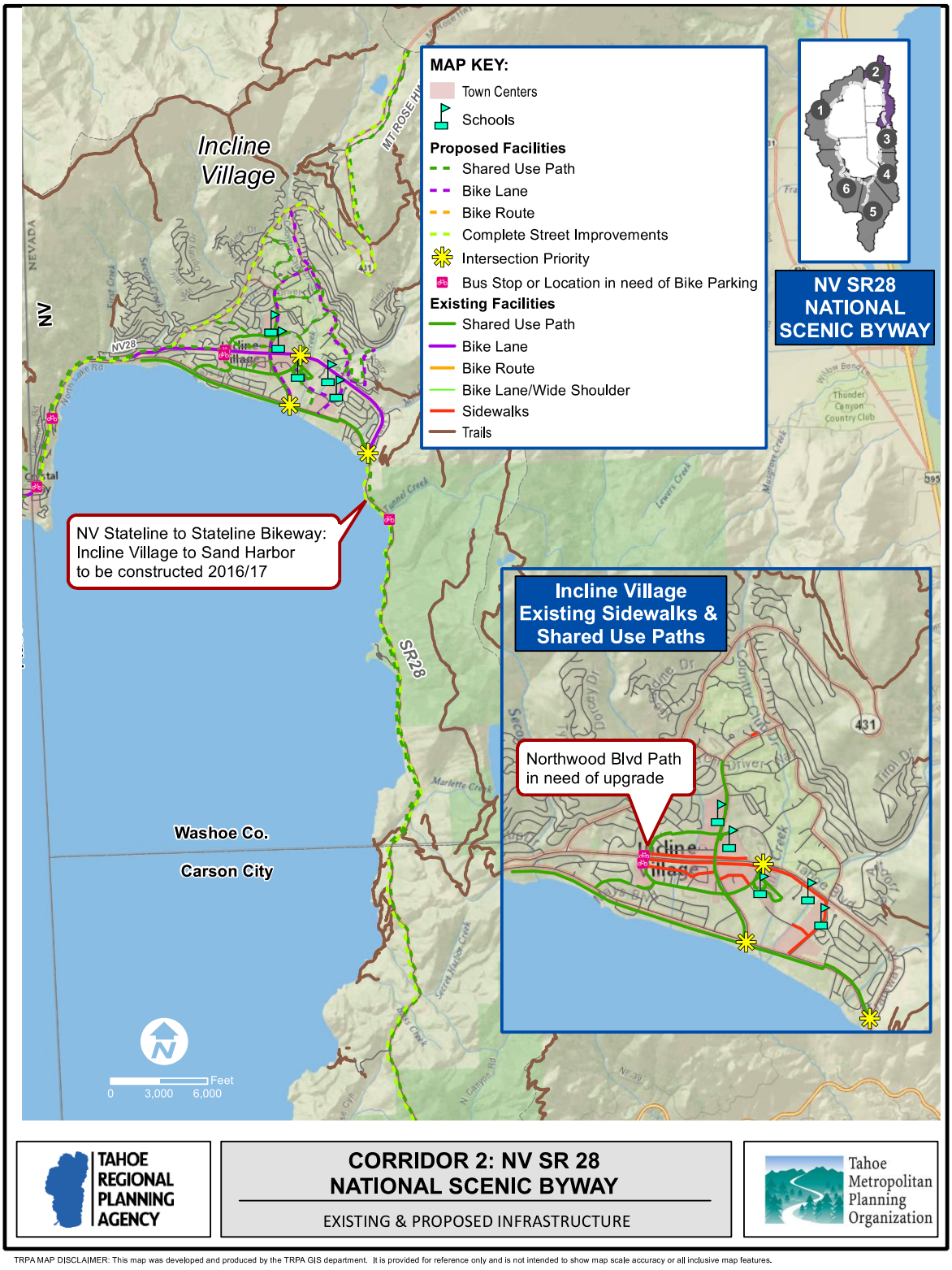


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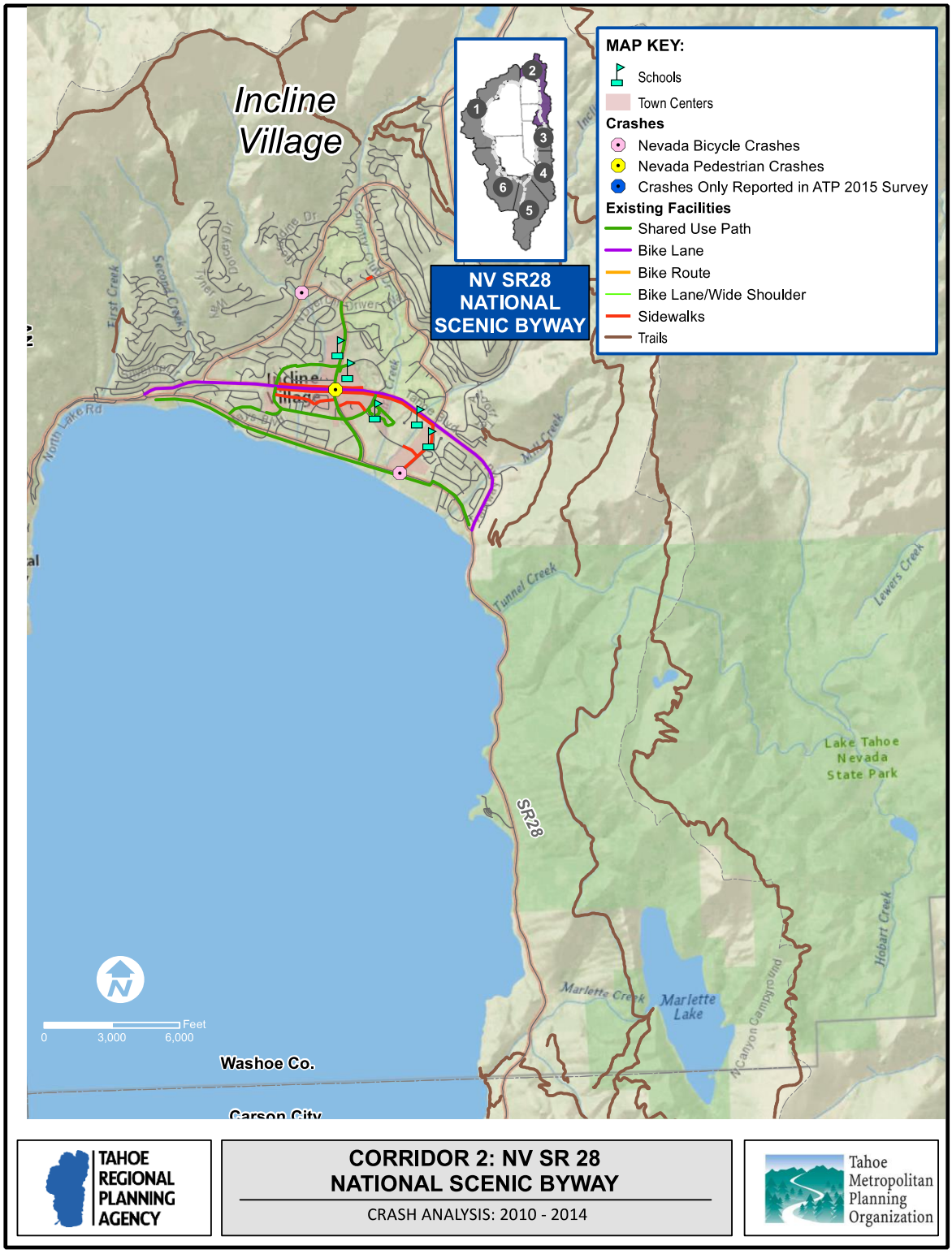
FIGURE 4-6: CORRIDOR 2 CRASH ANALYSIS



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CORRIDOR PROJECT LISTS:

Table 4-4: Corridor 2 Design Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/ City
Nevada Stateline to Stateline Bikeway Phase 2 (Incline to Sand Harbor)	TTD	C-I / Shared-Use	$14,500,000	5	Washoe County
Nevada Stateline to Stateline Bikeway Phase 3 (Sand Harbor to Spooner Summit)	TTD	C-I / Shared-Use	$36,200,000	8	Washoe County/Carson City, Douglas County
TOTAL:			**$50,500,000**	**13**	

Table 4-5: Corridor 2 Planning Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/ City
Nevada Stateline to Stateline Bikeway Phase 5 (Crystal Bay to Incline)	TTD	C-I / Shared-Use	$20,000,000	2.1	Washoe County
Alder Avenue Shared Use Path	Washoe County	C-I / Shared-Use	$690,000	0.5	Washoe County
Driver Way Shared Use Path	Washoe County	C-I / Shared-Use	$870,000	0.6	Washoe County
Fairway Blvd Shared Use Path	Washoe County	C-I / Shared-Use	$660,000	0.4	Washoe County
Village Blvd Shared Use path	Washoe County	C-I / Shared-Use	$630,000	0.4	Washoe County
Golfers Pass Road Shared Use Path	Washoe County	C-I / Shared-Use	$1,260,000	0.8	Washoe County
Tanager Street Shared Use Path	Washoe County	C-I / Shared-Use	$135,000	0.1	Washoe County
Village Green Shared Use Path	Washoe County	C-I / Shared-Use	$300,000	0.2	Washoe County
Incline Way Shared Use Path	Washoe County	C-I / Shared-Use	$555,000	0.4	Washoe County
Northwood Blvd Shared Use Path	Washoe County	C-I / Shared-Use	$660,000	0.4	Washoe County
McCourry Blvd Shared Use Path	Washoe County	C-I / Shared-Use	$690,000	0.5	Washoe County
Ski Way Shared Use Path	Washoe County	C-I / Shared-Use	$1,095,000	0.7	Washoe County
Country Club Drive Shared Use Path	Washoe County	C-I / Shared-Use	$2,325,000	1.6	Washoe County
Old Mt. Rose Highway Shared Use Path	Washoe County	C-I / Shared-Use	$3,810,000	2.5	Washoe County

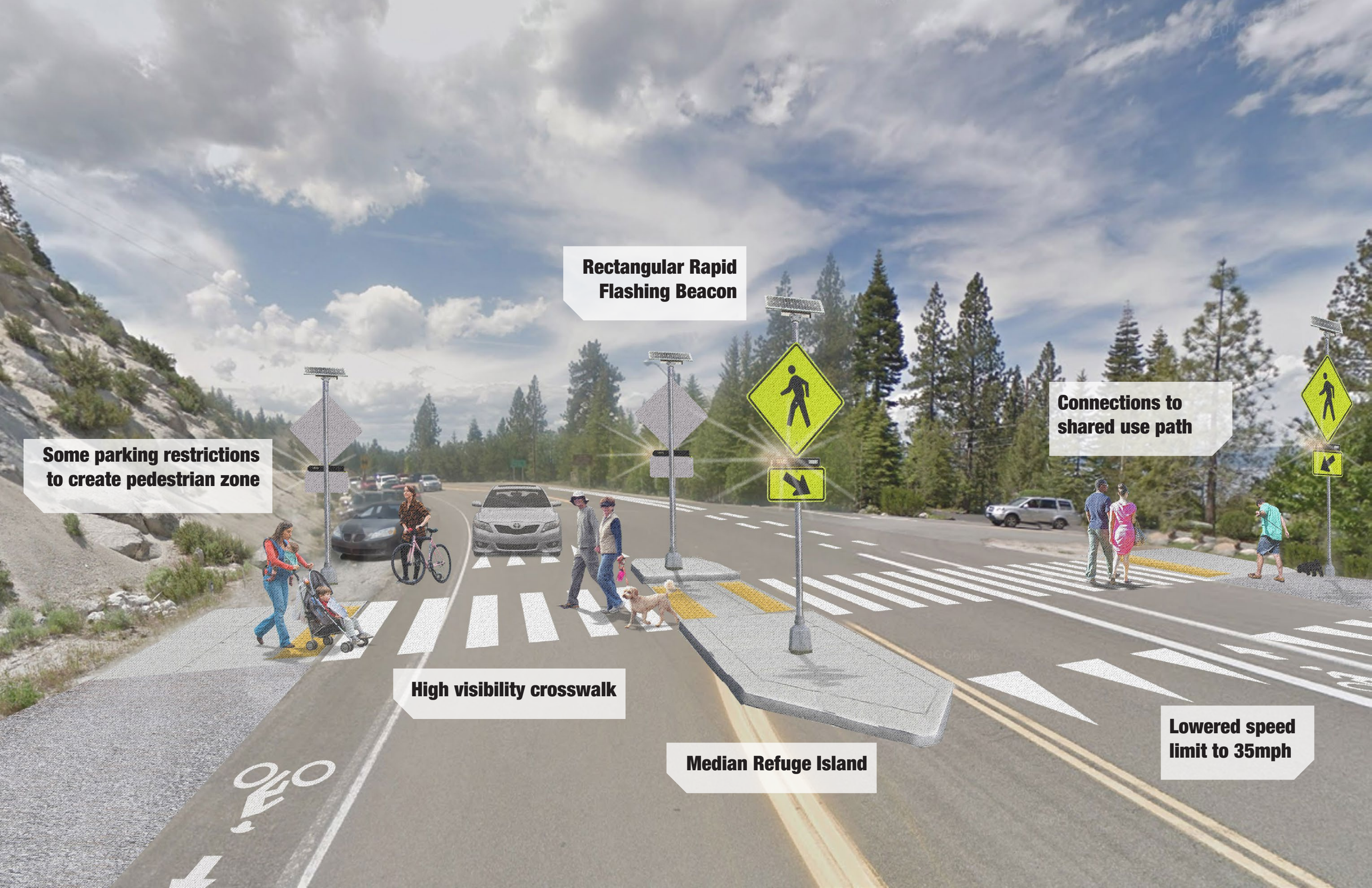
SR 28 Shared Use Path: I Lakeshore Drive to NV -431	Washoe County	C-I / Shared-Use	$750,000	0.5	Washoe County
Class I Bike Trail along State Route 28 from Preston Field to Northwood Blvd.	Washoe County	C-I / Shared-Use	$750,000	0.5	Washoe County
Country Club Drive Bike Lanes (SR 28 to NV -431)	Washoe County	C-II / Bike Lane	$26,700	2.7	Washoe County
Village Blvd Bike Lanes (Lakeshore Blvd to Country Club Road)	Washoe County	C-II / Bike Lane	$19,100	1.9	Washoe County
Incline Way Bike Lanes	Washoe County	C-II / Bike Lane	$5,800	0.6	Washoe County
Ski Way Bike Lanes	Washoe County	C-II / Bike Lane	$8,100	0.8	Washoe County
TOTAL			**$35,239,700**	**18.2**	

Table 4-6: Corridor 2 Priority Intersections:

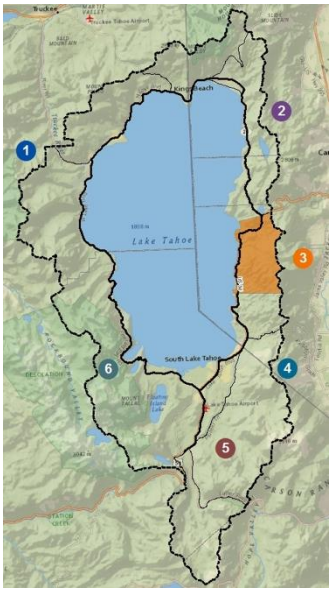
Project Name	Lead Implementer	Jurisdiction
SR 28 & Northwood Blvd.	NDOT	Washoe County
Lakeshore Blvd & Village Blvd	Washoe County	Washoe County
Lakeshore Blvd & SR 28	NDOT	Washoe County

Please see the following to page for a conceptual rendering produced as part of the Transforming Tahoe Transportation Workshop. Participants were asked to evaluate mobility challenges in the Tahoe area and provide recommendations for improvements. The renderings, provided by Alta Planning + Design, illustrate near-term complete street options. The location for Corridor 2 is the intersection of Lakeshore Boulevard and State Route 28. A roundabout was also suggested at this location as a long term solution.

Existing conditions


Rectangular Rapid Flashing Beacon
Some parking restrictions to create pedestrian zone
Connections to shared use path
High visibility crosswalk
Median Refuge Island
Lowered speed limit to 35mph

CORRIDOR 3: US HIGHWAY 50 EAST SHORE



Physical Geographic Description: This corridor starts at the intersection of US Highway 50 and State Route 28 and extends to roughly 950 feet northwest of Elks Point Road. This latter point is the northern end of the Round Hill Mall commercial center, and marks where the predominantly rural, low density areas to the north transition to the predominantly developed areas to the south. This corridor is located in Douglas County.

Context Relevant Plans & Studies:

- Tahoe Douglas Area Plan
- Round Hill Community Plan

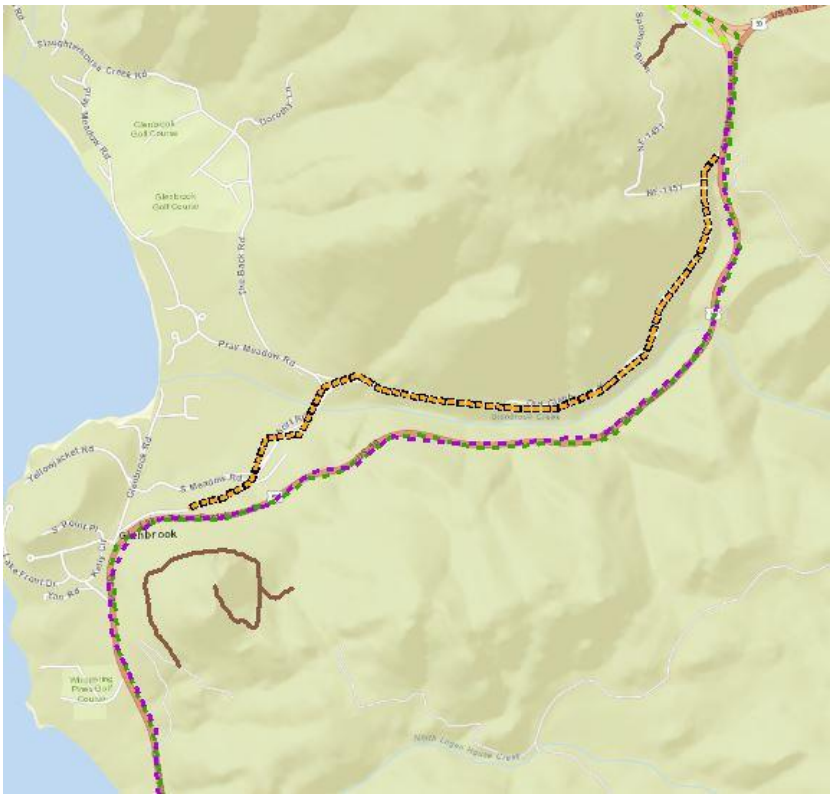
Additional Corridor Considerations:

Community Input: Stakeholders suggested a variety of bike routes that at this time have not been included because they currently do not connect to any facilities. However, these bike routes should be analyzed by the appropriate implementing agency to determine feasibility and need as adjacent facilities are planned.

Proposals include:

1. Bike Route along Old Highway 50 in Glenbrook.

2. Bike Route in Skyland Park residential area



Bike Route Proposal: Old Glenwood Highway

FIGURE 4-7: CORRIDOR 3 EXISTING & PROPOSED INFRASTRUCTURE

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FIGURE 4-8: CORRIDOR 3 CRASH ANALYSIS

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CORRIDOR PROJECT LIST:

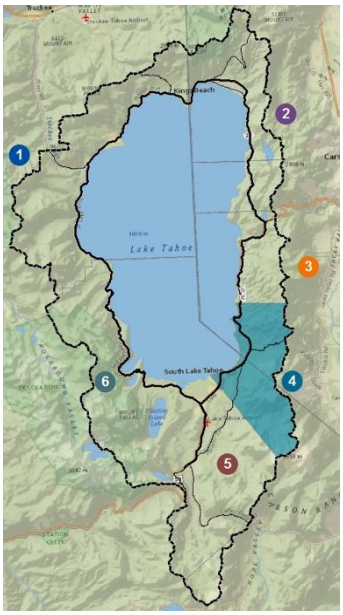
Table 4-7: Corridor 3 Planning Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Nevada Stateline to Stateline Bikeway Phase 4 (Spooner Summit to Round Hill Pines)	TTD	C-I / Shared-Use	$32,000,000	10.6	Douglas County
TOTAL:			**$32,000,000**	**10.6**	

Conceptual Stateline to Stateline Bikeway: SR 28 National Scenic Byway Corridor Management Plan

This corridor was not chosen as a location for the activity at the workshop because the State Route 28 Corridor Management Plan already has renderings and many facilities in the design process.

CORRIDOR 4: US 50 SOUTH SHORE

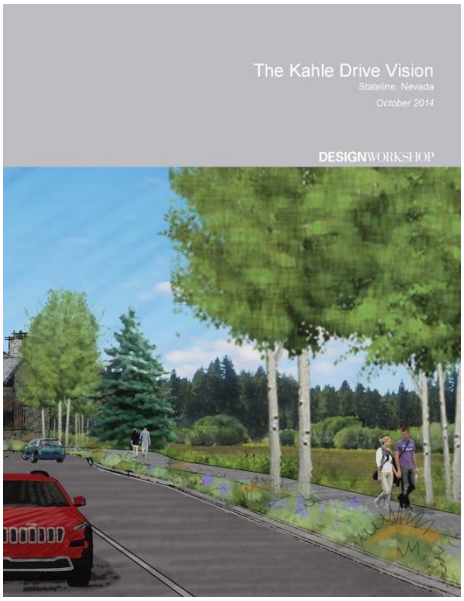


Physical Geographic Description: This corridor starts at US Highway 50 from roughly 950 feet northwest of Elks Point Road in Douglas County to the Upper Truckee River Bridge (just west of River Street), in the City of South Lake Tahoe. The corridor also includes Pioneer Trail east of the Trout Creek Bridge (just northeast of Golden Bear Avenue) and State Route 207 (Kingsbury Grade) west of Pine Ridge Drive.

Context Relevant Plans & Studies:

- Tahoe Douglas Area Plan
- South Shore Area Plan
- Tourist Core Area Plan
- South Shore Wayfinding Plan
- Lake Tahoe Unified School District Safe Routes to School Master Plan
- South Tahoe Middle School Area Connectivity Plan
- Kahle Drive Vision

Additional Corridor Considerations:



Community Input: Stakeholders suggested a variety of Class I/ Shared-use paths that were vetted by city staff, the South Lake Tahoe Recreation Joint Powers Authority Bicycle Advisory Committee, and the Lake Tahoe Sustainability Collaborative Community Mobility Group. Many of the recommendations were included in this plan as proposed facilities, were slightly altered, or were not included based on technical expertise. To review all of the community proposed projects for this corridor, please review Appendix B, the *2015 Community Outreach Report*. The *Existing & Proposed Infrastructure* maps found in this section show community-suggested bicycle parking needs. For more detailed information on locations in need of bicycle parking, also see Appendix B.

Facilities in Need of Upgrade: Stakeholders also noted the Pioneer Trail roadway is in need of upgrade. The City of South Lake Tahoe and El Dorado County are aware of this need and are considering a variety of options to address the issue, which may include roadway reconfiguration, or upgraded bike lanes such as the use of a buffer, a separated bikeway, and rumble strips.

Utilizing Future Studies & Plans: City staff indicate they will conduct a citywide parking audit and are in the process of producing a citywide area plan for areas not already included in an existing area plan. Community stakeholders suggest a master plan be developed for the Bijou Bike Park, and include connecting the Park to nearby facilities, such as the soon to be constructed Greenway, and the middle school. As these studies and plans are developed, the Active Transportation Plan will incorporate any new alignments and recommendations.

FIGURE 4-9: CORRIDOR 4 EXISTING & PROPOSED INFRASTRUCTURE

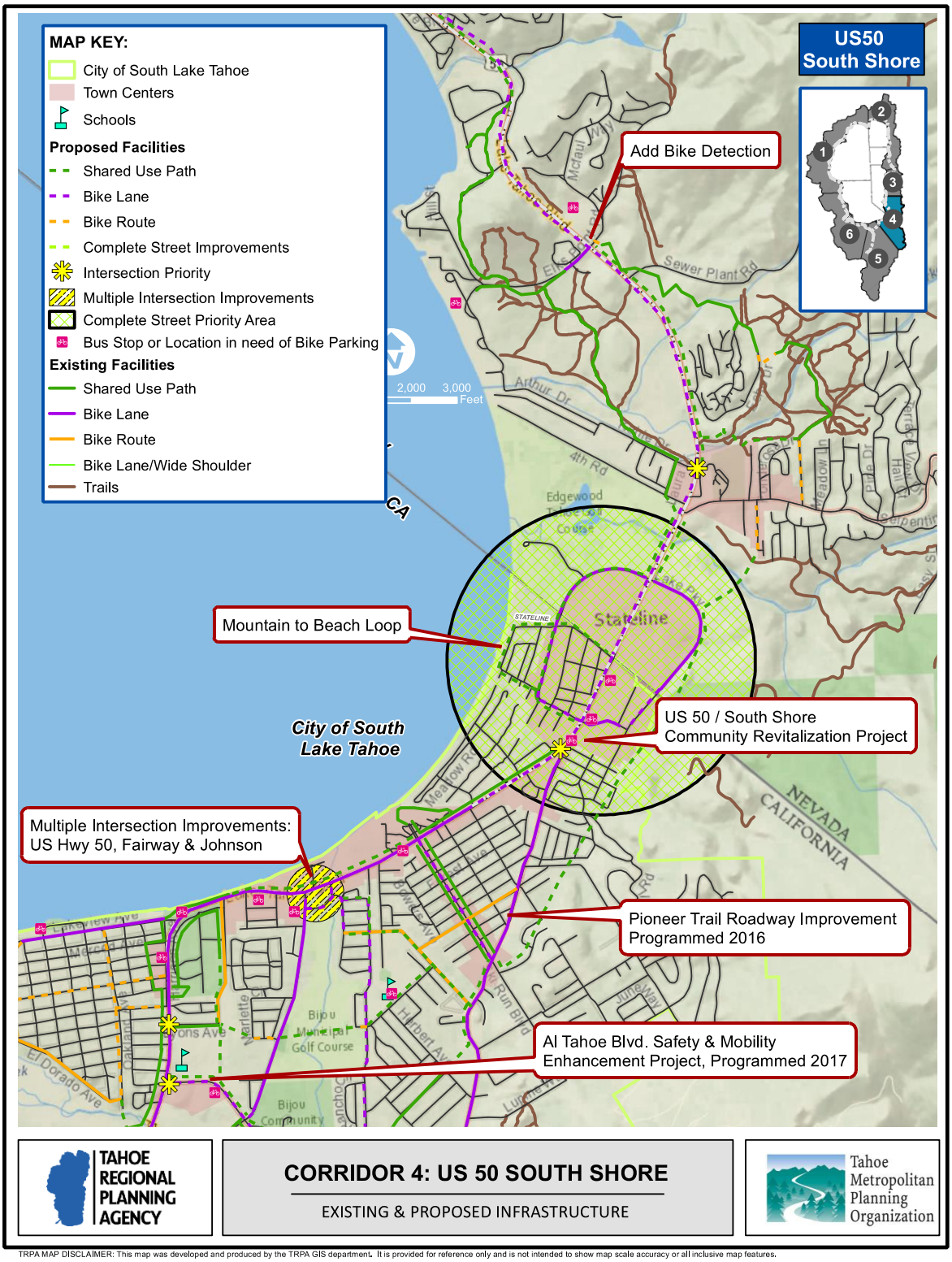


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FIGURE 4-10: CORRIDOR 4 (MIDTOWN) EXISTING & PROPOSED INFRASTRUCTURE

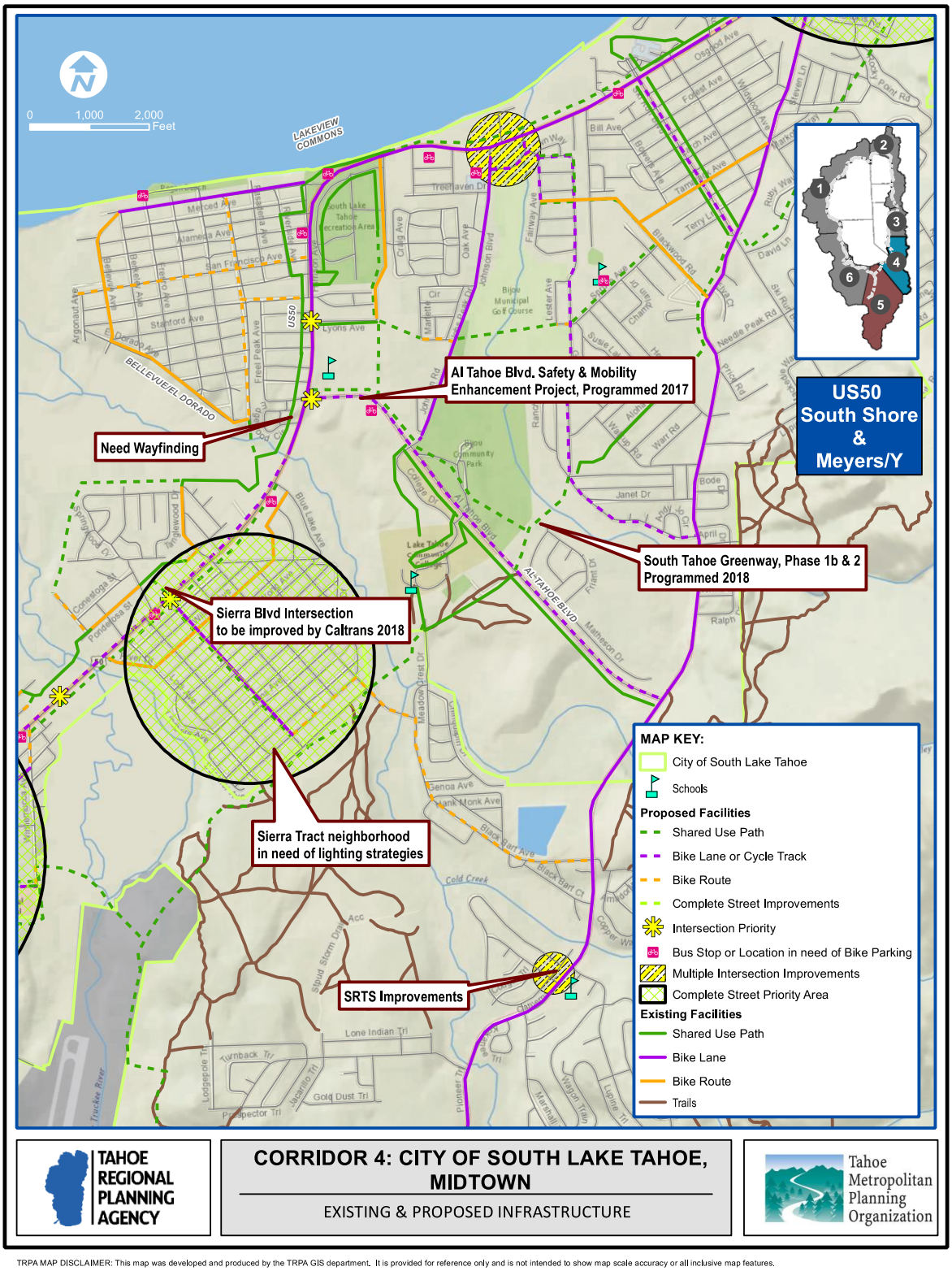

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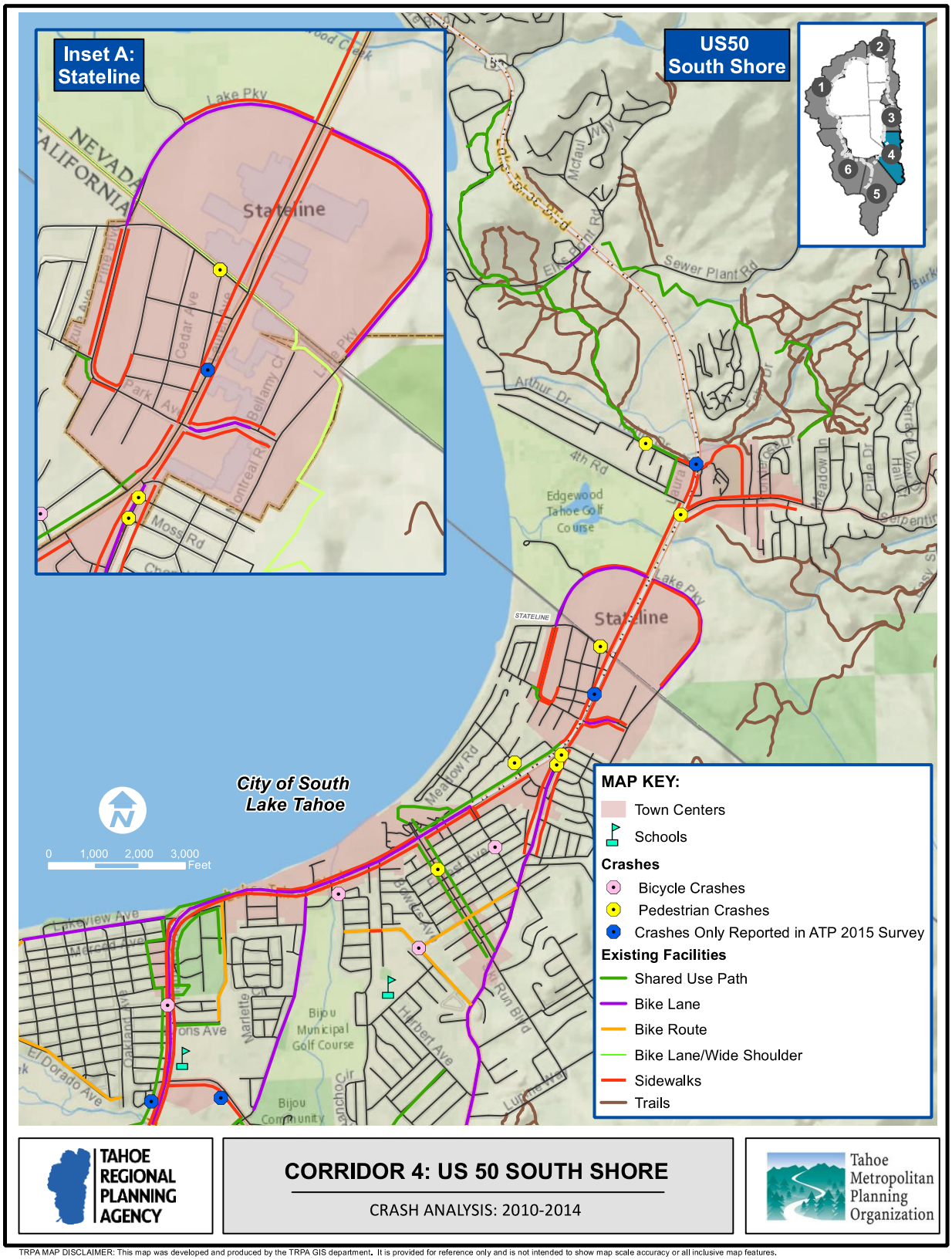
FIGURE 4-11: CORRIDOR 4 CRASH ANALYSIS



TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

CORRIDOR PROJECT LISTS:

Table 4-8: Corridor 4 Design Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Al Tahoe Safety and Mobility Enhancement Project	City of South Lake Tahoe	C-I / Shared-Use	$2,160,928	1.9	City of South Lake Tahoe
South Tahoe Greenway Shared-Use Trail (Van Sickle to Sierra Blvd.)	CTC	C-I / Shared-Use	$5,000,000	2.5	City of South Lake Tahoe
El Dorado Beach to Ski Run Boulevard Bike Trail	City of South Lake Tahoe	C-I / Shared-Use	$2,200,000	0.8	City of South Lake Tahoe
US Highway 50 Sidewalk or Shared Use Path Construction - Kingsbury Grade to Lake Parkway	TTD / NDOT	C-I / Shared-Use	$156,600	0.3	Douglas County
Nevada Stateline to Stateline Bikeway Phase 1A (Stateline/ Edgewood)	TTD	C-I / Shared-Use	$3,000,000	0.4	Douglas County
TOTAL:			**$12,517,528**	**5.9**	

Table 4-9: Corridor 4 Planning Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Blackwood Road Safe Routes to School Project	City of South Lake Tahoe	C-I / Shared Use	$290,000	0.5	City of South Lake Tahoe
Bijou Bike Park Path (Johnson Blvd to Greenway)	City of South Lake Tahoe	C-I / Shared-Use	$213,750	0.5	City of South Lake Tahoe
South Tahoe Bikeway Extension (Oakland Avenue)	City of South Lake Tahoe	C-I / Shared-Use	$360,000	0.1	City of South Lake Tahoe
Blackwood Road Shared Use Path (Fairway to Pioneer Trail)	City of South Lake Tahoe	C-I / Shared-Use	$900,000	0.6	City of South Lake Tahoe
Glenwood Way Shared Use Path (Fairway to Blackwood)	City of South Lake Tahoe	C-I / Shared-Use	$375,000	0.3	City of South Lake Tahoe
Bijou Meadow East-West Connectivity (SRTS)	City of South Lake Tahoe	C-I / Shared-Use	$1,350,000	0.4	City of South Lake Tahoe

Rufus Allen Boulevard Shared Use Path (SRTS)	City of South Lake Tahoe	C-I / Shared-Use	$435,000	0.3	City of South Lake Tahoe
Lyons Avenue to Al Tahoe Blvd. North - South Connectivity (SRTS)	City of South Lake Tahoe / LTUSD	C-I / Shared-Use	$330,000	0.2	City of South Lake Tahoe
Glenwood Avenue Bike Lanes	City of South Lake Tahoe	C-II / Bike Lane	$16,000	1.6	City of South Lake Tahoe
Ski Run Bike Lanes	City of South Lake Tahoe	C-II / Bike Lane	$6,000	0.6	City of South Lake Tahoe
Spruce Avenue Safe Routes to School Project	City of South Lake Tahoe	Corridor Revitalization / Complete Streets	$203,000	0.4	City of South Lake Tahoe
Mountain to Beach Loop (Park Avenue, Pine Blvd., Lakeshore Blvd, and Stateline Avenue)	City of South Lake Tahoe / TTD	Corridor Revitalization / Complete Streets	$1,385,000	1	City of South Lake Tahoe
Fairway Avenue Bike Lanes	City of South Lake Tahoe	C-II / Bike Lane	$3,200	0.3	City of South Lake Tahoe
US 50 Shared Use Path (Kahle to Elk's Point)	NDOT	C-I / Shared-Use	$3,210,000	1.1	Douglas County
Pine Ridge Drive to Kahle/US 50 Intersection	Douglas County	C-I / Shared-Use	750,000	.5	Douglas County
Nevada Greenway Extension to Kingsbury grade (via Market Street)	Douglas County/ CTC	C-I / Shared-Use	$2,310,000	0.8	Douglas County
Douglas County Bike Route System	Douglas County	C-III / Bike Route	$2,242.50	0.7	Douglas County
US 50 Bike Lanes (Stateline to Spooner Summit)	NDOT	C-II / Bike Lane	$122,100	12.2	Douglas County
TOTAL			**$12,261,292**	**22**	

Table 4-10: Corridor 4 Priority Intersections:

Project Name	Lead Implementer	Jurisdiction
Fairway Drive & US 50	Caltrans	City of South Lake Tahoe
Johnson Blvd & US 50	Caltrans	City of South Lake Tahoe
Bal Bijou Road & Us 50	Caltrans	City of South Lake Tahoe
Johnson Blvd & Al Tahoe Boulevard	City of South Lake Tahoe	City of South Lake Tahoe
Kahle Drive & US 50	NDOT	Douglas County
Warrior Way & US 50	NDOT	Douglas County

Please see the following to page for a conceptual rendering produced as part of the Transforming Tahoe Transportation Workshop. Participants were asked to evaluate mobility challenges in the Tahoe area and provide recommendations for improvements. The renderings, provided by Alta Planning + Design, illustrate near-term complete street options. The location for Corridor 4 is the intersection of US Highway 50 and Warrior Way. A roundabout was also suggested at this location as a long term solution.

Existing conditions

Sidewalk connection to school and parking

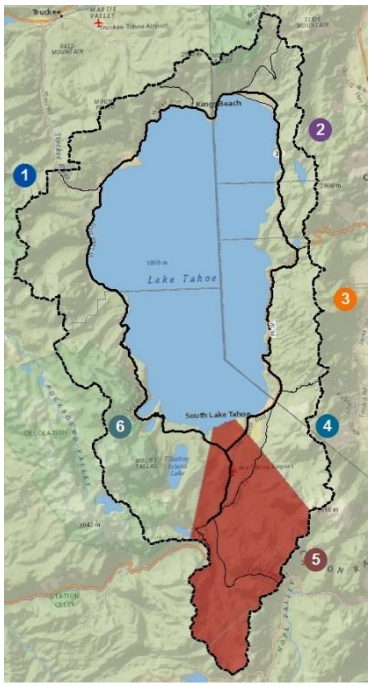
Pedestrian Hybrid Beacon

Parking restrictions along Highway 50

Beach access

Bike Lanes

CORRIDOR 5: MEYERS / Y



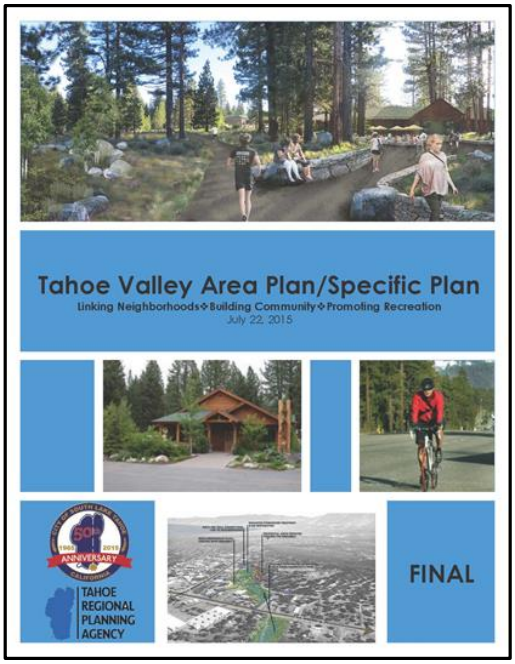
Physical Geographic Description: This corridor begins at US Highway 50 west of the Upper Truckee River in the City of South Lake Tahoe and extends to just north of the South Tahoe "Y" and south to include Meyers, located in El Dorado County.

Context Relevant Plans & Studies:

- Meyers Area Plan (Draft)
- Tahoe Valley Area Plan
- Tahoe Valley Area Plan Bicycle Facility Evaluation
- Lake Tahoe Unified School District Safe Routes to School Master Plan
- South Tahoe Middle School Area Connectivity Plan

Additional Corridor Considerations:

Community Input: Stakeholders suggested a variety of Class I / Shared-use paths. Suggestions were vetted by El Dorado County, City of South Lake Tahoe, the South Lake Tahoe Recreation Joint Powers Authority Bicycle Advisory Committee, and the Lake Tahoe Sustainability Collaborative Community Mobility Group. Many of the recommendations were included as proposed facilities in this plan, were slightly altered, or were not included based on technical expertise. To review community-proposed projects for this corridor, please review Appendix B, the *2015 Community Outreach Report.*



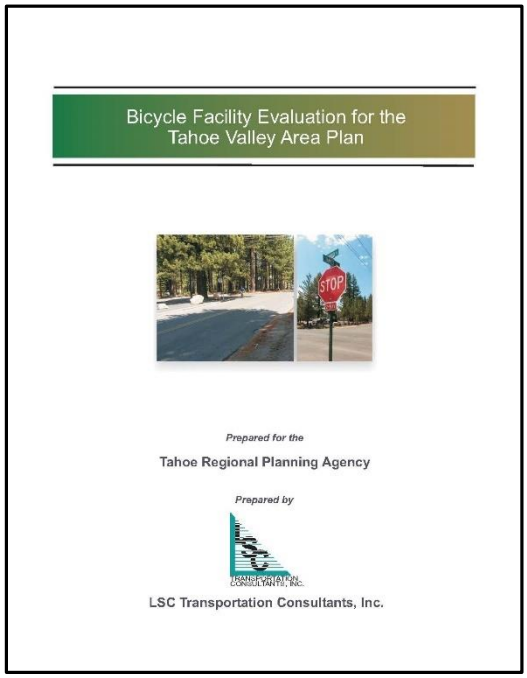
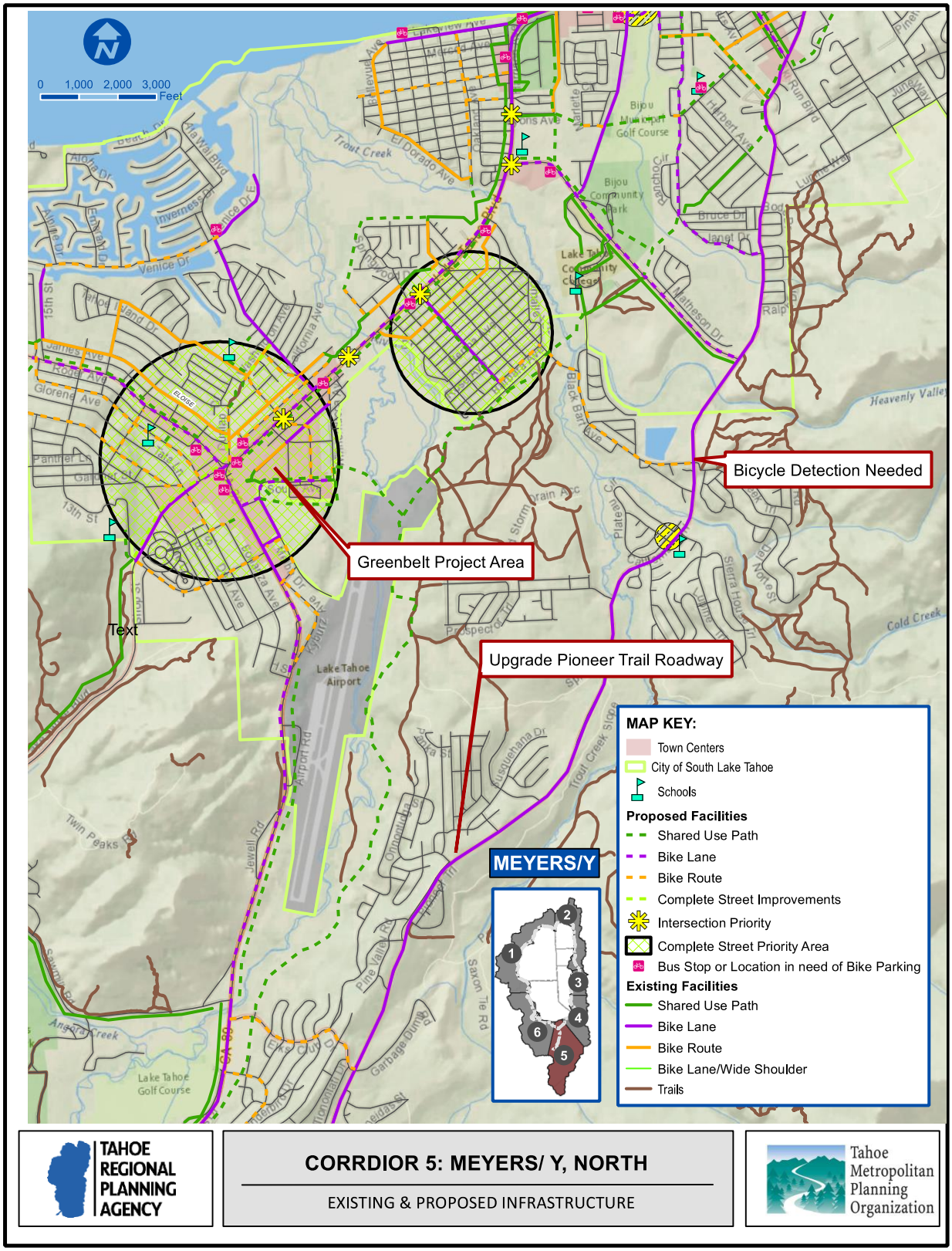


FIGURE 4-12: CORRIDOR 5 NORTH EXISTING & PROPOSED INFRASTRUCTURE



TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

FIGURE 4-13: CORRIDOR 5 SOUTH EXISTING & PROPOSED INFRASTRUCTURE

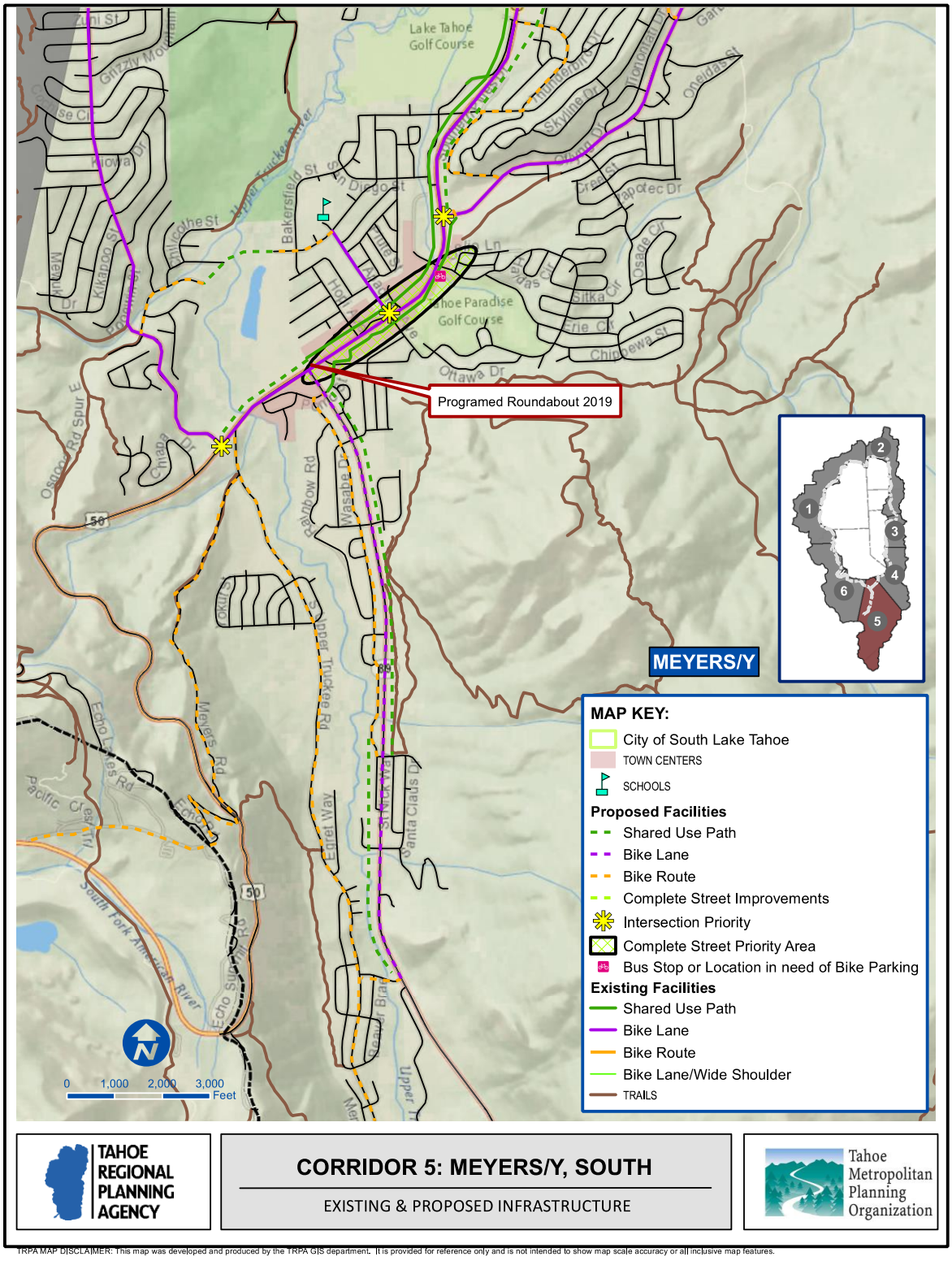
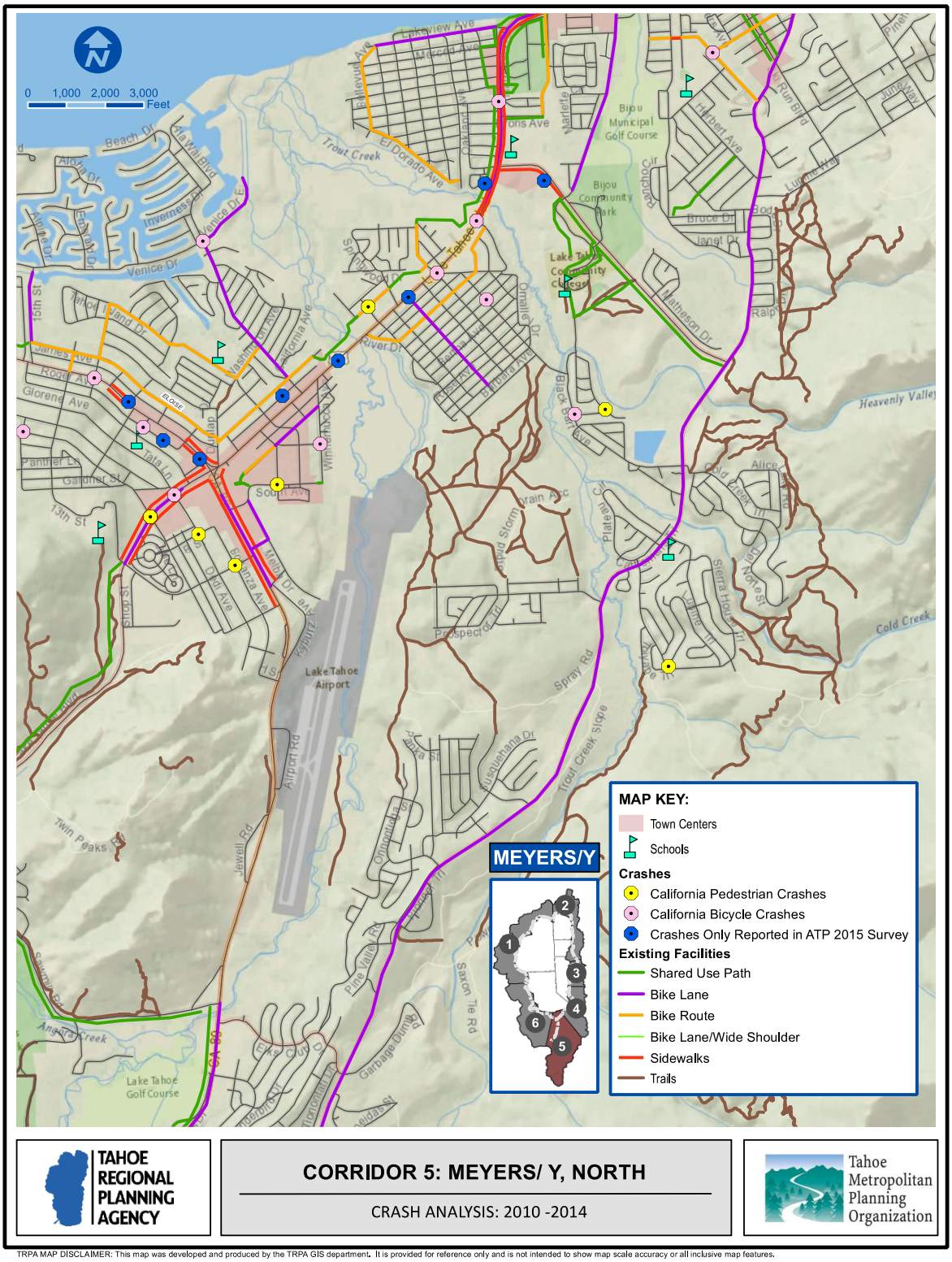
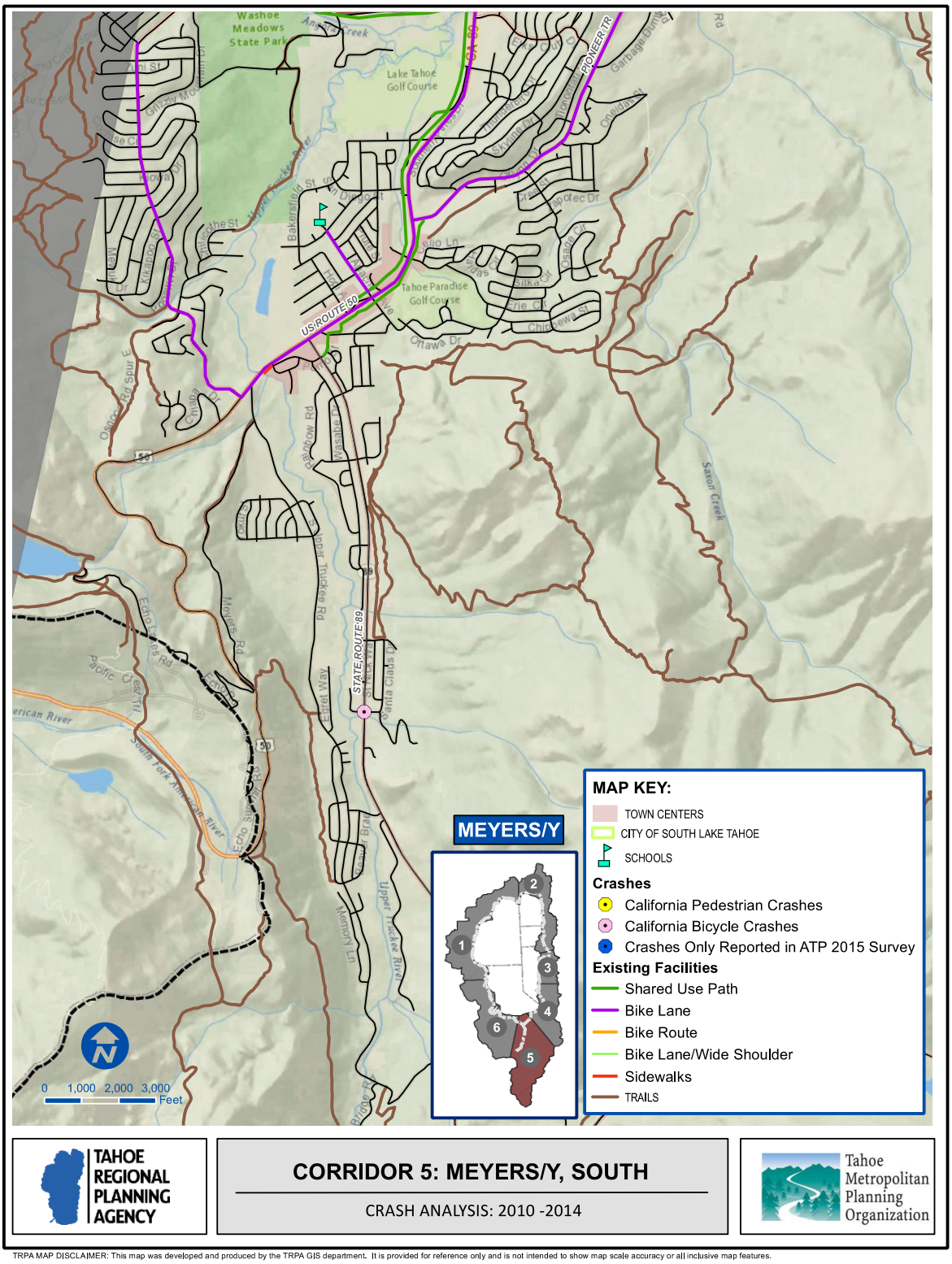


FIGURE 4-14: CORRIDOR 5 NORTH CRASH ANALYSIS



TRPA MAP DISCLAIMER: This map was developed and produced by the TRPA GIS department. It is provided for reference only and is not intended to show map scale accuracy or all inclusive map features.

FIGURE 4-15: CORRIDOR 5 SOUTH CRASH ANALYSIS



CORRIDOR PROJECT LISTS:

Table 4-11: Corridor 5 Design Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Sierra Boulevard Complete Streets Project (From US Highway 50 to Barbara Avenue)	City of South Lake Tahoe	Corridor Revitalization /Complete Streets	$1,620,000	0.5	City of South Lake Tahoe
South Tahoe Greenbelt (B Street, Winnemucca, South Avenue)	City of South Lake Tahoe	Corridor Revitalization /Complete Streets	$2,162,500	1.6	City of South Lake Tahoe
TOTAL:			**$3,782,500**	**2.1**	

Table 4-12: Corridor 5 Planning Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Class I Bike Trail along US Highway 50 from H Street to the City Limits	City of South Lake Tahoe	C-I / Shared-Use	$600,000	0.4	City of South Lake Tahoe
Class I Bike Trail: Third Street/Tahoe Valley Elementary	City of South Lake Tahoe	C-I / Shared-Use	$75,400	0.1	City of South Lake Tahoe
South Tahoe Bikeway Connector (US 50 @ Sierra Blvd to Bikeway)	City of South Lake Tahoe	C-I / Shared-Use	$28,500	0.1	City of South Lake Tahoe
South Tahoe High Shared Use Trail, Safe Routes to School	City of South Lake Tahoe	C-I / Shared-Use	$450,000	0.2	City of South Lake Tahoe
South Tahoe Bikeway Extension (James Avenue)	City of South Lake Tahoe	C-I / Shared-Use	$14,250	0.1	City of South Lake Tahoe
Wyoming Avenue to Tahoe Valley	City of South Lake Tahoe	C-I / Shared-Use	$34,800	0.1	City of South Lake Tahoe

Elementary Safe Routes to School Project					
State Route 89 Shared Use Path (South Tahoe "Y" to 15th Street)	City of South Lake Tahoe	C-I / Shared-Use	$1,305,000	0.9	City of South Lake Tahoe
South Tahoe Bikeway Extension (Meadow Connection: Sunset Avenue)	City of South Lake Tahoe	C-I / Shared-Use	$2,010,000	0.7	City of South Lake Tahoe
Gardner Mountain Shared Use Connector Path	City of South Lake Tahoe	C-I / Shared-Use	$38,000	0.1	City of South Lake Tahoe
Tahoe Valley Shared Use Connector Path (Dunlap)	City of South Lake Tahoe	C-I / Shared-Use	$87,000	0.2	City of South Lake Tahoe
Washington Avenue Safe Routes to School Project	City of South Lake Tahoe	Corridor Revitalization / Complete Streets	$200,000	0.2	City of South Lake Tahoe
Lake Tahoe Boulevard Bike Trail Extension to Eloise Bike Route	City of South Lake Tahoe	Corridor Revitalization / Complete Streets	$1,185,000	0.8	City of South Lake Tahoe
Meyers Bikeway Extension	El Dorado County / Caltrans	C-I / Shared-Use	$675,000	0.5	El Dorado County
South Tahoe Greenway Future Phases (Meyers to Sierra Blvd)	CTC	C -I / Shared Use	$14,187,000	5	El Dorado / City of South Lake Tahoe
South Tahoe Greenway "Y" Connector	CTC	C -I / Shared Use	$1,320,000	0.4	El Dorado County
Class I Bike Path: East San Bernardino - West San Bernardino	El Dorado County	C-I / Shared-Use	$960,000	0.3	El Dorado County
State Route 89 Class I Bike Trail - Highway 50 to Portal Road	El Dorado County	C-I / Shared-Use	$3,645,000	2.4	El Dorado County
Class I Bike Trail Along US Highway 50	El Dorado County	C-I / Shared-Use	$1,935,000	1.3	El Dorado County

from City Limits to Sawmill Road					
US 50 City to Meyers Bike Lanes	El Dorado County / Caltrans	C-II / Bike Lane	$21,100	2.1	El Dorado County
El Dorado County Bike Route System	El Dorado County	C-III / Bike Route	$44,609	12.9	El Dorado County
North Upper Truckee Bike Lanes	El Dorado County	C-II / Bike Lane	$7,100	0.7	El Dorado County
City of South Lake Tahoe Bike Route System	City of South Lake Tahoe	C-III / Bike Route	$35,018	10.2	City of South Lake Tahoe
TOTAL			**$28,857,777**	**39.7**	

Table 4-13: Corridor 5 Priority Intersections:

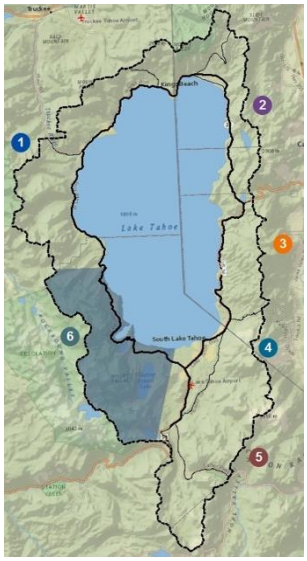
Project Name	Lead Implementer	Jurisdiction
Grocery Outlet Driveway & US 50	Caltrans	City of South Lake Tahoe
Third Street & US 50	Caltrans	City of South Lake Tahoe
Sierra Blvd & US 50	Caltrans	City of South Lake Tahoe
South Tahoe "Y"	Caltrans / City of South Lake Tahoe	City of South Lake Tahoe
Tahoe Keys & US 50	City of South Lake Tahoe	City of South Lake Tahoe
Pioneer Trail & US 50	Caltrans	El Dorado County
Apache Avenue & US 50	Caltrans	El Dorado County

Please see the following to page for a conceptual rendering produced as part of the Transforming Tahoe Transportation Workshop. Participants were asked to evaluate mobility challenges in the Tahoe area and provide recommendations for improvements. The renderings, provided by Alta Planning + Design, illustrate near-term complete street options. The location for Corridor 5 is the intersection of Tahoe Island Boulevard and Washington Street.

Existing conditions


Landscaped island
Mini traffic circle with yield control
YIELD
Natural surface walkways

CORRIDOR 6: STATE ROUTE 89 RECREATION



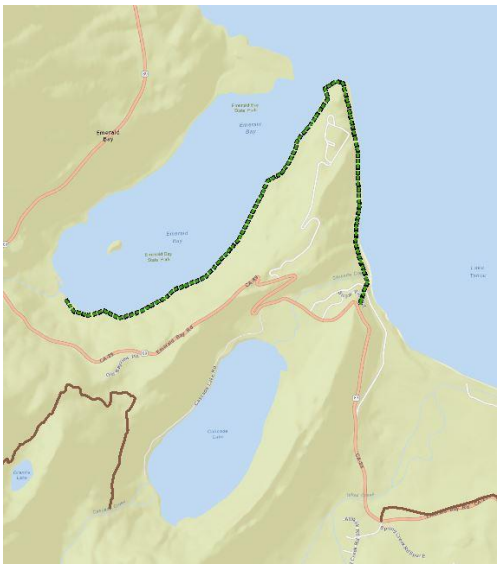
Physical Geographic Description: This corridor begins at the northern edge of the City of South Lake Tahoe just past the South Tahoe "Y" and extends to the north into El Dorado County, just past of Meeks Bay.

Context Relevant Plans & Studies:

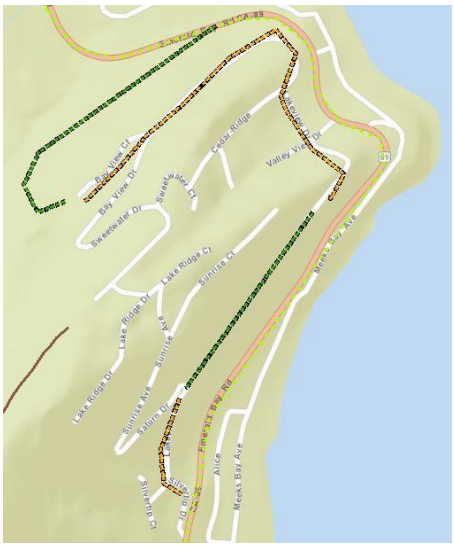
- SR -89 Cascade to Rubicon Bay Bikeway Study
- West Shore Area General Plan
- El Dorado County General Plan

Additional Corridor Considerations:

Community Input: The Meeks Bay Homeowners Association has proposed a variety of bike routes and Class I/shared-use paths for the Meeks Bay area that at this time have not been included because they currently do not connect to any facilities. However, these proposals should be analyzed by the appropriate implementing agency to determine feasibility and need as adjacent facilities are planned. Also proposed by the community is a path that follows the shoreline of Emerald Bay to connect users to Vikingsholm. At this time the route has not been included in the proposed project list for this corridor. However, this suggestion should be analyzed by the appropriate implementing agency to determine feasibility and need. The Corridor Connection Plan currently in development for this corridor should review these suggestions and incorporate if determined desirable.



Emerald Bay Proposal



Meeks Bay HOA Proposal

FIGURE 4-16: CORRIDOR 6 EXISTING & PROPOSED INFRASTRUCTURE

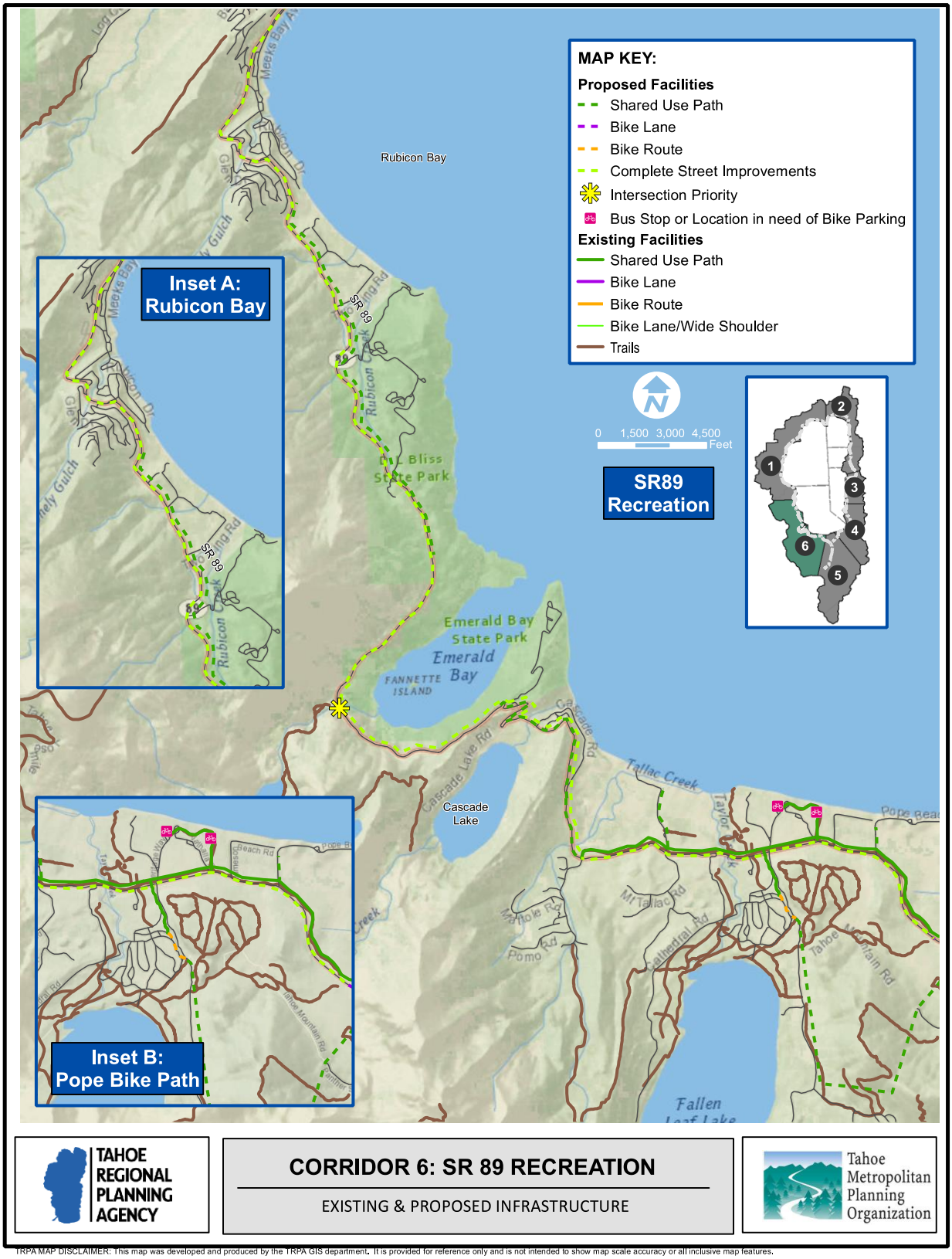
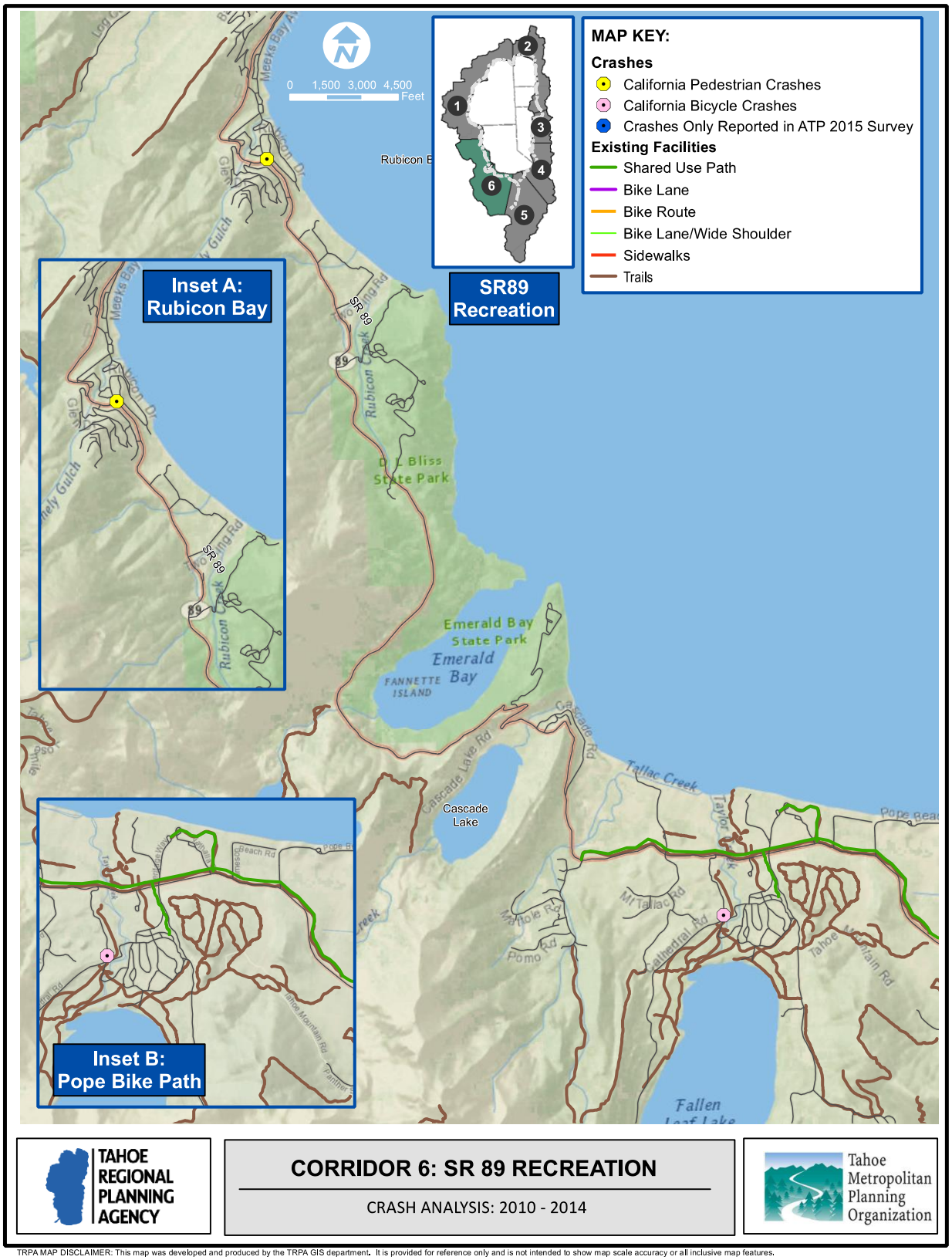


FIGURE 4-17: CORRIDOR 6 CRASH ANALYSIS



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CORRIDOR PROJECT LISTS:

Table 4-14: Corridor 6 Design Project List:

Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
Fallen Leaf Bike Trail	U.S. Forest Service - Lake Tahoe Basin Management Unit	C-I / Shared-Use	$4,740,000	3.2	El Dorado County
Baldwin Beach Bike Path	U.S. Forest Service - Lake Tahoe Basin Management Unit	C-I / Shared-Use	$272,600	0.5	El Dorado County
Pope Beach Bike Path	U.S. Forest Service - Lake Tahoe Basin Management Unit	C-I / Shared-Use	$92,800	0.2	El Dorado County
TOTAL:			**$5,105,400**	**3.9**	

Table 4-15: Corridor 6 Planning Project List:

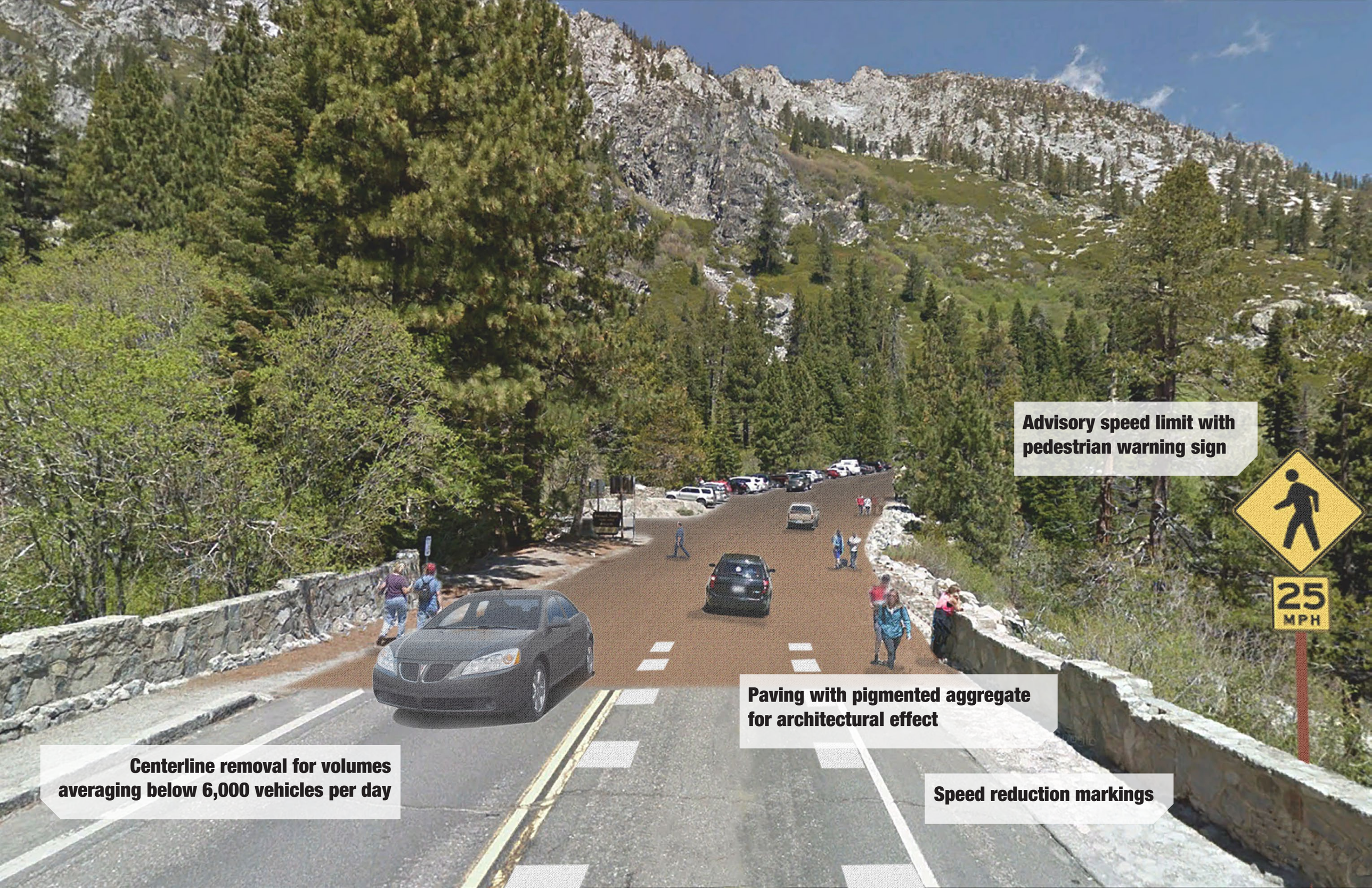
Project Name	Lead Implementer	Description	Estimated Total Cost	Miles	County/City
South Shore Beach Path (Cascade to Spring Creek Road)	U.S. Forest Service - Lake Tahoe Basin Management Unit	C-I / Shared-Use	$2,610,000	1.7	El Dorado County
West Shore Trail Extension (DL Bliss)	N/A	C-I / Shared Use	$9,660,000	3.2	El Dorado County
TOTAL			**$12,270,000**	**4.9**	

Table 4-16: Corridor 6 Priority Intersection:

Project Name	Lead Implementer	Jurisdiction
Eagle Falls Trailhead & SR 89	Caltrans	El Dorado County

Please see the following to page for a rendering produced as part of the Transforming Tahoe Transportation Workshop. Participants were asked to evaluate mobility challenges in the Tahoe area and provide recommendations for improvements. The renderings, provided by Alta Planning + Design, illustrate some of the complete street options. <u>The location for Corridor 6 is the section of State Route 89 stretching from Inspiration Point to the Eagle Falls Trailhead.</u>

Existing conditions


Advisory speed limit with pedestrian warning sign
25 MPH
Paving with pigmented aggregate for architectural effect
Centerline removal for volumes averaging below 6,000 vehicles per day
Speed reduction markings

CHAPTER 5: PROGRAMS

Awareness programming is a major aspect of encouraging community members and visitors to use multi-modal methods of transportation. Successful programs require a joint effort between state departments of transportation, local jurisdictions, law enforcement, advocacy groups, and local organizations. Campaigns that include encouragement, education and awareness, evaluation, and enforcement all work together to increase active transportation, improve safety, and gather valuable community feedback. Agencies and organizations currently involved in awareness programs include:

Type of Organization	Organization Name	Location	Responsibility
Government & Agency Associations	Counties, CSLT, TMAs	Region-wide	Funding, staff time, materials
Public Safety	City of South Lake Tahoe Police Department	South Lake Tahoe	Funding, staff time, materials
	California Highway Patrol	California	
	Nevada Highway Patrol	Nevada	
Advocacy	Community Mobility Group	South Lake Tahoe	Volunteer time & program development
	Lake Tahoe Bicycle Coalition	Region-wide	Volunteer time & program development
	Tahoe Mountain Biking Association	South Lake Tahoe	Volunteer Time
	The League to Save Lake Tahoe	Region-wide	Funding, staff time, and materials
Education	NDOT Safe Routes to School Program	East Shore	Funding, staff time, program development
	NDOT Bicycle/Pedestrian Education Program	East Shore	Funding, staff time, program development
	School Districts	Region-wide	Funding, staff time, program development
	Lake Tahoe Community College	South Lake Tahoe	Funding, staff time, program development
	South Tahoe Environmental Education Coalition (STEEC)	South Lake Tahoe	Funding, staff time, program development
	North Tahoe Environmental Education Coalition (NTEEC)	North Lake Tahoe	Funding, staff time, program development
	Boys & Girls Club	South Lake Tahoe	Funding, staff time, program development

Table 5-1: Agencies Involved in Awareness Programming. Source: TMPO

5.1 ENCOURAGEMENT:

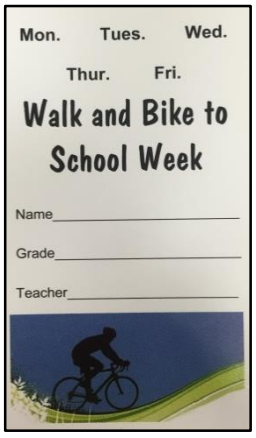
Encouragement to use active transportation as a method of travel can be conducted in many ways. Below are examples of existing programs and recommended programs that should be implemented.

Lake Tahoe Bike Challenge

Since 2005, the Lake Tahoe Bicycle Coalition (LTBC), TRPA/TMPO, and other local and regional partners organize the annual Lake Tahoe Bike Challenge. The goal of the Bike Challenge is to encourage people all around the Region to forego driving and instead bike as often as possible. Each year, hundreds of cyclists join teams or ride as individuals and record their total number of bicycle trips through an online site: http://tahoebikechallenge.org/. Sponsors also organize a variety of events and group rides throughout the two-week period to increase awareness and participation. In 2015, 315 participants logged 17,299 miles and 2,706 total trips. The impact of this challenge on the environment was tremendous, preventing an estimated 18,663 pounds of carbon dioxide emissions.

June 30, 2015 TRPA Car Free Day

Safe Routes to School



Bike to School Week and ***Nevada Moves Day*** promote active transportation at schools by coordinating group rides, providing route information, and offering recognition for participants. During the first week of June 2015, the Community Mobility Group led a pilot program for Bike to School week. All elementary schools within the City of South Lake Tahoe and the town of Meyers participated. Coordinated rides included a series of drop off points where parents could take students if they were too young to bike alone, didn't have a bike, or lived too far away. Volunteers were stationed at each school to pass out and hole-punch cards for each day students used active transportation. At the end of the week, participating students were recognized with prizes. Nevada Moves Day is an annual statewide event sponsored by NDOT's Safe Routes to School Program.

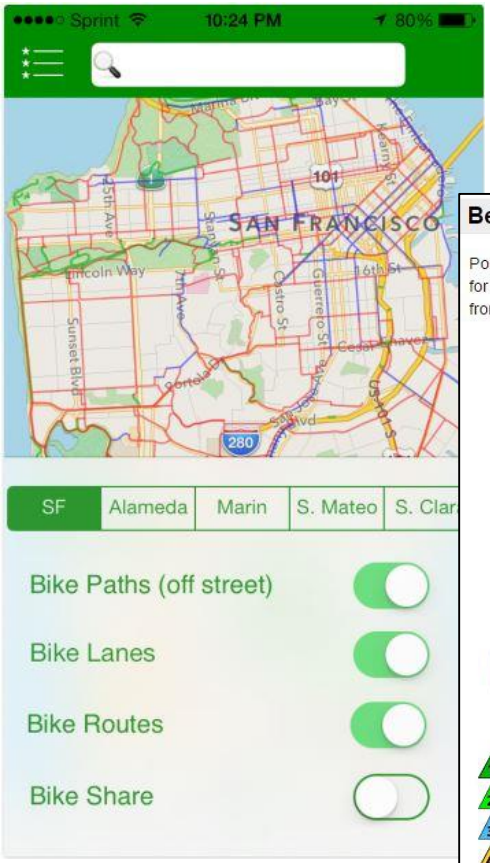
Golden Sneaker Contest, Grades K-5

As biking and walking to school increases and becomes safer, several walk/bike to school days throughout the year can take place. Participation can be tracked by class and whichever class gets the most participation in that particular month could receive the Golden Sneaker Trophy. Different standards are applied for grades K-2 and 3-5.

Maps & Mobile Applications

User maps and mobile applications are another method of encouraging people to use active transportation. A variety of Lake Tahoe organizations, including the TCPUD and LTBC, produce free hard-copy maps for the community. TRPA/TMPO has an online and mobile-friendly GIS map that illustrates existing and proposed infrastructure, available online at: http://gis.trpa.org/BIKEMAP/.

Though these resources are helpful and technology is improving, people continue to desire interactive maps, real-time transit information, and other user-friendly resources to help make informed transportation choices. Partners should work together to create a mapping system that will support increased and well-informed use of the network. One example is the "Best Rides around Portland" website – sponsored by the City of Portland, Oregon. The site gives people a variety of biking options depending on the length, difficulty level, and destinations riders would like to access. There are also a variety of start-ups and private entrepreneurs creating applications that can be customized to specific locations. Some examples include *Ride the City* (http://www.ridethecity.com/) and *Get There by Bike – Interactive Bike Maps for the Urban Commuter*, available for purchase on iTunes.



Transportation Demand Management

Transportation Demand Management (TDM) is a combination of strategies that incentivize use of non-auto modes of transportation. TDM makes it easier for travelers to shift some trips from driving alone to multi-modal methods.[1] Offering a connected, safe, and convenient active transport network and support facilities are all methods of TDM. The TRPA/TMPO *2015 Tahoe Basin ITS Strategic Plan* recommends adding bicycle detection, flashing-beacon crosswalks, and other pedestrian-signal upgrades that directly impact accessibility as TDM strategies.

***Mobility 2035* outlines the Employer Trip Reduction Ordinance, which includes many of the below TDM strategies.**

- Flexible work schedules
- Telecommuting
- Bicycle fleets for commuting to meetings within a specified distance
- Financial incentives such as subsidized transit passes or pre-tax deductions for bicycle commute costs.
- Support facilities such as secure bike parking, showers, and dressing rooms with lockers.

Boulder BCycle.
Photo: Erica Van Steenis

Cities, counties, and private entrepreneurs can also offer more bike carrying capacity on buses, or bikeshare programs that assist users in their first and last mile when conducting travel in combination with public transit. The 2015 Survey asked respondents if their most common transit stops provide secure bicycle parking. Figure 5-1 illustrates that almost 50 percent of bus stations typically used for multi-modal travel do not provide adequate parking facilities. Not offering adequate bike parking discourages people from leaving their bike at bus stops or using multi-modal methods. This issue is compounded by many buses not having enough bike carrying capacity available for users, as currently Lake Tahoe buses only have capacity for two bikes at a time. Survey respondents indicated that bike rack space is not available 11 percent of the time.

Increasing capacity on buses is one solution, while another is a bikeshare program. Bike share programs can be offered by governments or private entities. Mountain communities similar to Tahoe that have bikeshare programs include Boulder, CO (Boulder BCycle), Aspen, CO (We Cycle), and Salt Lake City, UT (GREENbike).

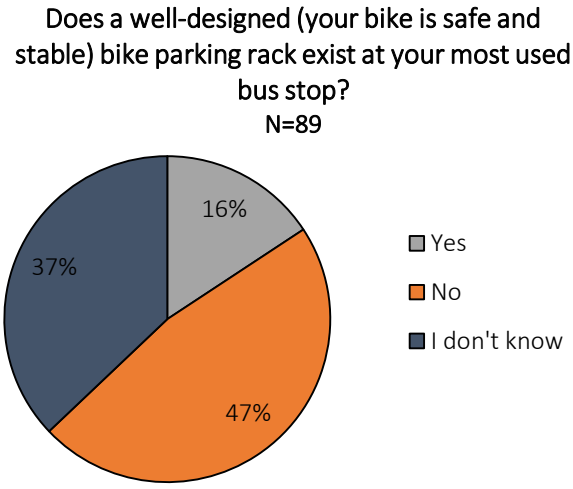


Figure 5-1: Bike Parking at Transit Stations. Source: 2015 ATP Survey.

[1] SANDAG, 2012

5.2 EDUCATION & AWARENESS:

Education and awareness programming should engage people of all ages and include local community members and visitors to the Region. One overarching approach that increases education and awareness is the "Vision Zero" initiative. Vision Zero contends that *no loss of life is acceptable* and asks partners to focus resources on solutions that stop roadway conflict fatalities from occurring. Vision Zero began in Sweden in the mid-1990s and has quickly spread to many countries, as well as to states and cities throughout the United States. Nevada reflects the Vision Zero initiative through its "Zero Fatalities" program (http://www.zerofatalitiesnv.com/). San Francisco, Portland, New York City, and Seattle also have Vision Zero programs. The Lake Tahoe Region, or individual counties and cities within the Region, should consider implementing a Vision Zero program that directs resources and increases community awareness towards sharing the road safely with all users and eliminating roadway fatalities. Described below are existing efforts that TRPA/TMPO and its many partners conduct to increase understanding of our current system, discuss challenges and opportunities, educate people about regulations, and provide venues for capacity building and creating long-lasting partnerships.

Tahoe Talks

The Tahoe Talks Series, initiated in the fall of 2014, is a monthly lunchtime forum of community members and industry experts who present and discuss ideas on transportation, the environment, and the economy. The forum is free to the public and includes an hour of presentations or webinars followed by a half hour of discussion. The TRPA/TMPO hosts the Tahoe Talks Series in partnership with other local organizations to stimulate conversation and education of pressing issues among the Region's citizenry and agency stakeholders.

Tahoe Talks: "Roundabouts" with FHWA's Hilary Isebrands

Fact Sheets & Media Campaigns

Transportation topics can be complicated and require research to educate stakeholders on best practices and find solutions to known challenges. Fact sheets help explain complex issues and outline actions partners can take to help implement laws, provide funding, or initiate program development. In 2015, the TRPA/TMPO produced fact sheets on three topics. The *Three-Feet for Safety Act* and *Reducing User Conflicts on Shared-Use Paths* fact sheets were created to supply information requested by the community. Also, at the request of the City of South Lake Tahoe Police Department, the TRPA/TMPO produced a *Rules of the Road* informational flyer to hand out at events, bicycle rodeos, and other outreach efforts. These fact sheets are in Appendix E and on the TMPO website at: www.tahoempo.org.

Billboard Artwork. Provided by NDOT

Media campaigns also enhance awareness of transportation related issues such as safety. NDOT, through their Bicycle/Pedestrian Education Program produces printed, social media, and video collateral for advertising on billboards, in newspapers, online, and on the radio. The Lake Tahoe Bicycle Coalition is also working with partners on a region wide safety media campaign.

Safe Routes to School

Some existing programs have been conducted in an ad hoc manner over the last 10 years, such as bicycle rodeos. There are also several supporting programs sponsored by organizations serving the local student-age population, including the Boys and Girls Club and the Recreation Center summer camp program. In addition, during 2015 agencies and advocacy groups organized several pilot projects. These included Bike to School Week and Safe Routes to Schools activities at community events.

Bijou Bike Club Rider

This plan recommends a comprehensive and consistent Safe Routes to Schools Education & Encouragement Program that can be planned and implemented by a designated regional SRTS coordinator and a partnership of agencies and volunteers. The LTUSD has adopted the programs listed below in their SRTS Master Plan, and it is recommended that other districts without a master plan pursue implementation of similar programs. Activities may be implemented in phases or as pilot projects. More information on the results of these pilot projects is available in the *2015 Community Outreach Report*.

Regional SRTS Coordinator:
Many counties, school districts, and regions throughout the country have SRTS coordinators that work with stakeholders to improve infrastructure, organize and teach education programs, and work with volunteers on encouragement campaigns and activities. Nevada has two coordinators whose jurisdictions encompass locations around the Lake.

Table 5-2: Nevada Safe Route to School Coordinators. Source: TMPO

Location	Funder	Title
Washoe County (Includes Incline)	NDOT	SRTS Coordinator
Western NV (Includes Douglas County)	NDOT	SRTS Coordinator

Safe Routes to School Volunteers on Bike to School Day

On the California side of the Lake Tahoe Basin, it may be beneficial for school districts, counties, and the city to partner to fund a SRTS coordinator position. Alternatively, all counties and school districts in the Region could partner to have one SRTS coordinator.

Educational Programs:
This plan recommends that all students in grades K-8 in all district schools participate in at least two to three education and encouragement activities each year. Table 5-3 organizes the program activities by season and identifies potential partner agencies.

Bicycle Rodeo, Grades K-5
A bicycle rodeo consists of multiple stations that students rotate through over the course of a physical education class. The stations educate students about bike skills and safety and include discussion of the environmental benefits of active transportation and physical activity. All stations are interactive. Station themes can range from checking to ensure helmets fit properly to properly signaling turns and weaving through an obstacle course of cones. Instruction and teaching materials become more advanced for older grades so students are able to refine their skills and learn new ones each year.

Pump Track Event, Grades 6-8

Boys & Girls Club Bicycle Rodeo

This event is similar to a bicycle rodeo, but is designed specifically for middle school students. In this activity, students learn bicycling skills in a mountain environment. Learning how to ride on dirt paths is important for Tahoe residents, as many bike paths used for recreation or getting around town are dirt paths. The event could take place at the Bijou Bike Park in South Lake Tahoe. By participating in this event, middle school students will become more comfortable with mountain biking skills and have the opportunity to learn more advanced skills in a safe and fun environment. There are also national associations and clubs with local chapters, such as the National Interscholastic Cycling Association (http://www.nationalmtb.org/), which seeks to develop high school mountain biking skillsets.

Bijou Bike Park. Photo: Mike Vollmer

In-Class Education Series, Grades 2, 4, and 6

The in-class education series teaches students about bicycle safety and the environmental benefits of active transportation. The program is an opportunity to keep students informed and bike-aware during winter months. The proposed curriculum includes activities such as mapping safe routes to school as well as interactive presentations. In-class education allows greater topic depth and facilitates student discussion. Parent and local organization volunteers and TRPA/TMPO would partner to teach the series. The series would consist of 45-minute sessions for each classroom of second, fourth, and sixth graders. In second grade, the focus is on safe walking and street safety, such as street crossing. In fourth and sixth grade, the focus is on bike safety and the traffic regulations that govern active transport.

Slow Bike Race

Activity	Grade	Season	Partners
Bicycle Rodeos	K-5	Fall and/or Spring	Physical Education Teachers, CSLT PD, CHP, TRPA/TMPO
Pump Track Event	6-8	Fall and/or Spring	Advocacy Groups, Physical Education Teachers
In-Classroom Education Series	K -8	Winter	Science teachers, TRPA/TMPO, Parent Volunteers
Bike to School Week	K – 5	Spring	Parent Volunteers, TRPA/TMPO, Advocacy Groups
Bike/Walk to School Day	All Grades	Monthly	Parent Volunteers
Walking School Bus & Bicycle Trains	All Grades	Monthly	Parent Volunteers
Golden Sneaker Contest	K-5	Monthly	Home Room Teachers, Advocacy Groups

Table 5-3: Safe Routes to School Education & Encouragement Program Outline. Source: LTUSD SRTS Master Plan.

Events

Events are a great way to engage the public in a fun atmosphere. Many events in Lake Tahoe have booth space available and are often looking for partners to add to the festivities. The Lake Tahoe Bike Challenge, AMBRR, Tahoe Tour, Lake Tahoe Marathon, and Earth Day are some examples.

5.3 ENFORCEMENT

Increasing active transportation is achieved through providing safe and convenient infrastructure, and educating users how to appropriately use infrastructure by obeying road rules. To support educational efforts and to significantly reduce conflict between motorists and vulnerable users, enforcement of roadway regulations is imperative. Emphasis should be on fostering responsibility and respect for the rights of all roadway users. Enforcement must work in tandem with education. As an example, the City of South Lake Tahoe Police Department, California Highway Patrol, NDOT, and the Nevada Highway Patrol participate in bicycle rodeo stations and other outreach activities at events around the Region. The Nevada Highway Patrol also conducts a bicycle passing awareness campaign and enforcement.

SLTPD at the Boys & Girls Club Bicycle Rodeo

Other enforcement strategies may include:

Phase 1: Educate & Build Rapport

This phase includes booths at events to educate, give away appropriate safety and educational items, and re-enforce good behavior. Annually (during the first few weeks of school), law enforcement should monitor pick-up and drop-off locations at schools, as well as other "hotspots" along the transportation network where conflict is known to exist. In some cases, warnings and tickets may be issued in areas of high safety risk. During these efforts, all modes of transportation should be targeted. Some areas of focus to consider are:

- Speed control
- Driving under the influence
- Aggressive driving
- School circulation regulations
- Failure to yield at crosswalks
- Three Foot Passing law
- Riding the wrong direction in a bike lane
- Not observing signalization
- Not using arm signalization (for bicyclist)

Phase 2: Increase Enforcement Activity

This phase continues the program of citations on a more consistent and aggressive level. Enforcement should target "hotspot" locations and focus on serious violations. Media outreach should be included such as articles in newspapers, radio ads, and social media. Outreach can include information about roadway rights and regulations, as well as updates on the results of education and enforcement campaigns.

Phase 3: School Zone Speed Recorder Boxes

As culture and behavior change, constant enforcement may not be necessary. One way to maintain enforcement, particularly in school zones, may be through the use of permanent speed recorder boxes.

5.4 EVALUATION

Workshop Activity. Photo: Jen Cannon

Consistent evaluation of network facilities and programmatic efforts help to determine what is working and where investments and improvements are necessary. Data also helps implementers demonstrate project need for funding opportunities by showing current and estimated use patterns, crash data, and community desire. TRPA/TMPO's role is to act as a clearinghouse and provide analysis of collected information. Partnering entities are encouraged to monitor their programs and projects and coordinate with TRPA/TMPO on data collection and analysis. Historically, monitoring of projects and programs is conducted on an infrequent or ad hoc basis. To better assist in this collaborative effort, TRPA/TMPO produced the *Lake Tahoe Bicycle & Pedestrian Monitoring Protocol,* will annually report on Active Transportation Plan progress through its annual report, and continue to conduct community surveys as appropriate.

Bike Trail User Model

The Bike Trail User Model estimates bicycle and pedestrian trips on Class I/shared-use paths and Class II/bicycle lanes in the Region. This model is based upon observed facility use levels, characteristics of user types, and demographic and travel data. The model estimates reflect relatively urban or inter-community travel corridors, and are not applicable to mountain bike trails. The model is used to help estimate the impacts of bicycling and walking region-wide for the Regional Plan and Regional Transportation Plan, and is also used to estimate active transportation on individual trail segments. Jurisdictions, departments of transportation, and funders will find the model useful for estimating potential trail use for planned projects. Over the next four years, TRPA/TMPO will use bike trail user counts collected through the *Lake Tahoe Bicycle & Pedestrian Monitoring Protocol* to validate and update the model if necessary.

Lake Tahoe Region Bicycle & Pedestrian Monitoring Protocol

TRPA/TMPO developed the *Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol* to establish a clear and consistent approach to collecting bicycle and pedestrian volume data in the Region. By implementing the protocol, TRPA/TMPO is building on prior bicycle and pedestrian monitoring programs conducted by a variety of partners. This will create a coordinated and consistent, ongoing monitoring program that tracks changes in bicycle and pedestrian volumes. The data collected each year as part of this program will be used for a variety of purposes, including project prioritization, safety analysis, utilization trends, and support for grant applications.

The protocol was produced in collaboration with nationally recognized monitoring experts Kittleson and Associates, with review by the BPTAC. The protocol outlines count methodology, provides

criteria for choosing count locations, and makes recommendations for phased implementation. The protocol consolidates and analyzes all historical count information and provides a living database that will continue to be updated.

Rank	Criteria	Weighting Score
1	Planned Bicycle/Pedestrian Improvement Projects (Before/After)	5 points
2	Existing Bicycle Facility Types	4 points
3*	Historic Count Locations	3 points*
3*	Schools	3 points*
5	Transit Stations and Stops	1 points

Table 5-4: Count Location Choice Criteria. Source: Lake Tahoe Region Bicycle & Pedestrian Monitoring Protocol

TRPA/TMPO began implementing the protocol in 2015 by collecting summer and fall counts. Detailed analysis of 2015 monitoring can be found in the *Summer & Fall 2015 Data Collection Report* on the TMPO website. Monitoring will continue during the winter and spring months of 2016 to assist in the creation of seasonal and land-use oriented extrapolation factors. Lake Tahoe-specific extrapolation factors will help to estimate the impact of project implementation and seasonality more accurately. Long-term, TRPA/TMPO will collaborate with local jurisdictions to implement permanent count infrastructure, while also conducting manual counts on a two or four-year cycle, depending on need.

Active Transportation Plan Implementation Report

Starting in 2016, TRPA/TMPO will annually report on implementation of the Goals, Policies, and Actions of this Active Transportation Plan. Reporting will include updates on meeting performance measures, project implementation, and outreach and evaluation programs. The implementation report will appear in the TRPA Annual Report.

Round Hill Pines. Photo: Mike Vollmer

CHAPTER 6: IMPLEMENTATION PLAN

Implementation is by far the most challenging aspect of creating a successful active transportation network. Significant obstacles can include acquisition of right-of-way, securing construction and maintenance funding, designing projects that provide access for all roadway users, and meeting environmental standards. Partners must work together to find common ground on project designs, locations, and funding mechanisms. This chapter outlines the actions that partnering agencies should take to implement the goals and policies in Chapter 3. Benchmarks have also been listed that will help partners implement actions in a timely fashion. To assist in project development, Section 6.2 contains cost estimates that can be used as a resource when estimating full project cost. This can be helpful for grant applications, or when budgeting various funding sources (such as TRPA Air Quality Mitigation Fees) for project implementation. In section 6.3, the prioritized project list is explained, and can be found in Appendix H. Projects are prioritized based on criteria vetted by the BPTAC, the community, and best practices. This list should be utilized when partners decide where to focus staff time and funding. Finally, this chapter also includes funding strategies.

Kahle and Laura Drive Intersection. Photo: Mike Vollmer.

6.1 ACTIONS

SECTION 1: NETWORK DESIGN

Action1.A: Public and private entities should continue to focus planning and funding efforts on the remaining priority projects that will connect a complete shared-use path around the lake.

Benchmark 1.A: At least one new project will be 100 percent designed and funded by 2018.

Action1.B: TRPA/TMPO will supply guidelines on the design/build process for implementing entities to review when considering transportation-related projects. TRPA/TMPO will coordinate educational opportunities through webinars and workshops on the many design/build processes available. Implementing agencies will create a document that outlines their design/build process and make available for the community.

Benchmark 1.B: TRPA/TMPO will create guidelines and conduct one webinar by end of 2016. Complete street workshop will be held in November 2015. TRPA/TMPO will request implementing agencies submit design/build process and provide online for community by end of 2017.

Action 1.C: TRPA/TMPO will annually request betterment projects or maintenance plans (for appropriate time horizon) for all roadway improvement projects.

Action 1.D: TRPA/TMPO will continue to provide funding, monitoring, and conduct outreach for SRTS program and project implementation. TRPA/TMPO is available to provide assistance if requested. Local jurisdictions should also adopt SRTS plans and prioritize SRTS funding and implementation of associated engineering projects. Law Enforcement agencies should conduct enforcement activities around schools at the beginning of each school year.

Benchmark 1.D: TRPA/TMPO will continue to offer On Our Way grants for the remainder of 2015, school locations will be used as criteria for choosing monitoring sites, and outreach to all school districts to be completed by 2015. LTUSD will adopt SRTS Plan in 2015, CSLT and El Dorado County will adopt SRTS Plan in 2016 and review projects for inclusion on CIP list by 2018. Law Enforcement will implement enforcement and education activities by start of 2016 school year.

SECTION 2: FACILITY MAINTENANCE

Action 2.A: Local jurisdictions should continue current winter maintenance while using data to identify and seek opportunities to expand programs. Regional bikeways and SRTS projects should be prioritized for winter maintenance. TRPA/TMPO to monitor winter use patterns to help identify locations in need of winter maintenance and to research incentives to support winter maintenance programs.

Benchmark 2.A: Local jurisdictions will create or expand winter maintenance programs by 2019 if appropriate. Winter monitoring will begin by TRPA/TMPO in 2016. Formal requests will be made to state agencies for spring striping maintenance by end of 2016.

Action 2.B: Consistent with TRPA Code of Ordinances section 36.5.5, TRPA/TMPO will include a Maintenance Responsibilities Chart and Plan template as part of TRPA and local jurisdiction permit application packets (when appropriate), and ensure this information is located within permits. Minor

technical amendments may be necessary to Code section.

Benchmark 2.B: Template will be included into packet and technical amendments to Code completed by end of 2016.

Action 2.C: TRPA/ TMPO will annually update jurisdictions on available Air Quality Mitigation funds. TRPA/TMPO will request that local jurisdictions submit five year plans with estimated project fund requests.

Benchmark 2.C: TRPA/TMPO will update EIP reporting process and update Code technical amendments to assist local jurisdictions, if necessary, by end of 2016.

SECTION 3: MULTI-MODAL CONNECTIONS

Action 3.A: TTD to continue to work in partnership with TRPA/TMPO and local jurisdictions on the corridor connection process. Community organizations and private entities will use data collected on bike parking location needs and either purchase and install or create programs to help increase bike parking. TRPA/TMPO is available to provide technical assistance and outreach on multi-modal connections. An example of such assistance could be a forum on first and last mile solutions that includes governmental and private entities. Local jurisdictions will address adequate bike parking needs by working with local property owners during project review process.

Benchmark 3.A: Corridor connection plans complete by end of 2017, TRPA/TMPO will work with local jurisdictions to set bike parking increase target by end of 2017, TRPA/TMPO will complete first and last mile forum by end of 2016, and local jurisdictions will have increased equitable parking facilities to appropriate target by 2018.

Action 3.B: Using TRPA/TMPO data, TTD will seek to increase bicycle carrying capacity on high-use routes by seeking additional funding and upgrading infrastructure to meet current standards and available technologies.

Benchmark 3.B: Bicycle carrying capacity increased by 2018.

SECTION 4: PROJECT IMPLEMENTATION

Action 4.A: TRPA/TMPO will facilitate the 2015 complete street workshop, develop next steps memorandum to guide responsible agency actions, and provide *Lake Tahoe Complete Street Resource Guide* to all implementing agencies. Local jurisdictions will adopt and/or update current policies if necessary and use guidance for all future projects.

Benchmark 4.A: TRPA/TMPO will conduct workshop in fall of 2015 and supply *Lake Tahoe Complete Street Resource Guide* by summer of 2016. Local jurisdictions will adopt and upgrade policies and processes by end of 2018. These updates will live in area plans, general plans, and engineering standard documents.

Action 4.B: TRPA/TMPO will update Code of Ordinances Section 36.5.2 to include all active transportation users. This Code section addresses standards for commercial, tourist accommodation, public service and multi-family residential projects. Language updates would include replacing "pedestrian circulation system" with "active transportation circulation systems."

Benchmark 4.B: Code updated by end of 2016.

Action 4.C: TRPA/TMPO will include active transportation support and end-of-trip facilities questions and recommended standard conditions of approval in appropriate permit application packages and permit approval checklists for use by TRPA/TMPO and local jurisdictions.

Benchmark 4.C: To be updated by end of 2016.

Action 4.D: TRPA/TMPO will bi-annually update the Active Transportation Plan sections that analyze crash, health, and infrastructure data with assistance from partnering agencies.

Benchmark 4.D: Next update to occur in 2017.

Action 4.E: TRPA/TMPO will coordinate partnership meetings among local agencies that should work together to implement local projects. Meetings should take place twice annually, in the spring and fall of each year.

Benchmark 4.E: First meeting will be held in February 2016.

Action 4.F: TRPA/TMPO will work with local partners and advocacy groups to engage Lahontan and secure the Water Board's concurrence as to the merits of code provision 30.4.6.D.3 and discuss their approval of the necessary changes to Lahontan regulations to fully activate the TRPA Code provision in California.

SECTION 5: EDUCATION, ENCOURAGEMENT, EVALUATION, AND ENFORCEMENT PROGRAMMING

Action 5.A: All actions for this policy for the LTUSD are located in the *Lake Tahoe Unified School District Safe Routes to School Master Plan*. All other districts without a SRTS master plan should seek to assess current conditions, consider developing a SRTS master plan, or implement some of the recommended programming in the LTUSD SRTS Master Plan as appropriate for their schools. TRPA/TMPO should continue to offer support through funding and outreach for SRTS planning.

Benchmark 5.A: Program actions in LTUSD SRTS master plan implemented by end of 2016.

Action 5.B: Through the Bikeway Partnership, continue to coordinate wayfinding efforts and identify "Rules of the Trail" etiquette strategies that are consistent region-wide. Community organizations, private entities, and implementing agencies should work together to generate campaigns and signage to educate users.

Benchmark 5.B: Wayfinding implementation increased by end of 2016, "Rules of the Trail" considered and adopted, if appropriate, by Bikeway Partnership by mid-2016, and implemented by various agencies/organizations by end of 2017.

Action 5.C: TRPA/TMPO will bi-annually implement, act as a clearing house, and report on data collected through monitoring implementation. TRPA/TMPO will work with local and state agencies on securing and implementing permanent data collection infrastructure. TRPA/TMPO will consider expanding the monitoring protocol to include implementation of a Travel Diary and/or the

continuation of intercept surveys.

Benchmark 5.C: Monitoring reports will be released in January of every other year (next to be 2018). Permanent counting infrastructure to be implemented by end of 2016 and monitoring protocol to enter second phase by end of 2020.

Action 5.D: TRPA/TMPO will annually produce the Active Transportation Implementation Report as part of the TRPA Annual Report, and update the plan every four years.

Benchmark 5.D: Implementation report will be released in 2017, and Active Transportation Plan will be updated in 2020.

Action 5.E: Law enforcement agencies will utilize funding sources to increase enforcement and education programs that increase active transportation safety. For more information about how to accomplish this policy, please see Chapter 5.

Benchmark 5.E: On an ongoing basis, TRPA/TMPO will request enforcement agencies to submit information on when enforcement and education programs are conducted. This information will be included in TRPA/TMPO's Implementation Report.

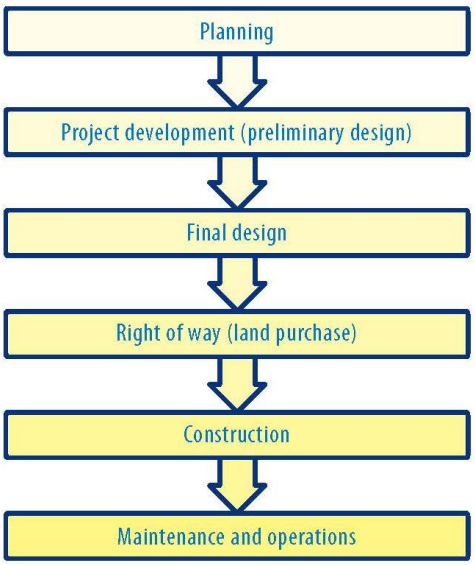
6.2 BALANCING COST AND BENEFITS

Implementation of the active transportation network incurs short and long terms costs, while also affording benefits to transportation users, the environment, and the community. To determine the potential effectiveness of a project in comparison to the cost, increasingly governmental agencies are conducting cost benefit analysis. This type of analysis compares potential benefits such as reduction in VMT, increased physical activity (health), and decreased crash incidence to total project cost. A variety of tools are available, such as the *California Active Transportation Program Benefit/Cost Tool*, which can be accessed on the Caltrans website. Cost/benefit tools are used for detailed analysis that quantifies data collected for specific projects. For high-level project prioritization, as is conducted for this plan, assessment of cost and benefits are conducted through the use of broad quantitative and qualitative criteria.

Sawmill Bike Path. Photo: Mike Vollmer.

Cost Estimates: Phase, Type, & Total Project Components

Project Phase: Implementation of the active transportation network involves many planning phases and sources of funding. Often, active transport facilities are included as parts of other projects, such as water quality improvements on the state highway system. When considering the full cost of projects, implementers must include all phases of work, including planning, design, environmental review, construction, and on-going maintenance. It is difficult to assess the cost of each phase, as it is highly dependent on project type, size and the amount of community outreach and environmental review. This is based on a variety of factors such as ease of implementation, right-of-way constraints, level of community support, and geography. Table 6-1 illustrates current cost estimates of annual maintenance by agency, and what those activities include.



Agency	Cost	Cost Unit	Description	Snow Removal
City of South Lake Tahoe	$7,500.00	per mile per year	sweeping, clearing, striping, vegetation management, and crack filling	No
	$9,500.00		Same as above, including snow blowing.	Yes
Douglas County	$35,000.00	per year	trash removal, sweeping, vegetation management, seal and repair	No
	$5,585.00		Snow removal (in some areas only)	Yes
El Dorado County	$10,000.00	per year	Sweeping, striping, clearing, brushing, & sign replacement	No
Placer County	$82,000.00	per mile per year	crack filling, vegetation removal, power washing	Paths = No Sidewalks = Yes
Washoe County	Not available			
Tahoe City Public Utility District	$12,000.00	per year	Sweeping, crack sealing, vegetation trimming, minor repairs, etc.	No
North Tahoe Public Utility District	$10,000.00	per year	Clearing, vegetation management, crack sealing	No

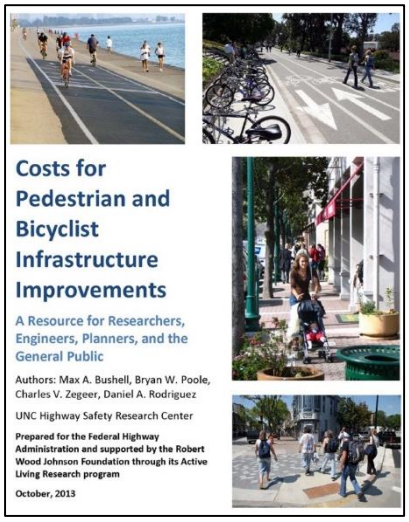
Table 6-1: Region-wide Agency Annual Maintenance Cost Estimates. Source: TMPO

Project Type: High-level, average costs are used to generate an overall estimated cost by project type, such as implementation of a Class I/shared-use path, or a sidewalk. These are rough costs based on historical local cost data, current project data, national research, level of improvement, and geographic considerations. For this plan, high-level costs are used as a criterion for determining project prioritization level (organized as high, medium, and low). Table 6-2 is used to determine high-level costs associated with projects in this plan.

FACILITY TYPE	ESTIMATED COST*	COST UNIT
Class III/Bike Route		
Signage	$600.00	each
Sharrows	$90.00	each
Class II/Bike Lane		
Striping only	$5,000.00	Per Mile
Stripping & Bike Lane Arrow	$10,000.00	Per Mile
Class I/Shared Use Path		
New 10' wide paved trail on public land, already graded ROW with minimal site improvements necessary	$475,000.00	Per Mile
New 10' wide paved path on public land, relatively flat ground with minimal site improvements, no major structures, and some grading required	$580,000.00	Per Mile
New 10' wide paved path on public land, relatively flat ground with grading and drainage facilities, small walls, short stretches of board walk and or minor bridge structures, small trail head improvements (parking, restrooms)	$1,500,000.00	Per Mile
New 10' wide paved path on public land, requiring substantial grading on steeper slopes, large wall sections, major bridge structures, major drainage improvements, new trail head facilities (parking, possibly restrooms)	$3,000,000.00	Per Mile
Refurbished existing trail	$250,000.00	Per Mile
Upgrade of existing trail to meet current standards	$360,000.00	Per Mile
Pedestrian		
New Sidewalk (5ft)	$240,000.00	Per Mile
New Sidewalk including Cub & Gutter	$750,000.00	Per Mile
Refurbished Sidewalk	$120,000.00	Per Mile
Crosswalk	$550.00	each
*All costs include labor to install and purchase of necessary materials		

Table 6-2: Project Type High Level Cost Estimates. Source: TMPO

Detailed Project Components: A FHWA 2013 report conducted research on average infrastructure improvement costs nationwide. For the report, *Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public*, provides median and average prices for infrastructure improvements. These costs were generated by making over 1,700 cost observations. Though costs can vary depending on state, geography, or local regulations, the costs provided are robust estimates that can be used for project development and funding requests. More detailed cost information can also be found in Appendix A: *Lake Tahoe Complete Street Resource Guide.*



6.3 PROJECT PRIORITIZATION

TRPA/TMPO conducts high-level prioritization for all active transportation projects. Projects are assessed based on a variety of criteria, while also utilizing professional expertise. Projects are listed as high, medium, and low priorities. All **design-level high priority projects** are listed below, while the full prioritized list can be found in *Appendix H: Existing and Proposed Project List.* All of the projects that are ranked as "High" in the "Design" list should be included on the constrained project list in the Regional Transportation Plan if reasonably foreseeable revenues exist. Implementing agencies should use the prioritized list to assist in determining their project focus areas for their capital improvement plans. However, as Policy 4.7 states, "Projects should go forward, regardless of where they are on the priority list, when an opportunity or eminent loss of an opportunity makes implementation favorable or necessary."
Bike route projects and the east and west shore complete street improvement areas are not included in the prioritized list. Bike routes are low-cost solutions to closing gaps in the active transportation network and should be implemented when funds are available. The east and west shore complete street improvements are currently being explored through the corridor connection planning process and individual projects will be identified in 2017. At that time, individual projects will be added to the prioritized list.

Table 6-3: Design-Level High Priority Projects. Source: TMPO

Project Name	Lead Implementer	Stage	Description	Estimated Total Cost	Miles	Jurisdiction	Final Score
High Priority							
Nevada Stateline to Stateline Bikeway Phase 2 (Incline to Sand Harbor)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$14,500,000.00	5.02	Washoe County	100
US Highway 50 Sidewalk or Shared Use Path Construction - Kingsbury Grade to Lake Parkway	Nevada Department of Transportation	Design	C-I / Shared-Use Path	$156,600.00	0.27	Douglas County	98.75
Al Tahoe Safety and Mobility Enhancement Project	City of South Lake Tahoe	Design	C-I / Shared-Use Path	$2,160,928.00	1.90	City of South Lake Tahoe	93.75
West Shore Bike Trail Extension & Improvements - Homewood	Tahoe City Public Utility District	Design	C- I / Shared-Use Path	$1,804,000.00	0.97	Placer County	92.5
South Tahoe Greenway Shared-Use Trail (Van Sickle to Sierra Blvd.)	California Tahoe Conservancy	Design	C-I / Shared-Use Path	$5,000,000.00	2.50	City of South Lake Tahoe	90
El Dorado Beach to Ski Run Boulevard Bike Trail	City of South Lake Tahoe	Design	C-I / Shared-Use Path	$2,200,000.00	0.82	City of South Lake Tahoe	88.75
South Tahoe Greenbelt (B Street, Winnemucca, South Avenue)	City of South Lake Tahoe	Design	Corridor Revitalization / Complete Streets	$2,162,500.00	1.60	City of South Lake Tahoe	87.5
West Shore Bike Trail Extensions & Improvements - Sugar Pine to Meeks Bay	Tahoe Transportation District	Design	C-I / Shared-Use Path	$3,000,000.00	0.60	El Dorado County	87.5
Nevada Stateline to Stateline Bikeway Phase 1 (Stateline / Edgewood)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$3,000,000.00	0.36	Douglas County	81.25
Nevada Stateline to Stateline Bikeway Phase 3 (Sand Harbor to Spooner Summit)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$36,200,000.00	8.00	Washoe County, Carson City, Douglas County	78.75

Criteria

The criteria on the next page was updated from the 2010 Bike and Pedestrian Plan by the BPTAC. The same criteria are used for both planning and design level projects. However, two additional criteria were added for design-level projects, including "improvement of facilities" and "constructability." Table 6-3 illustrates how criteria were applied. The Bike Trail User Model determined "estimated usage." For more information on how the model is applied, please see two TRPA/TMPO generated documents: the 2009 study *Environmental, Economic, and Public Health Impacts of Shared Use Paths* and *Appendix K: Lake Tahoe Bicycle and Pedestrian Plan 2010 Use Estimation*. Both documents can be found on the TMPO website.

Photo: Mike Vollmer

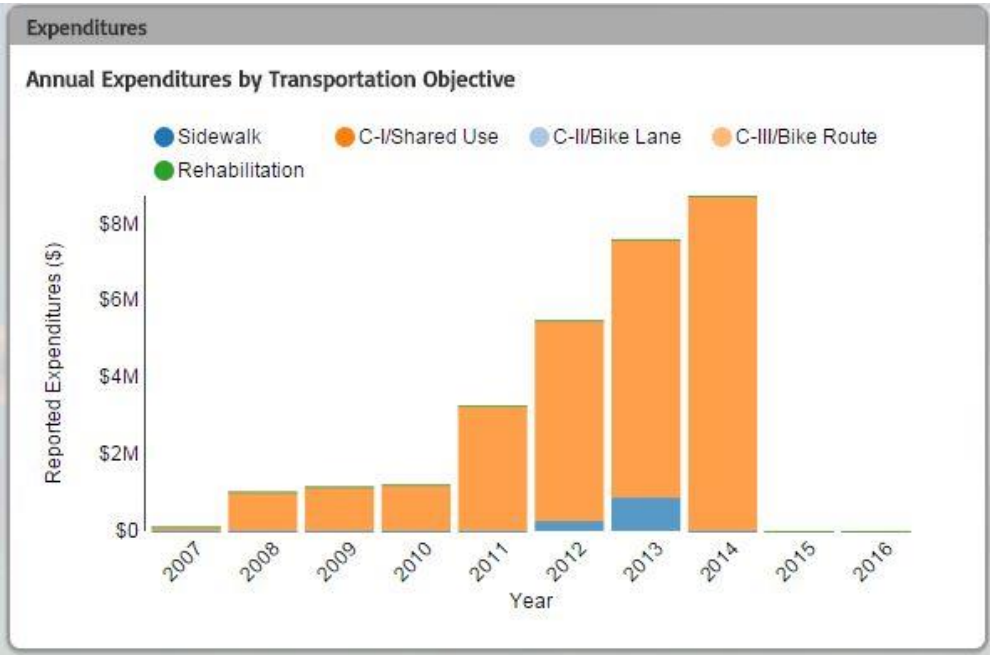
Table 6-4: Prioritization Criteria. Source: TMPO.

PROJECT PRIORITIZATION CRITERIA		
PLANNING-LEVEL PROJECTS		
The overarching goal of all criteria is to increase connectivity of the active transportation network		
Ranking Criteria	**Weight**	**Evaluators should use professional judgement when ranking. Not all situations conform to the criteria below.**
Gap Closure	20	Project closes a gap within the network between popular destinations such as schools, towncenters, tourist accommodation and residential bed base areas, recreation areas, and/or disadvantaged communities. If yes = 1; If no = 0
Estimated use	15	Based on the Lake Tahoe Bicycle and Pedestrian User Model. Over 1,500 estimated users per day **= 1 pt.** 1,000 to 1,500 **= 0.75 pt.** 500 to 1,000 **= 0.5 pt.** 100 to 500 **= 0.25 pt.** Less than 100 **= 0.1 pt.** Note: Destination connectivity is incorporated into this criterion through the model calculations.
Destination Connectivity	15	Provides a direct link between destinations (residential and tourist accommodation areas, recreational or commercial area) where either no, *or* only indirect routes exist. If yes = 1; If no = 0
Safety	20	Project will provide for increased safety for active transportation users while providing for the concept of complete streets. Project will mitigate user conflict, identified through public outreach, State and locally reported collisions, and known best practices in facility safety design. If yes = 1; If no = 0
Multi-Modal Connectivity	15	Project is within 1/4 mile of existing transit stops, routes, water transit, private shuttle services, or intercept parking lots/nodes. If yes = 1; If no = 0
Cost	10	Based on cost per mile of project Under $100,000.00 **= 1 pt.** $100,000.00 to $500,000.00 **= 0.75 pt.** $500,000.00 to $1 Million **= 0.5 pt.** $1 Million to $3 Million **= 0.25 pt.** Above $3 Million **= 0 pt**.
Economic Vitality	5	The project improves aesthetic value of location, making the area more walkable, bikeable, and livable. If yes = 1; If no = 0
TOTAL	**100**	
DESIGN-LEVEL PROJECTS		
Criteria are the same as for Planning-level projects, with addition of criteria below.		
Improves Facilities	10	Project upgrades a section not built to current standards or increases capacity ability, *and/or* project adds support facilities such as bike racks, benches, shelter, water, and wayfinding. If yes = 1; If no = 0
Constructability	20	Permitted or Permit Requested **= 1 pt.** Final Design **= 0.75 pt.** Environmental Review **= 0.5 pt.** Preliminary Design or Feasibility Study **= 0.25** Feasibility Study **= 0**
TOTAL	**130**	

6.4 FUNDING STRATEGIES

Construction of the active transportation network at Lake Tahoe is a partnership between federal, state, and local agencies. Partners work together to combine funding sources and construction and maintenance responsibilities. Project expenditures are tracked by all agencies in the Region and are consolidated in the TRPA EIP Project Tracker, located online at www.conservationclearly.org/tracker. This helpful tool can segregate projects by infrastructure type, jurisdiction, funding source, and more.

Figure 6-1: Annual Expenditures by Transportation Objective. Source: EIP Tracker.



Between 2010 and 2014, an estimated total of over $30 million funded the completion or rehabilitation of active transportation infrastructure at Lake Tahoe. This estimate is derived from the EIP tool and will become more accurate as jurisdictions continue to update information about their past projects. This cost does not include water quality projects that may have also added infrastructure such as bike lanes. Overwhelmingly, most expended funds constructed Class I / shared-use paths, as shown in Figure 6-1. Another estimated $60 million in project investments are undergoing design and/or implementation and expected to be completed by 2020.

The existing network of 120 miles represents a substantial implementation and long-term investment. To add approximately 68 miles of high-priority facilities will require funding that surpasses $150 million. The total cost of complete build out of the entire network as proposed is over $230 million.

Funding Sources

Many projects will use federal and state funding sources made available through formula allocation methods, such as the Surface Transportation Program (STP). Some of the proposed network will be constructed using formula allocated funds as part of future development and roadway projects. However, a substantial portion of project implementation will rely on grant funds or other revenues.

Advocacy Advance (http://www.advocacyadvance.org/resources) tracks available funding sources and provides descriptions and infographics to help applicants understand how funding is allocated and the types of projects each source funds. Advocacy Advance also provides reports to help project applicants and advocacy groups secure funding to implement projects.

LIST OF FEDERAL, STATE, AND LOCAL GRANT PROGRAMS:

**Note: The below list is non-exhaustive, but is a starting point when researching possible grant opportunities.*

FEDERAL:

The federal government offers a wide variety of funding sources. Advocacy Advance provides a "Find It, Fund it! Tool" to connect people interested in getting infrastructure or other programs funded with all potential federal funding sources.
Find it here: http://www.advocacyadvance.org/MAP21/finditfundit.

The FHWA also offers a very helpful website that lists all funding opportunities and eligible project components on their website:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Specific program requirements must be met and eligibility must be determined on a case-by-case basis. For example: Transit funds must provide access to transit; Congestion Mitigation and Air Quality Improvement Program (CMAQ) must benefit air quality; Highway Safety Improvement Program (HSIP) projects must be consistent with the State Strategic Highway Safety Plan and address a highway safety problem; NHPP must benefit National Highway System (NHS) corridors; RTP must benefit trails; the Federal Lands and Tribal Transportation Programs (FLTTP) must provide access to or within federal or tribal lands.

Highway Safety Improvement Program (HSIP)

HSIP are federal funds that are administered by State departments of transportation. The purpose of the Highway Safety Improvement Program (HSIP) is to significantly reduce traffic fatalities and serious injuries on public roads, including non-state-owned public roads and roads on tribal land. HSIP funds are eligible for work on any public road or publicly owned bicycle or pedestrian pathway or trail, or on tribal lands for general use of tribal members, that improves safety for its users.

CALIFORNIA:

Active Transportation Program

The Active Transportation Program is designed and developed to promote bicycle and pedestrian projects that support SB 375 goals and to bring additional funding to these projects. The Active Transportation Program consolidates four existing programs into a single program, providing approximately $129.5 million in funding per grant cycle. The program will be funded from a combination of federal and state funds. The four programs that were consolidated are the federal Transportation Alternatives Program, federal and state Safe Routes to Schools programs, and the state Bicycle Transportation Account program.

Metropolitan Planning Organizations (MPOs) with a population over 200,000 receive 40 percent of the ATP funds for sub-allocation. Fifty percent of Active Transportation Program funds are administered via a statewide competitive program. Small urban and rural areas are guaranteed at least 10 percent of the funds within the statewide program. Disadvantaged communities are guaranteed at least 25 percent of the entire program's funding.

Systemic Safety Analysis Report Program (New)

The Systemic Safety Analysis Report Program will enable local agencies to apply a more comprehensive approach to their safety programs and provide them the opportunity to include a systemic proactive approach for evaluating their local roadway systems. When the SSAR's funded by this program are complete, local agencies will be encouraged to use the results documented in the SSAR to address safety issues on their local roadway networks and help prepare future HSIP applications.

Wildwood. Photo: Mike Vollmer.

NEVADA:

Complete Streets Program

Enacted in 2013, this program promotes the retrofitting of streets or highways that are under the jurisdiction of the board of county highway commissioners for the primary purpose of adding or significantly repairing facilities which provide street or highway access considering all users, including, without limitation, pedestrians, bicycle riders, disabled persons, persons who use public transportation, and motorists. Nevada counties must adopt a complete street policy to access the funds, which are generated by donations to Nevada Department of Motor Vehicles.

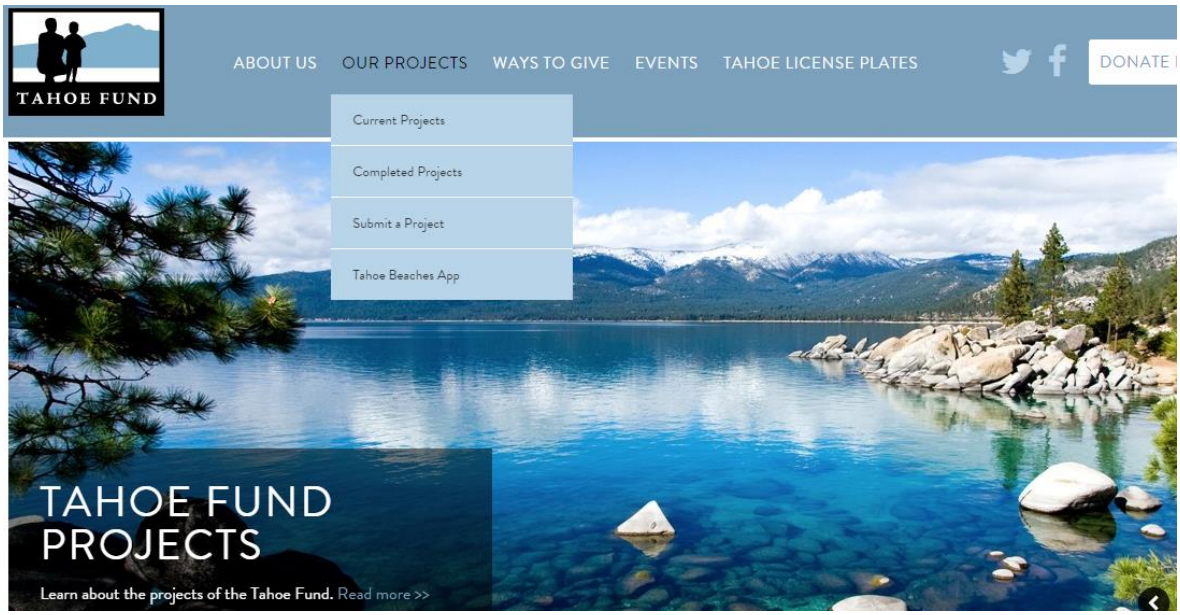
Bicycle/Pedestrian Safety Education Program

This program provides safety education funding to local jurisdictions and programs in Nevada. The funds are generated from driver's license fees.

TAHOE-SPECIFIC:

Tahoe Fund

The Tahoe Fund inspires the private community to support environmental improvement projects that improve watersheds and lake clarity, enhance outdoor recreation, and build a greater sense of stewardship in the Tahoe Basin.



TRPA/TMPO On Our Way Grant Program

The purpose of the program is to help Lake Tahoe communities identify neighborhood-level transportation and community improvements to meet region-wide sustainability goals of:

- creating walkable, mixed use centers
- encouraging biking, walking, and transit use
- supporting economic vitality
- reducing impacts to the environment

Local jurisdictions, non-profit organizations, educational institutions, other formalized community groups, and government agencies are eligible to apply. The products of the On Our Way program will inform the Regional Transportation Plan Update, the Regional Plan, area plans, and other local and regional plans or codes, and are intended to lead to construction of capital improvements or the approval of new policies and programs.

North Lake Tahoe Resort Association (NLTRA):

The NLTRA supports active transportation projects in North Tahoe through its capital investment program. The program uses Transient Occupancy Tax funding to help pay for projects that are in conformance with the NLTRA's strategic goals and the North Lake Tahoe Tourist Development Plan.

NATIONAL NON-PROFIT:

People for Bikes Community Grant Program

This program supports bicycle infrastructure projects and targeted advocacy initiatives that make it easier and safer for people of all ages and abilities to ride. Visit the grants awarded database for examples of funded projects.

THANK YOU!

Thank you to all project partners, community members, and elected officials, for your continued support promoting and building active transportation infrastructure at Lake Tahoe. This plan illustrates our progress in the Lake Tahoe Region and provides a vision for our continued success. Together, we can continue to support innovative complete street projects that improve the mobility and safety of all roadway users. And for those about to actively transport: We salute you!

Logan Shoals. Photo: Tom Lotshaw

linkingtahoe.com

View the plan online at: tahoempo.org/activetransportationplan

Tahoe Metropolitan Planning Organization

TAHOE REGIONAL PLANNING AGENCY

Appendix A

Lake Tahoe Complete Streets Resource Guide

Lake Tahoe Complete Street Resource Guide

Prepared for Tahoe Regional Planning Agency/ Tahoe Metropolitan Planning Organization

January 2016

Prepared by:
Alta Planning + Design

131 L Street
Sacramento, CA
95814

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONT.)

FOREWORD:

COMPLETE STREETS WORKSHOP

RECAP, NEXT STEPS & ACTIONS

OVERVIEW

TRPA/TMPO hosted a Complete Streets Workshop on Wednesday, November 18 and Thursday, November 19, 2015 for local, regional and state agency partners. Alta Planning + Design's Joe Gilpin, National Association of City Transportation Officials Certified, and Bryan Jones, PE, AICP, facilitated the workshop. Many agencies in the area, such as Truckee, Kings Beach, Tahoe City, and Carson City, are already applying complete street techniques to their projects to improve mobility and safety for all users. Key examples are the King's Beach roundabouts and Truckee's many projects including roundabouts, paid parking, trail system, and creative funding mechanisms and partnerships for maintenance. In addition, Caltrans and FHWA highlighted their efforts to encourage engineering judgment, design flexibility, and complete street funding opportunities.

More than 60 people attended the workshop, representing the following agencies:

- California Department of Transportation
- Nevada Department of Transportation
- Washoe County
- El Dorado County
- Douglas County
- Placer County
- Town of Truckee
- City of South Lake Tahoe
- California Highway Patrol
- Tahoe City Public Utility District
- California Tahoe Conservancy
- Federal Highway Administration
- TRPA/TMPO

Through brainstorm sessions, presentations, and expert panel discussions, Day 1 focused on exploring a variety of topics including:

- What makes the Tahoe Region unique and special to its residents and visitors
- Identifying Tahoe's transportation system customers and the challenges the Region faces serving them
- Redefining the challenges agency staff must solve
- Broadening the use of tools, resources, and solutions
- Debunking policy, funding, and engineering misconceptions to empower and enable complete street implementation
- Identifying agency-specific policies and commitments to designing and building complete street infrastructure
- Networking with regional partners to create new relationships, synergy and partnerships to better serve the Region.

Day 1 also included three guest presenters:

1. A keynote presentation by Dan Wilkins, the Public Works Director for the Town of Truckee. Dan highlighted Truckee's successes with trails, paid parking, roundabouts, and funding opportunities.
2. A roundabout and design flexibility presentation by Hilary Isebrands, a Federal Highway Administration (FHWA) Safety Engineer specializing in roundabouts and road safety audits.
3. A presentation on intersection control evaluation by Jerry Champa, Traffic Safety Liaison, for Caltrans.

The expert panel discussions involved agencies from all levels of government and included the audience in a question and answer period. The panel provided a localized discussion on challenges, opportunities, and commitments. Panel participants are listed on the right.

Day 2 began with a robust discussion about the key takeaways from day 1, followed by group design exercises of five local Tahoe roadway challenges. Participants split into three groups, with a mix of agency staff and expertise. These exercises gave participants an opportunity to apply newly learned tools in an intense and collaborative design process. Armed with data and local knowledge, groups proposed options for improving mobility, and safety for all users.

Expert Panel Participants

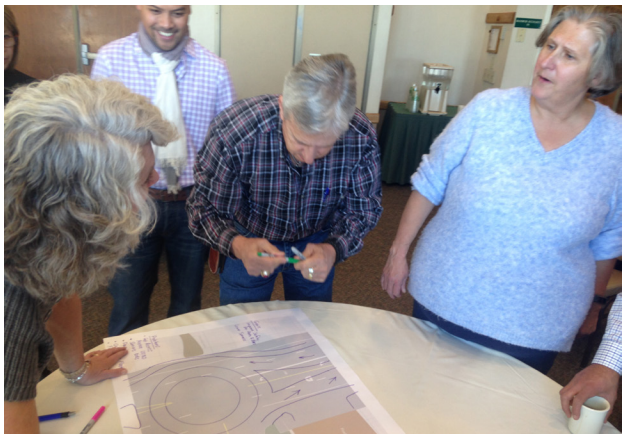
Planning, Design & Funding

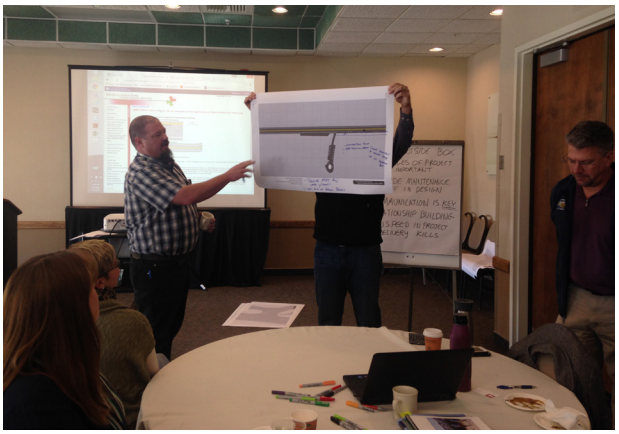
Name	Organization	Position
Sondra Rosenberg	NDOT	Assistant Director Planning
Robert Peterson	Caltrans HQ	Chief, Office of HSIP
Chris Engleman	Caltrans HQ	CA MUTCD / CTCDC
David Cohen	FHWA California Division	Traffic Safety Specialist
Jerry Champa	Caltrans HQ	Traffic Safety & Ops Liaison Engineer
Dan Wilkins	Town of Truckee	Public Works Director

Implementation & Maintenance

Name	Organization	Position
Hilary Isebrands	FHWA Resource Center	Safety Engineer
Dan Wilkins	Town of Truckee	Public Works Director
Brian Stewart	Placer County Public Works	Design & Construction Engineer
Rod Murphy	Caltrans	District 3 Project Manager
Thor Dyson	NDOT	District 2 Engineer
Jerry Champa	Caltrans HQ	Traffic Safety & Ops Liaison Engineer
Tom Hallenbeck	Caltrans HQ	Traffic Safety Division Chief

Brainstorming Session on Day 1





Participants Create and Share Their Design Solutions on Day 2

Top Concerns

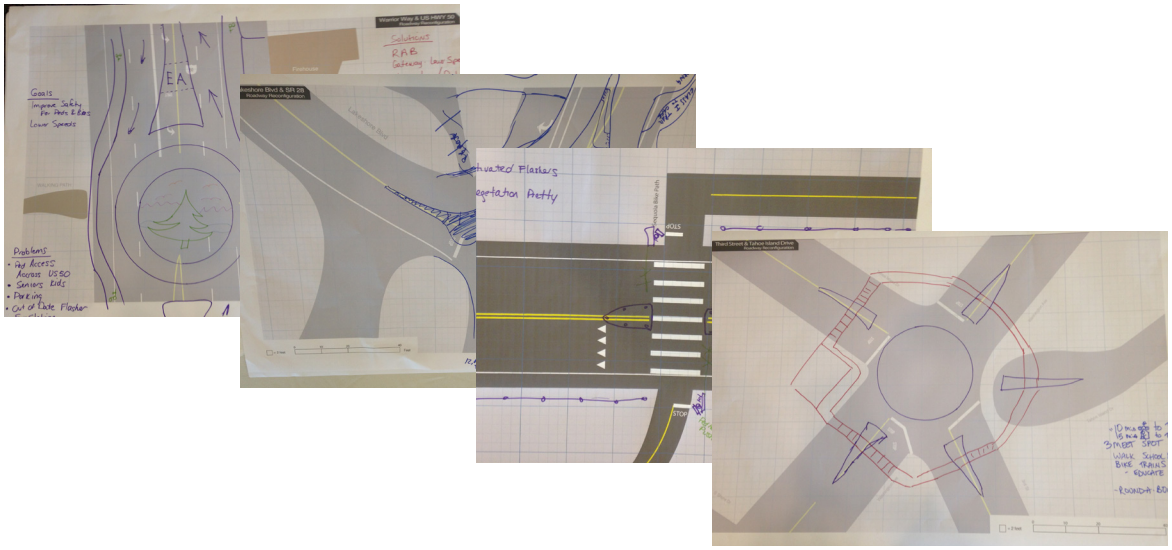
Alta Planning + Design led a brainstorm discussion at the beginning of the day to help identify local concerns about implementing complete streets projects. The main concerns included:

- The difficulty of designing projects for peak season and off peak season demands and needs. How can you design for both?
- Generating public support for project design, maintenance and funding.
- The conservation of natural resources.
- Support for design flexibility among agency leaders.
- The challenge of designing projects for snow removal and storage.

Who Are Tahoe's Customers?

The next brainstorm identified customers the Region serves or needs to serve with our transportation system. The list was long and diverse.

- Local residents and businesses
- Tourists (local, national, and international)
- People that walk, bike, drive, and use transit
- Emergency responders
- Special events
- Maintenance crews
- Regular and seasonal workforce
- People of different socio-economic backgrounds
- Freight and goods movement
- People seeking parking and access to destinations such as casinos, ski resorts, trail heads, and beaches.



Example Designs

The Biggest Barrier

Project Design & Liability

Presentations, panel sessions, design exercises, and peer to peer conversations all touched on this issue. Resources regarding design flexibility include:

- FHWA supports design flexibility through its 2013 memo, "Bicycle and Pedestrian Facility Design Flexibility." In that memo, FHWA refers planners and engineers to guides published by the American Association of State Highway and Transportation Officials, the National Association of City Transportation Officials, and the Institute of Transportation Engineers. FHWA also published the "Revision of Thirteen Controlling Criteria for Design" in 2015 which promotes design flexibility and clarifies FHWA's standards.
- Deputy Directive 64-R2, signed in October 2008 and renewed in 2014, directs Caltrans to implement complete streets.

  "The Department provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and products on the State Highway System."

- The 2014 Caltrans memo, "Design Flexibility in Multi-Modal Design," provides for flexibility in design through experimental project processes. The memo identifies design documents such as the National Association of City Transportation Officials' "Urban Street Design Guide," "Urban Bikeway Design Guide," and the Institute of Transportation Engineers' "Designing Urban Walkable Thoroughfares" as important resources when considering designs that accommodate all users.

Local Issues and Solutions

Local issues and solutions were identified to support staff in taking advantage of the design flexibility offered by these federal and state government agencies.

Supported Documented Innovative Design

Many staff and elected officials are deterred from opportunistic innovation by perceived limitations. Staff and elected officials can rely too heavily on common standards, existing knowledge, or historic project experience. It is easy to be overly reactive to initial public perception, rather than letting a project gain support over time as the public becomes more familiar. There is a perceived high risk in trying something new, combined with a fear of costly failure both financially to the agency and in personal employment.

Generate Strong Leadership & Local Champions

Support and encourage agency staff to pursue new designs that better accommodate all users. Strong leadership can exist at the staff and elected official level. Leaders create a clear vision, and encourage staff to utilize new tools, resources, and techniques by creating an environment that supports experimentation and innovation to improve projects. Leaders should also increase the reward for successful project implementation that is adaptive, flexible and improves over time. Champions are those who are the first to implement new tools, resources, and techniques.

Activate Public Support for Projects & Funding Initiatives

Public support encourages continued innovative project implementation. Many projects that prioritize all roadway users require a change in roadway design, maintenance operations, and user behavior. Leaders can identify opportunities to bring additional support to agency staff through frequent training and by offering public education opportunities to the Region. Education should focus on increasing awareness about what other recreational tourism destinations and mountain communities do to publicly and financially support complete street implementation and maintenance. Interim projects, a phased project approach, and including maintenance staff during project design are other ways to gain public support and reduce increased maintenance costs.

Key Takeaways

Complete Street Policies & Vision Already Exist at Lake Tahoe

The Tahoe Region has a clear complete streets vision. TRPA/TMPO's Regional Plan and local agency general and area plans contain policy language that clearly defines a complete street policy and supports complete streets by

Panel Discussion

planning for creating walkable, bikeable communities. The following are some of the current policies that support complete streets in the Region.

TRPA/TMPO Active Transportation Plan:

Policy 1.1: Transportation projects will accommodate the needs of all travelers by designing and operating roads to provide for safe, comfortable, and efficient travel for roadways users of all ages and abilities such as pedestrians, bicyclists, transit riders, motorists, commercial vehicles, and emergency vehicles.

City of South Lake Tahoe General Plan:

Policy TC-1.8: Complete Streets Design: The City shall seek to develop or upgrade all State Highways, arterials, and collectors as Complete Streets that accommodate all travel modes.

Douglas County General Plan:

Policy 7-2A.3 Through the design process, ensure that collector and arterial road rights-of-way are wide enough to accommodate all identified street users and functions. These may include vehicles, transit, pedestrians, bike lanes, off-street shared use trails, landscaping and roundabouts. Traffic calming features should be included to improve safety and increase pedestrian and bicyclist safety.

Policy 7-2C.2 Design neighborhood streets to calm traffic and discourage traffic volumes in excess of adopted standards using methods such as shorter street lengths.

Policy 7-4B.4 Ensure new and existing developments promote connectivity through road and off-street path design to reduce trip lengths, provide multiple alternative travel routes between community uses and destinations, and provide alternatives to automobile use.

El Dorado County – Meyer's Area Plan

Page 3-3: Transportation and Circulation Goal: Redevelop the transportation system within the community plan area to reduce reliance on the private automobile, improve circulation and provide opportunities to experience Meyers as a pedestrian or cyclist.

Placer County General Plan:

Policy 3.D.9. Consider Complete Streets infrastructure and design features in street design and construction to create safe and inviting environments for all users consistent with the land uses to be served.

Policy 3.26. Placer County will incorporate Complete Streets principles into its Transportation and Circulation Element, Bikeways Master Plan, Regional Bikeway Plan, Community Plans, and other plans, manuals, rules, regulations and programs as appropriate, and will establish performance standards with measurable outcomes.

Design Flexibility & Engineering Judgment is Encouraged

FHWA and Caltrans have documented their encouragement of design flexibility and the use of engineering judgment. This protects engineers from liability as design decisions are documented with real world examples. We must remember that bike lanes are not the only tool. We need to explore many potential solutions and consider how each project is contextual and serves different users.

High Speed Kills on Roadways

High speed roadways are dangerous barriers to pedestrians and bicyclists and is the number one contributor to the feeling of safety. High speed only works on open highways with low traffic volumes. Highways routed

though communities should not feel like highways and should not be designed primarily to accommodate peak traffic demand. Designing mostly for peak demand creates excess width and capacity and encourages speeding as a natural and consistent behavior for drivers during typical off-peak traffic periods. During peak times, there can be travel surges between traffic signals which also creates safety concerns and increases likelihood of vulnerable user collisions. Cars move through an urban corridor at a safer and more consistent flow at lower speeds.

Low Speed Kills when Delivering Projects

It often takes much longer to design and approve a project than it does to build the project. Agencies can use pilot and demonstration projects to more quickly build roadway improvements, test new solutions, and build public support. Also, agencies should utilize maintenance projects, such as roadway resurfacing to temporarily adjust the roadway. Changes should be monitored over time, adjusting for improvements and creating permanent solutions. Snow removal operations which degrade roadway stripping offer significant annual opportunities to repurpose roadways in the spring and summer.

Matching the Community's Character: Tahoe's Population is Variable

Agencies often focus on "how" and "what," but vision is created by asking "why." While Tahoe is home for many, it is also a major tourism destination. To maintain Tahoe's competitiveness while improving the environment, it is critical to provide a transportation system that is consistent with the area's scale and sense of place. Complete streets create an opportunity to better manage the peak season and off season demand by providing choices in mobility.

Maintenance Should Be Part of the Design & Engineering Process

Understanding resource and equipment limitations is important in project design. These discussions are also an opportunity to reprioritize resources and equipment and evaluate the performance metrics used to measure their success.

Reducing Capacity is OK When You Create Safe Transportation Choices

We have built our transportation system to accommodate motor vehicles and as a result our system forces people to drive. By offering people convenient, safe, and enjoyable walking and biking opportunities to reach desired destinations we can reduce vehicle use and dependence.

Lifecycle Cost Decision Making

Project decisions should consider more than initial construction costs. Annual and long term maintenance costs can vary significantly. Sometimes, projects that are more expensive to build may be the less expensive to maintain.

Next Steps

Alta Planning + Design summarized some suggested key next steps for consideration by TRPA/TMPO and local regional partners to continue the momentum and realize progress.

Embolden Design Flexibility & Engineering Judgment by Creating a Learning Environment

It is important to the future of the Tahoe area that practitioners utilize engineering judgment and design flexibility. Documentation of decisions is critical for design immunity. Practitioners should move past applying outdated standards and create new guidelines and standards that are tailored to solve the Tahoe area's unique challenges.

If you are a leader at your organization, create an environment that encourages staff to create adaptive projects that improve over time. Learning and growing agency cultures are focused on balancing risk and reward when trying something new.

Bring Training to Each Agency

While individuals from all regional agencies attended the Transforming Tahoe Transportation Workshop, it is crucial for people to bring information back to their entire agency. Knowledge is power and staff at all levels of each organization need to be in alignment.

Collaboration Between Disciplines is Critical: Concept to Construction to Maintenance

Every project has the opportunity to be a complete streets project. Agencies need to integrate their departments and disciplines so that opportunities for multiple-benefit projects are not missed.

Facilitate an Elected Officials Transportation Summit for Tahoe

The Tahoe area is seeing changes in how people want to live and travel. New research and rules are creating opportunities for new solutions to be part of the discussion.

Create an occasion for elected officials to learn from each other and focus on real and perceived challenges, economic opportunities, environmental constraints, equity imbalances, and safety issues facing the Region. Elected officials can band together on the regional vision and how the transportation system contributes to that vision.

Redefine the Problem(s) to be Solved

Often how a problem is defined dictates the approach and the solutions that are proposed. As projects move forward, agency staff and elected officials need to be aware of how focusing on only one transportation concern at a time can create other problems for different users. Scoping a project to move and connect transportation users of all types more efficiently and safely will yield more holistic results rather than improving capacity for motor vehicles only.

Continue Agency Knowledge Share

TRPA/TMPO are committed to continuing agency knowledge sharing as an annual forum. This will create opportunities to share victories, successes, lesson learned, challenges overcome, and brainstorm solutions to existing challenges. The updated TRPA Code of Ordinances coverage requirements which exempt bicycle trails are a great example of taking steps to reduce barriers to the development of transportation and recreational facilities. More issues like this will come to surface as agencies collaborate and solutions can be found.

Be a Multi-Modal User

What we see or experience from the windshield of a car is often dramatically different than what people experience on foot or on a bike. When designing projects, get out onto the street and truly experience the challenges and opportunities from another perspective.

Actions

As a 12-month assignment, agency participants are challenged to accomplish the following in 2016:

1. Move towards adopting a complete street strategy or policy. If a policy is present, review it to see how it could be more effective and supported through standards, code, and other agency policies.

2. Identify at least one pilot project where small changes could create big improvements. Use it as a learning opportunity to test coordination and cooperation between staff, elected officials and the public. Pilot projects can use interim materials and be flexible in their approach. Report back at next annual complete streets meeting on your lessons learned.

3. Examine the funding realities. Complete streets elements should be seen as essential components of the agency's transportation infrastructure rather than as optional elements which must be funded separately. Take steps towards identifying or creating new local funding sources such as paid parking, fees, taxes, etc.

Participants Networking During Day 1

INTRODUCTION

INTRODUCTION

POLICY GUIDANCE

This appendix to the Linking Tahoe: Active Transportation Plan presents an overview of bicycle and pedestrian facility designs, based on appropriate MUTCD and Highway Design Manuals, and is supplemented by national best practices developed by FHWA and NACTO, as well as state standards and Tahoe-specific design guidelines. The purpose is to provide readers and project designers with an understanding of the facility types that are proposed in the Plan, and with specific treatments that are recommended or required region-wide. This appendix also acts as a stand alone document for implementing agencies to use as a reference guide for designing projects that provide for all roadway user mobility and safety.

Discussion

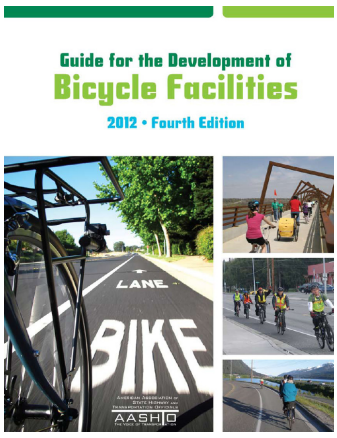
The Lake Tahoe Complete Street Resource Guide presents standards and recommendations that specifically provide for consistency in the Lake Tahoe Region, or where details are needed beyond what is provided by state and federal design standards. All projects must also meet state and federal design standards, as well as other Tahoe Regional Planning Agency (TRPA) design guidelines including scenic requirements and best management practices. Therefore, in addition to these design guidelines, planners and designers should also refer to the following documents and their subsequent updates when planning and designing bicycle and pedestrian facilities. Project designers are encouraged to employ design flexibility in accordance with FHWA and Caltrans directives. Engineering judgment should be employed to ensure that projects are safe and satisfy the needs of all users.

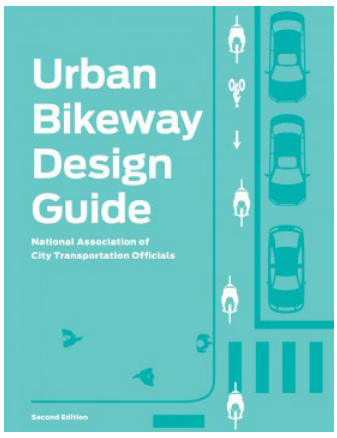
National Guidance

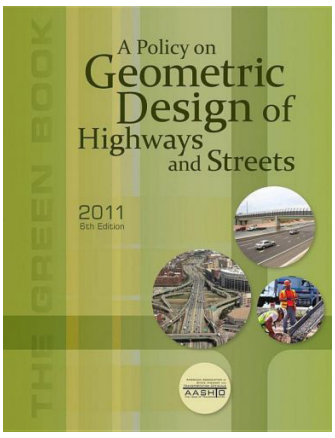
The Federal Highway Administration's (FHWA) **Manual on Uniform Traffic Control Devices (MUTCD)** defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings. The California portion of the Lake Tahoe Region is governed by the California MUTCD and the Nevada portion is governed by the Federal Highway Administration (FHWA) MUTCD. In the event that a specific treatment is in the California or Federal MUTCD, but not in the other, it may be necessary to go through experimental testing procedures. Experimental testing is overseen by the California Traffic Control Devices Committee (CTCDC) in California and the FHWA in Nevada.

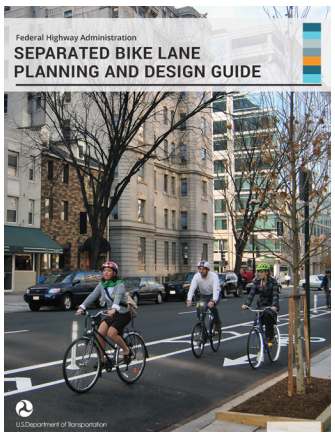
To further clarify the MUTCD, the FHWA created a table of **Bicycle Facilities and the Manual on Uniform Traffic Control Devices**, which lists contemporary bicycle facilities such as bicycle-related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). This table can be found at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/mutcd/index.cfm.

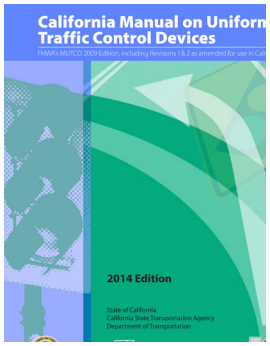
Bikeway treatments not explicitly covered by the MUTCD

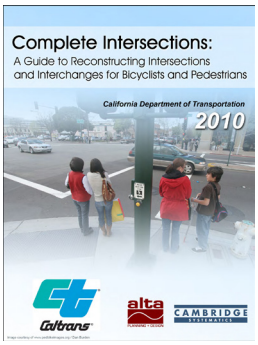


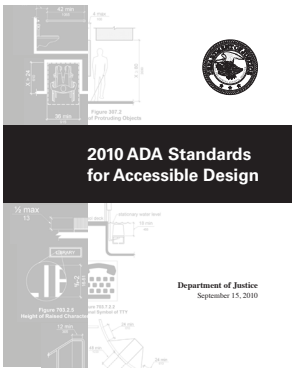












are often subject to experiments, interpretations and official rulings by the FHWA. The **MUTCD Official Rulings** is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available.

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities (2013)**, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities.

Last updated in 2004, the AASHTO provides guidance on dimensions, use, and layout of specific pedestrian facilities. The standards and guidelines presented by AASHTO **Guide for the Planning, Design and Operation of Pedestrian Facilities (2004)** provide basic information, such as minimum sidewalk widths, driveway construction, crosswalk striping requirements and other recommended signage and pavement markings.

The 2011 **AASHTO A Policy on Geometric Design of Highways and Streets (2011)** commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.

FHWA's 2015 **Separated Bike Lane and Planning Design Guide** is the newest publication of nationally recognized bicycle-specific design guidelines, and outlines planning considerations for protected bicycle facilities, presents a suite of design recommendations based on corridor context, and highlights notable case studies from across the US.

The National Association of City Transportation Officials' **(NACTO) Urban Bikeway Design Guide (2012)** is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. **NACTO's Urban Streets Design Guide (2013)** is the newest publication of nationally recognized street design guidelines, covering street designs and elements focused on creating walkable, bikeable, transit-friendly places.

Some of the treatments featured in the NACTO guides are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities in employment, transportation, public accommodation, communications, and governmental activities. The **Department of Justice 2010 ADA Standards for Accessible Design** and the **DOT ADA Standards for Transportation Facilities** provide accessibility standards for all facilities covered by ADA.

In addition, the United States Access Board published **Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (2011)** but they have been subsequently adopted.

Local Guidance

CALIFORNIA:

The **California Manual on Uniform Traffic Control Devices (CAMUTCD) (2014)** is an amended version of the FHWA MUTCD 2009 edition modified for use in California. While standards presented in the CA MUTCD substantially conform to the FHWA MUTCD, the state of California follows local practices, laws and requirements with regards to signing, striping and other traffic control devices.

The **California Highway Design Manual (HDM) (2015)** establishes uniform policies and procedures to carry out highway design functions for the California Department of Transportation. The 2012 edition incorporated Complete Streets focused revisions to address the Department Directive 64 R-1.

Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (2010) is a reference guide that presents information and concepts related to improving conditions for bicyclists and pedestrians at major intersections and interchanges. The guide can be used to inform minor signage and striping changes to intersections, as well as major changes and designs for new intersections.

Main Street, California: A Guide for Improving Community and Transportation Vitality (2013) reflects California's current manuals and policies that improve multimodal access, livability and sustainability within the transportation system. The guide recognizes the overlapping and sometimes competing needs of main streets.

The Caltrans Memo: **Design Flexibility in Multimodal Design (2014)** encourages flexibility in highway design. The memo stated that "publications such as the National Association of City Transportation Officials (NACTO) *Urban Street Design Guide* and *Urban Bikeway Design Guide* are resources that Caltrans and local entities can reference when making planning and design decisions on the State highway system and local streets and roads."

NEVADA:

The **NDOT Road Design Guide (2010)** establishes uniform design criteria and interpretation on AASHTO Green Book geometric design elements.

The **NDOT Standard Plans for Road and Bridge Construction (undergoing update in 2015)** include CAD drawings of street design cross sectional elements and details.

The **NDOT Standard Specifications for Road and Bridge Construction (2014)** includes important details for contractor processes and standards in the design and construction of roads.

The **NDOT Landscape and Aesthetics Master Plan (2002)** established policies, procedures, standards, and guidelines for landscape and aesthetic treatments on Nevada's roads and highways

TAHOE AREA:

The Tahoe Metropolitan Planning Organization (TMPO) serves as the federally-designated metropolitan planning organization for the Tahoe region while TRPA carries out planning requirements of the Bi-State Tahoe Regional Planning Compact (Public Law 96-551) and serves as the regional transportation planning agency for the California portion of the Lake Tahoe Region. The most recent **Lake Tahoe Regional Plan** was adopted in 2012 by TRPA/TMPO and addressed several policies including ecosystem restoration and economic development. The TRPA/TMPO Regional Transportation Plan, **Mobility 2035,** is the transportation component of the Regional Plan. The RTP contains goals and policies that support the creation of walkable communities and increased transportation choice through sidewalk infill and bike trail projects.

Lake Tahoe Community Plans and Area Plans are part of the TRPA Regional Plan and outline bicycle and pedestrian policies and projects for specific neighborhoods in the Tahoe Region. The next revision of the RTP is scheduled for 2016.

The **TRPA Code of Ordinances** compiles all the laws and ordinances needed to implement the Goals and Policies of the Regional Plan. The Code was last updated in 2013.

BIKEWAY CLASSIFICATION OVERVIEW

Caltrans has defined three types of bikeways in Chapter 1000 of the Highway Design Manual: Class I/Shared-Use Path, Class II/Bike Lane, and Class III/Bike Route. Nevada does not have similar class designations, but uses the AASHTO terms, which include "shared-use path", "bike lane" and "signed shared roadway". For consistency with other Regional and prior plans, this document uses the generic terms "shared-use path", "bike lane" and "bike route". Both AASHTO and Caltrans have similar design standards for these facilities. Facilities using federal or state funding will generally be required to meet the standards below. TRPA recommends that all facilities, regardless of funding source, meet the standards below.

Design Summary

Path Width

8 feet is the minimum allowed for a two-way bicycle path and is only recommended for very low traffic situations.

10 feet is recommended in most situations and will be adequate for moderate to heavy use.

12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.

Bike Lane Width with Adjacent On-Street Parking

6.5' preferred width, 5' minimum recommended when parking stalls are marked

Bike Lane Width without Adjacent Parking

Recommended Width: 6' where right-of-way allows

4' minimum when no gutter is present (rural road sections)

5' minimum when adjacent to curb and gutter (3' more than the gutter pan width if the gutter pan is greater than 2')

Lane Width for Bicycle Route With Wide Outside Lane

Fourteen feet (14') minimum is preferred. This can include a striped shoulder. Fifteen feet (15') should be considered if heavy truck or bus traffic is present. Bike lanes should be considered on roadways with outside lanes wider than 15 feet. This treatment is found on all residential streets, collectors, and minor arterials.

Shared-Use Path

Bike Lane

Bike Route/Shared Signed Roadway

Discussion

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared-Use Paths (Class I) are facilities separated from roadways for use by bicyclists and pedestrians. These facilities provide a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow minimized. A total width of 10 feet is required, but 12 feet is recommended.

On-Street Bikeways (Class II), such as conventional or buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists. Another variant of on-street bikeway is **Separated Bikeways (Class IV)** which are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes. Bicycle lanes of 6-7 feet are recommended, while minimum dimensions are 4-5 feet depending on if a gutter is present.

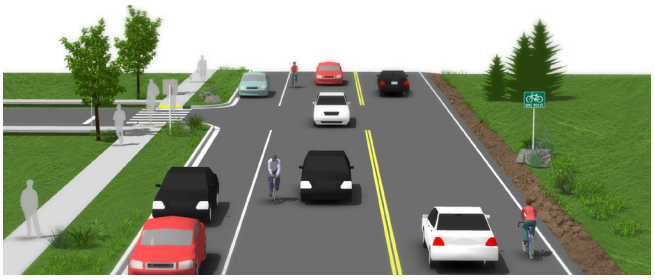
Signed Shared Roadways (Class III) are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors. The recommended width of a shared use travel lane is 14 feet.

Bike Routes are designated bicycle route alignments within a street network, identified as the preferred streets and facilities to be used for bicycle travel. A bike routes is a designation, not a facility type, and may be made up of various facilities in order to provide a connected network for bicycle travel.

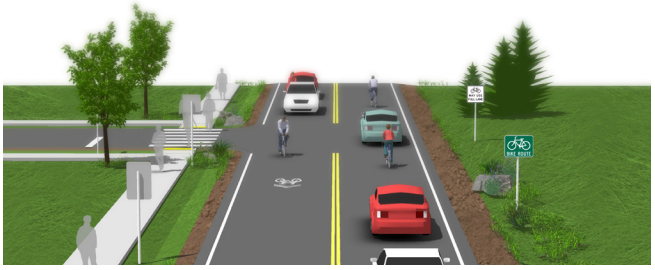
Shared-Use Paths (Class I)

On-Street Bikeway (Class II)

Separated Bikeway (Class IV)



Signed Shared Roadway (Class III)



Signed Shared Roadway with Pavement Markings (Class III)

References

- Caltrans. Highway Design Manual. 2015
- FHWA. Manual of Uniform Traffic Control Devices. 2009.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Shared-use path (10' wide): $475,000 - $3,000,000 per mile
- Bike Lane: $5,000 - $500,000 per mile
- Bike Route: $1,000 - $300,000 per mile

SHARED-USE PATHS

SHARED-USE PATHS

PATHWAY DESIGN

A shared-use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. Within the Lake Tahoe Region, shared-use paths are often found in urbanized areas and connecting urbanized areas to popular recreation sites or other population centers. Shared-use paths can also include amenities such as lighting, signage, and fencing (where appropriate).

General Design Practices

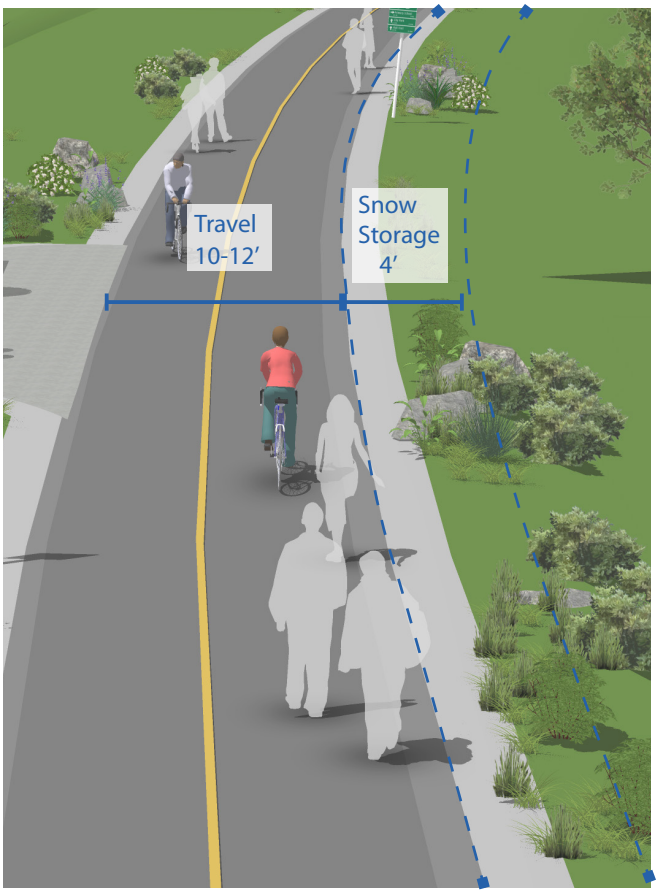
Shared-use paths can provide a desirable facility for users of all skill levels preferring separation from traffic. Some of the elements that enhance off-street path design include:

- Frequent access points from the local road network;
- Placing directional signs to direct users to and from the path;
- Limiting the number of at-grade crossings with streets or driveways;
- Identifying and addressing potential security problems up front;
- Whenever possible, and especially where heavy use by bicycle users can be expected, separate pedestrian ways should be provided to reduce conflicts.

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared-use paths directly adjacent to roadways, although at Lake Tahoe, due to geographical constraints, this is often necessary. Also known as "sidepaths", these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic. This can result in an unsafe situation where motorists entering or crossing the roadway at intersections and driveways do not notice bicyclists coming from their right, as they are not expecting traffic coming from that direction. The guide explores solutions to this problem on page 18.

As bicyclists gain experience and realize some of the advantages of riding on the roadway, many stop riding on paths adjacent to roadways. Bicyclists may also tend to prefer the roadway as pedestrian traffic on the bicycle path increases. When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are bicycling for transportation purposes. Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.

Bicycle paths must also include the proper "Best Management Practices" (BMPs) for treating runoff from the facility. These designs are not included here, but path designers can find more information on the TRPA's BMP website at: http://www.tahoebmp.org.



Discussion

Twelve-foot wide paths are usually best for accommodating all uses, and better for long-term maintenance and emergency vehicle access. When motor vehicles are driven on shared-use paths, their wheels often will be at or very near the edges of the path. Since this can cause edge damage that, in turn, will reduce the effective operating width of the path, adequate edge support should be provided. Edge support can be either in the form of stabilized shoulders, a concrete "ribbon curb" along one or more edges of the path, or constructing additional pavement width or thickness. Constructing a typical pavement width of 12 feet, where right-of-way and other conditions permit, lessens the edge raveling problem.

Surfacing and Path Construction

Thicker surfacing and a well-prepared sub-grade will reduce deformation over time and reduce long-term maintenance costs. At a minimum, off-street paths should be designed with sufficient surfacing structural depth for the sub-grade soil type to support maintenance and emergency vehicles.

Asphalt and concrete are the most common surface treatment for multi-use paths, however the material composition and construction methods used can have a significant determination on the longevity of the pathway. Concrete is not as durable in cold climates and may not be suitable on a large scale for Lake Tahoe. Alternative surface materials such as decomposed granite may be appropriate in some circumstances. Each jurisdiction needs to consider durability and snow removal needs (grooming vs. clearing) when selecting an alternative surface material such as decomposed granite. Surface selection should take place during the design process.

Recommendation

The following pathway construction design is recommended for improved durability and low maintenance at Lake Tahoe:

• Asphalt Option: 4 inches of type B asphalt over a minimum of 9 inches of 1.5 inch minus crushed gravel base material. An asphalt path has the advantage of melting out more quickly after a snowfall under sunlight than a concrete path.

If trees are adjacent to the path, a root barrier should be installed along the path to avoid root uplift.

Design Summary

Width

- 10 feet width preferred, 8 feet minimum.
- 12 feet or more is recommended in areas with heavy anticipated bicycle and/or pedestrian traffic (Caltrans, 2015). AASHTO recommends a paved width of 10 feet minimum, with up to 14 feet being the preferred width.
- A 3-4 foot native surface path may be considered alongside shared-use paths for runners.

Separation From Highway

When two-way shared-use paths are located adjacent to a roadway, wide separation between a shared-use path and the adjacent highway is desirable. Bike paths closer than 5 feet from the edge of the shoulder shall include a physical barrier to prevent bicyclists from encroaching onto the highway (Caltrans, 2015). Where used, the barrier should be a minimum of 42 inches high (AASHTO, 2012).

Snow Storage

If a facility is to be plowed or blown in the winter, shoulder or clear width should be increased to provide adequate snow storage. In constrained locations, snow may need to be trucked out instead of stored on-site. As an alternative to snow clearance, a facility may be groomed to allow cross-country skiers and snowshoers to use it.

References

- Caltrans. Highway Design Manual. 2015.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.

Cost

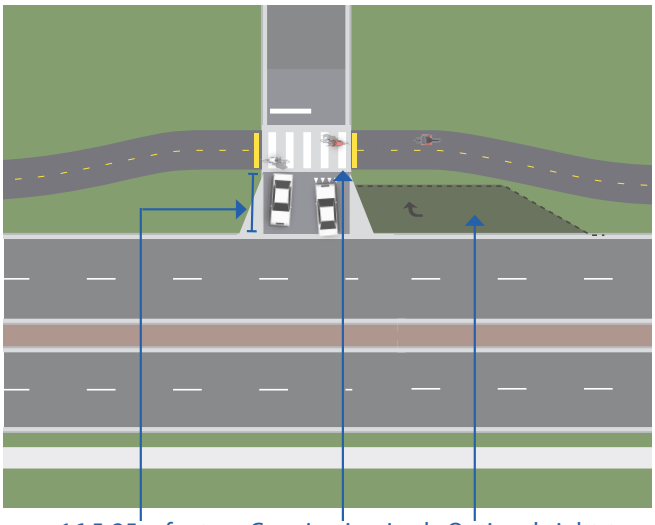
Shared-use Path (10' wide): $475,000 - $3,000,000 per mile

Costs can vary substantially based on the materials used, right-of-way costs, path width and other factors. A paved, multi-use trail can range in cost from approximately $65,000 per mile to more than $4 million per mile. An unpaved path can range from approximately $30,000 to $400,000 per mile.

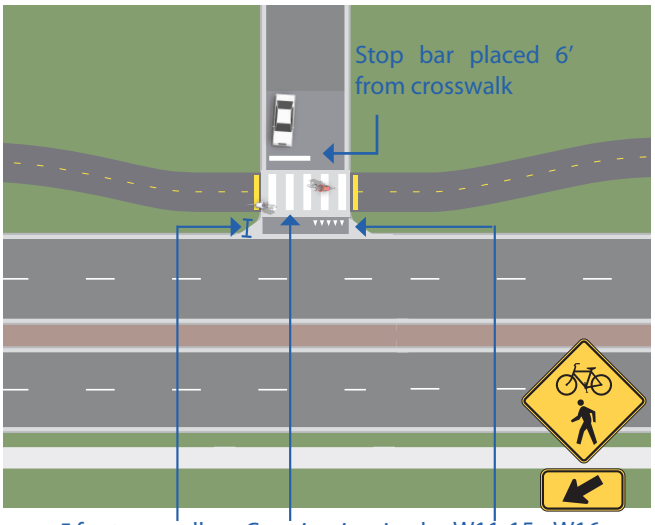
SIDE PATHS AT DRIVEWAYS AND MINOR STREETS

Shared use paths along roadways, also called Sidepaths, are a type of path that run adjacent to a street. Because of operational concerns it is generally preferable to place paths within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.

Setback Path Crossing



Adjacent Path Crossing



Discussion

Guidance for sidepaths should follow that for general design practices of shared use paths.

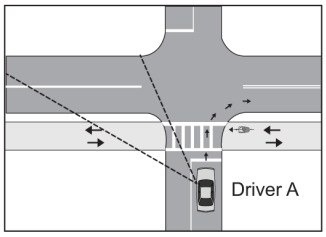
Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Where possible, path users should have right-of-way priority over traffic on side streets. Crossings may be STOP or YIELD controlled for motor vehicles depending on sight lines and bicycle motor vehicle volumes and speeds.

Design Summary

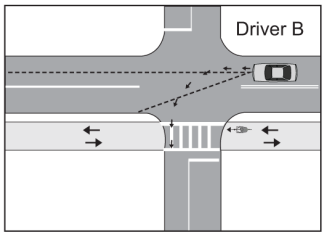
- In general, there are two approaches to driveway crossings: setback crossings and adjacent crossings, illustrated above.
- **Setback Crossing** - A set back of 25 feet separates the path crossing from merging/turning movements that may be competing for a driver's attention.
- **Adjacent Crossing** - A separation of 5 feet or less emphasizes the conspicuity of riders at the approach to the crossing.

Sidepath Conflicts (AASHTO 2012)

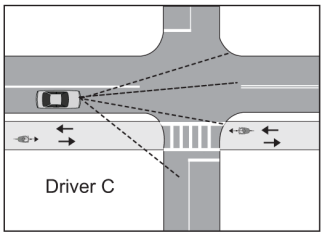
The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings. The setback path crossing configuration shown on page 18 is the preferred design to mitigate these design concerns.



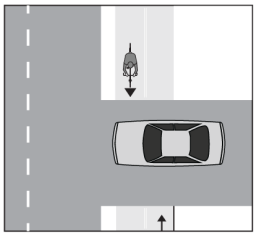
Right turning Driver A is looking for traffic on the left. A contraflow bicyclist is not in the driver's main field of vision.



Left turning Driver B is looking for traffic ahead. A contraflow bicyclist is not in the driver's main field of vision.



Right turning Driver C is looking for left turning traffic on the main road and traffic on the minor road. A bicyclist riding with traffic is not in the driver's main field of vision.



Stopped motor vehicles on side streets or driveways may block the path.

Additional Considerations

- Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path. Therefore, appropriate connecting facilities must be provided.
- The provision of a shared use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved bike lanes, but should be considered in some locations in addition to on-road bicycle facilities.
- To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street. **(AASHTO 2012)**

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA. Roundabouts: An Informational Guide. 2000.
- TRB. Roundabouts: An Informational Guide, Second Edition. NCHRP 672. 2010.

Cost

Costs can vary substantially based on the materials used, right-of-way costs, and other factors. A paved, multi-use trail can range in cost from approximately $65,000 per mile to more than $4 million per mile.

TREAD-SEPARATED SHARED-USE PATH

As user volumes on shared-use paths increase, the degree of mobility, usability and comfort for those users decreases. In high volume scenarios, shared-use paths should separate users through lane delineation, materials, or physical separation.

Discussion

Tread-separated shared-use paths are typically used when there are high volumes of users, or high potential demand for the facility. They are also appropriate for segments of paths that connect to conventional or separated bike lanes.

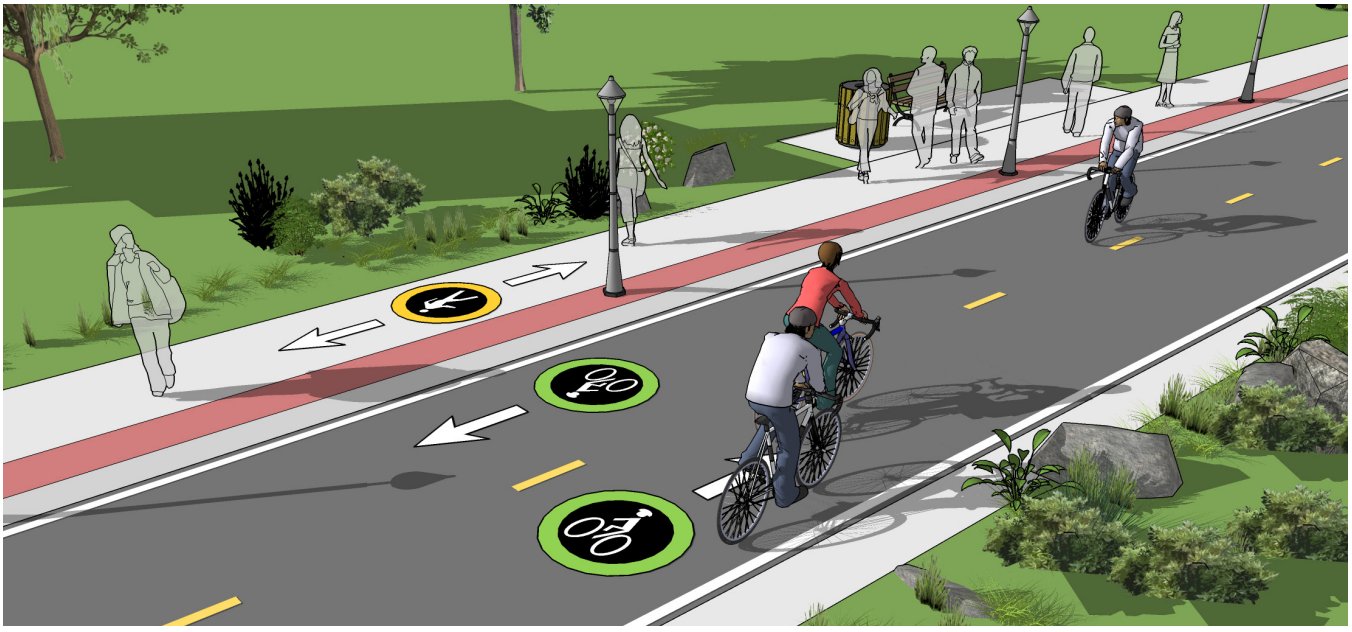
User separation increases mobility during path segments, but may introduce additional conflicts at intersections or connections to other paths. Clear signing and markings should be used to specify yielding expectations

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Design Summary

- 15 feet minimum width to allow for tread separation: 10 feet wide path for bicycle only use, with 5 ft section for pedestrian-only use.
- User delineation may be lane striping or differing paving materials. If different materials are used, consider concrete for pedestrians and asphalt for bicyclists.
- In areas with extra width available, user treads may be separated further, with materials such as cobblestones, or planted landscaping.
- Lighting is recommended and provides security and safety benefits, allowing the facility to be used after dusk, particularly during the winter months.
- Clear signs should be used to specify user positioning.
- If markings are used, use small-scale symbols instead of full-sized roadway markings.



SHARED-USE PATHS

BOARDWALKS

Boardwalk construction may be used in sensitive areas such as stream environment zones and in areas of steep slopes. Boardwalk construction is typically much more expensive than standard paved paths. Boardwalks should have a surface that is comfortable and safe for bicyclist use and should be considered in relation to environmental needs, budget, and potential use needs and management issues.

Design Summary

Design Criteria

If bicyclists are allowed, design criteria for boardwalks should meet AASHTO design recommendations for paved shared-use paths. Paths should also be designed to structurally support the weight of a small truck or a light-weight maintenance vehicle.

Width

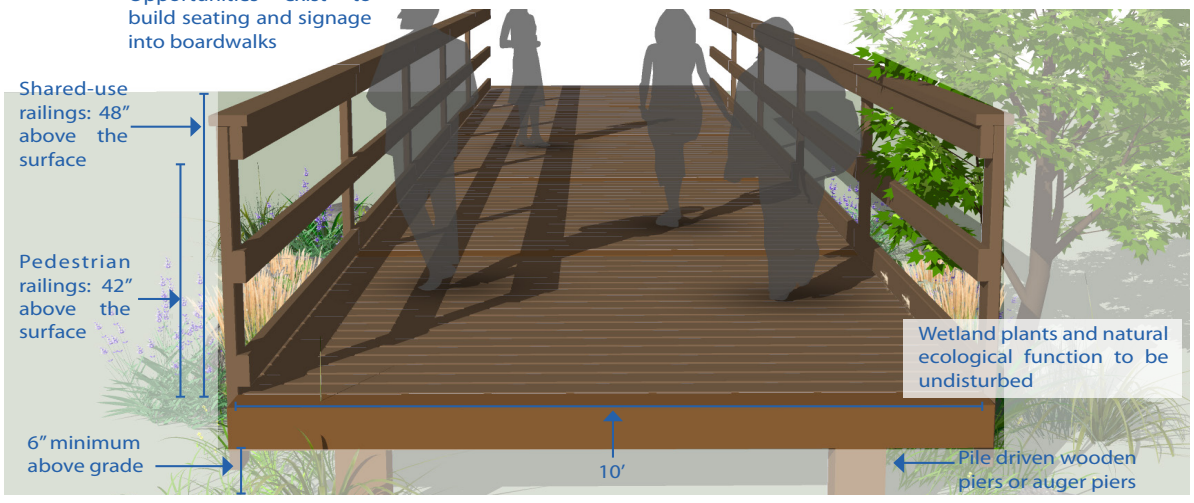
Path width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with high anticipated use and whenever rails are used. AASHTO recommends carrying the clear area (or 2 foot space on either side of path) across the structure. This provides an appropriate horizontal shy distance from the railing and allows for maneuvering space to avoid conflicts with users stopped on the structure. A 10 foot width is recommended only for low-use areas.

Height from Ground

Path height should be set to allow for small animal movement under the structure and passage of expected water flows, a minimum of 6" above grade.

Railings

Paths less than 30" above grade may not require a railing according to current building standards. Six inch curb rails may be used. Paths higher than 30" above grade require a 42" high rail. It should be noted that AASHTO recommends 42" high railings on any structured path.



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- Department of Justice. ADA Standards for Accessible Design. 2010.

Cost

Dependent on use of railings, materials, width, height, and anticipated loads. Can vary between $2.25M and $4M per mile for a 10 foot wide path.

SHARED-USE PATHS

CAUSEWAYS

Causeways or "burm" type path construction may be used to minimize disturbance of water flow in stream environment zones. Paths are elevated above wet ground using a permeable fill material as a base. Path edges incorporate small boulders or a rock riprap to contain the permeable fill. Geotextile mats and other construction materials such as geocells can be incorporated to ensure a stable base on which asphalt or concrete paving may be applied. The path should be built up to an elevation no greater than 30 inches above natural grade.

Design Summary

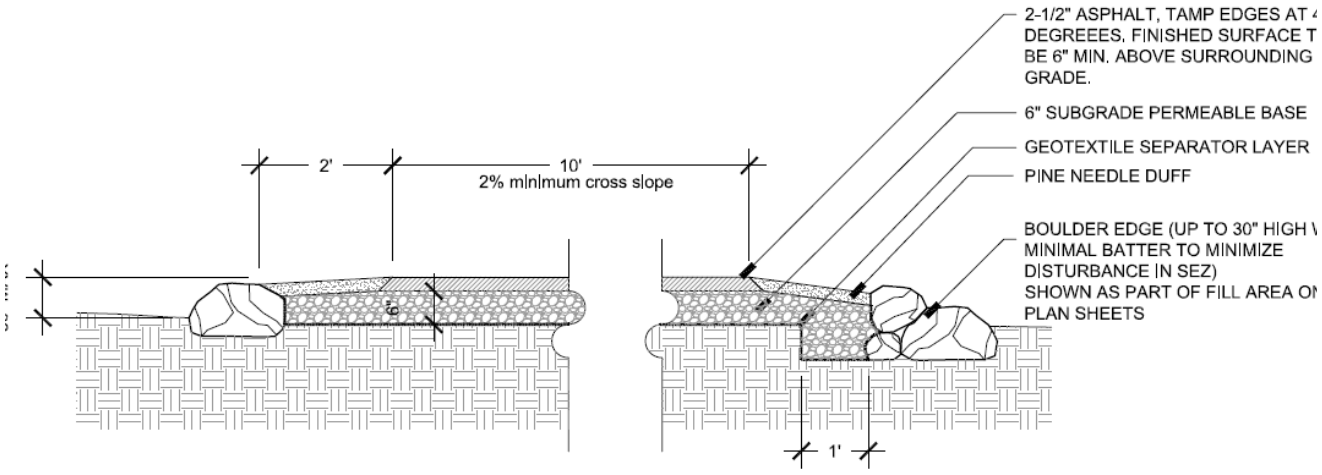
Design Criteria

Design criteria for causeways should meet AASHTO and Caltrans design recommendations for paved shared-use paths.

Base

Path construction and detailing depends on water table and surface flows through site. A stable base for paving must be established while allowing for water flow under path. Base materials should be designed so as not to be compromised by future water flows. Firm mineral soil, coarse-grained soils or granular material, or small, well-graded angular rocks are needed for fill.

It should be noted that AASHTO recommends 42" high railings on any structured path.



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- United States Forest Service. Trail Construction and Maintenance Notebook. 2007.
- Caltrans. Highway Design Manual. 2015.

Cost

Dependent on surface type. Native surface and decomposed granite surfaces are less expensive than paving. Paved applications would include the typical cost of a paved path plus the riprap edge support.

AGGREGATE SURFACE TRAILS

Aggregate surface trails are most applicable in non-urban environments and in multi-use areas where a variety of recreational use is anticipated. This includes hiking, biking, mountain biking, and equestrian use. Aggregate surface trails composed of crushed rock using pine tar or other trail stabilization techniques can fit in well with a natural setting and can cost less to construct than an asphalt trail.

Discussion

Sustainable design must consider these forces – compaction, displacement, and erosion – that are caused by water and trail use. Compaction will deepen the heavily traveled portion of the trail. Displacement deepens the tread and raises the untraveled edges. Erosion follows and further deepens the tread. Understanding the site soils, topography, water movement, and anticipated use patterns should be considered during the trail design.

This type of trail may be considered for both permanent and temporary use. As a temporary facility, future phasing would then include returning to the site and paving the surface. This allows for major grading and stabilization to be completed during the first phase and paving completed during the second phase.

Design Summary

Width

Trail widths vary depending upon anticipated type and volume of use.

References

- United States Forest Service. Trail Management Handbook (FSH) 2309.18. 2008.
- Minnesota Department of Natural Resource. Trail Planning, Design, and Development Guidelines. 2007
- United States Forest Service. Trail Construction and Maintenance Notebook. 2007

Cost

$75,000 - $150,000 per mile

LIGHTING

Lighting improves the safety of the path user by increasing visibility during non-daylight hours. The fixtures should be installed near benches, drinking fountains, bicycle racks, trailheads, and roadway and path crossings. TRPA recommends lighting in urbanized areas only. Lighting must be downcast to minimize light pollution and must follow the recommendations in the applicable Community Plan or Area Plan.

Photo by Dan Burden via PBIC Image Library

Design Summary

Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux should be considered (AASHTO, 2012). Where special security problems exist, higher illumination levels may be considered.

References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

SHARED-USE PATHS

BOLLARDS

Minimize the use of bollards to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. The California MUTCD explains, "Such devices should be used only where extreme problems are encountered" (Section 9C.101). Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. Please see the next page for alternative design solutions to bollards.

Discussion

Flexible bollards and posts are designed to give way on impact and can be used instead of steel or solid posts. These bollards are typically made of plastic that is bolted to the roadway and bend and return to their original position when hit. They are intended to deter access, but allow vehicles through in an emergency.

Bollards are typically installed using one of two methods: 1) The bollard is set into concrete footing in the ground; and 2) the bollard is attached to the surface by mechanical means (mechanical anchoring or chemical anchor).

The TRPA recommends flexible bollards or no bollards as opposed to solid posts.

Design Summary

- Where removable bollards are used, the top of the mount point should be flush with the path's surface so as not to create a hazard or potentially be damaged by snow removal devices when the bollard is not in place. Posts shall be permanently reflectorized for nighttime visibility and painted a bright color for improved daytime visibility.
- Striping an envelope around the post is recommended.
- When more than one post is used, an odd number of posts at 1.5m (5-foot) spacing is desirable. Wider spacing can allow entry by adult tricycles, wheelchair users and bicycles with trailers.

Examples of Flexible Bollards

References

- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bollard, fixed: $220 - $800 each
- Bollard, removable: $680 - $940 each

BOLLARD ALTERNATIVES

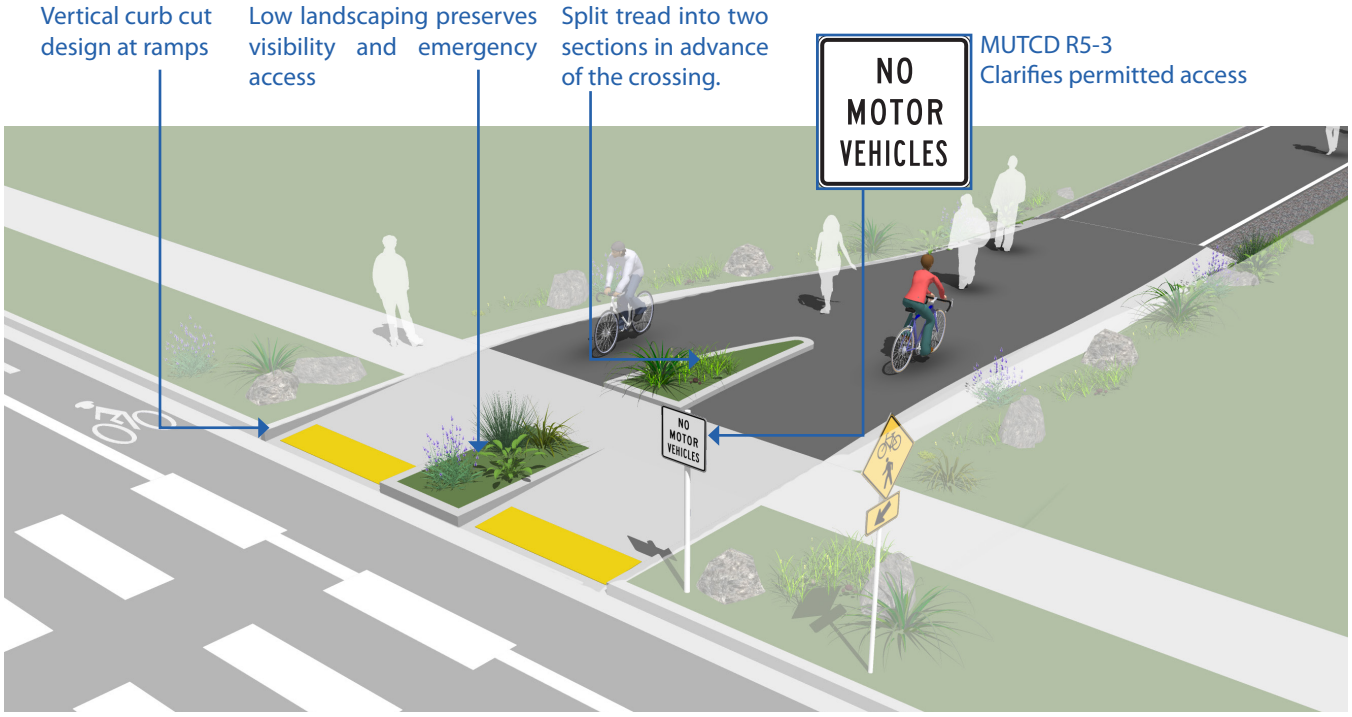
Bollards are physical barriers designed to restrict motor vehicle access to the multi-use path. Unfortunately, physical barriers are often ineffective at preventing access, and create obstacles to legitimate trail users. Alternative design strategies use signage, landscaping and curb cut design to reduce the likelihood of motor vehicle access.

Discussion

Bollards or other barriers should not be used unless there is a documented history of unauthorized intrusion by motor vehicles. If unauthorized use persists, assess whether the problems posed by unauthorized access exceed the risks and issues posed by bollards and other barriers.

Design Summary

- "No Motor Vehicles" signage (MUTCD R5-3) may be used to reinforce access rules.
- At intersections, split the path tread into two sections separated by low landscaping.
- Vertical curb cuts should be used to discourage motor vehicle access.
- Consider targeted surveillance and enforcement at specific intrusion locations



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Reconstructing a path crossing entry can range from $2,000 to $4,000.

RECOMMENDED YIELD POLICIES

TRPA is collaborating with partner jurisdictions through the Bikeway Partnership on an education campaign aimed at reducing user conflicts on shared-use paths between pedestrians and bicyclists. Custom signage may be installed to guide path users on proper etiquette, especially in areas where conflicts are likely to occur. Local agencies should coordinate with advocacy groups to develop consistent Trail "rules" and campaign materials. Funding and staff capacity is also necessary to implement signage and outreach programs.

Discussion

FHWA has developed and promoted campaigns that educate active transportation users how to travel safely. The FHWA has several pedestrian and bicyclist tools to assist educators, such as "Safer Journey" videos, and interactive websites. The campaigns promote three basic themes: Be Visible, Be Predictable and Follow the Rules of the Road. California State Parks also has basic rules for the trail to reduce user conflict between pedestrians, bicyclists, and equestrians and has implemented signage throughout their vast network of trails.

A centerline marking is particularly beneficial in the following circumstances: A) Where there is heavy use; B) On curves with restricted sight distance; and C) Where the path is unlighted and nighttime riding is expected. A centerline stripe may also be applied uniformly across the entire facility.

Design Summary

Signage

Etiquette signage and education campaigns are recommended by TRPA/TMPO as ways to encourage path users to yield to each other and to keep the paths clear. They also help to encourage predictable user behavior, especially in areas of high use or where conflicts have occurred. Cyclists, pedestrians, and equestrians (where applicable) are advised to adhere to the path rules and share the trail. Under certain conditions such as during times with lower activity and faster bicyclists, it may be advantageous to walk against traffic, however, it is likely not the safest practice for all conditions and thus should not be regulated with signage. To accommodate counterflow walking, no center line should be marked on the path in order to permit maximum flexibility in path user positioning during passing and approaching maneuvers.

User Etiquette Signs Along Multi-Use Paths

References

- FHWA. Manual of Uniform Traffic Control Devices. 2009.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Signs, trail regulation: $150 each
- Signs, trail wayfinding / information: $500 - $2,000 each

SUMMARY OF COVERAGE REQUIREMENTS

Coverage is regulated in Chapter 30 of the TRPA Code of Ordinances. In 2013, the Code was updated to provide exemptions for the provision of ADA facilities and non-motorized public trails. This is an important development that makes planning and building these types of facilities easier for implementors, both public and private.

Discussion

In the Lake Tahoe Region, due to the need to maintain the natural filtration function of soils to reduce runoff into the Lake, there are limits on the amounts of new pavement, or "coverage" that may be constructed. Where the coverage limitation on a parcel or project area is exceeded, new coverage must be transferred in, and mitigated by removing other coverage within the same watershed, or by purchasing banked coverage. Depending on the land capability of the project area, new coverage must be mitigated by removing other coverage at a ratio of 1:1 or 1.5:1.

In certain situations, private property owners will donate or sell easements for implementation of a bicycle path or sidewalk. In this case, any coverage used to construct the path within the easement does not count towards the property owner's total allowable coverage, since the easement area is effectively part of a "project area" that is separate from the parcel. Memorandums of Understanding (MOUs) may be put in place for either the public entity or the private parcel owner to conduct maintenance, such as the snow removal.

References

- TRPA. Code of Ordinances. 2013.

Detailed Guidance

Section 30.4.1. Base Land Coverage Requirements

This section describes the amount of allowable coverage for different land capability districts. Lower land capability districts, such as wetlands or steep slopes, are allowed only 1% of their area to be covered by impermeable surfaces. The highest land capability districts, where water filtration is the best, may have up to 30% of their area covered by impermeable surfaces.

Section 30.4.2. Transferred Land Coverage Requirements

Subsection (2), Linear Public Facilities, establishes that this use is eligible for transferring coverage. Bicycle paths, sidewalks, and bicycle lanes are linear public service facilities.

Section 30.5. Prohibition of Additional Land Coverage in Land Capability Districts 1a, 1c, 2 and 3 and 1b (Stream Environment Zones)

Subsections 30.5.1(C) and 30.5.2(C) describe the conditions under which additional land coverage may be transferred into the most sensitive land capability districts for linear public service facility projects.

Section 30.4.6. Exemptions and Partial Exemptions from Calculations of Land Coverage

Subsection C notes that the provision of ADA-required features are typically exempt from the calculation of land coverage. Under Subsection D3, Non-Motorized Public Trails are exempt from the calculation of land coverage subject to design limitations.


SHARED-USE PATH
CROSSINGS

SHARED-USE PATH CROSSINGS

PATH CROSSING AT INTERSECTION

The evaluation of a roadway crossing involves analysis of vehicular traffic and path user travel patterns, including speeds, street width, traffic volumes (average daily traffic, peak hour traffic), line of sight, and path user profile (age distribution and destinations). When engineering judgment determines that the visibility of the intersection is limited on the shared-use path approach, Intersection Warning signs should be used.

Design Summary

A path should cross at a signalized intersection if there is a signalized intersection within 350 feet of the path and the crossroad is crossing a major arterial with a high ADT.

Signage

Intersection Warning (W2-1 through W2-5) signs may be used on a roadway, street, or shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic, no less than 50 feet before the intersection. A path-sized stop sign (R1-1) should be placed about 5 feet before the intersection.

Traffic Calming

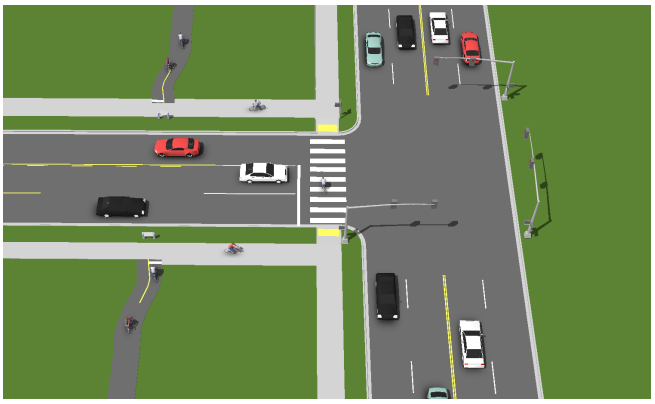
Reducing the speed of the conflicting motor vehicle traffic should be considered. Options may include: transverse rumble strips approaching the path crossing; sinusoidal speed humps (compatible with slow speed snow removal operations).[1]

Crosswalk Markings

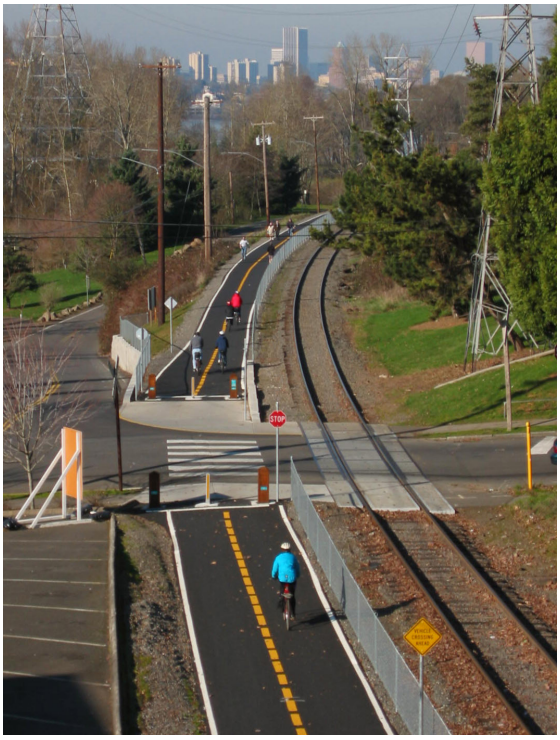
Colored and/or high visibility crosswalks are recommended.

Path Speed Control

A chicane, or swerve in multi-use path approaching the crossing is recommended to slow bicyclist speed. Path users traveling in different directions should be separated either with physical separation (such as a raised median) or a centerline. If a centerline is used, it should be striped for the last 100 feet of the approach.



Recommended "Typical" At-Grade Crossing of a Major Arterial at an Intersection Where Path is Within 350 Feet of a Roadway Intersection



1 Humps with a sinusoidal profile are similar to round-top humps but have a shallower initial rise (similar to a sine wave). They were developed to provide a more comfortable ride for cyclists in traffic calmed areas.

SHARED-USE PATH CROSSINGS

STOP VERSUS YIELD MARKINGS AT CROSSINGS

Where conditions require path users, but not roadway users, to stop or yield, the STOP sign or YIELD sign should be placed on the path. When placement of STOP or YIELD signs is considered, priority at a shared-use path/roadway intersection should be assigned with consideration of the relative speeds of shared-use path and roadway users, relative volumes of shared-use path and roadway traffic, and whether the crossing is parallel to or across a major roadway.

Discussion

Speed should not be the sole factor used to determine priority, as it is sometimes appropriate to give priority to a high-volume shared-use path crossing a low-volume street, or to a Regional shared-use path crossing a minor collector street. This is most prevalent when crossing a minor street in parallel with a major street, such as a sidepath. In some cases it may be appropriate to control the roadway only, while not controlling the path. The least restrictive appropriate controls should be used. STOP signs should not be used where YIELD signs would be acceptable.

The *Side Paths at Driveways and Minor Streets* reference sheet provides more guidance.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. Manual of Uniform Traffic Control Devices. 2014.
- AASHTO. Guide for the Development of Bicycle Facilities,. 2012.

Design Summary

Path Crossing Signage

STOP (R1-1) signs shall be installed on shared-use paths at points where bicyclists are required to stop. YIELD (R1-2) signs shall be installed on shared-use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists are required to yield the right-of-way to that conflicting traffic.

R1-1

R1-2

Cost

- Stop limit bars/yield teeth: $200-$530 per set
- Stop pavement markings: $420 each
- Pavement Markings (Thermoplastic): $3.39 per square foot
- Signs, Path Crossing: $780 each
- Signs, Path Stop/Path Yield: $520 each
- Signs, Path Regulation: $150 each

MARKED/UNSIGNALIZED MID-BLOCK CROSSINGS

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions. When space is available, using a median refuge island improves user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 opportunities to cross per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons, and excellent sight distance. For more information see the discussion of active warning beacons.

This treatment is appropriate for crossings located in school zones.

Design Summary

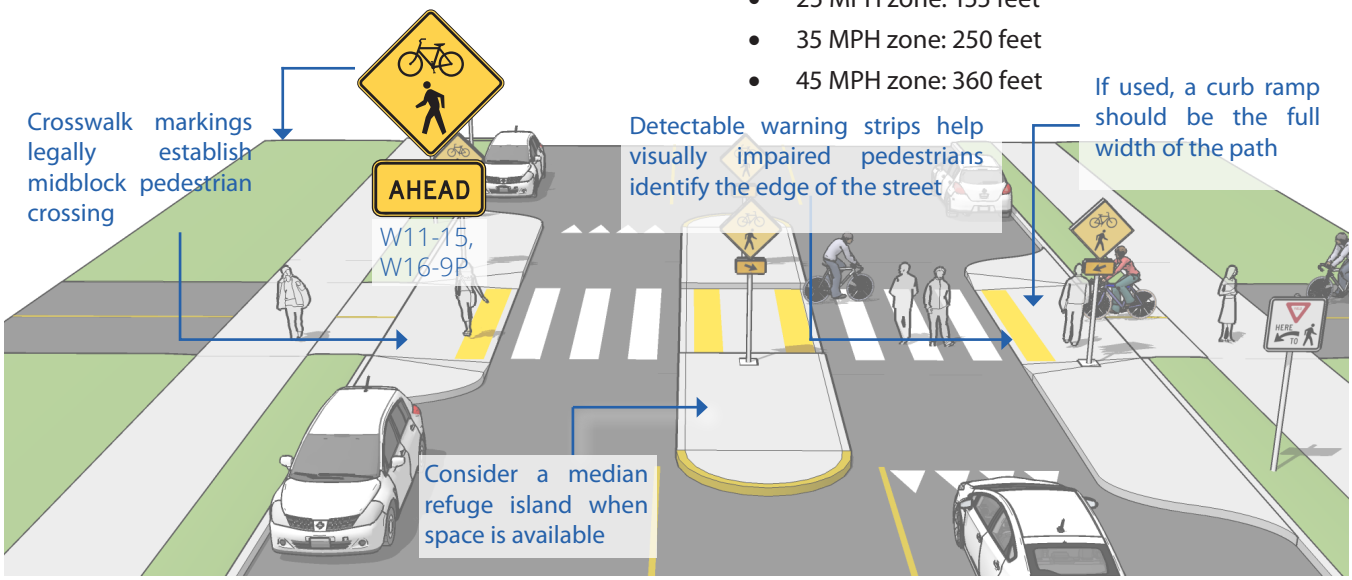
Maximum traffic volumes

- ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed: 35 MPH

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NDOT. Process for the Evaluation of Uncontrolled Crosswalk Locations. 2014.

Cost

- Signage: $125 each
- Marked Crosswalk, $550 each
- Stop limit bars/yield teeth: $200-$530 per set
- Median Refuge Island (optional): $8,500 - $33,000 each

ACTIVE WARNING BEACONS

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

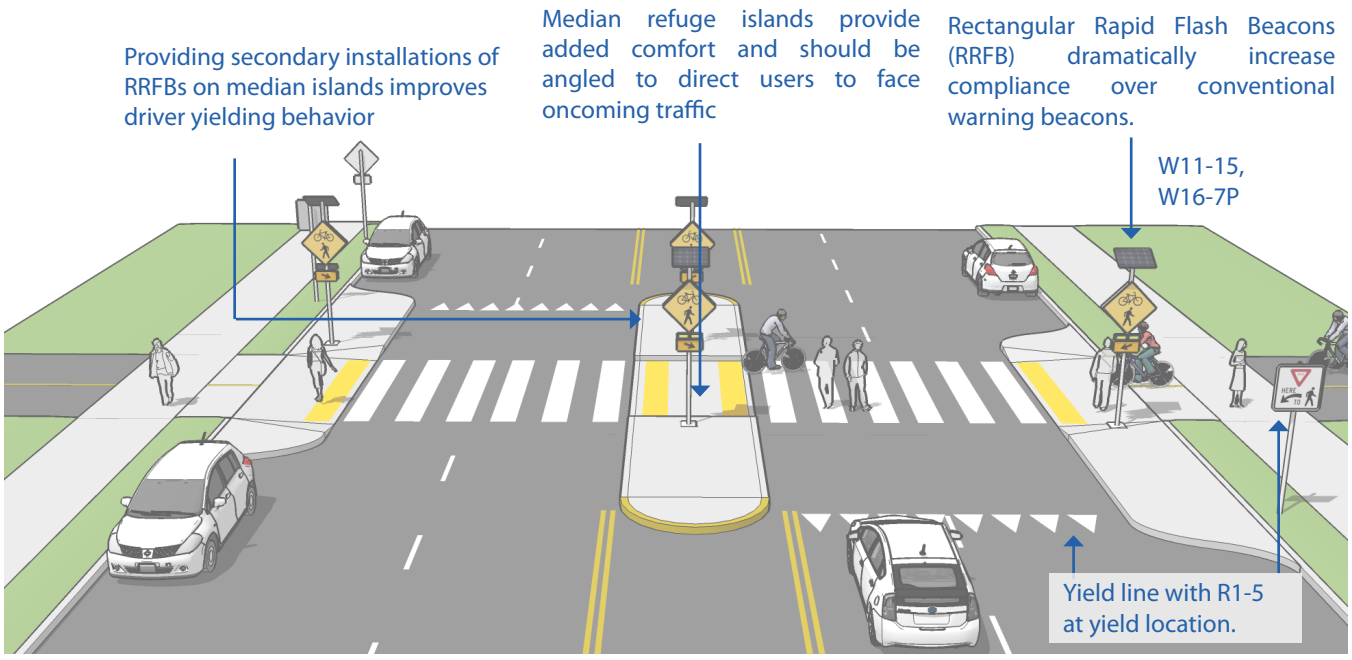
Discussion

Rectangular rapid flash beacons have the highest compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent.

Design Summary

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NDOT. Process for the Evaluation of Uncontrolled Crosswalk Locations. 2014.

Cost

- Actuated Pedestrian Crossing: $40,000 each
- Marked Crosswalk, $550 each
- Signage: $125 each
- Median Refuge Island (optional): $8,500 - $33,000 each

SHARED-USE PATH CROSSINGS

HYBRID BEACONS

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk.

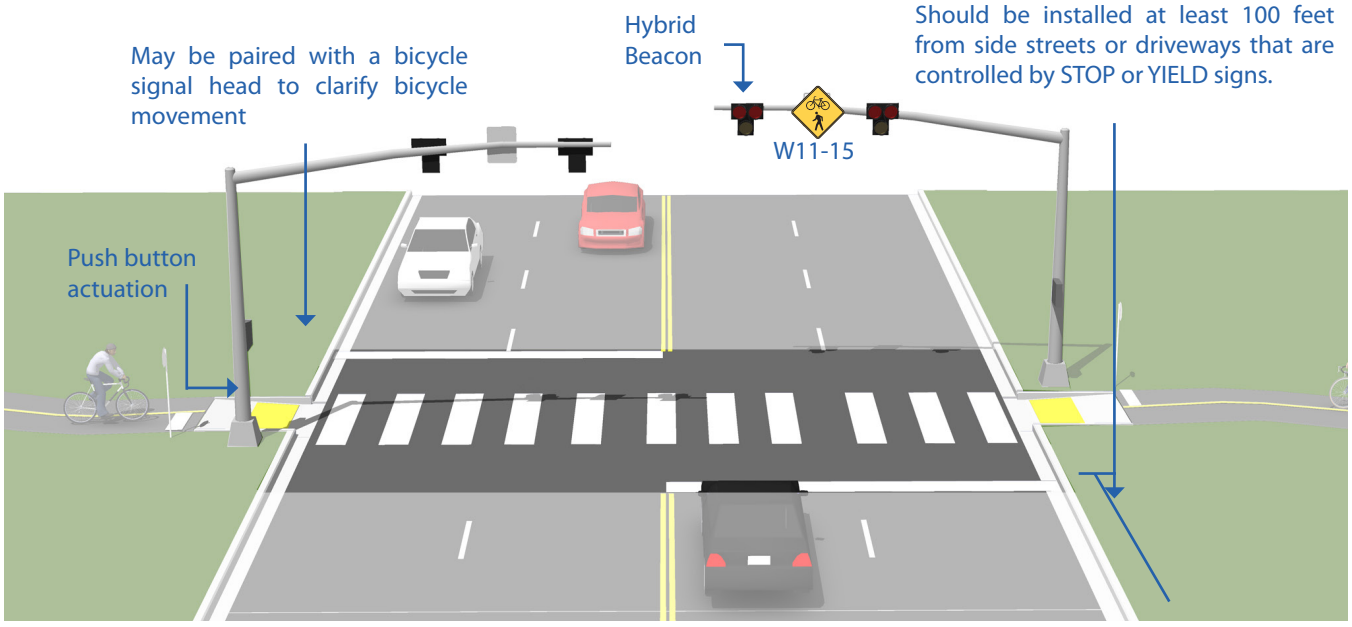
Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

This treatment is appropriate for crossings located within school zones.

Design Summary

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Crossing, Hybrid Beacon $50,000+ each
- Marked Crosswalk, $550 each
- Signage: $125 each

Photo above by Mike Cynecki via PBIC Image Library

SIGNALIZED MID-BLOCK CROSSING

Warrants from the MUTCD combined with sound engineering judgment should be considered when determining the type of traffic control device to be installed at path-roadway intersections. Traffic signals for path-roadway intersections are appropriate under certain circumstances. The MUTCD lists 11 warrants for traffic signals, and although path crossings are not addressed, bicycle traffic on the path may be functionally classified as vehicular traffic and the warrants applied accordingly. Pedestrian volumes can also be used for warrants.

Discussion

Experimental Treatment

A Toucan crossing (derived from: "two can cross") is used in higher traffic areas where pedestrians and bicyclists are crossing together.

This treatment is appropriate for crossings located within school zones.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Design Summary

Warrants

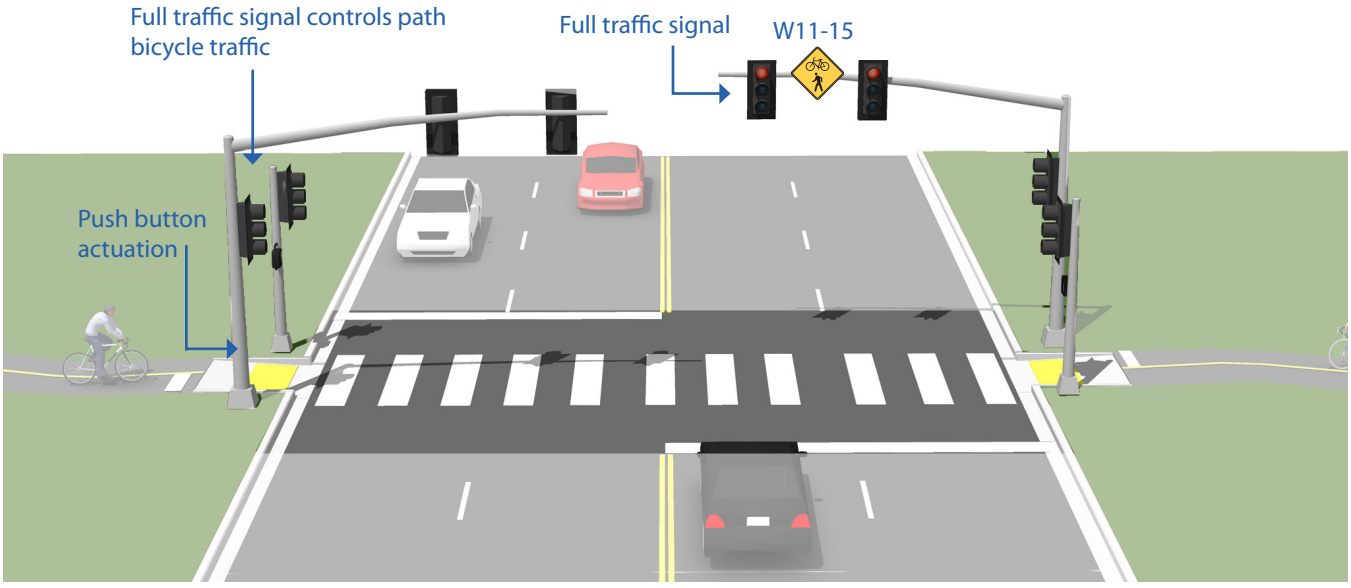
Section 4C.05 in the MUTCD and CAMUTCD describes pedestrian volume minimum requirements (referred to as warrants) for a mid-block pedestrian-actuated signal. Note that California and Nevada have different warrants.

Pavement Markings

Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication.

Cost

- Crossing, Toucan: $90,000 each
- Marked Crosswalk, $550 each
- Signage, $125 each



INTERSECTIONS WITH SMALL STREETS

The California and Nevada Vehicle Code requires that motorists yield right-of-way to pedestrians within crosswalks. This requirement for motorists to yield is not explicitly extended to bicyclists, and the rights and responsibilities for bicyclists within crosswalks is ambiguous. On crossings of minor streets, design solutions should resolve this ambiguity where possible by giving people on bicycles priority within the crossing. Where this is not possible, the design should create conditions and slow speeds that encourage safe interactions in the case of a user error. Determination of priority between streets and paths can be found in the TRB Highway Capacity Manual (2010),

Benefits

Crosswalk markings establish a legal crosswalk at areas away from intersections (MUTCD Section 3B.18).

Motorists decrease speed in the vicinity of marked crosswalks and crosswalk usage increases with the installations of crosswalk markings (Knoblauch, 2001).

Motorists are statistically more likely to yield right-of-way to pedestrians in a marked crosswalk than an unmarked crosswalk (Mitman, 2008).

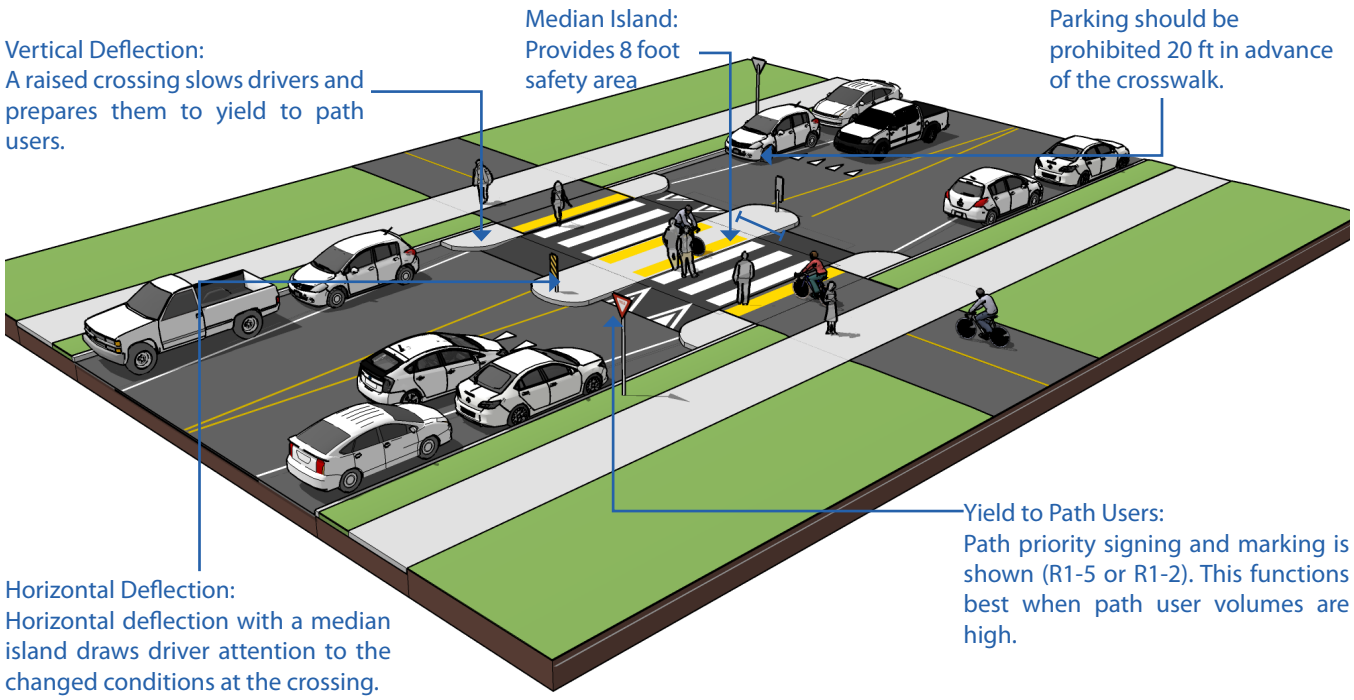
Discussion

Geometric design should promote a high degree of yielding to path users through raised crossings, horizontal deflection, signing, and striping.

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

On high speed and high volumes roadways, crosswalk markings alone are not a viable safety measure. This supports the creation of more robust crossing solutions (Zeeger, 2001).

Path Priority Crossing



Design Summary

Crossing Geometry

In Nevada, parking is prohibited within 20 feet of any marked crosswalk.

A median safety island should allow path users to cross one lane of traffic at a time. The bicycle waiting area should 8 feet wide or wider to allow for a variety of bicycle types.

Raised crossings should raise 4 inches above the roadway with a steep 1:6 (16%) ramp. The raise should use a sinusoidal profile to facilitate snow plow operation. Advisory speed signs may be used to indicate the required slow crossing speed.

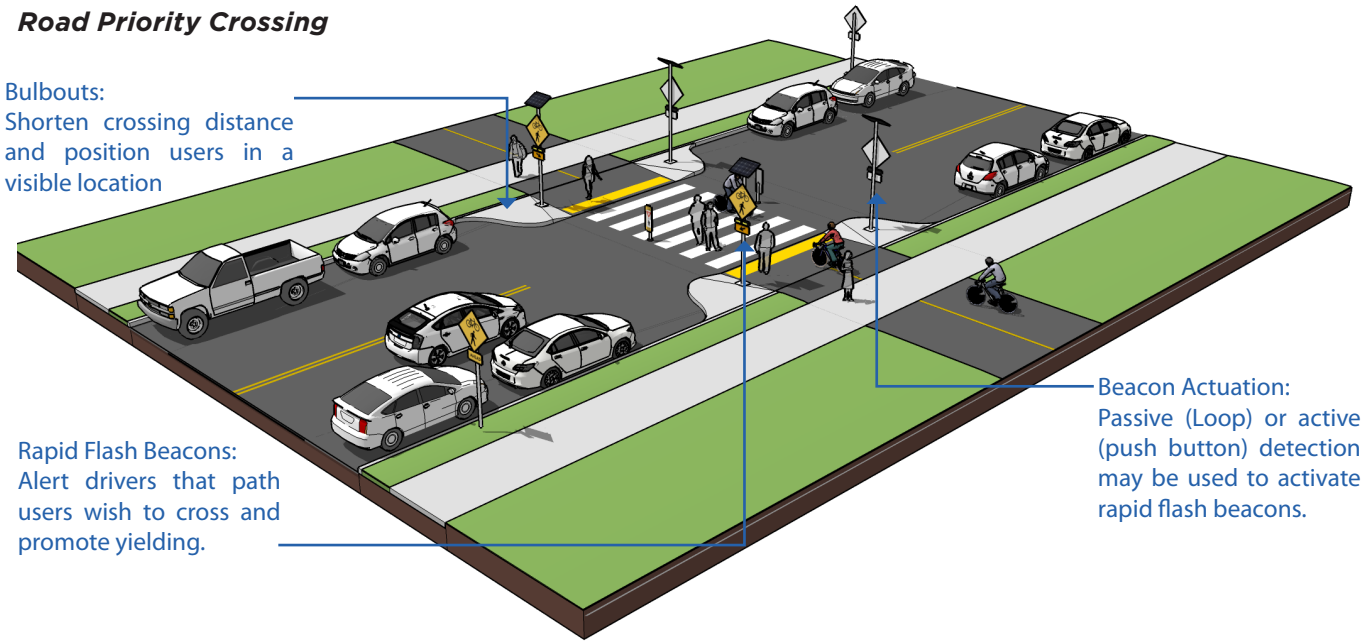
Markings

High-visibility crosswalk markings are the preferred marking type at uncontrolled marked crossings (FHWA, 2013). Transverse lines are "essentially not visible" when viewed from a standard approaching vehicle. (ITE, 2010)

Stop or Yield lines may be used on the roadway 20 ft. in advance of crosswalks when right-of-way priority is given to path users (CA MUTCD 3B.18). A yield line must be paired with a Yield (R1-2) or Yield Here To Pedestrians (R1-5) sign.

In roadway Yield to Pedestrians (R1-6) signs may be used along the centerline point of a crosswalk.

Road Priority Crossing



References

- Caltrans. California Highway Design Manual (CAHDM). 2015.
- Caltrans. California Manual on Uniform Traffic Control Devices (CAMUTCD). 2014.
- ITE. Pavement Marking Patterns Used at Uncontrolled Pedestrian Crossings. 2010.
- Mitman, M.F., Ragland, D.R., and C.V. Zegeer. The Marked Crosswalk Dilemma: Uncovering Some Missing Links in a 35-Year Debate. 2008.
- Knoblauch, R., M. Nitzburg, and R. Seifert. Pedestrian Crosswalk Case Studies. 2001.
- Zeeger, C., J. Stewart, and H. Huang. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations. 2001.
- NDOT. Standard Specifications for Road and Bridge Construction. 2014.

Cost

- Striped crosswalks costs range from approximately $100 to 2,100 each.
- Curb extension costs can range from $2,000 to $20,000 depending on the design and site condition.
- Rapid flash beacons costs can range from $15,000 to $60,000 depending on the number of beacons.

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ON-STREET BICYCLE FACILITY DESIGN

ON-STREET BICYCLE FACILITY DESIGN

BICYCLE BOULEVARD

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming, traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

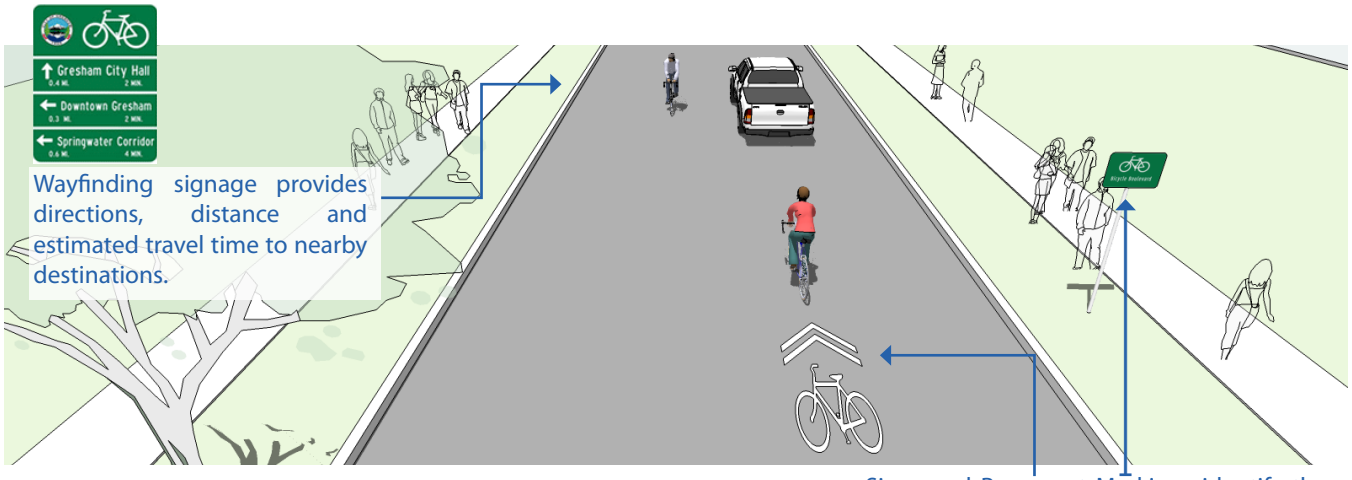
Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety. Traffic calming can deter motorists from driving on a street, increasing safety for active transportation. Anticipate and monitor vehicle volumes to determine whether traffic calming results in the displacement of traffic volumes to adjacent residential streets. Traffic calming can be implemented on a trial basis.

This treatment is appropriate for school zones.

Design Summary

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 20 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes are under 1,000.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.



References

- Alta Planning + Design and IBPI. Bicycle Boulevard Planning and Design Handbook. 2009.
- FHWA. BikeSafe Bicycle Countermeasure Selection System. 2014.
- NACTO. Urban Bikeway Design Guide. 2012.
- Reid Ewing and Steven Brown. US Traffic Calming Manual. 2009.

Cost

- Bike Boulevard: $1,000-$40,000 per mile (assumes no major renovation is required)
- Bike Boulevard: $150,000-$300,000 (assuming moderate to major roadway renovation)

ON-STREET BICYCLE FACILITY DESIGN

SHOULDER BIKEWAY

Paved shoulders on rural arterials and state highways can offer a functional option to the installation of bicycle lanes when bicycle lanes are not possible. Major intersection designs should still have bicycle pockets (if applicable) and other treatments to make bicycle travel safer and more visible.

Design Summary

Shoulder Width:

Shoulder width should be 4 feet wide minimum (in addition to a gutter pan, if present) to accommodate a shoulder bike route. Shoulder width of at least 5 feet is recommended when a guardrail, curb, or other roadside barrier is present to provide additional shy distance. If a rumble strip is present (such as on a state highway) it is recommended to include a skip (or gap) in the rumble strip to allow bicyclists to cross from the shoulder to the travel lane when encountering debris.

Sign Placement:

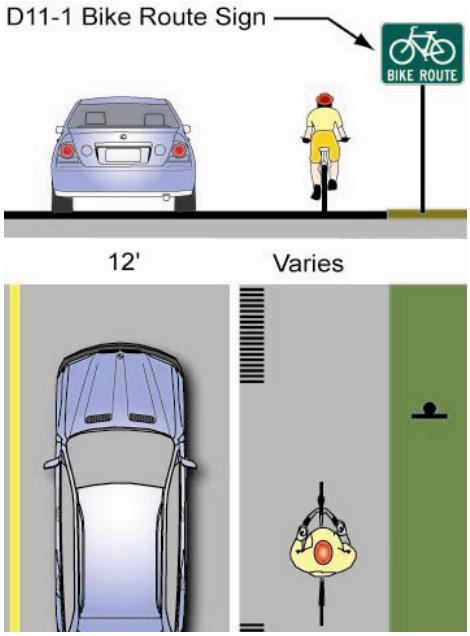
Bicycle Route signage should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

References

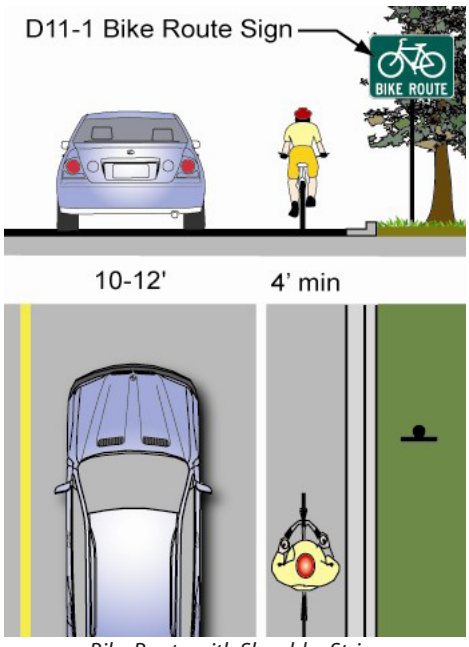
- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Route signs with Shoulder Stripe: $5,000 - $10,000 per mile (assumes no major renovation is required)
- Rumble Strip: $0.10 to $0.50 per linear foot



Bike Route with Wide Shoulder and Bicycle Friendly Rumble Strip



Bike Route with Shoulder Stripe

SHARED LANE MARKINGS (SHARROWS)

Shared Lane Markings (also called "Sharrows") are used as an additional treatment for shared roadway facilities. The stencil can serve a number of purposes, such as making motorists aware of the need to share the road with bicyclists, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to avoid "dooring" collisions.

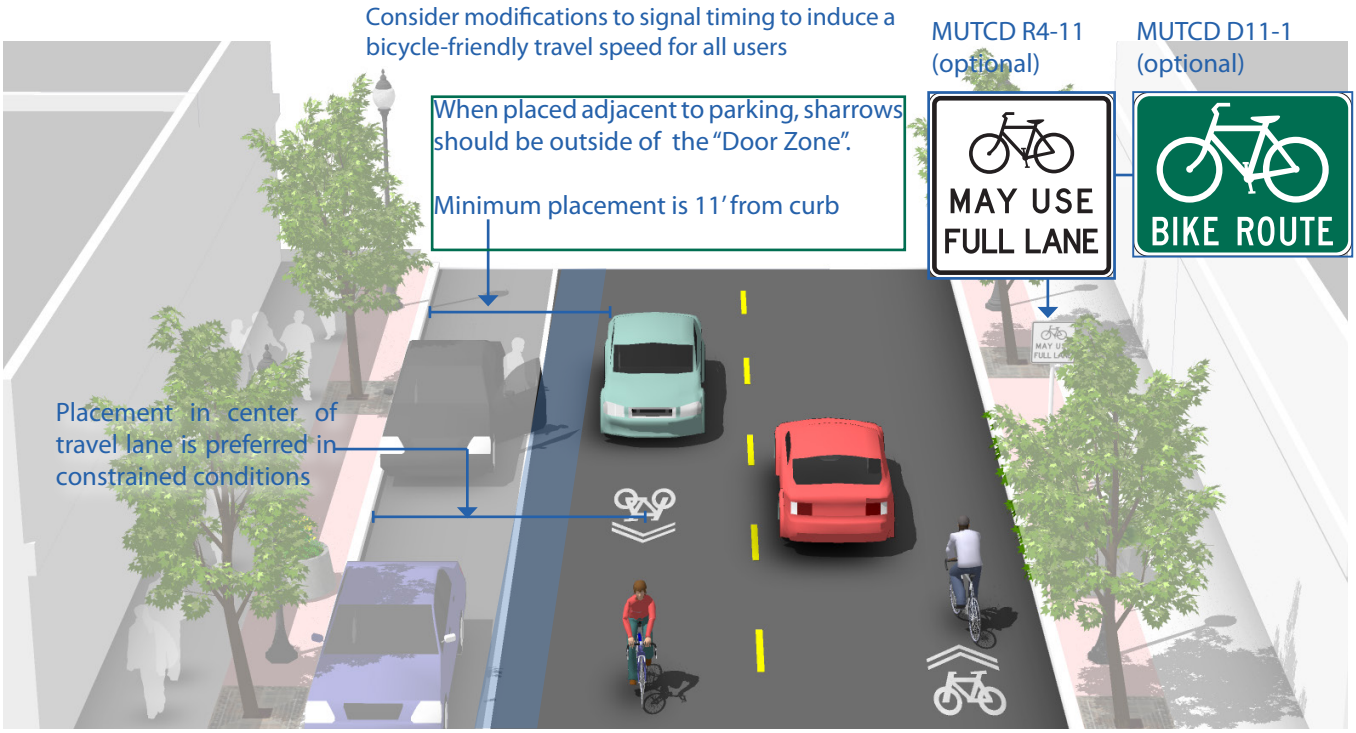
Discussion

Shared lane markings are not appropriate on paved shoulders or in bike lanes, and should not be used on roadways that have a speed limit above 35 mph. Markings should be placed immediately after intersections and spaced at 250 ft intervals thereafter. Though not always possible, placing the markings outside of vehicle tire tracks will increase the life of the markings and the long-term cost of the treatment.

Design Summary

Sign Placement:

Shared Lane Markings pair well with Bikes May Use Full Lane signs.



References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Shared Lane Marking application: $90 each

ON-STREET BICYCLE FACILITY DESIGN

BIKE LANE WITH NO ON-STREET PARKING

Recommended bicycle lane width is 5 feet minimum when adjacent to curb and gutter. Wider bicycle lanes are desirable in certain circumstances such as on higher speed arterials (45 mph+) where a wider bicycle lane can increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Bicycle lanes wider than 7 feet are not recommended.

Design Summary

Bike Lane Width:

4′ minimum when no gutter is present (rural road sections)

5′ minimum when adjacent to curb and gutter (3′ more than the gutter pan width if the gutter pan is greater than 2′)

Recommended Width:

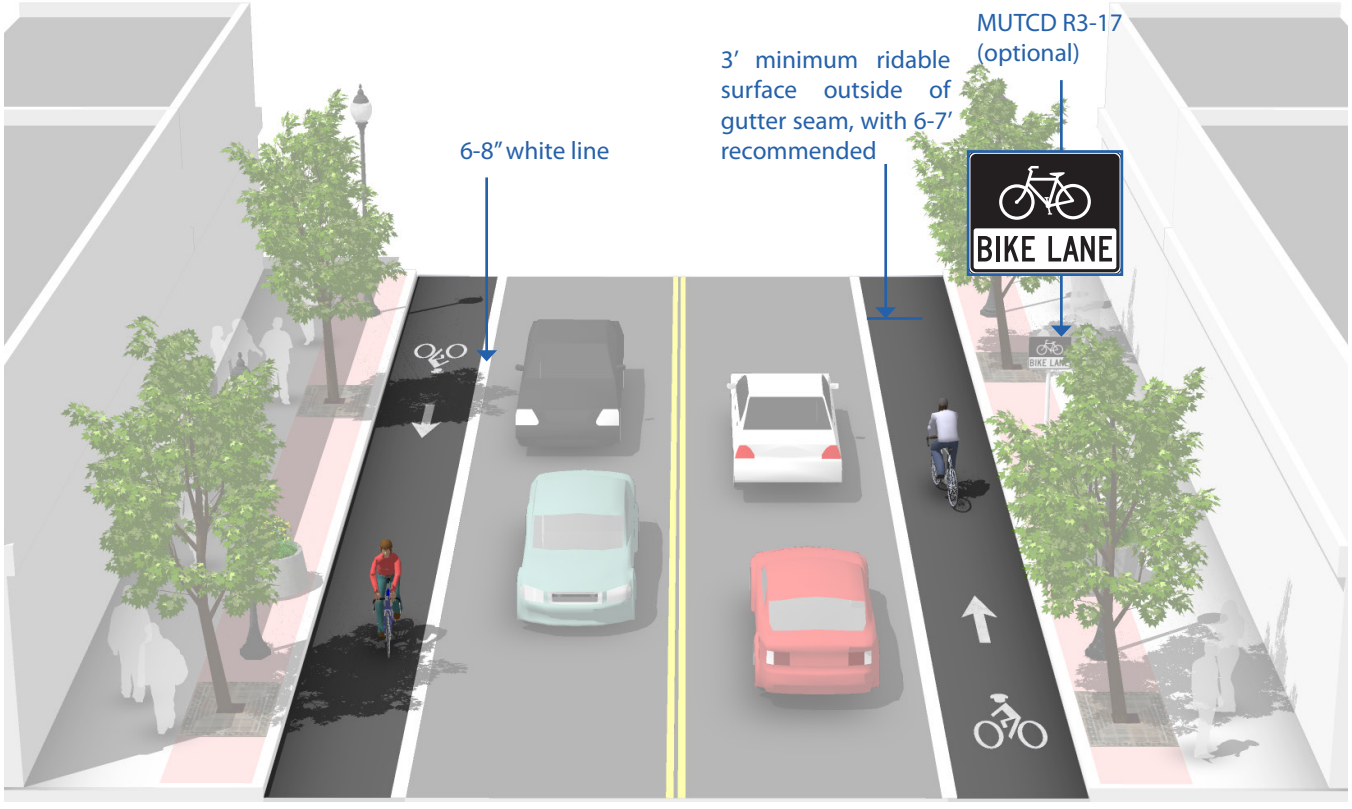
6-7′ where right-of-way allows, in areas of high bicycle use, or on high-speed, high-volume roadways (or with heavy truck volumes) where wider bicycle lanes provide additional lateral separation

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Lane: $5,000 - $10,000 per mile



ON-STREET BICYCLE FACILITY DESIGN

BIKE LANE WITH ON-STREET PARALLEL PARKING

Bike lanes adjacent to parallel parking should be designed to be wide enough to allow bicyclists to ride without conflicts with opening car doors.

Design Summary

Bike Lane Width:

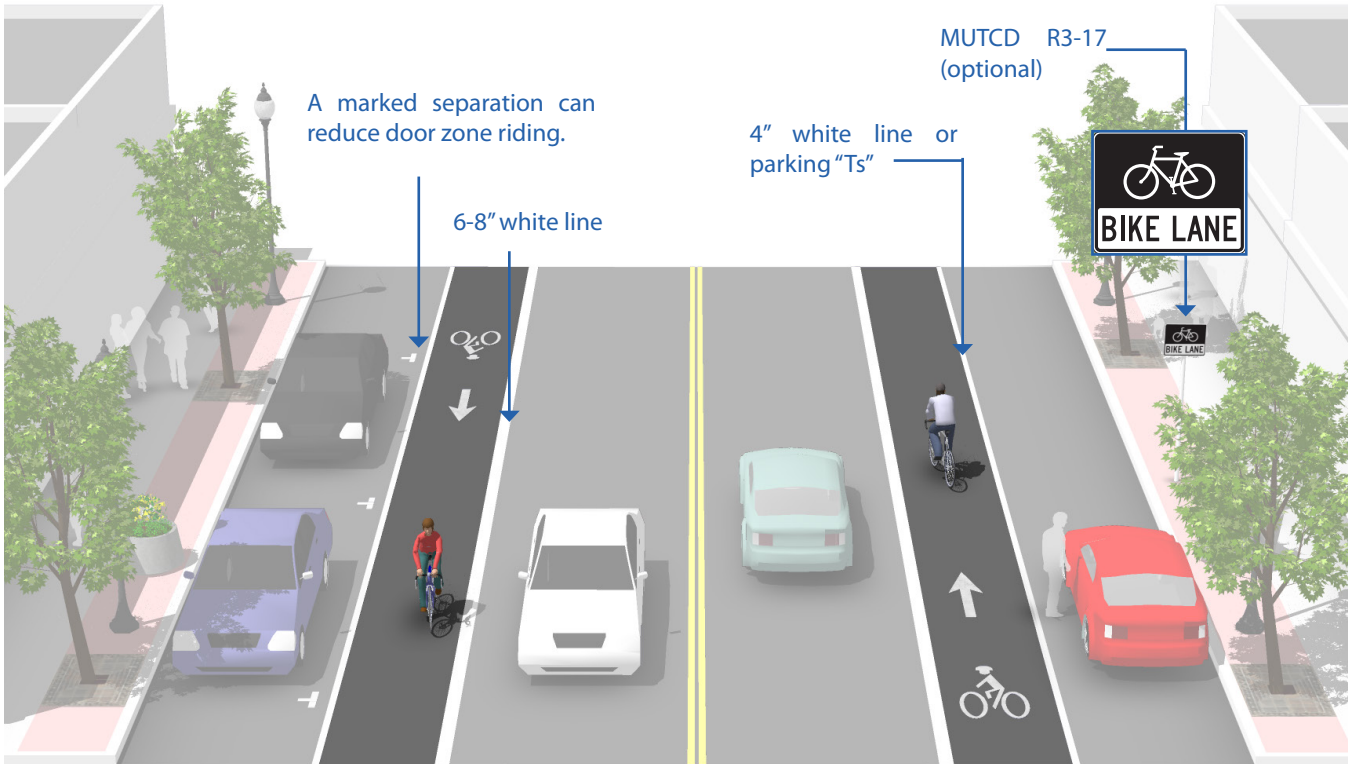
- 6-7 feet recommended to reduce dooring risk in areas with high parking turnover.
- 5 feet minimum recommended when parking stalls are marked
- If wider bike lanes are desired, configure as a buffered bike lane.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Bike Lane: $5,000 - $10,000 per mile



ON-STREET BICYCLE FACILITY DESIGN

BUFFERED BIKE LANE

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. Buffer striping is called Preferential Lane Longitudinal Markings in Section 3D.02 the MUTCD. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

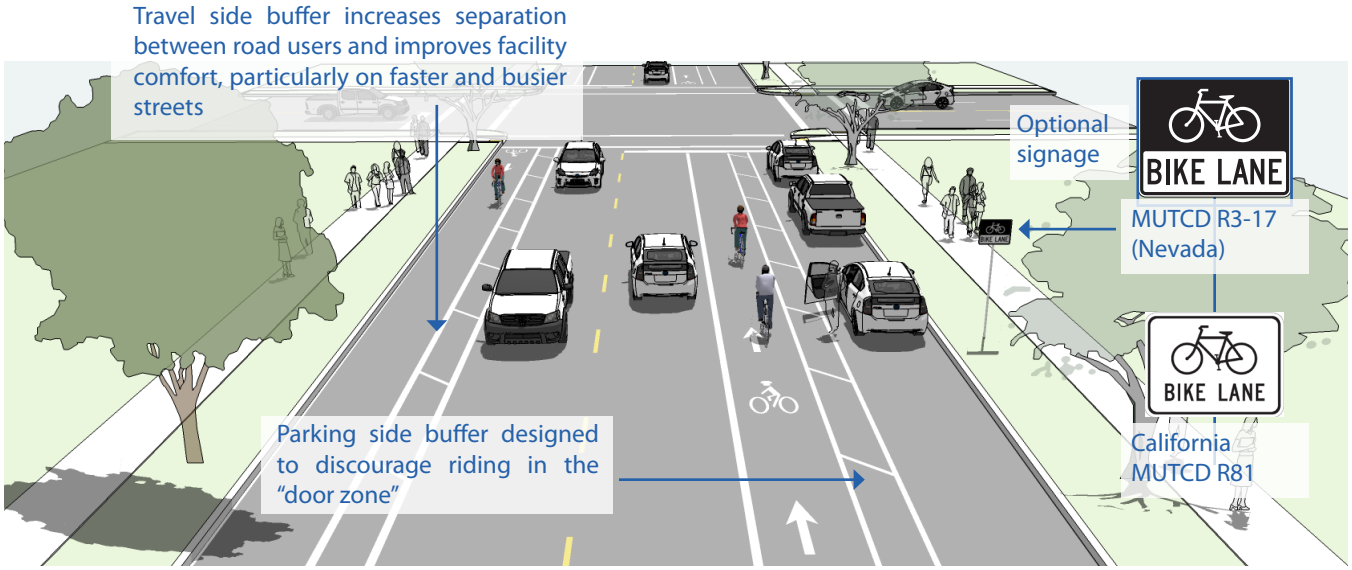
Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

This treatment is appropriate for school zones.

Design Summary

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.



References

- FHWA. Separated Bike Lane Planning and Design Guide. 2015.
- NACTO. Urban Bikeway Design Guide. 2012.
- Caltrans. MUTCD. 2014.

Cost

- Bike Lane: $5,000 - $10,000 per mile

ON-STREET BICYCLE FACILITY DESIGN

SEPARATED BIKEWAY (CYCLE TRACK)

Separated bikeways, also known as cycle tracks or protected bike lanes, are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of a conventional bike lane. They are physically separated from motor traffic and distinct from the sidewalk. Separated bikeways have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. Raised bike lanes may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the bike lane from the pedestrian space.

Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to separated bike lane design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the bike lane has priority over entering and exiting traffic.

Protection is provided through physical barriers and can include bollards, parking, a planter strip, an extruded curb, or on-street parking. Bike lanes using these protection elements typically share the same elevation as adjacent travel lanes. Raised cycle tracks may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the facility from the pedestrian area. **This treatment is appropriate for school zones.**

Design Summary

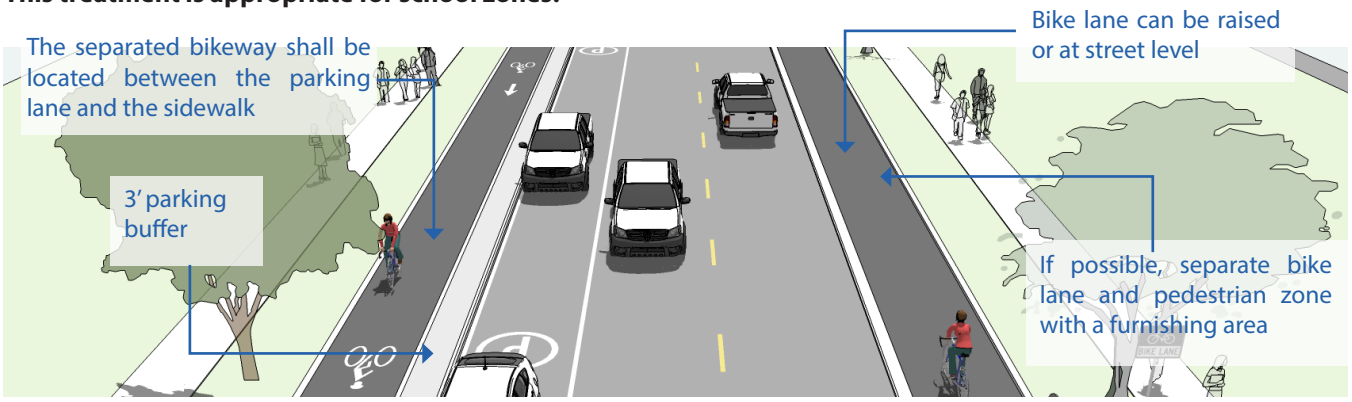
Separated bikeways should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

One-Way Separated Bike Lanes

- 7 foot recommended minimum to allow passing. 5 foot minimum width in constrained locations.

Two-Way Separated Bike Lanes

- Separated bike lanes located on one-way streets have fewer potential conflict areas than those on two-way streets.
- 12 foot recommended minimum for two-way facility. 8 foot minimum in constrained locations



References

- NACTO. Urban Bikeway Design Guide. 2012.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Cost

- Cost varies depending on design and site conditions.

ON-STREET BICYCLE FACILITY DESIGN

ADVISORY BIKE LANE

Advisory bicycle lanes (also called dashed bicycle lanes) provide a bicycle-priority space on a two-lane street too narrow for conventional bicycle lanes. Similar in appearance to bicycle lanes, advisory bicycle lanes are distinct in that they are temporarily shared with motor vehicles during head-on approaching maneuvers and turning movements. They are most appropriate on streets where there is no centerline, or on wide and rural residential streets.

Discussion

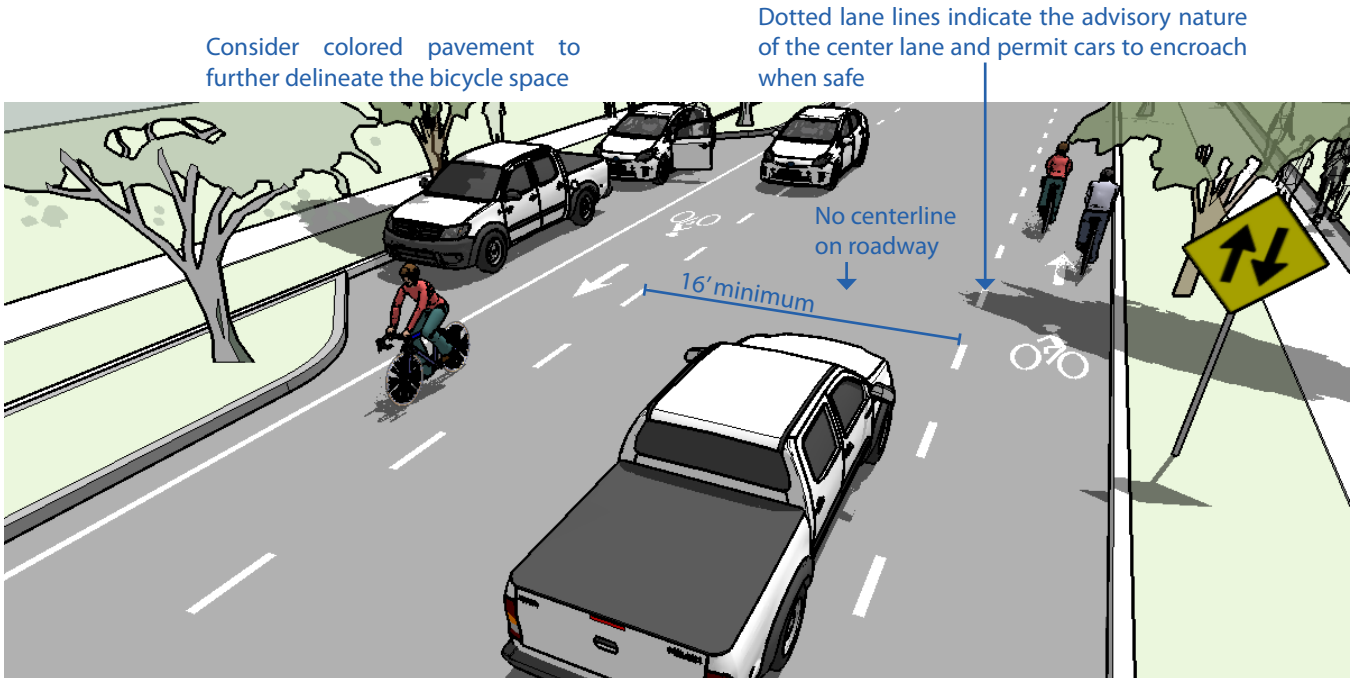
This treatment is considered experimental by FHWA and may require a *Request to Experiment* as described in section 1A.10 of the MUTCD. Specific design detail should conform to MUTCD and Ca-TCDC experimentation requirements.

Consider the use of colored pavement within the advisory bicycle lane area to discourage unnecessary encroachment by motorists or parked vehicles.

Design Summary

Advisory bike lanes should have the following characteristics:

- Motor vehicle traffic is <4000 motor vehicles per day (<2000 preferred).
- Advisory bike lane width of 5 to 7 ft.
- Recommended two-way motor vehicle travel lane width of 16 ft. Some installations have worked with center lane as narrow as 10 ft.



References

- City of Minneapolis. Request To Experiment. 2010.

Cost

- Bike Lane: $5,000-$10,000 per mile

ADDITIONAL BIKE ROUTE SIGNAGE

Signs may be used to raise awareness of the presence of bikes on the roadway beyond that of the conventional "Bike Route" sign. These signs are intended to reduce motor vehicle/bicyclist conflict and are appropriate to be placed on routes that lack paved shoulders or other bicycle facilities.

Discussion

In higher speed rural contexts, a bicycle warning sign (W11-1) paired with a legend plaque reading "ON ROADWAY" may clarify to motor vehicle drivers to expect bicyclists.

In more developed areas, "Bikes May Use Full Lane" (BMUFL) (R4-11) signs encourages bicyclists to take the lane when the lane is too narrow. They typically work best when placed near activity centers such as schools, shopping centers and other destinations that attract bicycle traffic.

A study by researchers at North Carolina State University concluded that the BMUFL sign achieves greater clarity of understanding than the "Share the Road" (W16-1P) plaque often used in similar situations.

Study responses indicated a lack of awareness of the meaning of the Share the Road plaque. Due to this lack of public understanding and lack of support by local bicycle groups, at least one state DOT has discontinued use of the Share The Road plaque. (DelDOT, Memorandum: Bicycle Warning Sign and Share the Road Plaque. November 2013)

Dedicated bicycle facilities are recommended for roadways with speed limits above 35 mph where the need for bicycle access exists.

W11-1 with custom "ON ROADWAY" legend plaque. Under MUTCD 2C.03 P04, a state or local road agency is permitted to use word messages on warning signs other than those shown in the MUTCD.

R4-11

Design Summary

- Use with travel lanes less than 14 feet wide, which are too narrow for safe passing within the lane.
- Signs should be placed at regular intervals along routes with no designated bicycle facilities.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- Hess G, Peterson MN (2015) "Bicycles May Use Full Lane" Signage Communicates U.S. Roadway Rules and Increases Perception of Safety.

Cost

- Sign, regulation: $150 each

MANHOLES AND DRAINAGE GATES

Utility infrastructure within the roadway can present significant hazards to bicyclists. Manholes, water valve covers, drain inlets and other obstructions can present an abrupt change in level, or present a situation where the bicyclist's tire could become stuck, potentially causing a collision. Every effort should be made to avoid placing these hazards within the likely travel path of bicyclists on new roadway construction.

Discussion

For existing roadways, the roadway surface can be ground down around the manhole or drainage grate to be no more than half an inch of vertical drop. When roadways undergo overlays, this step is often omitted and significant elevation differences can result in hazardous conditions for bicyclists.

Bicycle drainage grates should not have longitudinal slats that can catch a bicycle tire and potentially cause a crash. Acceptable grate designs are presented (top right) as A: patterned, B: transverse grate, or C: modified longitudinal with no more than 6" between transverse supports). Type C is the least desirable as it could still cause problems with some bicycle tires.

The drop in-inlet shown to the right avoids all issues with grates in the bicyclists' line of travel. However, these drainage inlets are less efficient than grate inlets, and therefore require installing more closely spaced inlets, much longer inlets and perhaps supplemental means of capturing runoff. For this reason TRPA does not recommend replacing existing grate inlets with drop-in inlets, and suggests agencies weigh the additional costs of drop-in inlets in new construction with the possible benefits.

The MUTCD recommends providing a diagonal solid white line for hazards or obstructions in bikeways (see right).

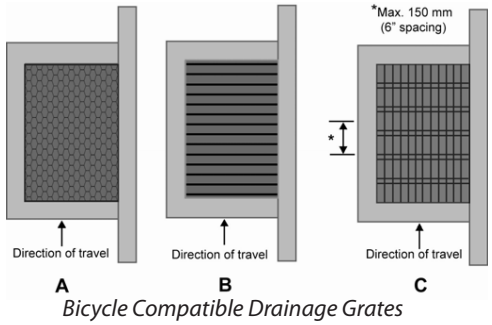
References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- NDOT Standard Plans for Road and Bridge Construction.
- NDOT Standard Specifications for Road and Bridge Construction.

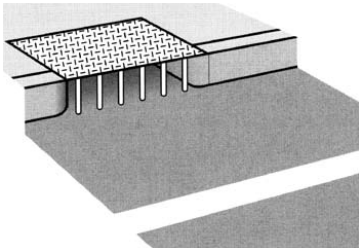
Design Summary

Placement:

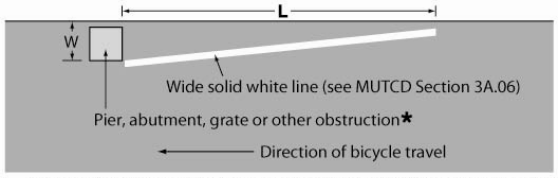
Manholes should be placed outside of any bike lanes. Drainage grates should be of one of the types below.



Bicycle Compatible Drainage Grates



Drop-in inlet flush with in the curb face (Oregon DOT)
(Not approved for use on California Highways)



L = WS, where W is the offset in feet and S is bicycle approach speed in mph

★ Provide an additional foot of offset for a raised obstruction and use the formula L= (W+1) S for the taper length

Figure 9C-8B (National MUTCD)

Cost

- Striping: $2 per linear foot
- Drainage grate: $500

BICYCLE ACCESS DURING CONSTRUCTION ACTIVITIES

When construction impedes a bicycle facility, the provision for bicycle access shall be developed during the construction project planning. Long detour routing should be avoided because of lack of compliance. Where there is no detour, provide for passage of bicyclists through or adjacent to the construction area, with signage or other indication of where cyclists should go.

Discussion

Advance warning of the detour should be placed at appropriate locations and clear wayfinding should be implemented to enable bicyclists to continue safe operation along travel corridor. Traffic control signs should not be placed within bike lanes or road shoulders.

Design Summary

Construction Detour Signs:

Detours should be adequately marked with standard temporary route and destination signs (M409a and M4-9c).

The Pedestrian/Bicycle Detour sign should have an arrow pointing in the appropriate direction.

National MUTCD

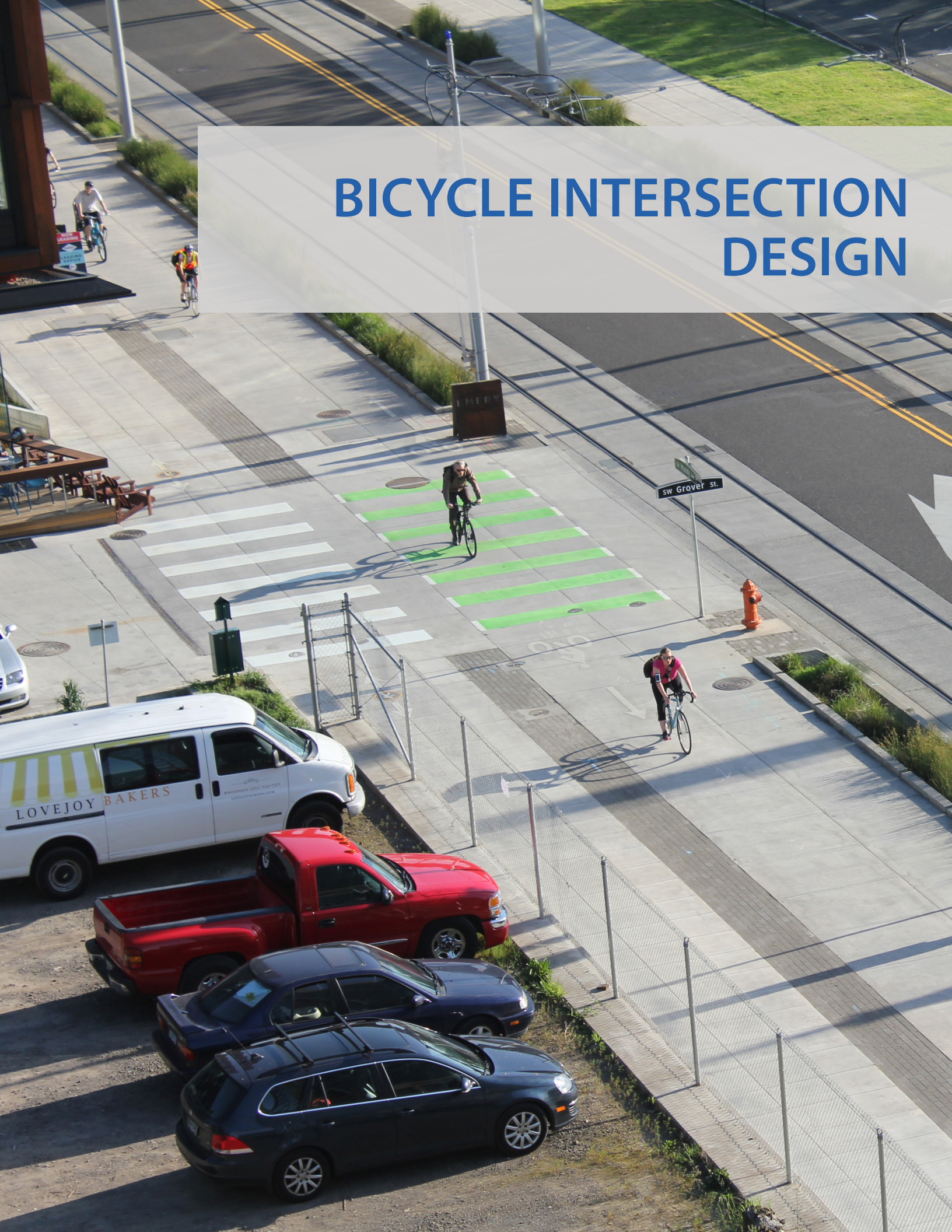
References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.

Cost

- Sign, regulation: $150 each

BICYCLE INTERSECTION DESIGN



BICYCLE DETECTION AT SIGNALIZED INTERSECTIONS

Proper bicycle detection should meet two primary criteria: 1) accurately detects bicyclists and 2) provides clear guidance to bicyclists on how to actuate detection (e.g., what button to push, where to stand). Bicycle loops and other detection mechanisms can also provide bicyclists with an extended green time before the main signal turns green.

Discussion

Push Button Actuation

User-activated button mounted on a pole facing the street.

Loop Detectors

Bicycle-activated loop detectors are installed within the roadway to allow the presence of a bicycle to trigger a change in the traffic signal. This allows the bicyclist to stay within the lane of travel without having to maneuver to the side of the road to trigger a push button.

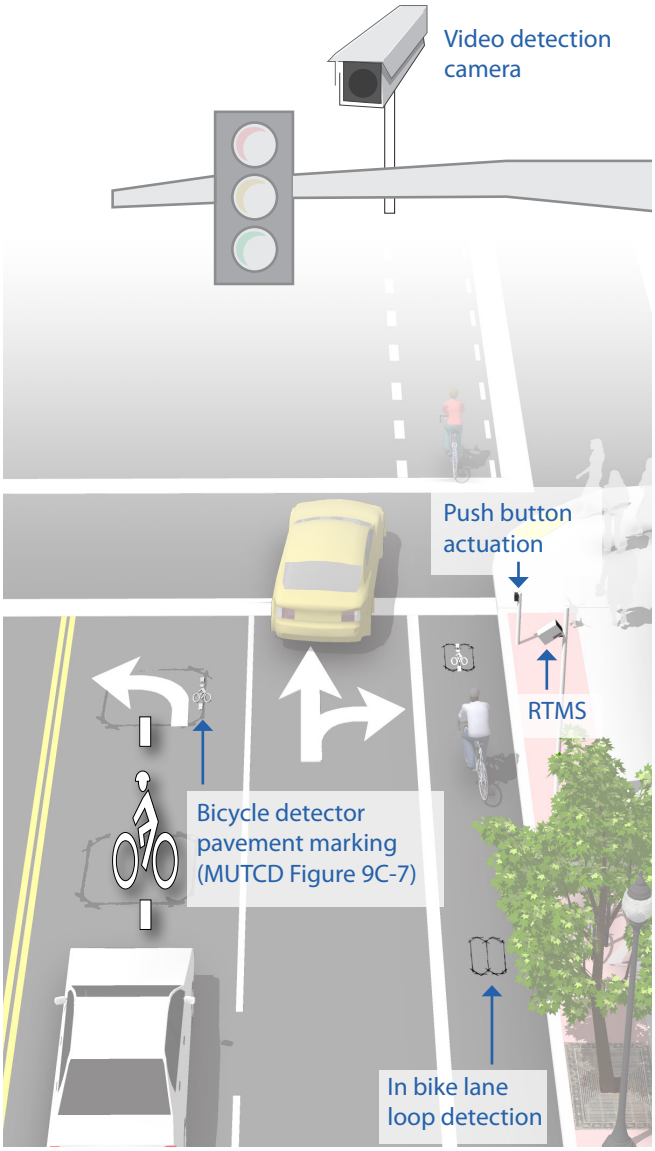
Loops that are sensitive enough to detect bicycles should be supplemented with pavement markings to instruct bicyclists how to trip them.

Video Detection Cameras

Video detection systems use digital image processing to detect a change in the image at a location. These systems can be calibrated to detect bicycles. Video camera system costs range from $20,000 to $25,000 per intersection.

Remote Traffic Microwave Sensor Detection (RTMS)

RTMS is a system which uses frequency modulated continuous wave radio signals to detect objects in the roadway. This method marks the detected object with a time code to determine its distance from the sensor. The RTMS system is unaffected by temperature and lighting, which can affect standard video detection.



References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Bicycle Loop Detector: $1,000-$2,500 each

LOOP DETECTOR PAVEMENT MARKINGS AND SIGNAGE

Bicycle Detector Pavement Markings guide bicyclists to position themselves at an intersection to trigger signal actuation. The CA MUTCD has a different recommended configuration for these pavement markings that the National MUTCD. Frequently these pavement markings are accompanied by signage that can provide additional guidance (see below).

Design Summary

Locate Bicycle Detector Pavement Marking over center of quadrupole loop detector if in bike lane, or where bicycle can be detected in a shared lane by loop detector or other detection technology.

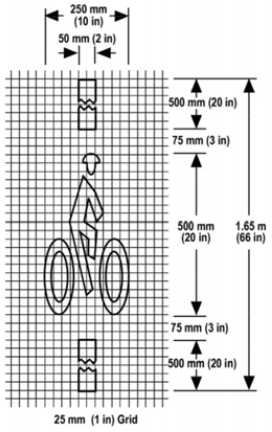


Figure 9C-7 - CAMUTCD

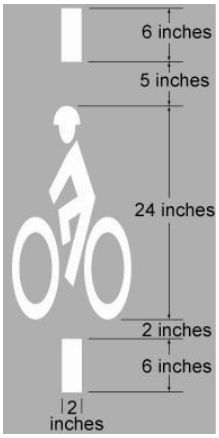


Figure 9C-7 - National MUTCD

Accompanying Signage (R10-22)

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- Caltrans. Standard Plans ES-5B. 2010.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Cost

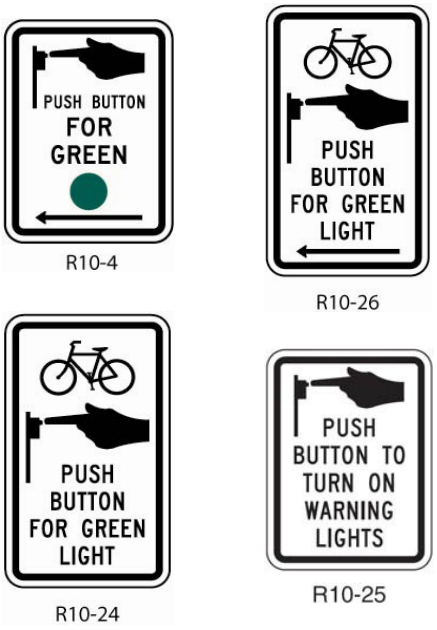
- Bicycle -> Loop -> Detector, -> Install -> stencils: -> $100per intersection leg

BICYCLE PUSH BUTTONS

Bicycle push buttons can also provide signal actuation and timing adjustments for bicyclists. Push buttons are recommended for use with shared-use paths or other unique interactions with bicycle facilities. Push buttons are generally unsuitable for conventional bike lane situations as the bicyclist would have to leave the roadway to activate the signal. An acceptable situation exists where a push button can be located closer to the bike lane if no vehicle right turn lane is present so that the bicyclist does not have to dismount to reach the signal.

Design Summary

- Bicycle push buttons may be used where a push button detector has been installed exclusively to activate a green phase for bicyclists.
- The R10-4, R10-24, R10-25, R10-26 and R62C signs should be installed near the edge of the sidewalk, in the vicinity of where bicyclists will be crossing the street.



2009 National MUTCD

R62C (California Only) sign

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Cost

- Push Button: $600-$1,390 each

BICYCLE SIGNAL PHASE

Protected bicycle lane crossings of signalized intersections can be accomplished through the use of a bicycle signal phase which reduces conflicts with motor vehicles by separating bicycle movements from any conflicting motor vehicle movements. Bicycle signals are traditional three lens signal heads with green, yellow and red bicycle stenciled lenses.

Discussion

A bicycle signal should be considered for use only when the volume/collision or volume/geometric warrants have been met. (CAMUTCD 4C.102)

FHWA has approved bicycle signals for use, if they comply with requirements from Interim Approval 16 (I.A. 16).

Bicyclists typically need more time to travel through an intersection than motor vehicles. Green light times should be determined using the bicycle crossing time for standing bicycles.

Design Summary

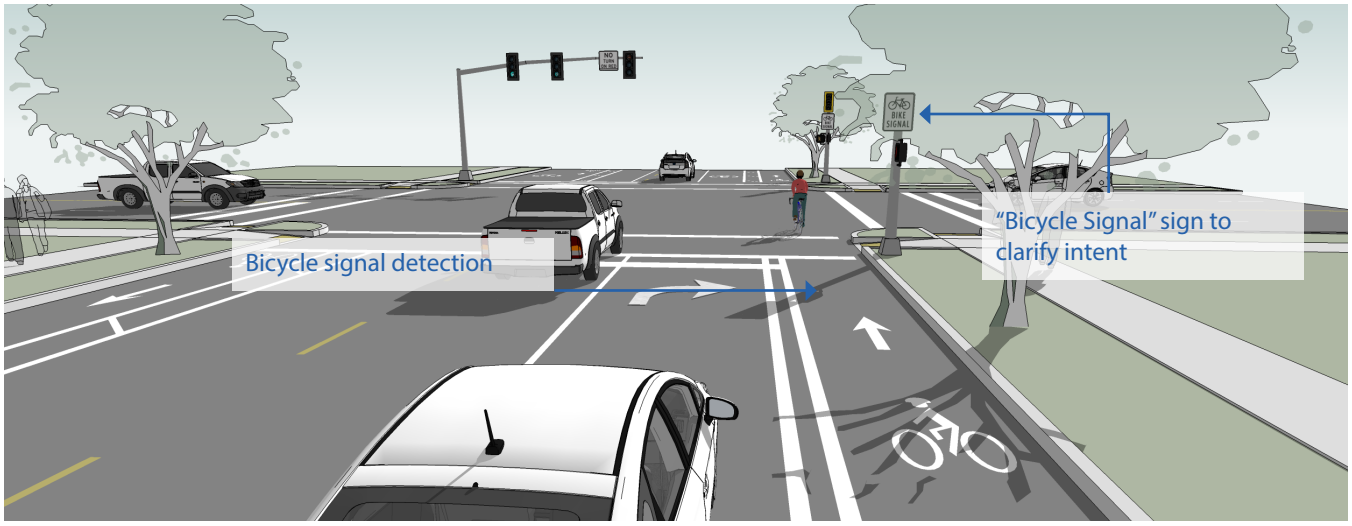
Application:

Bicyclists moving on a green or yellow signal indication in a bicycle signal shall not be in conflict with any simultaneous motor vehicle movement at the signalized location

Design:

An additional "Bicycle Signal" sign should be installed below the bicycle signal head.

Designs for bicycles at signalized crossings should allow bicyclists to trigger signals and safely maneuver the crossing.



References

- FHWA. Interim Approval for Optional Use of a Bicycle Signal Face (IA-16). 2013.

Cost

- Bicycle signal heads have an average cost of $12,800.
- Video detection camera system costs range from $20,000 to $25,000 per intersection.

BICYCLE INTERSECTION DESIGN

BIKE BOX

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

Discussion

Bike boxes are considered experimental by the FHWA. They should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

References

- NACTO. Urban Bikeway Design Guide. 2012.

Application of green pavement coloring addressed in:

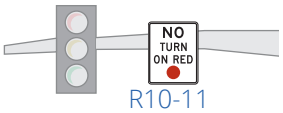
- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

Design Summary

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.



R10-11

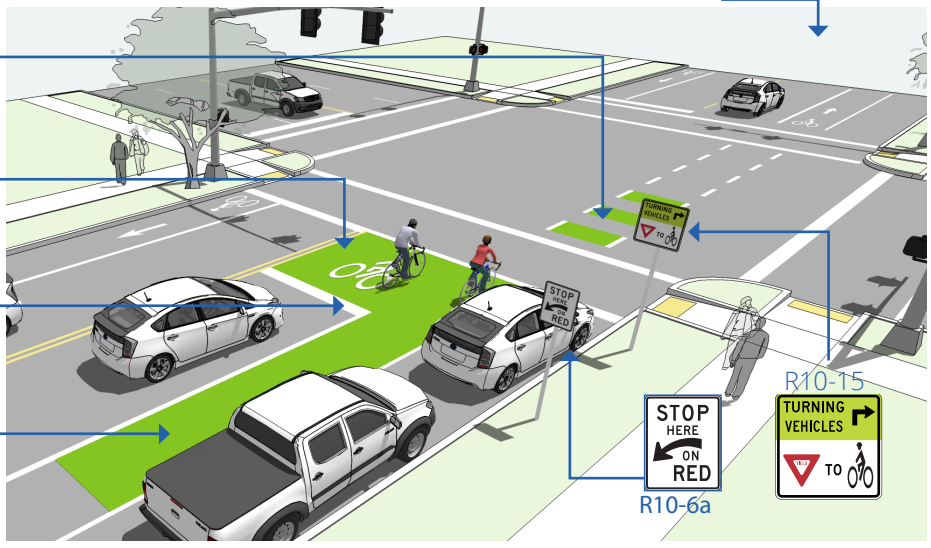
No Turn on Red restriction for motorists

May be combined with intersection crossing markings and colored bike lanes in conflict areas

Colored pavement can be used in the box for increased visibility

Wide stop lines used for increased visibility

If used, colored pavement should extend 50' from the intersection



R10-15

R10-6a

TWO-STAGE LEFT TURN BOX

Two-stage turn boxes offer bicyclists a safe way to make turns at multi-lane signalized intersections from a separated or conventional bike lane, as an alternative to making a vehicular left turn by "taking the lane". On high-speed, high-volume streets, bicyclists are often unable to merge into traffic to turn making the provision of two-stage left turn boxes critical. Design guidance for two-stage turns apply to both conventional and separated bike lanes.

Discussion

Two-Stage turn boxes are considered experimental by FHWA. While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through street, followed by one for the cross street) before proceeding.

References

- NACTO. Urban Bikeway Design Guide. 2012.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

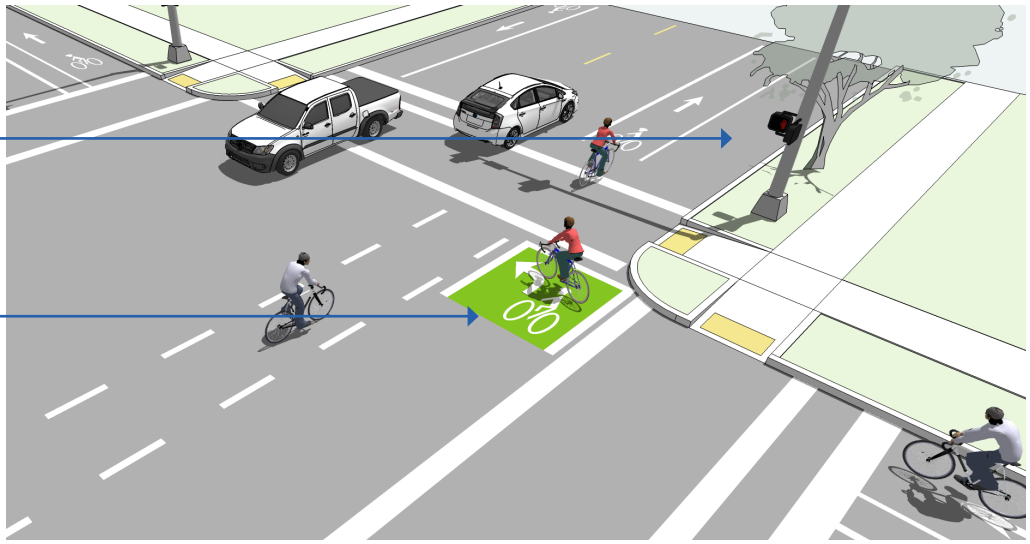
Design Summary

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or separated bike lane buffer area.
- 6' minimum depth of bicycle storage area
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed on the cross street to prevent vehicles from entering the turn box.

Turns from cycle tracks may be protected by a parking lane or other physical buffer

Turns from a bicycle lane may be protected by an adjacent parking lane or crosswalk setback space.

Consider using colored pavement inside the box to further define the bicycle space



BIKE LANE AT INTERSECTION WITH RIGHT TURN ONLY LANE

The appropriate treatment at right turn only lanes is to introduce an added turn lane to the outside of the bicycle lane. The area where people driving must weave across the bicycle lane should be marked with dotted lines and dotted green pavement to identify the potential conflict areas. Signage should indicate that motorists must yield to bicyclists through the conflict area.

Discussion

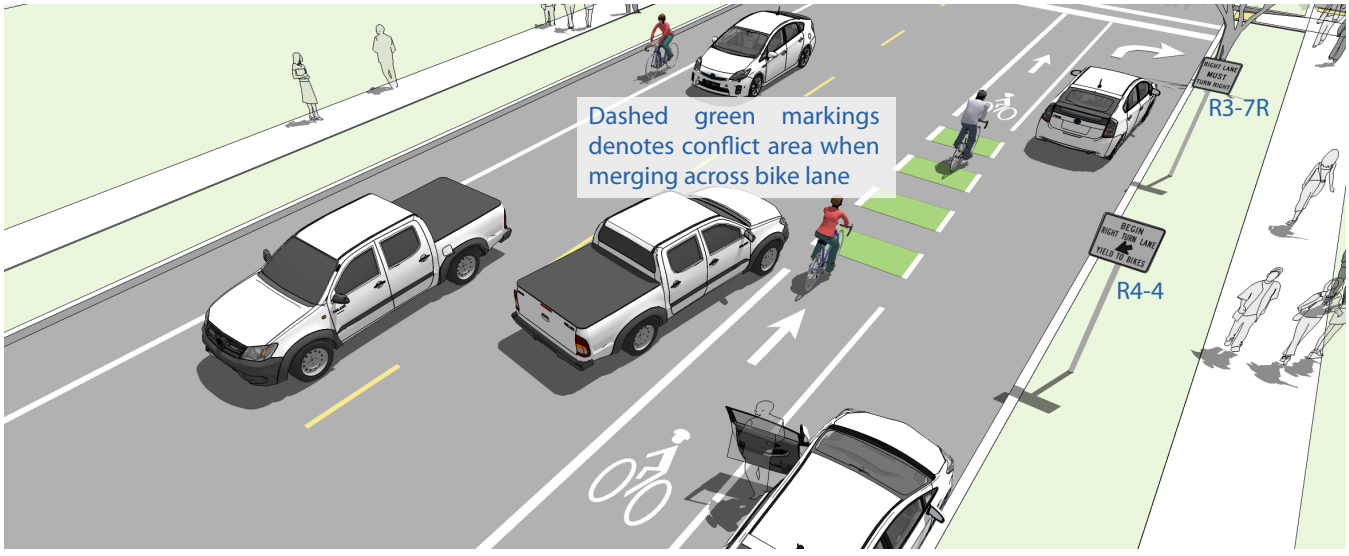
Maintaining a straight bicycle path reinforces the priority of bicyclists over turning cars. Drivers must yield to bicyclists before crossing the bike lane to enter the turn only lane.

The use of dual right-turn-only lanes should be avoided on streets with bike lanes (AASHTO, 2012). Where there are dual right-turn-only lanes, the bike lane should be placed to the left of both right-turn lanes, in the same manner as where there is just one right-turn-only lane.

Design Summary

Design details should emphasis that motorists should yield to bicyclists through the merge area. Travel lane width reductions may be required to achieve this design.

- Mark inside line with 6" stripe.
- Continue existing bike lane width; standard width of 5 to 6 feet (4 feet in constrained locations.)
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored markings in the conflict areas to promote visibility of the dashed weaving area.



References

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

COMBINED BIKE LANE/TURN LANE

The combined bike lane/turn lane places shared lane markings within a right turn only lane. A dotted line delineates the space for bicyclists and motorists within the shared lane. Where there isn't room for a conventional bicycle lane and turn lane, a combined bike/turn lane creates a combined lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. This treatment includes markings advising bicyclists of proper positioning within the lane and is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.

Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less). May not be appropriate for high-speed arterials or intersections with long right turn lanes.

References

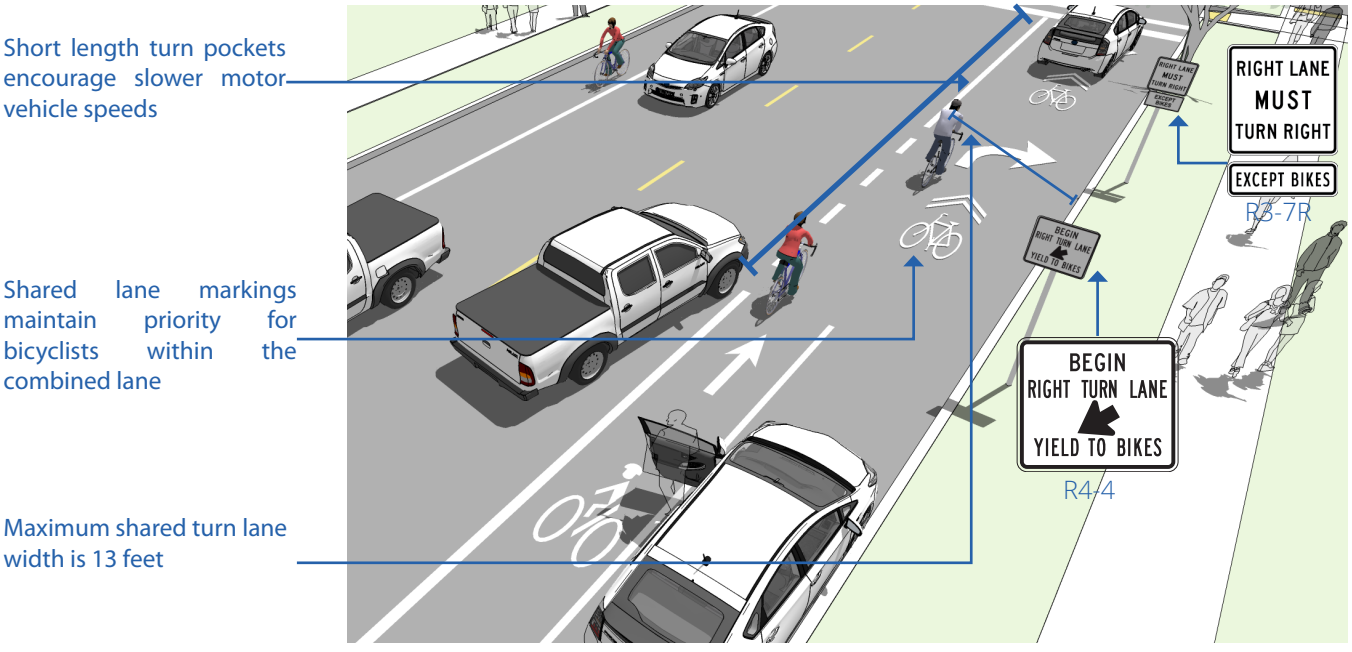
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Cost varies depending on design and site conditions.

Design Summary

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.



INTERSECTION DESIGN

BIKE LANE AT DROP LANE

When a through lane transitions directly into a right turn only lane, bicyclists traveling in a curbside bike lane must move laterally to the left of the right turn lane. Designers should provide the opportunity for bicyclists to accept gaps in traffic and control the transition.

Discussion

This treatment is used on streets with curbside bike lanes where a moderate-high speed (≥30 mph) through travel lane transitions into a right turn only lane. Right turn only drop lanes should be avoided where possible.

This treatment functions for skilled riders, but is not appropriate for riders of all ages and abilities. The design should not suggests to bicyclists that they do not need to yield to motorists when moving laterally. This differs from added right turn lanes in important details:

- Do not use a R4-4-YIELD TO BIKES sign
- The bike lane line should not be striped diagonally across the travel lane (with or without colored pavement), as this inappropriately suggests to bicyclists that they do not need to yield to motorists when moving laterally.

Cost

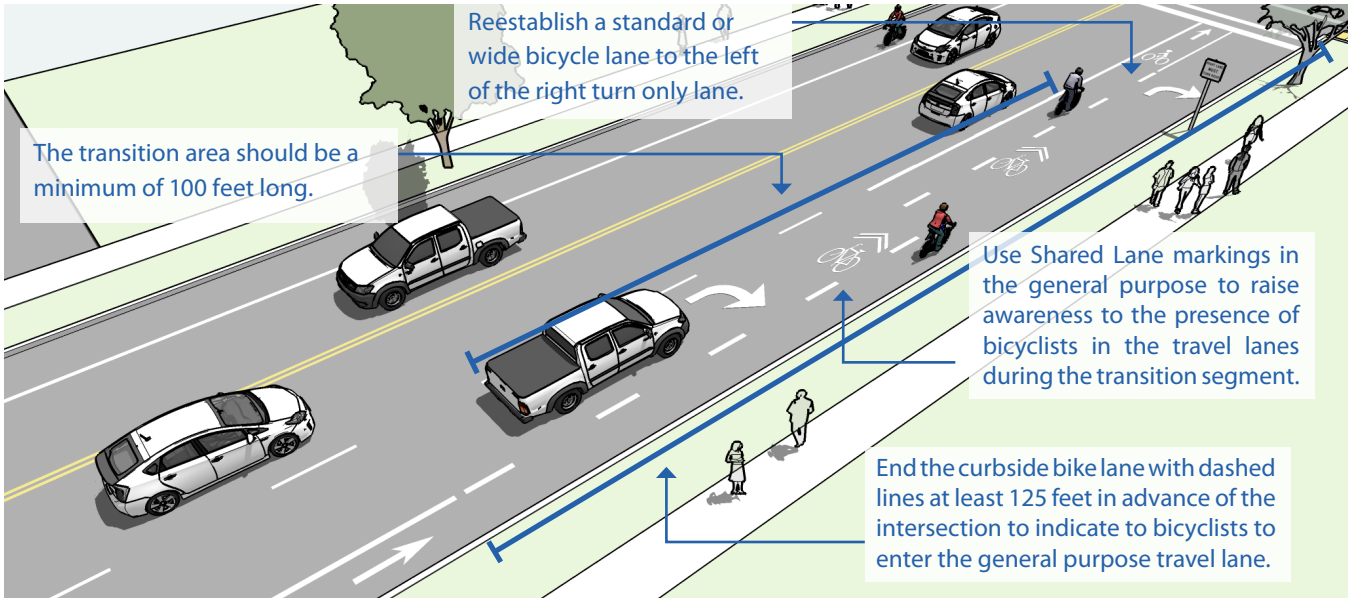
- Cost varies depending on design and site conditions.

Design Summary

- Maximum shared turn lane width is 13 feet; narrower is preferable.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.



SEPARATED BIKE LANE INTERSECTION APPROACHES

Separated bike lanes provide additional distance and physical barriers between the bike lane and adjacent travel lane. This separation requires careful design and consideration at intersections to encourage safe interactions.

Discussion

Intersection approach designs depend on available right-of-way, turn lane configuration and bike lane separation distance.

Designs consist of one of the following concepts:

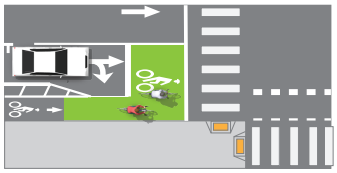
- Exclusive right turn only lanes
- Adjacent shared through/right turn lanes

Signal phasing may have significant impacts on the safety and efficiency of intersections. Where possible, offer protected left-turn signal phases to remove left-hook conflicts. Where right turn volumes are high, consider an exclusive right turn lane and protected right turn signal phase to separate conflicting movements with bicyclists.

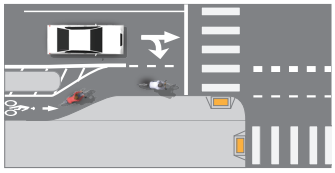
Design Summary

All design approaches use the following principles:

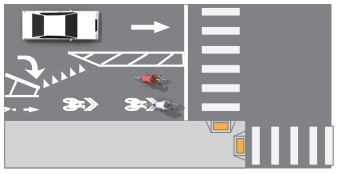
- Increase awareness – Use color, signs and other markings to indicate potential conflict points.
- Raise conspicuity – align the bike lane and remove visual obstruction so that drivers can see bicyclists.
- Isolate conflicts – Focus bicyclists and motor vehicle interactions at specific locations to simplify user expectations.
- Assign priority – In ambiguous situations, clarify who has responsibility to yield.



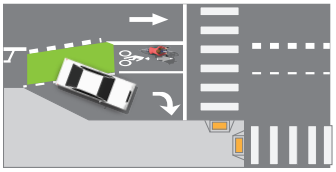
Bike Lane/Bike Box



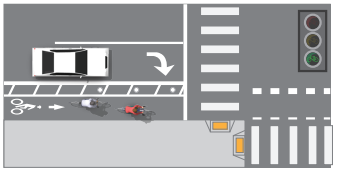
Bend-In



Mixing Zone



Through Bike Lane



Bicycle Signal Phase

References

- NACTO. Urban Bikeway Design Guide. 2012.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Application of green pavement coloring addressed in:

- FHWA. Interim Approval (IA-14). 2014.

Cost

- Cost varies depending on design and site conditions.

BICYCLE INTERSECTION DESIGN

SINGLE LANE ROUNDABOUTS

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

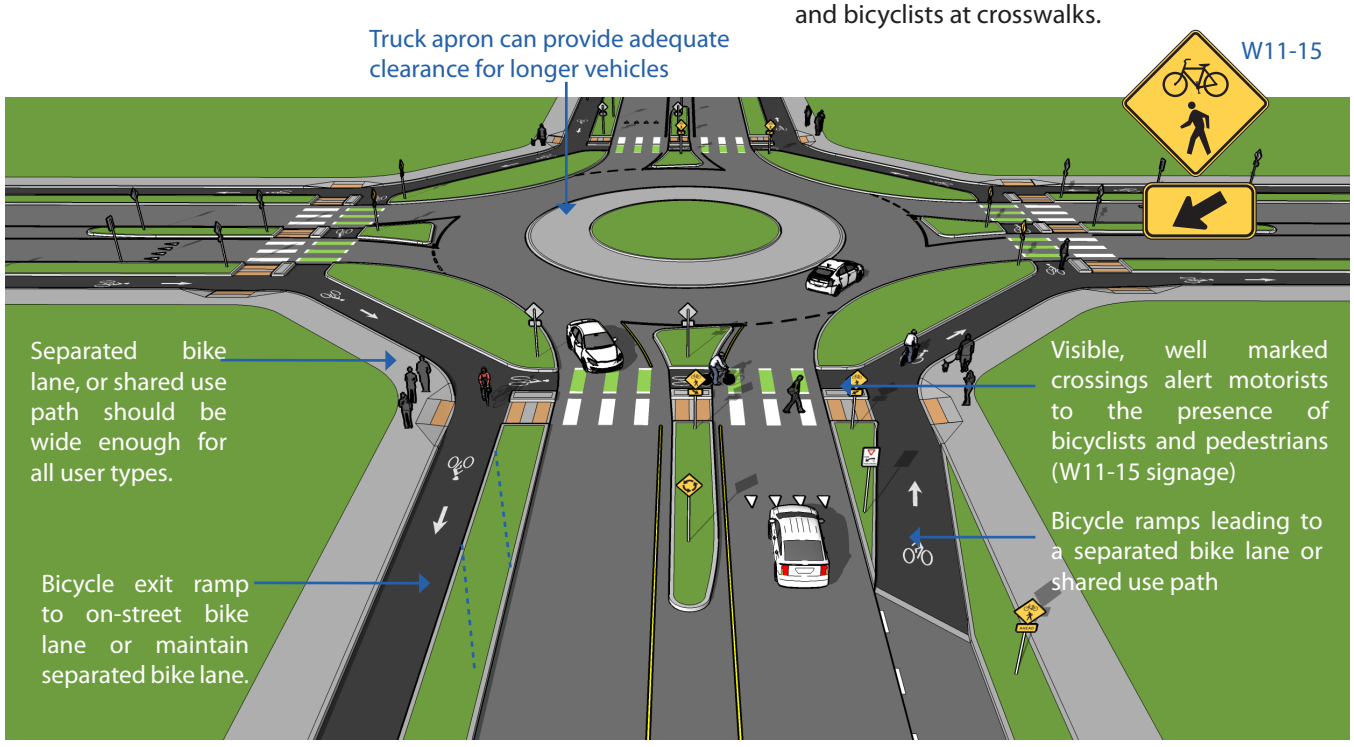
Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

While some bicyclists will operate within the roadway, provide separated facilities for bicyclists who prefer not to navigate in mixed traffic.

Design Summary

- Design approaches/exits to the lowest speeds possible. 10-15 mph preferred with 25 mph maximum circulating design speed.
- Allow bicyclist to exit the roadway onto a separated bike lane or shared use path that circulates around the roundabout.
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.



Guidance

- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- FHWA. Roundabouts: An Informational Guide. 2000.
- TRB. Roundabouts: An Informational Guide, Second Edition. NCHRP 672. 2010.

Cost

- Roundabouts cost $250,000 - $500,000 depending on the size, site conditions, and right-of-way acquisitions. Roundabouts usually have lower ongoing maintenance costs than traffic signals, depending on whether the roundabout is landscaped.

PROTECTED INTERSECTIONS

A protected intersection uses a collection of intersection design elements to maximize user comfort within the intersection and promote a high rate of motorists yielding to people bicycling. The design maintains a physical separation within the intersection to define the turning paths of motor vehicles, slow vehicle turning speed, and offer a comfortable place for people bicycling to wait at a red signal.

Discussion

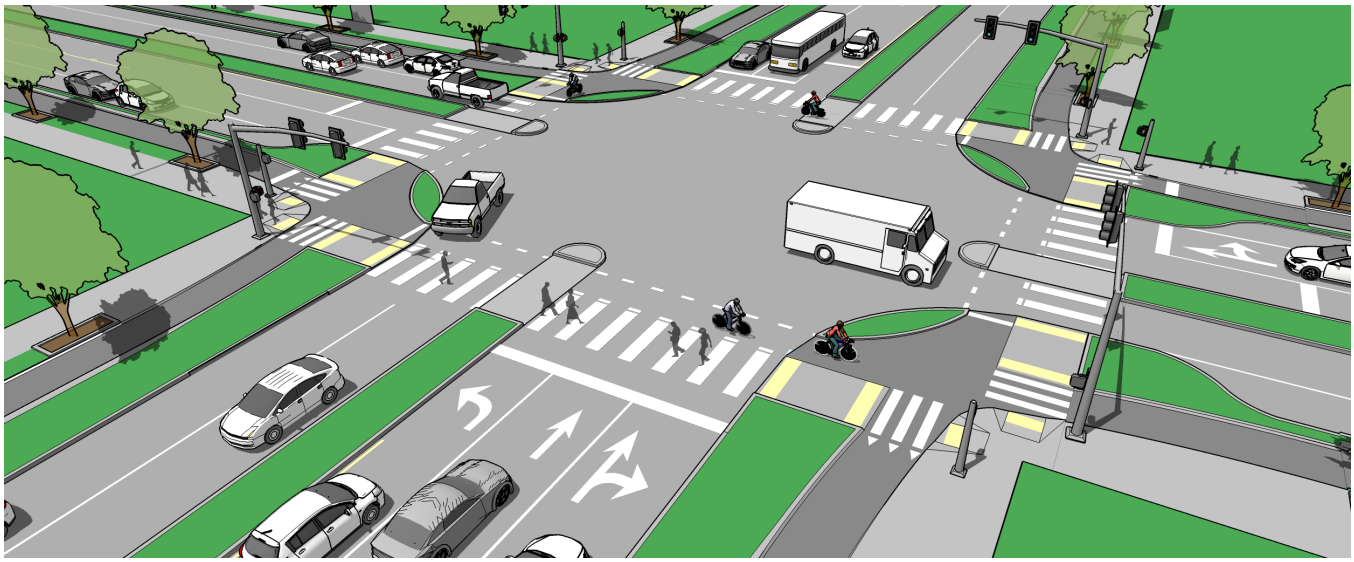
Protected intersections are included in the 2015 Caltrans DIB 89.

Colored pavement may be used within the corner refuge area to clarify use by people bicycling and discourage use by people walking or driving.

Intersection approaches with high volumes of right turning vehicles should provide a dedicated right turn only lane paired with a protected signal phase. Protected signal phasing may allow different design dimensions than are described here.

Design Summary

- Setback bicycle crossing of 16.5 feet allows for one passenger car to queue while yielding. Smaller setback distance is possible in slow-speed, space constrained conditions.
- Corner safety island with a 15-20 foot corner radius slows motor vehicle speeds. Larger radius designs may be possible when paired with a deeper setback or a protected signal phase, or small mountable aprons.
- Intersection crossing markings should be used.



References

- Caltrans. DIB 89: Class IV Bikeway Guidance.2015.
- FHWA. Separated Bike Lane Planning and Design Guide. 2015.
- MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

Cost

- Reconstruction costs comparable to a full intersection.
- Retrofit implementation may be possible at lower costs if existing curbs and drainage are maintained.

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PEDESTRIAN FACILITY DESIGN

PEDESTRIAN FACILITY DESIGN

SIDEWALK WIDTHS

Medium to high-density pedestrian zones located in areas with commercial or retail activity provide excellent opportunities to develop an inviting pedestrian environment. The frontage zone in retail and commercial areas may include seating for cafés and restaurants or extensions of retail establishments. The furnishings zone may include seating, transit shelters, newspaper racks, water fountains, utility boxes, lampposts, street trees and other landscaping. The medium to high-density pedestrian zone should provide an interesting and inviting environment for walking and window shopping.

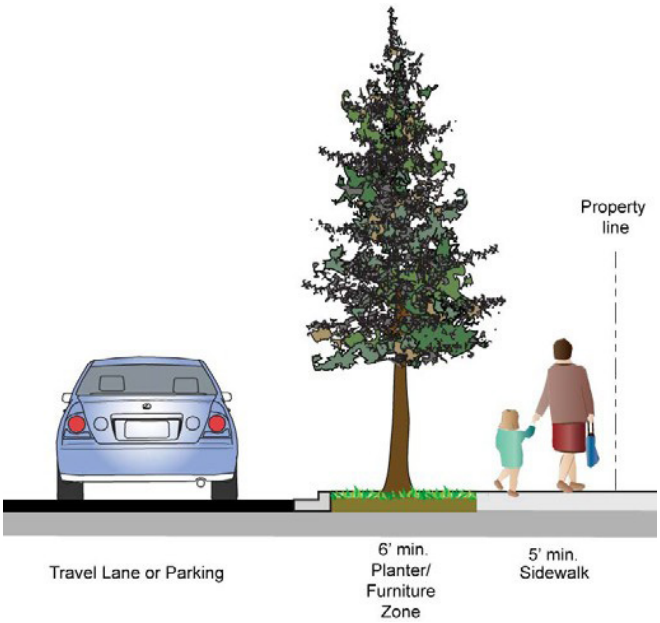
Design Summary

Width Considerations

The ITE recommends planning sidewalks that are a minimum of 5 feet wide with a planting strip of 2 feet on local streets and in residential and commercial areas.

The Caltrans HDM establishes 8 feet minimum width for sidewalks between curbs and buildings when in urban and rural main street place types. For all other locations, the minimum width should be 6 feet when adjacent to a curb or 5 feet when separated by a planting strip.

TRPA/TMPO recommends all new development provide width for shared-use paths where feasible, and if close to a connecting path. If a standard shared-use path is not feasible then as a wide a sidewalk as possible should be implemented. Asphalt is preferred over concrete for active transportation comfort. The use of vertical-face or rolled curbs is determined by stormwater best management practices, impacts on snow maintenance operations, and safety of road users.



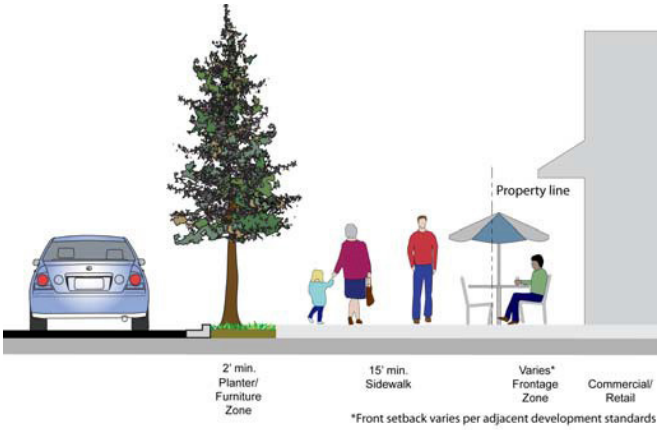
Typical Sidewalk on Arterial/Major Collector

References

- Institute of Transportation Engineers. Design and Safety of Pedestrian Facilities. 1998.
- AASHTO. Guide for the Planning, Design, and Operation or Pedestrian Facilities. 2004.
- Caltrans. Highway Design Manual. 2015.
- US Access Board. Accessible Public Rights-of-Way Planning and Design for Alterations. 2007.

Cost

- Sidewalk, concrete: $240,000 - $750,000 (with curb and gutter) per mile



Typical Commercial Area Sidewalk

SIDEWALK MATERIAL

Sidewalks should be firm and stable, and resistant to slipping. Sidewalks are normally constructed out of Portland cement concrete. Although multi-use pathways may be constructed out of asphalt, it is not suitable for sidewalk construction due to its shorter lifespan and higher maintenance costs. Asphalt and concrete are the most common surfaces for sidewalks; however, some sidewalks are designed using decorative materials, such as brick or cobblestone. Although these surfaces may improve the aesthetic quality of the sidewalk, they may also present challenges to people with mobility impairments. For example, tiles that are not spaced tightly together can create grooves that catch wheelchair casters. Concrete may not hold up as well under snowy conditions.

Discussion

Facilities should be designed so that they are easy to maintain. Of particular importance is including an area for snow storage adjacent to sidewalks, on-street facilities and pathways. Currently, Caltrans and NDOT use sidewalks and paths adjacent to roadways as temporary snow storage areas, resulting in degradation and limited access.

Wherever possible, sidewalks should be separated from the roadway by a paved or landscaped furnishing zone. This zone should be used for locating trees, landscaping, lighting, and for seasonal snow storage outside of the through paths of pedestrians.

Tahoe City Sidewalk

Asphalt Surfacing (non local)

Design Summary

In the Lake Tahoe Region, some Area Plans or local jurisdictions provide design guidelines for sidewalk materials. For example, the City of South Lake Tahoe City-Wide Design Standards state that sidewalks shall be constructed of asphalt (or concrete subject to City approval). The El Dorado County Transit Authority states that sidewalks should be constructed of an impervious material, such as concrete and that surfaces should be non-slip, stable, firm, and well-drained. Other jurisdictions do not recommend or require a specific material type.

Asphalt

- Maintenance life: 40 years plus (with no tree root damage)
- Cost: $2.89/sq ft [1], 20 Year Cost : $1.44/sq ft

1 The 20-year cost normalizes the cost by the useful product life.

Concrete

- Maintenance life: up to 75 years plus (with no tree root damage)
- Cost: $3.37/sq ft, 20 Year Cost: $0.90/sq ft

Concrete Pavers

- Acceptable material for use where aesthetic treatment is desired. May be best suited for the Furnishings Zone as streetscape accent where pedestrian through travel is not expected. Not recommended for use on sidewalk through-zone.
- Maintenance life: 20 years plus
- Cost: $5.77/sq ft, 20 Year Cost: $5.77/sq ft

Concrete Surfacing (non local)

References

- AASHTO. Guide for the Planning, Design, and Operation or Pedestrian Facilities. 2004.

Cost

- Asphalt: $2.89/sq ft
- Concrete: $3.37/sq ft
- Concrete pavers: $5.77/sq ft

FURNISHINGS

The furnishings zone is the area between the curb zone and the through passage zone, where pedestrians pass. The furnishings zone creates an important buffer between pedestrians and vehicle travel lanes by providing horizontal separation, and can also be used for snow storage in the winter time.

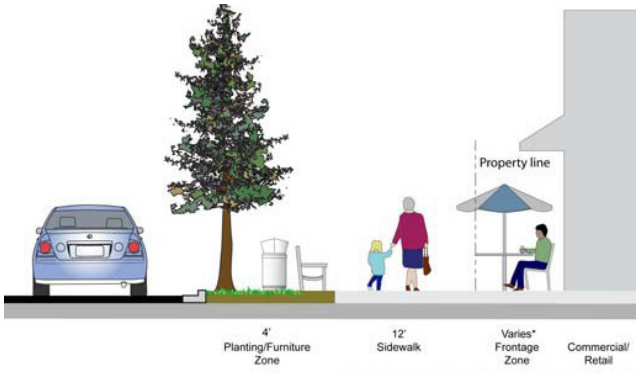
Design Summary

Width

A minimum width of 24 inches (48 inches if planting trees) is recommended. On sidewalks of ten feet or greater, the furnishings zone width should be a minimum of four feet. A wider zone should be provided in areas with large planters and/or seating areas. The TRPA recommends a minimum 6 foot wide landscaped buffer on arterials and major collectors.

Transit Stop/Shelter Placement

BlueGO and Tahoe Area Regional Transit (TART) on the North Shore both have guidelines for transit shelter design and placement, which can be obtained by contacting these agencies.

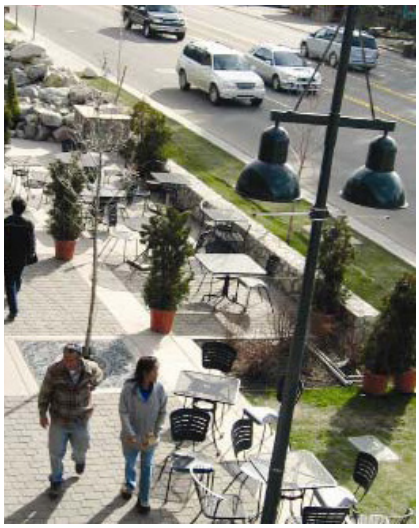


Street Trees and Plantings

Wherever the sidewalk is wide enough, the furnishings zone should include street trees. In order to maintain line of sight to stop signs or other traffic control devices at intersections, when planning for new trees, care should be taken not to plant street trees within 25 feet of corners of any intersection. However, native plants and bioswales can be used in these areas as long as they do not obstruct the vision of road users.

Street Furniture and Amenities

Street furniture should be placed in the furnishings zone to maintain through passage zones for pedestrians and to provide a buffer between the sidewalk and the street.



References

- FHWA. Designing Sidewalks and Trails for Access Part II of II: Best Practices Design Guide. 2001.
- AASHTO. Guide for Planning, Design and Operation of Pedestrian Facilities. 2010.
- USDOT. ADA Standards for Transportation Facilities. 2006.
- El Dorado County Transit Authority. Transit Design Manual. 2007.

Cost

- Bus Shelter: $5,340 - $10,800 each
- Bus concrete pad: $1,200 to $6,940 each
- Trees: $50 - $880 each

PEDESTRIAN FACILITY DESIGN

CURB RAMPS

Curb ramps are necessary for people who use wheelchairs to access sidewalks and crosswalks. ADA requires the installation of curb ramps in new sidewalks, as well as retrofitting existing sidewalks. Curb ramps may be placed at each end of the crosswalk (perpendicular curb ramps), or between crosswalks (diagonal curb ramps).

Design Summary

Orientation and Alignment

Perpendicular curb ramps should be used at large intersections. Curb ramps should be aligned with crosswalks, unless they are installed in a retrofitting effort and are located in an area with low vehicular traffic.

Drainage

Adequate drainage should be provided to prevent flooding of curb ramps.

Detectable Warnings

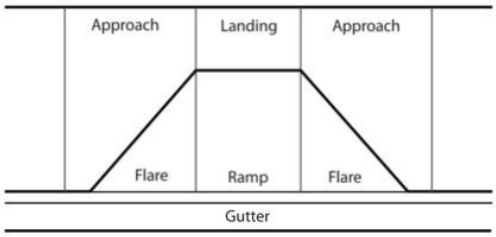
Detectable warnings, consisting of raised truncated domes that visually contrast with the surrounding materials, must be used to assist sight-impaired pedestrians in locating the curb ramp. Certain exemptions apply (see USDOT ADA Standards Section 406 and the ADA Access Board Guidelines on Accessible Public Rights of Way).

References

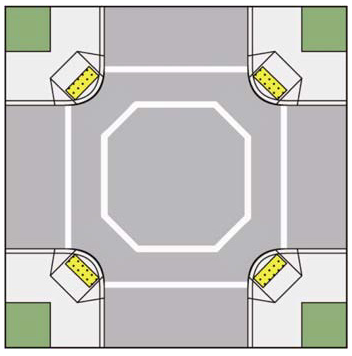
- AASHTO. Guide for Planning, Design and Operation of Pedestrian Facilities. 2004..
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.
- USDOT. ADA Standards for Transportation Facilities. 2006.
- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.

Cost

- Curb Ramps, Retrofit (diagonal, per corner): $800 - $5,340 each
- Curb Ramps, Retrofit (perpendicular, per corner): $5,340 - $10,000 each



Typical Sidewalk on Arterial/Major Collector



Crosswalk Striping when using Diagonal Curb Ramps

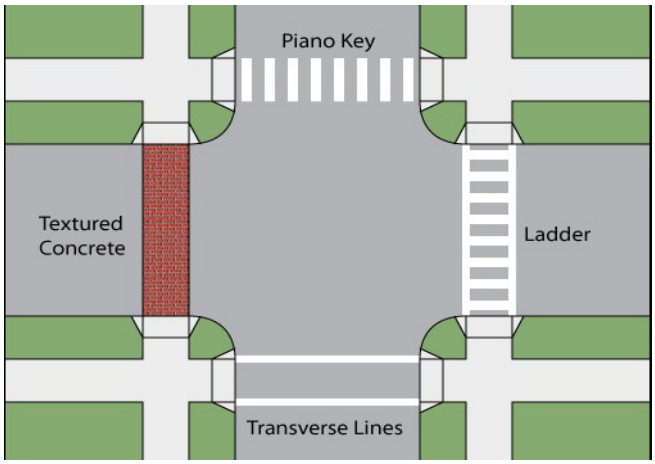
PEDESTRIAN INTERSECTION DESIGN

PEDESTRIAN CROSSWALK DESIGN

Crosswalks are to be marked on all legs of a signalized intersection. At unsignalized intersections, crosswalks should be marked when they help orient pedestrians, or help position pedestrians where they can best be seen by oncoming traffic. At mid-block locations, crosswalks are marked where there is a demand for crossing, and there are no nearby marked crosswalks.

Discussion

High-visibility markings such as Piano Key or Ladder crosswalks are recommended for crosswalks in the Tahoe Region due to their increased visibility and resistance to wear if they are located out of the wheel paths. Crosswalks forming transverse lines will wear quickly in snow country.



Crosswalk Types

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.

Design Summary

Ladder or piano key crosswalk markings are recommended for most crosswalks in the Tahoe Region, including school crossings, across arterial streets for pedestrian-only signals, at mid- block crosswalks, and where the crosswalk crosses a street not controlled by signals or stop signs.

- A piano key pavement marking consists of 2' wide bars spaced 2' apart.
- A ladder pavement marking consists of 2' wide bars spaced 2' apart.
- Transverse lines consist of 1' wide bars spaced no less than 6' apart.

Cost

- Crosswalk, Thermoplastic: $6 per sf
- Crosswalk, Transverse: $550 each
- Crosswalk, Permeable Pavement (brick, includes demo of existing): $14 per sf
- Crosswalk, Scored Concrete (includes demolition of existing): $9-$14 each

PEDESTRIAN REFUGE ISLANDS

Pedestrian refuge islands reduce pedestrian exposure to motor vehicles, allow pedestrians to consider traffic coming from one direction at a time and provide a place for slower pedestrians to rest or wait. Pedestrian refuge islands can be installed at intersections or at mid block locations.

Design Summary

Pedestrian refuge islands should be considered at all crossings of multi-lane roadways. Depending on the signal timing, median islands should be considered when the crossing distance exceeds 60 feet, but can be used at intersections with shorter crossing distances where a need has been recognized. **This treatment is recommended in school zones.**

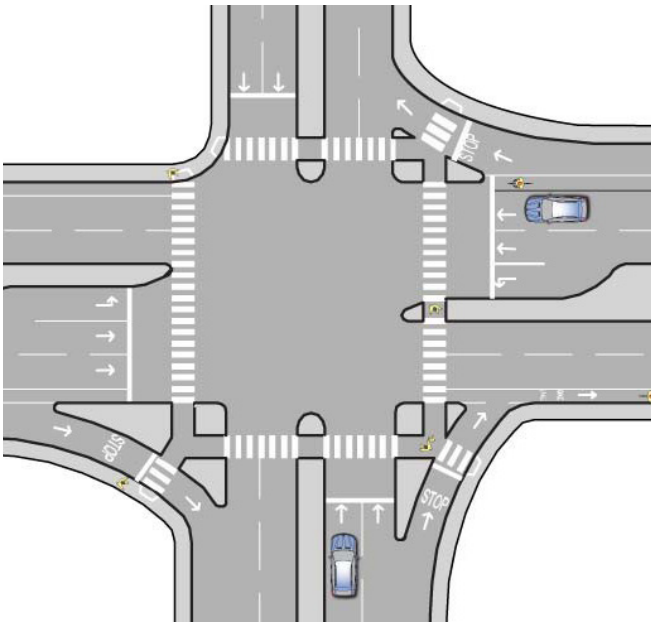
See the ADA Access Board Guidelines on Accessible Public Rights of Way for more information on median islands.

References

- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.
- AASHTO. Guide for the Development of Pedestrian Facilities. 2004.
- AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2010.

Cost

- Median, Pedestrian Refuge Island: $8,500-$33,000 each



The median "noses"shown are not required by MUTCD.

Median "nose" (non-local)

PEDESTRIAN INTERSECTION DESIGN

IN-STREET CROSSWALK SIGNAGE

The In-Street Pedestrian Crossing (R1-6) sign should be used to remind users of laws regarding the right of way at an unsignalized pedestrian crossing (CA and NV). These paddles are installed at the center stripe of the roadway on the leading edge of the crosswalk. Approaching motorists are warned to yield to crossing pedestrians.

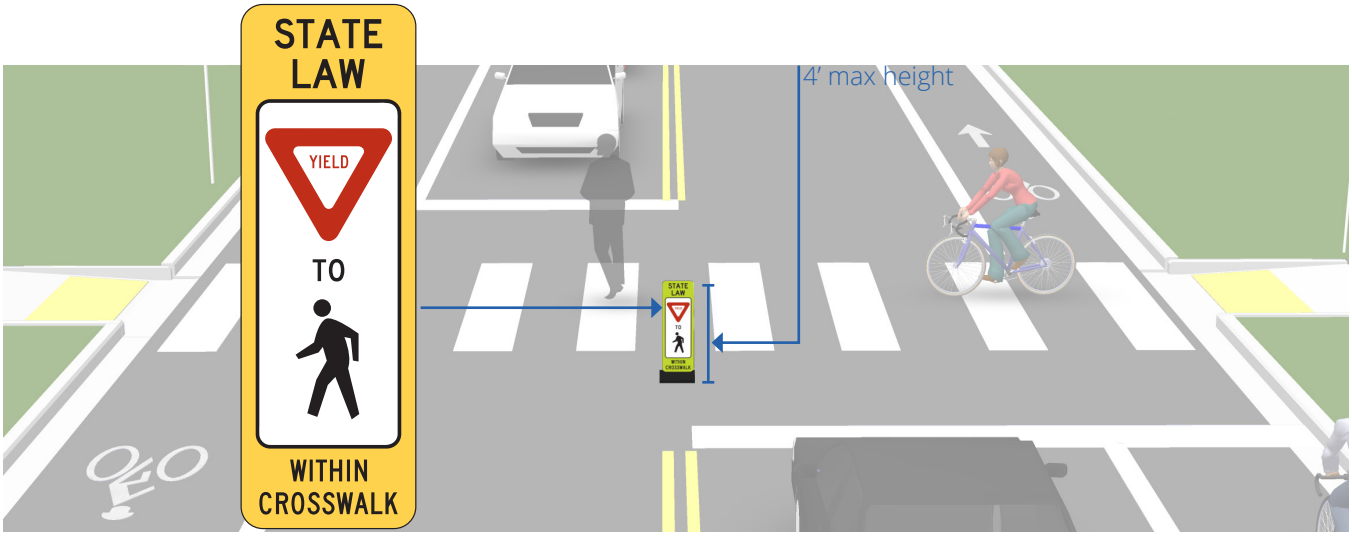
Discussion

These flexible signs must be extremely durable to withstand potential impacts with motor vehicles. Semi-permanent installations are also possible when the sign is combined with a movable base. This allows for day-time only applications. The signs perform better on narrow roadways, where the visibility of the signs is maximized. On multi-lane roadways, consider active warning beacons for improved yielding compliance.

This treatment is appropriate for crosswalks located in school zones.

Design Summary

- The in-street pedestrian crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The top of an in-street pedestrian crossing sign shall be a maximum of 4 feet above the pavement or median island surface.
- Install in a manner that does not impede pedestrian flow and outside the turn radius of vehicles that may be approaching from cross street.
- May be placed on a median island (when available).



References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO. Guide for the Development of Pedestrian Facilities. 2004.

Cost

- Crosswalk, Thermoplastic: $6 per sf
- Crosswalk, Transverse: $320-$550 each
- Crosswalk, Permeable Pavement (brick, includes demo of existing): $14 per sf
- Crosswalk, Scored Concrete (includes demolition of existing): $9-$14 each

CURB EXTENSIONS (BULB OUTS)

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

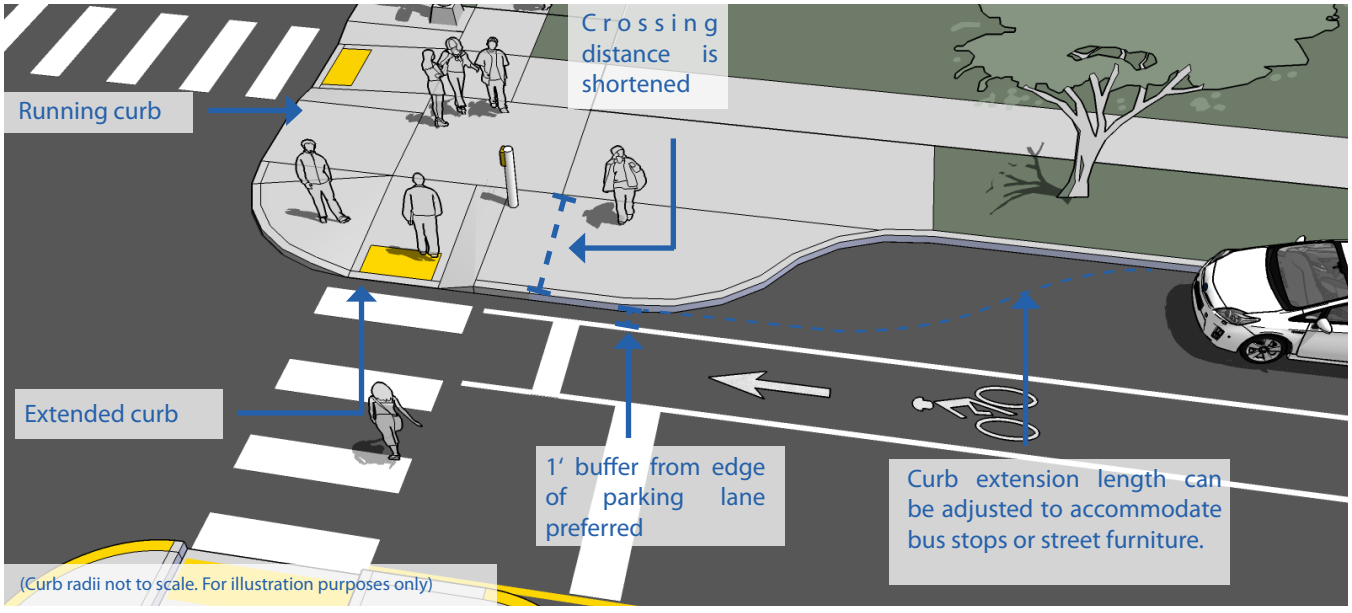
Discussion

Adding curb extensions may not be possible if there is no parking lane. Curb extensions should not block bike lanes or shoulders used by bicyclists.

This treatment is recommended at intersections in school zones.

Design Summary

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.



References

- AASHTO. Policy on Geometric Design of Highways and Streets. 2011.
- AASHTO. Guide for the Development of Bicycle Facilities. 2012.

Cost

- Curb Extension: $12,000 each

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DESIGN OF INTERPRETIVE AND WAYFINDING SIGNAGE

INTERPRETIVE SIGNAGE

Interpretive signs enhance the trail or bikeway experience by providing information about the history and culture of the area. Signs may discuss local ecology, people, environmental issues, and other educational information. Educational information may be placed at scenic view areas or in relation to specific elements being interpreted. They may take on many forms including textual messages, plaques, markers, panels, and demonstrations.

Design Summary

Because interpretive signs need to relate directly to the needs of a site, no specific guidelines have been established for their format. However, interpretive signs should be concise and should be an integral part of an overall area sign plan.

Cost

- Signs, Path Wayfinding / Information: $550 - $2,000 each

WAYFINDING SIGNAGE - LOCAL GUIDELINES

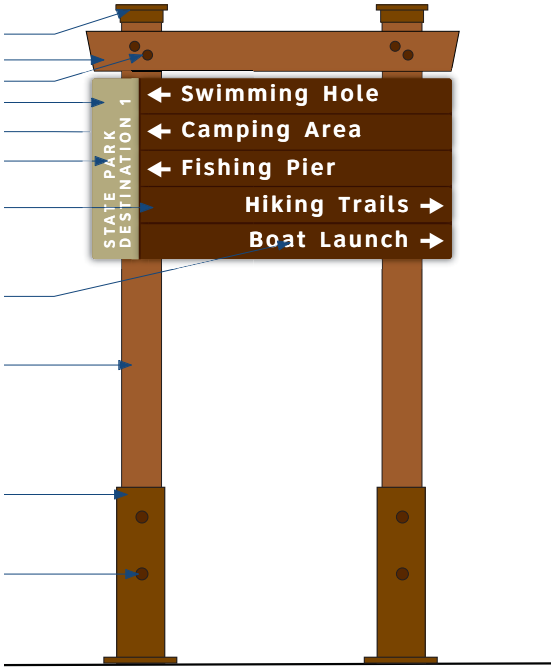
Three local documents currently govern the design of wayfinding signs in the Tahoe area. The North Lake Tahoe Community Wayfinding Signage Design Standards Manual (May 2013) provides design standards related to community wayfinding in public-accessible areas, such as recreational areas, commercial zones or neighborhood districts. It includes clear, schematic concepts for signage design while remaining adaptable to variations in local features. This manual also contains information about applying for permits for signs.

South Lake Tahoe community wayfinding standards are presented in the Wayfinding in South Lake Tahoe Status Report #3 (August 2008). Guidelines specific to bicycle route wayfinding in South Lake Tahoe are provided in the South Lake Tahoe Bicycle Transportation Signage System report (May 2013). The guidelines build upon and enhance standard wayfinding signs in the California MUTCD.

Design Summary

Unless superseded by locally approved design standards, Signage shall conform to the National MUTCD when in Nevada and CA MUTCD in California.

On bicycle wayfinding, mileage should be listed to the right side of each destination.



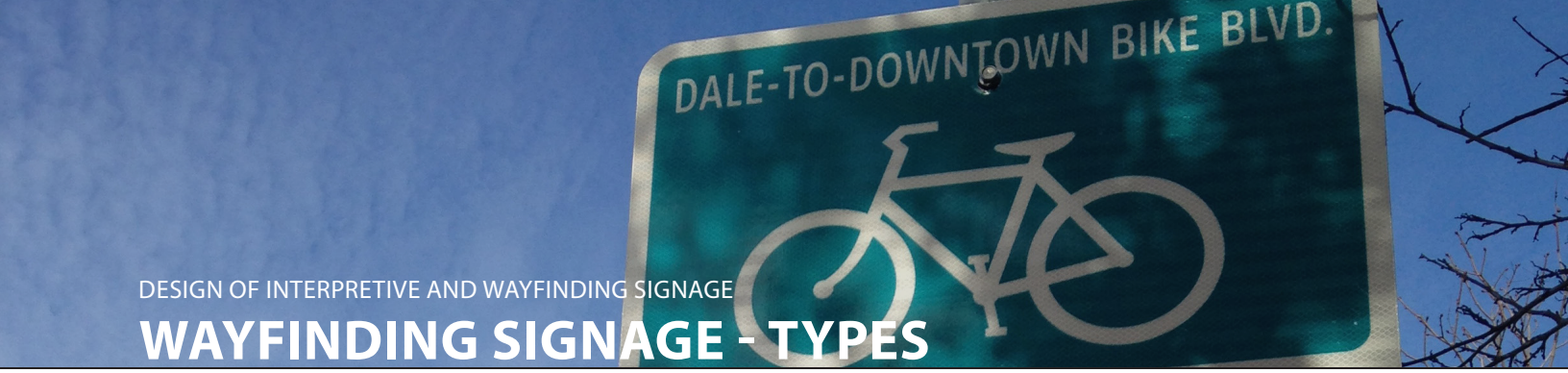
Example sign assembly from the North Lake Tahoe Community Wayfinding Signage Design Standards Manual

References

- North Lake Tahoe Community Wayfinding Signage Design Standards Manual (May 2013)
- South Lake Tahoe Bicycle Transportation Signage System (May 2013)
- Wayfinding in South Lake Tahoe Status Report #3 (August 2008)

Community Wayfinding in South Lake Tahoe

Bicycle specific wayfinding design from the South Lake Tahoe Bicycle Signage System Report.



WAYFINDING SIGNAGE - TYPES

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs: confirmation signs, turn signs, and decision signs.

Discussion

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.

Can include destinations and distance/time. Do not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.

Include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways.

Inform bicyclists of "four D's," distance, direction, duration and destinations.

Travel times are optional but recommended.

Design Summary

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

References

- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.
- Caltrans. Highway Design Manual. 2015.

Cost

- Sign, regulatory: $150 - $250 per sign

WAYFINDING SIGNAGE - PLACEMENT

Wayfinding signage acts as a "map on the street" for cyclists, pedestrians, and path users. Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Discussion

Confirmation Signs

Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

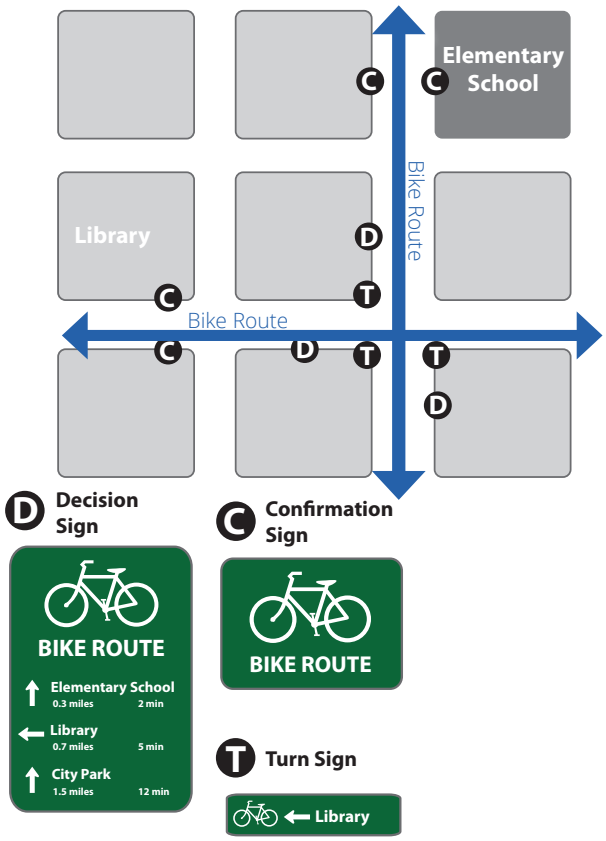
Turn Signs

Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

Along a route to indicate a nearby destination.



Design Summary

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's presence on the sign can be a function of its physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

References

- Caltrans. Highway Design Manual. 2015.
- Caltrans. MUTCD. 2014.
- FHWA. MUTCD. 2009.
- AASHTO Guide for the Development of Bicycle Facilities. 2012.
- NACTO. Urban Bikeway Design Guide. 2012.

Cost

- Sign, regulatory: $150 - $250 per sign

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SUPPORT AND END OF TRIP FACILITIES

RECOMMENDED RATES OF BICYCLE PARKING

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters. In addition, safe and easy access to bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Providing bicycle access to transit and space for bicycles on buses and rail vehicles can increase the feasibility of transit in lower-density areas, where transit stops are beyond walking distance of many residences. People are often willing to walk only a quarter-mile to half-mile to access a bus stop, while they might bike as much as two or more miles to reach a transit station.

Discussion

Bicycle Parking Manufacturers:

- Palmer: www.bikeparking.com
- Dero: www.dero.com
- Creative Pipe: www.creativepipe.com
- Cycle Safe: www.cyclesafe.com

Short-Term Bicycle Parking

References

- TRPA. Code of Ordinances. 2014.
- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines. 2010.

Design Summary

- All bicycle parking facilities should be dedicated for the exclusive use of bicycles.
- Short-term bicycle parking serves users who will park for less than two hours, typically for shopping and recreation. This type of parking should be convenient. Short-term parking is typically provided with bicycle racks (see table below).
- Long-term bicycle parking should serve users who park their bicycles for a period longer than two hours. This type of parking should provide a high level of security. Long-term parking is typically provided with bicycle lockers and bicycle cages (see table below).
- The rates below are minimums. Actual use of areas may indicate additional parking capacity is needed. Both short-term and long-term parking should be required.

Cost

- Bicycle racks: $150-$200 each
- Bicycle lockers: $1,350-$2,000 each

Land Use or Location	Physical Location	Short-Term Bicycle Parking Capacity	Long-Term Bicycle Parking Capacity
Multi-Family Residential (with private garage for each unit)	Near building entrance with good visibility	0.05 spaces for each bedroom (2 spaces minimum for whole complex)	0
Multi-Family Residential (without private garage for each unit)	Near building entrance with good visibility	0.05 spaces for each bedroom (2 spaces minimum)	0.15 spaces for each bedroom (2 spaces minimum)
Park	Adjacent to restrooms, picnic areas, fields and other attractions	8 spaces	0
Schools	Near office entrance with good visibility	8 spaces	2 spaces per 2 classrooms
Public Facilities (city hall, libraries, community centers)	Near main entrance with good visibility	8 spaces	0
Commercial, retail and industrial developments over 10,000 gross square feet	Near main entrance with good visibility	8 spaces per 10,000 square feet	2 locker spaces per 10,000 square feet
Shopping Centers over 10,000 gross square feet	Near main entrance with good visibility	8 spaces per 10,000 square feet	2 locker spaces per 10,000 square feet
Commercial Districts	Near main entrance with good visibility	4 spaces every 200 feet	0
Transit Stations	Near platform or security guard	8 spaces	2 locker spaces for every 30 parking spaces

Bike parking requirements by land use

Secure bike parking area

SUPPORT AND END OF TRIP FACILITIES

BICYCLE PARKING

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

Typical Application

- Bike racks provide short-term bicycle parking and is meant to accommodate visitors, customers, and others expected to depart within two hours. It should be an approved standard rack, appropriate location and placement, and weather protection.
- On-street bike corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.
- Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain.
- A Secure Parking Area for bicycles, also known as a BikeSPA or Bike & Ride (when located at transit stations), is a semi-enclosed space that offers a higher level of security than ordinary bike racks. Accessible via key-card, combination locks, or keys, BikeSPAs provide high-capacity parking for 10 to 100 or more bicycles. Increased security measures create an additional transportation option for those whose biggest concern is theft and vulnerability.

Design Features

Bike Racks

- (A) 2 feet minimum from the curb face to avoid 'dooring.'
- (B) 4 feet between racks to provide maneuvering room.
- Locate close to destinations; 50 feet maximum distance from main building entrance.
- Minimum clear distance of 6 feet should be provided between the bicycle rack and the property line.

Bike Corrals

- Bicyclists should have an entrance width from the roadway of 5-6 feet.
- (C) Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for bicycle corrals since the concrete extension serves as delimitation on one side.

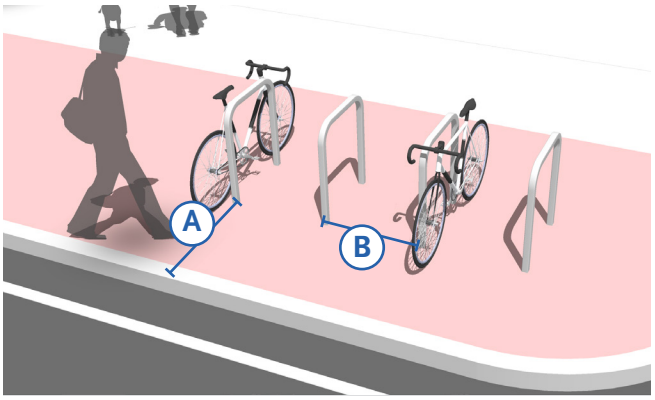
Bike Lockers

- Minimum dimensions: width (opening) 2.5 feet; height 4 feet; depth 6 feet.
- 4 foot side clearance and 6 foot end clearance.
- (D) 7 foot minimum distance between facing lockers.

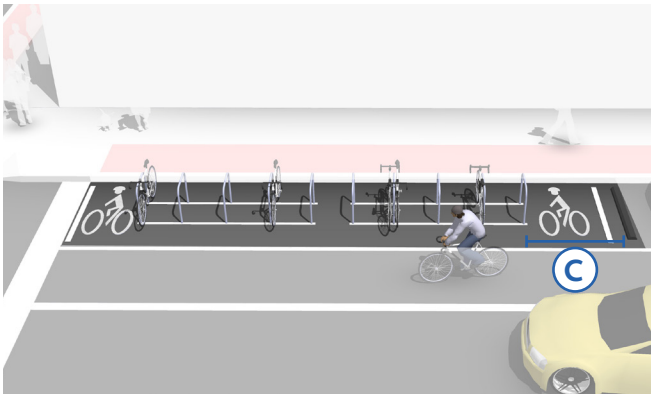
Secure Parking Area

- Closed-circuit television monitoring with secure access for users.
- Double high racks & cargo bike spaces.
- Bike repair station with bench and bike tube and maintenance item vending machine.
- (E) Bike lock "hitching post" – allows people to leave bike locks.

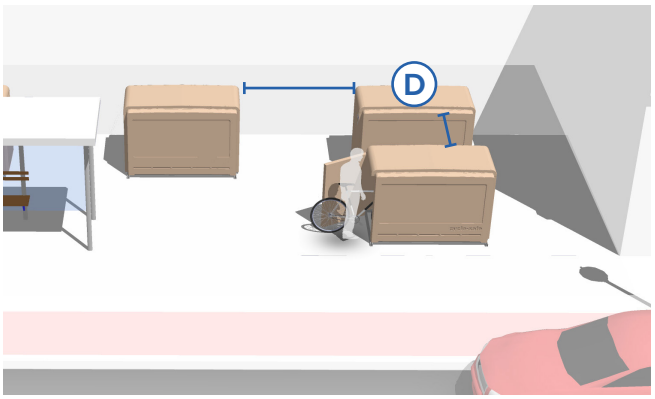
Perpendicular Bike Racks



Bike Corral



Bike Locker



Secure Parking Area

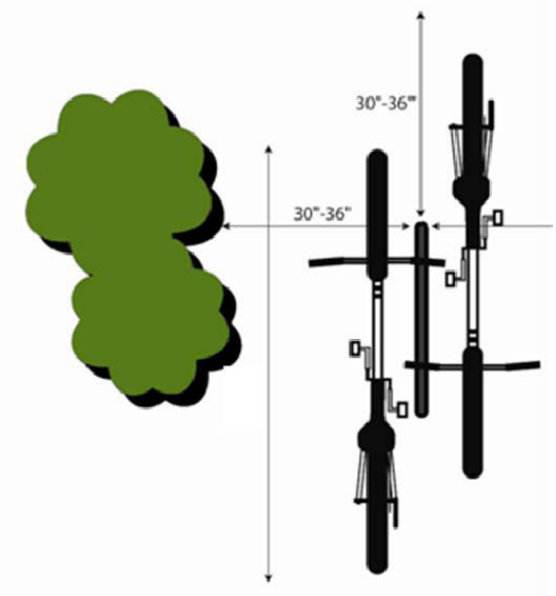
BICYCLE RACK DESIGN

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that supports the bicycle in at least two places, preventing it from falling over, allows locking of the frame and one or both wheels with a U-lock, is securely anchored to ground, and resists cutting, rusting and bending or deformation.

Discussion

Bicycle Parking Manufacturers:

- Palmer: www.bikeparking.com
- Dero: www.dero.com
- Creative Pipe: www.creativepipe.com
- Cycle Safe: www.cyclesafe.com



Design Summary

- Bicycle racks should be a design that is intuitive and easy to use.
- A standard inverted-U style or Bolt rack is recommended for Lake Tahoe.
- Bicycle racks should be securely anchored to a surface or structure and positioned racks out of the walkway's clear zone.
- The rack element (part of the rack that supports the bicycle) should keep the bicycle upright by supporting the frame in two places without the bicycle frame touching the rack. The rack should allow one or both wheels to be secured.
- Avoid use of multiple-capacity "wave" style racks. Users commonly misunderstand how to correctly park at wave racks, placing their bikes parallel to the rack and limiting capacity to 1 or 2 bikes.
- Position racks so there is enough room between parked bicycles. Racks should be situated on 36" minimum centers.
- A five-foot aisle for bicycle maneuvering should be provided and maintained beside or between each row of bicycle racks.
- Racks should be located close to a main building entrance, in a lighted, high-visibility area protected from the elements.

References

- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines. 2010.
- City of Oakland, CA. Bicycle Parking Standards. 2008.

Cost

- Bicycle racks: $150-$200 each

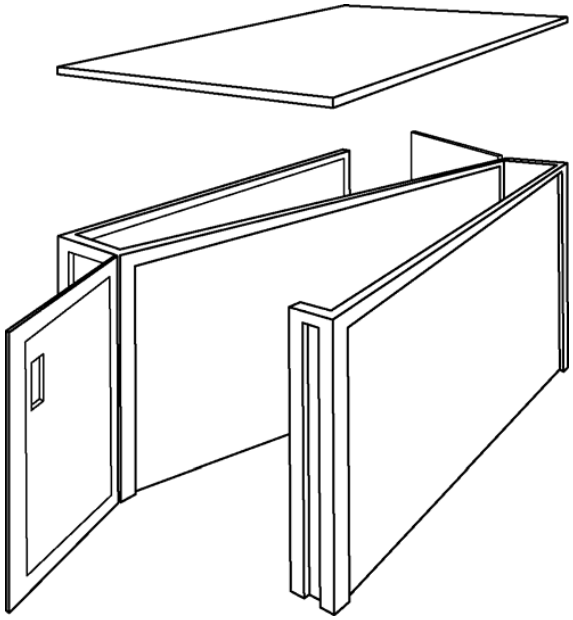
BICYCLE LOCKER DESIGN

Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain. Bicycle lockers provide space to store a few accessories or rain gear in addition to containing the bicycle. Some lockers allow access to two users - a partition separating the two bicycles can help users feel their bike is secure. Lockers can also be stacked, reducing the footprint of the area, although that makes them more difficult to use.

Discussion

Bicycle Parking Manufacturers:

- Palmer: www.bikeparking.com
- Dero: www.dero.com
- Creative Pipe: www.creativepipe.com
- Cycle Safe: www.cyclesafe.com



Design Summary

- Bicycle lockers should be a design that is intuitive and easy to use.
- Bicycle lockers should be securely anchored to a surface or structure.
- Bicycle lockers should be constructed to provide protection from theft, vandalism and weather.
- A five-foot aisle for bicycle maneuvering should be provided and maintained beside or between each row of bicycle lockers.
- Lockers should be located close to a main building entrance, in a lighted, high-visibility area protected from the elements. Long-term parking should always be protected from the weather.

References

- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines. 2010.
- City of Oakland, CA. Bicycle Parking Standards. 2008.

Cost

- Bicycle lockers: $1,350-$2,000 each

SHOWERS AND LOCKERS

Discussion

Shower and locker facilities at large commercial developments encourage bicycling by providing storage space for clothing and an opportunity to freshen up before work. Employees who exercise on their lunch break can also benefit from shower and locker facilities.

Design Summary

- Two shower facilities (one per gender) should be provided by employers of 100-200 persons.
- 20 lockers (10 per gender) should be provided by employers of 100-200 persons.
- Four shower facilities (two per gender) should be provided by employers of more than 200 persons. An additional four showers (two per gender) should be provided for every additional 500 employees over the initial 200 employees.
- 40 lockers (20 per gender) should be provided by employers of more than 200 persons. An additional 20 lockers (10 per gender) should be provided for every additional 500 employees over the initial 200 employees

References

- Association of Bicycle and Pedestrian Professionals. Bicycle Parking Guidelines. 2010.
- City of Oakland, CA. Bicycle Parking Standards. 2008.

Cost

- Costs vary

MAINTENANCE STANDARDS

SHARED-USE PATH MAINTENANCE STANDARDS

Standards Summary

SURFACE GAP REPAIR

To provide for accessibility and functionality for all users, shared use paths must be maintained to provide a continuous clear width of firm stable surface.

Path Surface

- The surface of the pedestrian access route shall be firm, stable and slip resistant (US Access Board, PROWAG, Section R302.7).

Vertical Changes in Level

- Surface discontinuities shall not exceed ½ inch maximum. Vertical discontinuities between ¼ inch and ½ inch maximum shall be beveled at 1:2 minimum. The bevel shall be applied across the entire level change (PROWAG, Section R302.7.2). Changes in level greater than ½ inch shall be accomplished by means of an accessible ramp.

Gaps and Elongated Openings

- Walkway Joints and Gratings. Openings shall not permit passage of a sphere more than ½ inch in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel (PROWAG, Section R302.7.3).

Discussion

Basic Maintenance

- Path pavement should be repaired as needed to avoid safety issues and to ensure ADA compliance.
- Paths should be swept regularly.
- Shoulder vegetation should be cleared and trimmed regularly.

Long-Term Maintenance

- Paths should be slurry sealed, at minimum, 10 years after construction.
- Paths should receive an overlay, at minimum, 15 years after construction.

Maintenance Activity	Frequency
Surface gap repair	As needed (see additional guidance below)
Inspections	Monthly
Pavement sweeping/blowing	As needed, weekly in Fall
Snow removal	As needed, or as feasible
Pavement markings replacement	1-3 years, or as needed
Signage replacement	1-3 years, or as needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year, middle of growing season and early Fall
Tree and shrub plantings, trimming	1-3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Maintenance Challenges

- Most agencies pay for sidewalk and path maintenance out of their maintenance and operations budget. This funding is generally enough to provide seasonal maintenance, but is not enough to fund long-term preventative maintenance, such as overlays.
- Grant funding is not generally available for maintenance activities.
- Paths with year-round use or with commuting utility should be cleared of snow.
- If snow is removed from paths, snow must be removed far enough back from the pavement so that it does not melt, refreeze and create black ice. Sand is not permitted on many paths because they are adjacent to the lake and sanding increases costs.
- Small plows, which have been purchased by some Lake Tahoe agencies, are not strong enough to clear heavy snows or densely packed snows. Specialized blowers may be needed to clear deep snow or snow that has condensed by freeze/thaw.

References

- ADA Access Board. Proposed Guidelines on Accessible Public Rights of Way. 2011.

Cost

- $1,000-14,000 per mile per year

ON-STREET FACILITY MAINTENANCE STANDARDS

Discussion

Basic Maintenance

Bicyclists often avoid shoulders and bike lanes filled with sanding materials, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept. Roadways should also be swept after automobile collisions.

Long-Term Maintenance

Roadway surface is a critical issue for bicyclists' quality. Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Examine pavement quality and transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.

Street sweeper

Maintenance Activity	Frequency
Inspections	Seasonal - at beginning and end of summer
Pavement sweeping/blowing	As needed, weekly in Fall
Snow removal	As needed, or as feasible
Pavement sealing, potholes	5 - 15 years
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement (includes crosswalks)	1-3 years
Signage replacement	1-3 years
Shoulder plant trimming (weeds, trees, brambles)	Twice a year, middle of growing season and early Fall
Tree and shrub plantings, trimming	1-3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Standards Summary

NOTE: Caltrans recommends tolerance of surface discontinuities no more than ½ inch wide when parallel to the direction of travel on bike lanes (Class II) and bike routes (Class III).

Cost

- $2,000 per mile per year

MAINTENANCE STANDARDS

SEPARATED BIKE LANE MAINTENANCE

Separated bike lanes require increased maintenance effort compared to conventional bicycle lanes. Some designs are more maintenance-friendly than others and implications for snow storage, removal and clearance should be considered.

Discussion

All bikeways should be maintained free of debris, including snow, leaves and gravel.

Design Summary

Consider barrier type on snow storage.

- Street level separated bike lanes collect more debris than raised separated bike lanes. Fully raised sidewalk –level separated bike lanes may be plowed at the same time as the adjacent sidewalk. Bollards may be designed for seasonal removal to allow for plowing during snow events.

Design for access and egress

- Snow removal vehicles must be able to maneuver into and out of the separated bike lane.

Design adequate width for sweepers

- A clear bike lane/buffer width of 10' should be considered for maximum compatibility with most snowplow equipment. Smaller sized sweepers should be used when facilities are smaller than this size.

Provide capacity for snow storage

- Snow should not be stored within the through-zone of the bike lane. Snow may be stored in the separated bike lane buffer area, or the furnishing zone of the adjacent sidewalk.

Separated bike lanes should be promptly cleared after snow events.

Fallen leaves accumulating separated bike lanes cause hazardous conditions in wet weather.

References

- FHWA. Separated Bike Lane Planning and Design Guide. 2015.

Appendix H

Existing & Proposed Project List

Existing Project List

Project Name	Description	Lead Implementer	Miles	Location Start	Location End	Jurisdiction
Al Tahoe Blvd	C-I / Shared-Use	City of South Lake Tahoe	1.12	Johnson Blvd	Pioneer Trail	City of South Lake Tahoe
B Street (North Side)	C-I / Shared-Use	City of South Lake Tahoe	0.14	Parking Lot	Helen & South Ave	City of South Lake Tahoe
Black Rock Road Bike Path	C-I / Shared-Use	City of South Lake Tahoe	0.07	Pine Blvd	Black Rock Road	City of South Lake Tahoe
Greenway Phase 1	C-I / Shared-Use	CTC	0.43	Glenwood Way	Herbert	City of South Lake Tahoe
Lake Tahoe Community College	C-I / Shared-Use	City of South Lake Tahoe	1.28	Al Tahoe Blvd	Lake Tahoe Community College	City of South Lake Tahoe
Linear Park	C-I / Shared-Use	City of South Lake Tahoe	1.07	Ski Run Blvd	Pioneer Trail	City of South Lake Tahoe
Lyons Ave	C-I / Shared-Use	City of South Lake Tahoe	0.18	Rufus Allen Blvd	US Highway 50	City of South Lake Tahoe
Ski Run Blvd	C-I / Shared-Use	City of South Lake Tahoe	1.10	US Highway 50	Pioneer Trail	City of South Lake Tahoe
South Ave Class 1	C-I / Shared-Use	City of South Lake Tahoe	0.02	South Ave	Winnemucca	City of South Lake Tahoe
South Lake Tahoe Rec Center	C-I / Shared-Use	City of South Lake Tahoe	0.74	Rufus Allen Blvd	South Lake Tahoe Rec Center	City of South Lake Tahoe
South Tahoe Bikeway	C-I / Shared-Use	City of South Lake Tahoe	2.21	Eloise Ave	Fremont Avenue	City of South Lake Tahoe
TOTAL			**8.37**			
15th Street	C-II / Bike Lanes	City of South Lake Tahoe	0.34	Venice Drive	Eloise Ave	City of South Lake Tahoe
Heavenly Village Way	C-II / Bike Lanes	City of South Lake Tahoe	0.12	US Highway 50	Park Ave	City of South Lake Tahoe
Helen Ave	C-II / Bike Lanes	City of South Lake Tahoe	0.29	South Ave	Winnemucca Ave	City of South Lake Tahoe
US Highway 50	C-II / Bike Lanes	Caltrans	0.51	South Tahoe "Y"	E Street	City of South Lake Tahoe
Johnson Blvd	C-II / Bike Lanes	City of South Lake Tahoe	0.91	US Highway 50	Al Tahoe Blvd	City of South Lake Tahoe
Lake Tahoe Blvd	C-II / Bike Lanes	City of South Lake Tahoe	0.47	Glorene Ave	D Street	City of South Lake Tahoe
Lakeview Ave	C-II / Bike Lanes	City of South Lake Tahoe	0.59	US Highway 50	Berkeley Ave	City of South Lake Tahoe
Melba	C-II / Bike Lanes	City of South Lake Tahoe	0.31	B Street	US Highway 50	City of South Lake Tahoe
Pioneer Trail	C-II / Bike Lanes	City of South Lake Tahoe	7.95	US Highway 50 (South Lake Tahoe)	US Highway 50 (Meyers)	City of South Lake Tahoe & El Dorado County
Sierra Blvd	C-II / Bike Lanes	City of South Lake Tahoe	0.54	Palmira Ave	Fountain Ave	City of South Lake Tahoe
Tahoe Keys Blvd	C-II / Bike Lanes	City of South Lake Tahoe	0.80	Eloise Ave	Venice Drive	City of South Lake Tahoe
Venice Drive	C-II / Bike Lanes	City of South Lake Tahoe	0.41	Marina	Tahoe Keys Blvd	City of South Lake Tahoe
US Highway 50 Bike Lanes	C-II / Bike Lanes	Caltrans	2.20	Trout Creek	Wildwood Ave	City of South Lake Tahoe
TOTAL			**15.45**			
13th Street	C-III / Bike Route	City of South Lake Tahoe	0.10	Eloise Ave	State Route 89	City of South Lake Tahoe
Bellevue Ave/El Dorado Ave	C-III / Bike Route	City of South Lake Tahoe	0.96	Lakeview Ave	Oakland Ave	City of South Lake Tahoe
Blackwood Road	C-III / Bike Route	City of South Lake Tahoe	0.67	Pioneer Trail	Fairway Ave	City of South Lake Tahoe
Eloise Ave	C-III / Bike Route	City of South Lake Tahoe	1.70	South Lake Tahoe Bike Path Near Tahoe Keys	15th Street	City of South Lake Tahoe
Helen Ave	C-III / Bike Route	City of South Lake Tahoe	0.20	4th Street	Class I Shared-use path	City of South Lake Tahoe
River Drive/William Street	C-III / Bike Route	City of South Lake Tahoe	0.33	US Highway 50	Sierra Blvd	City of South Lake Tahoe
Rubicon Trail	C-III / Bike Route	City of South Lake Tahoe	0.22	Mackinaw	Sussex Ave	City of South Lake Tahoe
Rufus Allen Blvd	C-III / Bike Route	City of South Lake Tahoe	0.52	US Highway 50	Lyons Ave	City of South Lake Tahoe
Sussex Ave	C-III / Bike Route	City of South Lake Tahoe	0.05	Rubicon Trail	Class 1 Shared-use path	City of South Lake Tahoe
Tahoe Island Drive/12 Street	C-III / Bike Route	City of South Lake Tahoe	1.20	Tahoe Keys Blvd	Eloise Ave	City of South Lake Tahoe
Tamarack Ave	C-III / Bike Route	City of South Lake Tahoe	0.48	Pioneer Trail	Blackwood Road	City of South Lake Tahoe
William St/River Drive	C-III / Bike Route	City of South Lake Tahoe	0.57	River Drive/US Highway 50	Blue Lake Ave	City of South Lake Tahoe
Ponderosa	C-III / Bike Route	City of South Lake Tahoe	0.21	Silver Dollar	Class I Shared-use path	City of South Lake Tahoe
TOTAL			**7.64**			
Al Tahoe Blvd	Sidewalk	City of South Lake Tahoe	0.36	US Highway 50	Johnson Blvd	City of South Lake Tahoe
Blackwood Road	Sidewalk	City of South Lake Tahoe	0.05	Glenwood Way	Lake Tahoe Christian Fellowship	City of South Lake Tahoe
City US Highway 50 Sidewalk (East Side)	Sidewalk	City of South Lake Tahoe	1.26	Stateline Ave	Ski Run Blvd	City of South Lake Tahoe
City US Highway 50 Sidewalk (West Side)	Sidewalk	City of South Lake Tahoe	2.16	Johnson Blvd	Stateline Ave	City of South Lake Tahoe
Heavenly Village (West Side)	Sidewalk	City of South Lake Tahoe	0.36	US Highway 50	Lake Parkway	City of South Lake Tahoe
Lake Tahoe Blvd Sidewalks	Sidewalk	City of South Lake Tahoe	1.21	South Tahoe "Y"	D Street	City of South Lake Tahoe
Park Ave Sidewalk (West Side)	Sidewalk	City of South Lake Tahoe	0.06	Manzanita	Pine Blvd	City of South Lake Tahoe
Pine Blvd Sidewalk	Sidewalk	City of South Lake Tahoe	0.67	Stateline	Park Ave	City of South Lake Tahoe
Pioneer Trail Sidewalks	Sidewalk	City of South Lake Tahoe	0.91	Larch Ave	US Highway 50	City of South Lake Tahoe
State Route 89 Sidewalk	Sidewalk	City of South Lake Tahoe	0.38	US Highway 50	5th Street	City of South Lake Tahoe
State Route 89 Sidewalk	Sidewalk	City of South Lake Tahoe	0.25	10th Street	11th Street	City of South Lake Tahoe
US Highway 50 Sidewalks (East)	Sidewalk	City of South Lake Tahoe	2.03	Trout Creek	Ski Run Blvd	City of South Lake Tahoe
US Highway 50 Sidewalks -(West)	Sidewalk	City of South Lake Tahoe	0.97	Trout Creek	Lakeview Blvd	City of South Lake Tahoe
US Highway 50 Sidewalks	Sidewalk	City of South Lake Tahoe	1.32	South Tahoe "Y"	E / F Street	City of South Lake Tahoe
Wildwood Ave	Sidewalk	City of South Lake Tahoe	0.11	US Highway 50	Osgood Ave	City of South Lake Tahoe
TOTAL			**12.10**			
Elks Point Road	C-I / Shared-Use	Douglas County	0.41	Nevada Beach	Elks Point Road	Douglas County
Nevada Stateline To Stateline Phase 1	C-I / Shared-Use	Tahoe Transportation District	2.28	4th Street	Round Hill Pines Beach	Douglas County
Round Hill Bike Path	C-I / Shared-Use	Douglas County	1.69	Round Hill	Pineridge Drive	Douglas County
Zephyr Cove Bike Path	C-I / Shared-Use	U.S. Forest Service	0.21	Zephyr Cove Stables	Zephyr Cove Campground	Douglas County
TOTAL			**4.60**			
Lake Parkway Bike Lanes	C-II / Bike Lane	Douglas County	1.11	Stateline	US Highway 50	Douglas Count
Elks Point Road	C-II / Bike Lanes	Douglas County	0.14	Elks Point Class I Shared-use path	US Highway 50	Douglas County
TOTAL			**1.25**			
Douglas Co. Hwy 50 Sidewalk (East Side)	Sidewalk	Douglas County	0.30	Kahle Drive	4th Road	Douglas County

Project Name	Description	Lead Implementer	Miles	Location Start	Location End	Jurisdiction
Kahle Community Park Path	Sidewalk	Douglas County	0.40	State Route 207	US Highway50	Douglas County
Kahle Drive	Sidewalk	Douglas County	0.08	US Highway 50	Class I Shared-use path	Douglas County
Kingsbury Grade Sidewalks	Sidewalk	Douglas County	0.98	US Highway 50	Pineridge Drive	Douglas County
Lake Parkway Sidewalks	Sidewalk	Douglas County	0.86	Stateline	US Highway 50	Douglas County
US Highway 50 (West)	Sidewalk	Douglas County	0.34	State Route 207/Kingsbury Grade	Lake Parkway	Douglas County
TOTAL			**2.96**			
15th Street Bike Path	C-I / Shared-Use	U.S. Forest Service	0.32	15th Street	Pope/Baldwin Path	El Dorado County
Fallen Leaf Lake Trail	C-I / Shared-Use	U.S. Forest Service	0.39	State Route 89	Fallen Leaf Campground	El Dorado County
Lake Tahoe Blvd	C-I / Shared-Use	El Dorado County	1.61	D Street	Sawmill Road	El Dorado County
Meyers Bikeway	C-I / Shared-Use	El Dorado County	4.80	State Route 89 & US Highway 50	Viking Way	El Dorado County
Pope/Baldwin Path	C-I / Shared-Use	U.S. Forest Service	3.89	15th Street	Spring Creek Road	El Dorado County
TOTAL			**11.01**			
Apache Ave (West)	C-II / Bike Lanes	El Dorado County	0.38	East San Bernadino	US Highway 50	El Dorado County
Lake Tahoe Blvd	C-II / Bike Lanes	El Dorado County	1.08	Boulder Mountain Drive	Sawmill Road	El Dorado County
North Upper Truckee	C-II / Bike Lanes	El Dorado County	4.62	Lake Tahoe Blvd	US Highway 50	El Dorado County
TOTAL			**6.07**			
Meyers US Highway 50 Sidewalk (South Side)	Sidewalk	Caltrans	0.06	South Upper Truckee	Pomo Street	El Dorado County
TOTAL			**0.06**			
Lakeside Bike Path	C-I / Shared-Use	TCPUD	2.81	Tahoe City "Wye"	Dollar Drive	Placer County
National Avenue	C-I / Shared-Use	NTPUD	0.23	State Route 28	Toyon Road	Placer County
Pinedrop Trail	C-I / Shared-Use	NTPUD	1.19	North Tahoe Regional Park	Pinedrop Lane	Placer County
Snow Creek Restoration Project	C-I / Shared-Use	Placer County	0.16	Toyon Road/Connection With Thud Path	Existing Forest Service Trail System	Placer County
Truckee River Trail	C-I / Shared-Use	TCPUD	6.86	Basin Boundary	Tahoe City "Wye"	Placer County
West Shore Bike Path	C-I / Shared-Use	Placer County	8.85	Sugar Pine Point	Tahoe City	Placer County
TOTAL			**20.09**			
State Route 28	C-II / Bike Lanes	Caltrans	10.00	Tahoe City "Wye"	Stateline Road	Placer County
War Creek To Tahoma Wide Shoulder	Wide Shoulder	Caltrans	6.14	Tahoma	Ward Creek	Placer County
TOTAL			**16.14**			
McKinney Drive	C-III / Bike Route	TCPUD	0.74	State Route 89	State Route 89 (Near Fremont Way)	Placer County
San Souci/Tahoe Ski Bowl Way	C-III / Bike Route	TCPUD	0.46	McKinney Drive	Fawn Street	Placer County
Sequoia Ave	C-III / Bike Route	Placer County	0.34	State Route 89	West Shore Trail	Placer County
State Route 89	C-III / Bike Route	Caltrans	0.11	Tahoe Ski Bowl Way	McKinney Drive	Placer County
TOTAL			**1.65**			
Kings Beach Sidewalks - Bear Street	Sidewalk	Placer County	0.05	State Route 28	Trout Street	Placer County
Kings Beach Sidewalks - Brooke Ave	Sidewalk	Placer County	0.14	Bear Street	Coon Street	Placer County
Kings Beach Sidewalks - Deer Street	Sidewalk	Placer County	0.03	State Route 28	Almost to Rainbow Ave	Placer County
Kings Beach Sidewalks - Fox Street	Sidewalk	Placer County	0.32	State Route 28	Steelhead Ave	Placer County
Kings Beach Sidewalks - Minnow Ave	Sidewalk	Placer County	0.07	Fox Street	Almost to Chipmunk	Placer County
Kings Beach Sidewalks - Secline Ave	Sidewalk	Placer County	0.16	State Route 28	Steelhead Ave	Placer County
Kings Beach Sidewalks - State Route 38	Sidewalk	Placer County	0.87	State Route 431	Chipmunk Street	Placer County
Kings Beach Sidewalks - Steelhead Ave	Sidewalk	Placer County	0.57	Secline Street	State Route 28	Placer County
Kings Beach Sidewalks -Coon Street	Sidewalk	Placer County	0.40	State Route 28	Dolly Vraden Ave	Placer County
Red Cedar Street	Sidewalk	Placer County	0.07	N. Lake Blvd (CA-28)	Tahoe Street	Placer County
State Route 28 Sidewalk (Northside)	Sidewalk	Placer County	0.71	Grove Street	Fairway Drive	Placer County
State Route 28 Sidewalks	Sidewalk	TCPUD	0.56	Tahoe State Recreation Area--Truckee River Outlet	Burton Creek State Park	Placer County
TOTAL			**3.93**			
Lakeshore Blvd	C-I / Shared-Use	Washoe County	2.97	West Terminus Park	East Terminus Park	Washoe County
Mays Blvd	C-I / Shared-Use	Washoe County	0.42	Lakeshore Blvd	Southwood Blvd	Washoe County
Northwood Blvd	C-I / Shared-Use	Washoe County	0.76	State Route 28	Northwood Blvd Elementary School	Washoe County
Southwood Blvd	C-I / Shared-Use	Washoe County	1.81	State Route 28	State Route 28	Washoe County
Village Blvd (South)	C-I / Shared-Use	Washoe County	1.38	Lakeshore Boulevard	College Drive	Washoe County
TOTAL			**7.34**			
State Route 28	C-II / Bike Lane	NDOT	**3.68**	Lakeshore Blvd	Lake Shore Blvd	Washoe County
Country Club Drive (West Side)	Sidewalk	Washoe County	0.51	State Route 28	Lakeshore Blvd	Washoe County
Incline Way	Sidewalk	Washoe County	0.26	Village Blvd	Northwood Blvd	Washoe County
Incline Way (North Side)	Sidewalk	Washoe County	0.16	Incline Creek	Country Club Drive	Washoe County
Oriole Way	Sidewalk	Washoe County	0.35	Southwood Blvd	Tanager Way	Washoe County
State Route 28 Sidewalk (North Side)	Sidewalk	Washoe County	0.23	Northwood Blvd	3rd Creek Townhomes	Washoe County
State Route 28 Sidewalks	Sidewalk	Washoe County	0.14	Stateline Road	Calaneva Drive	Washoe County
State Route 28 Sidewalks	Sidewalk	Washoe County	1.36	Stone Circle	Country Club Drive	Washoe County
State Route 28 Sidewalks	Sidewalk	Washoe County	0.16	Stateline Rd	Post Office	Washoe County
Stateline Rd	Sidewalk	Washoe County	0.06	State Route 28	End of Stateline Rd.	Washoe County
Tanager St	Sidewalk	Washoe County	0.18	Oriole Way	Village Blvd	Washoe County
Village Blvd Sidewalk	Sidewalk	Washoe County	0.06	Peepsight Ct	Lake Country Dr.	Washoe County
TOTAL			**3.46**			
OVERALL TOTAL			**119.86**			

Design Level Prioritized Project List

Project Name	Lead Implementer	Stage	Description	Estimated Total Cost	Miles	Jurisdiction	Final Score
High Priority							
Nevada Stateline to Stateline Bikeway Phase 2 (Incline to Sand Harbor)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$14,500,000.00	5.02	Washoe County	100
US Highway 50 Sidewalk or Shared Use Path Construction - Kingsbury Grade to Lake Parkway	Nevada Department of Transportation	Design	C-I / Shared-Use Path	$156,600.00	0.27	Douglas County	98.75
Al Tahoe Safety and Mobility Enhancement Project	City of South Lake Tahoe	Design	C-I / Shared-Use Path	$2,160,928.00	1.90	City of South Lake Tahoe	93.75
West Shore Bike Trail Extension & Improvements - Homewood	Tahoe City Public Utility District	Design	C- I / Shared-Use Path	$1,804,000.00	0.97	Placer County	92.5
South Tahoe Greenway Shared-Use Trail (Van Sickle to Sierra Blvd.)	California Tahoe Conservancy	Design	C-I / Shared-Use Path	$5,000,000.00	2.50	City of South Lake Tahoe	90
El Dorado Beach to Ski Run Boulevard Bike Trail	City of South Lake Tahoe	Design	C-I / Shared-Use Path	$2,200,000.00	0.82	City of South Lake Tahoe	88.75
South Tahoe Greenbelt (B Street, Winnemucca, South Avenue)	City of South Lake Tahoe	Design	Corridor Revitalization / Complete Streets	$2,162,500.00	1.60	City of South Lake Tahoe	87.5
West Shore Bike Trail Extensions & Improvements - Sugar Pine to Meeks Bay	Tahoe Transportation District	Design	C-I / Shared-Use Path	$3,000,000.00	0.60	El Dorado County	87.5
Nevada Stateline to Stateline Bikeway Phase 1 (Stateline / Edgewood)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$3,000,000.00	0.36	Douglas County	81.25
Nevada Stateline to Stateline Bikeway Phase 3 (Sand Harbor to Spooner Summit)	Tahoe Transportation District	Design	C-I / Shared-Use Path	$36,200,000.00	8.00	Washoe County, Carson City, Douglas County	78.75
Medium Priority							
Dollar Creek Shared-Use Trail	Placer County	Design	C-I / Shared-Use Path	$4,385,000.00	2.31	Placer County	62.5
Sierra Boulevard Complete Streets Project (From US Highway 50 to Barbara Avenue)	City of South Lake Tahoe	Design	Corridor Revitalization / Complete Streets	$1,620,000.00	0.54	City of South Lake Tahoe	62.5
Pope Beach Bike Path	U.S. Forest Service	Design	C-I / Shared-Use Path	$92,800.00	0.16	El Dorado County	60
Baldwin Beach Bike Path	U.S. Forest Service	Design	C-I / Shared-Use Path	$272,600.00	0.47	El Dorado County	58.75
Fallen Leaf Bike Trail	U.S. Forest Service	Design	C-I / Shared-Use Path	$4,740,000.00	3.16	El Dorado County	55
Low Priority							
North Tahoe Regional Bike Trail	Placer County	Design	C-I / Shared-Use Path	$15,800,000.00	4.35	Placer County	47.5
TOTAL:							
TOTAL:				**$97,094,428.00**	**33.03**		

Planning Level Prioritized Project List

Project Name	Lead Implementer	Stage	Description	Estimated Total Cost	Miles	Jurisdiction	Final Score
High Priority							
Blackwood Road Safe Routes to School Project	City of South Lake Tahoe	Planning	C-I / Shared Use	$290,000.00	0.50	City of South Lake Tahoe	97.5
Country Club Drive Bike Lanes (SR 28 to NV -431)	Washoe County	Planning	C-II / Bike Lane	$26,700.00	2.67	Washoe County	96.25
Incline Way Bike Lanes	Washoe County	Planning	C-II / Bike Lane	$5,800.00	0.58	Washoe County	96.25
Village Blvd Bike Lanes (Lakeshore Blvd to Country Club Road)	Washoe County	Planning	C-II / Bike Lane	$19,100.00	1.91	Washoe County	96.25
Tanager Street Shared Use Path	Washoe County	Planning	C-II / Shared-Use	$135,000.00	0.09	Washoe County	93.75
Village Green Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$300,000.00	0.20	Washoe County	93.75
Mountain to Beach Loop (Park Avenue, Pine Blvd., Lakeshore Blvd, and Stateline Avenue)	City of South Lake Tahoe / Tahoe Transportation District	Planning	Corridor Revitalization/Complete Streets	$1,385,000.00	0.97	City of South Lake Tahoe	92.5
Pine Ridge Dr. to Kahle /US 50 Intersection	Douglas County	Planning	C-I / Shared-Use	$750,000.00	0.50	Douglas County	92.5
Class I Bike Trail along State Route 28 from Preston Field to Northwood Blvd.	Washoe County	Planning	C-I / Shared-Use	$750,000.00	0.50	Washoe County	91.25
Incline Way Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$555,000.00	0.37	Washoe County	91.25
Northwood Blvd Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$660,000.00	0.44	Washoe County	91.25
Lakeside Bike Trail Phase 2C - Mackinaw to Commons Beach	Tahoe City Public Utility District	Planning	C-I / Shared-Use	$225,000.00	0.15	Placer County	90
Rufus Allen Boulevard Shared Use Path (SRTS)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$435,000.00	0.29	City of South Lake Tahoe	90
South Tahoe High Shared Use Trail, Safe Routes to School	City of South Lake Tahoe	Planning	C-I / Shared-Use	$450,000.00	0.15	City of South Lake Tahoe	90
Spruce Avenue Safe Routes to School Project	City of South Lake Tahoe	Planning	Corridor Revitalization/Complete Streets	$203,000.00	0.35	City of South Lake Tahoe	90
US 50 Shared Use Path (Kahle to Elk's Point)	Douglas County / NDOT	Planning	C-I / Shared-Use	$3,210,000.00	1.07	Douglas County	90
Country Club Drive Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$2,325,000.00	1.55	Washoe County	88.75
Nevada Stateline to Stateline Bikeway Phase 4 (Spooner Summit to Round Hill Pines)	Tahoe Transportation District	Planning	C-I / Shared-Use	$32,000,000.00	10.64	Douglas County	86.25
Lake Tahoe Boulevard Bike Trail Extension to Eloise Bike Route	City of South Lake Tahoe	Planning	Corridor Revitalization/Complete Streets	$1,185,000.00	0.79	City of South Lake Tahoe	85
Glenwood Way Shared Use Path (Fairway to Blackwood)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$375,000.00	0.25	City of South Lake Tahoe	82.5
Nevada Stateline to Stateline Bikeway Phase 5 (Crystal Bay to Incline)	Tahoe Transportation District	Planning	C-I / Shared-Use	$20,000,000.00	2.14	Washoe County	82.5
Class I Bike Trail: Third Street/Tahoe Valley Elementary	City of South Lake Tahoe	Planning	C-I / Shared-Use	$75,400.00	0.13	City of South Lake Tahoe	81.25
South Shore Beach Path (Cascade to Spring Creek Road)	U.S. Forest Service - Lake Tahoe Basin Management Unit	Planning	C-I / Shared-Use	$2,610,000.00	1.74	El Dorado County	81.25
Wyoming Avenue to Tahoe Valley Elementary Safe Routes to School Project	City of South Lake Tahoe	Planning	C-I / Shared-Use	$34,800.00	0.06	City of South Lake Tahoe	81.25
Blackwood Road Shared Use Path (Fairway to Pioneer Trail)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$900,000.00	0.60	City of South Lake Tahoe	80
Fairway Avenue Bike Lanes	City of South Lake Tahoe	Planning	C-II / Bike Lane	$3,200.00	0.32	City of South Lake Tahoe	80
Ski Run Bike Lanes	City of South Lake Tahoe	Planning	C-II / Bike Lane	$6,000.00	0.60	City of South Lake Tahoe	80
Brockway Vista Multi-Use Trail	Placer County	Planning	C-I / Shared-Use	$2,190,000.00	0.73	Placer County	79
US Hwy 50 Bike Lanes (Stateline to Spooner Summit)	Douglas County / NDOT	Planning	C-II / Bike Lane	$122,100.00	12.21	Douglas County	78.75
West Shore Trail Extension (DL Bliss)	N/A	Planning	C-I /Shared Use	$9,660,000.00	3.22	El Dorado County	78.75
Brockway Vista Multi Use Path Extension	Placer County	Planning	C-I / Shared-Use	$2,430,000.00	0.81	Placer County	77.65
State Route 89 Bike Lanes (Tahoe City "WYE" to Basin Boundary)	Caltrans	Planning	C-II / Bike Lane	$36,000.00	4.00	Placer County	76.25
Medium Priority							
Tahoe Valley Shared Use Connector Path (Dunlap)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$87,000.00	0.15	City of South Lake Tahoe	76.25

Project Name	Lead Implementer	Stage	Description	Estimated Total Cost	Miles	Jurisdiction	Final Score
Bijou Bike Park Path (Johnson Blvd to Greenway)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$213,750.00	0.45	City of South Lake Tahoe	73.75
Washington Avenue Safe Routes to School Project	City of South Lake Tahoe	Planning	Corridor Revitalization/Complete Streets	$200,000.00	0.19	City of South Lake Tahoe	73.75
Class I Bike Path: East San Bernardino - West San Bernardino	El Dorado County	Planning	C-I / Shared-Use	$960,000.00	0.32	El Dorado County	72.5
Class I Bike Trail along US Highway 50 from H Street to the City Limits	City of South Lake Tahoe	Planning	C-I / Shared-Use	$600,000.00	0.40	City of South Lake Tahoe	72.5
Meyers Bikeway Extension	El Dorado County / Caltrans	Planning	C-I / Shared-Use	$675,000.00	0.45	El Dorado County	72.5
State Route 89 Shared Use Path (South Tahoe "Y" to 15th Street)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$1,305,000.00	0.87	City of South Lake Tahoe	72.5
Alder Avenue Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$690,000.00	0.46	Washoe County	71.25
SR 28 Shared Use Path: I Lakeshore Drive to NV -431	Washoe County	Planning	C-I / Shared-Use	$750,000.00	0.50	Washoe County	71.25
South Tahoe Bikeway Extension (Oakland Avenue)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$360,000.00	0.12	City of South Lake Tahoe	70
South Tahoe Greenway "Y" Connector	California Tahoe Conservancy	Planning	C -I / Shared Use	$1,320,000.00	0.44	El Dorado County	68.75
Glenwood Avenue Bike Lanes	City of South Lake Tahoe	Planning	C-II / Bike Lane	$16,000.00	1.60	City of South Lake Tahoe	67.5
Nevada Greenway Extension to Kingsbury grade (via Market Street)	Douglas County/ California Tahoe Conservancy	Planning	C-I / Shared-Use	$2,310,000.00	0.77	Douglas County	67.5
Lyons Avenue to Al Tahoe Blvd. North - South Connectivity (SRTS)	City of South Lake Tahoe / LTUSD	Planning	C-I / Shared-Use	$330,000.00	0.22	City of South Lake Tahoe	66.25
State Route 267 Complete Street Improvements	Placer County/ Caltrans	Planning	Corridor Revitalization / Complete Streets	$9,570,000.00	3.19	Placer County	63.75
Bijou Meadow East-West Connectivity (SRTS)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$1,350,000.00	0.45	City of South Lake Tahoe	62.5
Hwy 50 City to Meyers Bike Lanes	El Dorado County / Caltrans	Planning	C-II / Bike Lane	$21,100.00	2.11	El Dorado County	61.25
McCourry Blvd Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$690,000.00	0.46	Washoe County	57.5
Driver Way Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$870,000.00	0.58	Washoe County	56.25
Fairway Blvd Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$660,000.00	0.44	Washoe County	56.25
Ski Way Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$1,095,000.00	0.73	Washoe County	56.25
South Tahoe Bikeway Extension (James Avenue)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$14,250.00	0.03	City of South Lake Tahoe	56.25
Village Blvd Shared Use path	Washoe County	Planning	C-I / Shared-Use	$630,000.00	0.42	Washoe County	56.25
Class I Bike Trail Along US Highway 50 from City Limits to Sawmill Road	El Dorado County	Planning	C-I / Shared-Use	$1,935,000.00	1.29	El Dorado County	55
South Tahoe Bikeway Connector (US 50 @ Sierra Blvd to Bikeway)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$28,500.00	0.06	City of South Lake Tahoe	55
SR 89 North Shared-Use Path	Placer County	Planning	C-I / Shared -Use	$266,000.00	0.56	Placer County	55
Gardner Mountain Shared Use Connector Path	City of South Lake Tahoe	Planning	C-I / Shared-Use	$38,000.00	0.08	City of South Lake Tahoe	53.75
Golfers Pass Road Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$1,260,000.00	0.84	Washoe County	53.75
North Tahoe Regional Bike Trail Connector (Carnelian Woods Avenue to Trail)	Placer County	Planning	C-I / Shared-Use	$1,245,000.00	0.83	Placer County	52.5
Low Priority							
Old Mt. Rose Highway Shared Use Path	Washoe County	Planning	C-I / Shared-Use	$3,810,000.00	2.54	Washoe County	47.5
State Route 89 Class I Bike Trail - Highway 50 to Portal Road	El Dorado County	Planning	C-I / Shared-Use	$3,645,000.00	2.43	El Dorado County	47.5
National Avenue Shared Use Path	Placer County	Planning	C-I / Shared-Use	$750,000.00	0.50	Placer County	45
North Upper Truckee Bike Lanes	El Dorado County	Planning	C-II / Bike Lane	$7,100.00	0.71	El Dorado County	42.5
Ski Way Bike Lanes	Washoe County	Planning	C-II / Bike Lane	$8,100.00	0.81	Washoe County	41.25
Summit to Lake Trail	Placer County	Planning	C-1/ Shared-Use	$7,000,000.00	3.00	Placer County	37.5
South Tahoe Greenway Future Phases (Meyers to Sierra Blvd)	California Tahoe Conservancy	Planning	C -I / Shared Use	$14,187,000.00	5.00	El Dorado / City of South Lake Tahoe	32.5
Carnelian Woods Bike Lanes	Placer County	Planning	C-II / Bike Lane	$4,700.00	0.47	Placer County	25
South Tahoe Bikeway Extension (Meadow Connection: Sunset Avenue)	City of South Lake Tahoe	Planning	C-I / Shared-Use	$2,010,000.00	0.67	City of South Lake Tahoe	13.75
SR 267 (Kings Beach) - Stateline: Shared-Use Path	Placer County	Planning	C-I / Shared-Use	$3,400,000.00	1.90	Placer County	10
TOTAL:							
TOTAL:				**$147,663,600.00**	**87.57**		