



**COLORADO**  
Department of Transportation

# Statewide Bicycle and Pedestrian Plan



prepared by:

**Amended June, 2015**  
Adopted October, 2012



in association with:



# STATE OF COLORADO

## DEPARTMENT OF TRANSPORTATION

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November 30, 2012

To our citizens:

The Colorado Department of Transportation (CDOT) is pleased to present the Statewide Bicycle and Pedestrian Plan. This document outlines a vision and direction for improving bicycling and walking throughout this great state of Colorado.

This Plan was developed in consultation with a wide range of representatives from different levels of government, special interest groups, design professionals, and citizens. These working groups held meetings, webinars and many conversations for more than a year to develop a plan that would increase the level of biking and walking for both transportation and recreational purposes.

This Plan includes the goals of increasing safety for bicyclists and pedestrians and increasing the use of these modes for travel. It also addresses other benefits of biking and walking including reducing reliance on fossil fuels, reducing emissions, improving health, improving local economy and ultimately enhancing our quality of life.

This Plan will be integrated into the Statewide Transportation Plan, which is currently being updated. We will also be moving into an implementation stage of the Statewide Bicycle and Pedestrian Plan to ensure resources are allocated in the most efficient and effective way possible. We'll also be developing specific performance measurements to help us evaluate our progress.

Bicycling and walking are important components of a statewide transportation network. This Plan is another step in our commitment to increasing multimodal transportation options for our public.

Sincerely,

A handwritten signature in blue ink that reads "Donald E. Hunt". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Donald E. Hunt,  
Executive Director

# COLORADO STATEWIDE BICYCLE AND PEDESTRIAN PLAN

The Colorado Department of Transportation (CDOT) adopted its first-ever Statewide Bicycle and Pedestrian Plan in October, 2012. Its purpose was to establish a direction for improving biking and walking throughout Colorado. The Plan also provided performance measures that would gauge improvements as well as provide guidance for investment decisions.

As the Plan began to be implemented, it was determined that the performance measures needed to focus more on key system-level measures rather than individual project-level measures. As such, the measures identified in Chapter IV were revisited.

Because the Bicycle and Pedestrian Plan is a snapshot in time, and because the revisions only apply to performance measures, we did not change any information as it was originally presented. Instead, we created a new appendix (Appendix A) that looks at system-wide measurements including: bicycle and pedestrian crash rates, bicycle accommodation on the state's roadways, and obesity rates. Evaluating these three measurements would allow us to provide baseline statewide data for the performance measures, identify existing data trends, and propose targets that represent significant improvement.

The goals and vision of the Plan remain the same, as do its integration and influence on other documents such as the Statewide Transportation Plan and the Strategic Highway Safety Plan, with the ultimate purpose of increasing bicycling and walking activity.

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Adopted October, 2012  
**Amended June, 2015**



## ACKNOWLEDGEMENTS

The following individuals provided valuable time and indispensable input in the development of the *Statewide Bicycle and Pedestrian Plan*.

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Bert Weaver – Clear Creek County

Hundreds of webinar and online survey participants from around the state also provided valuable input in the plan's development, and Consultant Team members BBC Research & Consulting, LiveWell Colorado, and Jack Faucett Associates contributed expertise in establishing performance measures.





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## I. INTRODUCTION, BACKGROUND, AND PLAN SUMMARY

### Background and Setting

The Colorado Department of Transportation (CDOT) has an excellent foundation on which to develop a statewide plan for improving bicycling and walking in the state. The residents and visitors of Colorado find an increasing number of bicycle and pedestrian facilities awaiting them for their transportation and recreational needs. CDOT has been progressive in providing accommodations for bicycling and walking. New policy and procedural directives and subsequent State Statute 43-1-120 are helping to increase walking and bicycling across the state. CDOT has also been proactive in training planners, designers, and engineers, with agency staff attending bicycle and pedestrian facility design training for many years. CDOT recently developed one of the most progressive and reliable roadway design manuals for bicycle and pedestrian facilities in the country. Additionally, CDOT has embarked on a groundbreaking effort to help integrate active transportation and healthy living lessons into Colorado classrooms in all subject areas. Finally, the state has a growing bicycle and pedestrian counting program that offers fresh insight and support for bicycle and pedestrian programs. These are just a few of the many ways CDOT is promoting and encouraging walking and biking throughout Colorado.

However, there is more to be done to establish the comprehensive and multimodal transportation system outlined in CDOT’s Policy and Procedural Directives; the stakes are high and the challenges continue to mount. Existing rights-of-way are constrained in many places and funding for roadway construction, reconstruction, and maintenance continues to shrink. Often, significant segments of CDOT’s constituency do not see the long-term value or benefits of investing in bicycle or pedestrian infrastructure or programs. Advocacy groups often do not agree among themselves on what types of facilities or programs will best serve them. An accurate and comprehensive statewide inventory of bicycling and walking facilities and existing conditions does not currently exist as a baseline for measurement. Technical staff of CDOT’s regions or local jurisdictions are grappling not only with tight budgets, but also with a variety of operational design challenges, such as how to provide safe and effective mid-block pedestrian or multi-use pathway crossings, as well as how to incorporate safely-functioning multi-use pathways alongside their roadways.

More importantly, Colorado, like other parts of the country, still faces significant economic challenges. Many of the state’s “economic engines” have been idled, and significant recovery is still years away. For example, the resort industry and real estate development, long staples of many areas on the Western





Slope, and significant revenue components for the state, have slowed considerably and will likely continue a slow recovery. The state’s population, while relatively young and fit compared to the rest of the United States, nevertheless faces increasing health care costs, whether due to the enduring effects of childhood obesity, adult inactivity, or the effects of an aging population. Finally, volatile energy and fuel prices continue to claim larger shares of Colorado residents’ household budgets, affecting not only disposable income, but in many cases their basic economic viability. These hardships faced by Colorado’s citizens represent a real challenge to the state’s financial health.

Colorado’s history has been inextricably tied to its core economic engines. For nearly a century, the economic basis for the state was tied to the discovery of gold and other precious metals in the mid- and late-1800s and the ensuing development of the mining industry. As mineral resources economically diminished, tourism began to fill the gap and has become an engine for the state. Resorts and land development followed, not only providing a sustenance to the Western Slope, but also significantly affecting the growth of Front Range communities. Today Colorado has a more diversified economic base, yet these sectors’ vitality remains central to the state’s overall economic prosperity.

Better accommodation of active transportation, such as bicycling and walking, plays a tangible role in Colorado’s economic health. Providing more varied and appealing access to Colorado’s

rich history, historic towns, and natural beauty by enhancing bicycle access to Scenic Byways, for example, will help the state’s tourism sector, which is so important to the state’s economy. Providing better and safer access for our students to walk or bicycle to school can help reduce childhood obesity, as well as create more alert students who achieve more in the classroom and beyond. Providing access to jobs, for those who don’t have cars, or for those who may be faced with losing access to them, will have a palpably positive effect on Colorado’s



Photo courtesy of Jim Parkin - Dreamstime.com

economy. Preserving and enhancing the outdoor and active recreational lifestyle of Colorado residents through provision of bicycling and walking facilities offers widespread benefits. Enabling a mode shift to bicycling or transit confers three times the benefits in: congestion and greenhouse gas (GHG) reductions, increases in households’ disposable incomes, and the ongoing promotion of community health. Perhaps more so than for any other state in the country, the investment in bicycling and walking infrastructure and programs has the potential for compounding







economic benefits for Colorado, not only in the short term, but also in the long term.

It is within this setting of challenges and opportunities that CDOT has initiated this first phase of the *Statewide Bicycle and Pedestrian Plan*.

### Plan Summary

CDOT is routinely faced with the dilemma of determining which bicycle and pedestrian projects and programs to fund. Furthermore, in the face of restricted revenues, the demand for such projects and programs, both from within the state’s jurisdiction and from local and regional agencies that rely on state funding sources, far exceeds available resources. Therefore, a key objective of this *Plan* is to create and implement an approach to evaluating competing projects that is consistent, defensible, and reflective of the needs and perspectives of various stakeholder groups.

The first several sections of the *Plan* provide the foundation for this approach, which builds on the methodological foundation and process used by many metropolitan planning organizations (MPOs) and transportation planning regions (TPRs):

- A *Plan* vision and the identification of broad statewide goals achieved through bicycling and walking activity, as well as the central role that the public and stakeholders had in shaping the goals and subsequent *Plan* elements;

- A summary of existing conditions, particularly as they relate to the *Plan’s* goals, to provide a snapshot of the current setting and to establish a general baseline for tracking progress; and
- Investment decision criteria, based on the *Plan’s* goals, to assist in the evaluation of candidate bicycle and pedestrian infrastructure projects and programs, alongside specific performance measures to aid in such evaluations and to track statewide progress toward achieving the goals.

Following the establishment of this “goals → investment decision criteria → performance measurement” track, the *Plan* focuses on coordination with other statewide planning initiatives. One arena for coordination is the integration of the *Statewide Bicycle and Pedestrian Plan* into CDOT’s *Statewide Long Range Transportation Plan* and other multimodal planning initiatives, as well as the long range transportation planning that is continually performed by the state’s metropolitan and rural regions. The *Plan* also identifies tools for change, originating both from within CDOT and from larger national initiatives, which collectively bolster the standing of bicycle and pedestrian transportation. Finally, the *Plan* identifies appropriate next steps to ensure that CDOT’s many bicycle and pedestrian planning efforts remain responsive, flexible, and viable throughout the coming decades.





## II. VISION, GOALS, AND PUBLIC OUTREACH

### Vision

Bicycling and walking activity in Colorado benefits the state and its citizens in many ways. Some of these benefits are not commonly associated with the act itself of traveling by bike or on foot, but nearly all of them are widely recognized throughout the state as valuable aims. CDOT intends to help achieve these benefits by promoting active transportation, as stated in the following vision for this *Plan* and for CDOT’s broader bicycle and pedestrian program:

“The Colorado Department of Transportation intends to increase bicycling and walking activity levels, for both transportation and recreational purposes, through both infrastructure projects and promotional programs, to help achieve the broadly established and supported economic, public health, environmental, and quality of life benefits.”

### Goals

The goals developed for this *Plan*, which have been developed to help achieve the *Plan’s* vision, begin with increasing bicycling and walking activity, and subsequently include elements that are directly related to the benefits of such activity. For the most part, these goals originate with policy statements produced by other statewide planning

initiatives, including documents produced by groups such as the Colorado Transportation and Finance Implementation Panel, the Colorado Physical Activity and Nutrition Program, and the Colorado Climate Action Plan. The state’s two types of regional transportation planning agencies, MPOs and TPRs<sup>1</sup>, have also adopted many of the goals in some form. Input from this *Plan’s* Stakeholder Group and through feedback received from the public via statewide goal-setting webinars also contributed to the development of goals (as discussed in more detail in the Public Outreach section). This process led to the creation and refinement of the following goals for CDOT’s ongoing promotion of bicycling and walking in Colorado.

- **Enhance Safety** - Many bicycle- and pedestrian-related projects and programs are specifically geared to improve safety for users of those modes. Many innovative new engineering approaches are available to improve non-motorized safety, particularly at intersections and mid-block locations, and the efficacy of safety projects can be measured using crash reports and statistics. This goal also incorporates efforts to improve safe operating behaviors among motorists, bicyclists, and pedestrians through education and enforcement activities.

<sup>1</sup> **Appendix B** contains the results of a thorough review of regional bicycle- and pedestrian-related goals and objectives.





- Increase Bicycling and Walking Activity** - Increased bicycling and walking activity is the springboard that enables widespread benefits. Many communities statewide have found that the best way to increase non-motorized activity is by improving the bicycling and walking conditions in their transportation corridors.

**Expand Recreational Opportunities and Enhance Quality of Life** - Numerous quality of life indicators are enhanced by the ability to safely and comfortably bicycle and walk. Specifically, bicycle and pedestrian accommodation provides a greater variety of transportation choices, enables lifelong communities to be created in which



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residents of a particular place can comfortably progress through all stages of life, enhances and preserves the character of communities, helps maintain property values, and offers abundant recreational opportunities. Such opportunities can be enhanced by creating better access to public lands and offering more ways to enjoy the state’s Scenic Byways.

- Improve Public Health** - Active transportation is an ideal way for Colorado’s residents to build the recommended amount of daily exercise into their lives. Such activity has the potential to play a key role in reversing the trend of increased obesity in the state among children, adults, and senior citizens, as well as the associated chronic disease rates. Beyond the physical benefits, bicycling and walking activity can also improve mental health.
- Improve the Environment, Air Quality, and Fossil Fuel Independence** - More people bicycling and walking instead of driving their cars leads to lower GHG emissions, thereby benefiting air quality for the state. The importance of this benefit is underscored by the fact that the short auto trips that bicycling and walking would replace are those that produce the highest level of emissions. Furthermore, shifting to active transportation modes helps reduce economic dependence on fossil fuels.





- Provide Transportation Equity (Social and Educational Opportunities)** - For many Coloradans, bicycling and walking are key elements of transportation mobility. This mobility can be realized by providing safe non-motorized access to schools and learning centers for Colorado’s youth, and by constructing new bicycle and pedestrian facilities in areas with significant senior, minority, and low-income populations.
- Maximize Transportation Investments** - Bicycling and walking can go a long way in optimizing the many types of transportation investments made by Colorado’s public agencies. Roadway capacity projects, which represent significant capital expenditures, can be made more efficient if some auto trips are converted to bicycling and walking. Enhanced non-motorized access to transit expands the reach of public transportation systems and the effectiveness in those investments. Finally, the efficacy of bicycle and pedestrian networks themselves can be optimized by implementing strategic and logical connections.
- Improve Statewide and Regional Economy** - Promoting and accommodating bicycling and walking can lead to economic benefits. For example, new facilities (both on-road and off-road) can lead to active transportation-related tourism. The choice to bike or walk to work leaves more money in residents’ pockets, otherwise used for fuel and other auto-related expenses, which

is then frequently re-invested in the local economy. Bicycle and pedestrian facilities create access to jobs for much of the state’s population. Bicycle infrastructure, in particular, attracts a creative and highly educated working class that develops new business in the state.



Photo courtesy of Bruce Landis

### Public Outreach

Early in the planning process, citizenry were actively engaged in both goal-setting and continuing involvement and coordination. This occurred through two primary ways: 1) a *Plan* Stakeholder Group made up of public agencies and advocacy groups who represent a broad cross-section of the public, and 2) a series of interactive statewide webinars held primarily for general public input and participation. Stakeholder Group members include representation from state agencies such as the Colorado Department of Public Health and Environment (CDPHE), the Colorado Department of Local Affairs (DOLA), and the Colorado State Patrol; regional, county, and





municipal planning agencies; LiveWell Colorado; and Bicycle Colorado. The Stakeholder Group convened at key stages in the *Plan* development to provide input, direction, and review of work products.

At a relatively early stage in the *Plan* development process, two webinars were conducted to brief the public regarding the *Plan's* purpose and the status of CDOT's other bicycle- and pedestrian-related initiatives, and to garner feedback regarding proposed goals and associated investment decision criteria that would be used to help CDOT evaluate candidate projects and programs. Subsequent to the webinars, a link to a recording of the webinar was distributed, and those who were unable to participate in the initial webinars were able to view the recorded webinar and participate in an on-line survey consisting of the same questions that were asked during the webinars.

Approximately 150 people statewide participated in the webinars, and nearly 50 people participated in the subsequent on-line survey.

Among other questions, webinar and survey participants were asked to specify how important each of the draft goals is to them. The results affirmed that all of the draft goals, indeed, have broad support. Therefore, while the titles of some of the draft goals were refined based on participant feedback, all of the draft goals were retained and none were added. Many participant suggestions for additional or refined investment decision criteria, which are discussed in the next section, were incorporated into the *Plan*. **Appendix C** contains a full summary of the webinar and survey results.





### III. EXISTING CONDITIONS AND TRENDS

Colorado is well suited to bicycling and walking activity. The state’s sunny weather, scenic quality, and physically active citizenry all contribute to the potential for bicycling and walking to become even more significant forms of transportation and recreational activity. Much of this potential has already been realized. Colorado is viewed nationwide as a destination for biking and hiking. For example, the League of American Bicyclists ranks Colorado as the fourth most bicycle friendly state in the nation, and the state’s 16 designated Bicycle Friendly Communities rank second per capita nationally. Against this backdrop, this section of the *Statewide Bicycle and Pedestrian Plan* highlights existing conditions and suggests baseline measures for many statewide sectors, focusing on those that represent the established *Plan* goals.

#### Safety

Existing data sources provide insight into the extent and nature of pedestrian and bicycle crashes in Colorado. While overall crash volumes could be used to measure the success of safety programs, the raw number of crashes or fatalities may not tell the complete story of pedestrian and bicycle safety. The following section provides information that could be used as a baseline for evaluating crash reduction strategies. These include lighting conditions, month of year, crash fault (motorist versus bicyclist/pedestrian), sex of the bicyclist or

pedestrian involved, and age of the bicyclist or pedestrian involved.

On a national level, fatalities per 100,000 population is typically used to rank states in terms of crash rates. According to the National Highway Traffic Safety Administration’s (NHTSA’s) Traffic Crash Facts, Colorado ranked 22nd in the country in terms of crash rates (with the first ranked being the lowest crash rate) with a fatality rate of 0.94 fatalities/100,000 population.<sup>2</sup> For bicycle crashes, Colorado was ranked 20th with a fatality rate of 1.51 fatalities/100,000 population (tied with Wisconsin).<sup>3</sup> Because the actual number of pedestrian or bicycle miles traveled may not be directly correlated to population, some care must be used when using this fatalities/100,000 population rate as a basis of comparison among states. There is no measure of pedestrian exposure or bicyclist exposure that can be used across Colorado to determine crashes per mile traveled (or per trip, or per hour of exposure, etc.). Until such time as this data is available, any use of data to identify trends must rely on assumptions of relative exposure rates for different populations.

According to CDOT’s 2012 *Problem Identification Report Draft*, pedestrians

<sup>2</sup> Traffic Crash Facts 2009, Pedestrians, NHTSA, Washington DC, 2010. This is the most recent year for which this summary is available.

<sup>3</sup> Traffic Crash Facts 2010, Bicyclists and Other Cyclists, NHTSA, Washington DC, 2012. This is the most recent year for which this summary is available.





represented nearly 10 percent of Colorado’s traffic fatalities (44 of 446) and bicyclists represented nearly 2 percent of traffic fatalities (8 of 446) in 2011. Between 2003 and 2007 (the most recent years for which there are complete CDOT Crash Database datasets), there have been an average of 1,475 pedestrian crashes and 1,106 bicycle crashes (with motorists) resulting in 61 fatalities and 8 fatalities, respectively.

A detailed analysis of crash records (a database) and crash reports (which include narrative text and sketches) would provide specific baseline data with respect to the temporal, demographic, and causal factors associated with Colorado’s pedestrian and bicycle crashes. The results of such an analysis could be used to identify specific measures that could be taken to reduce pedestrian and bicycle crashes. **Appendix D** provides a sample of potential benchmarking datasets.

### **Bicycling and Walking Activity**

Relative to other states, bicycling and walking for both recreational and utilitarian purposes are quite prevalent in Colorado. One concrete example of this statewide characteristic is from the 2009 National Household Travel Survey (NHTS), data from which indicate that nearly 2 percent of commute trips in Colorado are made by bicycle, which is more than twice the national average. Colorado ranks second among all states in this regard.

Statistics like these are currently difficult to come by because bicycle and pedestrian travel monitoring (i.e., counting) lags far behind monitoring of motorized traffic. Colorado, however, has emerged as a national leader in non-motorized travel monitoring in terms of both researching effective and appropriate count technologies and actually installing count devices. As CDOT’s count program continues to expand, it will enable the establishment of valuable baseline data and create the ability to track bicycle and pedestrian activity levels over time.

### **Recreational Opportunities and Quality of Life**

For many current and future residents of Colorado, the ability to bike and walk comfortably in everyday life, particularly in terms of recreational opportunities, represents a significant component of their perceived quality of life. The La Plata County Economic Development Alliance and the City of Denver (through its bike share program) are just two examples of Colorado agencies that have touted bicycling as an important quality of life indicator. As noted in the Statewide Economy section, providing a high quality of life is a key factor in attracting businesses and the people who work there. For example Colorado Blueprint identifies DOLA’s Sustainable Main Streets Initiative, with its focus on pedestrian friendliness, as a tool for recruiting and retaining businesses.





Some of the best ways to create non-motorized recreational opportunities are through enhancing Scenic Byways, creating access to public lands, and simply constructing shared use paths near where people live. Statewide trends for these initiatives are identified below.

### Enhancing Scenic Byways

CDOT operates a well-established system of designated Scenic and Historic Byways. These 25 routes frequently include bicycle and pedestrian facilities. In addition, the Scenic Byways’ adopted corridor management plans frequently identify needs and opportunities for non-motorized access, as well as walking tours and adjacent bicycle paths that can be quickly accessed from the byway routes. In the coming years, it will be important to provide safe and comfortable bicycle and pedestrian accommodation along much of the scenic byway system.

### Creating Access to Public Lands

Colorado is fortunate to have abundant public lands. In fact, according to the United States Department of the Interior’s Bureau of Land Management (BLM), “More than one-third of Colorado’s land area is owned by the public and available for public use.” Given that roads are frequently sparse in these lands, the best ways for them to be explored are often by bicycle and on foot, and many groups around the state are working to create access and opportunities for recreational use.

One particular success story highlighted by the Federal Highway Administration (FHWA) in its 2008 *Guide to Promoting Bicycling on Federal Lands* is the trail systems on more than 1 million acres of BLM lands near Fruita and Grand Junction. According to the Guide, in the more than 20 years since the trail system began to form, “Fruita has evolved from an economically depressed agricultural community into a thriving mountain biking destination.”

Of course, a key challenge related to bicycling and walking on public lands is not only to create opportunities on the lands themselves, but also to provide facilities on the roads (frequently CDOT highways) that lead to public lands.

### Providing Shared Use Pathways

When it comes to recreational opportunities, the facilities that have the potential to draw the widest variety of users, from families with young children to senior citizens, are shared use paths. Throughout Colorado, there are many examples of successful trails, both in urban environments (e.g., the Cherry Creek Trail, the South Platte River Greenway Trail, and the Pikes Peak Greenway) and rural environments (e.g., the Glenwood Canyon Recreational Trail – recognized by FHWA as a best practice for locating trails adjacent to interstate highways). As shared use paths become more prevalent statewide, focus will be needed to create numerous and safe connections between this off-street system and the concurrently expanding on-street network of bicycle and pedestrian facilities.





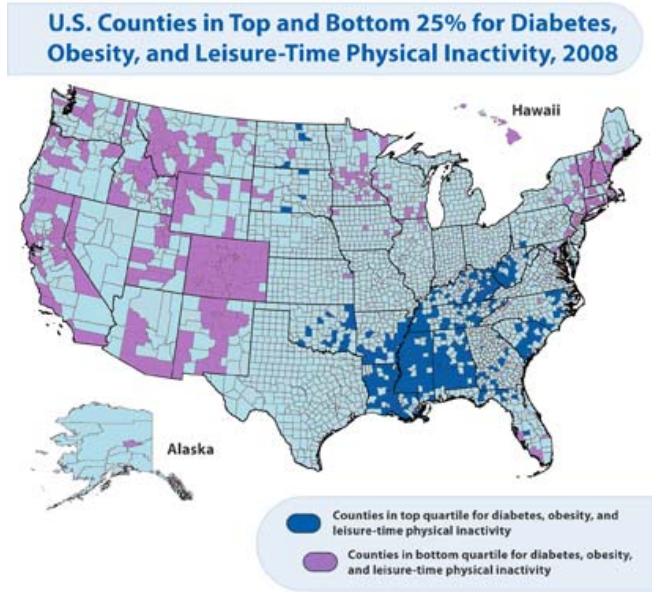


## Public Health

Colorado is generally viewed as one of the nation’s healthiest states. It routinely ranks among the nation’s best in activity levels, obesity rates, and prevention of associated diseases such as hypertension and diabetes. The following statistics provide evidence of Colorado’s successes in this arena:

- The state’s 21 percent obesity rate in 2010 was the lowest in the nation (Centers for Disease Control and Prevention [CDC]);
- 71 percent of Colorado adults are classified as “physically active,” the sixth highest rate in the nation (CDC); and
- 68 percent of Colorado’s youth, more than in any other state, have parks, community centers, and sidewalks in their neighborhoods (CDC).

The CDC map shown in **Figure 1** indicates (in purple) counties that rank in the bottom (best) 25 percent nationwide in the incidence of diabetes, obesity, and leisure-time physical inactivity; Colorado stands out for being the most “filled in” of any state.



**Figure 1. U.S. Counties in Top and Bottom 25% for Diabetes, Obesity, and Leisure-Time Physical Inactivity, 2008 (CDC)**

While Colorado clearly ranks well in many health indicators, its residents are not immune from nationwide trends. Obesity and disease rates are on the rise in Colorado, as they are elsewhere in the United States.<sup>4</sup> In fact, a recent CDPHE study<sup>5</sup> indicates that the state’s rise in obesity between 1995 and 2008 (an 89 percent increase) was notably higher than the nationwide increase (67 percent). Enabling residents to maintain or increase their physical

<sup>4</sup> According to a CDC National Center for Health Statistics Data Brief, between 2000 and 2010 obesity rates rose among United States men (28% to 36%), women (33% to 36%), boys (14% to 19%), and girls (14% to 15%).

<sup>5</sup> Weight of the State: 2009 Report on Overweight and Obesity in Colorado, CDPHE, 2009.



activity levels is one of the best ways to reverse this trend, and bicycling and walking at a moderate pace constitute the moderate physical activity levels recommended by the CDC. Accommodation of bicycling and walking, both for recreation and transportation purposes, leads to more bicycle and pedestrian activity, hence improved health for Coloradans.

### Environment

Preserving and enhancing Colorado’s natural and built environment is important to the state’s citizens and for maintaining a high quality of life for future generations. CDOT’s department-wide vision is “To enhance the quality of life and environment of the citizens of Colorado by creating an integrated transportation system that focuses on safely moving people and goods by offering convenient linkages among modal choices.”<sup>6</sup> Provisions for bicycling and walking are critical to realizing this vision and can be fundamental in preserving and enhancing the environment.

Colorado’s environmental resources are vast and varied, including parks and recreational resources, fish and wildlife, historic properties, air quality, water quality, and many others. Of the environmental resources in Colorado, air quality has the highest potential for improvement through investment in bicycle and pedestrian infrastructure and programs.

Air quality can be affected by a number of transportation-related sources, such as tailpipe emissions, road dust, and refueling. Often, these emissions are proportional to the vehicle miles of travel (VMT). Total pollutant emissions can be decreased through shifting from auto to bicycle and pedestrian modes, thereby reducing VMT.

The Clean Air Act (CAA) and its amendments directed the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for each of six criteria pollutants to protect the public from the health hazards associated with air pollution. Nine counties in Colorado (in the Denver and North Front Range areas) are within an ozone nonattainment area. An area is defined as nonattainment if it does not meet the NAAQS for a certain pollutant. Several regions of the state are maintenance areas for particulate matter (PM<sub>10</sub>) and/or carbon monoxide. A maintenance area is one that has been previously designated as a nonattainment area and is required to develop a maintenance plan. These areas of the state, in particular, are the focus of efforts to reduce air pollution.

In addition to improving Colorado’s air quality and GHG emissions, provision of bicycle and pedestrian facilities and programs can contribute to a reduction in the state’s dependence on fossil fuels.

<sup>6</sup> CDOT Policy Directive 14.0 – Colorado Department of Transportation Vision, Mission, Investment Category Goals and Objectives.





Statewide Bicycle and Pedestrian Plan

**Transportation Equity**

While bicycling and walking are a hobby for some Coloradans, for many others they represent the only opportunity for mobility. As such, active transportation modes serve a key function in expanding the social and educational opportunities available to many segments of the population who are frequently transportation disadvantaged, including children, senior citizens, the disabled community, and low-income individuals and families.

Providing bicycle and pedestrian facilities in places where senior, disabled, and low-income populations are prevalent helps ensure mobility for all and promotes the concept of transportation equity. At this time, statewide baseline estimates of the percentage of these groups who have easy access to safe and comfortable non-motorized travel opportunities do not exist.



Photo courtesy of Jennifer Bartlett

Colorado is involved in a nationwide effort to improve safe bicycle and pedestrian access to schools. Safe Routes to School (SRTS) initiatives

frequently include both infrastructure (i.e., facility) and promotional (education, encouragement, and enforcement)

components. The state’s SRTS program (spearheaded by CDOT) currently provides funding to more than 500 schools across Colorado, and many more Colorado schools participate in SRTS activities without funding from CDOT.

**Maximizing Transportation Investments**

Statewide, transportation agencies are faced with difficult decisions regarding which projects to fund and construct, regardless of the mode(s) the projects serve. One of the greatest benefits of providing for bicyclists and pedestrians in the transportation network is those modes’ ability to maximize investments in the auto and transit modes. Increased utilitarian bicycle and pedestrian travel along already congested routes can help alleviate congestion and help ensure that when roadway widening projects are undertaken that they do not become quickly obsolete. National research shows that mode shift to the active transportation modes is a real phenomenon, particularly when auto congestion already exists, as long as the provision of good multimodal accommodation is provided along corridors of interest and the surrounding roadway networks.

Nearly all transit trips begin with a walking trip, and many more include a bicycle trip at the





origin and/or destination. Billions of dollars are being invested statewide in transit initiatives such as the Regional Transportation District (RTD) FasTracks program. Successful bicycle and pedestrian networks have the potential to greatly expand the reach and effectiveness of public transit. The transit agencies for all of Colorado’s major metropolitan areas, as well as many mountain communities, already have bus fleets that are entirely equipped with bike racks; this indicates existing acknowledgement of the importance of non-motorized access to transit. The next step throughout the state will be to increase the percentage of transit stops and stations that are easily accessible by bike or on foot and that provide secure bicycle parking.

Several cities in Colorado, including Denver, Boulder, and Fort Collins, have invested in bike sharing programs. Increasing the bicycle network available to users of these programs can effectively maximize the benefits of the communities’ investment in both the bike sharing program and transit, since the bike sharing stations often exist at transit stations.

Thorough data collection of all travel modes using the transportation system, as well as modal interaction (e.g., bike to bus modal transfers), can help to validate the maximization of transportation investments.

### Statewide Economy

Colorado’s economy has changed over the years from having a mining and manufacturing focus to having a diversified base with strong

service, agriculture, and industrial sectors. The service sector is bolstered by tourism, which capitalizes on the state’s natural scenic beauty. Colorado is viewed as a national destination for outdoor activity, much of which includes bicycling and hiking. According to a 2000 CDOT study,<sup>7</sup> the total annual economic benefit of bicycling in the state is more than \$1 billion, including revenue from summertime cycling tourists at the state’s ski resorts of nearly \$200 million (at the time, Colorado’s Gross State Product was approximately \$170 billion). The 2011 USA Pro Cycling Challenge reported \$83.5 million in economic benefit for the state, the majority of which was generated by attendees from out of state. Of those out-of-state visitors, 85 percent reported that they are more likely to visit Colorado again in the future because of their positive experience with the event.



Photo courtesy of Pro Cycling Challenge: Bikes: <http://usprocyclingchallenge.com/gallery>

<sup>7</sup> Bicycling and Walking in Colorado: Economic Impact and Household Survey Results, CDOT, 2000.





Colorado Blueprint,<sup>8</sup> which represents the state’s current economic development strategy, identifies key focus areas to generate economic development including Recruit, Grow and Retain Business; Create and Market a Stronger Colorado Brand; and Educate and Train the Workforce of the Future. These initiatives focus on fostering a high quality of life to attract and retain businesses, particularly those that attract a highly educated workforce. Promotion of bicycling and walking, and creating the accompanying bicycle and pedestrian infrastructure, will be key in creating the desired quality of life that attracts such businesses and workers.

<sup>8</sup> Bottom-Up Economic Development Planning Initiative: Colorado Blueprint, Colorado Office of Economic Development and International Trade, 2011.





#### IV. INVESTMENT DECISION CRITERIA AND PERFORMANCE MEASURES

##### Investment Decision Criteria

The *Statewide Bicycle and Pedestrian Plan* is based on broadly supported statewide goals that can be achieved in part through more bicycling and walking, particularly for transportation. One of the key components of the *Plan* is a procedure to objectively evaluate the effectiveness of candidate bicycle and pedestrian facility (i.e., infrastructure) projects and program initiatives (e.g., engineering training, education, enforcement, and encouragement). This process will enable CDOT (and potentially regions and communities around the state) to effectively allocate funding for competing projects and programs in a way that will most benefit Colorado residents.

Accordingly, measurable “investment decision criteria” supporting each of the adopted goals have been established. These criteria represent measurable characteristics of candidate projects and programs that collectively demonstrate the ability of the project or program to make progress toward the *Plan* goals.

During the initial stage of the *Statewide Bicycle and Pedestrian Plan’s* development, investment decision criteria were established and refined through a collaborative process involving the *Plan’s* Stakeholder Group, the CDOT Project Team, and the public. **Table 1** identifies the established criteria.



**Table 1. Investment Decision Criteria**

<b>Goals and Investment Decision Criteria</b>
<b>Enhance Safety</b>
Reduce crash rate or potential threat of crashes
<b>Increase Bicycling and Walking Activity</b>
Improve (corridor) bicycling or walking conditions
Expand permanent data collection infrastructure
<b>Expand Recreational Opportunities and Enhance Quality of Life</b>
Enhance Scenic Byways
Create access to public lands
Provide multi-use pathways near populations
Preserve and enhance downtown character
<b>Improve Public Health</b>
Reduce disease/obesity in children, adults, and seniors
<b>Improve Environment, Air Quality, and Fossil Fuel Independence</b>
Reduce carbon-based vehicle miles traveled through increased bicycling and walking
<b>Provide Transportation Equity</b>
Provide mobility options to underserved populations
Provide safe active transportation to schools and learning centers
Provide pedestrian mobility for seniors and disabled populations
<b>Maximize Transportation Investments</b>
Complete or connect network or system
Reduce motor vehicle traffic congestion
Enhance multimodal efficiency (expand utility of public transportation)
<b>Improve State/Regional Economy</b>
Provide better access to jobs
Bolster tourism
Induce mode shift to bicycling, walking, and transit = more household disposable income



## Performance Measures and Evaluation Methodology

Performance measures enable the investment decision criteria to be put to use in an evaluation setting. Performance measures are also useful in allowing CDOT to track statewide progress toward the adopted goals over time. Therefore, in addition to project-level performance measures, system-wide performance measures for the various investment decision criteria have been established. The following sections outline the recommended methodologies for evaluating projects and programs and for tracking success in achieving the *Plan's* goals.

### Project Evaluation

The recommended procedure for evaluating facility projects follows the goal and investment decision criteria structure of the *Plan*. Each statewide goal, all of which were selected because of broad and varied statewide support, has one or more supporting investment decision criteria. The evaluation procedure described in this section establishes a performance measure for each such criterion. Furthermore, it establishes an approach by which the various performance measures could be combined to quantify the estimated benefits of candidate projects. The benefits could be optionally compared against project costs to produce a straightforward benefit-to-cost index, a primary component of which is a project's ability to improve bicycling and walking conditions. While characteristics such

as project readiness, availability of relevant funding sources, and the potential to leverage other funds can also play a role in determining when projects are built, this benefit-based analysis is valuable in setting initial priorities for funding.

The central purpose of bicycle and pedestrian infrastructure projects is to increase and accommodate non-motorized transportation activity. In turn, the potential use of new or enhanced facilities is heavily tied to the ability of the facility to provide an environment in which people bicycling or walking feel comfortable. This degree of accommodation is widely measured throughout Colorado and the United States via the 2010 *Highway Capacity Manual's* bicycle and pedestrian level of service evaluations (i.e., bicycling and walking conditions), which quantify perceived safety and comfort based on geometric and traffic conditions. Whenever an infrastructure project is proposed for funding,<sup>9</sup> whether the facility is a sidewalk, a bike lane, a shared use path, or some other facility, the improvement in level of service can be measured. Because this before-and-after difference in bicycling and walking conditions, in turn, has an amplifying effect on nearly all other identified performance measures, hence progress toward the statewide goals, the proposed evaluation procedure calls for the improvement in conditions to be

<sup>9</sup> Note that all projects submitted for funding must incorporate applicable Americans with Disabilities Act (ADA) requirements.







multiplied by the sum of the benefits associated with each of the eight goals.<sup>10</sup>

To ensure generally equal treatment of the identified investment decision criteria, benefits are generally evaluated on a 0 to 5 scale in which five represents the best score and 0 represents the worst score.<sup>11</sup> In some cases, the benefit may be a “yes or no” distinction; in which case the only possible scores may be 0 and 5. In cases when there is more than one evaluation criterion for a particular goal, the average score among the multiple criteria is assigned to that goal category.

The envisioned scenario by which candidate projects would be evaluated, which is expected to be refined over time based on experience, begins with applicants determining the relevant information about the project and the surrounding area and submitting the data on a standard form. The evaluating agency, in many cases expected to be a CDOT region office, would then use the Candidate Projects Evaluation Calculator to compare the benefits of all submitted projects for a given funding cycle. For some performance measures, such as demographic data and crash reduction potential, the reviewer would set the scales

based on the range of values associated with the candidate projects submitted for that funding mechanism or cycle.

Depending on the agency’s needs, the estimation of a project’s benefits can either be used on its own to set project priorities or be considered in concert with project cost. In the latter case, the total benefit score is divided by the project cost to produce a benefit-cost index. As an example of a project that could be evaluated in this manner, re-striping (lower construction cost) or construction (higher construction cost) of a new bike lane on a relatively busy arterial with no existing dedicated bike facility might improve the roadway’s bicycling conditions (i.e., bicycle level of service) from “D” to “B.” If the road is in a scenic setting or directly accesses a school, the significant improvement in bicycling conditions has an amplifying effect on the project’s tourism or education access.

**Table 2** indicates the relationship between the performance measures and the goals and investment decision criteria. **Figure 2** shows the format of the companion Candidate Projects Evaluation Calculator, which, through Phase II refinement of this *Plan*, implements the methodology in a spreadsheet setting. Each identified benefit and the associated approaches to performance measurement are briefly described following the table and figure.

<sup>10</sup> In addition to being counted as a stand-alone component of the “Increase Bicycling and Walking Activity” goal.

<sup>11</sup> Because of CDOT’s continued emphasis on safety, and because of the safety goal’s particularly strong support demonstrated via public outreach (see **Appendix B**), the crash reduction potential criterion is instead evaluated on a 0 to 10 scale.



**Table 2. Goals, Criteria, and Project-Level Performance Measures**

Goals and Investment Decision Criteria	Project-Level Performance Measures
<b>Enhance Safety</b>	
Reduce crash rate or potential threat of crashes	<ul style="list-style-type: none"> <li>▪ Project would result in safety improvement as quantified by Crash Modification Factors<sup>12</sup></li> </ul>
<b>Increase Bicycling and Walking Activity</b>	
Improve (corridor) bicycling or walking conditions	<ul style="list-style-type: none"> <li>▪ Quality of improvement, measured as the change in bicycle or pedestrian LOS (primary benefit evaluation component)</li> </ul>
Expand permanent data collection infrastructure	<ul style="list-style-type: none"> <li>▪ Project includes installation of permanent bike/ped counting device</li> </ul>
<b>Expand Recreational Opportunities and Enhance Quality of Life</b>	
Enhance Scenic Byways	<ul style="list-style-type: none"> <li>▪ Project is located along a Scenic Byway (Yes/No)</li> </ul>
Create access to public lands	<ul style="list-style-type: none"> <li>▪ Project provides direct access to public lands (Yes/No)</li> </ul>
Provide multi-use pathways near populations	<ul style="list-style-type: none"> <li>▪ Project is a multi-use pathway (Yes/No)</li> <li>▪ Relative population of project area</li> </ul>
Preserve and enhance downtown character	<ul style="list-style-type: none"> <li>▪ Project is located in defined downtown or “Main Street” area</li> </ul>
<b>Improve Public Health</b>	
Reduce disease/obesity in children, adults, and seniors	<ul style="list-style-type: none"> <li>▪ Mode shift and induced recreational travel</li> <li>▪ Obesity rate in project county</li> </ul>
<b>Improve Environment, Air Quality, and Fossil Fuel Independence</b>	
Reduce carbon-based vehicle miles traveled through increased bicycling and walking	<ul style="list-style-type: none"> <li>▪ Mode shift</li> </ul>
<b>Provide Transportation Equity</b>	
Provide mobility options to underserved populations	<ul style="list-style-type: none"> <li>▪ Project is located in an area of underserved population (low-income or minority)</li> </ul>

<sup>12</sup> Crash Modification Factors are defined by FHWA; <http://www.cmfclearinghouse.org/index.cfm>



Goals and Investment Decision Criteria	Project-Level Performance Measures
Provide safe active transportation to schools and learning centers	<ul style="list-style-type: none"> <li>Project provides direct connection to school and would likely be used by students or staff to walk or bike to school</li> </ul>
Provide pedestrian mobility for seniors and disabled populations	<ul style="list-style-type: none"> <li>Project located in an area of high &gt;65 population</li> </ul>
<b>Maximize Transportation Investments</b>	
Complete or connect network or system	<ul style="list-style-type: none"> <li>Project connects to an existing bicycle or pedestrian facility</li> </ul>
Reduce motor vehicle traffic congestion	<ul style="list-style-type: none"> <li>Project located along or parallel to a congested roadway</li> </ul>
Enhance multimodal efficiency (expand utility of public transportation)	<ul style="list-style-type: none"> <li>Project provides direct connection to transit service</li> </ul>
<b>Improve State/Regional Economy</b>	
Provide better access to jobs	<ul style="list-style-type: none"> <li>Jobs * population in vicinity</li> </ul>
Bolster tourism	<ul style="list-style-type: none"> <li>Relative level of tourism in area</li> <li>Demonstrated level of tourism promotion investment in local community</li> </ul>
Induce mode shift to bicycling, walking, and transit = more household disposable income	<ul style="list-style-type: none"> <li>Mode shift</li> </ul>



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*Bicycle & Pedestrian Candidate Projects Evaluation Calculator*

Input Information (use drop-downs for assistance)		
Variable/Characteristic	Input Type	Input
Bicycling/Walking Conditions Before Project (B/P LOS)	LOS value	3.62
Bicycling/Walking Conditions After Project (B/P LOS)	LOS value	2.09
Crash Rate Reduction Potential	0-10 scale	4
Motor Vehicle LOS	LOS grade	D
Roadway Functional Class	Classification Type	Major Collector
Population*Employment in Surrounding Area	0-5 scale	4
Population of Surrounding Area	0-5 scale	5
Corridor Aesthetics	0-5 scale	2
Count Device Included	Yes/No	Yes
Designated Scenic Byway	Yes/No	No
Direct Access to Designated Scenic Byway	Yes/No	No
Direct Access to Public Lands	Yes/No	Yes
Shared Use Path	Yes/No	No
Located in Designated Downtown Area	Yes/No	Yes
County Obesity Rate	0-5 scale	4
Minority/Low Income Population in Surrounding Area	0-5 scale	3
Access to School	Yes/No	Yes
Senior Population in Surrounding Area	0-5 scale	2
Closes Gap Between Two Existing Facilities	Yes/No	No
Extends Existing Facility	Yes/No	Yes
Fixed Route Transit Service	Yes/No	Yes
Access to Park and Ride Facility (including carpool/vanpool)	Yes/No	No
County Tourism Revenue	0-5 scale	1
Concerted Tourism Investment	Yes/No	Yes
Facility Construction Cost	\$	\$120,000

Evaluation Results: Advancement toward Statewide Goals	
Enhance Safety	4.0
Increase Bicycling and Walking Activity	4.3
Expand Recreational Opportunities & Enhance Quality of Life	2.5
Improve Public Health	3.8
Improve Environment, Air Quality, & Fossil Fuel Independence	3.5
Provide Transportation Equity	3.3
Maximize Transportation Investments	3.3
Improve State & Regional Economy	3.5
<b>Total Benefits Score Summary</b>	<b>43.10</b>
or	
<b>Benefit-to-Cost Index</b>	<b>35.91</b>

**Figure 2. Candidate Projects Evaluation Calculator**

**Reduce Crash Rate or Potential Threat of Crashes**

The ability of a new bicycle or pedestrian facility to improve safety along a corridor is highly dependent on the types of crashes that occur within the corridor. As an example, the provision of a bike lane may be most beneficial in reducing “overtaking” crashes, but the incidence of overtaking crashes is frequently quite small relative to other crash types. Thus, a detailed crash analysis would be the most accurate way to measure the expected safety performance of a candidate project. Crash rate is defined as the number of bicycle or pedestrian crashes per the number of bicycle or pedestrian miles traveled. Both of these pieces of information must be identified for this performance measure to be included in the scoring process. A project applicant would

likely be expected to provide historic crash data along with a description of the postulated crash reduction that would result from project implementation. The project receives a score between 0 and 10 based on its relative potential to improve safety.

**Expand Permanent Data Collection Infrastructure**

The project receives a score between 0 and 5. It would receive the higher score if it includes the installation of a permanent bicycle and/or pedestrian counting device.

**Enhance Scenic Byways**

The project receives a score between 0 and 5. It would receive the higher score if it is located along or connects directly to a CDOT-designated Scenic and Historic Byway.





**Create Access to Public Lands** The project receives a score between 0 and 5. It would receive the higher score if it provides direct access to publicly owned lands.

**Create Shared Use Pathways near Populations** The project receives a score between 0 and 5. It would receive a higher score if the project is a shared use path (new construction or widening) and is in a relatively populated area. While the most accurate way to measure the surrounding population would be gravity-based (i.e., the importance of the population decreases as the distance from the facility increases), for convenience the recommended measure is the total population of all Census tracts located at least in part within five miles of the midpoint of the proposed facility.

**Preserve and Enhance Downtown Character** The project receives a score between 0 and 5. It would receive the higher score if it is located in a defined downtown or “Main Street” area and improves bicycle and/or pedestrian accommodation.

**Induce Mode Shift (and Recreational Activity)** The ability of a project to induce travelers to shift from making trips by motor vehicle to making those same trips by bicycle or on foot, and in some cases to induce recreational bicycle and pedestrian travel, is a criterion that plays a role in many of the identified goals. It is practically synonymous with the goal of increasing bicycling and walking activity; it represents a key component in the goal to improve the environment, air quality, and fossil

fuel independence; and it is also an important consideration in the goals to improve public health and the state economy (through increased disposable income). National research indicates that the ability of an infrastructure project to increase bicycling and walking activity in these two ways (mode shift and recreational travel) is based on factors such as population and employment density, population of the surrounding area, network connectivity, average corridor trip length, corridor aesthetics, income, and multimodal (motor vehicle, bicycle pedestrian, and transit) level of service; many of these components are directly or indirectly included as stand-alone performance measures.

When mode shift alone is a recommended performance measure (as it is for the environment and economy goals), the mode shift score considers motor vehicle level of service, bicycle or pedestrian level of service, average trip length (using roadway functional classification as a surrogate), population and employment mix, and connectivity. When mode shift plus induced recreational travel is a performance measure (for the activity level and health goals), all of the above, plus corridor aesthetics and pure population of the surrounding area, are incorporated into the scoring.

**Reduce Disease and Obesity** The project receives a score between 0 and 5. It would receive a higher score if the county in which the project is located has a high obesity rate.





**Provide Mobility Options to Underserved**

**Populations** The project receives a score between 0 and 5. A project in an area in which the underserved population represents a high percent of the total population (using Census tract data) would receive a higher score. Underserved populations will be defined as those who are minority and/or below the poverty level.

**Provide Safe Active Transportation to Schools**

The project receives a score between 0 and 5. It would receive the higher score if it provides direct access to a school (public or private, K-12 level).

**Provide Pedestrian Mobility for Senior Citizens**

The project receives a score between 0 and 5. A project in an area in which the over age 65 population represents a high percent of the total population (using Census tract data) would receive a higher score.

**Improve Network Connectivity** The project receives a score between 0 and 5. It would receive a higher score if it closes a gap between two facilities or if it is an extension of an existing facility. In this context, a facility is defined as either a shared use path or a designated bike lane for the bicycle mode and as either a shared use path or a sidewalk for the pedestrian mode.

**Reduce Motor Vehicle Traffic Congestion** The ability to reduce motor vehicle congestion depends on the existing level of congestion. The likelihood of mode shift is higher where there is

existing traffic congestion.<sup>13</sup> The project receives a score between 0 and 5. A higher score would be given to a project on or parallel to a roadway with a worse (planning level) motor vehicle level of service.

**Enhance Multimodal Efficiency** In this context, multimodal efficiency refers to improving the interface between the non-motorized modes and fixed route transit service. This measurement would most accurately take into consideration the ridership and headway of the transit in question, and would consider facilities located near (but not coincident with) transit routes. The project receives a score between 0 and 5. It would receive a higher score if the project is located in a corridor with any type of fixed route transit service and/or if the project provides access to a park-and-ride facility, including designated gathering places for carpools and vanpools.

**Improve Access to Jobs** Providing bicycle and pedestrian access to jobs requires that a facility be located in an area where both the origins and destinations of commute trips (residences and places of employment) are located in close proximity to one another. The most accurate way to measure this interaction would be to identify the travel shed of the proposed facility (likely via travel intercept surveys) and to calculate the product of the population density and employment density within that area. For

<sup>13</sup> Conserve by Bicycling and Walking: Phase II Report, Florida Department of Transportation, 2009.





ease of use, it is recommended that the product instead be calculated for the Census tract(s) in which the proposed facility is located. By multiplying the population density and the employment density, both the balance of jobs to housing and the magnitude of each are accounted for. The project receives a score between 0 and 5 based on the relative magnitude of population density x employment density in the area.

**Bolster Tourism** The project receives a score between 0 and 5. A project in an area with a high tourism revenue<sup>14</sup>, and/or within a community that has demonstrated a concerted investment to bolster tourism, such as a dedicated marketing campaign or a Regional Tourism Act application, would receive a higher score.



Photo courtesy of <http://fromthecrousehouse.blogspot.com/2010/08/day-7-part-1-vail-to-frisco-bike-ride.html>

<sup>14</sup> County tourism revenue based on *The Economic Impact of Travel on Colorado*, September 2011 - <http://www.deanrunyan.com/COTravellImpacts/COTravellImpacts.html>

## Program Evaluation

The evaluation of candidate bicycle and/or pedestrian program initiatives for funding selection is an inherently different process than the one used for infrastructure projects. Many of the performance measures identified for facility evaluations, such as network connectivity and improvement in bicycling and walking conditions, are simply not applicable to programs. Furthermore, and perhaps even more significantly, candidate programs are widely disparate in nature. Quantifying and evaluating the differences among a sidewalk project, a bike lane project, and a shared use path project is more straightforward than evaluating the differences between, for example, a pedestrian safety marketing campaign and a school-based bike giveaway program. Accordingly, it is recommended that CDOT evaluate all such programs from a pure benefit-to-cost index.

Nevertheless, identification of benefits for candidate programs should follow the structure of the adopted *Statewide Bicycle and Pedestrian Plan* goals. While the corresponding criteria will not be used as specific performance measures as they do for the project selection component, the criteria still serve as a reference for applicants as they consider ways in which their programs will lead to benefits that could be monetized. The application process should, therefore, identify program costs and any identified benefits (and associated monetization calculation assumptions), leading to a simple



evaluation process on the part of CDOT. For example, the primary benefit of pedestrian safety marketing campaign would likely be a reduction in pedestrian-related crashes, the value of which could be monetized based the value of lives saved and the medical expense savings.

### System Performance Evaluation

As the state provides more facilities and programs to accommodate and promote bicycling and walking, progress toward the major goals will occur. Therefore, as noted

earlier, performance measures are needed not only to assist in the evaluation of candidate projects and programs, but also to track statewide progress on the *Plan* goals. Accordingly, many of the investment decision criteria have both project-level performance measures and system-wide performance measures. **Table 3** shows the recommended methods by which system progress can be tracked. Several of these key system-level performance measures are discussed in greater detail in **Appendix A**.

**Table 3. Goals, Criteria, and System-Level Performance Measures**

Goals and Investment Decision Criteria	System-Wide Performance Measures
<b>Enhance Safety</b>	
Reduce crash rate or potential threat of crashes	<ul style="list-style-type: none"> <li>▪ Change in bicycle and pedestrian crash rates</li> <li>▪ State bicycle and pedestrian crash rankings</li> <li>▪ Number of communities with adopted Share the Road programs or policies</li> </ul>
<b>Increase Bicycling and Walking Activity</b>	
Improve (corridor) bicycling or walking conditions	<ul style="list-style-type: none"> <li>▪ Percent bike/ped mode share</li> <li>▪ Percent of CDOT’s system at bike LOS A-D, E, F</li> <li>▪ Percent of CDOT’s system at ped LOS A-D, E, F</li> </ul>
Expand permanent data collection infrastructure	<ul style="list-style-type: none"> <li>▪ Number of permanent bike/ped counting devices on the State’s system</li> </ul>





<b>Expand Recreational Opportunities and Enhance Quality of Life</b>	
Enhance Scenic Byways	<ul style="list-style-type: none"> <li>▪ Percent of Scenic Byways miles that are bicycle/pedestrian compatible</li> </ul>
Create access to public lands	<ul style="list-style-type: none"> <li>▪ Percent of public lands with bike/ped access</li> </ul>
Provide multi-use pathways near populations	<ul style="list-style-type: none"> <li>▪ Miles of multi-use pathways</li> </ul>
Preserve and enhance downtown character	<ul style="list-style-type: none"> <li>▪ Number of communities participating in Main Street Program</li> </ul>
<b>Improve Public Health</b>	
Reduce disease/obesity in children, adults, and seniors	<ul style="list-style-type: none"> <li>▪ Percent of Medically Underserved Populations<sup>15</sup> in the state living within a quarter mile of defined bicycle or pedestrian facility</li> <li>▪ Obesity Rate</li> <li>▪ Bicycle and pedestrian mode share</li> </ul>
<b>Improve Environment, Air Quality, and Fossil Fuel Independence</b>	
Reduce carbon-based vehicle miles traveled through increased bicycling and walking	<ul style="list-style-type: none"> <li>▪ Mode split estimated through phone or mail survey</li> <li>▪ Change in biking and walking activity</li> </ul>
<b>Provide Transportation Equity</b>	
Provide mobility options to underserved populations	<ul style="list-style-type: none"> <li>▪ Percent of underserved populations (low-income or minority) in the state living within a quarter mile of a defined bicycle or pedestrian facility</li> </ul>
Provide safe active transportation to schools and learning centers	<ul style="list-style-type: none"> <li>▪ Percent of schools in Colorado that have a Safe Routes map and program</li> <li>▪ Number of schools teaching CDOT Safe Routes to School curriculum</li> <li>▪ Percentage of students who bicycle or walk to school</li> </ul>
Provide pedestrian mobility for seniors and disabled populations	<ul style="list-style-type: none"> <li>▪ Percent of &gt;65 population living within a quarter mile of a defined pedestrian facility</li> </ul>

<sup>15</sup> Medically Underserved Populations, as defined by the Colorado Department of Public Health and Environment (CDPHE), is a population group within a certain geographic area that faces high barriers to health care access.



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Maximize Transportation Investments	
Complete or connect network or system	<ul style="list-style-type: none"> <li>▪ Percent of planned bicycle/pedestrian network complete</li> </ul>
Reduce motor vehicle traffic congestion	<ul style="list-style-type: none"> <li>▪ Percent of State Highways (or congested State Highways) that are bicycle and pedestrian compatible, as measured through adopted level of service targets</li> </ul>
Enhance multimodal efficiency (expand utility of public transportation)	<ul style="list-style-type: none"> <li>▪ Percent of transit stations that have bicycle parking</li> <li>▪ Percent of stations that are bicycle and pedestrian accessible</li> <li>▪ Percent of transit vehicles that can accommodate bicycles</li> <li>▪ Percent of transit routes or systems that provide shared bicycles for the last mile connection</li> </ul>
Improve State/Regional Economy	
Provide better access to jobs	<ul style="list-style-type: none"> <li>▪ Employees who ride/walk to work (through employer survey)</li> </ul>
Bolster tourism	<ul style="list-style-type: none"> <li>▪ Tourists using bicycle/pedestrian facility, quality of their experience, would they come back (through phone survey)</li> </ul>
Induce mode shift to bicycling, walking and transit = more household disposable income	<ul style="list-style-type: none"> <li>▪ Mode split estimated through phone or mail survey</li> <li>▪ Change in biking and walking activity</li> </ul>





## V. INTEGRATION WITH THE STATEWIDE LONG RANGE TRANSPORTATION PLAN AND REGIONAL PLANS

Successful integration of this *Statewide Bicycle and Pedestrian Plan* into the *Statewide Long Range Transportation Plan* (SWLRTP) and the *Regional Transportation Plans* (RTPs) for the state’s 15 MPOs and TPRs will be critical to realizing the goals established in this *Plan*. The following sections describe the basis for systematic inclusion of bicycle and pedestrian modes in the statewide and regional plans and list opportunities to effectively complete the integration.

### Federal and State Policies

Federal and State policies in recent years clearly establish the importance of bicycle and pedestrian modes as an element of the transportation system. Both the United States Department of Transportation’s (USDOT) policy statement on bicycle and pedestrian accommodation (signed March 11, 2010) and the Colorado Transportation Commission’s Bike and Pedestrian Policy Directive 1602.0 (dated October 22, 2009) and subsequent State Statute 43-1-120, which codifies the accommodation of bicyclists and pedestrians on the state highway system, should be referenced in the SWLRTP. The state legislation states that, “It is in the best interest of all Coloradans to promote transportation mode choice by enhancing safety and mobility for bicyclists and

pedestrians on or along the state highway system.”

The SWLRTP should include a discussion about existing state and federal funding sources relevant to bicycle and pedestrian projects and programs and should articulate that, per Section 217 of Title 23 of the United States Code, bicycle and pedestrian projects are broadly eligible for funding from almost all major Federal-aid highway, transit, and safety programs.

### Federal and State Planning Factors

There are opportunities for the bicycle and pedestrian modes to play an important role in the development of the next SWLRTP. Current State and Federal Planning Factors include multimodal integration and connectivity, as well as protection and enhancement of the environment, both of which can be supported through enhancements to bicycle and pedestrian accommodation.

### Development of next Statewide and Regional Long-Range Transportation Plans

The next SWLRTP is in the early stages of development; the statewide and regional planning processes are anticipated to begin in the summer of 2012, with anticipated adoption in the spring of 2015. Because the direction for the next SWLRTP has not yet been definitively established, the actions required to integrate the *Statewide Bicycle and Pedestrian Plan* into the SWLRTP are uncertain. Due to the timing of





the *Statewide Bicycle and Pedestrian Plan* and the SWLRTP, the recommendations included herein should be revisited as the SWLRTP process evolves. Similarly, the *Statewide Bicycle and Pedestrian Plan* itself will likely evolve and expand over time as a result of the direction of the SWLRTP.

### **Status of Statewide Long Range Transportation Plan Development and Corridor Based Plan Structure**

The SWLRTP is a corridor-based plan that integrates all modes of transportation into a vision for the transportation system of Colorado. As such, the *Statewide Bicycle and Pedestrian Plan*, along with other modal plans, will serve as an important component of the next SWLRTP. Similarly, it will serve as a vital document helping to inform the RTPs that feed into the Statewide Transportation Plan.

### **Opportunities for Integration**

The foundation of the statewide and regional transportation plans has been visions for the primary transportation corridors in the state. The corridors are multimodal and consider the movement of both people and goods. To effectively integrate this *Statewide Bicycle and Pedestrian Plan* into the next update of the RTPs and SWLRTP, each region should reconsider the definition of the corridors in light of the information provided in this *Plan*, and the statewide bicycle and pedestrian goals and objectives should be used to help incorporate bicycle and pedestrian needs into the overall corridor goals, objectives, and strategies.

CDOT is also in the early stages of developing the first Statewide Transit Plan. Because nearly all transit trips begin with a walking trip, and many include a bicycle trip at the origin and/or destination, there is an opportunity for this *Statewide Bicycle and Pedestrian Plan* and the forthcoming Statewide Transit Plan to complement each other.

Through all of these efforts, planning for bicycle and pedestrian travel will play an appropriate and integral role in planning for and providing an excellent transportation system to the residents, businesses, and visitors of Colorado.





## VI. THE CHANGING CHARACTER OF COLORADO'S TRANSPORTATION SYSTEM

### Tools for Change

It is evident that bicycling and walking have moved closer to the forefront of transportation planning in Colorado in recent years. Rather than being an afterthought, accommodation of the active transportation modes is now more fully integrated into the planning process. This shift has occurred for reasons that relate to this *Plan's* goals: the benefits that bicycling and walking offer in terms of health, air quality, transportation equity, and quality of life have become widely recognized and documented. Coincident with this shift has been the creation of numerous state and national tools that enable practitioners to thoroughly and effectively analyze and accommodate bicycle and pedestrian travel. This section describes some of these tools, which collectively provide for further advancement in the treatment of active transportation.

### Transportation Commission Policy and Procedural Directives and State Statute

In October 2009, CDOT adopted a new Bicycle/Pedestrian Policy (Policy Directive 1602), which states the following: “The needs of bicyclists and pedestrians shall be included in the planning, design, and operation of transportation facilities, as a matter of routine. A decision to not accommodate them shall be documented based on the exemption criteria in

the procedural directive.” The background section of the Policy Directive cites multimodal transportation as a key element to the statewide transportation system, the “increased interest and use in bicycle transportation by Coloradans,” and the need to “develop a transportation infrastructure that provides connectivity and access for all, opportunity for modal choice, and safety for each mode of travel.”

CDOT’s February 2010 Procedural Directive 1602.1 outlines the implementation of the Policy. It provides guidance within the areas of Education and Enforcement, Planning, Programming/Funding, Design, Construction, and Maintenance. Collectively, the Policy and Procedural Directives provide strong direction and a foundation that supports increased accommodation of bicycle and pedestrian travel, and they show a commitment that also has the potential to spread to regional, county, and municipal agencies. Colorado State Statute 43-1-120 codifies the bicycle and pedestrian policy directive into law. **Appendix E** of this *Plan* includes the Directives and State Statute for reference.

### CDOT’s Roadway Design Guide (Chapter 14)

CDOT’s Chapter 14 of the *Roadway Design Guide*, developed in 2011, provides a major advancement in the accommodation of bicycling and walking throughout the State. CDOT’s Bicycle/Pedestrian Procedural Directive states that “staff shall develop a chapter on





bicycle and pedestrian design guidelines as part of the existing CDOT Design Manual.” To address this mandate, CDOT developed a comprehensive design chapter for its *Roadway Design Guide*. This chapter includes provisions of the 2012 American Association of Transportation Officials (AASHTO) *Bike Guide*, the AASHTO *Pedestrian Guide*, the MUTCD, and the Americans with Disabilities Act DRAFT *Public Rights of Way Accessibility Guidelines (PROWAG)*. This new Bicycle and Pedestrian Facilities Design Chapter provides designers statewide with clear direction on designs for better accommodating bicyclists and pedestrians on the Colorado highway system. It can be viewed online at [http://www.coloradodot.info/business/designsupport/bulletins\\_manuals/roadway-design-guide/dg05-ch-14/view](http://www.coloradodot.info/business/designsupport/bulletins_manuals/roadway-design-guide/dg05-ch-14/view).

**CDOT’s Chapter 14 of the *Roadway Design Guide*, developed in 2011, provides a major advancement in the accommodation of bicycling and walking throughout the State. Prominent in this manual is the provision of shoulders and bike lanes.**

### **The Highway Capacity Manual, the AASHTO Bicycle and Pedestrian Guides, and Complete Streets Initiatives**

The *Highway Capacity Manual (HCM)* is the leading national document in providing guidance on the evaluation, planning, design, and operations of transportation facilities, particularly in terms of the level of service

provided to users of the transportation system. The 2010 update of the *HCM* significantly elevates the status of the bicycle and pedestrian modes by integrating their analysis into numerous chapters (rural two-lane highways, signalized intersections, etc.) and by adopting user perception-based operating conditions (level of service) models that are based on how safe or comfortable bicyclists feel operating within the roadway environment, as opposed to the frequently less useful “capacity” of the bicycle or pedestrian facilities. Prominently, the new urban street segments chapter, widely recognized as a significant advancement of HCM 2010, promotes a new multimodal level of service analysis procedure for comparing trade-offs among the auto, bicycle, pedestrian, and transit modes when designing or analyzing a metropolitan area street.

AASHTO produces bicycle and pedestrian design guidance through its *Guide for the Development of Bicycle Facilities* and *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. A new version of the AASHTO Bicycle Guide, released in 2012, includes new shared use path design criteria, wayfinding recommendations, and enhanced integration of bicycling with transit. The *Pedestrian Guide* is currently being updated, and the update is anticipated to include new sections on documenting pedestrian activity and integrating pedestrian transportation with land use planning.

The complete streets movement is focused on creating safe access and travel for all roadway





users, including bicyclists and pedestrians. CDOT’s Policy and Procedural Directives represent the State of Colorado’s commitment to complete streets, and there is national support as well. The United States Department of Transportation announced a similar policy in March 2010. Furthermore, the National Complete Streets Coalition provides a wealth of resources for agencies seeking to implement complete streets in their communities.

### **Equipping CDOT and Local Government Staff**

CDOT is actively engaged in instructing its own staff, as well as transportation professionals from related agencies statewide, on proper bicycle and pedestrian facility design. Over the past seven years, well over 500 attendees have participated in this CDOT training, which is offered in numerous cities every year. The design courses, which also include elements related to bicycle and pedestrian planning, engineering, and operations, have significantly broadened the level of statewide expertise on these important issues.

### **CDOT’s Bicycle and Pedestrian Volume Counting Program**

To help guide investment decisions, CDOT implemented a new bicycle and pedestrian counting program in the fall of 2009. Since that time, CDOT has installed eight permanent count locations and have rotated approximately 15 short-duration counters throughout the state. While the counting program is still in its infancy, it puts Colorado near the forefront of this

emerging science, and the type of data already collected is providing valuable detailed information regarding bicycle and pedestrian travel patterns and trends.

In a recent FHWA report on pedestrian and bicycle counting, CDOT was identified as “the only [state] agency that identified a standard [bicycle and pedestrian] reporting format based on the traffic data software package they use for processing other traffic data.” In addition to CDOT’s work, the same FHWA report recognizes the cities of Boulder and Durango as examples of successful municipal non-motorized count programs.

### **Programs for Our Future – Safe Routes to School**

Colorado Safe Routes to School (SRTS) uses a comprehensive approach to make school routes safe for children when walking and bicycling to school. CDOT administers Colorado's SRTS program, as mandated by Colorado Statute 43-1-1601 through 1604. In Colorado, many communities, parents, and schools are fostering a safe environment for their students by using SRTS programs to not only fund education and safe infrastructure, but also to encourage healthy options for our children that are safe for both walking and bicycling.

SRTS programs can improve safety, not just for children, but for the entire community. It provides opportunities for people to increase their physical activity and improve their health. It reduces congestion and pollution around our schools and encourages partnerships.





In Colorado, funds are distributed to develop programs for K-8 grades. The SRTS Advisory Committee includes educators, parents, bicyclists, pedestrians, law enforcement, and transportation planners. School districts, schools, cities, counties, state entities, and tribal entities are eligible to apply. Nonprofits need to partner with a state subdivision to apply for funding. As noted previously, CDOT’s SRTS program currently provides funding to more than 500 schools across Colorado. Furthermore, the Colorado SRTS program has developed a number of free resources including a crossing guard training program and materials and a cross-curriculum lesson plan that can be used in the classroom to further integrate the concepts of active transportation and healthy living. CDOT’s SRTS website can be viewed at <http://www.coloradodot.info/programs/bikeped/safe-routes> for more information.

### The Next Steps

The recommendations of the first phase of this *Plan* and the initiatives described above enable CDOT, and potentially by extension other Colorado jurisdictions, to continue on a path toward an effective and consistent approach to improving bicycling and walking accommodation on the state’s roadways. Several next steps have been identified for future statewide bicycle and pedestrian planning phases or other related initiatives to ensure that the momentum is maintained by CDOT for many years to come:

- Corridor visioning to identify target (minimum) bicycling and walking conditions
- Identification and adoption of appropriate multimodal level of service targets or standards for different classifications and settings of roadways
- An inventory of existing bicycle and pedestrian facilities on the state highway system
- A sampling of statewide bicycle and pedestrian crashes to determine trends, rates, and potential safety countermeasures
- Statewide testing and refinement of the *Candidate Projects Evaluation Calculator* developed in this phase of the *Plan*
- Identification of high priority bicycle corridors and high priority pedestrian activity areas







## **APPENDIX A DETAILED EXAMINATION OF SELECT SYSTEM-LEVEL PERFORMANCE MEASURES**





Chapter IV identifies a series of system-wide performance measures that can be used to track statewide progress on the Plan’s goals. Subsequent to the Plan’s adoption, CDOT explored several of these key system-level performance measures in greater detail: bicycle and pedestrian crash rates, bicycle accommodation on the state’s roadways, and obesity rate (specifically as a function of facility provision). The purpose of these evaluations is to provide baseline statewide data for the performance measures, identify existing data trends, and propose targets that represent significant achievement. The following sections outline the findings of this Plan update.

## Bicycle and Pedestrian Crash Rates

### Baseline and Trends

CDOT’s Traffic Records Unit – Traffic and Safety Engineering Branch provided bicycle and pedestrian crash data for recent years. These data include the total number of annual crashes on the state highway system from 2005 to 2012, also categorized by severity/injury type. Four groups of crashes were analyzed to provide baseline data, identify trends, and establish targets that represent significant achievement:

- total bicycle crashes;
- fatal and serious injury bicycle crashes;<sup>1</sup>
- total pedestrian crashes; and
- fatal and serious pedestrian crashes.<sup>2</sup>

One challenge when analyzing historical crash data in Colorado is to account for the likely significant increase in bicycling and walking over time. Part of this increase in activity is simply a function of the state’s significant population increase. To account for this growth, the data were initially converted to per capita figures. An additional consideration, however, is the general increase in active transportation and recreation, which is more challenging to incorporate into the formulation of trends. The best available resource is the U.S. Census Bureau’s annual American Community Survey (ACS), which includes commute data by mode and also accounts for total increase in commute trips that result from population increase. ACS mode shares from 2005 to 2012 were applied to estimate the number of crashes per 1,000 commute trips for the four crash categories.<sup>3</sup>

<sup>1</sup> Within the CDOT database, bicycle crashes are classified as fatalities, incapacitating injuries, evident injuries, and complaint of injuries. For this analysis, incapacitating injuries were used to define “Serious.”

<sup>2</sup> Within the CDOT database, pedestrian crashes are classified as fatalities, serious injuries, visible injuries, and possible injuries. Only crashes classified as serious injuries were included in the “Serious” analysis category.

<sup>3</sup> Naturally not all of the crashes are commuting related, but commute activity data are most readily available and their use is standard practice for that reason, and because increases in utilitarian and

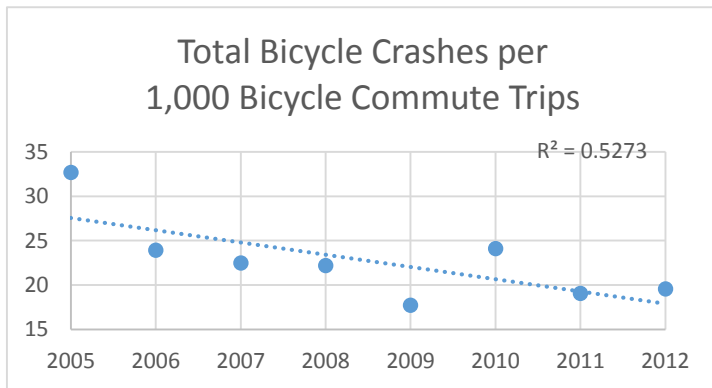




This process normalizes the crash data based on the number of commute trips by adjusting the denominator of the calculation so that it reflects only commute trips.

Based on this approach, a clear trend emerges for three of the four categories. Total bicycle crashes, fatal and serious injury bicycle crashes, and total pedestrian crashes all demonstrate a significant downward trend during the study period. No discernible trend is evident for fatal and serious pedestrian crashes, in part because of the relatively small number of such crashes. Crash rates and associated trends are shown in the figures that follow.<sup>4</sup>

These data collectively indicate two noteworthy findings: 1) bicycle and pedestrian crashes are both trending downward, likely in part a result of CDOT's and its partners' efforts in design standards, facility design training, construction of bicycle and pedestrian infrastructure, Safe Routes to School programs, and other outreach programs; and 2) bicycle and pedestrian crashes are still prevalent in Colorado and there is considerable room for improvement. Therefore, an appropriate next step is to identify target crash rates that represent significant continued improvement.



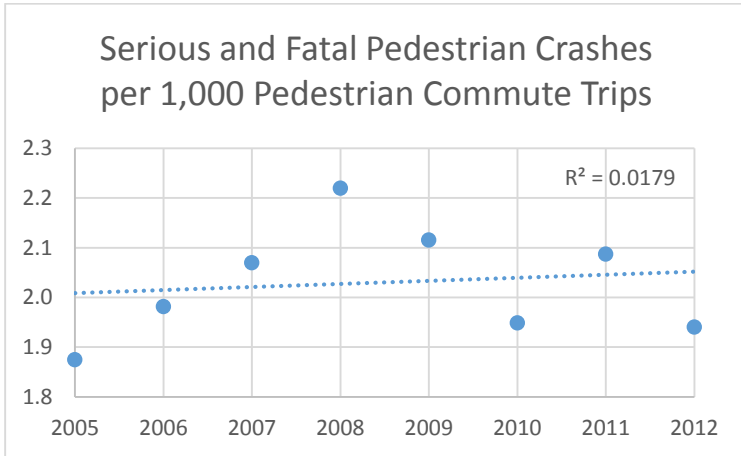
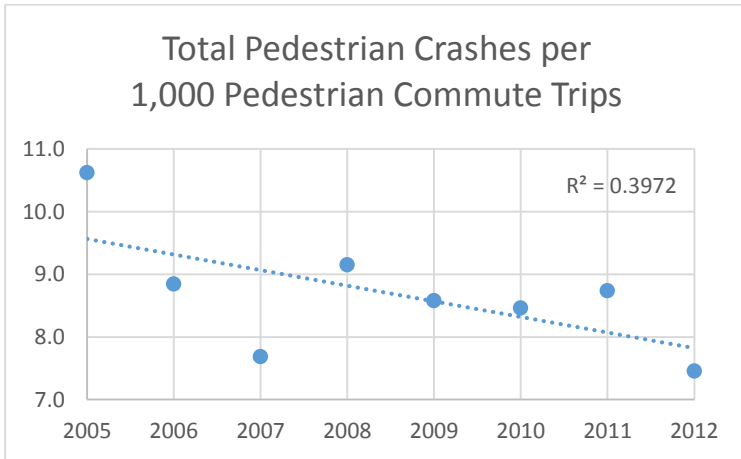
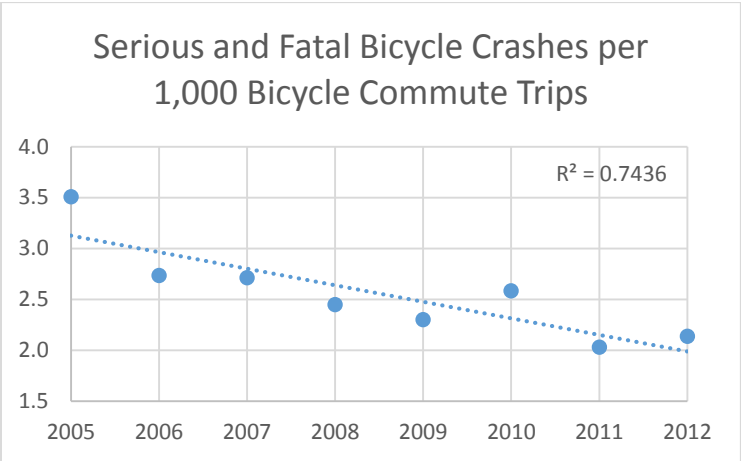
recreational bicycling and walking are frequently positively correlated.

<sup>4</sup> Note that these graphs represent all crashes relative to the number of commute trips, not commute-related crashes per commute trips.





Statewide Bicycle and Pedestrian Plan





## Recommended Targets

Applying exponential curves to the data produces the best statistical fit for developing projections and is helpful in establishing targets. These curves, when extrapolated to 2040, **establish the following long-term projections, as shown in the associated figures.**

- 3.8 total bicycle crashes per 1,000 bicycle commute trips (2012 baseline value = 19.5);
- 0.4 fatal and serious injury bicycle crashes per 1,000 bicycle commute trips (2012 baseline value = 2.2);
- 3.6 total pedestrian crashes per 1,000 pedestrian commute trips (2012 baseline value = 7.5); and
- 1.0 fatal and serious pedestrian crashes per 1,000 pedestrian commute trips (2012 baseline value = 1.9).<sup>5</sup>

**These projections represent appropriate**

**targets for achievement.** To ensure that these positive trends continue and that the resulting targets are eventually met, CDOT should continue its existing programs that promote bicycle and pedestrian safety and look to identify new programs in the coming years.

Circumstances may change the trajectory of the projections, so CDOT should monitor the data annually to determine whether adjustments to the targets are needed. For example, as CDOT and local communities enact programs and pieces of legislation designed to improve bicycle and pedestrian safety, the positive impacts of such actions may need to be considered over time when re-examining target crash rates.

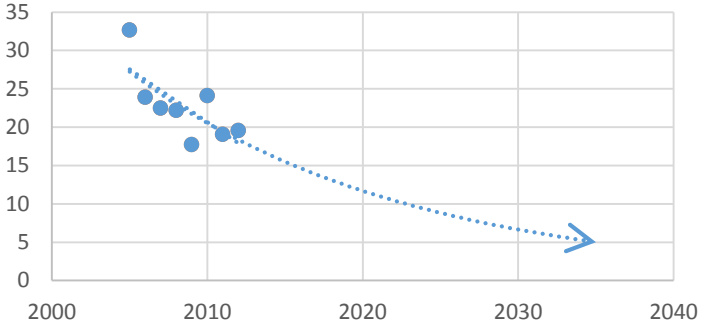
<sup>5</sup> Because of the lack of a clear trend for this subset of crashes, this projection represents the existing proportion of pedestrian crashes that are serious or fatal, as applied to the total pedestrian crashes target above.



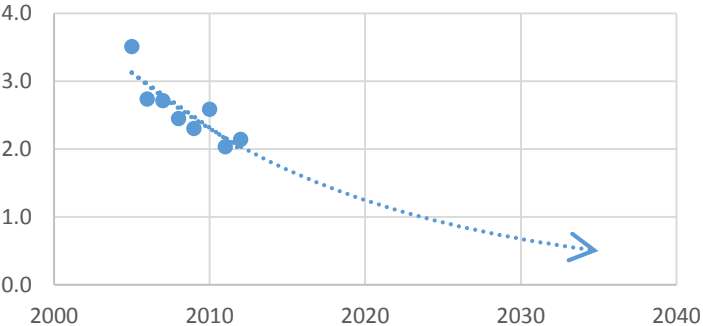


Statewide Bicycle and Pedestrian Plan

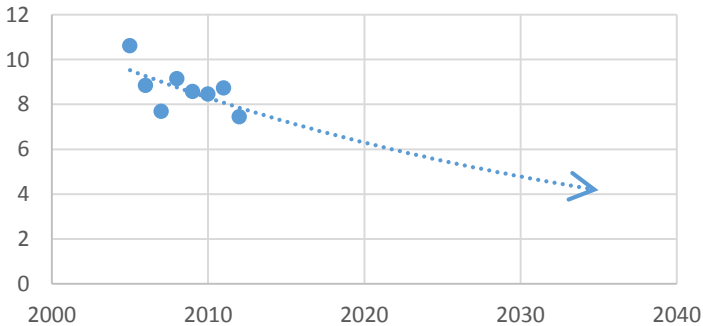
Projected Total Bicycle Crashes per 1,000 Bicycle Commute Trips



Projected Serious and Fatal Bicycle Crashes per 1,000 Bicycle Commute Trips



Projected Total Pedestrian Crashes per 1,000 Pedestrian Commute Trips





### CDOT Traffic Fatality Reduction Targets

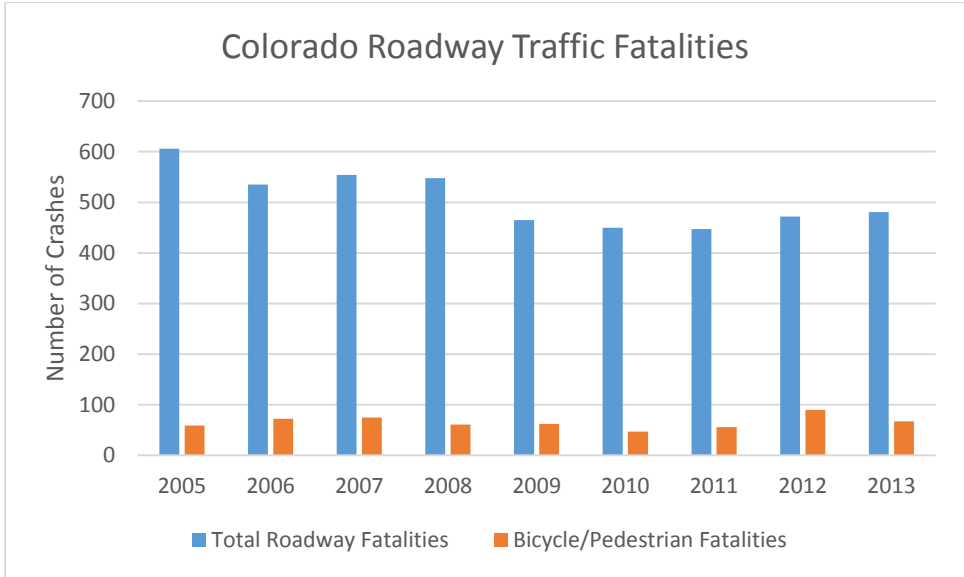
Related but distinct from the above analysis and recommendations, CDOT’s Traffic and Safety Engineering Branch has established targets for reducing roadway traffic fatalities, both overall and for bicyclists and pedestrians. The figure that follows shows total fatalities and bicycle and pedestrian fatalities from 2005 to 2013. These data suggest that total fatalities are exhibiting an overall declining trend, while bicycle and pedestrian fatalities are remaining

relatively constant (exposure and resulting crash rates are not considered). CDOT aims to reduce the total number of fatalities by 12 each year and the number of bicycle crashes by two each year, from 67 in 2013 to 43 in 2025.<sup>6</sup> CDOT’s overall goal is “Moving Colorado toward zero deaths by reducing traffic-related deaths and serious injuries by one-half by 2030.”

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<sup>6</sup> A related goal is to reduce serious injuries involving motorized vehicles by 14 per year from 469 in 2013 to 311 in 2025. 2025 is the horizon year for the *Strategic Highway Safety Plan*.





**Bicycle and Pedestrian Accommodation/Facility Provision**  
**Baseline and Trends**

As described earlier in this Plan, accommodating bicyclists and pedestrians on the state’s roadway system is established by CDOT policy and corresponding State Statute, and supports the Plan’s goals of increasing bicycling and walking activity and maximizing transportation investments. In turn, the increase in activity supports many of the other plan goals, including improving public health. The most precise way to measure active transportation accommodation in the roadway environment, as outlined in the *Highway Capacity Manual*, is via bicycle and pedestrian level of service evaluations. These methodologies quantify users’ perceived safety and comfort while bicycling or walking along a roadway, primarily as a function of their interaction with motor vehicle traffic.

Transportation agencies in Colorado have not historically included level of service analyses in their bicycle and pedestrian planning projects. Accordingly, the presence or absence of facilities is a rational, though less precise, surrogate for accommodation. While facilities do not tell the whole story (Is a four-foot paved shoulder sufficient to accommodate bicyclists on a high-volume, high-speed arterial? Conversely, are bicyclists well-accommodated on a quiet residential street in a shared lane?), presence of facility is a major component of bicycle and pedestrian level of service, and is a reasonable indicator of a commitment to improve conditions for non-motorized users.

Even at the facility level, data are not readily available at the statewide level for establishing baselines, trends, and targets. A pilot program is planned for CDOT Region 2 that will provide a complete and up-to-date bicycle and pedestrian facility inventory for that area, and the program







could eventually expand to the entire state. The pilot program will inventory all facility types along or adjacent to State facilities that contribute to the network for bicycling and walking. As an interim surrogate, the best available data come from CDOT’s Integrated Roadway Information System (IRIS), which is a database produced annually that contains various roadway characteristics for CDOT roads and other major roadways that are not part of the state system. One of the IRIS data fields is outside shoulder width, and paved shoulders at least four feet wide are facilities that generally accommodate bicycle travel.<sup>7</sup> As of 2013, 32.6 percent of the IRIS non-interstate system centerline mileage has such facilities, a figure which has remained generally constant over the past five years. There are significant shortcomings to this surrogate measure, including the lack of other bicycle and pedestrian facility types; its use to track progress should be replaced when more complete statewide facility (or perhaps level of service) data are available.

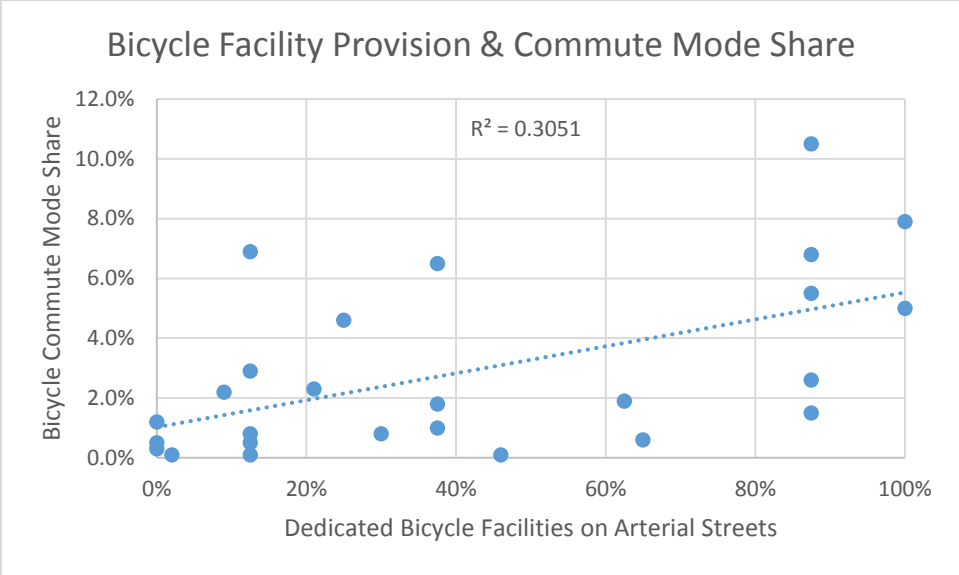
Comparing bicycle facility provision and activity levels is somewhat more practical at the municipal level. Percentages of major (i.e., arterial) street network<sup>8</sup> with dedicated bicycle facilities, as self-reported through either direct correspondence or League of American Bicyclists Bicycle Friendly Community Applications, were collected for more than two dozen Colorado municipalities.<sup>9</sup> Bicycle commute mode share for these communities is available through the U.S Census Bureau’s American Community Survey. The following chart shows, for these Colorado municipalities, the positive correlation between providing a bicycle-friendly environment and the amount of bicycle activity that occurs.

<sup>7</sup> The state system, which includes many rural roadways, has much more limited pedestrian facility provision. Pedestrian facilities are more widespread at the local level.

<sup>8</sup> These networks typically include, but are not limited to, CDOT-maintained roadways.

<sup>9</sup> Alamosa, Arvada, Boulder, Breckenridge, Carbondale, Castle Rock, Colorado Springs, Cortez, Craig, Crested Butte, Denver, Durango, Fort Collins, Golden, Grand Junction, Greeley, Gunnison, Lakewood, Lamar, Longmont, Pagosa Springs, Pueblo, Salida, Steamboat Springs, Telluride, Trinidad, and Vail.





Most of the state’s metropolitan planning organizations (MPOs) also maintain facility inventories to varying degrees of specificity and geographic coverage. For example, the Denver Regional Council of Governments (DRCOG) maintains a bicycle facility inventory for various on-road and off-road bicycle facility types that is updated as local governments build new facilities. While it is possible to begin to see some preliminary trends in facility provision (e.g., 395 miles of bike lanes in the Denver region in 2013 versus 339 in 2011), there is insufficient temporal data across the state to use such inventories to inform the establishment of targets.

**Recommended Targets**

The current bicycle commute mode share (a surrogate for overall bicycle activity) statewide, including both urban and rural locations, is 1.3%. While the majority of the (mostly urban) municipalities used in this plan’s evaluation exceed this average, only eight out of twenty-six have a bicycle mode share of greater than 4 percent, which represents a reasonable target for most urban areas given that very few cities nationwide (and only two of the seventy largest cities) currently achieve this value.<sup>10</sup> **To help**

<sup>10</sup> Several Front Range communities, typically those that already have higher than average bicycle and pedestrian activity, have established specific bicycle and/or pedestrian mode share goals that are significantly higher than 4 percent. For example, in Boulder, 19 percent of trips are currently bicycle trips and 20 percent are pedestrian trips, and the City’s goals are 30 percent and 25 percent, respectively. The City of Fort Collins has established a 2020 bicycle commute mode share goal of 20 percent and the City of Denver has a 2020 combined





achieve this target, a statewide goal is to provide bicycle facilities on at least 60% of arterial roadways by 2040, which represents nearly doubling the state baseline figure.

## Obesity Rates

### Baseline and Trends

The State of Colorado is taking notice of the high cost of our population’s physical inactivity to the state’s economy. Obesity increases costs for employers and reduces disposable income of Colorado families. According to the Colorado Department of Public Health and Environment (CDPHE), Colorado expends about \$1.6 billion per year treating obesity and obesity-related chronic disease. Decreasing the obesity rate will help Colorado achieve the high levels of public health it needs for a competitive future. There is a correlation between the quality and extent of bicycle (and pedestrian) facilities and the obesity rate found in communities throughout Colorado and across the country.

The figure that follows shows the municipal-level bicycle facility provision data (described in the previous section) relative to the obesity rates for the counties in which they are located.<sup>11</sup> As with many locations in the United States, communities with good bicycle infrastructure tend to exhibit better public health indicators. Causation between these two factors is difficult to establish: do people become healthier when given more options to be active, or are healthy people inclined to move to communities with good active transportation infrastructure? Regardless of the answer, the important consideration for CDOT and its partners is that there is a direct relationship between the widely accepted goal of improving public health (and the many associated economic and quality of life benefits) and better accommodating bicycling and walking on roads within the state.

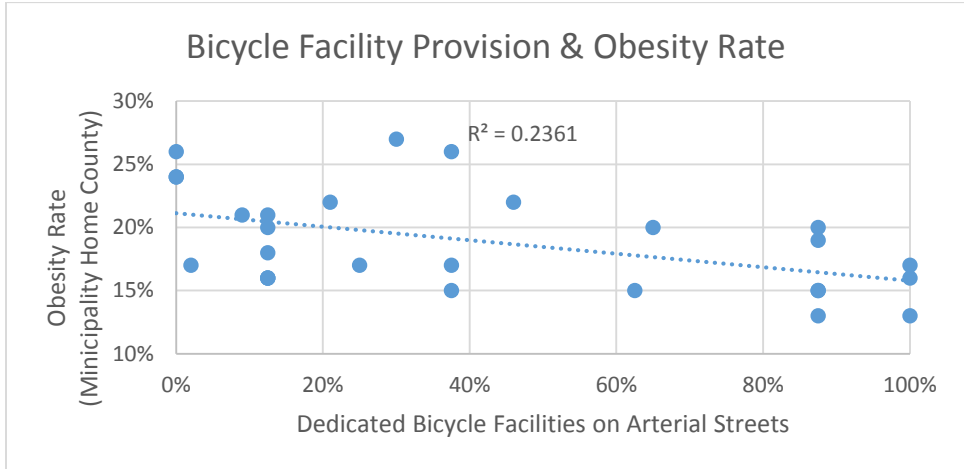
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bicycle and pedestrian commute goal of 15 percent. Other communities, including Glenwood Springs, have goals to decrease single-occupant vehicle use which identify increased bicycle and pedestrian travel as an associated strategy.

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<sup>11</sup> County data were used because municipal-level obesity data are generally unavailable).





**Recommended Targets**

CDPHE has identified obesity as one of “Colorado’s 10 Winnable Battles” for elevating health and environment in the state. While Colorado continues to rank among the best in the nation in adult obesity rates, those rates are nonetheless steadily on the rise. According to CDPHE, 10.1 percent of Colorado adults were obese in 1995, a figure which more than doubled to 21.3 percent in 2013. The figure that follows shows the increase in the percentage of Colorado adults who are classified as obese and either overweight or obese over the period from 1995 to 2013, with the trend extrapolated to 2020. **CDPHE has a stated goal of reducing the adult overweight/obesity rate to 50.8 percent by that time**, which is 10 percent lower than the baseline and 20 percent lower than the extrapolated current trend.<sup>12</sup> Given that

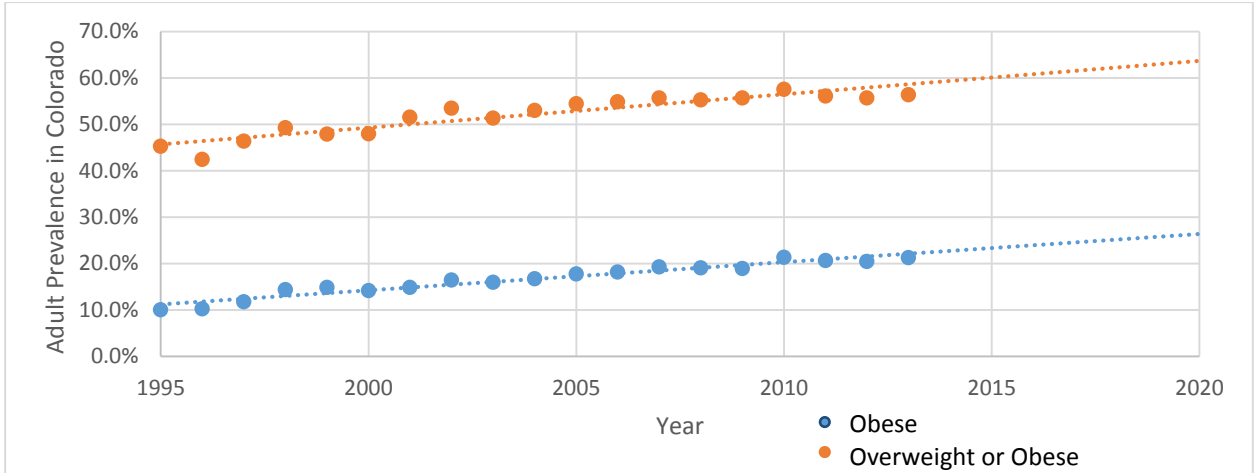
CDPHE has established a short-term goal that reverses the existing trend, that same goal is considered applicable in the long term. If the goal of reducing the overweight/obese rate 10 percent from the baseline is applied to the obesity baseline, this equates to a goal of reducing the obesity rate to approximately 19.2 percent.

The trendline representing the relationship between bicycle facility provision and obesity rate (from the prior Bicycle Facility Provision & Obesity Rate figure) shows that approximately 40 percent facility provision is associated with

<sup>12</sup> Separately, CDPHE has goals to 1) decrease the percentage of Colorado children aged 2-14 years who are overweight or obese from 26.4 percent in

2013 to 23.8 percent in 2020, and 2) to decrease the percentage of Colorado high school students who are overweight or obese from 19.3 percent in 2013 to 17.4 percent in 2020.





19 percent obesity,<sup>13</sup> which (as with the mode share goal) suggests that **60 percent facility provision is an appropriate target for CDOT and the Colorado’s local communities** to help reverse the obesity trend. The provision of more bicycle and pedestrian facilities will continue to play a role in meeting and sustaining this goal by providing additional opportunities for Colorado residents to be physically active through non-motorized transportation and recreation.

**Future Data Needs**

The ability to establish baseline data, trends, and associated targets for these and other bicycle- and pedestrian-related performance measures is often hindered by incomplete data, particularly compared to data for motorized travel. CDOT and its local and regional partners should make the collection of non-motorized

transportation data a priority, with the goal of being able to do more robust statewide tracking of performance in reaching this plan’s goals.

The areas in which bicycle and pedestrian data collection should be enhanced include:

- volume/count data (in part to be able to refine crash rates);
- mode share for trip purposes other than commuting;
- prevalent trip origins and destinations;
- crash types (overtaking, right hook, left hook, dart-out, signal violation, etc.) for fatal and serious crashes;
- tourist activity levels;
- access to transit facilities;
- facility inventories (by facility type and updated regularly to eventually provide temporal/trend analysis data);
- level of service (using *Highway Capacity Manual* methodologies); and
- level of service associated with various roadway functional classifications.

<sup>13</sup> A similar national-level database developed for Idaho’s Statewide Bicycle and Pedestrian Plan equates a 19 percent adult obesity rate with 61 percent bicycle facility provision.

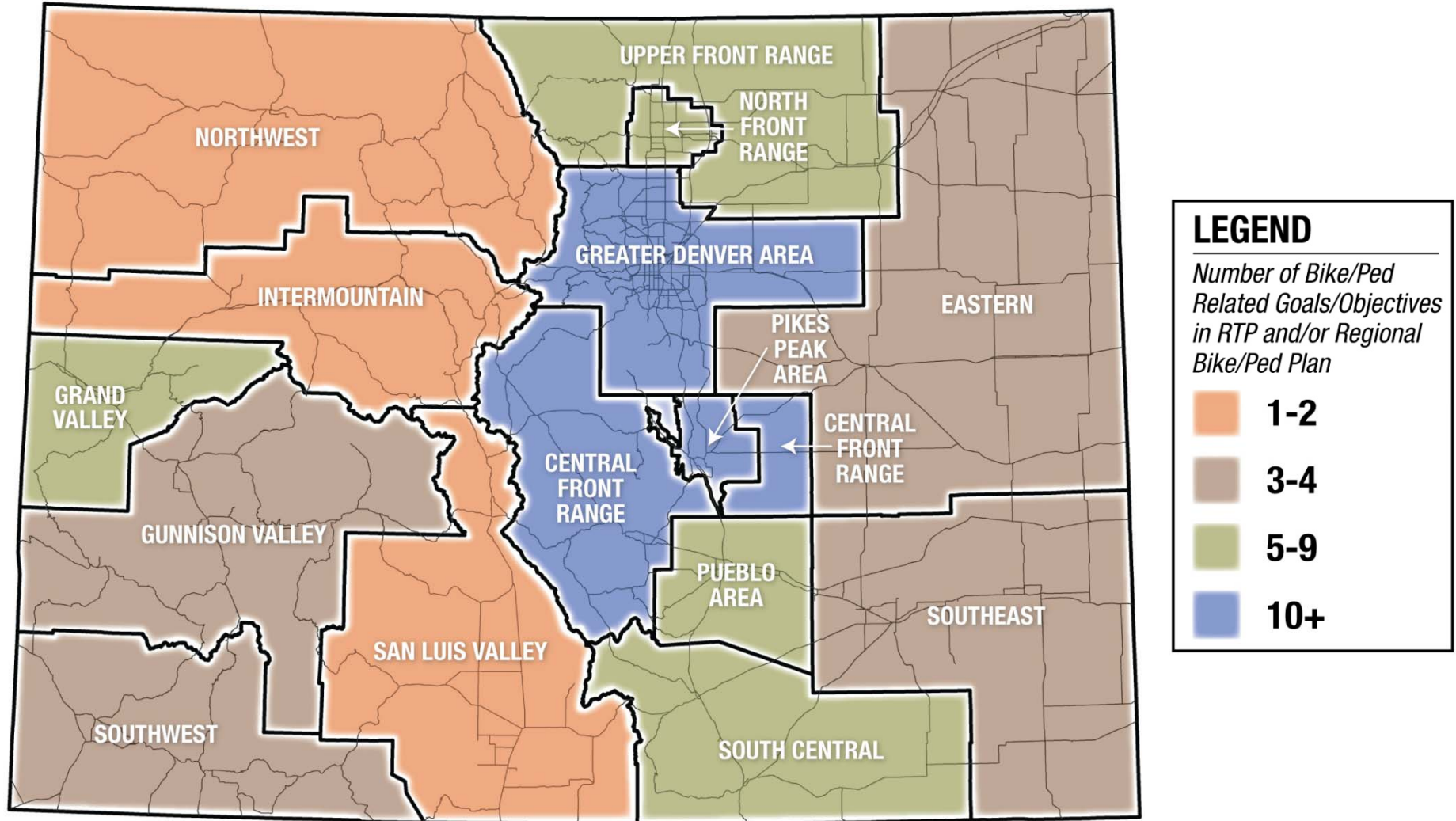




## APPENDIX B MPO AND TPR BICYCLE AND PEDESTRIAN GOALS AND OBJECTIVES



# MPO and TPR Bike/Ped Goals and Objectives



# MPO and TPR Bike/Ped Goals and Objectives (cont.)

- **Enhance Bicycle and Pedestrian Mobility**
  - Provide B/P facilities (6)
  - Complete gaps in B/P system (3)
  - Expand trail system (5)
  - Enhance connections between modes (5)
  - Accommodate bicyclists by adding/improving shoulders (7)
  - Improve surface condition of B/P facilities (2)
- **Improve Safety for Bicyclists and Pedestrians**
  - Improve safety for B/P (11)



# MPO and TPR Bike/Ped Goals and Objectives (cont.)

- **Support Recreation/Tourism/Economic Development**
  - Support economic development by providing modal options (1)
  - Enhance tourism through improved B/P facilities (3)
  - Improve B/P access to recreation areas (3)
  - Provide B/P access to major activity centers (5)
- **Improve Livability/Provide Options for Alternative Modes**
  - Reduce dependency on SOV by enhancing B/P (7)
  - Increase non-motorized options (5)
  - Create walkable communities (2)
  - Encourage bike sharing programs (1)

# MPO and TPR Bike/Ped Goals and Objectives (cont.)

- **Promote Education/Implement Policy**
  - Promote public awareness of non-motorized modes (2)
  - Support local and state initiatives to improve B/P (1)
  - Establish B/P level of service standards (1)
  - Adopt and maintain regional trails plan (1)
  - Provide employer incentives for B/P (1)
  - Incorporate B/P in new development (2)
  - Incorporate B/P in capital projects (2)

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
<i>MPOs</i>	
DRCOG	<p><u>RTP:</u></p> <ul style="list-style-type: none"> <li>• Policy # 5. Rights-of-way Preservation. Reserve adequate rights-of-way in newly developing and redeveloping areas for pedestrian, bicycle, transit, and roadway facilities.</li> <li>• Policy #6. Denver Central Business District. Improve and maintain efficient transportation access by all modes to downtown Denver.</li> <li>• Policy #7. Safety. Develop and maintain a safe transportation system for all users. <ul style="list-style-type: none"> <li>○ Emphasize projects on existing and future facilities that will reduce the likelihood or severity of crashes involving motor vehicles, trains, bicycles, and pedestrians; and</li> <li>○ Support legislation aimed at cost-effectively improving the safety of drivers, passengers, pedestrians, and bicyclists.</li> </ul> </li> <li>• Policy #9. Bicycle and Pedestrian. Provide robust bicycle and pedestrian accessibility throughout the region. <ul style="list-style-type: none"> <li>○ Require adequate sidewalks or pedestrian accommodations be provided along all roadways and within and between private developments in the region’s urbanized area and in densely developed rural communities.</li> <li>○ Prioritize transportation system improvements locally and regionally that support bicycle and pedestrian modes as viable alternative travel choices.</li> <li>○ Develop regional off-street and on-street bicycle corridor facilities and encourage the provision of local facilities throughout the region.</li> <li>○ Encourage bicycle sharing programs.</li> </ul> </li> <li>• Policy #10. Interconnections. Provide efficient interconnections of the transportation system within modes, among different modes, and between the metropolitan area and the rest of the state and nation. <ul style="list-style-type: none"> <li>○ Improve transportation linkages to major destinations and attractions outside the region.</li> <li>○ Provide safe and convenient access for pedestrians and bicyclists to park-n-Ride lots, rapid transit stations, and bus stops. Also provide bicycle parking and promote the capability of transit vehicles to carry bicycles.</li> <li>○ Ensure convenient access to Denver International Airport (DIA) for all modes of travel, and maintain DIA’s important role in connecting the Denver region to the rest of the nation.</li> </ul> </li> <li>• Policy #11. Transportation-efficient Housing and Business Developments. Design new developments within communities to allow the efficient movement of pedestrians, bicyclists, buses, and motor vehicles within, to, and through the area.</li> <li>• While each urban center will be unique, all urban centers will be active, pedestrian-, bicycle-, and transit-friendly places that are more dense and mixed in use than surrounding areas.</li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>• Transportation Options. Modes such as walking, bicycling and transit will be equally competitive with driving within urban centers.</li> <li>• Density. Promote development densities that make walking, bicycling or taking transit viable options to reduce reliance on the automobile and enhance the independence of people who prefer not to drive or are unable to because of age, income or ability.</li> <li>• Development Patterns. Promote human-scaled development (as opposed to auto-oriented) patterns that are easy to navigate and enhance multimodal connectivity and maximize the ability of all people to access opportunities. Create pedestrian and bicycle friendly environments by providing sidewalks, narrowed street crossings (distance across street), curb ramps, adequate crosswalk signal timing, medians as midway stopping points, traffic calming measures, bicycle and pedestrian access to transit facilities, and improved bike paths and trail systems. Establish “level-of-service” standards for pedestrian and bicycle facilities.</li> <li>• Trails Network. Metro Vision calls for an areawide trails network to link open space and provide access. This network should take full advantage of all potential connections, including road and railroad rights-of-way, floodplains, ditch service roads and utility corridors.</li> </ul> <p><u>Bike &amp; Ped Plan:</u>  <i>Facility Planning Policies</i></p> <ul style="list-style-type: none"> <li>• Pedestrian <ul style="list-style-type: none"> <li>○ In all urban and suburban areas, continuous sidewalks should be provided on both sides of all streets and roadways (except freeways), and where possible, detached from the roadway (preferred). Connections through developments and to the entrances of businesses, stores, schools, parks and other activity centers need to be established and maintained.</li> <li>○ In rural areas, where pedestrian volumes tend to be low, paved shoulders should be provided along arterials with adequate width (in accordance with local, state and national guidelines) to buffer the pedestrian from the traveled roadway.</li> <li>○ Local governments are encouraged to conduct a comprehensive review of pedestrian facilities and initiate efforts to provide any needed missing segments. In making such an analysis, local governments should also evaluate the degree to which barriers and intrusions exist and take the necessary steps to eliminate them.</li> </ul> </li> <li>• Bicycle <ul style="list-style-type: none"> <li>○ The existing and planned street system should accommodate bicycles and motor vehicles to the maximum extent possible for safe bicycle travel.</li> <li>○ Local governments are encouraged to identify specific bicycle transportation markets (i.e., home-to-school, home-to-shop, home-to-work), and provide bicycle facilities to serve these markets.</li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>○ Where street improvement and drainage projects coincide with desired bikeways, provisions for bicycle and pedestrian travel should be explicitly addressed before the project proceeds and upheld throughout project development, construction, and operation.</li> </ul> <p><i>Facility Design Policies</i></p> <ul style="list-style-type: none"> <li>● Pedestrian <ul style="list-style-type: none"> <li>○ New or reconstructed sidewalks detached from the curb along major regional and principal arterials should be a minimum unobstructed width of six feet. Planting or hard landscape strips between the curb and sidewalk should be no less than three feet wide.</li> <li>○ New or reconstructed sidewalks attached to the curb along major regional and principal arterials should be a minimum unobstructed width of eight feet.</li> <li>○ Sidewalks and multi-use trails should be built to accommodate the needs of all pedestrians and shall adhere to all Americans with Disabilities Act (ADA) design and accessibility guidelines.</li> <li>○ Specific attention should be given to pedestrian needs in the design of intersections and traffic signalization.</li> <li>○ “Right-turn-on-red” should be prohibited where high pedestrian volumes exist.</li> <li>○ Roadway lighting should be provided at pedestrian crossings and other locations where conflicts could arise between drivers and pedestrians.</li> <li>○ Property owners adjacent to sidewalks should meet local ordinance requirements to maintain and repair their sidewalks and promptly remove snow from walkways throughout the year.</li> </ul> </li> <li>● Bicycle <ul style="list-style-type: none"> <li>○ In rural areas, paved shoulders of at least four feet in width should be provided along major regional and principal arterials, county highways, and state highways to accommodate bicycle and pedestrian travel.</li> <li>○ In urban and suburban areas, as roadways and bridges on the regional roadway system are constructed, reconstructed, resurfaced, or re-striped, curb lanes should be widened to provide space for bicyclists.</li> <li>○ Bicycle lanes designed to national standards are encouraged on collector and arterial roadways and along streets in areas where the construction of such a facility could improve the safety and/or connectivity of the regional bicycle system.</li> <li>○ The use of “sharrow” pavement markings is encouraged where bicycles and vehicles share the traveled lane.</li> <li>○ Bicycle parking facilities should be provided at major employment, retail, entertainment, commercial, and/or other activity centers in the region. Local governments should establish an off-street bicycle parking policy, which considers security, placement, quality of facilities, and provision of signs directing bicyclists to the parking facilities.</li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>○ At actuated traffic signal locations, provision should be made to allow bicycles to be detected or to easily allow a bicyclist to activate a green signal.</li> <li>● Multi-use Trails <ul style="list-style-type: none"> <li>○ Multi-use facilities should have: (a) connections to the local street system and with residential, employment, commercial, recreational, and school sites; (b) explicit signage regarding proper use of the facilities; (c) a minimum width of ten feet to meet national standards; and (d) adequate lighting in underpasses and other dark areas.</li> </ul> </li> <li>● Overall <ul style="list-style-type: none"> <li>○ In 1999, the Federal Highway Administration (FHWA) adopted the Policy Statement on Accommodating Bicyclists and Pedestrians in Transportation Projects (see document in Appendix A) as an approach to integrating bicycling and walking infrastructure investments into the transportation mainstream. FHWA’s goal is that public agencies, professional associations, advocacy groups, and others (e.g., private entities) adopt this policy, sometimes referred to as “Complete Streets”, to reflect the intent of current and future transportation legislation (such as SAFETEA-LU). FHWA’s policy states, “Bicycling and walking will be incorporated into all transportation projects unless exceptional circumstances exist.”</li> <li>○ Limited-access highways can create barriers to bicycle and pedestrian travel. Bicycling and walking should be accommodated near or adjacent to limited-access highways through the provision of facilities along parallel roadways or within the highway right-of-way.</li> <li>○ Overpasses and underpasses to accommodate pedestrian and bicycle travel should be constructed to cross major obstacles such as freeways, rivers, or railways. As roadway overpasses and underpasses are constructed or reconstructed, accommodations should be made for pedestrians and bicyclists.</li> <li>○ Pedestrian and bicycle connections should be explicitly addressed as communities plan for RTD FasTracks rapid transit stations as well as other transit services. In addition, bicycle access and short-term and long-term bicycle parking facilities should be provided at all park-n-Rides, carpool lots, rail and bus stations and other transit facilities as appropriate with the potential market.</li> <li>○ No federal funding should be provided for any pedestrian or bicycle capital projects unless the recipient agrees to provide regular maintenance as outlined in a plan, ordinance, or agreement. Maintenance activities should include: <ul style="list-style-type: none"> <li>▪ Keeping the facility smooth and free of debris such as sand, gravel, leaves, and trash;</li> <li>▪ Repairing cracks and other damage;</li> <li>▪ Leveling grade differences between bridge decks and approaches;</li> <li>▪ Leveling manholes with the street surface;</li> </ul> </li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>▪ Replacing drainage gates having longitudinal spacing with those having lateral spacing;</li> <li>▪ Removing snow and ice;</li> <li>▪ Clearing vegetation;</li> <li>▪ Replacing faulty lighting; and</li> <li>▪ Maintaining safe operating conditions during construction or other temporary events.</li> </ul> <ul style="list-style-type: none"> <li>○ Traffic calming techniques should be considered where appropriate to improve safety for pedestrian and bicycle travel.</li> </ul> <p><i>Land Development Policies</i></p> <ul style="list-style-type: none"> <li>• Local governments should require the provision of pedestrian and bicycle facilities in all new and redeveloped areas. Subdivision and planned unit development ordinances should require good pedestrian and bicycle access among residential areas, arterial and collector roads, transit stops, shopping facilities, schools, employment sites, and recreation facilities as well as through the development. Building and zoning ordinances should require bicycle parking at all major trip attractors.</li> <li>• Communities are encouraged to maintain existing pedestrian and bicycle linkages within development areas and provide new ones where appropriate and feasible. For example, cut-through sidewalks/trails at the end of cul-de-sacs or unpaved footpaths are viable components of the transportation system.</li> <li>• Local governments should consider pedestrian and bicycle facilities when designing, rebuilding, or restriping streets based on the context of the existing and planned land development and the function of the street using principles of context sensitive design solutions.</li> </ul> <p><i>Education and Encouragement Policies</i></p> <ul style="list-style-type: none"> <li>• School districts are encouraged to develop a consistent and comprehensive bicyclist and pedestrian education program for children and parents. The program should provide basic principles for all users to safely operate on roadways and multi-use facilities. The program should include adequate on- and off-road training time and bicycle handling skills.</li> <li>• Bicycle clubs, bicycle shops, activist groups, community colleges, health clubs, and other organizations are encouraged to provide education programs on how to ride a bicycle safely. Instructors should be trained in the initial program years.</li> <li>• School districts and senior centers are encouraged to develop and provide classes regarding the pedestrian aspects of traffic signal operations.</li> <li>• Driver’s license exams should continue to include questions on the legal rights and responsibilities of motorists, bicyclists, and pedestrians.</li> <li>• Driver education classes should explain how pedestrians and bicyclists use the road. This information should be incorporated into motorist’s manuals and driver education programs.</li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>• The state is encouraged to develop and implement a law enforcement training program to educate police officers on the rights and responsibilities of motorists, pedestrians, and bicyclists on roadways and off-street multi-use trails.</li> <li>• The state should require motorists, bicyclists, and pedestrians to take and pass a pedestrian and/or bicyclist education course when they are involved in a significant number of violations. Motor vehicle defensive driving classes, frequently required for traffic violators, would be an ideal place to introduce awareness of all other modes.</li> <li>• Local governments should consider increasing police or special bicycle patrols of the off-street bicycle and pedestrian system.</li> <li>• Local governments, school districts, bicycle advocacy groups, and others should develop and disseminate maps to serve bicycling and pedestrian interests. Examples include bicycle route/facility maps, roadway bicycling suitability maps, and Safe Routes to School maps. The appropriate age and skill levels needed to use facilities should be identified on the various maps. These groups can also disseminate bicycle and pedestrian education materials.</li> <li>• Each local government should designate a bicycle and pedestrian coordinator. The functions of this position could include reviewing transportation projects and land development site plans for pedestrian and bicycle accommodations, implementing the pedestrian and bicycle components of local comprehensive plans, and organizing local pedestrian and bicycle workgroups and Safe Routes to School planning as needed.</li> <li>• Local governments are encouraged to conduct bicycle traffic counts to document the level of bicycling activity on specific routes.</li> <li>• Local governments are encouraged to provide bicycle-sharing programs, including kiosk stations, which allow for checking out and returning bicycles.</li> </ul>
Grand Valley	<p><i>RTP Goals</i></p> <ul style="list-style-type: none"> <li>• Enhance Mobility</li> <li>• Increase Safety</li> </ul> <p><i>RTP Strategies</i></p> <ul style="list-style-type: none"> <li>• Implement the Multi-modal Study (1993) recommendations by requiring pedestrian-bicycle improvements in new developments and capital improvement projects as well as other transportation projects in accordance with Urban Trails Master Plan as amended over time.</li> <li>• Build easily used connections between all modes of transportation.</li> <li>• Continue the Riverfront Park and trail development by expanding the Riverfront trails system from the east to west end of the valley.</li> <li>• Provide employer incentives for carpooling, bike riding, public transit, and public transit and park and ride use.</li> </ul>



Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
NFR	<ul style="list-style-type: none"> <li>• Goal 3: To provide a well-connected multi-modal system. <ul style="list-style-type: none"> <li>○ Objective 3-1: Develop a plan that shows all modes of transportation and identifies the gaps and connections.</li> </ul> </li> <li>• Corridor Visions: GOALS <ul style="list-style-type: none"> <li>○ Reduce dependency on single occupancy vehicles by enhancing transit, TDM, and bicycle/pedestrian options.</li> <li>○ Provide for safe movement of all travel modes.</li> </ul> </li> <li>• Corridor Visions: STRATEGIES <ul style="list-style-type: none"> <li>○ Provide for bicycle and pedestrian travel through improvements such as bicycle/pedestrian paths, crosswalk improvements, wider shoulders, or designated bike lanes.</li> <li>○ Add/improve shoulders with consideration for bike lanes.</li> <li>○ Increase safety by implementing improvements such as railroad crossing devices, rumble strips, geometric modifications, and bicycle/pedestrian overpasses.</li> <li>○ Provide bicycle/pedestrian facilities and connections with other regional trails.</li> </ul> </li> </ul>
PPACOG	<p><i>RTP</i></p> <ul style="list-style-type: none"> <li>• Principles <ul style="list-style-type: none"> <li>○ Develop a multi-modal transportation system that provides access to employment, services, military installations, and other destinations.</li> <li>○ Fully integrate connections within and between modes for people and for freight.</li> <li>○ Increase the safety of motorized and non-motorized travel.</li> </ul> </li> <li>• Goals <ul style="list-style-type: none"> <li>○ Improve surface condition of existing non-motorized facilities.</li> <li>○ Increase non-motorized options and facilities available in the Pikes Peak Region.</li> <li>○ Promote connectivity within and/or between modes.</li> <li>○ Reduce percentage of fatal and injury crashes for non-motorized travel.</li> </ul> </li> </ul> <p><i>Bike Plan</i></p> <ul style="list-style-type: none"> <li>• Goals <ul style="list-style-type: none"> <li>○ Establish a continuous and coordinated regional non-motorized transportation network that will increase the incidence of bicycling and walking.</li> <li>○ Reduce the number of bicycle and pedestrian accidents, injuries, and fatalities, particularly those that involve motorists.</li> <li>○ Encourage organizations with the appropriate interest or authority to improve traffic safety, education, and enforcement.</li> <li>○ Promote public awareness and acceptance of non-motorized transportation modes for all destination-oriented trip purposes.</li> <li>○ Create a traveling environment in which bicycling and walking are attractive alternatives.</li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
PACOG	<p><i>RTP</i></p> <ul style="list-style-type: none"> <li>• Plan, develop, and maintain a safe and efficient transportation system to preserve and enhance the present and future mobility needs of the Pueblo Region. <ul style="list-style-type: none"> <li>○ Maintain, protect and improve safety for the multi-modal transportation system users;</li> <li>○ Develop, improve and maintain pedestrian facilities to create a barrier-free walkable community;</li> </ul> </li> <li>• Balance the mobility needs of the community with the community objective of creating a livable human and natural environment. Plan and develop transportation along with land use planning activities. <ul style="list-style-type: none"> <li>○ Improve pedestrian access and circulation within, and between neighborhoods, and commercial pedestrian oriented business areas such as Downtown;</li> </ul> </li> <li>• Encourage the use of transportation modes other than the single-occupant automobile. Focus on developing facilities that link modes together. <ul style="list-style-type: none"> <li>○ Ensure connectivity between major activity centers by developing and promoting mode transfer points (e.g., park-and-ride facilities, bike-on-bus, etc.) to enhance the use of alternative modes within the inter-modal transportation system;</li> <li>○ Adopt and maintain a Regional Trails Plan that identifies the future alignment of all regionally significant off-street trails and on-street bicycle facilities.</li> </ul> </li> </ul>
<i>TPRs</i>	
Central Front Range	<ul style="list-style-type: none"> <li>• Goal 2. The existing transportation system will be maintained in the most efficient manner possible. <ul style="list-style-type: none"> <li>○ Strategy C. Pavement condition on multi-use facilities will be maintained at a level that protects the original investment and provides for safe use.</li> </ul> </li> <li>• Goal 3. The transportation system provides safe travel opportunities. <ul style="list-style-type: none"> <li>○ Strategy A. The TPR will support local, regional, statewide and national initiatives to modify and improve vehicle safety and driver behavior for all types of vehicles, including private automobiles, transit vehicles, trucks, and bicycles.</li> <li>○ Strategy D. Additional paved shoulder width will be incorporated into highway construction projects to provide safer bicycle and pedestrian zones.</li> <li>○ Strategy E. Bicyclist and pedestrian facilities should be constructed separate from motorized vehicle lanes where necessary and feasible.</li> <li>○ Strategy F. Encourage safe driving initiative such as CDOT’s “Share the Road” program which identify the responsibilities of all users of the state’s roadways.</li> </ul> </li> <li>• Goal 4. The transportation system enhances and/or minimizes impacts to the region’s air, water, scenic view corridors, cultural resources and wild life habitat.</li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
	<ul style="list-style-type: none"> <li>○ Strategy C. Multimodal development such as public transit, bicycle and pedestrian options will be implemented where feasible so as to offer alternatives to single occupant vehicle travel.</li> <li>● Goal 5. The transportation system functions as a complete system with effective connectivity both within the region and to the rest of the state. <ul style="list-style-type: none"> <li>○ Strategy B. The transportation system provides effective access to visitor destinations, including multimodal choices such as public transportation and bicycle/pedestrian facilities.</li> <li>○ Strategy F. Improve system connectivity by providing missing segments linking designated inter-regional multi-use trails.</li> </ul> </li> <li>● Goal 6. The transportation system preserves and enhances the region’s overall economic health. <ul style="list-style-type: none"> <li>○ Strategy C. The transportation system provides enhanced tourism facilities such as rest areas, traveler information services, signage, Scenic and Historic Byway enhancements, and linkage to historic and other downtown areas by pedestrian access from parking areas.</li> <li>○ Strategy D. Recognize significant economic opportunities by developing bicycle and pedestrian facilities so as to enhance tourism and other travel opportunities.</li> </ul> </li> <li>● Goal 7. The transportation system provides new intermodal access and mobility options for individuals and commerce. <ul style="list-style-type: none"> <li>○ Strategy E. The plan seeks to improve additional non-motorized transportation access to recreation areas.</li> <li>○ Strategy F. Construct and maintain bicycle and pedestrian facilities so as to provide additional access and mobility options.</li> </ul> </li> </ul>
Eastern	<ul style="list-style-type: none"> <li>● GOAL: Provide highway facilities that can safely accommodate bike events, training, and recreational riding in the region. <ul style="list-style-type: none"> <li>○ OBJECTIVE: Widen State Highway shoulders to enhance safety on the region’s State Highways</li> <li>○ OBJECTIVE: Use CDOT Enhancement Funds to enhance or extend existing trails</li> </ul> </li> <li>● GOAL: Implement strategies to improve safety for all modes of transportation. <ul style="list-style-type: none"> <li>○ OBJECTIVE: Provide adequate highway shoulders to separate bike traffic from other vehicle traffic</li> </ul> </li> </ul>
Gunnison Valley	<p><i>From Corridor Vision Plans in the RTP</i></p> <ul style="list-style-type: none"> <li>● GOAL: Provide for safe movement of bicycles and pedestrians <ul style="list-style-type: none"> <li>○ Provide bicycle/pedestrian facilities</li> <li>○ Add/improve shoulders</li> <li>○ Develop separated trail system for bicycle/pedestrian</li> <li>○ Stripe and sign designated bike lanes</li> </ul> </li> </ul>
Intermountain	<p><i>From Corridor Vision Plans in the RTP</i></p> <ul style="list-style-type: none"> <li>● Provide for bicycle/pedestrian travel <ul style="list-style-type: none"> <li>○ Provide bicycle/pedestrian facilities</li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
Northwest	<ul style="list-style-type: none"> <li>• Goal 7. Provide a safe, efficient and well maintained roadway system               <ul style="list-style-type: none"> <li>○ Widen appropriate roadways, shoulders, provide passing lanes (where appropriate), improve railroad crossings, and develop bike trails along appropriate roadways to allow for safe passage of both vehicles and bicycles.</li> </ul> </li> </ul>
San Luis Valley	<ul style="list-style-type: none"> <li>• Goal 4. The transportation system minimizes impacts to the region’s air, water, scenic view corridors, wildlife habitat and cultural resources.               <ul style="list-style-type: none"> <li>○ Strategy D Additional pedestrian and bicycle access to recreational areas, both on-street and off-street.</li> </ul> </li> </ul>
South Central	<ul style="list-style-type: none"> <li>• Goal 2. The existing transportation system will be maintained in the most efficient manner possible.               <ul style="list-style-type: none"> <li>○ Strategy B Surface condition on airport runways and bicycle/pedestrian paths will be maintained at a level that protects the original investment and provides for safe use.</li> </ul> </li> <li>• Goal 4. The transportation system minimizes impacts to the region’s air, water, scenic view corridors, cultural resources and wildlife habitat.               <ul style="list-style-type: none"> <li>○ Strategy C Multimodal development such as public transit, bicycle and pedestrian options will be implemented where feasible so as to offer alternatives to single occupant vehicle travel.</li> </ul> </li> <li>• Goal 6. The transportation system preserves and enhances the region’s overall economic health.               <ul style="list-style-type: none"> <li>○ Strategy C The transportation system provides enhanced tourism facilities such as rest areas, traveler information services, signage, Scenic and Historic Byway enhancements, and linkage to historic and other downtown areas by pedestrian access from parking areas.</li> </ul> </li> <li>• Goal 7. The transportation system provides new intermodal access and mobility options for individuals and commerce.               <ul style="list-style-type: none"> <li>○ Strategy E The plan seeks to improve additional non-motorized transportation access to recreation areas including development of a continuous bike/pedestrian trail along the Highway of Legends Scenic and Historic Byway, and connection of this loop on Highway 12 to Trinidad and Walsenburg.</li> </ul> </li> </ul>
Southeast	<ul style="list-style-type: none"> <li>• Goal 1. To strengthen the economic viability of the region.               <ul style="list-style-type: none"> <li>○ Sub-goal B: To enhance tourism and recreational opportunities for residents and visitors to the region through development of transportation infrastructure.</li> </ul> </li> <li>• Goal 2. To develop multimodal transportation options to improve mobility and support economic development.               <ul style="list-style-type: none"> <li>○ Sub-goal C: To improve air, rail, intercity bus, public transit and bikeway facilities and services throughout the region, in addition to highways.</li> </ul> </li> </ul>

Regional Bike & Ped Goals/Objectives	
Entity	Goals & Objectives
Southwest	<ul style="list-style-type: none"> <li>• Goal 1. A safe region-wide transportation system               <ul style="list-style-type: none"> <li>○ Strategy 1b: Widen shoulders of appropriate roadways and develop bike trails along appropriate roadways to allow for the safe passage of both vehicles and bicycles.</li> </ul> </li> <li>• Goal 3. Provide multimodal options for the region               <ul style="list-style-type: none"> <li>○ Strategy 3g: Encourage trail development between communities of Durango and Bayfield, and Cortez, Dolores and Mancos.</li> <li>○ Strategy 3i: Upgrade and maintain major/primary routes and alternate modes of travel to accommodate tourism/scenic byways/trails.</li> </ul> </li> </ul>
Upper Front Range	<ul style="list-style-type: none"> <li>• To provide a multi-modal transportation system for the safe and efficient movement of persons, goods, and information.</li> <li>• Provide for bicycle/pedestrian travel               <ul style="list-style-type: none"> <li>○ Add/improve shoulders</li> </ul> </li> <li>• Reduce dependency on single occupancy vehicles by enhancing transit, TDM, and bicycle/pedestrian options</li> </ul>



**APPENDIX C      WEBINAR & ON-LINE SURVEY RESULTS**



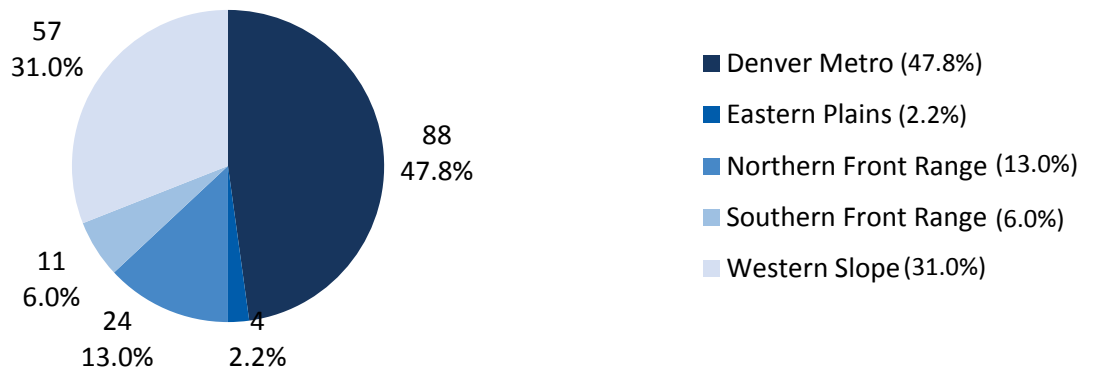


Following are the results of a survey conducted during two webinars presented by the Colorado Department of Transportation on November 30 and December 1, 2011. Subsequent to the webinars, a link to a recording of the webinar was distributed, and those who were unable to participate in the webinars were able to view the recorded webinar and participate in an on-line survey consisting of the same questions that were asked during the webinars.

Participants were asked to provide feedback on each of eight prospective goals of the Statewide Bicycle Pedestrian Plan. The survey was not intended to weight the goals, but rather to identify their applicability and relative importance for the Plan. The available options were Most Important (which could be answered no more than twice per participant), Very Important, Important, Somewhat Important, and Not Important; these responses were converted to a 5 (Most Important) to 1 (Not Important) scale for analysis. The responses affirmed that all of the draft goals indeed have broad support, with average scores ranging from 4.14 (for the safety goal) to 3.51 (for the economy goal). In no case did more than 3% of respondents deem a goal "Not Important."

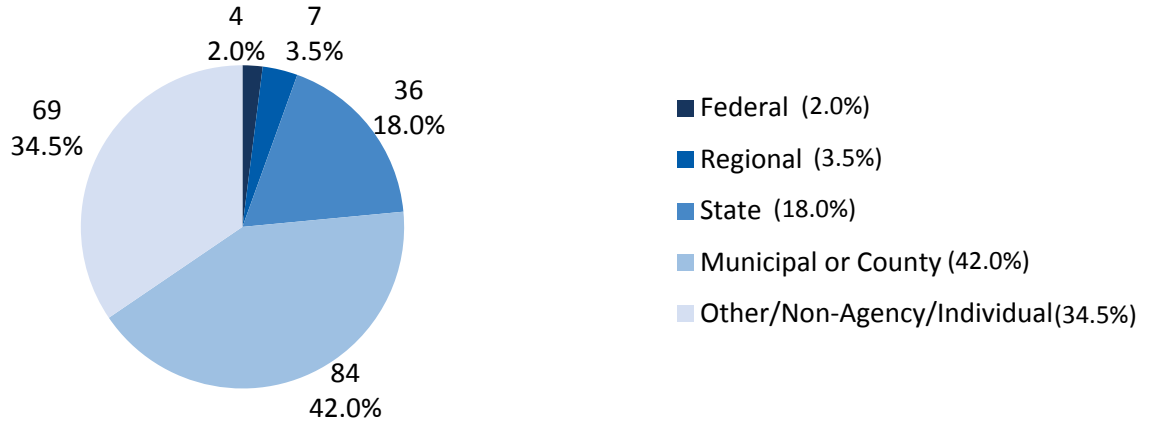
Approximately 150 people participated in the webinars, and 48 people participated in the subsequent on-line survey. The results are combined and summarized below.

What area are you from?

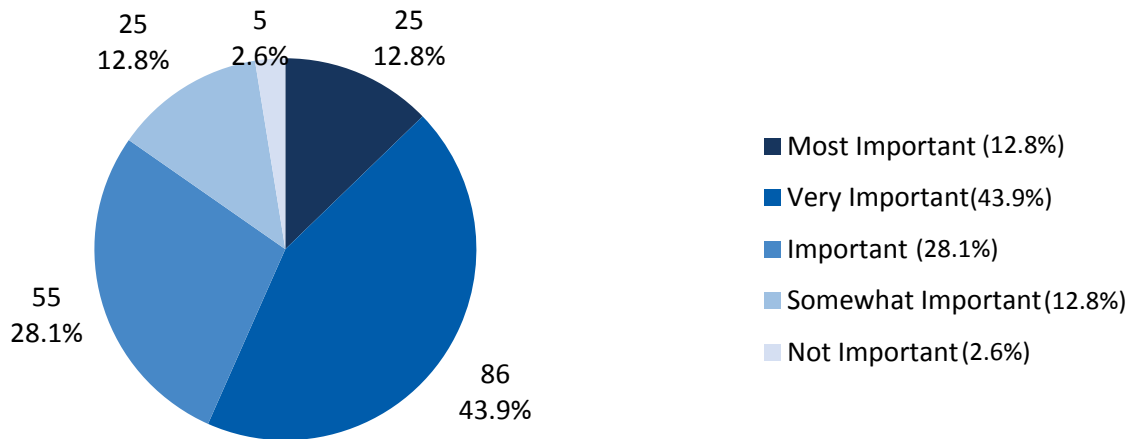




What type of agency are you with?



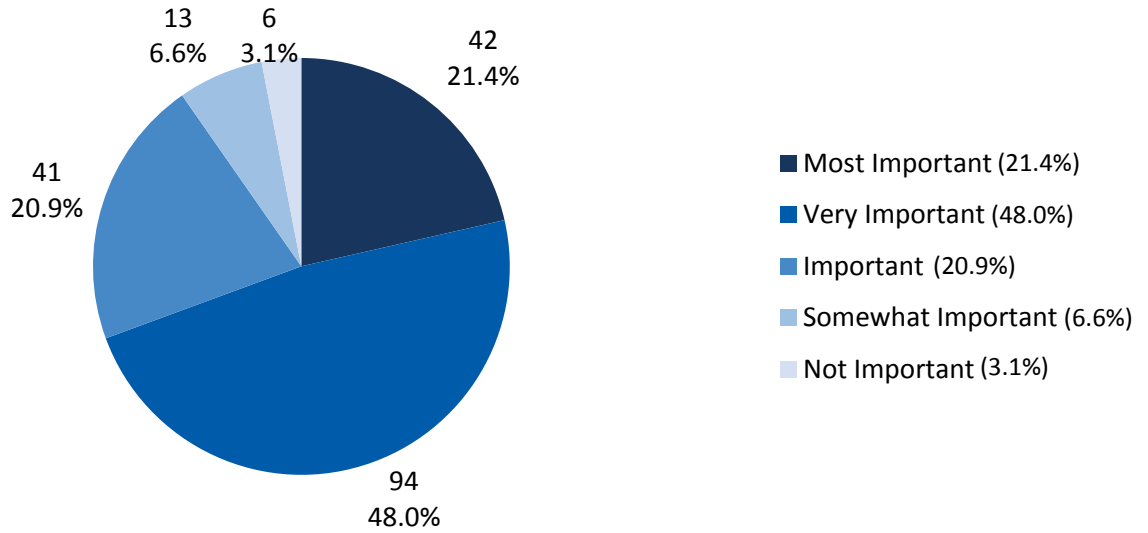
How important to you is the goal of an Improved State/Regional Economy (access to jobs, tourism, increased disposable income)?



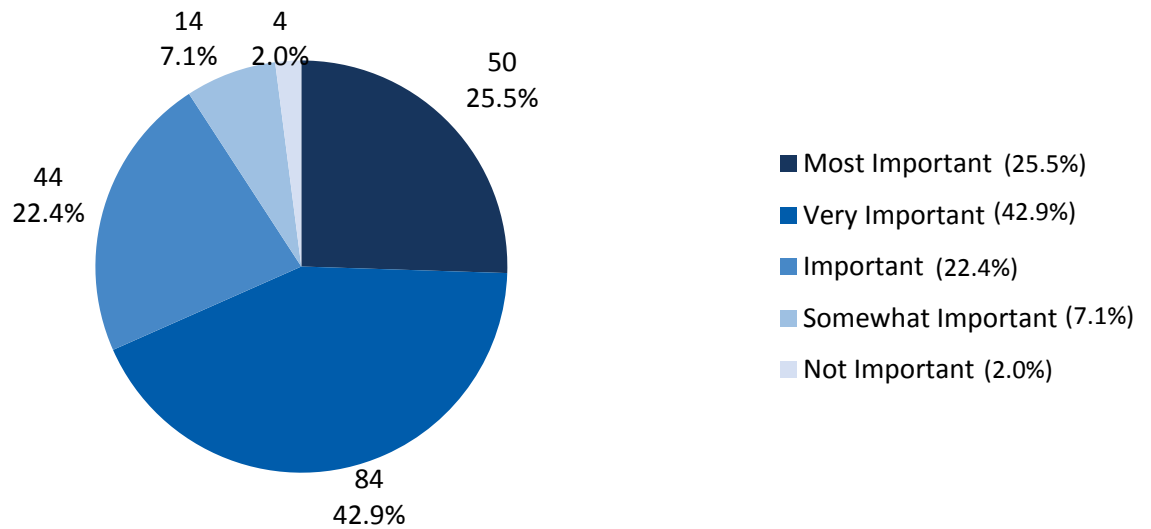




How important to you is the goal of Better Public Health (reduced disease and obesity)?

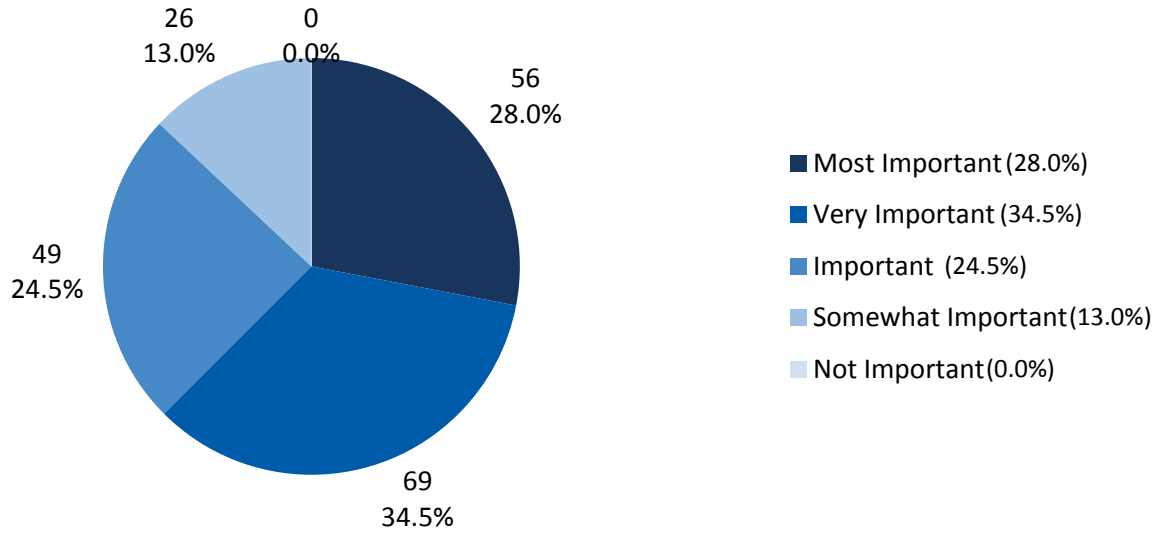


How important to you is the goal More Opportunities for Recreation and Enhanced Quality of Life?

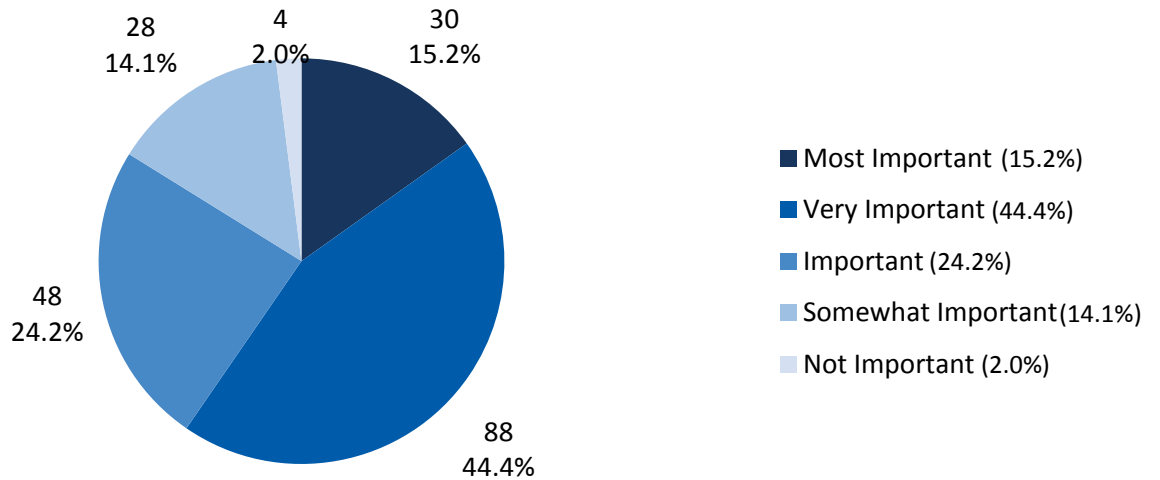




How important to you is the goal of Better Environment and Air Quality?

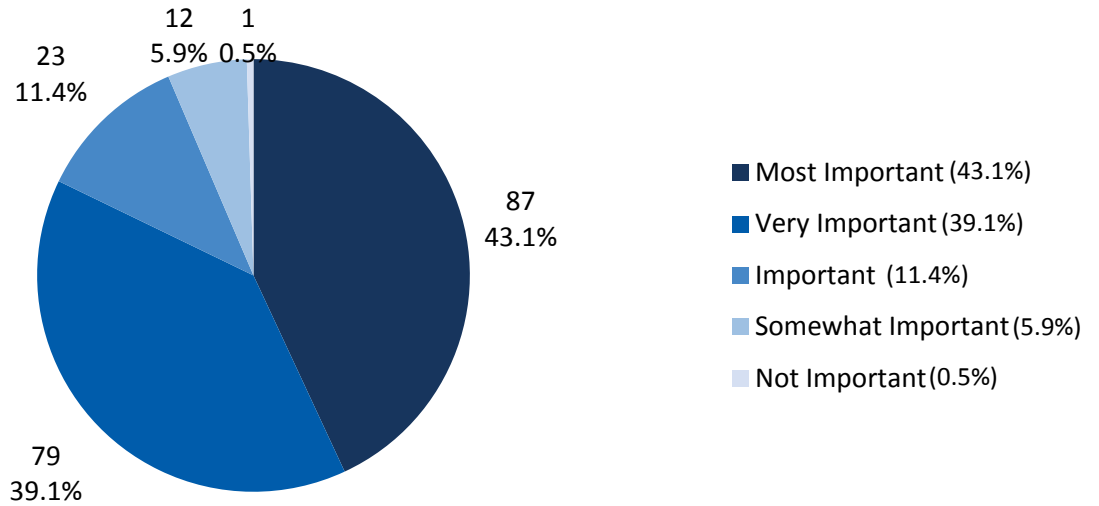


How important to you is the goal of Better Social and Educational Opportunities (providing bicycle/pedestrian facilities to underserved populations and/or to access schools)?

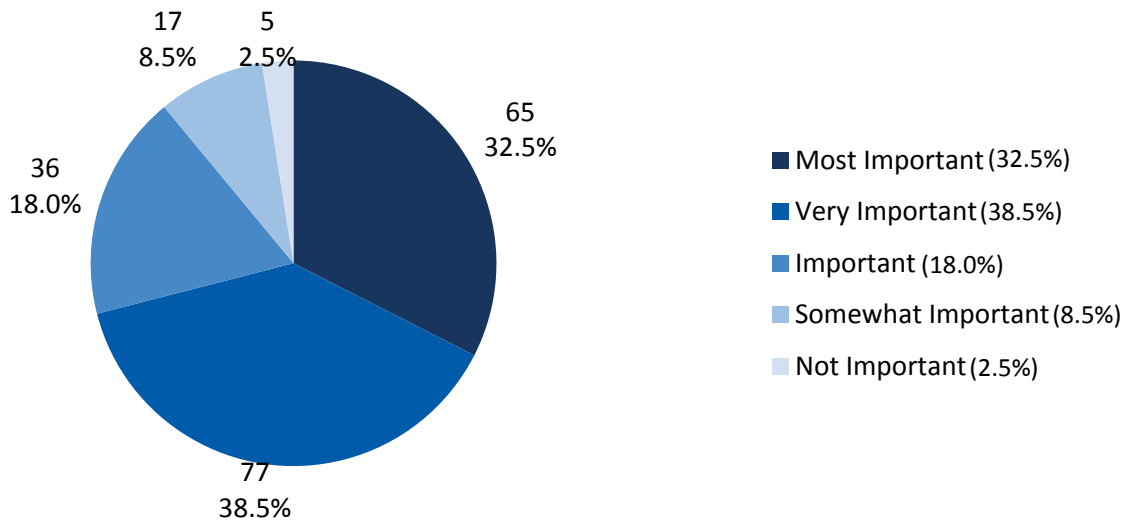




How important to you is the goal of Enhanced Safety?

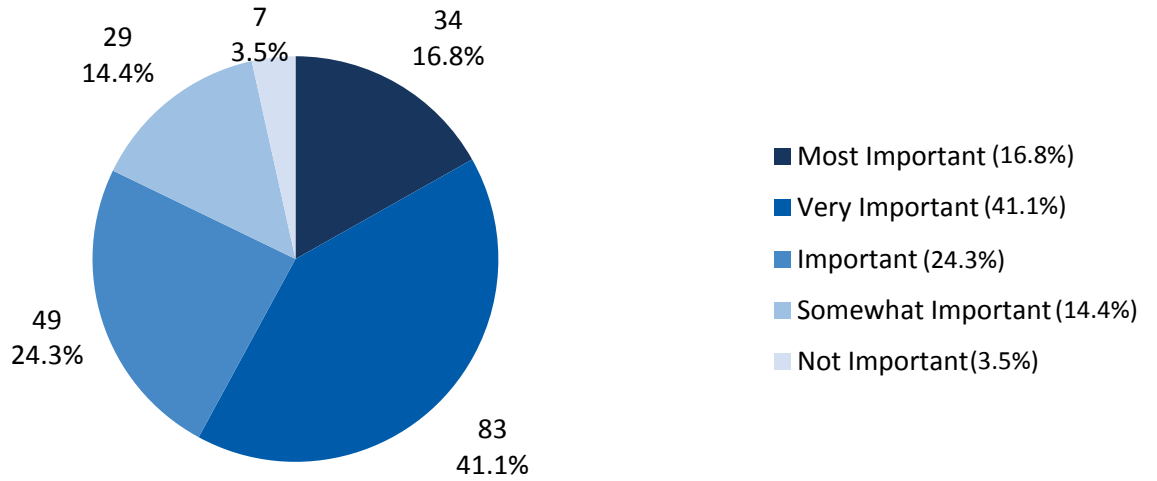


How important to you is the goal of Increased Bicycling and Walking Activity?

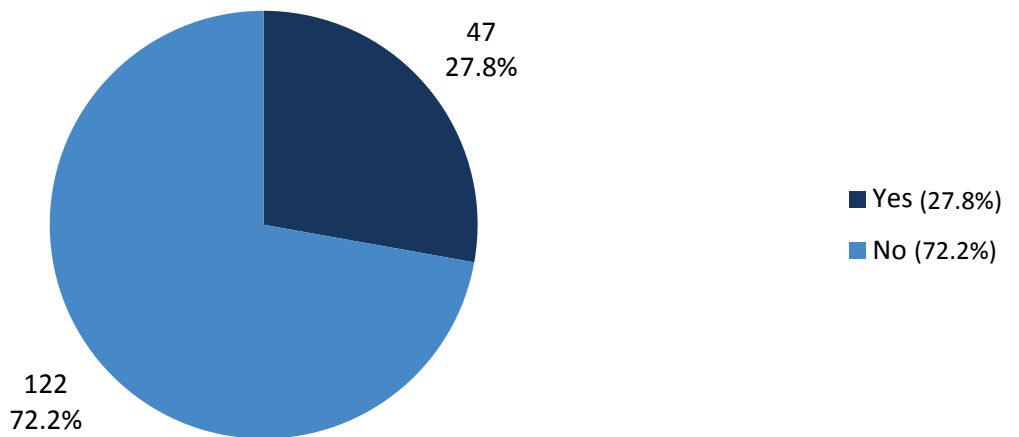




How important to you is the goal of Maximizing other Transportation Investments (reduced congestion connectivity to transit)?



Are there any major goals not described here that you believe should be considered?





**APPENDIX D      EXAMPLE BASELINE SAFETY DATA**

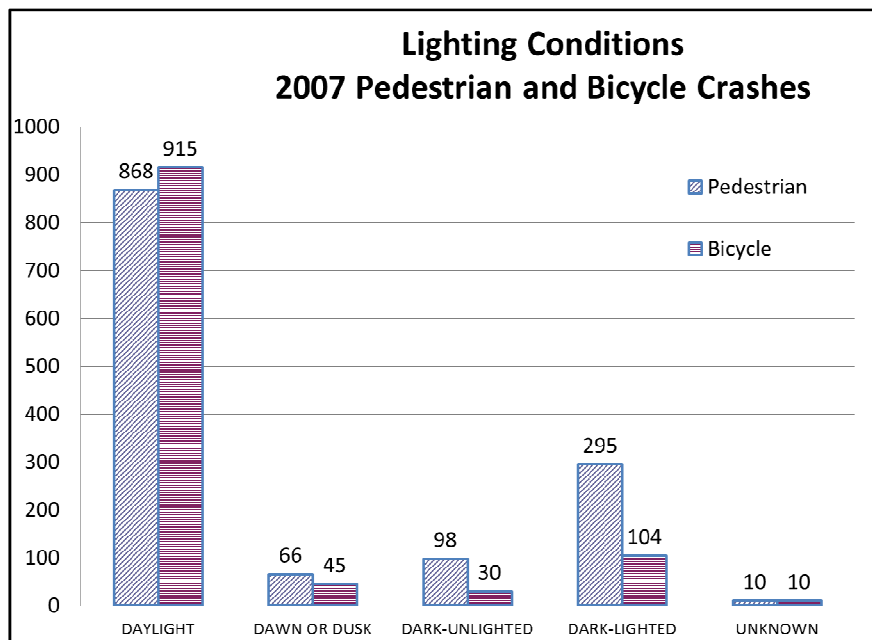


Existing data sources provide insight into the extent and nature of pedestrian and bicycle crashes in Colorado. While overall crash volumes could be used to measure the success of safety programs, the raw number of crashes or fatalities may not tell the complete story of pedestrian and bicycle safety. This appendix provides information that could be used as a baseline for evaluating crash reduction strategies, including lighting conditions, month of year, sex (and related fault), and age of the person involved in pedestrian and bicycle crashes.

A detailed analysis of crash records (a database) and crash reports (which include narrative text and sketches) would provide specific baseline data with respect to the temporal, demographic, and causal factors associated with Colorado’s pedestrian and bicycle crashes. The results of such an analysis could be used to identify specific measures that could be taken to reduce pedestrian and bicycle crashes.

Some examples of potential baseline data are provided in the following paragraphs. 2007 crashes form the basis for these analyses; in 2007, there were 1337 pedestrian crashes and 1104 bicycle crashes.

Nationwide, a disproportionate number of pedestrian and bicycle crashes occur at night. In Colorado, 34 percent of pedestrian crashes and 16 percent of bicycle crashes occur under non-optimal lighting conditions (dawn or dusk, dark unlighted, or dark lighted), as shown in **Figure D.1**. With respect to infrastructure, a concerted effort to improve urban roadway lighting could reduce the number of non-daylight crashes. Campaigns that educate pedestrians and bicyclists to their conspicuity could also have an influence on these crashes. Another non-daylight crash mitigation measure might be targeted enforcement of bicycle light laws.



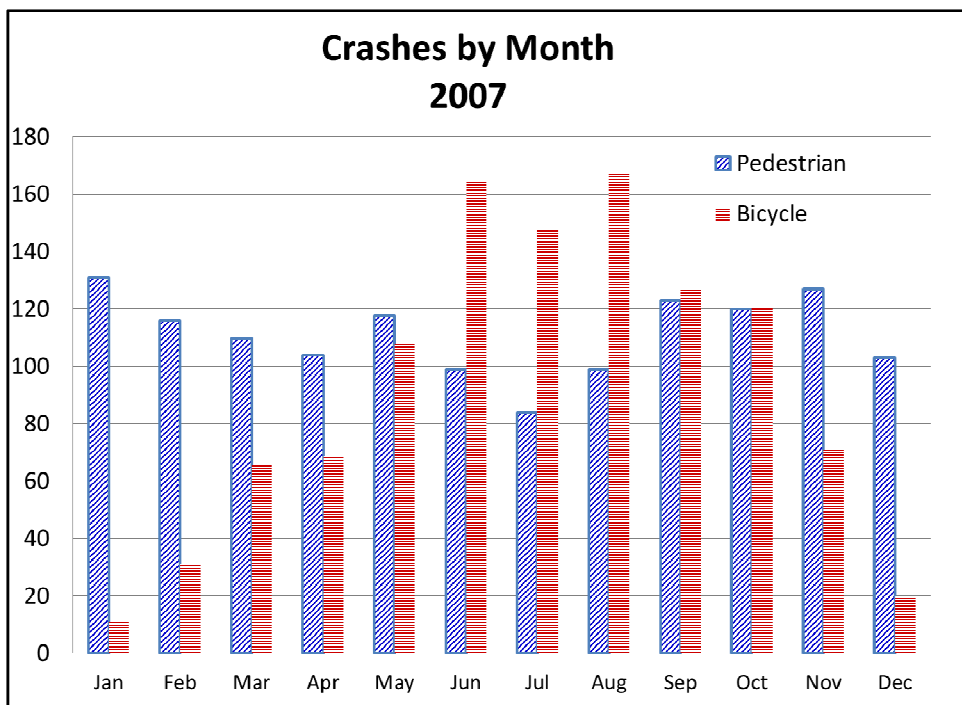
**Figure D.1 2007 Pedestrian and Bicycle Crashes by Lighting Condition**

Seasonal variations also have a significant impact on the occurrence of bicycle crashes; more bike crashes occur during the warmer months, as shown in **Figure D.2**. Pedestrian crashes do not show the same trend; they may slightly increase during winter months. If correlated with non-daylight crashes these data could further support lighting (infrastructure) improvements. The bicycle crash data suggest that educational and enforcement campaigns are likely to be most relevant during the late spring through early autumn, when motorists and bicyclists appear to be most active.

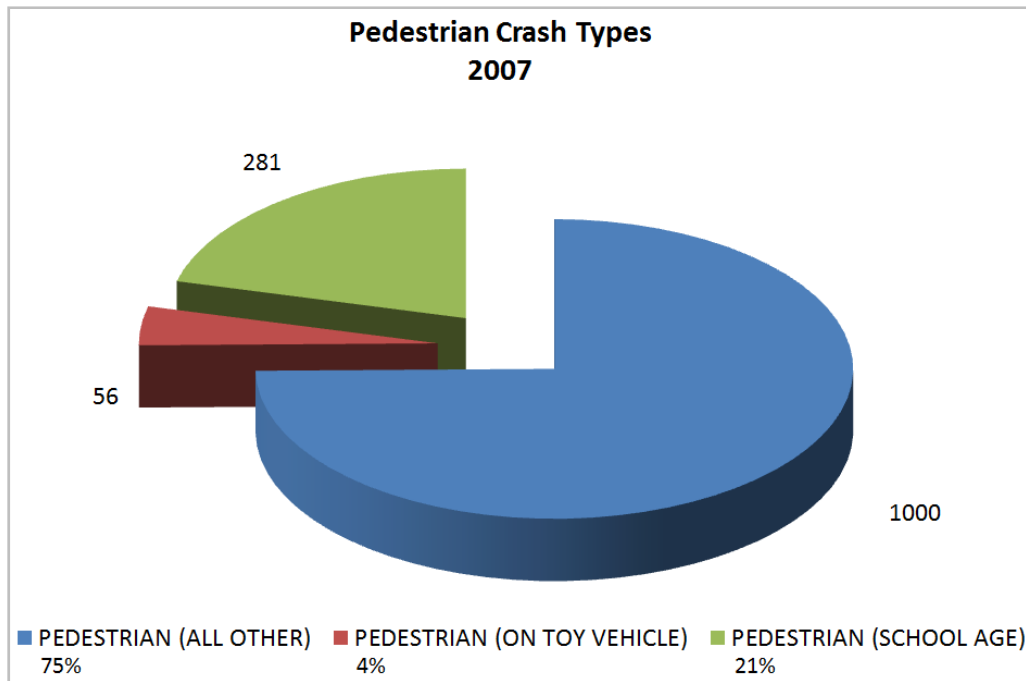
Approximately 23 percent of bicyclists involved in crashes were female, while 77 percent of bicyclists involved in crashes were male (data were available for 898 of the 1104 bike crashes occurring in 2007). Of the crashes in which female bicyclists were involved, they were identified as primarily at fault (coded as “Vehicle 1” on the crash report) in 37 percent of the crashes. Of the crashes in which male

bicyclists were involved, they were identified as primarily at fault in 46 percent of the crashes. With further analysis of the data, including crash typing, specific educational countermeasures could be developed to reduce particular crash types. For instance, women subjects could be used in the educational graphics developed to combat those crashes types that most often involve women. The database does not provide adequate information to identify the female/male split of pedestrians involved in crashes.

While the database does not provide adequate information to identify the specific age of pedestrians involved in crashes, three types of pedestrian crashes are identified on Colorado crash reports—school age, on toy vehicle, and all other. In 2007, according to this specification in the crash reports and as shown in **Figure D.3**, 21 percent of the pedestrian crashes involved school aged children (5-19 years old). Tracking this statistic can help determine if



**Figure D.2. 2007 Pedestrian and Bicycle Crashes by Month**



**Figure D.3 2007 Pedestrian Crashes by Crash Type**

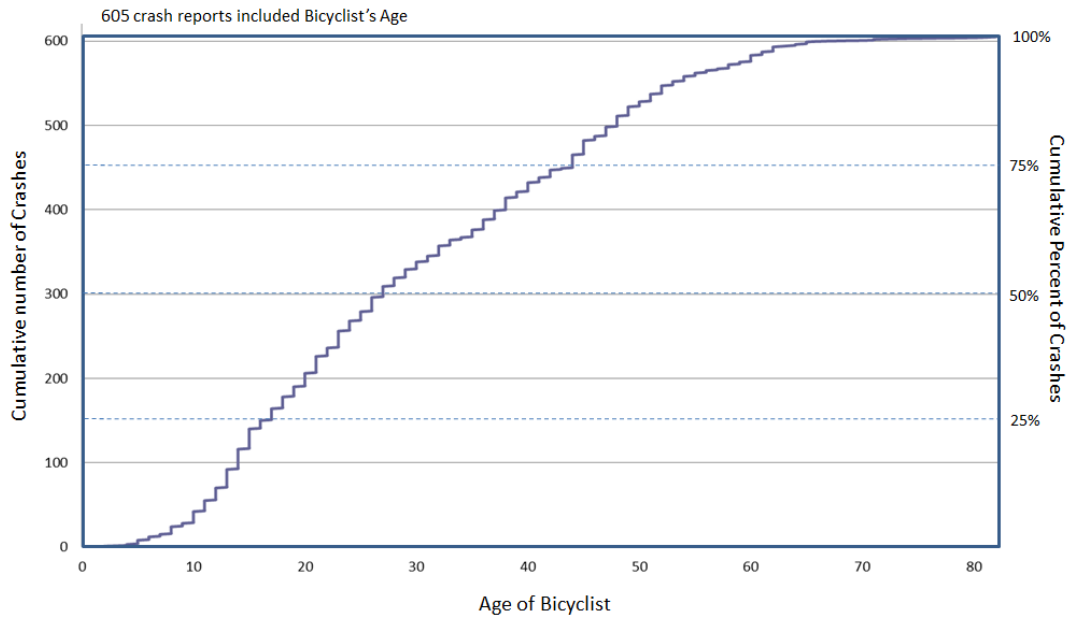
safety campaigns directed at school age children are having a significant impact.

Cumulative plots can also provide useful information. For instance, age information was provided for 605 of the bicyclists involved in crashes. **Figure D.4** shows a cumulative plot of bicycle crashes by age of cyclist. As an example of how this information could be used, this plot reveals that more than 10 percent (11.57 percent) of the bicycle crashes involved bicyclists ages 13, 14, or 15 years old. Targeting these ages with an educational campaign would likely not only address crashes for this age group, but also have a long term effect on crash rates.

With a crash typing analysis (using PBCAT or similar methods), crash countermeasures could become more targeted. For instance, it might be found that on multi-lane roadways bicyclists riding against traffic on sidewalks represent a significant percentage of crashes. Or that within particular areas of the pedestrians walking along the roadway at night are over represented in the crash data. An initial detailed analysis would give Colorado agencies a set of benchmarks to inform countermeasure selection and evaluate countermeasure effectiveness.



### Age of Bicyclists Involved in Crashes (Cumulative) 2007



**Figure D.4. 2007 Bicycle Crashes by Age of Bicyclist**



**APPENDIX E**

**CDOT BICYCLE AND PEDESTRIAN POLICY & PROCEDURAL DIRECTIVES AND STATE STATUTE**



<b>COLORADO DEPARTMENT OF TRANSPORTATION</b>		<input checked="" type="checkbox"/> <b>POLICY DIRECTIVE</b> <input type="checkbox"/> <b>PROCEDURAL DIRECTIVE</b>
Subject <b>Bike and Pedestrian</b>		Number <b>1602.0</b>
Effective <b>10/22/09</b>	Supersedes <b>7/1/77</b>	Originating Office <b>Division of Transportation Development</b>

**PURPOSE**

The purpose of this policy is to promote transportation mode choice by enhancing safety and mobility for bicyclists and pedestrians on or along the state highway system by defining the policies related to education and enforcement, planning, programming, design, construction, operation and maintenance of bicycle and pedestrian facilities and their usage.

**AUTHORITY**

- Colorado Transportation Commission
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), 2005
- 23 USC 104 (Federal funds), 23 USC 109 (existing routes), 23 USC 134 and 135 (planning for all modes), 23 USC 217 (due consideration for bike/ped), 23 USC 402 (highway safety), 23 USC 652 (bike/ped accommodation in projects)
- 43-1-104 (CDOT Bike/Ped staff), 42-1-109 (education outreach), 42-2-1412 (bicycles subject to same rights and responsibilities as motor vehicles)
- TC Policy Directive 902.0

**APPLICABILITY**

This Policy Directive applies to the Colorado Department of Transportation (CDOT) and its subdivisions.

**POLICY**

It is the policy of the Colorado Transportation Commission to provide transportation infrastructure that accommodates bicycle and pedestrian use of the highways in a manner that is safe and reliable for all highway users. The needs of bicyclists and pedestrians shall be included in the planning, design, and operation of transportation facilities, as a matter of routine. A decision to not accommodate them shall be documented based on the exemption criteria in the procedural directive.

**POLICY BACKGROUND**

Multimodal transportation is a key element of CDOT’s mission in providing improvements to the statewide transportation system. Federal surface transportation law places a strong emphasis on creating a seamless transportation system that persons of all ages and abilities can utilize for safe and convenient access to jobs, services, schools and recreation.

Today the bicycle is more than a recreational conveyance. It has become an acceptable mode of transportation. With the increasing public interest in the environment, personal health, and energy

conservation, the bicycle offers a viable alternative to the auto, particularly for local trips or those that are combined with another mode such as transit. Because of the increased interest and use in bicycle transportation by Coloradans, full consideration for their safety and mobility on the roadway system needs to be an integral part of CDOT's project development process.

The challenge for transportation planners and highway engineers is to balance the needs of all roadway users and to develop a transportation infrastructure that provides connectivity and access for all, opportunity for modal choice, and safety for each mode of travel. More choice equates to more capacity.

**FISCAL IMPACT**

Implementation will have a fiscal impact as part of project and maintenance costs and may lead to reprioritizing work.

**IMPLEMENTATION**

This policy is effective immediately upon approval and shall be implemented by all Divisions, Branches, Regions, and Offices of CDOT.

**REVIEW DATE**

This Policy shall be reviewed in October 2015.

  
\_\_\_\_\_  
Transportation Commission Secretary

10/22/09

\_\_\_\_\_  
Date

<b>COLORADO DEPARTMENT OF TRANSPORTATION</b>		<input type="checkbox"/> <b>POLICY DIRECTIVE</b>	<input checked="" type="checkbox"/> <b>PROCEDURAL DIRECTIVE</b>
Subject <b>Bike and Pedestrian</b>		Number <b>1602.1</b>	
Effective <b>02/04/10</b>	Supersedes <b>New</b>	Originating Office <b>Division of Transportation Development</b>	

**PURPOSE**

The purpose of this directive is to promote transportation mode choice by enhancing safety and mobility for bicyclists and pedestrians on or along the state highway system by defining the policies related to education and enforcement, planning, programming, design, construction, operation and maintenance of bicycle and pedestrian facilities and their usage.

**AUTHORITY**

- CDOT Executive Director
- Policy Directive 1602.0
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), 2005
- 23 USC 104 (Federal funds), 23 USC 109 (existing routes), 23 USC 134 and 135 (planning for all modes), 23 USC 217 (due consideration for bike/ped), 23 USC 402 (highway safety), 23 USC 652 (bike/ped accommodation in projects)
- 43-1-104 (CDOT Bike/Ped staff), 42-1-109 (education outreach), 42-2-1412 (bicycles subject to same rights and responsibilities as motor vehicles)

**APPLICABILITY**

This Procedural Directive applies to the Colorado Department of Transportation (CDOT) and its subdivisions.

**DEFINITIONS**

**Bike Lane:** Portion of a roadway or shoulder designated for preferential or exclusive use by bicyclists. It is distinguished from the portion of the roadway for motor vehicle traffic by a paint stripe, curb, or other devices.

**Bike Route:** A system of bikeways designating preferred routes for bicycle use by signing with appropriate directional and informational route markers.

**Bikeway:** A generic term for any road, street, path, or way which, in some manner, is designated as being available for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation. This includes but is not limited to bike lanes, bike routes, shoulders and multi-purpose paths.

**Roadway:** The portion of a highway, including shoulders, for vehicular use. (Page 327, Chapter IV, AASHTO 1994).

**Multipurpose Paths (also known as Trails or Shared-Use Paths):** A paved or unpaved bikeway physically separated from motorized vehicular traffic by an open space or barrier, specifically designated as being open to bicycle users, pedestrians, skaters, joggers, equestrians, or other non-motorized users.

**PROCEDURE**

**EDUCATION AND ENFORCEMENT**

Subject <b>Bike and Pedestrian</b>	Number 1602.1
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Education programs can help to dispel misinformation, encourage courteous and lawful behavior among motorists and bicyclists of all ages, enhance the skill level of bicyclists, and improve motorist awareness, thus leading to a reduction in crashes. CDOT shall continue its on-going programs that support education for motorists, bicyclists, pedestrians and law enforcement personnel regarding their shared responsibilities, as well as programs that provide design and planning instruction to internal and external audiences. The Department will continue to publish a Colorado Bicycle Manual and Colorado Bicycling Map to provide guidance on shared roadway usage.

The Colorado State Patrol will continue to police bikeways within State Highway right of way which are adjacent to and are an integral part of the traveled portion of State Highways and the shoulder area, and which are not separated from the roadway by a physical barrier, except where such bikeways are within the jurisdiction of a city, city and county or incorporated town. The policing of all other bikeways shall be the responsibility of local law enforcement agencies or other state agencies.

### **PLANNING**

Planning for existing and potential bicycle and pedestrian use shall be integrated into the overall Statewide transportation planning process. Along with the Statewide Long Range Plan update, a statewide bicycle and pedestrian plan will be developed or revised as part of that process. CDOT staff or consultants shall provide technical support and education assistance for bicycle and pedestrian planning to the rural Transportation Planning Regions (TPR's). Metropolitan Planning Organizations should include a bicycle and pedestrian plan as part of their Regional Transportation Plan (RTP). Planning for bicycle and pedestrian improvements shall be consistent with local and regional transportation plans. CDOT shall, as part of the statewide planning process, identify criteria for high priority corridors or locations that can be used to evaluate potential bicycle and pedestrian improvements within each region for the purpose of focusing limited resources for future improvements and/or maintenance activities.

### **PROGRAMMING/FUNDING**

Virtually all the major transportation funding programs can be used for bicycle and pedestrian-related projects. It is the intent of this policy to apply funds in the most efficient and effective way possible by integrating full consideration of bicycle and pedestrian needs early in the project development and programming process; by encouraging use of low cost solutions to increase safety and mobility for all modes; and by focusing on high priority bicycle corridors or locations for the more costly improvements and/or maintenance activities. Project programming estimates used for the Statewide Transportation Improvement Program (STIP) shall include the costs related to planned bicycle and pedestrian accommodations.

### **DESIGN**

A wide range of options can serve to enhance bicycle and pedestrian mobility. Bicycle and pedestrian accommodation comes in many sizes and styles from signage and striping to sidewalks and shoulders. Context sensitive solution practices are encouraged to determine the appropriate solution for accommodating bicyclists and pedestrians within the project area so that they are consistent with local and regional transportation plans. Bicycle and pedestrian accommodations shall be integrated into the overall design process for state highway projects that begin the scoping process after the approval date of this procedural directive. Consideration of bicycle and pedestrian accommodations in on-going projects will be incorporated as reasonable and feasible given budget and schedule constraints.

Current AASHTO and MUTCD standards for bicycle and pedestrian facilities shall be used in developing potential facility improvements. To provide consistent information on accommodating bicyclists and pedestrians on the state highway system, staff shall develop a chapter on bicycle and

Subject <b>Bike and Pedestrian</b>	Number 1602.1
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pedestrian design guidelines as part of the existing *CDOT Roadway Design Guide*.

All design scoping meeting agendas shall include an item: Bicycle and Pedestrian Accommodation. Scoping summary shall address the consideration given to bicycle and pedestrian facilities and any decisions made regarding the accommodation of these modes.

CDOT Design Data (Form 463) Section 5: Project Characteristics (proposed) shall provide special attention to “Bikeways”. FIR and FOR meeting notes shall address consideration given to bicycle and pedestrian facilities and decisions made regarding accommodation of these modes.

Safety analysis of state roadways will include bicycle and pedestrian information. Any rumble strip installation shall abide by CDOT’s Rumble Strip Standard M-614-1.

### **CONSTRUCTION**

During construction, reasonable accommodations for bicyclist and pedestrian use will be made, or reasonable detour routes (adequate in capacity, roadway surface, and travel distance from beginning to end of detour to accommodate detoured traffic) will be provided and appropriately signed.

### **MAINTENANCE**

When bikeways are covered with sanding materials, broken glass, and other debris, bicyclists will avoid them and use motorized travel lanes. To reduce conflict with motorized vehicles, to provide safer travel for all users, and to protect the investment of public funds in bikeways and walkways, maintenance plans should provide accommodation for bicycle travel to include scheduled inspection and maintenance of state facilities consistent with the annual level of service adopted by the Transportation Commission.

Until specific high use corridors can be identified through the planning process, CDOT maintenance should work with region traffic engineers and the headquarters bicycle/pedestrian coordinator to identify interim priority areas based on historical use and potential conflicts. Multi-purpose paths owned by the state and identified by CDOT as a commuter route shall be plowed immediately following the end of a snow storm.

Bikeways which are adjacent to or are an integral part of State Highways including the shoulder area, and which are not separated by a physical barrier from that portion of the highway used by motor vehicles, shall be maintained by the Department of Transportation. Bikeways within the right-of-way of controlled-access State Highways will be maintained by the Department, except where a maintenance agreement provides otherwise. Where new projects are being considered, maintenance agreements shall be in place prior to construction.

All bikeways other than those defined above shall be the maintenance responsibility of others. These will include, but not be limited to: 1) Bikeways which are within federal-aid system right of way, but which are beyond that portion of the highway used by motor vehicles including the shoulder area and; 2) Bikeways which are outside of the federal-aid system right of way.

Responsibilities for operation, maintenance and policing of facilities in CDOT ROW shall be determined and outlined prior to construction of such facilities, except where a pre-existing maintenance agreement is in place.

A Maintenance Program Area (MPA) shall be developed for multi-purpose paths to ensure maintenance

funding is provided. This MPA will also provide for the appropriate tracking and analysis of these maintenance costs.

### **EXEMPTION**

CDOT will utilize FHWA exemption guidance in situations where one or more of the following occur:

- Bicyclists and pedestrians are prohibited by law from using the roadway
- The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. (Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.)
- Where scarcity of population or other factors indicate an absence of need.

Requests for an exemption from the inclusion of bikeways and walkways shall be documented with supporting data that indicates the basis for the decision. Exemption requests shall be submitted to the Regional Transportation Director and the headquarters Bicycle/Pedestrian Coordinator. Review and response will be done within 30 days following submittal.

### **FISCAL IMPACT**

Implementation will have a fiscal impact as part of project and continuing maintenance costs and may lead to reprioritizing work.

### **IMPLEMENTATION**

This procedural directive is effective immediately upon approval and shall be implemented by all Divisions, Branches, Regions, and Offices of CDOT.

### **REVIEW DATE**

This procedural directive shall be reviewed in February, 2015.




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Executive Director

02/04/10

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Date of Approval



CHAPTER 422

**TRANSPORTATION**

**HOUSE BILL 10-1147**

BY REPRESENTATIVE(S) Kefalas, Fischer, Gagliardi, Hullinghorst, Kerr A., McFadyen, Primavera, Vigil, Benefield, Labuda, Ryden, Schafer S., Todd, Tyler, May, Pace; also SENATOR(S) Bacon.

**AN ACT**

**CONCERNING SAFER USE OF NONMOTORIZED WHEELED TRANSPORTATION BY MINORS, AND, IN CONNECTION THEREWITH, CODIFYING INTO LAW THE EXISTING BIKE AND PEDESTRIAN POLICY DIRECTIVE OF THE DEPARTMENT OF TRANSPORTATION AND REQUIRING THE DEPARTMENT OF TRANSPORTATION, IN COLLABORATION WITH THE DEPARTMENTS OF EDUCATION AND PUBLIC SAFETY AND APPROPRIATE NONPROFIT ORGANIZATIONS AND ADVOCACY GROUPS, TO NOTIFY SCHOOLS OF THE AVAILABILITY OF AND MAKE AVAILABLE TO SCHOOLS EXISTING EDUCATIONAL CURRICULUM FOR MINORS REGARDING THE SAFE USE OF PUBLIC STREETS AND PREMISES OPEN TO THE PUBLIC.**

*Be it enacted by the General Assembly of the State of Colorado:*

**SECTION 1. Legislative declaration.** (1) The general assembly hereby finds and declares that:

(a) It is in the best interests of all Coloradans to make our streets safe for all users including motorists, transit users, pedestrians, bicyclists, and users of other types of nonmotorized wheeled transportation;

(b) The safe routes to school program and the bicycle and pedestrian policy adopted by the Colorado department of transportation help to make our streets more friendly to pedestrians, bicyclists, and users of other forms of nonmotorized wheeled transportation and to encourage more children to walk, bike, or use another form of nonmotorized wheeled transportation to get to and from school safely; and

(c) Children and adolescents will benefit from additional education regarding the rules of the road, high risk traffic situations, and the safe use of bicycles and other forms of nonmotorized wheeled transportation.

(2) The general assembly further finds and declares that:

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*Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.*

(a) In its strategic plan, the Colorado state patrol has made a commitment to lead and to sustain a cooperative effort that will eliminate most traffic fatalities in Colorado by 2025;

(b) Although bicycling is a safe and healthy activity, on average, eleven bicyclists are killed and five hundred forty bicyclists are hospitalized annually in Colorado due to injuries sustained in bicycle crashes;

(c) Brain injury is the leading cause of death and serious disability resulting from the use of nonmotorized wheeled transportation, and in Colorado approximately one-third of hospital emergency room visits for bicycle-related accidents are for brain injuries;

(d) Of all age groups, children between the ages of five and fourteen have the highest rate of bicycle-related hospital admissions, and almost one-third of such hospitalized children have suffered brain injuries; and

(e) Because the economic cost to an individual and to society of a single severe nonfatal brain injury can exceed two million one hundred thousand dollars, the state has a legitimate interest in preventing and mitigating the severity of such injuries.

(3) The general assembly further finds and declares that it is necessary, appropriate, and in the best interest of the state to:

(a) Adopt the existing bike and pedestrian policy directive of the department of transportation as law; and

(b) Facilitate the promulgation and distribution of a nonmotorized wheeled vehicle safety education curriculum.

**SECTION 2.** Part 1 of article 1 of title 43, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW SECTION to read:

**43-1-120. Bicycle and pedestrian policy - codification - legislative declaration.** (1) THE GENERAL ASSEMBLY HEREBY FINDS AND DECLARES THAT:

(a) IT IS IN THE BEST INTEREST OF ALL COLORADANS TO PROMOTE TRANSPORTATION MODE CHOICE BY ENHANCING SAFETY AND MOBILITY FOR BICYCLISTS AND PEDESTRIANS ON OR ALONG THE STATE HIGHWAY SYSTEM;

(b) THE DEPARTMENT HAS ADOPTED A BIKE AND PEDESTRIAN POLICY DIRECTIVE TO FURTHER THIS GOAL; AND

(c) IT IS NECESSARY AND APPROPRIATE TO ELEVATE THE STATUS OF THE BIKE AND PEDESTRIAN POLICY OF THE DEPARTMENT TO THAT OF LAW BY CODIFYING IT IN SUBSECTION (2) OF THIS SECTION.

(2) (a) THE DEPARTMENT AND ITS SUBDIVISIONS SHALL PROVIDE TRANSPORTATION INFRASTRUCTURE THAT ACCOMMODATES BICYCLE AND PEDESTRIAN USE OF PUBLIC STREETS IN A MANNER THAT IS SAFE AND RELIABLE FOR

ALL USERS OF PUBLIC STREETS;

(b) THE NEEDS OF BICYCLISTS AND PEDESTRIANS SHALL BE INCLUDED IN THE PLANNING, DESIGN, AND OPERATION OF TRANSPORTATION FACILITIES AS A MATTER OF ROUTINE; AND

(c) ANY DECISION OF THE DEPARTMENT TO NOT ACCOMMODATE THE NEEDS OF BICYCLISTS AND PEDESTRIANS SHALL BE DOCUMENTED BASED ON EXEMPTION CRITERIA THAT WERE ESTABLISHED BY THE COMMISSION BEFORE THE DECISION WAS MADE.

**SECTION 3.** Article 4 of title 42, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW PART to read:

PART 23  
EDUCATION REGARDING USE OF NONMOTORIZED  
WHEELED TRANSPORTATION BY MINORS

**42-4-2301. Comprehensive education.** (1) THE DEPARTMENT OF TRANSPORTATION, IN COLLABORATION WITH THE DEPARTMENTS OF EDUCATION AND PUBLIC SAFETY AND APPROPRIATE NONPROFIT ORGANIZATIONS AND ADVOCACY GROUPS, SHALL NOTIFY SCHOOLS OF THE AVAILABILITY OF AND MAKE AVAILABLE TO SCHOOLS EXISTING EDUCATIONAL CURRICULUM FOR INDIVIDUALS UNDER EIGHTEEN YEARS OF AGE REGARDING THE SAFE USE OF PUBLIC STREETS AND PREMISES OPEN TO THE PUBLIC BY USERS OF NONMOTORIZED WHEELED TRANSPORTATION AND PEDESTRIANS. THE CURRICULUM SHALL FOCUS ON, AT A MINIMUM, INSTRUCTION REGARDING:

- (a) THE SAFE USE OF BICYCLES;
- (b) HIGH RISK TRAFFIC SITUATIONS;
- (c) BICYCLE AND TRAFFIC HANDLING SKILLS;
- (d) ON-BIKE TRAINING;
- (e) PROPER USE OF BICYCLE HELMETS;
- (f) TRAFFIC LAWS AND REGULATIONS;
- (g) THE USE OF HIKING AND BICYCLING TRAILS; AND
- (h) SAFE PEDESTRIAN PRACTICES.

**SECTION 4. Specified effective date.** This act shall take effect July 1, 2010.

**SECTION 5. Safety clause.** The general assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Approved: June 10, 2010

[www.sprinkleconsulting.com](http://www.sprinkleconsulting.com)

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