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Dear neighbors:

When more people ride bicycles, everyone wins. Cyclists get improved health, a cheaper ride and simple fun; people in cars see less congestion; and the community saves energy and reduces air pollution.

It's in everyone's interest to make our roads and trails safer for those on bikes. But despite years of expanding Denver's cycling infrastructure, we still see too many cyclists injured, and in the worst cases killed. Simply put, it's imperative that we make cycling safer. Everyone wins when we do.

For this reason, I asked our Office of Sustainability, in partnership with our Departments of Public Works, Safety and Environmental Health, to develop the city's first comprehensive bike safety plan. Thanks to funding from Anadarko Petroleum, a long-time supporter of cycling in our city, we've produced this document, the implementation of which will lead to safer streets.

Our plan is a product of a stakeholder process led by Steer Davies Gleave, an international mobility consulting firm. We involved not only the key city departments, but also advocates from both the cycling and the automotive communities and Registered Neighborhood Organizations. Working together, they studied current conditions in Denver and looked at promising practices developed and implemented elsewhere. They produced a plan that is thorough and proactive, addressing our roadway infrastructure, our traffic rules, enforcement, and education.

This plan is also transparent. We've spelled out exactly what we're going to do by way of implementation in 2016. Where funding does not yet exist for actions we'd like to take, we have acknowledged the shortfall and described how we plan to address it. We've also included a host of additional measures that we can study further and adopt or modify as opportunities arise. And we've promised regular evaluation of results and plan updates.

Denver needs more people out on two wheels. I am confident that the following plan will allow us to offer a safer cycling environment that invites people to strap on a helmet and get on a bike.

Respectfully,

A handwritten signature in black ink, which appears to read "M. Hancock". The signature is stylized and includes a long horizontal line extending to the right.

Michael B. Hancock

Mayor



Contents

Executive Summary	i
1 Introduction	1
Preface	1
Context	2
Task Force	3
2 Process, themes and goals	4
Organizational Themes	4
Actions Development	5
3 Action plan	8
Overall Top Priorities	8
Physical Conditions and Infrastructure (1): Integrated Planning	10
Physical Conditions and Infrastructure (2): Network Development	12
Physical Conditions and Infrastructure: Other Priorities.....	15
Traffic Control and Operations (1): Intersection Crash Mitigation.....	16
Traffic Control and Operations (2): Intersection Design and Education	19
Traffic Control and Operations: Other Priorities	21
Education and Outreach (1): Cycling Curriculum and Training	22
Education and Outreach (2): Cyclist Education in Schools	24
Education and Outreach: Other Priorities	26
Ordinances and Enforcement (1): Cyclist Laws	27
Ordinances and Enforcement (2): Law Awareness.....	29
Ordinances and Enforcement: Other Priorities	31
4 Evaluation and monitoring	32
5 Next Steps	33
Task Force Members.....	36
Workshop #1 Breakout Sessions	36
Workshop #2 Overall Prioritization	37

Goals	39
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Figures

Figure 2.1: Process	4
Figure 3.1: PPACG prioritized nonmotorized route network	13
Figure 3.2: Cycle superhighway distinctive coloring, standardized infrastructure and wayfinding.	14
Figure 3.3: Intersection remedial designs (Source: www.nacto.com)	17
Figure 3.4: City of Davies, CA protected intersection (Source: City of Davis, CA)	20
Figure 3.4: Bikeability cycle training	23

Tables

Table 2.1: Task Force Members	3
Table 2.2: Task Force Goals	6
Table 3.1: Top Priority Actions by Theme	8

Appendices

- A Appendix: Task Force Workshops**
- B Appendix: Goals**
- C Appendix: Actions Matrix**

Executive Summary

In March 2015, the Office of the Mayor for the City and County of Denver (the City) initiated the development of the Denver Bicycle Safety Action Plan (Action Plan). The overarching goal of the Action Plan is to identify specific actions, improvements, or interventions aimed at increasing bicycle safety across the City. This report is the summary product of the Action Plan effort.

The Action Plan builds off of the Bicycle Crash Analysis developed by Denver Public Works in 2015. The purpose of the Bicycle Crash Analysis was to offer a baseline in understanding collisions and analyzing future events and trends related to bicycle crashes. The Bicycle Crash Analysis identified the overall context for crashes that took place between 2008 – 2012 including street conditions, motorist and bicyclist ages, and crash typologies.

The City ultimately wishes to improve safety for one of the most vulnerable transportation modes, because it will lead to improved safety for all street and trail users.

The Action Plan aims to supplement many of the data-driven issues identified in the Bicycle Crash Analysis by incorporating community safety concerns and considerations that were captured through a Task Force. Input that was received from the Task Force developed the Action Plan. The Task Force included representation from a broad range of stakeholders related to bicycling, public safety, infrastructure, parks/trails, driving, walking, communications/marketing, environmental health, business interests, and bicycle advocacy groups. The City recognized the importance of diverse opinions and differing perspectives on bicycle safety.

During the development of the Action Plan's scope, four key themes were identified and used to organize the Plan's recommendations:

1. Physical conditions and infrastructure;
2. Traffic control and operations;
3. Education and outreach; and
4. Ordinances and enforcement.



The Task Force identified goals for the Action Plan relating directly back to the established themes. The goals outlined the importance of partnerships and building flexibility into future frameworks. For example, one goal within the Physical Conditions and Infrastructure theme—“Prioritize and separate modes where appropriate”—highlights the importance of protected facilities but does not set a mandate for making this the default infrastructure across the region.

Following the goal creation process, the project team identified specific action items. The Task Force conducted a prioritization process of all the identified actions, ultimately resulting in two top priorities for each theme. The top priorities included:

- Bicycle network development;
- Integrated multi-modal planning;
- Intersection design and education;
- Intersection crash mitigation;
- Bicycle laws;
- Law awareness;
- Bicycling curriculum and training; and
- Cyclist education in schools.

Out of all prioritized action items, the Task Force identified the most important issues to focus on first. The following rose to the top:

- **Continuing development of the bicycle network;**
- **Improving intersection design, clarity, and education on the intersection operations (cyclists, pedestrians, and drivers); and**
- **Implementing broader bicycling curriculum and training.**

The following report details the overall process for identifying the action items as well as necessary pieces for implementation. For the top eight priorities, a number of details are identified: responsible parties, estimated cost, estimated implementation timeline, 2016 implementation activities, as well as the direct connection to safety issues identified within the Bicycle Crash Analysis.

1 Introduction

Preface

In March 2015, the Office of the Mayor for the City and County of Denver (the City) initiated the development of the Denver Bicycle Safety Action Plan (Action Plan). The overarching goal of the Action Plan is to identify specific actions, improvements, or interventions aimed at increasing bicycle safety across the City. This report is the summary product of the Action Plan effort.

The Action Plan forms the second step in a multi-stepped process by the City to better understand and address bicycle safety. The process began with a detailed study performed by Denver Public Works (Bicycle Crash Analysis) to examine the history of bicycle/vehicle crashes and safety challenges from 2008 to 2012. The Bicycle Crash Analysis report served as the basis to understand crash characteristics, top crash types, top crash locations, and other specific bicycle safety challenges present in the City.

Through the voice of a Task Force, the Denver Bicycle Safety Action Plan builds on the Bicycle Crash Analysis by pairing safety challenges and issues with specific improvements or actions.

The full process being progressed by the City is set out in the following bullets:

- ***Understanding the safety data and issues*** - Bicycle Crash Analysis (2015);
- ***Identifying actions to address the identified safety issues*** - Denver Bicycle Safety Action Plan (2015); and
- ***Implementing actions and monitoring change*** - Specific projects advanced through multiple City departments and organizations to enhance infrastructure and education, aimed at improving bicycle and roadway safety in the Short, Mid, and Long-Term (2015-ongoing).

This report specifically summarizes the process and outcomes of the second point above, the Denver Bicycle Safety Action Plan. The final step of implementing actions and monitoring change will be an ongoing process. To begin to advance several of the actions identified in this plan, the Office of the Mayor shared an early version of the Action Plan with other City departments, at the beginning of the annual budget process for 2016. Departments were requested to include improvements within their budget requests or incorporate these into other projects (where appropriate). The 2016 budget process has now concluded.

Context

Growth in bicycling is a continuing trend. There are inherent benefits to bicycling including increased mobility, health, environmental benefits, as well as lower transportation costs. The City supports this mode shift with new facilities to improve bicycle connectivity, access, and safety. Clear and defined bicycle facilities help all users (drivers, pedestrians, bicyclists) to understand their place in the street or trail.

Bicycle safety has come to the forefront in the City for several reasons, including:

- An increase in bicycle use and an overall greater interest in bicycling throughout Denver;
- Increase in the number of bicyclist/auto crash occurrences;
- The need to improve conditions for cyclists; and
- The desire to encourage bicycling as a viable transportation mode.

Although incidents of bicyclist crashes in Denver are increasing, with the growth in cycling in the metropolitan area, the crash rate is decreasing. Despite this improving trend, many motorists and pedestrians are unsure how to interact safely with bicyclists on the street or multiuse trail. The converse is also true that many bicyclists either do not know, or do not consistently follow the proper rules of the street or trail when interacting with vehicles or pedestrians. These conflicts and resulting safety issues create barriers for new bicyclists and may discourage many from choosing to cycle instead of driving.

Denver's Bicycle Crash Analysis reveals that the vast majority (85%) of bicycle crashes occur on or near intersections¹. This suggests that actions that can increase the safety of bicyclists on intersections should be prioritized to mitigate the incidence of bicyclist/auto conflicts at intersections.

The majority of bicycle crashes occur at an intersection and in downtown Denver.

Overall, the top crashes are identified in the Bicycle Crash Analysis are the following¹:

- Broadside with on-street bicyclist (26%);
- Same direction with on-street bicyclist (13%);
- Left hook with on-street bicyclist (9%);
- Right hook with against traffic sidewalk-riding bicyclist (7%); and
- Broadside with against traffic sidewalk-riding bicyclist (6%).

The Bicycle Safety Action Plan refers to collisions between motor vehicles and bicycles as “crashes” rather than “accidents”. The terminology “accidents” suggests that these incidents are not predictable and preventable. The term “crash” is widely used to describe a traffic collision as a way to focus on the event circumstances and contributing factors.

¹ The City and County of Denver. (2015). Bicycle Crash Analysis.

Task Force

A broad cross section of stakeholders related to bicycling, public safety, infrastructure, parks/trails, driving, walking, communications/marketing, environmental health, business interests, and bicycle advocacy groups were invited to participate on the project’s Task Force to help identify potential bicycle safety actions.

The City recognized the importance of diverse opinions and differing perspectives on bicycle safety.

The Task Force ultimately included staff from across multiple City departments, DPD, non-profit organizations, and the private sector to guide the development of the Action Plan. The Task Force members are listed below in Table 1.1. Notes from each of the Task Force workshops are also included in Appendix A.

Table 1.1: Task Force Members

Task Force Members
City and County of Denver (CCD) – Office of the Mayor
CCD - Department of Environmental Health
CCD - Department of Public Works
CCD - Department of Parks & Recreation
Denver Police Department
Denver Cruiser Ride
Inter-Neighborhood Cooperation
Anadarko
BikeDenver
Mayor’s Bike Advisory Committee
Sander Marketing Group
American Automobile Association (Colorado Chapter)

2 Process, themes and goals

Development of the Action Plan followed an accelerated schedule, in part to provide timely information to other City departments on any items to be requested within the 2016 budget process. The process developed through two central workshops with the project's stakeholder Task Force. Figure 2.1 displays the project's general process and flow.

Figure 2.1: Process



Organizational Themes

The Task Force identified four critical themes for improvement that would likely have the most impact on bicycle safety.

The themes range from physical improvements to behavioral change and educational programs.

Each theme is detailed below:

- **Physical Conditions and Infrastructure:** The transportation environment that influences how road users behave. Examples include: sidewalks, bicycle lanes, off-road multiuse paths, buffer between vehicle traffic and separated bicycle treatments as well as intersection design.
- **Traffic Control and Operations:** As part of the larger roadway operations, this theme addresses signal controls, traffic speed, bicycle detection and priority signalization for bicycles along a corridor.
- **Education and Outreach:** A critical method to increase safety across all road users, but especially bicyclists, will be a comprehensive education campaign. A project team will consider a number of different options, including: on-the-bicycle training curriculum, law awareness, marketing campaigns as well as making suggestions for training focused on the driver perspective (driver's education).
- **Ordinances and Enforcement:** Led by the Denver Police Department (DPD), a number of different options will be considered to make laws and ordinances have a positive influence on the bicycling experience. Success will require mitigation of the current tensions between bicyclists and law enforcement through reevaluating current laws, signage and expectations for how bicyclists behave in traffic.

The themes were followed throughout the lifespan of the project and the recommended actions were organized under each theme.

Actions Development

The Task Force met in March and April of 2015. Over the course of these workshops, the Task Force discussed, debated, and ultimately agreed upon a long list of potential actions aimed at improving bicycle safety. While the group did not unanimously agree on every point, there was consensus to advancing many actions, in an attempt to address bicycle safety on multiple fronts. The Task Force agreed that no single action alone could address bicycle safety in Denver. The following section provides a summary of the workshop activities and their outcomes.

Workshop #1 - March 26, 2015

The initial workshop began by setting out the structure and roles for the Task Force. Members of the Task Force agreed to work cooperatively and bring forward a variety of creative bicycle safety ideas for consideration.

Bicycle safety data and the experience of peer communities was presented to ensure all Task Force members had a strong foundation of bicycle safety information.

Workshop #1 presented a significant amount of data and information related to bicycle safety in Denver and other peer communities. This included presenting summary information from the Bicycle Crash Analysis. The Task Force dedicated the majority of Workshop #1 to two activities:

- The identification of issues and opportunities; and
- Translating the issues and opportunities to specific goals for bicycle safety.

Small groups brainstormed bicycle safety issues and opportunities, then reconfirmed with the entire Task Force. A significant number of bicycle safety issues were captured including:

- Lack of dedicated bicycle facilities;
- Disconnected bicycle facilities;
- Limited knowledge of bicycle rules of the road (by cyclists, drivers, and pedestrians); and
- A mentality of 'us vs. them' between cyclists, motorists and pedestrians.

The Task Force members were also challenged with identifying some of the opportunities for bicycle safety present in Denver. It is important to understand and discuss the positive improvements currently happening, so this project hopes to build off those successes. The Task Force generated a wide range of opportunities, including the following examples:

- Enhancing educational programs (perhaps through drivers education and bicycle education);
- Expanding new cycle facilities (such as 15th Street); and
- Developing creative enforcement programs (beyond citations) to encourage safe behaviors.

Additional details regarding the strengths, issues and opportunities are included in Appendix A.

Considering the numerous issues and opportunities, the Task Force went on to translate these into goals for the project. The goals were intended to be specific, attainable, and measurable outcomes. The goals are presented in Table 2.1.

Table 2.1: Task Force Goals

Theme	Goal
Ordinances & Enforcement	<ul style="list-style-type: none"> Create regular, focused, and balanced enforcement for both cyclists and motorists. Support broader enforcement as a way to educate all road users. Update laws to ensure consistency and reasonableness for cyclists. Create method to track near misses (upcoming on pocketgov.org). Provide optional (user-friendly) registrations and/or licenses with member benefits (e.g. recovery assistance, insurance, maintenance, etc.). Promote programs to deter theft.
Traffic Control and Operations	<ul style="list-style-type: none"> Promote consistent intersection treatments to clarify expectations for all users. Promote more neighborhood bikeways. Consider alternative cycle routes (alleyways). Consider lower auto speed limits. Consider re-prioritization of modes and revised signal timing.
Education and Outreach	<ul style="list-style-type: none"> Set a standard for sharing information to provide high quality, easily accessible and clear information related to cycling. Get past 'us vs. them' mentality between cyclists and motorists. Support cultural change (ubiquity). Promote multi-pronged programs to advance grass roots education. Enable cycling access and provide training for all. Add cycle/driver training as enforcement with the option for deferred disposition instead of citation fines.
Physical Conditions and Infrastructure	<ul style="list-style-type: none"> Create a connected network and fill the gaps – even between phases. Build safe, consistent, and intuitive intersections. Explore big funding ideas to provide sustainable funding sources to cycling-related activities (e.g. tax, congestion charge, private finance, etc.). Install more protected cycle facilities. Create higher standards of infrastructure. Prioritize and separate modes where appropriate. Encourage and incorporate big programs, ideas, and visions. Advance pilots and demonstration projects (e.g. tactical urbanism). Provide strong signage and wayfinding (especially at pinch-points).

Interim Activities

Between the two workshops, City staff further examined the goals created by the Task Force. Using the Task Force's issues, opportunities, and action items as a basis, the City staff developed a series of draft actions. The draft actions were sent to each of the Task Force members for review, consideration, and editing. The Task Force members were asked to review the draft actions with their respective organizations and provide their refinements back to City staff. This exercise resulted in a draft set of potential bicycle safety actions to be discussed, debated, refined, and prioritized in the final workshop.

Workshop #2 - April 24, 2015

The attendees at the second and final workshop were presented with the current/draft list of potential bicycle safety actions. The Task Force formed small teams to review and discuss the actions. The small groups were asked to systematically:

- Review and refine the proposed actions;
- Add any additional actions that may be missing;
- Assign champions/partners that would be the likely department or organization to advance each action;
- Identify a (high level) cost range of high, medium, or low (based on their knowledge); and
- Prioritize the actions.

Each small team worked to refine and prioritize the actions. The prioritization was completed using a pairwise comparison technique. The pairwise comparison requires that those teams compare each potential action to every other potential action, and make a priority decision of one over the other. The technique breaks down the long lists of actions that are often difficult to organize into manageable/individual decisions. Through this exercise, the Task Force was able to create a sequential list of priority actions that was ultimately agreed upon by the full Task Force.

The prioritized list of actions form the key product of the Bicycle Safety Action Plan.

The actions and top priorities are further detailed in Section 3 Action Plan.

3 Action plan

This section details the specific actions generated by the Task Force, at the close of Workshop #2. The recommended actions are consistently organized by the project themes. The Task Force incrementally developed the recommended actions based on:

- Detailed bicycle safety data, research, and information (including the Bicycle Crash Analysis);
- Issues and opportunities related to bicycle safety;
- Task Force bicycle safety goals; and
- Detailed discussion, debate, and ultimately consensus among the Task Force members.

Overall Top Priorities

The prioritization (pairwise comparison) exercise completed in Workshop #2 ultimately generated a sequential list of all identified actions in priority order. However, the Task Force went on to discuss and ultimately identify the top priorities under each theme.

The Task Force noted that advancing the full list of all recommended actions would be required to have the greatest positive influence on bicycle safety.

At the end of Workshop #2, the Task Force identified their top priorities from the full list of actions. Three action items rose to the top, including:

- Continuing development of the bicycle network;
- Improving intersection design, clarity, and education about the intersection operations (for cyclists, pedestrians, and drivers); and
- Implementing broader bicycling curriculum and training.

While all of the recommended actions are important, the Task Force generally agreed that advancing the top priorities (at a minimum) would facilitate implementation of the additional actions identified in the Action Plan. Table 3.1 lists the top two actions from each theme, which combine to identify the most immediate steps the City will take under the top priorities.

Table 3.1: Top Priority Actions by Theme (those in bold are top action items)

Theme	Action Item
Physical Conditions and Infrastructure	Integrated planning Network development
Traffic Control and Operations	Intersection design and education Intersection crash mitigation
Ordinances and Enforcement	Bicycle laws Law awareness
Education and Outreach	Cycling curriculum and training Cyclist education in schools

The following sections provide additional details on the top priority actions for each theme. Each theme is presented with:

- Top two priority actions for that theme;
- Who will be the organization or department to that will lead pursuit of the priority (champion);
- A high level estimate of the cost (high, medium, low);
- Estimated implementation timeline;
- Information on the specific challenge or issue that is addressed, based on the Bicycle Crash Analysis and the Task Force discussions; and
- One or more examples of similar actions taken elsewhere (examples are for purposes of illustration and do not imply a commitment by the City to replicate the examples); and
- Description of implementation activities that are funded through 2016 in the City's budget.

The high level costs presented are generally based on ranges including High (\$500K to \$1M+), Medium (\$100K to \$500K), and Low (Under \$100K). Additionally, high level ranges of time frames were applied to each of the potential actions. The time frame ranges included Long-Term (five years +), Mid-Term (two to five years), and Short-Term (less than a year).

While the City will begin pursuing the priority actions immediately, it will look for opportunities to pursue additional actions, which are identified following discussion of the priority actions. For example, if a promising grant opportunity arises that could fund pursuit of one of the additional actions, the City may submit an application. In addition, further actions will be reviewed when the City begins its 2017 budget process to determine if any could be funded in that cycle.

Physical Conditions and Infrastructure: Integrated Planning

Creating a bicycling system to meet varying comfort levels will provide a safer experience for everyone. Instead of emphasizing a specific type of infrastructure, the Task Force valued the importance of flexibility and creating the appropriate connections given the current conditions of the network. Enhancing safety in the downtown area, for example, will require different infrastructure from what would be appropriate for a residential street. The Task Force identified integrated planning (bicycle, roadway, pedestrian, land use) and continued development of the bicycle network as the top two priorities.

The Task Force discussed the importance of comprehensive, multi-modal planning. Land use, transportation, parks and trails, wayfinding, and development planning must jointly consider safe and efficient bicycle connections. Historically, planning for the transportation infrastructure has focused almost exclusively on making provision for cars. That has already begun the change to a more balanced and integrated approach, and this change needs to continue and accelerate. The Task Force recommended as a top priority:

Create a fully integrated and comprehensive Master Transportation Plan that is based on accurate population growth projections and emerging development patterns.

Since many plans and studies occur concurrently, it will be difficult to create a single resource that includes all plans related to transportation. However, a comprehensive plan (such as a revised Strategic Transportation Plan) could serve as the unifying planning document for multi-modal improvements within the City. Regular (likely biannual) updates to the plan would be required to ensure it is accurate and reflects the evolving City direction on multi-modal planning.

This comprehensive plan may build upon the resources maintained by the Department of Community Planning and Development to track their own plans and studies on a map and list. All relevant plans will be reviewed to identify overlapping areas or gaps missing within the planning process. The project team will also identify a maintenance method to stay current with any plan updates or changes.

Leader: Denver Public Works

Public Works would lead this effort and coordinate the various City departments and agencies throughout the planning effort.

Estimated Cost: Medium

This project will likely cost \$100,000-\$300,000 of staff or consultant time to navigate all relevant plans to create a summary of plans for all modes. Since plans and studies regularly update conditions, this process should be updated every two years to allow for the most accurate information.

Estimated Implementation Timeline: Short-Term

The timeframe to implement integrated planning would take longer to establish, but the process of obtaining all the relevant information from current plans should be a relatively quick process.

Connection to Bicycle Crash Analysis Report: Infrastructure Improvements

The Bicycle Crash Analysis identifies crash locations throughout Denver in relation to the current infrastructure. The report found that 42% of all crashes involved arterial streets without a bicycle facility (arterial streets often carry high motor vehicle volumes at relatively high speeds). Integrated planning and dedicated infrastructure would begin to address the physical needs of cyclists and clarify operations for all users.

Case Study: City of Boulder Transportation Master Plan (TMP)

The City of Boulder has been developing and regularly updating its TMP since 1989. The master plan combines numerous aspects of transportation planning including:

- Complete Streets;
- Regional Travel;
- Transportation Demand Management;
- Funding; and
- Sustainability Initiatives.

Throughout the plan, land use, wayfinding and bicycle improvements are cited as important goals of the TMP.

For more information about the City of Boulder TMP, see:

<https://bouldercolorado.gov/transportation/tmp-update>

Implementing Activities Funded Through 2016

Denver Public Works, in partnership with Community Planning and Development and other City agencies, has already begun integrated planning to address land use and transportation. In 2016, a multi-agency effort will kick off a Citywide Planning process that includes an update to Blueprint Denver, update to Parks and Recreation Game Plan, and two additional transportation plans.

Lead by Community Planning and Development, Blueprint Denver is will guide Denver's growth through land use guidance, address mobility with multi-modal transportation approach, and lay out a sustainable future for Denver.

Concurrently in 2016, Denver Public Works will be initiate Denver Moves: Pedestrians and Trails and Denver Moves: Transit. These planning efforts will build upon the existing Denver Moves: Bicycles plan. Under a more comprehensive approach to Denver Moves, the result will incorporate the trails and pedestrian infrastructure with the on-street bicycle network into one connected system. It will also then consider the first-last mile connections with transit.

Physical Conditions and Infrastructure: Network Development

Both the Task Force and the Bicycle Crash Analysis discuss the discontinuity of the existing bicycle network. While Denver has made great strides in developing high quality bicycle infrastructure and connections, many gaps still exist. This requires cyclists to utilize roadways, trails, and sidewalks that were not originally designed for multi-modal use. Traffic, congestion, uneven road surfaces, and inadequate space all create challenging environments for cyclists to complete a journey from their origin to destination. To begin to address these challenges, the Task Force recommended as a top priority:

Link origin and destination points with routes, road infrastructure, intersection treatments and technologies and signage along the entire route. This will provide standardized infrastructure and level of service in Denver.

A number of origins and destinations can be selected, and infrastructure developed that will allow an average bicyclist traveling 15 miles per hour (mph) to cover one mile of route in 5 minutes. The City has started to make progress on linking the bicycling network with the development of Denver Moves (2011), Denver Moves – Enhanced Bikeways (2015). This includes new bikeways, as well as protected bike lanes, striped bike lanes, sharrows, and new bicycle/pedestrian bridge connections crossing major barriers. The Task Force generally agreed this process should continue, be expanded, and advance rapidly.

Leader: Denver Public Works

A connected network would likely contain a number of different types of infrastructure to cater to different types of riders as well as create a network, even if some connections do not provide separated infrastructure. Public Works is currently taking the lead in moving this action item forward, building off the Denver Moves 2011 plan with Denver Moves – Enhanced Bikeways to identify and prioritize connecting gaps to expand the existing network.

Estimated Cost: High

Both the planning and the construction of the network would require a considerable amount of funding. However, staff can manage the cost and gain efficiencies by combining improvements with already scheduled resurfacing or intersection redesign projects. Denver has already done some of this during re-paving projects funded by revenues from Issue 2B, which the voters passed in November 2012.

Estimated Implementation Timeline: Long-Term

Although the overall process for this action item would likely be an ongoing one with no definite end, there would be important milestones to contribute to the network development: 1) Identify connections for gaps and 2) Determine most appropriate infrastructure for gaps.

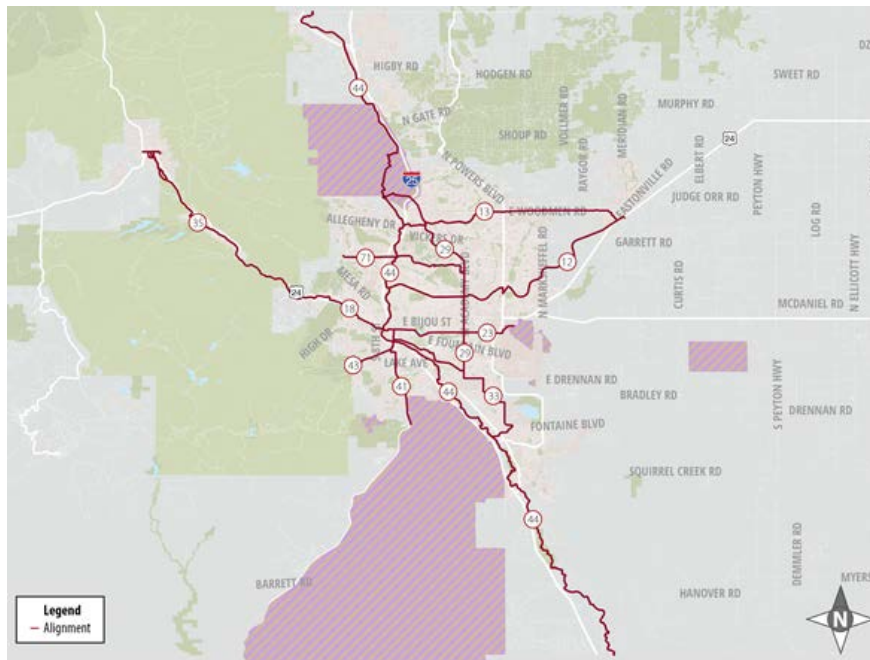
Connection to Bicycle Crash Analysis Report: Infrastructure Improvements

Network development is critical to providing secure connections for cyclists from their origin to their destination. As noted previously, the Bicycle Crash Analysis found that 42% of all crashes involved arterials without a bicycle facility¹. Enhanced network connectivity would begin to address the gaps in the system. A number of crashes (34%) occur when the bicyclist rides on the sidewalk—which can occur because s/he feels uncomfortable riding in the street without any infrastructure¹. Creating a more integrated network would minimize these situations and provide more opportunities for a connected network.

Case Study: PPACG (Pikes Peak Area Council of Governments) Regional Nonmotorized System Plan

This plan was developed by first identifying major destinations within the Colorado Springs area, this included an analysis of residential/employment density, schools, parks and community downtown areas. A continuous route network linking the major destinations using standardized infrastructure was based on connecting these major destinations (rather than building the network “where it fits”).

Figure 3.1: PPACG prioritized nonmotorized route network



The result of the development of the PPACG Nonmotorized Plan will be a network where cyclists know exactly where they can get from/to, and encounter a set standard of bicycle infrastructure along the entire route. For more information see www.walkbikeconnect.org/documentation

Case Study: The London (UK) Barclays Cycle Superhighways

In response to a fragmented network, Transport for London (TfL) produced a plan to devise a ‘cycle superhighway’ network. This network linked major destination through to the center of

London. Every ‘superhighway’ was given a unique blue coloring and was standardized throughout. Currently there are four superhighways, with five more due to open in the next two years.

Figure 3.2: Cycle superhighway distinctive coloring, standardized infrastructure and wayfinding



For more information see: <https://tfl.gov.uk/modes/cycling/routes-and-maps/cycle-superhighways>

Implementing Activities Funded Through 2016

Denver Public Works received \$2.2 million dollars in the 2016 city budget for the continued implementation of the Denver Moves: Bicycles network. These funds are identified for the development of enhanced bikeways, such as protected bike lanes and neighborhood bikeways, which provide a high-ease-of-use (low stress) for users. These projects often include capital construction improvements (curb line adjustments, signal improvements, etc) and will supplement the signage and striping projects provided through existing annual maintenance funding mechanisms. In 2016, Denver Public Works is anticipating the installation of 2-3 protected bike lanes, six bike lane corridors, and 1-2 neighborhood bikeways. It will also continue to build the project pipeline with the design of additional protected bike lanes, bike lanes and neighborhood bikeways.

Physical Conditions and Infrastructure: Other Action Items

The following text provides summary on other important action items for this theme. Where funding to work on these priorities is not immediately available, Denver will look for opportunities such as foundation and government grants, and will also revisit this list during each budget cycle. Additional information on the full priority list is included in Appendix C.

- **Connectivity:** Related to the Network Development priority, the Task Force recommended future policy changes requiring all bicycle infrastructure to connect into the bicycle network, or provide signage to inform the cyclist how they can continue their journey.
- **Install Bike Parking:** The Task Force recommended the provision of safe and secure locations for people to store their bicycles. Crashes may occur when bicyclists ride on the sidewalk while crossing driveway access. Most bicycle parking is located on the sidewalk, which requires bicyclists using the roadway to transition to the sidewalk. This can result in an unexpected movement to drivers, potentially causing conflict. Denver now has a process for merchants to obtain bike racks or corrals near their businesses.
- **Invest in Bike Hubs:** The Task Force recommended the development of bicycle hubs (multi-modal hubs) including bicycle storage and connections to other modes. Denver is currently developing a bike hub downtown at Union Station, offering secure bike parking, shower and locker rooms.
- **Separating Modes:** The Task Force recommended planning and designing for separated modes on regional trails where necessary and feasible (constrained right-of-way may pose challenges to this). This action item addresses the concerns of having a number of different speeds and abilities sharing the same area. Opportunities to separate modes will be identified within the Denver Moves Pedestrians and Trails Plan.
- **Design Tools**
 - **Wayfinding:** The Task Force recommended the development of a City-wide standardized wayfinding system. Clear and consistent wayfinding can benefit a range of local cyclists, as well as visitors. There is an opportunity to integrate a new wayfinding program with the B-Cycle system, since there is already a platform to provide this resource. Mapping bicycle routes and infrastructure should be well distributed and current. The City should consider using internet-based mapping to inform a journey plan that takes into account route choice based on comfort, safety, signed speed or stress level.
 - **Innovation and Piloting:** The Task Force recommended the development of a living lab style outreach platform to encourage pilot projects and rapid implementation (including tactical urbanism). With a formal innovation/pilot program, staff would have a platform to test ideas new to Denver, based on proven results from other places. This process should include a before and after analysis of users as well as an opportunity for public engagement. A website could provide an accessible mechanism for feedback. Similar pilot projects have taken place in Fort Collins, Boulder and Pueblo.
 - **Protected Infrastructure:** The Task Force recommended investment in multiple types of cycle lane protection, and identification of locations for pilot projects. Bicycle lane protection could include 'plow proof' systems such as: LED studs, rumble strips, buffer lanes, removable 'seasonal' separation, targeted investment in heated bicycle paths in problematic areas, etc. The NACTO Cities for Cycling network can be a helpful resource for Denver to understand the best practices from other American municipalities.

Traffic Control and Operations: Intersection Crash Mitigation

The Task Force recognized that intersection locations were the primary site of significant conflicts between bicycles and other modes. The Bicycle Crash Analysis data confirm the assumptions of the Task Force members. Addressing operations, physical infrastructure, and education for all intersection users will be critical to improving safety at these key junctions. To begin to address these challenges, the Task Force recommended as a top priority:

Identify top intersections with bicycle crashes and develop a remedial framework, depending on the intersection type, to mitigate the incidence of cyclist crashes. Prioritize a number of intersections for improvement, and monitor collision rates. Roll out improvements across the city to directly tackle cyclist crashes at intersections. Top crash type and top intersections would be important considerations for this action item.

This priority is also identified as a next step in the Bicycle Crash Analysis; both strategies will be coordinated to ensure success. The outcome of this recommendation is likely a framework of various improvements that may be implemented at an intersection, depending on the locations' specific challenges and needs. A number of different strategies would be considered in improving intersections across the city:

- Restrict right turn on red;
- Install bicycle signals;
- Install red light cameras;
- Improve signage;
- Paint delineations to identify locations of road users; and
- Increase bicycle detection.

Leader: Denver Public Works

Public Works and advocacy groups would work in collaboration with the Denver Police Department to identify the intersections and identify creative solutions for crash mitigation. Typical intersection improvements may create a safer environment for users (striping, signal timing, etc.). However, some unique considerations would be required to address certain intersections' individual challenges. The framework of concepts and ideas generated from this effort would provide Public Works with a starting point for identifying potential mitigation efforts depending on level of severity and available funding.

Estimated Cost: Low

This action item would require cooperation among the appropriate partners to develop an implementable framework for mitigating crashes. This would likely require facilitation from Public Works.

Estimated Implementation Timeline: Short-Term

The framework could be developed within a relatively short time frame. Rapid implementation would be needed to ensure ample before and after monitoring and evaluation.

Connection to Bicycle Crash Analysis Report: Crash Type

Within the Bicycle Crash Analysis, high frequency crashes are identified at a number of intersections, especially in the downtown area. Crashes at signalized intersections occur on major arterials and in downtown, as the majority of intersections in downtown Denver are signal controlled. The framework generated from this recommendation would address the top five crash types as identified within the crash report¹:

- Broadside with on-street bicyclist (26%);
- Same direction with on-street bicyclist (13%);
- Left hook with on-street bicyclist (9%);
- Right hook with against traffic sidewalk-riding bicyclist (7%); and
- Broadside with against traffic sidewalk-riding bicyclist (6%).

Case Study: Intersection Crash Mitigation

Key to reducing the incidence of crashes at intersections is to improve cyclist visibility to other road users. The National Association of City Transportation Officials (NACTO) provides a number of remedial designs for intersections that can help reduce the incidence of collision.

Figure 3.3: Intersection remedial designs (Source: www.nacto.com)



For more information see: <http://nacto.org/publication/urban-bikeway-design-guide/intersection-treatments/>

Implementing Activities Funded Through 2016

The Bicycle Crash Analysis identified the top corridors and intersections for bicycle crashes in Denver. Denver Public Works currently has active planning or implantation actions to address the corridors. With regards to the high crash intersections, individual analyses of these locations will be undertaken to evaluate crash characteristics and determine appropriate mitigations. This Priority item is also directly related to the City's Vision Zero effort. In 2016, Denver Public Works will assist in the development of a Vision Zero plan for Denver. While the final scope is to be determined, safety improvements that support all users are anticipated as part of Vision Zero.

Traffic Control and Operations: Intersection Design and Education

Varying intersection design and a lack of balance of priority for the range of modes using the intersection creates challenging conditions for cyclists.

To begin to address these conditions, the Task Force recommended as a top priority:

Building off of the intersection crash mitigation framework, intersection design standards would be re-evaluated and adjusted to effectively accommodate all road users. Formal education programs and pilot projects would be implemented to enhance the understanding of safely navigating intersections for all users.

While there would likely be limited ability to completely redesign intersections, this action item allows staff to think about creative solutions instead of reacting when crashes occur. A critical component of this action item is educating the public on expectations for the intersection. This process provides the opportunity to ensure clear designs that are intuitive and cater to all modes and levels of experience. This action item also includes hands-on opportunities to learn how to navigate intersections, for both bicyclists and drivers. A number of different methods may be available, but an outreach event and/or video will provide the necessary information to users.

Leader: Denver Public Works

Similar to the crash mitigation action item, a group of representatives from different agencies and departments would work together to identify a framework for consistent design at intersections. The ultimate goal will allow for flexible design but applied on a widespread scale to allow for consistency and familiarity with road users. Public Works is a logical leader of this effort given their experience in bicycle design and safety; paired with the public relations and outreach staff at the City to inform the development on any educational components. Current collaborative and inter-agency efforts taking place on Arapahoe and Lawrence protected bike lanes offer an opportunity to work towards formalizing this action item.

Estimated Cost: High

Physical treatments can be expensive, especially when they are not coupled with existing construction projects. While the cumulative cost of all the improvements will be costly, staff can address projects one at a time and likely as part of larger projects. Educational campaigns costs can be scaled based on available funds.

Estimated Implementation Timeline: Long-Term

This would take a significant amount of cooperation from the involved parties, likely buy-in from elected officials and the public as well. For this reason it would likely take an extended time frame for this action to be completely implemented.

Connection to Bicycle Crash Analysis Report: Intersections and Education

Since most of the crashes occur at intersections across the City, this action item addresses crash prevention by improving future intersection changes instead of just reacting to intersections with a need for crash mitigation (Intersection Crash Mitigation action). The education component of

this recommendation is a critical to reduce many of the contributing factors identified in crashes (following the rules of the intersection).

Case Study: Protected Intersection Design

In August, 2015 the first protected intersection in the U.S. was unveiled in Davis, California. The intersection uses a hybrid of Dutch/American designs. As the intersection is new, there is little information of use, other than anecdotal evidence from the Davis bicycle coordination Jennifer Donofrio:

"What did surprise me was how intuitive the intersection is. Observing people use the intersection, they are able to use it without any sort of education or any sort of guidance."

For more information see: <http://www.peopleforbikes.org/blog/entry/americas-first-protected-intersection-is-open-in-davis-and-working-like-a-c>

Figure 3.4: City of Davis, CA protected intersection (Source: City of Davis, CA)



Although Davis, CA is the first city to implement the protected intersection, other cities like the City of Salt Lake, UT and the City of Austin, TX, are all constructing protected intersections.

For more information see: <http://usa.streetsblog.org/2015/05/28/four-cities-race-to-finish-the-countrys-first-protected-intersection/>

Implementing Activities Funded Through 2016

In 2016, Denver Public Works will finalize a Bikeway Design Guide specific for the transportation context in Denver. Based off of national guidance, these Guidelines will provide consistency in design and also provide education to the public, developers, and other city staff about what designs are appropriate to use in various situations. Additionally, Denver Public Works will perform additional evaluation of the intersection designs on Lawrence and Arapahoe protected bike lanes to determine which treatments are most effective and intuitive to users.

Traffic Control and Operations: Other Priorities

The following text provides summary on other important action items for this theme. Where funding to work on these priorities is not immediately available, Denver will look for opportunities such as foundation and government grants, and will also revisit this list during each budget cycle. Additional information on the full priority list is included in Appendix C.

- **Auto Speed Reduction:** The Task Force recommended investigating where reducing speed limits in the City could reduce cyclist crash rates. As it has been well documented, speed is a very important factor in determining likelihood of survival. Identifying areas around schools for lower speed limits may be a good way to approach areas with lower speeds.
- **Maintenance:** The Task Force recommended developing a maintenance plan for all cycling infrastructure, including in funding plan. Infrastructure can provide great access but without clearing snow and/or other debris, it is less attractive to users.
- **Design Tools**
 - **Signaling:** The Task Force recommended re-programming highly used bicycle routes to prioritize cyclist movements, rather than motorist movements. These routes should likely be phased to allow a bicycle traveling at 12 – 15 mph to access the entire route without generally stopping at stop lights. This change would not be applied to all roads and routes, but only to some prioritized for bicycle movements.
 - **Cyclist Actuation:** The Task Force recommended ensuring that appropriate signalized crossings can detect cyclists to prompt signal change. A visual marking on the pavement at the intersection can communicate the presence of a detection signal. Seven signalized intersections in Denver have bicycle-specific detection, and this program will expand over the coming years.
 - **Alleyway Utilization:** The Task Force recommended exploring how the City's alleyways could be used as part of the cycling network, including a peer review of other cities with alleyway strategies. Alleyways could provide some of the network for bicyclists looking for a more relaxing environment with fewer cars.

Education and Outreach: Cycling Curriculum and Training

Education, training, and direction for cyclists are critical to create a safer and more predictable bicycle environment. In support of education, the Task Force recommended as a top priority:

A citywide quality controlled and standardized cycle training program available to all, from 8-80 year olds.

Training would include how to interact safely with motorized traffic, and the road network. Training would also focus on the driver's perspective to effectively navigate road conditions and other users. The goal of this recommendation would be to create a base training program and then adapt it as appropriate given the audience. For example, a training program for those who occasionally cycle will be different from those who have just moved to Denver without recent experience of bicycling for transportation.

Leader: BikeDenver

Although BikeDenver has been named the champion for this action item, it would require a partnership and collaboration of a number of organizations, including: Bicycle Colorado, National Safe Routes to School Partnership, Parks, American Bicyclists League of Certified Instructors and WalkDenver. The project team can utilize a number of education programs developed by Bicycle Colorado and the National Safe Routes to School Partnership as a starting point for determining critical inclusion items for the Denver area. Because BikeDenver is not a taxpayer-supported entity, funding support from third parties will be crucial to allow BikeDenver to play the leader's role.

Estimated Cost: High

There are roughly two stages associated with this action item: the curriculum and the training. BikeDenver would coordinate both efforts but likely work in partnership with Bicycle Colorado or consultant to develop the curriculum and then take the lead on the actual training component, while working with key partners at Parks and Recreation. The cost estimation depends on the structure and roll out of the cycle training program.

Estimated Implementation Timeline: Medium

While the curriculum creation would likely take approximately six months, establishing the training programs would take a number of years to establish and ensure their continued success.

Connection to Bicycle Crash Analysis Report: Yielding

The Bicycle Crash Analysis details the significant number of crashes that result from failing to yield right of way. In addition, many times bicyclists ride on sidewalks, even though that is illegal nearly everywhere within the City limits. Although it's hard to say why these bicyclists are riding on the sidewalk, it is likely related to feeling uncomfortable riding on the street (with or without facilities). Through more widespread education on both the driver and bicyclist perspectives, users will understand better strategies to navigate the roadway.

Case Study: Bikeability National Cycle Training (UK)

Bikeability is a national cycle training program funded by the UK's central government (Department for Transport) throughout the UK. The program is standardized from top to bottom and has trained over 1,500,000 school pupils to cycle. Bikeability began in 2006 as a pilot program delivered in a handful of schools, it has since grown to allow almost every school pupil in the UK the chance to take Bikeability cycle training. Bikeability is not only for school children, adults of any age can take Bikeability training, and the program also provides guidelines for delivering bicycle training to people with disabilities. Bikeability is often lauded by parents, teachers and elected officials alike on its effectiveness at imparting important cycling skills to allow children to cycle safely and is based on three key levels. The Bikeability model is being investigated to help form cycle training in British Columbia, Canada.

Figure 3.5: Bikeability cycle training



For more information see www.bikeability.org.uk

Implementing Activities Funded Through 2016

BikeDenver plans the following activities:

- Recruit and train at least 10 volunteer bicycle ambassadors. These volunteer ambassadors will provide 'in the classroom' and 'on the bike' education for youth, families, college students, and adults, including the aging population.
- Through the Bicycle Ambassador program, host 24-30 educational classes (various ages), 15-20 technical clinics, and 24-30 bike rides throughout Denver. Youth and family programming includes Safe Routes to School education, bike rodeos and learn-to-ride clinics. Adult programming includes commuter classes, technical clinics, bicycle counts, and community rides to teach residents how to replace short car trips with bike trips. (i.e. group rides to the grocery store, park or post office.)
- Run two marketing/outreach campaigns: "Conquer your Commute" will teach adults how to commute to work safely. "No Ridiculous Car Trips" will teach adults to walk or bike for their short trips (<3 miles). Target neighborhoods for much of this work will be Baker and Five Points.

Education and Outreach: Cyclist Education in Schools

Comprehensive cyclist education, beginning at a young age and continuing on through high school has shown to produce safer cyclists, and also encourage cycling later on in life.

To encourage stronger education and understanding, the Task Force recommended as a top priority:

Add cycling skills and education training for home-room teachers in the school system (elementary through middle and high school).

For on-the-bike training, it is recommended that formal training be added to students' physical education (PE) curriculum. This two-pronged approach is in response to a lack of bike education programs due to the high cost of providing bicycles for students, and an overall reduction of PE programs in schools.

Leader: Denver Environmental Health

Denver's Environmental Health department has a strong working relationship working Denver Public Schools (DPS). Therefore, Environmental Health would be a natural fit for to advance this action item forward. In addition, the school board and teacher alliances will play important roles in making training available at a widespread level. Private and parochial schools should also be involved.

Estimated Cost: Medium-High

The estimated cost depends on the structure for integrating the education into the schools. A fully standardized program that delivers quality cycle training to every child in the City and County of Denver will cost more than a lighter, more focused, approach.

Estimated Implementation Timeline: Medium

Working with schools can sometimes take longer than other institutions given the sensitive nature of working with children and the oversight of parents, teachers, and administrators. The City has been working more closely with DPS in recent years, but this will likely take a number of years to get fully implemented, especially depending on available funding.

Connection to Bicycle Crash Analysis Report: Education

The Bicycle Crash Analysis noted that instilling education at a young age will allow safer decisions from both the bicyclist and driver perspectives.

Case Study: Biking as part of the curriculum

Columbia Secondary School in Harlem, NY and Public School 76 in the Bronx, NY are two schools that offer bicycle riding as part of the physical education curriculum.

Bicycle training as part of a school's curriculum is few and far between in the US, and usually dependent on each individual school. Cycle training in schools is often delivered by not-for-profits. For example in Colorado, Bicycle Colorado delivers bicycle training through the safe routes to school program. For the Bicycle Colorado curriculum, please see: <http://bicyclecolorado.org/wp-content/uploads/2013/10/ElementaryCurriculum.pdf>

Implementing Activities Funded Through 2016

Denver Environmental Health applied for but did not receive funding to carry on activities under this Priority in 2016. It will continue to maximize resources to support bike safety, and seek grant funding for such activities. Denver Environmental Health will report to the community its efforts to obtain such funding, and renew its request for an appropriation to carry on work under this Priority in 2017.

Education and Outreach: Other Priorities

The following text provides summary details on other important priorities for this theme, beyond the top two priorities detailed above. Where funding to work on these priorities is not immediately available, Denver will look for funding opportunities such as foundation and government grants, and will also revisit this list during each budget cycle. Additional information on the full priority list is also included in Appendix C.

- **Grassroots:** The Task Force recommended utilizing existing frameworks for neighborhood-based marketing and training (examples include Fort Collins 'spokes' program).
- **No More 'Us vs. Them' Messaging:** The Task Force recommended developing marketing strategies specifically targeted at getting past the 'us vs. them' mentality. Campaigns could include a range of people representing different road users (CDOT 'Share the Road' campaign and banner).
- **Drivers Education Training and Testing:** The Task Force recommended introducing cycling related questions to drivers training and education for all moving vehicles. This may include piloting a cycle skills course embedded within driver's education. It is recommended that bicycle training be required when obtaining a C license or other specialized licensing.
- **Trails:** The Task Force recommended developing a trail etiquette marketing campaign. A number of issues between different users have been identified and resulted in crashes. This marketing campaign would work to mitigate those conflicts and create a more enjoyable environment for all users.
- **Online Tools:** The Task Force recommended developing a leaflet and 'one stop shop' website for bicycle information in Denver. This could include links to more in-detail resources.
- **Community-based Training:** The Task Force recommended creating elective training courses through community recreation centers. The training courses would be adapted to meet different knowledge levels and age groups.
- **In-lieu Training:** The Task Force recommended allowing those receiving traffic violations to attend a bicyclist/drivers training course in-lieu of paying a fine for a violation. This could be offered to both drivers and cyclists to learn about how to better navigate the roadway.

Ordinances and Enforcement: Cyclist Laws

The stakeholder group identified the need to update bicycling related laws to better fit with current challenges and cycling culture. Many laws simply apply the same rules of vehicles to bicycles. To consider and update logical rules related to bicycling, the Task Force recommended as a top priority:

Review all laws pertaining to bicycling, and conduct peer review with other cities with the aim to create laws that make cycling safer. This includes analyzing current fine amounts and making changes where necessary.

Leader: Denver Public Works & Denver Police Department

Since Public Works and the Denver Police Department share enforcement responsibilities, both agencies will lead this effort. Although DPD will ultimately decide how laws will be enforced, Public Works would have a critical facilitation and coordination role in implementing this recommendation. This would be a collaborative effort across a number of different agencies: the City Attorney's Office, Mayors Bicycle Advisory Committee, BikeDenver, WalkDenver, Bicycle Colorado, American Automobile Association, B-cycle, Denver Cruise Ride, etc.

Estimated Cost: Low

Since this is policy based action item instead of an infrastructure based action item, the cost would be in the lower category. However, it would take a large time commitment and community engagement process to seriously evaluate the laws of the road.

Estimated Implementation Timeline: Long

Evaluating current laws will be the first step in this process and would frame the process for determining changes to current laws or identifying new laws. It can be completed relatively quickly, but making changes and developing new laws would likely require a long time as well as commitment from all the necessary partners.

Connection to Bicycle Crash Analysis Report: Following Road Signs

The Bicycle Crash Analysis noted that many of the contributing bicycle safety factors are associated with not following road signs or signals. This effort will work to directly address and change this behavior.

Case Study: Cyclist Laws

A number of Colorado towns and cities have undertaken a review of cyclist laws. Some key jurisdictions that have recently reviewed, or changed, cyclist laws include:

- City of Fort Collins;
- Town of Breckenridge; and
- Summit County.

The town of Breckenridge and Summit County changed their laws during the review to allow cyclists to use stop signs as yield signs.

Implementing Activities Funded Through 2016

The Denver Police Department will collaborate with its partners to conduct a thorough review of existing bicycle laws in Denver. DPD along with its partners will analyze bicycle laws in other jurisdictions within and outside the State of Colorado to determine what, if any, recommendations should be made to modify existing laws and fines. Close collaboration with the Denver City Attorney's office will be maintained throughout this process.

Denver Public Works has performed a cursory review of all bicycle laws through the update to Denver Moves: Bicycles plan; however funding and resources have not been identified to facilitate the larger process for policy modification. Denver Public Works will continue to work with stakeholders on ordinance issues as time permits while fulfilling the responsibilities to achieve other Priorities identified in this plan and discussed above.

Ordinances and Enforcement: Law Awareness

Many cyclists, pedestrians, and drivers simply do not understand the proper rules for interacting with various modes. This creates inconsistent and potentially unsafe situations at intersections, along trails, and on streets across the City. Creating awareness of the rules and training users to consistently apply these rules will create a more predictable and certain environment for cyclists, pedestrians, and drivers. To support law awareness, the Task Force recommended as a top priority:

Improve law awareness between both motorists and cyclists, working with all enforcement and ticketing agencies.

Leader: Denver Police Department

As the primary agency enforcing the rules and laws of the road, the DPD would lead on this action item. Similar to the bicyclist laws action item, many partners would be critical for successful implementation: Channel 8, local Transportation Management Associations, Downtown Denver Partnership, BikeDenver, American Automobile Association, B-cycle, Denver Cruise Ride, Bicycle Colorado, etc.

Estimated Cost: Low

This effort would be combined with other marketing and educational efforts to maintain a low incremental cost. A number of low-cost strategies could result from this effort.

Estimated Implementation Timeline: Short

It is assumed that DPD could advance this effort rapidly. DPD would work with the necessary partners to identify the best way to communicate the current laws. Coordination with other bicycling educational efforts would be critical to successfully building law awareness. There is an opportunity to develop an easy pamphlet for police officers to hand out when talking with bicyclists (and drivers if appropriate) or possibly information tags for parked bikes. Promoting an online video may also be an appropriate (and cost effective) way to communicate bicycle laws.

Connection to Bicycle Crash Analysis Report: Following Road Laws

Many of the contributing factors are associated with not following road signs or signals. This will hopefully address these concerns.

Case Study: Santa Monica Police Department Informational Leaflet

The Santa Monica Police Department designed an informational leaflet with the intention of improving cyclists' awareness of road laws. This leaflet was given instead of citations in some instances to educate cyclists, rather than penalize them. The Santa Monica Police Department worked with a consortium of partners, including the City of Santa Monica and the Santa Monica Bike Center to produce the leaflet.

For more information see: <http://www.santamonicanext.org/2014/12/smpd-joins-forces-with-bike-center-to-promote-smart-cycling-in-santa-monica/>

Implementing Activities Funded Through 2016

In support of the Law Awareness Priority, the Denver Police Department plans to lead the following actions in 2016:

- Video: Rules of the road for both bicyclists and motorists
- Podcast: How to safely navigate riding a bicycle in Denver
- Flyers: Present law offenders with bicycle safety flyers
- Social Media: Open dialogue on Twitter for 30 minutes where citizens can ask questions to law enforcement personnel for immediate answers on bike laws, once a month, for three months
- Buzz Feed: Create rules of the road on Buzz Feed to be shared on Facebook
- Media: Organize a press conference to highlight the laws and bike/car safety

Ordinances and Enforcement: Other Priorities

The following text provides summary details on other important priorities for this theme, beyond the top two priorities detailed above. Where funding to work on these priorities is not immediately available, Denver will look for funding opportunities such as foundation and government grants, and will also revisit this list during each budget cycle. Additional information on the full priority list is also included in Appendix C.

- **Marketing:** The Task Force recommended producing informational materials that inform how to cycle and drive safely. Potentially provide these for police to use instead of citations at their discretion.
- **Near Misses:** The Task Force recommended creating digital online and other collection tools to report near misses (close call collisions that were avoided). Anecdotally, near misses are very common in Denver. However, there are no reliable sources of data, in part because police reports are created only when there is a collision. Understanding the type and location of near misses would be critical to identifying bicycle safety problem locations before major incidents occur. The online tools would need to be simple and intuitive for Denver residents to use and report into an accessible database.
- **Registration and Licensing:** The Task Force recommended investigating the option of voluntary bicycle licenses and/or registration. Incentives (such as member rewards) could be provided as part of the registration process.
- **Deferred Disposition:** Similar to in-lieu training, the Task Force recommended updating the system for ‘deferred disposition’ to include provisions for cyclist/driver training. The training would be an option for drivers and cyclists receiving moving violations rather than simply paying fines.
- **Balanced Enforcement:** The Task Force recommended working with enforcement agencies to review enforcement throughout Denver. The goal of this review would be to ensure that enforcement is consistently applied for cyclists and motorists (cycle lane parking violations, stopping infractions, etc.), where the data is available to support such a review.
- **Trail Rules Awareness:** The Task Force recommended improving rules and regulations awareness among cyclists and pedestrians for trail use through effective communications tools.
- **Bicycle Safety Enforcement Campaign:** The Task Force recommended developing a bicycle safety enforcement campaign (such as “THE HEAT IS ON” or “CLICK IT OR TICKET” campaigns).
- **Grassroots Enforcement:** The Task Force recommended organizing at the grass roots level to influence the behavior of cyclists. For example, a peer pressure campaign among cyclists to encourage them to speak up or at least blow a horn when they see another cyclist running a red light.

4 Evaluation and monitoring

An important aspect of the future understanding of the effectiveness of this action plan is to ensure an active evaluation and monitoring framework is in place before, during and after the implementation of any actions.

There are a number of evaluation methods and strategies that can be investigated to monitor the impact of action items. These could include, but are not limited to:

- Changes and monitoring bicycle crash rates;
- Changes and monitoring bicycle 'near misses';
- Quality of bicycle network (measured by ease of use, level of service or level of traffic stress)s
- Amount of funding per capita invested in cycling infrastructure and programs;
- Changes in cycling rates, measured through bicycle counts or surveying;
- Number of Denver residents undertaking cycle training;
- Percent of bicycle mode share;
- Percent of intersections with bicycle safety improvements.
- Miles of continuous bicycle infrastructure.
- Percent of schools that have added a bicycle education program.
- Number of teachers trained to provide bicycle education.
- Amount of Safe Routes to School funds dedicated to Denver schools.
- Number of students that have completed a bicycle education course.
- Reduction in tickets/summons for bicycle-related traffic infractions.
- Number of Denver residents that have completed the bike ed course.
- Reduction in bicyclist speeding offences; and
- Implementation of deferred disposition initiative for bicyclists.

It should be noted that a full and robust evaluation and monitoring plan should be developed for each action item in the action plan.

5 Next Steps

With the close of Workshop #2, the Task Force completed the brainstorming and development stage of the Action Plan. Following Workshop #2, the comprehensive list of actions was distributed to the Task Force members for refinements, additions, and editing. This summary report was also developed to document the process and recommended actions resulting from the Task Force's efforts.

The next step will be to advance the priority and secondary recommendations for bicycle safety forward.

Because bicycle safety requires a coordinated multi-agency effort, the Office of the Mayor will continue to lead this discussion and ensure that this process continues with accountability of identified actions for the partners involved. The initial, draft list of action items was provided to many departments within the City to consider incorporating into requests for funding in the 2016 budget cycle. We have reported above what action items have actually been funded through 2016. We will look for additional funding sources and we will revisit actions called for in this Plan that were not funded in 2016 when we conduct the budget process for 2017.

To ensure the forward movement of improvements directed at increasing cyclists' safety, the Office of the Mayor will work to ensure progression on all top priorities within the next five years. This will be accomplished through allocating in a transparent fashion significant portions of the budget to achieve pieces of the top identified priorities.

A Appendix: Task Force Workshops

Task Force Members

The members included a number of different agencies/groups involved improving bicycle safety in Denver:

- City and County of Denver
 - Department of Environmental Health
 - Department of Public Works
 - Department of Parks & Recreation
 - Denver Police Department
- Denver Cruiser Ride
- Inter-Neighborhood Cooperation
- Anadarko
- BikeDenver
- Mayor's Bike Advisory Committee
- Sander Marketing Group
- AAA

Workshop #1 Breakout Sessions

After discussing issues, opportunities and goals in small groups, the Task Force members regrouped. Some common goals emerged from the discussion, including the following.

Table A.1: Draft Goals

Category	Draft Goals
Ordinances & Enforcement	Create regular, focused, and balanced enforcement for both cyclists and motorists. Support broader enforcement as a way to educate all road users. Update laws to ensure consistency and reasonableness for cyclists. Create method to track near misses (upcoming on pocketgov.org). Provide optional (user-friendly) registrations and/or licenses with member benefits (e.g. recovery assistance, insurance, maintenance, etc.). Promote programs to deter theft.
Traffic Control and Operations	Promote consistent intersection treatments to clarify expectations for all users. Promote more neighborhood bikeways. Consider alternative cycle routes (alleyways). Consider lower auto speed limits. Consider re-prioritization of modes and revised signal timing.

Education and Outreach	<p>Set a standard for sharing information to provide high quality, easily accessible and clear information related to cycling.</p> <p>Get past 'us vs. them' mentality between cyclists and motorists.</p> <p>Support cultural change (ubiquity).</p> <p>Promote multi-pronged programs to advance grass roots education.</p> <p>Enable cycling access and provide training for all.</p> <p>Add cycle/driver training as enforcement with the option for deferred disposition instead of citation fines.</p>
Physical Conditions and Infrastructure	<p>Create a connected network and fill the gaps – even between phases.</p> <p>Build safe, consistent, and intuitive intersections.</p> <p>Advance big funding ideas to provide sustainable funding sources to cycling-related activities (e.g. tax, congestion charge, etc.).</p> <p>Achieve more protected cycle facilities.</p> <p>Create higher standards of infrastructure.</p> <p>Prioritize and separate modes where appropriate.</p> <p>Encourage and incorporate big programs, ideas, and visions.</p> <p>Advance pilots and demonstration projects (e.g. tactical urbanism).</p> <p>Provide strong signage and wayfinding (and pinch-points).</p>

Workshop #2 Overall Prioritization

After the small group activity, the entire group got back together to report out and summarize the discussions. As a final exercise for this workshop, the members prioritized the top two action items from each of the themes, as identified through the pairwise comparison process. The pairwise comparison process compares two issues against one another so that the group must chose the item with the higher importance. At the conclusion of the exercise, the item with the most points will be determined as the most important issue. While this is not an exact science and does not represent all the nuances included in identifying priorities, it is a helpful tool to identify top priorities.

Three action items rose to the top:

- Network development
- Intersection design and education
- Cycling curriculum and training

Although all of the action items are important for improving safety, people identified these three as the most important. After this activity, much of the discussion focused on network development and intersection design and education. These two action items inherently comprise of a number of items that were listed as separate action items as well. An important component of network development is showing the visibility of the efforts, including wayfinding infrastructure. Not only is network development important for cyclists to navigate the roadway with motor vehicles but also with pedestrians. The intersection design and education action item reaffirms the lack of education related to Denver cycling. This action item is also associated with wayfinding and making it safer for all users.

Table A.1: Prioritized Action Items

Theme	Action Item	Dots
Physical Conditions and Infrastructure	Network development	9
	Integrated planning	4
Traffic Control and Operations	Intersection design and education	9
	Intersection crash mitigation	3
Ordinances and Enforcement	Cycle laws	6
	Law awareness	4
Education and Outreach	Cycling curriculum and training	8
	Cyclist education in schools	0

B Appendix: Goals

Goals

Physical Conditions and Infrastructure

- Create a connected network and fill the gaps – even between phases.
- Achieve more protected cycle facilities.
- Prioritize and separate modes where appropriate.
- Advance pilots and demonstration projects (e.g. tactical urbanism).
- Provide strong signage and wayfinding (and pinch-points).

Traffic Control and Operations

- Promote consistent intersection treatments to clarify expectations for all users.
- Promote more neighborhood bikeways.
- Consider alternative cycle routes (alleyways).
- Consider lower auto speed limits.
- Consider re-prioritization of modes and revised signal timing.

Ordinances and Enforcement

- Create regular, focused, and balanced enforcement for motorists, cyclists and pedestrians (trails).
- Support broader enforcement as a way to educate all road users.
- Update laws to ensure consistency and reasonableness for cyclists.
- Create method to track near misses (upcoming on pocketgov.org).
- Provide optional (user-friendly) registrations and/or licenses with member benefits (e.g. recovery assistance, insurance, maintenance, etc.).
- Promote programs to deter theft.

Education and Outreach

- Set a standard for sharing information to provide high quality, easily accessible and clear information related to cycling.
- Get past ‘us vs. them’ mentality between cyclists, motorists and pedestrians (trails).
- Promote multi-pronged programs to advance grass roots education.
- Enable cycling access and provide training for all.
- Add cycle/driver training as enforcement with the option for deferred disposition instead of citation fines.

Overall Improvements

- Advance big funding ideas to provide sustainable funding sources to cycling-related activities (e.g. tax, congestion charge, etc.).
- Create higher standards of infrastructure
- Encourage and incorporate big programs, ideas, and visions.
- Support cultural change (ubiquity).

C Appendix: Actions Matrix

Physical Conditions and Infrastructure Action Items			
Action Item	Cost	Champion	Pairwise
Connectivity: Policy change that requires all bicycle infrastructure to connect into the bikeway network, or provide signage to inform the cyclist how they can continue their journey.	Low	PW	6
Network Development: Link origination and destination points with routes, road infrastructure, intersection treatments and technologies and signage along the entire route. E.g. select several points of origin and corresponding destinations and ensure that engineering allows an average bicyclist who can travel 15 mph to cover one mile of route in 5 minutes.	High	PW	8
Innovation and piloting: Develop a living lab style outreach platform (similar to Boulder) to encourage pilot projects and rapid implementation—including tactical urbanism.	Med	PW	5
Protected infrastructure: Invest in different types of cycle lane protection, and begin identifying locations for pilot projects. Cycle lane protection could include 'plow proof' systems such as: LED studs, Rumble strips, Buffer lanes, Removable 'seasonal' separation (examples from Montreal, Canada), targeted investment in heated cycle paths in problematic areas.	High	PW, PD	3
Separating modes: Develop plan for separated modes on regional trails where necessary & feasible e.g. Lower Cherry Creek Channel.	Med-High	PW	1
Wayfinding: Develop and install a City and County wide standardized wayfinding system.	High	PW	6
Wayfinding: Ensure mapping of cycle routes and infrastructure is well distributed and up to date. Consider using internet-based mapping to help inform a journey planner that takes into account route choice based on comfort, safety, signed speed or stress level.	Med	PW	0
Integrated planning: Create a fully integrated comprehensive Master Transportation Plan that is based on accurate population growth projections and emerging development patterns – Vision 2025.	High	PW	9
Install bike parking: Provide safe and secure locations for people to store their bicycles.	Med	PW	4
Invest in Bike Hubs: These would provide protection to bikes across Denver.	High	PW	3

Traffic Control and Operations			
Action Item	Cost	Champion	Pairwise
Intersection design and education: Reform current intersection design practices to ensure designs are clear, intuitive and cater for all modes and all levels of experience (includes bike boxes). Consistent treatment that allow flexible design.	High	PW, Consultant, Advocacy	5
Signaling: Re-program highly used bicycle routes to prioritize cyclist movements, rather than motorist movements.	High	PW	2

Cyclist actuation: Ensure all signalized crossings can detect cyclists to prompt signal change.	High	PW	2+
Alleyway utilization: Explore how the cities alleyways could be used as part of the cycling network. Peer review other cities that have alleyway strategies.	Low	RNOs, Business Districts, TMAs	0
Auto speed reduction: Investigate where reducing speed limits in the city could reduce cyclist crash rates.	Low-High	Legislature	2++
Intersection crash mitigation: Identify the top intersections with bicycle crashes and develop a remedial framework, depending on the intersection type, to mitigate the incidence of cyclist crash. Prioritize a number of intersections for improvement, and monitor collision rates. Roll out improvements across the city to tackle cyclist crashes at intersections head-on.	Low	PW, Police, Advocacy	6
Maintenance: Develop maintenance plan with all infrastructure including in funding plan.	Med	PW, Parks	4

Ordinances and Enforcement Action Items			
Action Item	Cost	Champion	Pairwise
Cyclist laws: Review all laws pertaining to cycling, and conduct peer review with other cities with the aim to create laws that make cycling safer. This includes analyzing current fine amounts and making changes where necessary.	Low	PW, PD, CAO, Denver Business Association, BikeDenver, Bicycle Colorado, AAA, DCR, B-cycle	9
Law awareness: Improve law awareness between both motorists and cyclists, working with all enforcement and ticketing agencies.	Low	PD, Channel 8, TMAs, Denver Business Association, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	7
Marketing: Produce informational materials that inform how to cycle and drive safely. Potentially provide these for police to use instead of citations at their discretion.	Med	BMV, PD, Communications, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	6b
Near misses: Digital online and other collection tools, that is simple and intuitive for Denver residents to use and feeds into a single accessible database.	Low	TS, PW, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	1b
Registration/Licensing: Investigate the option of voluntary bicycle licenses and/or registration with member rewards and implement as appropriate.	Low	E & L, PD, Bike Retailers, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	1a
Deferred disposition: Update the system for 'deferred disposition' to include provisions for cycle/driver training is an option rather than citation fines.	Low	CAO, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	6a
Balanced enforcement: Work with enforcement agencies to review enforcement throughout Denver to ensure that it includes both enforcement for cyclists, and motorists (e.g. cycle lane parking violations) subject to the particular conditions of individual districts.	Low	CAO, PD, DPS, Rowe, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	4

Trail rules awareness: Improve rules and regulations awareness amongst cyclists and pedestrians for trail use through effective communications tools.	Low	DPR, DRCOG, IMBA Colorado, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	2
Bicycle safety enforcement campaign: Develop a bicycle safety enforcement campaign (such as “THE HEAT IS ON” or “CLICK IT OR TICKET” campaigns).	Med	Communications, Channel 8, DRCOG, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	3
Grass roots enforcement: Organize a peer pressure campaign among cyclists to encourage them to speak up or at least blow a horn when they see another cyclist running a red light.	Low	MBAC, DRCOG, BikeDenver, AAA, B-cycle, DCR, Bicycle Colorado	6c

Education and Outreach			
Action Item	Cost	Champion	Pairwise
Cycle curriculum and training: A citywide quality controlled and standardized cycle training program available to all, from 8-80 year olds. Training will include how to interact safely with motorized traffic, and the road network. Also include the driver perspective on how to navigate road conditions.	Med	BikeDenver, Bicycle Colorado, National Safe Route to School Partnership, Parks, League Certified Instructors, WalkDenver	8
Grass roots: Utilizing developed framework for neighborhood-based, marketing and training through neighborhoods (examples include Fort Collins ‘spokes’ program).	Low	Neighborhood Associations—transportation representatives	1
“No more us vs them” messaging: Develop marketing strategy specifically targeted at getting past the ‘us vs. them’ mentality. Campaign could include a range of people representing different road users (e.g. CDOT ‘Share the road’ campaign and banner).	Med-High	BikeDenver, WalkDenver, Mayor’s Office	4
Driver’s education training and testing: Introduce cycling related questions to drivers training and education for all moving vehicles. Potentially pilot a cycle skills course embedded within driver’s education. When getting specific class C license, have to have training.	Low	Driver’s Education providers, DMV, Businesses with large fleets	6
Trails: Trail etiquette marketing campaign.	Low	Parks	3
Online tools: Development of a leaflet and ‘one stop shop’ website for bicycle information in Denver. Links to greater and more in-detail resources.	Low	BikeDenver, PW, Environmental Health	2
Cyclist education in schools: Add cycling skills and education training for home-room teachers. For on-the-bike training, add to the PE curriculum.	Low	Environmental Health, DPS, School board, Teacher alliances	7
Community-based training: Through community recreation centers, training would provide elective training courses.	Low	Parks, Mayor’s Office	5

In-lieu training: Instead of paying a fine for a violation, offenders would attend a training course. This could be offered to both drivers and cyclists to learn about how to navigate the roadway.	Low	PD, Mayor's Office	0
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