

**Spring 2012**

# Comparative Analysis of Bicycling Around Campus: Comparing Bicycle Friendly University Standards to the University of Denver



## Table of Contents

### **I. Executive Summary.....(2-3)**

Recommendation for Bicycle University Friendliness  
 Methodology

### **II. Background.....(4)**

### **III. Findings.....(3-25)**

*Engineering : If We Build it, They Will Bike*

University of Denver Campus Infrastructure  
 Recommended Bicycle Infrastructure Improvements  
 Bicycle Boulevard

Sharrow

Sharrow Flower

Bicycle Lane

Green Sharrows and Colored Bike Lanes

Intersection Bicycle Treatment

Cycle Track

Roundabouts

Party Parking

Parking Practices/Policies

Short/Long Term Bicycle Parking

Bicycle Transit Centers, Bicycle Repair Stations, and Bicycle Vending  
 Machines

*Enforcement and Safety.....(25-28)*

Bicycle Registration

Enforcement and Citations

*Education.....(29-33)*

Teaching Bicycle Education

Technological Advancements for Teaching Bicycle Safety

Sustainable Bicycle Program (DU & Abroad)

Bicycle Education Programs

Bicycle Commuter Incentive Programs

*Encouragement.....(33-35)*

Campus Outreach

*Evaluation and Planning.....(35-36)*

Bicycle Coordinator

### **IV. Concluding Recommendation.....(36)**

## **Comparative Analysis of Bicycling Around Campus: Comparing Bicycle Friendly University Standards to the University of Denver**

### **I. Executive Summary**

In order to help the University of Denver facilitate a low-impact and sustainable institution, Transportation Solutions has conducted a comparative analysis of schools with notable bicycle master plans. Institutions referenced for this study originated from the “Bicycle Friendly University Master Award List” produced in 2011 by the League of American Bicyclists. Out of numerous nationwide applicants, twenty schools were ultimately ranked and awarded either a platinum, gold, silver or bronze rating based on their fulfillment of five categories (often referred to as the five Es): Engineering, Education, Encouragement, Enforcement, and Evaluation & Planning. Of the twenty schools, three, in particular, were selected for further observation—Stanford University,<sup>1</sup> Colorado State University (CSU),<sup>2</sup> and the University of Oregon (UO).<sup>3</sup>

**Recommendation for Bicycle University Friendliness:** The overall recommendation for the University of Denver is that it take the necessary steps to improve university bicycle friendliness by fulfilling and satisfying the League of American Bicyclists’ 5 Es. It is further recommended that the University complete a Bicycle Friendly University (BFU) application to better assess and compare campus bicycle friendliness to other bicycle friendly universities. Doing so will not only allow the University to see where it stands amongst others but also help it recognize what further improvements are needed to top the BFU list. Numerous recommendations for improving bicycle friendliness are outlined within this analysis but a major recommendation, in addition to adhering to the 5 Es, is that the school enact a university bicycle coordinator position to complete a BFU application and help oversee and implement bicycle friendly enhancements. The League of American Bicyclists application deadline for 2012 BFU award/recognition is July 20, 2012.

---

<sup>1</sup> Ranked number one and only recipient of platinum rating award.

<sup>2</sup> Ranked fifth overall with a silver rating, CSU is also the only Colorado school on the BFU Master Award List.

<sup>3</sup> From the well-known bicycle friendly state, UO is ranked tenth with a silver rating.

Finally, many of the University’s bicycle improvements will be dependent on coordination with the City and County of Denver Public Works. Denver Moves<sup>4</sup> recently outlined bicycle improvement plans for the City of Denver and has designated various projects for streets surrounding the University. While these improvements are favorable, many are listed as “Phase 3” projects that are dependent on available funding. In order to ensure implementation and timeliness for these street improvements, it recommended that the University work to accelerate Phase 3 projects to Phase 1 projects by coordinating with Denver Public Works.

**Methodology:**

Each BFU’s bicycle attributes have been assessed and identified for potential adoption or recommendation by the University of Denver (DU). Information collected was obtained by direct and indirect contact with each institution. Indirectly, Transportation Solutions acquired electronic copies of each school’s master bicycle plan and additional online campus resources relevant to bicycle safety, policies and laws. Directly, Transportation Solutions contacted CSU for a copy of its Bicycle Friendly University application and, upon receipt, was offered additional assistance should DU have any further bicycle inquiries. Lastly, Transportation Solutions communicated with UO as they, like DU, are in the process of researching and developing an updated master bicycle plan which will involve the implementation/construction of a newly updated bicycle facility. Transportation Solutions has requested copies of UO’s bicycle facility plans/research/materials (who have complied so long as DU also shares its information) and is awaiting receipt of materials. All information collected has been compared/contrasted with Denver Moves Final Plan,<sup>5</sup> DU’s *Fall 2007 Land Use Plan Update I*<sup>6</sup> and the school’s relevant online materials (i.e. information found at Campus Safety<sup>7</sup> and Transportation Center<sup>8</sup> webpages).

---

<sup>4</sup> See <http://www.denvergov.org/bikeprogram/BicyclinginDenver/StreetsandTrails/Planning/tabid/438250/Default.aspx> for further information and to see Denver Moves Final Plan, Facility Map, and Phasing Map.

<sup>5</sup> Found at [http://www.denvergov.org/Portals/708/documents/FINAL\\_Denver\\_Moves.pdf](http://www.denvergov.org/Portals/708/documents/FINAL_Denver_Moves.pdf)

<sup>6</sup> Found at [http://www.du.edu/architect/documents/071012\\_final.pdf](http://www.du.edu/architect/documents/071012_final.pdf)

<sup>7</sup> See <http://www.du.edu/campusafety/crimeprevention/bicycle.html>

<sup>8</sup> See <http://www.du.edu/transcenter/GettingAroundTown.html#bike>

## II. Background

The City of Denver’s abundant sunshine, moderate temperatures, and low humidity levels provide the city with a tolerable temperate climate that is perfect for year round bicycle commuting. This combined with the University of Denver’s development density and flat topography presents the University with the opportunity to become one of the nation’s most bicycle friendly campuses, so long as the institution can improve on its 5 Es (Engineering, Education, Encouragement, Enforcement, and Evaluation & Planning). By encouraging students, faculty and staff to commute by bicycle, DU will in turn contribute to mitigating efforts that reduce traffic congestion, and noise and air pollution, which will also increase transportation safety and well-being for all. While the University was recently awarded a gold rating from AASHE STARS (Sustainability Tracking Assessment & Rating System), it is apparent that there is room for improvement in campus bicycle programs, including updates to the out-of-date bicycle component in the 2007 campus Land Use Plan. It is the intention of this analysis to provide recommendations which will better serve DU’s bicycle planning efforts and layout processes necessary for meeting proposed recommendations.

## III. Findings

### *Engineering<sup>9</sup>: If We Build it, They Will Bike*

When encouraging bicycle use, one of the most important factors to consider is the availability of infrastructure that is safe and accessible for cyclists—a concept closely related to the *Field of Dreams* philosophy, “If you build it, they will come.” Take for example Amsterdam, Netherlands. Up until the 1970’s, the city, like most current U.S. cities, was heavily dominated by automobile use. After witnessing its auto-dependent European neighbors incur mounting

---

<sup>9</sup> See generally *Bicycle Friendly University: What are the 5 Es?*, (2012), [http://www.bikeleague.org/programs/bicycelfriendlyamerica/bicycelfriendlyuniversity/bfu\\_five\\_e\\_s.php](http://www.bikeleague.org/programs/bicycelfriendlyamerica/bicycelfriendlyuniversity/bfu_five_e_s.php) [hereinafter 5 Es]. Colleges and Universities are asked about what is on the ground; what has been built to promote cycling on campus and in the surrounding community. For example, questions in this category inquire about the adoption of a complete streets policy, training for engineers and planners, and the existence of both well-designed bike lanes and innovative techniques for bicycle accommodation. Reviewers also look at the availability of secure bike parking and the existence of end of trip facilities.

transportation problems (i.e. noise/air pollution, congestion, parking, etc.), Amsterdam began an initiative that put focus on an alternate form of transport, the bicycle. This process decentralized bicycle policies and placed a strengthened emphasis on bicycle infrastructure. Today Amsterdam boasts unequaled bicycle activity,<sup>10</sup> has over 249 miles of bike lanes/paths, advises cities from all over the world on bicycle improvements, and touts that there is, “No city in the world where people cycle as much as in Amsterdam.” Without a doubt, one of the best ways to cycle safely is to do so in a city that places a priority on safety for cyclists and achieves this by providing a safe and efficient infrastructure. Without infrastructure, there is less of an incentive and willingness to commute by bicycle—and the University of Denver (a miniature city on scale) presently lacks safe, secure, and efficient infrastructure for its cyclists.

### ***University of Denver Campus Infrastructure***

Admittedly no city in the U.S. is on scale with or has been able to achieve what Amsterdam has accomplished in such a short amount of time, though Portland, Oregon<sup>11</sup> and Minneapolis, Minnesota<sup>12</sup> (U.S. cities that have each been ranked #1 in bicycle friendliness) have made an impressive go at this by adhering to the 5 Es and the “If we build it” concept. Each city, in a relatively short period of time, has built/added an impressive amount of bicycle infrastructure. Such a build out has not been limited to cities but also universities such as Stanford, CSU, UO and the seventeen other awarded BFU colleges/universities that are all striving to provide, expand, and improve campus bicycle infrastructure. In contrast, there are relatively few bicycle routes/bike lanes surrounding DU.<sup>13</sup> DU has however recognized this fault and noted in Appendix J of the *Fall 2007 Land Use Plan Update I* that, “The University of Denver should concentrate on improving the quality of the bicycle environment throughout the campus.” The section further recommends improvements for bicycle circulation through construction of two primary north/south bicycle corridors (one on S. High Street and one within the central part of

<sup>10</sup> Amsterdam has over 550,000 bicycles. Seventy-five percent of residents (ages twelve and up) own a bicycle and half of this figure use a bicycle daily.

<sup>11</sup> See *North America’s Most Bicycle Friendly Cities* at [http://www.msnbc.msn.com/id/25267048/ns/travel-active\\_travel/t/north-americas-most-bike-friendly-cities/#.TzFpJ1y0xX0](http://www.msnbc.msn.com/id/25267048/ns/travel-active_travel/t/north-americas-most-bike-friendly-cities/#.TzFpJ1y0xX0)

<sup>12</sup> See *The Surprising Rise of Minneapolis as a Top Bike Town* at <http://www.planetizen.com/node/51910>

<sup>13</sup> Buchtel Boulevard, Franklin Street, Iliff Avenue, Steele Street are all designated bicycle routes, but bare little signage and markings/paint.

campus), including adequate pathways to safely accommodate both cyclists and pedestrians, and stressed the importance of working with the City of Denver to calm traffic and improve the cycling environment on Buchtel Boulevard, Asbury Avenue, Iliff Avenue and Wesley Avenue near the campus.

Since 2008, much attention has been directed towards improving S. High Street as a bicycle friendly corridor. Transportation Solutions aided in this movement by working with Denver Public Works and DU to engage a consultant to conduct an engineering study of the street so that *sharrows*<sup>14</sup> could be installed in 2011. The project was funded through grant funds awarded to Transportation Solutions, with some matching funds provided by the University. In addition to placing sharrows along S. High Street, more can be done to improve cycling safety along this street and neighboring University streets.

Additional improvements on campus area streets may require elimination of on-street parking, street vacations (partial or total closures), changes to parking/ traffic policies, and increased signage/paint. would help facilitate bicycle access and safety, and improve the campus' connection (by bicycle) to local destinations such as Washington Park and the Cherry Creek Trail/Shopping Center. The following section provides recommendations for infrastructure bicycle improvements. While there are specific streets flagged for infrastructure improvements, all recommendations made are applicable to any street wanting to become bicycle friendly.

***Recommended Bicycle Infrastructure Improvements:***

**Bicycle Boulevard**

**Definition:** Bike boulevards are streets designed to give priority to non-motorized users and discourage through-traffic by motorized vehicles. A separated space in the street is not necessary

---

because non-motorized users preference is communicated through the roadway design, signage, and traffic calming measures.<sup>15</sup>

**Findings:**

- **Denver Moves Implementation/Designation:**
  - **South Franklin Street – Phase 3**
  - **Jewell Avenue – Phase 3**
- Bike boulevards are typically employed in neighborhoods that connect to local destinations.
- To minimize passing conflicts between vehicles and bicycles, bike boulevards are designed to help maintain an equal (low) speed for both parties.

**Recommendation:**

Bike boulevards are ideal for streets surrounding DU as the campus is enclosed by neighborhoods and local destinations. Many of these streets do not have enough right-of-way to incorporate bicycle facility street improvements such as bicycle lanes or cycle tracks. Because of this, DU has an even greater need to advocate for and add bike boulevards. In addition to Denver Moves’ bicycle boulevard designations, streets like Asbury Avenue and Warren Avenue should also be considered potential candidates for bicycle boulevards.

**Sharrow**

**Definition:** Shared lane markings or “sharrows” are designed to provide guidance in situations where space is too narrow for a motor vehicle and a bicycle to travel side by side. It assists bicyclists with positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist’s impacting the open door of a parked vehicle, as well as alerts road users of the location bicyclists are likely to occupy within the traveled way. Sharrows also encourage safe passing practices and reduce the incidence of wrong-way bicycling.<sup>16</sup>

**Findings:**

---

<sup>15</sup> See Denver Moves: Making Bicycle and Multi-use Connections , 16 (2011) at [http://www.denvergov.org/Portals/708/documents/FINAL\\_Denver\\_Moves.pdf](http://www.denvergov.org/Portals/708/documents/FINAL_Denver_Moves.pdf) for further information on sharrows and other bicycle facility improvements. [Hereinafter *Denver Moves*]

<sup>16</sup> Denver Moves, *supra* note 15, at 27.



- **Denver Moves Designation/Implementation:**

- **South High Street – Phase 1**

**\*Project Update:** In the fall of 2011, S. High Street successfully added painted sharrows. Since 2008, much attention has been directed towards improving S. High Street as a bicycle friendly corridor. Transportation Solutions aided in this movement by working with Denver Public Works and DU to engage a consultant to conduct an engineering study of the street so that sharrows could be installed in 2011. The project was funded through grant funds awarded to Transportation Solutions, with some matching funds provided by the University.



**Figure 1** S. High Street sharrow

- **South Saint Paul Street – Phase 3**

- **South Steele Street<sup>17</sup> - Phase 3**

- Sharrows are typically installed along streets that lack space for a dedicated bicycle facility (i.e. bicycle lane).
- Sharrows are usually installed along streets with speed limits under 35 MPH.
- Sharrows are not always meant to be a permanent solution as many are an interim means to mitigating vehicle-bicycle conflicts. Next generation options should be considered in place of sharrows whenever possible.
- Sharrows are often considered a “low hanging fruit” option as their quick/easy installation nominally improves safety/awareness for cyclists and motorists at an economical cost.

**Recommendation:**

In addition to S. High Street’s sharrow designation, Transportation Solutions has determined and recommends that sharrows be further considered for installation along all surrounding University streets that are unable to add enhanced bicycle facility types such as bicycle lanes or cycle tracks.

---

<sup>17</sup> From the end of S. St. Paul St. to Exposition Ave., S. Steele St. will have sharrow designation but past Exposition Ave. it will gain a bicycle lane.

Notable streets for sharrow implementation may include but not be limited to Buchtel Boulevard, East Asbury Avenue, Jewell Avenue, and Wesley Avenue.

### **Sharrow Flower**

**Description:** Sharrow flowers, similar to the composition of a compass or “flower,” are placed at the center of intersections where sharrows extend along intersecting streets in all four directions.



**Figure 2** Sharrow flower in Portland, Oregon.

**Image found at:**

<http://www.flickr.com/photos/portlandafot/6018344965/>

### **Findings:**

- **Denver Moves Designation/Implementation:**
  - Sharrow flowers are not detailed in the Denver Moves plan.
- Sharrow flowers are a relatively new and progressive concept first developed and implemented in Portland, Oregon. They have since caught on throughout the state and neighboring states.
- Sharrow flowers are typically found accompanying Bicycle Boulevards.
- There are currently no sharrow flowers in the City of Denver—or State of Colorado for that matter.

### **Recommendation:**

The progressiveness of sharrow flowers presents DU with an excellent opportunity to be the first to have this incorporated along its streets. Being the first to have a sharrow flower in the State of Colorado will likely garner positive media attention and add unique character to DU.

Similar to sharrows, a sharrow flower is equally easy and cost effective to install. The greatest barrier to a sharrow flower’s addition is having intersecting streets that are designated with sharrows. Currently there is only one street, S. High Street, that has sharrow designation. Denver Moves has however designated Jewell Avenue as becoming a bicycle boulevard. It is not known what bicycle facility improvements will be made but should sharrows be added, the street’s intersection with S. High Street will provide an ideal opportunity for sharrow flower

implementation. It is recommended that sharrow flowers be installed at all future intersecting sharrow streets surrounding the campus.

### **Bicycle Lane**

**Definition:** Bicycle lanes are a portion of the roadway designated for preferential use by bicyclists. They are one-way facilities that typically carry bicycle traffic in the same direction as adjacent motor vehicle traffic on the right side of the roadway.<sup>18</sup>

### **Findings:**

- **Denver Moves Designation/Implementation:**

- **West Iliff Avenue – Phase 2<sup>19</sup>**
- **Buchtel Boulevard – Existing Bike Lane and Trail**

- **DU Bicycle Lane Designation:**

- University of Denver’s Human Resources webpage details recommended bicycle routes for commuting around campus in a section titled “Getting to and from Campus.”<sup>20</sup> The site states, “At least two streets with bicycle lanes and paths connect the University campus to the rest of Denver” and goes on further to specify what these main streets are. The provided descriptions are as follows:
  - Franklin St. (north-south; two to three blocks west of campus): bicycle lane runs from intersection of Franklin St. & Buchtel Blvd. north through Washington Park to the intersection of Downing St. & Speer Blvd., connecting with the Cherry Creek Trail.
  - Buchtel Blvd. (east-west; immediately north of campus): bicycle lane runs from intersection of Buchtel Blvd. & University Blvd. south-east to the intersection of Buchtel Blvd. & Colorado Blvd. and north-west to the intersection of Buchtel Blvd. & Downing St.



**Figure 3** Bicycle lane signage.

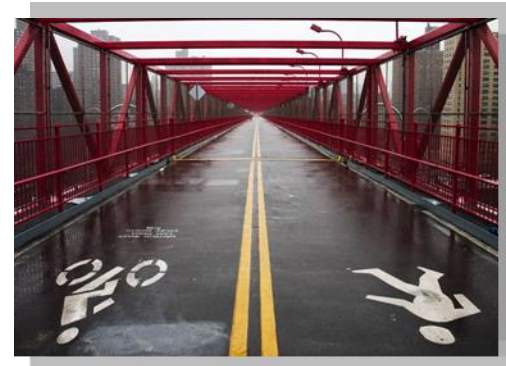
Image found at: <http://www.ogdenonpolitics.com/2011/11/city-eliminates-two-broad-ripple-avenue.html>

<sup>18</sup> Denver Moves, *supra* note 15 at 23.

<sup>19</sup> Past its intersection with Colorado Blvd. and to its intersection with S. Dahia St., the Iliff bike lane reverts to sharrow designations.

<sup>20</sup> See <http://www.du.edu/hr/orientation/information/tocampus.html#Bicycle>

- Following HR’s bicycle route information, Iliff Avenue, Saint Paul Street, and Florida Avenue are also mentioned as being practical bicycle routes (some of which will be further elaborated on later).
- Bicycle lanes, portions of a roadway that are exclusively marked for use by cyclists, are often what bicycle coordinators strive for when improving bicycle infrastructure.
- Bicycle lanes reduce stress and insecurities between cyclists and motorists as they allow each to travel at speeds that do not impede one another.
- Bicycle lanes are typically found on collectors and (some) arterials.
- Bicycle lanes are typically marked by striping, signing, and pavement marking. They may also incorporate colored paving or paint within the bicycle lane to help highlight merging areas.
- Psychologically, bicycle lanes provide cyclists the reassurance that they are “protected” and have their own dedicated space to ride—and rightly so as roads with marked bicycle lanes tend to be safer (i.e. fewer accidents and conflicts between motorists, cyclists, and pedestrians).<sup>21</sup>



**Figure 4** In addition to bicycle street improvements, signage and paint should further be considered for campus paths/trails to improve bicycle-pedestrian safety .

**Image found at:** <http://behindthehype.com/wp-content/uploads/2011/06/williamsburg-bridge-bike-path.jpg>

**Recommendation:**

Due to narrow street widths and parking, it is difficult to provide further bicycle lane recommendations for streets surrounding DU as many streets lack sufficient space. It should also be noted that HR’s assertion of Buchtel Boulevard having a bicycle lane is slightly incorrect. The street, in fact, has no bicycle lane between University Boulevard and S. Franklin Street. This is likely because a path is provided instead of a bike lane but such infrastructure can be confusing and dangerous for users. This point will further be elaborated on later but it is recommended that Buchtel Boulevard add a bike lane, sharrow marking or increase signage between University Boulevard and S. Franklin Street to absolve confusion for pedestrians, cyclists, and motorists.

<sup>21</sup> Conor CO Reynolds, M Anne Harris, Peter A Crompton and Meghan Winters, *The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature*, (2009), <http://www.ehjournal.net/content/pdf/1476-069x-8-47.pdf>.

### **Green Sharrows and Colored Bike Lanes**

**Description:** Building on the functionality of a basic sharrow, a green sharrow is a highlighted (green) lane complete with (white) sharrow markings. Green sharrows have the reputation of not being quite a bicycle lane and not quite a sharrow as the painted (green) strip only marks where bicyclists are to ride and does not delineate the area as being for bicycle use only (the lane is still shared). Green sharrows can however be converted into colored bicycle lanes—bicycle lanes that are filled in with green, red or blue (and sometimes purple) paint.



**Figure 5** Example of a green sharrow lane.

**Image found at:** <http://www.cnv.org/?c=3&i=423>

### **Findings:**

- **Denver Moves Designation/Implementation:**
  - Green sharrow and colored bike lanes are not detailed in the Denver Moves plan.
- Green sharrows are applicable to streets that facilitate lower speed limits, provide two (or more) lanes of traffic, and experience high volumes of bicycle traffic<sup>22</sup>
- Green sharrows make motorists aware that he/she can expect to encounter a bicyclist while driving in the colored lane. When such an encounter occurs, motorists are expected to either share the lane with cyclists or move to the adjoining left lane.
- Green sharrows and colored bike lanes are predominately a West Coast and international movement that have quickly spread to U.S. cities seeking bicycle friendliness.
- Stanford University employs the use of a colored bike lane and Portland, Oregon is famously known for its wide use of green sharrows.

<sup>22</sup> See Denver Moves, *supra* note 15 at 27. The use of “super sharrows” or “green sharrows” can also be considered in locations where traffic volumes are above 5,000 average daily vehicles or additional attention is warranted. Both treatments have sharrows inset to a green striped lane.

- The *Manual on Uniform Traffic Control Devices (MUTCD)* currently provides and grants “Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14)”<sup>23</sup>
  - Approval can be attained by sending a letter of request (on agency letterhead) to the Director of the Office of Transportation Operations, Federal Highway Administration (FHWA), and to: [MUTCDofficialrequest@dot.gov](mailto:MUTCDofficialrequest@dot.gov).
  - For the past ten years, the FHWA has approved experiments with green colored pavement for a variety of state and local governmental agencies.
  - June 2011, Golden, Colorado added a green background to a bicycle street marking (located along the Jackson Street corridor between 14<sup>th</sup> and 24<sup>th</sup> Streets) and will subsequently paint the entire bike lane green to determine if coloring enhances safety along the street.<sup>24</sup>

**Recommendation:**

Once again, as seen with sharrow flowers, the addition of green sharrows or colored bike lanes around campus provides an excellent opportunity for DU and the City of Denver to coordinate together and be recognized as leading figures in the progressive bicycle friendliness movement. It is recommended that the University of Denver select a street (or streets) and approach Denver Public Works to apply for and implement a green sharrows pilot program. Street candidates for such a program might include S. High Street and similar streets (streets that are too small for a bicycle lane because of width and/or parking) such as Jewell Avenue, Asbury Avenue, and Warren Avenue.

**Figure 6** Intersection bicycle treatment in Portland, Oregon.  
Image found at:  
[http://farm4.static.flickr.com/3172/2631764977\\_b5e76cbd59.jpg](http://farm4.static.flickr.com/3172/2631764977_b5e76cbd59.jpg)



**Intersection Bicycle Treatment**

**Definition:** Intersection bicycle treatments are a portion of the roadway designated for preferential use by bicyclists. They are designated facilities that allow bicycle traffic to make turning and thru movements at motor vehicle intersections.<sup>25</sup>

<sup>23</sup> See [http://mutcd.fhwa.dot.gov/resources/interim\\_approval/ia14/index.htm](http://mutcd.fhwa.dot.gov/resources/interim_approval/ia14/index.htm)

<sup>24</sup> See [http://www.cityofgolden.net/media/pdf\\_726.pdf](http://www.cityofgolden.net/media/pdf_726.pdf)

<sup>25</sup> Denver Moves, *supra* note 15 at 32.

**Findings:**

- **Denver Moves Designation/Implementation:**

- Denver Moves details intersection bicycle treatments but does not specify what intersections will receive such treatments. Relevant to DU, the plan has noted two intersections that could possibly receive intersection bicycle treatment. Project phasing for these are also not specified.
- **S. Franklin Street**
- **S. Saint Paul Street**
- There are a variety of intersection bicycle treatment designs used throughout the United States.
- Use of bicycle treatment design is dependent on the need, traffic volumes, roadway geometry, and traffic signal timing.
- Intersection bicycle treatments should be provided for all turn and thru movements at an intersection.
- Intersection bicycle treatment designs include painted bike boxes, turning lanes for cyclists, and dashed lanes to help guide cyclists safely through intersections.
- Intersection bicycle treatments reduce stress and improve safety between motorists and cyclists when turning at intersections.

**Recommendation:**

Intersection bicycle treatments are not widely seen throughout the City and County of Denver (so far) but there is such a treatment located at Broadway and 16<sup>th</sup> Avenue. The treatment at this location uses dashed lines to navigate cyclists across Broadway and connect to other bicycle paths/routes. Such a treatment would be excellent to have at the Buchtel Boulevard and S. High Street intersection. The dash treatment, along with added signage, would then help cyclists traverse to and from Buchtel Boulevard trail and absolve confusion between riding along the street or trail. To help better improve DU's connection with Washington Park (as requested by DU Sustainability Council), this type of treatment and signage should also be considered at the Buchtel Boulevard and S. Franklin Street intersection where, depending on the direction you are riding, the path ends/begins. Signs that read mileage and direction to DU and Washington Park

coupled with painted bicycle treatments such as bike boxes and dashed navigating lines can help cyclists better navigate their way to/from Washington Park and DU.

### **Cycle Track**

**Definition:** Cycle tracks provide an exclusive bikeway separated from motor vehicle and pedestrian traffic by a median, planter strip, and/or a parking lane. The cycle track may be designed at street level, sidewalk level or a height in-between the two to accentuate the separation.<sup>26</sup>

### **Findings:**

- **Denver Moves Designation/Implementation:**
  - Denver Moves details cycle tracks in its plan but has no designation or implementation planned for streets around DU.
- Cycle tracks are well known for their use in bicycle friendly cities such as Amsterdam, Netherlands and Copenhagen, Denmark.
- Rather than relying on a painted strip or perceived barrier, like a bike lane, these tracks provide a physical barrier that prevents motorists from impeding bicycle traffic, while also separating bicyclists from pedestrians.
- Cycle tracks are the epitome of safety and security for cyclists.



**Figure 7** An example of a cycle track separated automobiles, tram, and pedestrians in Amsterdam, Netherlands.



**Figure 8** Innovative lighting simultaneously provides light for streets and cycle tracks.

### **Recommendation:**

Cycle tracks should be considered wherever possible for DU as they provide heightened safety and security for cyclists. Cycle tracks provide a route clear of motorists and pedestrians. Amsterdam, Netherlands, a city where bicycle commutes make up

<sup>26</sup> Denver Moves, *supra* note 15 at 20.



nearly 40% of trips, has attained its status as “the most bicycle friendly city in the world” by adding an impressive amount of cycle tracks throughout the city. It is not necessary for DU to add cycle tracks to this extent but a north-south cycle track is recommend to better serve those commuting by bicycle throughout the campus.

- S. High Street, running adjacent to DU’s campus, could again be a potential candidate for cycle track implementation as the University has expressed an interest in potentially eliminating parking along the street. Doing this might allow enough space for the addition of either a north or south bound cycle track coupled with either sharrows or a green sharrow.
- While S. High Street is an option, rather than considering street implementation, a more practical choice might be to add a north/south bound cycle track throughout the entirety of the campus. Paths and walkways are already cut throughout the campus but mixing spaces like these with pedestrians and cyclists is extremely dangerous—especially since there are currently no signs or markings delineating where cyclists are to (and are not to) ride throughout campus. A cycle track would make this clear and absolve pedestrian/cyclist conflicts. It is recommended that a north and south bound cycle track be located from Buchtel Boulevard (near campus service access road) to South Campus. The cycle track would pass the school’s athletic fields, and cross Asbury and Evans Avenue. A bicycle bridge or tunnel should also be considered when spanning the cycle track across Evans Avenue. Lastly, east and west bound cycle tracks should also be given consideration. Asbury Avenue, where it cuts through campus, is a perfect candidate for these.

## Roundabouts

**Description:** Roundabouts are circular intersections. Roundabouts reduce traffic conflicts (for example, left turns) that are frequent causes of crashes at traditional intersections. Unlike a traffic circle or a rotary, a roundabout's incoming traffic yields to the circulating traffic. According to Federal Highway Administration (FHWA), roundabouts

**Figure 9** Roundabout.

Image found at:

<http://www.cf.wmich.edu/images/ClipArt/roundabout.png>



are featured as one of nine Proven Safety Countermeasures and are the subject of the 2012 Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures.<sup>27</sup>

### **Mini-Roundabouts:**

**Description:** Mini-roundabouts are a type of roundabout characterized by a small diameter and traversable islands (central island and splitter islands). Mini-roundabouts offer most of the benefits of regular roundabouts with the added benefit of a smaller footprint. They are best suited to environments where speeds are already low and environmental constraints would preclude the use of a larger roundabout with a raised central island. Mini-roundabouts are common in the United Kingdom (U.K.) and France and are emerging in the United States (including states such as Maryland and Michigan), Germany, and other countries.<sup>28</sup>

- **Benefits:** Compact size, operational efficiency, traffic safety, traffic calming, access management, aesthetics, and environmental benefits.

### **Findings:**

- **Denver Moves Designation/Implementation:**
  - Roundabouts are not detailed in the Denver Moves plan.
- Roundabouts absolve four-way intersection confusion, do not rely on stop signs or stop lights, are pedestrian and bicycle friendly, and maintain steady traffic flows.
- Roundabouts have been known to help define the character of an area, improve safety, and maintain traffic efficiency.

### **Recommendation:**

Mini-roundabouts would be exceptional additions to DU's campus as they improve safety and efficiency between motorists, cyclists, and pedestrians. Roundabouts would also help the University stand out and better define its character as pedestrian and bicycle friendly university. It is recommended that mini-roundabouts be installed at any applicable intersection, particularly S. High Street's intersection with Asbury Avenue. In addition to this, a roundabout in-between S. High Street and University Boulevard should also be considered to help make the most

---

<sup>27</sup> Found at <http://safety.fhwa.dot.gov/intersection/roundabouts/>

<sup>28</sup> Found at <http://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa10007/> for more info at FHWA Safety

dangerous street to cross on campus (Asbury Avenue) safer. However, it would be most ideal to convert Asbury Avenue into a bicycle-pedestrian thoroughfare free of automobiles. The street could then be used for special events and permit automobile access when necessary.

### **Party Parking**

**Definition:** Party parking lanes are marked parking lanes which have a very low weekday utilization rate and/or few street facing residences. The parking lanes provide overflow parking for adjacent perpendicular residential streets or adjacent land uses such as churches, schools, or recreation facilities which have limited, but intense on-street parking needs. During periods of low parking use or restricted parking use the parking lane can operate as a de-facto bicycle lane or shoulder for bicycle use.<sup>29</sup>



**Figure 10** S. Franklin Street party parking lane.

**Image found at:**

[http://www.denvergov.org/Portals/708/documents/FINAL\\_Denver\\_Moves.pdf](http://www.denvergov.org/Portals/708/documents/FINAL_Denver_Moves.pdf)

### **Findings:**

- **Denver Moves Designation/Implementation:**
  - **S. Franklin Street – Currently in place**

### **Recommendation:**

Party parking is an effective tool for improving bicycle safety along streets that provide parking and are too narrow for bicycle lanes. It is recommended that the Franklin Street party parking lane be extended past Buchtel Boulevard as it currently ends upon intersection with this street. S. High Street and similar streets surround the university should also consider the addition of party parking lanes.

<sup>29</sup> Denver Moves, *supra* note 15 at 26.

### **Parking Practices/Policies:**

**Description:** Back-in/Head-out Angle Parking has quickly become the new parking standard used when improving a street’s bicycle friendliness. Backing into the space and angling parking provides space for cyclists to safely commute as the direction of parking allows motorists to see and be aware of flowing traffic. Doors are also removed from traffic because of angling which reduces the likelihood of being “doored”—an event that occurs when a motorist suddenly opens their door without first looking to see if a cyclist is passing by. Additionally, Europe, where open space and parking spaces are often viewed as limited commodities, has become a leader in developing progressive parking practices and policies.

- **Revers Car Parking:** A European parking practice of particular regard to DU and its surrounding area is the idea of swapping the direction we park our automobiles. Consider for a moment parallel parking and how a simple alteration can substantially benefit both cyclist and motorist. Instead of parking with the flow of traffic—where the passenger door is lined up with the curb, the idea is to instead flip the car so that the car is directed against the traffic with the driver’s side of the door parallel to the road’s curb. The idea may sound a bit silly at face but its payoff is significant as the driver’s side of the door is removed from the street and thus no longer impedes bicycle traffic. Furthermore, both passenger and driver are now able to see bicycle, pedestrian, and automobile traffic moving towards them rather than having to rely on an awkward look backwards or look into “blind spot” ridden rearview mirrors. Most of all, should an exiting passenger fail to see a passing cyclists and open his/her door, the bicyclists is afforded more time to react and, if necessary, is able to apply pressure to close the door



**Figure 11** Cyclists in Amsterdam, Netherlands ride worry free and door free as they breeze by parked automobiles.

rather than having to hope for the best when crashing into a gaping—immovable—steel door.

**Recommendation:**

It is recommended that DU work with the City and County of Denver to see if it can be the first to implement progressive parking practices for streets surrounding DU’s campus. S. High Street and similar University streets should be considered candidates for progressive parking measures.

**Short/Long Term Bicycle Parking**

**As defined by the Association of Pedestrian and Bicycle Professionals (APBP):**

**Short-term Parking:** Consists of bicycle racks located on the sidewalk or street in front of a building or destination. The site planning focus is on convenience, utility, and the attempt to improve security for the rack and the parked bicycle.<sup>30</sup>

**Long-term Parking:** Uses a wider variety of fixture types and site plan layouts. It includes racks in cages and bicycle rooms, as well as lockers located in a variety of different settings, indoors and outdoors. Because long-term parking areas are frequently located in low pedestrian traffic areas or out-of-the-way locations, site design focus is on ensuring the safety of users while maintaining exclusive access to these areas.<sup>31</sup>

**Findings:**

- The League of American Bicyclists advises BFU applicants to meet the security and convenience guidelines recommended by the Association of Pedestrian and Bicycle Professionals (APBP).<sup>32</sup>
- Students, staff, and faculty have all requested more short-term, long-term, and covered parking around DU.

---

<sup>30</sup> *Bicycle Parking Guidelines, 2nd Edition* (2010) <http://www.apbp.org/?page=Publications>.

<sup>31</sup> *Id.*

<sup>32</sup> *Found at* <http://www.apbp.org/?page=Publications>

- Alternate and innovative bike racks, such as Josta 2-tier bicycle racks, that save space and reduce conflicts between cyclists have also been requested in addition to the want/need for more bicycle parking.
- In 2009 Portland University began a process that added stackable bicycle parking to its campus. A pilot program provided four different versions of stackable parking and allowed users to provide/give feedback on which rack they preferred most.<sup>33</sup>

**Figure 12** Josta 2-tier bike rack.  
 Image found at: <http://cycle-works.com/?products=josta-2-tier-with-new-assisted-lifting>



- Very little signage and mapping is provided on campus bicycle parking and B-Cycle stations.
  - Currently, the Ritchie Center Facility Map<sup>34</sup> is the only DU (online) map that showcases bicycle parking. Additional parking maps<sup>35</sup> provide excellent details on campus buildings and parking lots but withhold information on where to find bicycle parking and B-Cycle stations.
  - University of Colorado Denver provides an excellent example of what a map with designated bicycle parking should look like. Furthermore, it even includes a map for scooter parking. Said maps can be found and accessed at <http://www.ucdenver.edu/about/departments/FacilitiesManagement/ParkingMaps/Pages/BikesScooters.aspx>

**Recommendation:**

It is recommended that the University of Denver conduct a bicycle parking study to determine if and where additional bicycle parking is needed and what types of bicycle racks should be implemented. Pursuant to this study, knowledge of where to access bicycle parking should also be determined as it has been noted that many users do not realize bicycle parking, in addition to

<sup>33</sup> See <http://bikeportland.org/2009/03/31/double-decker-bike-parking-coming-to-psu-16588> for further information.

<sup>34</sup> See <http://recreation.du.edu/help/?sec=co&main=15&main2=137&main3=0/>

<sup>35</sup> Found at <http://www.du.edu/utilities/maps/index.html>

being located outside of University buildings, is also located in campus parking garages. To remedy this, signage reading “Bicycle Parking Available in Parking Garage” or something along the lines should be considered. In addition to this, painted markings (i.e. green sharrows/colored bike lanes) leading away from streets to parking garages could also help guide cyclists to available parking garage bicycle parking.<sup>36</sup> Painted markings would also help cyclists position themselves when entering/exiting a parking garage as doing so is at times difficult and confusing to do—especially when squeezing between motorists and parking gates. If at all possible/feasible, a separate entrance should be created for cyclists entering/exiting parking garages. Lastly, the addition of curb cuts is greatly needed to better access bicycle parking, parking entrances, B-Cycle stations, and (at times) paths. Specifically, a curb cut is needed on the backside of the Sturm College of Law building as bicycle parking is nearly inaccessible when riding along S. York Street. One can only (safely) access the bicycle parking by dismounting from the bike and walking along S. York Street’s sidewalk—which is often congested with loiters, smokers, and children.<sup>37</sup>

**Bicycle Transit Centers, Bicycle Repair Stations, and Bicycle Vending Machines:**

**Bicycle Transit Center Description:** Bicycle transit centers offer secure and weather-protected bicycle parking and are typically found near major rail or bus hubs. All bike transit centers are unique but many offer secure indoor/outdoor bike parking and useful bike services/amenities. Such amenities and services include restrooms, showers and/or changing rooms, day-use lockers, bicycle self-repair stations, bike rentals and repairs, retail sales and bicycle accessories, electric vehicle charging stations, access to environmentally-clean vehicle sharing (i.e. eGo car sharing), easy access to public transportation, information to plan commute trips, classrooms and bicycle maintenance classes.

---

<sup>36</sup> Similar to this, painted yellow dots (found outside of DU’s Transportation Center and in the Evans Parking garage) help guide faculty, staff, students, and visitors to DU’s Parking and Transportation office.

<sup>37</sup> S. York Street and its intersection with Asbury Avenue has been highlighted as a conflict area by the Buchtel Boulevard Coalition who wish to see this intersection’s traffic flow improved, specifically when parents drop off/pickup their children at the Ricks Center for Gifted Children and when DU students commute to and from morning/afternoon classes.

**Findings:**

- Bicycle transit centers are widely used throughout the Netherlands.
- All top ranked Bicycle Friendly Universities provide their campuses with bicycle transit centers.
  - University bicycle transit centers play a significant role for campuses and surrounding communities as, in addition to parking, services, and amenities, these provide an ideal environment and space for learning about bicycles (i.e. maintenance, laws/rules, routes, safety, etc.) and celebrating/advocating for sustainable transportation alternatives.



**Figure 13** UO Bike Program Coordinator, Ted Sweeney, stands inside the school's Outdoor Program Barn aka "Bike Barn."

**Image found at:**

<http://blogs.dailyemerald.com/photo/2011/01/05/ted-sweeney-uo-bike-program/>

**Recommendation:**

It is recommended that DU add a bicycle transit center to its campus so that cyclists can have access to a facility that provides secured parking and additional services/amenities associated with transit centers. Such a provision will also significantly heighten DU's probability of achieving BFU recognition and demonstrate DU's commitment to this endeavor. In recommendation of a bicycle transit center, this facility should not be limited to services and amenities for cyclists only. The addition of the facility should be relevant to all types of commuters. DU's Transportation Center (located at Evans parking garage) does an excellent job at providing information on sustainable transportation alternatives. It is further recommended that the addition of a bicycle transit center also include and house the current DU Transportation Center. Recommended locations for such a facility include Penrose Library, DU RTD Light Rail Station (existing unused retail space is currently available for lease), and renovation of a parking garage.



**Bicycle Repair Stand Description:**

A bicycle repair stand is a self-service rack that allows anyone to make repairs (like a flat tire) to their bike without incurring the hassle of balancing their bike when no one is around to help. Two bars up top are positioned to let one hang one’s bike by its seat. One slides the seat-post between the two bars and the bike is then suspended.

**Findings:**

- Basic bicycle tools are often tethered to the repair station for use.
- Bicycle repair stand have also been known to include air pumps.
- Bicycle repair stands are relatively cheap and easy/quick to install.
- Bicycle repair stand can be housed outdoors or indoors—including parking garages.
- Most Bicycle Friendly Universities provide bicycle repair stands.



**Figure 14** Bicycle repair stand.

Image found at: <http://crispgreen.com/2011/08/bike-repair-vending-machines-keep-cyclists-on-the-move/0bikefixt03/>



**Figure 15** December 2012 the university of Nebraska at Omaha added a bicycle fix-it station to a campus parking garage.

Image found at: <http://bikeomaha.blogspot.com/>



**Figure 16** Bicycle Fixation--bike fix station with vending machine & compressed air.

Image found at: <http://bikefixtation.com/products/self-service-kiosk>.

**Bicycle Vending Machine**

**Description:**<sup>38</sup>

A bicycle vending machine is an upgrade to a bicycle repair stand as bicycle vending machines provide not only a repair stand (complete with tools and compressed air) but also a vending machine that sells snacks and basic bike parts (i.e.

<sup>38</sup> See <http://bikefixtation.com/> also <http://www.treehugger.com/bikes/vending-machine-for-bike-parts-introduced-by-trek.html> for further information on bicycle repair stations.

chain lube, inner tubes, patch kits, tire boots, hand warmers, tools, bike brakes and other carded goods).

**Findings:**

- Bicycle vending machines or “Fixtations” are non-existent in Colorado but are employed by cities such as Chicago, New York, and the most bicycle friendly city in the country, Minneapolis.
  - It is unclear whether there is an institution in Colorado that provides such vending or if an outside vendor from a different state (such as Minneapolis, Minnesota) can be contacted to maintain and provide a bicycle vending machine. However, this should not be seen as a deterrence as DU is presented the opportunity to be the first in Colorado to employ the use of a bicycle vending machine. This could even be a student or campus project initiated and maintained by DU rather than an outside vendor.

**Recommendation for a bicycle repair station and/or bicycle vending machine:**

It is recommended that DU add a public bicycle repair stand (or stands)—and/or bicycle vending machine to its campus as it currently lacks facilities and services for repairing bicycles. Tools and air pump should also accompany the repair station as the campus does not provide tools or air. Presently, cyclists that incur a popped tire while on campus have little resources to remedy this situation. Cyclists are instead left to rely on nearby gas stations and bicycle shops in order to repair damages and fill low tires. Bicycle repair stands and vending machines are perfect interim solution for cyclists awaiting the addition of a university bicycle transit center. Bicycle repair stands and vending machines can be placed almost anywhere around campus but it is recommended that locations near the DU Transportation Center, Driscoll Student Center, Ritchie Wellness Center, or inside any parking garage facility be considered for possible locations.

***Enforcement<sup>39</sup> and Safety***

---

<sup>39</sup> 5 Es, *supra* note 9. The enforcement category contains questions that measure the connections between the cycling and law enforcement communities. Questions address whether or not the law enforcement community has a liaison with the student/ staff cycling community, if there are efforts to prevent bicycle theft, if there are bicycle divisions of the law enforcement or public safety communities, if the campus sponsors targeted enforcement

**Bicycle Registration:**

While the University of Denver lacks significant bicycle infrastructure, it does promote security measures that many bicycle friendly universities, like Stanford and CSU, also provide. According to DU’s Campus Safety webpage (under the Bicycle Regulations link),<sup>40</sup> policies ranging from proper bicycle locks (U-Lock) to bicycle parking practices, abandonment issues and registration matters are provided for those that visit. For the most part, these policies are much in line with Stanford and CSU bicycle policies. However, counter to this, DU bicycle policies are still in the developmental stage. For instance, DU suggests that those who bring a bicycle to campus to register their bike with Campus Safety, while schools like Stanford and CSU require all bicycle users (students, faculty, and staff—exceptions are made for visitors) to register their bicycles on campus.<sup>41</sup> Not only is this a requirement but marginal (one-time) fees

---

campaigns to encourage cyclists and motorists to share the road safely, and the existence of bicycling related laws such as those requiring helmet or the use of side paths.

<sup>40</sup> See <http://www.du.edu/campusafety/crimeprevention/bicycle.html>

<sup>41</sup> When registering a bicycle at DU, a registration sticker is provided for the bicycle which is typical college/university bicycle registration practice but at Stanford and CSU, the option of having your bicycle engraved with a serial number is also provided as stickers can become weathered overtime or be scratched off if a bicycle is stolen. Both universities require bicycles to be re-registered if the sticker is no longer readable (this sometimes includes an additional registration fee).



**Figure 17** Image found at: <http://www.nwevolution.com/wp-content/uploads/2012/01/qr.png>. While it is noted that registration stickers can be somewhat impractical, an advancement that builds on this practice has begun to take shape. Quick Response (QR) codes are now being used in place of registration stickers. There are many (free) online services that allow users to register their bike online using the frame number, and add photos to the profile page to help visually identify their bike. Registered bikes are allocated a unique QR code which can be printed as a sticker and affixed to the frame. The code can be read by many mobile devices. Registered bicycles can be reported as stolen or lost, or recorded as sold to a new owner, through the site. Examples can be found at <http://2d->

ranging from \$3.50-\$10.00 are required for registration. Bicycle registration fees are generally absorbed either by the university, campus safety, or directed to a fund that is exclusively setup of for bicycle improvements.

- While there is an economic benefit to be had from a bicycle registration requirement, there may also be a psychological benefit to this as “free” bicycle parking, campus enforcement/security, and infrastructure improvements will no longer be viewed as commodities. Instead the purchaser of a bicycle registration will now expect that he/she is paying for reputable/dependable services and superior amenities—much like a motorist at DU expects when paying over \$500 for a parking permit, a level of quality is expected to be met. If DU chooses to enact a registration fee for its cyclists it will need to meet this quality standard.

### **Enforcement and Citations:**

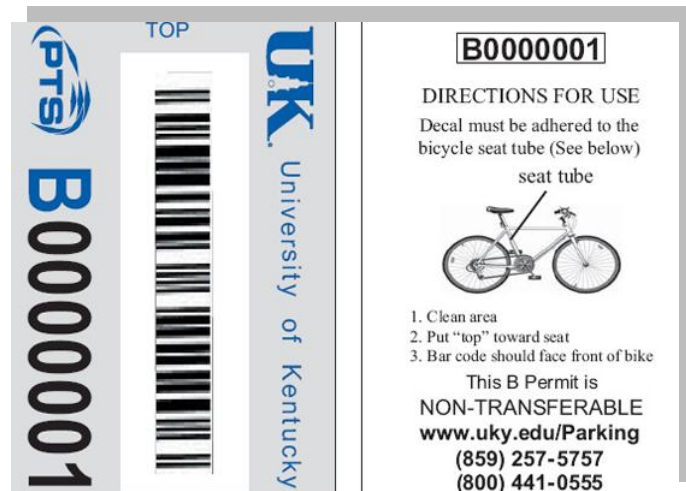
Aside from the profit benefit aspect of campus bicycle registration, this is an extremely useful tool for Campus Security as it improves the odds of recovering a lost or stolen bicycle. This is so imperative that Amsterdam (a city rampant with bicycle theft) has begun a city-wide initiative to encourage its population to register bikes and even the City of Denver has adopted this initiative. So far the numbers of registered bicycles are poor but an enactment by DU could improve this by setting up a partnership with the Denver Police Department (DPD) so that every person who registers his/her bicycle with the University can also be given the option of having his/her information sent to the DPD. In addition to improving the odds of bicycle recovery, registration can also help with enforcement (yet another area DU currently lacks in) as issuing citations to improperly parked/secured bicycles is nearly impossible to do, forcing campus safety to (at times) unnecessarily impound or boot a bicycle rather than issuing a simple citation. On the note of citations, there is zero information on DU’s website as to what specifically a bicycle citation

---

[code.co.uk/qr-code-bicycle/](http://code.co.uk/qr-code-bicycle/) and [http://www.springwise.com/life\\_hacks/mybikenumber/](http://www.springwise.com/life_hacks/mybikenumber/). Aside from security benefits, DU could enact this use for its own benefit. Accurate bicycle counts could be made by simply scanning QR codes, paper-less citations/warnings could be issued by scanning the code and sending an email, and, if a cyclist is willing to register his/her address along with his/her bicycle, a log of bicycling habits can be tracked to show where/how far riders are riding and where they are choosing to park.

might entail. Withholding this information provides little deterrence for bicycle riders to follow campus policies/rules. A great example of providing this information can be found at CSU's Bicycle Regulations website, <http://www.colostate.edu/Dept/CSUPD/beep.html>, where it spends ten pages explaining what campus bicycle regulations are and what infractions will be imposed when rules are not followed.<sup>42</sup>

In addition to providing more and clearly stated bicycle regulations, bicycle enforcement must be improved upon at DU. When pedestrians and bicyclists share pathways, the risk of serious accident exponentially increases—which is partly why the City of Denver outlaws sidewalk bicycle riding (unless specified in designated areas). Concerns over existing and potential conflicts between bicyclists and pedestrians have already been expressed by several campus groups, including Campus Safety, Student Life, Disability Services and Risk Management. As DU progresses in its bicycle development and campus ridership increases, this issue will need to be addressed. By designating shared or restricted-use paths and increasing enforcement, campus bicycle riders will be more likely to adopt safe riding habits as officials will be on hand to issue citations and explain what infraction has occurred (i.e. failure to stop at stop sign, signal a turn, signal a pass, break speed limit, ride on wrong side of road/path, ride recklessly, yield to a pedestrian, cut off a pedestrian, etc.). Improved enforcement not only ensures safe cycling habits for the campus but also encourages safe cycling throughout the city as Denver, like DU, currently lacks sufficient bicycle enforcement—which has begun to give way to a tolerance for unlawful riding habits and fostered an irresponsible bicycling culture (and motorists are taking notice).<sup>43</sup>



**Figure 18** University of Kentucky bicycle registration sticker with bar code. Stickers are to be affixed to a bicycle seat's bar or anywhere from pedals to seat. The new registration policy was enacted in 2009.

**Image found at:** <http://kykernel.com/2009/04/07/uk-plans-bicycle-permit-parking/> also see <http://www.uky.edu/pts/alternative-transportation-bicycle-information> for further bicycle registration information.

<sup>42</sup> Information provided by the website includes bicycle definitions, bicycle laws, speed limits, regulations for riding at night, safety violations (and fees for violations), payment options and an appeals process.

<sup>43</sup> At CSU the Police Department operates the Bicycle Education and Enforcement Program (BEEP). This program tracks all stolen bicycles, bicycle registrations, bicycle impounds and employs staff dedicated to educating the public

### ***Education***<sup>44</sup>

Promoting bicycle education is intrinsically tied to access to safe infrastructure (riders must know how to properly use/ride the facilities that are provided), security (riders need to be aware of bicycle laws/policies) and general rider safety (riders need to be aware of safe riding habits). Transportation Solutions has attempted to educate DU students on safe bicycling habits by providing information to incoming students and offering bicycle safety cards<sup>45</sup> at DU's Transportation Center, yet there is more that can be done—especially in this era of technology and social networking.

### **Teaching Bicycle Education:**

Stanford and CSU both provide bicycle safety information on their websites, including not only bicycle regulations and laws but also links to other websites (like city bicycle webpages) and to maps that detail nearby bicycle routes. Each university also offers a Bicycle Safety Seminar for students, faculty, and staff to attend and learn, hands on, proper cycling etiquette. These seminars are mainly intended for ticketed offenders who are given the opportunity to reduce their infraction by attending the seminar, but are also available for those interested in learning more about bicycle safety. This could be a great endeavor for DU to adopt but problems with coordinating specific meeting times, class sizes, and locations for meetings may take some effort. A solution to this could possibly be offering such an event during orientation week for first year or transfer students. Other Denver bike organizations such as BikeDenver or the Denver Cruisers

---

and enforcing the law by warnings and tickets. The CSU bike tickets range from \$15 to \$75 with the average ticket costing \$25.00. These tickets do not affect permanent records or driving points and the fines are significantly lower than city tickets. The PD employs student BEEP officers whose sole purpose is to enforce the laws as well as sworn officers who uphold the bicycle laws on campus.

<sup>44</sup> 5 Es, *supra* note 9. The questions in this category are designed to determine the amount of education there is available for both cyclists and motorists. Education includes teaching cyclists how to ride safely in any area from multi-use paths to congested city streets as well as teaching motorists how to share the road safely with cyclists. Some things that reviewers look at are the availability of cycling education, the number of League Cycling Instructors that are part of the college/ university and in the community, related course and physical education offerings, and other ways that safety information is distributed to both cyclists and motorists on campus including bike maps, new student packets, and the school newspaper.

<sup>45</sup> Bicycle safety cards are a great start but most campuses, in addition to providing materials on bicycle safety, handout campus brochures that detail bicycle information relative to the school (i.e. bike routes, destinations, bike parking, etc.)

are potential resources for conducting fun, engaging and informative safety classes. Offering additional courses or seminars during the year could also help reach returning students, those who purchase bikes during the year, or others who miss offerings during orientation. Additional offerings could be made in conjunction or in partnership with other events or groups on campus, such as Bike to Work Day events, the HR Benefits Fair, campus wellness events, or through departmental brown bags or “lunch and learns”.

### **Technological Advancements for Teaching Bicycle Safety:**

In this day of social networking and YouTube, there is no reason why informative bicycle safety videos cannot be filmed and posted online. Transportation Solutions, or even DU’s communication department could take the initiative to develop a series of webisodes<sup>46</sup> that demonstrate and reinforce bicycle laws, polices, and etiquette. These videos could then be linked to DU’s Transportation Center and Campus Safety websites or any viable social media network such as Facebook, Twitter, YouTube channel, etc. Providing online access to this information would absolve the previously mentioned issues with coordination and outreach.<sup>47</sup>

### **Sustainable Bicycle Program (DU & Abroad):**

Another opportunity for DU would be the inclusion of sustainable transportation topics in the campus curriculum (where appropriate). For example, DU currently offers a GEOG 3440 Urban Transportation Planning (4 qtr. hrs.)<sup>48</sup> course but there is opportunity to supplement this with a more narrowed class like “Bicycle Planning” or, as the University of Oregon provides,

**Figure 19** Amsterdam, NL

**Image found at:**

[http://studyabroad.uoregon.edu/index.php?option=com\\_content&view=article&id=1226&Itemid=79&catid=293&itemid=79](http://studyabroad.uoregon.edu/index.php?option=com_content&view=article&id=1226&Itemid=79&catid=293&itemid=79)



<sup>46</sup> See “NHTSA Bicycle Safety Tips For Adults” at [http://www.youtube.com/watch?v=jdrxIpOpt4&feature=player\\_embedded](http://www.youtube.com/watch?v=jdrxIpOpt4&feature=player_embedded) for an informative bicycle safety video.

<sup>47</sup> The Transportation Center (run by Transportation Solutions) currently provides an ample amount of bicycle information on its blog, [www.dutransportationcenter.com](http://www.dutransportationcenter.com). It has received little online traffic but the information is worthy of being improved upon and adopted by DU Campus Safety or Parking websites.

<sup>48</sup> See <http://www.du.edu/urbanstudies/courses.html> for DU Urban Planning Program

“Sustainable Bicycle Transportation.”<sup>49</sup> The UO class is a three week summer abroad class that takes place in Copenhagen, Denmark, Utrecht and Amsterdam, Netherlands. More information can be found online but a general description of the program is as followed,

“The program is a short, intensive seminar in the Netherlands. Participants will study bicycle planning, design, policy and culture as a sustainable and economically viable form of transportation. The program will focus on the practices and policies that foster safe, convenient and accessible bicycle infrastructure and the underlying culture that supports a high rate of bicycle use. Amsterdam and the Netherlands became great places to bike, and this course will explore how and why this transformation happened and will challenge students to think about how to make similar change within the United States context.”

It is recommended that DU consider inclusion of similar classes or study abroad programs in its curriculum.

### **Bicycle Education Programs:**

CSU is in the process of developing a program that addresses cyclist education called RamCycle. The program is based off an active pilot program and is designed to educate freshman CSU students living in the residence halls. The goal of the program is to educate Resident Advisors on bicycle safety topics so that they will be able to teach this information to the students on their hall floor. In addition to this, CSU is also working toward creating and providing information handouts and fliers to all students, faculty, and staff who purchase vehicle parking permits and/or who register bicycles. The materials will educate drivers on the rights of cyclists and promote safer interaction between the two groups.

### **Bicycle Commuter Incentive Programs:**

- **Student Incentives:** Reward DU students that choose to live on campus car free.<sup>50</sup> Students can sign a petition promising to leave their cars behind and be rewarded with a

---

<sup>49</sup> See

[http://studyabroad.uoregon.edu/index.php?option=com\\_content&view=article&id=1226&Itemid=79&catid=293&itemid=79](http://studyabroad.uoregon.edu/index.php?option=com_content&view=article&id=1226&Itemid=79&catid=293&itemid=79) for more information regarding the UO Sustainable Bicycle Transportation class.



certificate and prize (perhaps a bicycle, gift card to local area merchants, bicycle purchasing credits for DU's seasonal bicycle auction, etc.)—or be entered into a drawing for a larger prize. Further requirements such as maintaining an adequate GPA and participating in a required amount of service hours could also be imposed to make it more challenging and add a holistic benefit to the bicycle commuter incentive. The incentive program would ideally be similar to the Transportation Center's *Drive Less DU*<sup>51</sup> program (which is only applicable to full-time faculty, staff, graduate students, and law students) but have a more narrowed focus fixated on cycling for all University cyclists.

- Incentive programs reduce need for and reliance on parking.
- Incentive programs encourage students to make use of alternate forms of transport such as light rail, bus, carpool, car share, etc.—which DU happens to be enriched with.
- **Commuter Incentive Program:** Building on Transportation Solutions' successful *Ride, Walk, Roll, Win* program a similar program can be built out and added to the campus if it chooses to enact QR code registration and enforcement. In addition to the listed benefits of QR codes, this device could also track and grant commuter points to cyclists that commute throughout campus and the City of Denver by bike and/or public transportation. A tracking system could be developed (similar to Foursquare<sup>52</sup>) allowing users to check in to bike racks around campus, B-Cycle stations, bus, and light rail. Points could also be subtracted for any citations received by campus security. In the end, this competitive yet fun program will award those with the most points. There is an array of prizes that could be awarded but one idea might involve using granted credits to pay for a bike at DU bikes auctions or, if the campus adds a bicycle transit center, used in the facility to purchase various retail items. A QR bicycle incentive program could also (possibly) give way to a new social networking tool where users not only accumulate points but also share photos,

---

<sup>50</sup> Such an incentive would be meant for undergraduate students as DU graduates, law students, faculty, staff and employees have all had the option to participate in the *Ride, Walk, Roll, Win* commuter reward program which notably excludes undergraduate students.

<sup>51</sup> See <http://www.du.edu/transcenter/DriveLessDU.html> for further information on *Drive Less DU* program.

<sup>52</sup> See <https://foursquare.com/> for further information.

routes, information/tips, etc. with others—think Facebook meets Foursquare with a transportation twist.

*Encouragement*<sup>53</sup>

**Campus Outreach:**

- **Rick’s Center for Gifted Children at the University of Denver:** In the Netherlands it is

commonly believed that the Dutch inherently know everything there is to know about bicycles—and are in fact born attached to bicycles. While this is a humorous misconception, children are actually provided a bicycle and learn to ride it at the age of four. This early development could partly explain why the Dutch are so accepting towards bicycle use and why their country has one of the lowest obesity rates in the world. The U.S. has recognized the need to encourage bicycle use for youth as children are increasingly abstaining from outdoor activities and substituting these with video games, television/movies, and social networking. In an effort to combat this, the U.S. has developed the Safe Routes to School program which is meant to help improve infrastructure and encourage children to commute to school by walking or bicycling. While this beneficial program is available, the University of Denver has the unique opportunity to further this effort by working with children (ages 3-13) from the Ricks Center for Gifted Children at the University of Denver.

**Figure 20** UO students ride around a children's traffic garden while studying abroad in the Netherlands.



<sup>53</sup> 5 Es, *supra* note 9. This category concentrates on how the college/ university promotes and encourages bicycling. This can be done through organized campus rides as well as producing campus bike maps, signature cycling events, bicycle commuting incentive programs, and a bike share system. In addition, some questions focus on other things that have been built to promote cycling or a cycling culture such as a campus bike center, a BMX track and the existence of both road and mountain bicycling clubs.

In connection with DU’s Morgridge College of Education, Ricks Center for Gifted Children educates 250 students (preschool and K-8) with the mission to “provide a dynamic and challenging educational environment that anticipates and responds to the individual, intellectual, social, emotional, physical, aesthetic and cognitive needs of gifted children.” In compliance with this, Ricks Center for Gifted Children offers a vast array of unique programs, one of particular interest is its “Field Experience” where students participate in an environmental project that tests water quality of a nearby river and sends collected samples to the Colorado Division of Wildlife (CDOW) to help ensure the water is in compliance with the Clean Water Act. As this school facilitates environmental awareness, it might be worth adding to this by implementing a program which promotes sustainable transportation so that children can be exposed to alternate forms of transportation and be better equipped to make sustainable commuting choices as

**Figure 21** Children learn hand signals at a BikeDenver summer Kidical Mass.

**Image found at:**

<http://www.bikedenver.org/news/2011kidicalmass/>



they grow. Students/children in the Netherlands often attend schools that require students to be educated on proper bicycle etiquette in which students learn, in addition to safe riding habits, about the rules and laws of the road. Students are also tested on these and put through an obstacle course that tests what students have learned in the classroom. Upon completion of the course, students that pass are awarded a certificate of achievement.

Implementing such a program will require much thought and consideration by the University of Denver but may have a significant influence on the lives of the students at Ricks Center for Gifted Children and on the environment as students will learn how their commuting decisions influence the world we share and live in. Providing a program of this magnitude will require significant lesson planning in which a target age group will need to be identified and length and time of program will need to be determined. This could be a program which is set up to last a day, week, month, semester or even year

depending on how much time the school wishes to devote to this educational endeavor. A short term solution to this could be offering/developing such a program that is a fun recreational activity to attend over the weekend, summer, or during a DU event. BikeDenver is a prime example of this as they offered kid friendly bicycle education events called “Kidical Mass” throughout the summer of 2011. Transportation Solutions and DU could possibly connect and collaborate with BikeDenver to facilitate an additional event or even work together to develop a program for the school. More information on BikeDenver’s Kidical Mass can be found at <http://www.bikedenver.org/news/kidicalmass2011-1/#more-5916>.

- **Staple Cycling Events:**

While DU participates in “Walk to School Day” and “Bike to Work/School Day” events, it will need to facilitate additional cycling events that encourage and promote cycling around campus. Promotion and campus commitment for these events are also in need of reinforcement as they are mainly supported/put on by Transportation Solutions and BikeDenver. CSU is a prime example of effective bicycle event hosting as it holds six different events throughout the year. Events include a six day bicycle race, a “Community Ride” fundraiser, “Bike for Breakfast,” the annual Sensible Modes of Alternative Road Transportation (SMART) Fair, the MS150 Colorado ride (a ride with over 3,000 riders who camp overnight on campus grounds or in residence halls), and the CSU RAM cycling team hosts a Rocky Mountain Collegiate cycling race.

### *Evaluation and Planning*<sup>54</sup>

#### **Bicycle Coordinator:**

The most significant and imperative recommendation for improving DU’s bicycle friendliness, culture, access, safety and 5 Es is to create a bicycle coordinator position and develop a bicycle

---

<sup>54</sup> 5 Es, *supra* note 9. Here the college or university is judged on the systems that they have in place to evaluate current programs and plans for the future. Questions are focused on measuring the amount of cycling taking place on campus, the crash and fatality rates, and ways that the college or university works to improve these numbers. Institutions are asked about whether or not they have a bike plan, how much of it has been implemented and what the next steps for improvement are.

advisory committee. Stanford, UO, and CSU all employ the use of bicycle coordinators and maintain bicycle advisory committees. When filling out a BFU application, one of the first questions is whether or not the school makes use of a bicycle coordinator and committee. The League of American Bicyclists further stipulates its reasoning for this by stating,

These basic resources can be vital to a town's ability to respond to bicyclist's needs.... A bicycle advisory committee is a good structure for getting [sic] new policies written and formally proposed. Having someone on staff designated as bicycle coordinator can be crucial in achieving these measures. (Remember, it is a cardinal rule in every bureaucracy that any task not specified as someone's job is a task that will never get done.)

Given the variety of recommendations outlined within this analysis, there will be a clear need for a coordinator or committee to oversee and make sure bicycle improvements are being made throughout campus.

#### **IV. Concluding Recommendation**

It has been the intention of this analysis to provide recommendations that will better serve DU's bicycle planning efforts and layout processes necessary for meeting the proposed recommendations. By encouraging students, faculty and staff to commute by bicycle, DU will in turn contribute to mitigating efforts that reduce traffic congestion, and noise and air pollution, which will also increase transportation safety and well-being for all. The University of Denver currently lacks sufficient bicycle infrastructure and campus bicycle advocacy but has noted that it is ready to make improvements. By adhering to the proposed recommendations and satisfying the 5 E's (Engineering, Education, Encouragement, Enforcement, and Evaluation & Planning) the University of Denver is sure to top the League of American Bicyclists' Bicycle Friendly University Award list. Transportation Solutions looks forward to this endeavor and hopes to someday see the University of Denver ranked as the most bicycle friendly university in the nation.