

# Countermeasures for high-collision locations

The Boulder Safe Streets Report of 2012 identified the 15 intersections with the highest number of bicycle and pedestrian collisions over the study period. A summary of collisions at each of these locations and possible mitigation countermeasures is discussed below.

1. **Colorado and Regent** (11 collisions, 2.9 collisions/year): This intersection has a high westbound left-turn and northbound right-turn movement into and out of the University of Colorado campus. Both of these movements turn across a multi-use path on the south side of the intersection. Collision trends included bikes in the south crosswalk being hit by westbound vehicles making a permissive left turn; bikes being hit by northbound right-turn vehicles on the raised crossing right-turn bypass island; and eastbound right turns hooking in front of eastbound bicycles in the bike lane.

**Mitigation:**

**Enforcement** – Drivers yielding to persons legally in the crosswalk and future enforcement of proposed crosswalk speed limit for bikes.

**Engineering** – Possible green bike lane demonstration on the eastbound approach to the intersection and possible changes in protected left turn phase signal timing.

2. **Canyon and Folsom** (10 collisions, 2.6 collisions/year): This is the intersection of a minor arterial roadway with a state highway. There are bike lanes and high numbers of bikes on Folsom. Most of the collisions at this intersection were fairly unique and the only trend that could be identified was that several of the collisions involved either motor vehicle drivers or bicyclists making poor decisions at permissive left-turn opportunities in the intersection. There were two collisions involving northbound right turning vehicles hooking in front of northbound bicycles in the bike lane.

**Mitigation:**

**Enforcement** – Obeying traffic control. **Engineering** - Possible green bike lane demonstration for the northbound approach to the intersection.

3. **Broadway and University** (9 collisions, 2.3 collisions/year): This intersection of a minor arterial and a state highway has a high volume multi-use path (Broadway path) running along the east side and a lot of commercial development on the west side, which attracts bikes and pedestrians to the west sidewalk. One common trend for collisions in this intersection was bicyclists illegally entering the signalized crosswalk (jaywalking) and being hit by traffic legally in the intersection. Another trend was bikes being hit by northbound right turning vehicles on the raised crossing right-turn bypass island.

**Mitigation:**

**Enforcement** – Drivers yielding to persons legally in the crosswalk and future enforcement of proposed crosswalk speed limit for bikes.

**Engineering** – Sight distance may be an issue on the south-east corner of the intersection. Staff will work with the University of Colorado to trim back any sight distance obstructions.

4. **30th and Colorado** (9 collisions, 2.3 collisions/year): This is the intersection of two minor arterial roadways and is located between the University of Colorado's main campus and east campus. There is high bicycle and pedestrian student traffic back and forth between the two campuses. There are bike lanes on both 30th Street and on Colorado Avenue. There is a sidewalk/multi-use both sides of Colorado that carry

a lot of bike traffic. All collisions in this intersection were bike-related. The most common trend was bikes entering a crosswalk at the signal and being hit by either right turning vehicles or permissive left turning vehicles.

**Mitigation:**

**Enforcement** – Drivers yielding to persons legally in the crosswalk and future enforcement of proposed crosswalk speed limit for bikes.

5. **Broadway and Baseline** (9 collisions, 2.3 collisions/year): This is the intersection of two state highways with a collector roadway on the west side. There is a high volume multi-use path (Broadway path) which runs along the west side of the intersection and there are bike lanes on Baseline. There is also a multi-use path along both the north and south side of Baseline, east of Broadway. Collision trends include persons being hit by westbound right turning traffic in the raised crossing right-turn bypass island; and persons being hit while crossing the south side of the intersection by permissive westbound left turning traffic. The most common trend was bikes entering the intersection or crosswalks illegally and being hit by vehicles legally in the intersection.

**Mitigation:**

**Enforcement** – Obeying traffic control, enforcement of drivers yielding to persons legally in the crosswalk and future enforcement of proposed crosswalk speed limit for bikes.

6. **Flashing crosswalk on Baseline east of Broadway** (BEFORE: 9 collisions, 3.5 collisions/year) (AFTER: 0 collisions, 0.0 collisions per year): This mid-block crossing of a state highway was controlled by a flashing yellow sign crossing treatment. Pedestrians and bikes were hit in the crosswalk by vehicles failing to yield to them. In some cases, bikes would enter the crosswalk too quickly and fail to establish right-of-way. In a number of cases, the person crossing would not activate the flashing sign warning system. The flashing yellow sign crossing treatment was removed in the summer of 2010 and replaced with a mid-block traffic signal. There have been no collisions at this location since that time. In November 2011, the City of Boulder updated its Pedestrian Crossing Treatment Installation Guidelines (PCTIG), which outline when crossing treatments should be installed and what type of crossing treatment should be installed. Based on a study and findings of several flashing crosswalk locations, the criteria used to determine where flashing crosswalks should be installed and when a traffic signal should be installed instead, were modified. Conditions that include a location with more than two lanes in each direction, high speed, high motor vehicle volume, high crossing volume will necessitate the construction of a traffic signal rather than a flashing crosswalk treatment. The city is currently scheduled to construct an underpass at this location. No further mitigation needed.

7. **Broadway and Regent** (8 collisions, 2.1 collisions/year): This is the intersection of a state highway and a collector roadway entering the University of Colorado. There is a high volume multi-use path (Broadway Path) which runs along the east side of the intersection. Most collisions occurred in this crosswalk. The most common collision trend was westbound right turning vehicles, turning illegally against the existing red arrow display and hitting southbound bikes in the crosswalk. Another general trend was bikes either

entering the crosswalk illegally (against the light) or entering too fast to establish right-of-way and being hit by vehicles legally in the intersection.

**Mitigation:**

**Enforcement** – Drivers yielding to persons legally in the crosswalk and future enforcement of proposed crosswalk speed limit for bikes.

- 8. 28th and Arapahoe** (8 collisions, 2.1 collisions/year): This is the intersection of two state highways, with a lot of commercial land uses on all sides. There is a high volume multi-use path which runs along the north side of Arapahoe east of 28th Street (terminating at the intersection); a multi-use path which runs along the east side of 28th Street which connects the 28th Street frontage Road and the Twenty Ninth Street mall; and a multi-use path on the west side of 28th Street, south of Arapahoe (terminating at the intersection). The most common collision trend at this intersection was right turning motor vehicles hitting bikes in the crosswalk. However, there was no clear trend concerning which crosswalk was involved. There were two collisions involving northbound right turning vehicles with one additional collision for each of the other three directions of right turning vehicles. The remaining three collisions were bikes or pedestrians illegally entering the intersection and being hit by through motor vehicles operating with a green light.

**Mitigation:**

**Enforcement** – Obey traffic control and drivers yielding to bikes in crosswalk.

- 9. Broadway and Euclid** (8 collisions, 2.1 collisions/year): This is the intersection of a state highway and a collector roadway entering the University of Colorado. There is a high volume multi-use path (Broadway Path) that runs along the east side of the intersection. Most collisions occurred in this crosswalk. The most common collision trend (50% of collisions) was westbound right turning vehicles, turning illegally against the existing red arrow display and hitting southbound bikes in the crosswalk. Another general trend was bikes either entering the crosswalk illegally (against the light) or entering too fast to establish right-of-way and being hit by vehicles legally in the intersection. In the fall of 2011, the city broke ground on a major reconstruction project that includes a bicycle/pedestrian underpass under Broadway which will significantly decrease conflicts. The project will move a major transit stop to the north of the intersection, which will reduce pedestrian crossings of the intersection.

**Mitigation:**

**Enforcement** – Obey traffic control and drivers yielding to bikes in crosswalks.

- 10. Flashing crosswalk on 28th south of Iris** (BEFORE: 7 collisions, 2.5 collisions/year) (AFTER: 0 collisions, 0.0 collisions per year): This mid-block crossing of a state highway is controlled by a flashing yellow crossing treatment. Almost all of these collisions involved eastbound bikes or pedestrians being hit by either northbound or southbound motor vehicles. In the fall of 2010, a considerable amount of vegetation that may have been a sight distance issue for drivers was removed. The signing and striping was also modified to clarify the responsibilities of both the drivers and the people crossing. There has not been an collision at this crosswalk since these measures were taken.

**Mitigation:**

**Enforcement** – Obey crosswalk laws regarding requirement to use flashing sign display and requirement for driver not to pass other motor vehicle stopped for person in crosswalk.

11. **30th and Valmont** (7 collisions, 1.8 collisions/year): This is the intersection of two arterials roadways with a combination of commercial and residential land use. There are bike lanes on both roadways with sidewalks on all sides but no multi-use paths. It is legal for bikes to ride on the sidewalk adjacent to residential land uses. All collisions involved right turning drivers hitting bicyclists in either the adjacent bike lane or the adjacent crosswalk, with the most common collision being westbound right turning vehicles hitting southbound bikes in the crosswalk.

**Mitigation:**

**Enforcement** – Drivers yielding to bikes in crosswalks and right turning drivers yielding to adjacent bikes in bike lanes. Engineering - possible green bike lane demonstration on the eastbound approach to the intersection.

12. **Folsom and Pearl** (7 collisions, 1.8 collisions/year): This is the intersection of two arterial roadways surrounded by commercial development and a neighborhood park on the north-west corner. There are bike lanes on Folsom and on the east side of Pearl Street. There were two collision trends at this intersection. The most common trend was northbound drivers making a right turn and colliding with northbound bikes in the adjacent bike lane. The other was westbound drivers making a right turn and colliding with southbound bikes illegally in the crosswalk (against the light).

**Mitigation:**

**Enforcement** – Obey traffic control device and right turning drivers yielding to bikes in adjacent bike lane.

**Engineering** – Possible green bike lane demonstration on the eastbound approach to the intersection.

13. **Baseline and 29th** (7 collisions, 1.8 collisions/year): This is the T-intersection of a local roadway with an arterial roadway. There are bicycle lanes on the arterial and a multi-use path runs along the north side of the arterial, across the T-intersection. Almost all of the collisions at this intersection involve southbound left turning vehicles hitting eastbound bikes. Almost all of those collisions involved bikes being hit in the crosswalk.

**Mitigation:**

**Enforcement** – Drivers yielding to bikes in crosswalks. Engineering – Signing which warns 29th Street traffic about multi-use path.

14. **30th and Arapahoe** (7 collisions, 1.8 collisions/year): This is the intersection of an arterial roadway and a state highway. Bike lanes on 30th Street south of Arapahoe have been in place for many years. Bike lanes on 30th Street north of Arapahoe have recently (2011) been installed. There is a multi-use path on the west side of 30th Street, north of Arapahoe and on the north side of Arapahoe both east and west of 30th Street. All of the collisions at this intersection involved turning vehicles hitting bikes in a crosswalk. However, the only trend was northbound left turning vehicles hitting westbound bikes illegally in the south crosswalk.

**Mitigation:**

**Enforcement** – Obey traffic control device

**15. 28th and Walnut** (7 collisions, 1.8 collisions/year): This is the intersection of a pair of commercial driveways with a state highway as Walnut is a private street on both sides of 28th Street. There are bike lanes on Walnut both east and west of 28th Street. There is also a multi-use path on the east side of 28th Street both north and south of Walnut. Most of the collisions involved turning motor vehicles hitting bikes (or in one case a skateboarder) in crosswalks. However, there was no trend to these collisions. No combination of movements occurred more than once and collisions were caused by both drivers failing to yield and from bikes entering the crosswalk illegally.

**Mitigation:**

**Enforcement** – Obey traffic control and driver’s yielding to bikes in crosswalks.