

Improved on-street bike lanes increase the safety of riders and potentially encourage more bike travel - reducing congestion and pollution and an increasing the health of the community. Specific objectives include the following:

- High degree of safety
- Relative ease of maintenance
- Continuity and Interconnectivity
- Coordination with land use planning

8.1 DEFINITIONS

The following terms are derived from the Manual on Uniform Traffic Control Devices (MUTCD) and American Association of State Highway and Transportation Officials (AASHTO):

TERM	DEFINITIONS
Bicycle facilities	A general term denoting improvements and provisions that accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically designed for bicycle use.
Bicycle lane	A portion of a roadway that has been designated by signs and pavement marking for preferential or exclusive use by bicyclists.
Bikeway	A generic term for any road, street, path, or way that in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes. Bicycle routes, which might be a combination of various types of bikeways, should establish a continuous routing. Bikeway route signs may have specific bicycle route numbers.
Designated bicycle route	A shared roadway designated for bicycle use only by signage.
Shared-use path	A bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.
Shared roadway	A roadway open to both bicycle and motor vehicle travel.
Bicycle route system	A system of bikeways designated to establish a continuous routing, but may be a combination of any and all types of bikeways.
Signed shared roadway (signed bike route)	A shared roadway which has been designated by signing as a preferred route for bicycle use.
Roadway	The portion of the highway, including shoulders, intended for vehicular use.

¹ Excerpted from "Pedestrian Plan and Update to the Bicycle Plan" Inventory Database. Orth Rodgers, 2005.

8.2 CRASH HISTORY

Pedestrian and bicycle crash data for Carson City for the 3 years from January 2001 through December 2003 indicate 109 total crashes occurred with 3 fatalities. Bicycle crashes accounted for 50 percent (54 crashes). The 3 fatalities were pedestrian crashes. The raw crash data and percentage breakdowns are listed in Appendix 13.3. The bicycle crash data was analyzed against time of year, time of day, weather conditions, light conditions, vehicle direction, vehicle contributing factor, and cyclist action. The following statements summarize the results of these analyses:

- ⌘ Time of year, time of day, weather conditions, and light conditions all led to the same conclusion: More crashes occurred during bicycle friendly conditions (i.e. warm weather, afternoon, daylight, etc.).
- ⌘ Over 75% of the bicycle crashes were head-on. This maintains that cyclists are present in the roadway, or drivers are not staying attentive as they progress through crosswalks. Major vehicular contributing factors are improper action on a pedalcycle (60% -- 32 crashes) and failure to yield (31% -- 17 crashes).
- ⌘ Another telling contributing factor of this study was the location of each crash in regards to the street. Over half of the crashes occurred at an intersection (31 crashes total), while 35% of these (19 crashes) occurred at unsignalized intersections.

The crash data analysis revealed the need to increase the awareness of cyclists and reduce the mixing of vehicular traffic and cyclists. Increasing bicycle lane striping and signage will raise driver awareness of cyclists. Increased crosswalks, bike lanes, and signage will help provide positive guidance to the cyclists and limit their presence on the roadways. As the cyclists are provided more designated facilities, the interactions between them and the nearby traffic will decrease.

8.3 BIKEWAY DEMAND

Factors affecting the use of bicycle facilities and a methodology for determining the bicycle travel demand are summarized in this section.

8.3.1 FACTORS AFFECTING BICYCLE FACILITY USE

As with pedestrian facilities, there are a number of influencing factors that should be taken into account in the planning and design stages of future bicycle facilities. These include, but are not limited to, the following:

- ⌘ **Trip Distance** – Bicycle trips typically begin or end approximately 2 to 3 miles from the facility or destination being considered, significantly further than the thresholds for pedestrian trips.
- ⌘ **Trip Purpose** – Some trip purposes to consider specific to bicycling are:
 - Work
 - School
 - Recreation
 - Shopping
 - Errands
- ⌘ **Land Use Density** – As with walking, areas with higher densities and mixed land uses are more likely to encourage biking. Again, this occurs because destinations in higher density areas are often located within the general thresholds for bicycling.
- ⌘ **Demographics** – A variety of demographics have an effect on the amount of bicycle travel in an area. These factors include:
 - *Vehicle Ownership* – Like walking, biking is a convenient mode of transportation, especially for households without vehicles.

- *Income* – Because bicycling is relatively inexpensive, it is a viable travel mode for low income households.
 - *Age* – As with walking, the younger members of the population (i.e., school-age children who do not yet have driving privileges) often rely on bicycles as their primary mode of travel to school and for recreation.
 - Population and Employment Densities* – As mentioned previously, biking is a popular way to travel in higher density areas, as destinations tend to be close to trip origins. Also, the roadway network in these highly occupied areas is often congested, causing significant travel delays that can be avoided by bicycling.
- ⌘ **Facility Continuity** – Facility continuity is important to bicycle travel, as bicycles are generally traveling at a faster rate and don't have as much time to make decisions on where to stop or turn. Traffic control devices like signing and pavement markings can be used to improve bicycle facility continuity, as they provide users with guidance.
 - ⌘ **Facility Safety/User Security** – Some specific design factors should be taken into account including bike lane width, grade and cross slope, vertical clearance, alignment, sight distance, traffic control devices, and security lighting.
 - ⌘ **Amenities** – Bicycle racks, bicycle lockers, showers, water fountains, etc.

8.4 BIKE LANE POLICIES

1. Consider bicycles to the same extent as other travel modes in all aspects of developing the transportation system.
2. Keep the UPMP current.
3. Ensure bicycle facilities are included in all roadway improvement and development projects within the Carson City boundaries. Consider bicyclists as users in the design and construction of all roadway projects.
4. Provide adequate, predictable, and dedicated funding to construct and maintain bicycle lane improvement projects as identified in the UPMP.
5. Recognize the importance of bicycling for commuter trips, destination trips, and recreation trips when defining and prioritizing the Bicycle Plan.
6. Coordinate the planning, design, and construction of bicycle lanes with other agencies and municipalities within Carson City boundaries, continuing into neighboring jurisdictions.
7. Integrate bicycle lanes and facilities into the future fixed route transit system. Include bicycle storage at fixed route stops or bicycle racks on the transit vehicles.
8. Public Works department will be primarily responsible for the planning, construction, and maintenance of bicycle lanes. Coordinate bicycle lanes with other pathways of the UPMP to ensure continuity of routes.
9. Use the following criteria to assign priorities to bicycle lane projects:
 - address safety or hazardous conditions
 - provide key bicycle linkages in the urban area of the Carson City first
 - provide access to community activity centers (parks, schools, etc.)
 - take advantage of bicycle lanes provided by roadway improvement projects by providing key linkages
 - complete planned bicycle lanes or trails
 - provide linkages to the transit and school bus systems
10. Design standards for bicycle lanes shall be the most current edition of the "Guide for the Development of Bicycle Facilities" (AASHTO) and the "Manual of Uniform Traffic Control Devices" (MUTCD).
11. Address persons with special needs in designing, implementing, and maintaining bicycle transportation projects. Requirements of the Americans with Disabilities Act as amended shall be addressed for both public and private projects.
12. Establish and fund a training and education program to increase the awareness of City staff about bicycle needs including design standards, construction signing, maintenance needs, and increased technical expertise.
13. On- street bike lanes should be designed and monitored to improve security and safety. Establish regular, scheduled pathway maintenance, pavement and shoulder repair, vegetation placement/removal, and police pa-

trols. Allow different levels of maintenance for each facility based on amount and type of use or exposure to risk.

14. Assure that bicycle lanes are provided, where consistent with the UPMP, in and adjacent to development projects. Encourage development projects to provide linkages to existing or proposed bicycle facilities.
15. Require new or renovating properties to provide bicycle parking. Consider other facilities to encourage the use of bicycles.
16. Coordinate the planning, development, and funding of bicycle systems with affected citizens, neighborhood associations, and business groups.
17. Establish numbered bike routes with other counties, such as US395 and US50. Work toward interstate bike routes with adjoining states
18. Carson City may periodically close trails for rehabilitation of trails, sensitive lands, and watersheds.

8.5 BIKE LANE PROJECTS

The following projects are recommended for addition to the bicycle lane system:

1. Provide signage as required by the Manual on Uniform Traffic Control Devices
2. Provide additional bicycle routes in the vicinity of two schools, Mark Twain Elementary and Empire Elementary. Evaluate the feasibility of implementing bikeways along these routes.
3. Continue to review opportunities to accommodate a shared-use trail adjacent to the freeway corridor from the Linear Park south to the Edmonds Sports Complex, working with NDOT staff during the freeway design process. This is the preferred route over the Saliman Road path alignment if feasible.
4. Provide bike lanes from the Carson City Freeway's paved multi-use path along Emerson Drive south to College Parkway and establish a path along the Freeway from Emerson Drive to Hot Springs Road and bicycle lanes along Hot Springs Road to College Parkway.
5. Study the feasibility of creating bicycle corridors (bikeways) along Mountain Street and Saliman Road.

TABLE 8-1 - PROPOSED SCHOOL-RELATED BICYCLE ROUTES

SCHOOL	FACILITY ADDED TO:	STARTING POINT	ENDING POINT
Mark Twain Elementary Area	Marian Avenue	Long Street	Rolling Hills Drive
	Lindsay Lane	Joshua Drive	Carriage Crest Drive
	Carriage Crest Drive	Camille Drive	Wind Ridge Drive
Empire Elementary Area	Gordonia Drive	Airport Road	Monte Rosa Drive
	Stanton Drive	Mone Rosa Drive	Woodside Drive
	Monte Rosa Drive	Desatoya Drive	Woodside Drive
	La Loma Drive	Desatoya Drive	Selby Street