LONG RANGE PLAN

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DECEMBER 1995
BIKEWAYS

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APPENDIX A

Master Plan Design Concepts
Design Principles are established to indicate how the master plan will achieve its goals and objectives. This is the first step in the design process where philosophy and parameters are established to which all planning elements must adhere. These may change over time and should be continuously reviewed, but should never be compromised in the plan, or implementation of any part of the plan.

**LAND USE**

- Strengthen the existing land uses of the campus to improve their identity. Enhance the established Instructional core of campus. The Instructional Core will remain the primary land use in which all other land uses interact. It is a mixed use that includes the majority of the classrooms, the Library, and the Student Center.

- Other main campus land uses include residential, research, sports, service, administrative, and open space. Research areas should be self contained, while others allow for mixed use potential. The Administrative and Service uses may be combined as can the open space and sports related uses. We will group similar land use activities in a manner that complements the land uses's surrounding environments. Particularly at the campus perimeter, we will integrate land uses with the city and the surrounding community.

- The main campus has an established site structure that is organized around six major elements. The layout of these elements build a foundation which all parts of the master plan support. They consist of two major open spaces (the Oval and the open space west of the Lory Student Center) that are linked by a series of four axial elements. The first axis is a major academic spine running along Center Avenue north to the Student Center Plaza. Complementing this are two east/west pedestrian ways along Pitkin and University streets. The final organizational element is the Oval's centerline that terminates at the Shepardson Building. This structure should never be violated.

- Interconnect different modes of transportation while properly defining and separating vehicular, bicycle, and pedestrian traffic for increased safety and circulation efficiency. Create an internal ring road, remove streets in the center of the campus, and concentrate parking at the perimeter of campus. Give users an attractive route from concentrated parking to their destinations. Expand the current bicycle system and create better routing both east/west and north/south through the campus. Improve the connectivity and interface of all modes of transportation with the City of Fort Collins and the surrounding neighborhoods.

**ARCHITECTURE**

- Complement the prevalent building styles within the existing "zones" of architecture. Build a concept around the variety of architecture, rather than introduce new building style. Utilize materials consistent with those available in the region and existing on the campus to improve building aesthetics. Building architecture can be improved without creating additional styles to the campus.

- Establish improved building massing and site densities that support appropriate land use and site design concepts. Infill, renovate, and build additions in the eastern portion of campus as opposed to "spreading" out to the west.

**LANDSCAPE**

- Use consistent landscape materials to establish unity within the campus environment. Standardize plant materials for the main campus. This will soften the effect of the eclectic building styles.

- Augment existing landscape elements and develop additional features that beautify as well as improve the function of the campus. Create spaces symbolic of scholarly excellence. Large formal multi-use spaces, smaller informal places, paths, high activity spaces and landmarks all play a role in achieving that environment. This will help build campus legacy and tradition through its environment.
COLORADO STATE UNIVERSITY
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APPENDIX B

City of Fort Collins Guidelines for Bicycle Facilities Operations and Markings
INTRODUCTION

The transportation system is a major component of how a university conducts its day-to-day business. Routine actions, such as faculty and students getting to, from, and across campus, become critical if pathways are insufficient, confusing or dangerous.

In its early years, the Colorado State University main campus was configured first to complement a small, pedestrian population, and later to accommodate the addition of motor vehicles. As the majority walked and only a relatively few drove, these two methods of getting around campus blended comfortably. Today, many still walk; however, bicycling and driving have become basic methods of transportation for thousands who visit campus daily. The result is a campus transportation system serving multiple populations it was not designed to serve. Transportation design must be modified if walkers, bicyclists and motorists are to travel around campus quickly, effectively and safely.

Colorado State has long considered the benefits of separating traffic into three tiers: a ring road for motorists, an inner level for bicyclists, and a pedestrian core - as illustrated below. Such separations should greatly increase safety for all, provide more efficient access to common destinations, and reduce pollution and congestion. Moving vehicles to the ring road will not only reduce the number of vehicles in the center of campus which will inherently increase safety, it will also reduce the intrusions many believe vehicles have on the academic environment. In addition, parking lots and roads are occupying prime locations which could better serve the University as instructional, research and support spaces. Continuing to dedicate these resources to vehicular use and parking must be reconsidered if the University is to accommodate the forecasted increase in enrollment.

Today's increasingly fragile environment is also calling for a reduction of automobile use. Steps toward a pedestrian-oriented campus with a pleasing, functional bikeways system, will number Colorado State among the progressive schools which have long since banned automobiles from the inner core of their campuses. Notre Dame, the University of Colorado at Boulder, and the University of California at Davis, to name just a few, have banned automobiles from their core areas. As societal leaders, it is appropriate that universities recognize and respond to health and environmental concerns. Sedentary life styles and air pollution can be combated by walking, cycling, and reduced automobile usage. This is possible within the limited environment of campus and may serve as a model for community development.

Finally, as walking, biking and motoring populations grow, so does the likelihood of serious accident and the level of concern for safety and reasonable access to University resources. A dedicated bikeways system separate from pedestrians and motor vehicles should be considered. Accidents caused by or contributed to by poorly designed, poorly signed, or poorly enforced bikeways systems have, in some cases,
resulted in huge settlements against the entity owning the system. It is in the University's interest to design and provide systems which encourage walking and bicycling in a manner which reduces conflicts among walkers, bicyclists and motorists.

This bikeways plan (1) encourages walking and bicycling, (2) addresses safety and security issues for pedestrians, bicyclists, and motorists, (3) complements the bikeways plan recently developed by the City of Fort Collins, and (4) addresses health and pollution concerns by promoting alternative means of transportation.
THE PLANNING PROCESS

In recognition of the impact circulation has on campus operations, a review of transportation issues was incorporated with the current revision of the physical master plan. In Fall 1994, a committee was established to help develop a long range bikeways plan.

Committee members were drawn from faculty, Associated Students of Colorado State University (ASCSU), Facilities Management, and the University Police Department. In addition, Drake & Associates, bikeways consultant to the City of Fort Collins, was also retained by the University. This not only reduced travel and research costs, but it also assured a coordinated approach to bikeways and biking standards for the community at large.

Steps in the planning process included:

- Survey of existing conditions
- Review of good/bad bikeways design
- Development/review of goals/objectives
- Coordination with master planning concepts
- Coordination with the City of Fort Collins
- Review of existing standards and guidelines regarding bikeways
- Discussion of signage, maintenance, snow removal, parking
- Review of education/enforcement policies
- Recommendation/prioritization of new routes and projects

Master planning concepts (see Appendix A) were used throughout the development of this plan. Establishment of a ring road for motor vehicles, an inner tier for bicycles, and a central core reserved for pedestrian use (as illustrated in Figure 1) is consistent with the transportation concepts to be recommended in the master plan. The circulation, transportation, and parking concepts being used in the development of the master plan are:

Interconnect different modes of transportation while properly defining and separating vehicular, bicycle, and pedestrian traffic for increased safety and circulation efficiency.

Create an internal vehicular ring road, remove streets in the center of the campus, and concentrate parking at the perimeter of campus. Give users an attractive route from concentrated parking to their destinations.

Improve the interface of all modes of transportation with the City of Fort Collins and the surrounding neighborhoods.

Expand the current bicycle system and create better routing both east/west and north/south through the campus.
INVENTORY OF EXISTING BIKEWAYS SYSTEM

As its first step, the bikeways committee surveyed all existing marked bike routes on main campus for quality and continuance. Specific review criteria included pavement material, surface condition, direction of bike traffic, continuity, signage, obstructions, cleanliness, potential hazards, conflicts with pedestrians or motor vehicles, grade concerns, radius concerns, speed concerns, intersections and lighting. The results of that survey are summarized on the following two pages - Existing Bikeways (map) and Survey of Existing Bikeways (chart). They indicate that a continuous, designated bikeways system does not currently exist on the Colorado State Fort Collins campuses. Several areas needing improvement were noted.

As the Existing Bikeways map illustrates, the University has a collection of bike lanes, but no defined bikeways system. The bike lanes that do exist need attention. Bike lanes are "a portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists". Their purpose is to channel bicycle traffic across campus in an orderly manner. Because circulation routes are shared, these lanes pose potential conflicts with pedestrians and motor vehicles. Spaces treated as bike paths (a bikeway physically separated from motorized vehicular traffic by an open space or barrier) are actually sidewalks shared with pedestrians on campus.

Roadways constructed decades ago are too narrow to consistently accommodate motor vehicles, parking, and adequate bicycle lanes. As road configuration changes, bike lanes stop without warning or connection to other designated lanes. This causes confusion between bike riders and motorists.

On-street parking, which is permitted on many University roads, narrows the space available for vehicular and bicycle traffic. It also poses hazards to bicyclists from car doors being opened into the flow of traffic.

There is a twelve foot diagonal path through the intramural fields which is not designated as a bike path; however, bike traffic is commonly permitted. There are no designations or barriers between pedestrians and bicyclists. Unsigned, uncontrolled use of common paths by pedestrians and bicyclists is inviting serious injury.

Some lanes are designated for two-way bike traffic on one-way motor vehicle roads. Through this signage, the University authorizes one lane of bike traffic to ride against vehicular traffic. This is contrary to the Rules of the Road as stated in the Uniform Vehicle Code. "Wrong-way travel by bicyclists is a major cause of bicycle/automobile accidents and should be discouraged at every opportunity."2

As indicated on the Survey of Existing Bikeways (chart), lanes vary from three to eight feet in width. Surface condition varies from poor to excellent. Dirt and gravel are dragged onto bike lanes from dirt roads and construction sites which affects the riding surface for bicyclists. Horizontal storm drain grates create difficulties where bike lanes are narrow.

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2 Ibid, pg 22.
<table>
<thead>
<tr>
<th>Name</th>
<th>Direction</th>
<th>Type of Path</th>
<th>Pavement Material</th>
<th>Width of Lanes (ft)</th>
<th>Lane Level Diff. (in)</th>
<th>Surface Condition</th>
<th>Lane Cost</th>
<th>Signage: Directional Warning Signals</th>
<th>Obstructions</th>
<th>Cleanliness</th>
<th>Conflicts: Pedestrians Motor Vehicles</th>
<th>Concerns: Grade Radius Speed</th>
<th>Intersections</th>
<th>Land Use</th>
<th>Lighting</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Braiden Dr., East Side</td>
<td>North</td>
<td>Lane</td>
<td>Asphalt</td>
<td>5</td>
<td>No</td>
<td>Good</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Confusion @ South Dr. ; Stop sign setback to far from lane &amp; may not be seen by all cyclists</td>
</tr>
<tr>
<td>Braiden Dr., West Side</td>
<td>South</td>
<td>Lane</td>
<td>Asphalt</td>
<td>5</td>
<td>No</td>
<td>Needs Repair</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Confusion @ Pilkin; Drain grates near driveway &amp; lane crosses driveway</td>
</tr>
<tr>
<td>East Drive, West Side</td>
<td>North</td>
<td>Lane</td>
<td>Asphalt</td>
<td>7</td>
<td>No</td>
<td>Fair</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Confusion @ entering Oval; Broken pavement on Oval</td>
</tr>
<tr>
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<td>West</td>
<td>Lane</td>
<td>Asphalt</td>
<td>6 - 8</td>
<td>Yes</td>
<td>Good</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Bus stop @ Duwell; At Shields care cross lane to make right turn; drain grates; apron &amp; gutter pan needs repair @ various spots</td>
</tr>
<tr>
<td>North Drive, South Side</td>
<td>East</td>
<td>Lane</td>
<td>Asphalt</td>
<td>8</td>
<td>Yes</td>
<td>Good</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Lane ends abruptly @ Engineering parking lot; Numerous midlane manhole covers; drain grates</td>
</tr>
<tr>
<td>Pilkin Street, North Side</td>
<td>West</td>
<td>Lane</td>
<td>Asphalt</td>
<td>4 - 8</td>
<td>Yes</td>
<td>Needs Repair</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Lane ends @ Education &amp; begins again @ Braiden Drain grates</td>
</tr>
<tr>
<td>Pilkin Street, South Side</td>
<td>East</td>
<td>Lane</td>
<td>Asphalt</td>
<td>4 - 8</td>
<td>Yes</td>
<td>Fair</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Lane disappears &amp; reappears west of College Ave. ; Drain grates</td>
</tr>
<tr>
<td>Intramural Sidewalk</td>
<td>NW SSE</td>
<td>Walk Path</td>
<td>Concrete</td>
<td>12</td>
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<td>Good</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Conflict &amp; bike lanes &amp; cyclists; Abrupt drop off on sides of path; trees get caught causing crashes</td>
</tr>
<tr>
<td>South Drive, South Side</td>
<td>East / West</td>
<td>Lane</td>
<td>Asphalt</td>
<td>3</td>
<td>Yes</td>
<td>Good</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Drain grates; Sand could cause skid-outs</td>
</tr>
<tr>
<td>University Avenue West of LSC North Side</td>
<td>East / West</td>
<td>Lane</td>
<td>Asphalt</td>
<td>6</td>
<td>Yes</td>
<td>Excellent</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>18&quot; separation of lanes; Ped Xing needs to be enhanced; Stop sign @ Meridian hard to see</td>
</tr>
<tr>
<td>University Avenue East of LSC North &amp; South Sides</td>
<td>East / West</td>
<td>Lane</td>
<td>Asphalt</td>
<td>5 - 0</td>
<td>Yes</td>
<td>Fair</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Markings on north side is confusing; Drain grates RR crossing asphalt has heaved; the grade is uneven</td>
</tr>
<tr>
<td>West Drive, East Side</td>
<td>South</td>
<td>Lane</td>
<td>Asphalt</td>
<td>6</td>
<td>Yes</td>
<td>Poor/Needs Rep</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Curb cut @ Oval; Large hole near Administration; Right turn onto University crosses traffic; markings are faded</td>
</tr>
</tbody>
</table>
Many points along the bikeways present an opportunity for conflict with pedestrians and/or motor vehicles. Those are listed below.

**Conflict areas requiring immediate attention:**
1. Meridian and University
2. Rec Center sidewalk
3. Plaza dismount zone
4. Pitkin at Clark and Animal Sciences parking lots
5. South Drive and Meridian
6. Lory Student Center/Engineering parking lot and entrances/exits
7. Braiden Drive both ends

**Conflict areas which should be addressed in the near future:**
8. North Drive and Meridian (conflicts with bicycle traffic going north and south)
9. Pitkin and Center
10. Pitkin and Meridian
11. North Drive and Moby/Westfall lots
12. Corbett/Parmelee area crossing North Drive
13. Sidewalks just east of Clark (hard to see bikes around obstructions)
14. Oval Sidewalks and Crosswalks
15. Between Eddy and the Library

**Conflict areas which should be addressed in the long term:**
16. East Drive from Pitkin to University
17. Sidewalk south of Ingersoll (walkway frequently used by bicyclists)
18. All of Center Drive
19. South Drive at Ellis (cars turning onto Ellis and crossing bike lane)
20. South Drive (2-way bike lane on 1-way street)
21. Meridian "S" curve too tight for both bikes and autos)
22. College and Pitkin

Both railroad crossings along Mason Street need improvement. The crossings are rough. Gaps in the flange way can catch bike tires and cause the rider to experience a "flying involuntary dismount".

Although lanes are generally well maintained, lane striping needs improvement. In many areas, the current lane markings fade through the year while the abandoned markings bleed through to confuse riders and motorists alike.

Bike parking facilities are insufficient. Approximately 7,000 bike parking spaces are available for 15,000 bikes. (Seven thousand bikes are registered; however, a cordon study revealed that 15,000 bikes are on campus daily.) Bicycles commonly cost $300 to $400, some are as high as $1500 - a significant investment. Ideally, bike parking facilities are sheltered and secure. Much of the University's bike parking consists of racks open to the elements and potential thefts. This reduces student confidence that their bikes are secure and encourages them to move their bikes between classes rather than park them once for the day and walk. Multiple trips during the day add to congestion and aggravate safety concerns.
GOALS AND OBJECTIVES

For at least 30 years, the University has considered the benefits of reducing the volume of vehicular traffic on campus in favor of a pedestrian environment. During this same period, concerns about pollution grew as the nation became increasingly health conscious. Not too surprisingly, bicycles became more and more popular as a means of transportation for both students and faculty. In 1993, the University began developing a new comprehensive physical master plan. One of the cornerstones of this plan, being presented throughout 1995/96, is the pursuit of a pedestrian-oriented campus.

The bikeways plan is one of many long range plans intended to support and complement the comprehensive physical master plan. Its goals and objectives were developed to support both bikeways and the overall master plan.

Early in its processes, the Bikeways Committee adopted the following goals:

Pursue a pedestrian orientation for campus.
Create a safe environment for pedestrians and bicyclists.
Improve the circulation patterns for the bike system.
Provide facilities which are all-weather use for bikes.
Increase ridership and reduce vehicular traffic.
Define the role of the three major modes of transportation (walking, biking, motoring) and how they work together for the University.
Develop an implementation plan for the bike system established by this long range plan.

and associated objectives:

Separate the following and prioritize as Pedestrians (1), Bikes (2), and Vehicles (3).
Introduce the bike PATH (the concept of establishing paths for the exclusive use of bicycles)
Build and/or formally adopt a set of standards/guidelines for the University bikeway system.
Connect with the City system.
Create/improve a maintenance and operating system for bike routes.
Improve programmatic coordination with the City.
Improve education and enforcement.
Adopt a graphics package for marketing as well as physical signage for the system.
Remove on-road vehicular parking and replace with off-road parking.
Define criteria for bike parking locations.
Improve bike parking security.
NEEDS AND RECOMMENDATIONS

According to a cordon study conducted October 25, 1993, (see Appendix F) one-fourth of non-pedestrian occurrences entering or leaving campus was by bicycle. Colorado State's main campus is 3/4 of a mile wide and one mile long - ideal for walking or biking. An increasing number of people in the campus community are responding to health and environmental concerns by walking or biking to and around campus. At the same time, the University is struggling with the costs and land use associated with demands for automobile parking. Although walking and bicycling have become basic methods of transportation for many, three-fourths of University travel is still by auto, bus or other motorized vehicles.

The University wishes to embrace the growing national trend toward walking and bicycling and nurture its acceptance on campus. The following recommendations are offered to assist the University do just that.

Need

In order to significantly increase safety for walkers, riders, and motorists, the University needs bike lanes (on roadways) that are continuous, properly sized, well maintained, and adequately striped and signed. Bike paths (off roadways) should be separate from pedestrian walkways to reduce conflicts and the potential for serious accident and injury. Frequent, clear signage is necessary to communicate appropriate use of all paths.

Bicycle circulation patterns need to be reviewed and improved. Some lanes are designated for two-way bike traffic on one-way motor vehicle roads. Safety can be improved by avoiding such conditions. Options to improve this situation include altering vehicle traffic patterns, altering bicycle traffic patterns, or completely separating bikeways from other modes of transportation.

Consistent design, construction and enforcement standards are needed to (1) eliminate operating conflicts for bicyclists, (2) serve as a guide for lane widths and placement, appropriate signage, right-turn treatments, etc., and (3) make the transition from city streets to University property as seamless for bicyclists as for motorists and thereby reduce confusion, conflicts and the potential for accident and injury.

Recommendation 1


The AASHTO "Guide for the Development of Bicycle Facilities" is consistent with the Uniform Vehicle Code. It defines bike routes, lanes and paths and addresses design, hazards, lane widths and markings, and other critical bikeways issues. Although this publication is a set of guidelines rather than standards, bike facilities which have followed AASHTO experience increased safety and have fared well when challenged in court. Further, as bike facilities are designed or renovated, the Manual of Uniform Traffic Control Devices (MUTCD) should also be consulted.
Adoption of the Rules of the Road as stated in the *Uniform Vehicle Code* will encourage the University to assure that bike lanes are either one-way facilities carrying bicycle traffic in the same direction as adjacent motor vehicle traffic, or two-way facilities physically separated from vehicular traffic. This should increase rider safety significantly.

**Need**

Bike lane surface issues need to be improved to minimize irregularities and improve ease and safety of use. Irregularities between pavement and gutter pan can cause a bicyclist to lose balance and fall—potentially into the flow of vehicular traffic. The railroad crossings need improvement for the same reason. Drainage grates also catch tires, especially in narrow bike lanes. Lane markings need to be more consistent.

**Recommendation 2**

As budgets permit, take steps to correct existing bikeway deficiencies.

Improvements should include attention to drainage grates, railroad grade crossings, gutter pan construction. Existing lane widths, separation of bicycles and motor vehicles, and limiting or controlling use of sidewalks by bicyclists should be improved to be consistent with AASHTO guidelines. The flow of vehicle traffic and bike traffic should be adequately marked, especially approaching intersections. An example of a well marked intersection is at the east side of Shields and North Drive.

**Need**

Designated, marked routes on surrounding city streets do not continue and/or are not marked on University roads. Similar to motor ways, changes from one jurisdiction to another should be relatively transparent to the bicyclist. If we wish to encourage alternate means of transportation, continuous lanes and consistent traffic rules and signage are critical.

**Recommendation 3**

Complement the City bikeways system by extending University bikeways to form continuous routes between the City and the University. Adopt a modified version of City bikeways signage. Strengthen coordination with the City of Fort Collins by continuing working relationships developed during simultaneous bikeways efforts.

Construct and/or designate bike lanes/parts/routes which logically connect with and complement the bikeways within the City of Fort Collins.

Adopt the City of Fort Collins bikeways signage standards, with the addition of the Colorado State logo to promote continuity within the total biking system. The addition of the logo should inform a bike rider that the bikeway is now on University property; however, it should be unobtrusive and not interfere with the traffic message.

In 1994 the City initiated a bikeways study to encourage safe, alternate modes of transportation and improve air quality. As this was compatible with the University's efforts, the University Planner and several bikeways committee members worked with both the University and the City. In the process,
effective working relationships developed with City personnel responsible for bikeways. These relationships should be continued and nurtured in the interest of providing a safe bikeways system within the overall community.

Need
Maintenance of campus bikeways is generally very good. Pothole patrol, a Facilities Management function, routinely locates and fills potholes and responds to trouble calls regarding pavement problems. However, dirt and gravel accumulate in bike lanes near construction sites and unpaved streets. Current lane striping fades as does coverage of abandoned markings. The snow removal process for light snowfalls needs to be reviewed.

Recommendation 4
Improve bikeways maintenance by increasing street cleaning frequency, by increasing street painting as needed, and by brushing snow of 2"-3" depth from separate bike paths.

On-street bike lanes are currently cleaned twice a year during street cleaning operations. Spot cleaning occurs in response to trouble calls or as maintenance crews notice gravel buildup. It is recommended that scheduled street cleaning be increased to four times per year to reduce dirt and gravel buildup and keep the lanes cleaner longer.

Street and bike lane markings are repainted once a year. Increased frequency would enhance safety and prevent old abandoned markings from bleeding through to confuse bicyclists and motorists alike. This plan recommends that current lane markings be repainted twice a year and that abandoned markings be painted over sufficiently often so that the original markings do not become visible.

Heavy snow, 4" or more, is removed from sidewalks and vehicle lanes the first day and piled from the street onto the bike lanes. On the second day, snow on the bike lanes is moved onto grassed areas. As there is little to no bike traffic immediately after a heavy snow, this procedure is acceptable. For snowfalls of 2"-3", snow is brushed from major arterials and attached bike lanes. It is recommended that snow of this depth be brushed from separate bike paths as it is from sidewalks.

Need
Although active law enforcement reaches several thousand riders a year, many still appear to be ill-informed of legal riding procedures. Existing educational efforts regarding biking on campus are very good but they do not reach everyone.

Recommendation 5
Continue education and enforcement efforts. Explore opportunities to increase bikeways education before riders incur tickets for violations.

The Colorado State University Police Department's Bicycle Education and Enforcement Program (BEEP) does an excellent job of publicizing and enforcing biking policies on main campus. The "Colorado State University Bicycle Regulations", January 1995, outline biking information and
bicyclist responsibilities. This plan recommends the BEEP program be continued and its educational aspects be expanded where possible. Consider offering the National Safe Cycling Course on campus and coordinating bicycle education efforts with ASCSU to reach as many students as possible.

Need

Parking for bicycles needs to be increased and improved. Approximately 15,000 bikes are on campus daily. This represents 75% of enrollment. Seven thousand bike parking spaces are available to accommodate these bikes. Bicycles are expensive and bike owners want to feel that their property is secure from damage or theft. The University’s bike parking facilities are neither sheltered nor secured. These issues encourage students to move their bikes between classes rather than park them once for the day and walk. Multiple trips during the day add to congestion.

Recommendation 6
Increase and improve bike parking facilities.

If the University wishes to encourage bicycle use, upgraded bike parking and/or locker facilities are needed. Improved bike parking facilities (both racks and lockers) should be researched and upgraded on a continuing basis until all facilities meet the needs of both the bike riders and the University’s long range plans. It is recommended that enough bike parking be provided to accommodate 75% of enrollment which should be adequate for both student as well as faculty and staff bicyclists. In general, bike parking and dismount zones should be: adjacent to bikeways, secure, lighted, within approximately a one-minute brisk walk (about 300') of a major destination, located near population concentrations, and in harmony with the University plans for traffic flow, landscape and aesthetics. Bike parking areas may be located between buildings; however, quads and pedestrian ways should not be considered appropriate sites for bike lots. Approximately half of the bike facilities should be on a hard finished surface and half may be on a permeable surface.

The University and the City of Fort Collins are investigating the desirability of providing bike lockers for all-day use. Bike lockers offer a greater level of security than bike racks. The few bike lockers owned by the University have a waiting list for those wanting to use them. It is believed that the availability of bike lockers will encourage bike riders to (a) park their bikes for the day and walk between campus points, and (b) park their bikes only in designated areas.

Need
North/south and east/west routes through campus should be continuous, not segmented. Logical connections are needed from University roads to City streets. An inner tier is needed to provide reasonable access to campus facilities for bicyclists while maintaining a pedestrian core.

Recommendation 7
Provide additional and improved bike routes to fill gaps in the system. Reference the graphics on the next three pages and project descriptions beginning on page 17 for proposed arterial bikeways and specific projects.
If approved, this proposal will (1) establish primary north/south and east/west bike routes through main campus, (2) connect primary entries to campus with City bikeways, (3) provide access within reasonable distance to the academic core, and (4) preserve the central core for pedestrian traffic only. Also proposed are one fairly direct bikeway from main campus to south campus, and limited bikeways on foothills campus.
COLORADO STATE UNIVERSITY
FOOTHILLS CAMPUS
PROPOSED BIKEWAYS - 1995

PROPOSED
FORT COLLINS - EXISTING
## Project Descriptions

<table>
<thead>
<tr>
<th>Priority</th>
<th>Location</th>
<th>Project Description</th>
<th>Notes</th>
<th>Est. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>East/west asphalt path from Meridian to Shields, south of Moby and the Recreation Center Phase 1 - south of Rec Center to Meridian</td>
<td>Separate bike path from pedestrian way. This path is heavily used by both pedestrians and bicyclists. Separation would enhance safety and would be consistent with AASHTO guidelines. A bikeway in this location would complement the City's bike route feeding main campus from West Elizabeth.</td>
<td>Lighting exists.</td>
<td>$29,000 - $31,900</td>
</tr>
<tr>
<td>High</td>
<td>Bike lane along South Drive Phase 1</td>
<td>Replace 2-way bike lane to enhance safety per AASHTO and the Uniform Vehicle Code. Extend lane markings to Morgan Library so lane direction and width are clear to bike riders.</td>
<td>Portion of necessary lighting exists. Needed lighting included in Outdoor Lighting Plan and estimate.</td>
<td>$6,400 - $7,040</td>
</tr>
<tr>
<td>High</td>
<td>Plaza</td>
<td>Create/enforce dismount zone for this area. The level of pedestrian traffic plus the planned redesign of this area render it inappropriate for bicycle traffic. Locate and install a workable east/west route to skirt this area.</td>
<td>Costs for this activity in operating budgets.</td>
<td>N/A</td>
</tr>
<tr>
<td>High</td>
<td>Mason Street from Old Main Drive to Laurel</td>
<td>Designate bike lanes on both sides of street. This is a heavily used, unofficial route. Designation should reduce confusion between motorists and bicyclists. A bikeway in this location would complement the City's proposed bike route along Laurel.</td>
<td>Estimated costs do not include street repair costs if existing paving is in poor condition. Some additional lighting necessary. To be included in a 1996 landscape project.</td>
<td>$9,000 - $11,000</td>
</tr>
<tr>
<td>Mid-range</td>
<td>Meridian north of Pitkin Phase 1</td>
<td>Designate bike lanes on both sides of street, thus providing most of a north/south passage through campus. A bikeway in this location would complement the City's bike route feeding main campus from Loomis Street. Meridian is a congested area serving, motorists, pedestrians and bicyclists. Vehicle parking is allowed on both sides of the street. Consideration is being given to closing this road to vehicular traffic part or full time.</td>
<td>Estimated cost for addition of bike lanes on existing roadway only.</td>
<td>$4,000 - $6,500</td>
</tr>
<tr>
<td>Mid-range</td>
<td>Pitkin continuation</td>
<td>Modify Pitkin west of Braiden Hall to allow continuation of existing bike lanes or provide separate paths. Currently, designated lanes end west of Braiden where the roadway narrows. This causes confusion for both bicyclists and motorists. Extension of this bikeway to Shields would complement the City's renovated bikeway along Shields Street.</td>
<td>Lighting exists. Estimate is for costs to stripe lane markings on roadway, not a separate path. Estimate assumes road is extended to Shields. Costs to extend roadway to Shields are not included.</td>
<td>$6,000 to $8,000</td>
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</tr>
<tr>
<td>Mid-range</td>
<td>Lory Student Center/Engineering parking lot</td>
<td>Provide a lane or separate path through the Lory Student Center/Engineering parking lot. This is a heavily congested area and is not an appropriate route for bicyclists. When completed, this lane/path will complete a major east/west route through campus and will form the north edge of the bicycle inner tier.</td>
<td>Site design for eventual parking garage must be sensitive to the need for a continuous bike path through this area.</td>
<td>$10,000 to $12,500</td>
</tr>
<tr>
<td>Mid-range</td>
<td>Mason Street south of Old Main Drive</td>
<td>On both sides of road, designate bike lanes or separate paths. The master plan utilizes the Mason Street area as a ring road. As vehicles and parking are moved to the edges of campus, Mason will become a major arterial for both motorists and bicyclists providing access to main campus without using College Avenue.</td>
<td>Estimated costs are for lanes on future roadway, not separate paths. This estimate assumes roadway is extended and does not include costs for that extension.</td>
<td>$6,500 to $7,150</td>
</tr>
<tr>
<td>Mid-range</td>
<td>East side of Monfort Quad</td>
<td>Provide/designate a bike path, separate from walkways, from Pitkin to University, immediately along the east side of Monfort Quad and west of Shepardson. This would provide a link between Pitkin and University and replace the heavily used, unofficial route east of Clark which is cluttered with dumpsters and frequent service vehicle traffic.</td>
<td>Some lighting exists.</td>
<td>$62,000 to $68,200</td>
</tr>
<tr>
<td>Mid-range</td>
<td>Center Avenue</td>
<td>Designate bike lanes on both sides of street. A bikeway in this location would complement the University’s plans to extend Center Avenue to South Campus. Center is a congested area serving motorists, pedestrians and bicyclists. Vehicle parking is allowed on both sides of the street. Consideration is being given to removing on-street parking from this area.</td>
<td>Lighting costs excluded here. They are included in the Outdoor Lighting Plan and estimate. Estimate includes cost to extend lane to proposed bike parking coral near Clark Building.</td>
<td>$17,000 to $18,700</td>
</tr>
<tr>
<td>Long-range</td>
<td>Bike lane along South Drive Phase 2</td>
<td>Install dedicated asphalt bike path from Shields to Morgan Library after the street is removed.</td>
<td>Portion of necessary lighting exists. Needed lighting included in Outdoor Lighting Plan and estimate.</td>
<td>$99,500 to $109,450</td>
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<tr>
<td>Long-range</td>
<td>EastWest asphalt path from Meridian to Shields, south of Moby and the Recreation Center Phase 2 - from Shields to Rec Center south of Moby Complex</td>
<td>Separate bike path from pedestrian way. This path is heavily used by both pedestrians and bicyclists. Separation would enhance safety and would be consistent with AASHTO guidelines. A bikeway in this location would complement the City's bike route feeding main campus from West Elizabeth.</td>
<td>Lighting exists.</td>
<td>$62,000 to $68,200</td>
</tr>
<tr>
<td>Long-range</td>
<td>Meridian north of Pitkin Phase 2</td>
<td>Install asphalt bike path from North Drive to South Drive after existing roadway is removed.</td>
<td>Lighting exists.</td>
<td>$74,000 to $81,400</td>
</tr>
<tr>
<td>Long-range</td>
<td>Meridian south of Pitkin</td>
<td>Designate bike lanes on both sides of street, thus completing a north/south passage through campus (if Meridian north of Pitkin project is completed). A bikeway in this location would complement the City's proposed bike route feeding main campus from Lake Street.</td>
<td>Lighting exists. Estimate includes costs to widen existing roadway to provide room for bike lanes.</td>
<td>$55,000 to $60,500</td>
</tr>
<tr>
<td>Long-range</td>
<td>Oval</td>
<td>Designate a one-way bike lane or path separate from vehicles and pedestrians around the Oval. A bikeway in this location would complete many routes through this area. Removal of on-street parking from the Oval is being considered; however, one-way visitor traffic around this historic area is likely to continue.</td>
<td>Lighting exists. Estimate includes costs to install lanes on existing roadway. Long term plan would add separate bike path through grassed areas. Estimate does not include these costs.</td>
<td>$5,200 to $5,720</td>
</tr>
<tr>
<td>Long-range</td>
<td>East Drive north of Pitkin (interim only - This will be eliminated when East Drive is closed to bicycle traffic and West Drive is designated as the east edge of the bicycle inner tier.)</td>
<td>Continue the main campus bikeway system by designating one or two bike lanes (depending on resolution of vehicular traffic). This is a frequently used route. Lane designation would reduce confusion for bicyclists and motorists.</td>
<td>Most necessary lighting exists. Additional necessary lighting included in Outdoor Lighting Plan and estimate.</td>
<td>$3,000 to $3,750</td>
</tr>
<tr>
<td>Long-range</td>
<td>West Drive</td>
<td>After vehicular traffic is removed from West Drive, provide/designate a two-way bike path or lane, separate from walkways, along West Drive. This would provide a link between University and Isotope and the Oval. It would also complete the east edge of the bicycle inner tier.</td>
<td>Lighting exists.</td>
<td>$1,200 to $1,500</td>
</tr>
<tr>
<td>Long-range</td>
<td>Lagoon path</td>
<td>Provide a separate path from North Drive to Pitkin immediately west of Student Center and Morgan Library connecting to Braiden Drive. This area is used heavily by both pedestrians and bicyclists so effective separation is critical. When completed, this path will complete a major north/south route through campus and will form the west edge of the bicycle inner tier.</td>
<td>Most lighting exists. Estimate for 480 feet of new lighting included.</td>
<td>$ 74,000 to $ 81,400</td>
</tr>
<tr>
<td>Long-range</td>
<td>North/south Intramural Field path</td>
<td>Provide a separate path from North Drive to Pitkin immediately west of Moby Gym, the softball field, and Edwards Hall. When completed, this path will connect the two primary east/west routes through campus.</td>
<td>720' of this is street and requires no sod, irrigation or lighting. 980' will be a new path with sod, irrigation and lighting costs included in this estimate.</td>
<td>$ 85,000 to $ 71,500</td>
</tr>
<tr>
<td>Long-range</td>
<td>Isotope</td>
<td>Designate a bike path separate from pedestrians immediately south of the Engineering Building, from the Oval to the dismount zone. A terminal path to this area, plus appropriate bike parking facilities, would allow bicyclists close access to the core of campus plus parking near many academic buildings.</td>
<td>Lighting exists. This estimate assumes a separate path is provided.</td>
<td>$ 21,000 to $ 23,100</td>
</tr>
<tr>
<td>Long-range</td>
<td>Old Main Drive, from Mason to Oval</td>
<td>Designate a bike lane, on both sides of the street, on Old Main Drive from Mason Street to the Oval. This will allow bicycle traffic to flow from the City's proposed Laurel bikeway, to the University's proposed ring road, into campus. It will also channel traffic from North Drive and the Engineering parking lot to complete the east/west passage through campus on the north side.</td>
<td>Lighting needs included in the Outdoor Lighting Plan and estimate.</td>
<td>$ 600 to $ 800</td>
</tr>
<tr>
<td>Long-range</td>
<td>Future College Avenue entrance at University Avenue.</td>
<td>Provide bike lanes or separate path along future entrance at University Avenue connecting to City bikeway at East Elizabeth.</td>
<td>Project may be funded entirely through construction of new road.</td>
<td>N/A</td>
</tr>
<tr>
<td>Long-range</td>
<td>Arthur's Ditch</td>
<td>Provide separate bike path along edge of Arthur's Ditch from Meridian and North Drive connecting to University Avenue. Also provide section from North Drive south of Allison Hall curving west to Arthur's Ditch.</td>
<td>Lighting costs included.</td>
<td>$ 68,000 to $ 96,800</td>
</tr>
<tr>
<td>See note</td>
<td>Bikeway between South Campus and Main Campus</td>
<td>Provide bike lanes or separate paths as follows: (1) along future extension of Center Avenue from Prospect to Drake, (2) along path northwest of VTH and on street west of VTH, and (3) along future roadway along railroad tracks. This will complement the University's plan to encourage biking and join two campuses utilizing relatively low-traffic routes.</td>
<td>Estimated costs by section are: (1) $13,000-14,500 Center Ave ext. (high priority) (2) $91,000-100,100 west of VTH (medium priority) (3) $13,000-14,500 along railroad (long range)</td>
<td>$117,000 to $129,100</td>
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</tr>
<tr>
<td>Long-range</td>
<td>Foothills Campus bikeways</td>
<td>Provide asphalt bike lanes or separate paths on Foothills Campus to allow bicycle access to primary destination points from Overland Trail as follows: (1) Stadium path, and (2) along existing Rampart Road.</td>
<td>No lighting planned for bikeways at Foothills. Estimate does not include sod or irrigation allowance. Cost to widen Rampart Road included.</td>
<td>$200,000 to $215,000</td>
</tr>
<tr>
<td>On-going</td>
<td>Bike parking facilities</td>
<td>Provide/upgrade bike parking facilities to encourage bicycle use and long term parking. Facilities should be secure, well-lighted and within reasonable walking distance of population concentrations. Facilities should be chosen and located consistent with University plans for traffic flow, landscape and aesthetics.</td>
<td>Estimate is for 7,000 new spaces. Allowance includes hard finished surface for 3,500 spaces and permeable surface for 3,500 spaces.</td>
<td>$662,000 to $726,200</td>
</tr>
<tr>
<td>On-going</td>
<td>Education</td>
<td>Supplement existing biking education processes with informative materials early each semester. Provide free lectures and bike-safety videos. Explore other opportunities to increase bike education among campus community.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>On-going</td>
<td>Maintenance</td>
<td>Continue current levels of maintenance and improve maintenance activities as opportunities occur.</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
IMPLEMENTATION

Bikeways implementation will depend on funding availability and the implementation of master plan site projects. Total preliminary cost estimates for bikeways range from $1,677,400 to $1,847,410. By category, they are:

- high priority projects $57,400 to $64,440
- mid-range projects $196,500 to $221,150
- long range projects $761,500 to $833,620
- portions funded annually (bike racks) $662,000 to $728,200

Many of the proposed bikeways projects will be dependent on other site improvements, such as the closure or extension of roads. Closely related bikeways projects will be included as these site projects are requested, funded and approved. Bikeways improvements not dependent on other site improvements will be incorporated into the Physical Development Plan.
CITY OF FORT COLLINS

GUIDELINES
FOR
BICYCLE FACILITIES OPERATION AND MARKINGS

BIKELANE STENCILS AND SIGN LOCATIONS:

The purpose of the placement of bicycle stencils on the roadway is to reinforce the specified use of this designated area (bikelane) and to supplement the regulatory signs. Bicycle stencils are to be used on collector and arterial roadways with designated bikelanes. Whenever possible, longer last stencil materials (i.e. stamark) should be used. Bicycle stencils are to be re-installed in the same location on roadways that have been under construction for routine street maintenance or rehabilitation. The standard for the placement of bicycle stencils are as follows:

Arterial Street - between two arterial roadways
(example: Drake Road between Shields and Taft Hill Road)

Standard: 3 stencils per mile each direction

Placement:
1) approximately 50' to 100' past the intersection based upon roadway geometrics (driveways, curb cuts, speed limit signs etc).
   (example: Drake Road, place stencil approximately 100' west of the Shields Street intersection.)

2) Mid-block - install a stencil approximately 100' on the descend of the collector/arterial intersection.
   (example: Drake Road, place stencil approximately 100' past Dunbar Avenue.)

3) approximately 400' prior to the arterial/arterial intersection.
   (example: Drake Road, place stencil
Collector Street - between two arterial roadways.
(example: Constitution Avenue between W. Drake and W. Stuart)

Standard: 3 stencils per mile each direction

Placement:
1) approximately 50' to 100' past the collector/arterial intersection based upon roadway geometrics (driveways, curb cuts, speed limits etc.).
(example: Place stencil approximately 100' on Constitution north of Drake for northbound bike traffic.)

2) Mid-block - install a stencil approximately 100' past the local street or collector/collector intersection.
(example: Place stencil on Constitution Avenue 100' north of the Independence Road intersection.)

3) approximately 400' prior to the Collector/Collector or Collector/Arterial intersection.
(example: Place stencil on Constitution northbound approximately 400' prior to the intersection of W. Stuart.)

BICYCLE SIGNS:

The City of Fort Collins Bikeway Program has a unique logo that has been used to identify bicycle facilities as part of the overall bikeway system. This logo is being used as a backdrop to the regulatory signs and is a consistent identifier of the bikeway program. All bikeway signs will be mounted on a green sign blank with the FC logo on top and BIKEWAY printed on the second line in white. The third section of the sign is the regulatory/informational stencil (i.e. R3-17 - Right Lane Bikes Only). For sketches of the Bikeway Program signs, see appendix A. Bikelane signs placement should parallel the bike stencil locations (three per mile each direction) and serve to reinforce the pavement
marking regulations.

Bike Route signs will be used and will follow the previously described sign standard. A Bicycle Route may be relatively short connecting two bike facilities or long providing a recommended alternative when a bikelane is unavailable. Since a bike route does not benefit from the use of pavement stencils, three signs per mile each direction should be installed. The sign locations match the same standards as bikelane signs and stencils previously discussed.

BICYCLE PARKING signs will also utilize the same bike sign design standards previously discussed and will be placed where necessary.

TRAFFIC CONTROL DEVICES:

Bicycles should be considered in the traffic signal timing cycles at intersections where bicycle traffic exists or is expected. Special consideration should be given to the use of traffic detection devices at intersections as well. Normally, bicyclist can cross an intersection under the same signal timing phase as vehicles. However, special consideration should be given to multi-lane roadways to ensure adequate crossing time. Bike lanes crossing multi-lane roadways, such as College Avenue at Pitkin Street, should be equipped with bike loop detectors for traffic-actuated signals. These bicycle loop detectors actuate pedestrian timing splits which extend crossing times for that movement. Detectors for traffic-actuated signals should be sensitive to bicycles and located in the bicyclist's expected path, including left turns. Conveniently located pedestrian/bicyclist push buttons can be used as an alternative to pavement loop detectors if other options are not present.

BIKE LANE WIDTHS:

In July 1986, the City of Fort Collins adopted new design criteria and standards for the building of city street. These standards require that all new collector and arterial streets built provide for bicycle travel as well as automobiles and exemplify the city's commitment to cycling.

Under the street standards, a typical collector and/or arterial roadway will include a minimum bikelane width of 6 feet. See Appendix B. A collector roadway cross section with on street parking will include two 11' travel lanes and two 6' bikelanes adjacent to an 8' parking lane. The extra wide combination bike and parking lane can appear as another travel lane attracting moving vehicles. Therefore, these areas should be distinguished by painting a 4" white line delineating the parking and bikelane.
Bicycle stencils and signs should be used to reinforce the lane delineation.

Collector roads without parking consists of two 13' travel lanes, one 12' center reversible lane, and two 6' bike lanes. This type of configuration does not require any additional supportive pavement markings other than the city's standard application.

The city's arterial streets standards accommodate bicycle travel in two ways, either with on-street designated 6' bike lanes or off-street parallel sidewalk bikepaths. The on-street 6' bikelanes are preferred for safety, ease and commuting purposes and should be used whenever possible. Parallel sidewalk paths are discouraged as they contribute to crash problems.

The standard width for on-street bikelanes within the City of Fort Collins is 6'. Whenever possible, a full 6' of non-seamed pavement should be provided. The 6' standard should not include the 1 1/2' concrete pan and seam. It is desirable to pour the curb, gutter and bikelane in one concrete piece to eliminate the seam at the pan.

INTERSECTIONS WITH BIKE LANE MARKINGS:

A main point of conflict between automobiles and bicycles occurs at intersections. The placement of bikelanes keep bicyclists to the right side of the roadway and motorists to the left. At intersections, bicyclists proceeding straight and motorists turning right must cross paths, thus creating points of conflicts. Striping and signing will be used to encourage the changing of lanes in advance of the intersection. Bikelanes on roadways without dedicated right turn lanes should be dropped off approximately 50' to 75' prior to the intersection to allow cyclists to merge with forward or left-turn moving traffic. Figure 1 presents preferred pavement marking options for blending bicycle and vehicular traffic.

MAINTENANCE OF BICYCLE FACILITIES:

Bikeways are more susceptible to collecting debris, such as sand, rocks, tree limbs, overhanging shrubs, and broken glass; therefore regular sweeping and maintenance of bikelanes and routes is necessary. A smooth surface, free of potholes and debris, is essential to promoting cycling as a safe alternative method of transportation. Additionally, the pavement edges should be smooth, uniform and not have sharp dropoffs. Seams between the bikelane and travel lane or drainage pan will not exceed 1/4" in height.
The Streets Division is responsible for maintaining the city's roadways, including bikelanes and routes. Potholes and broken pavement should be repaired immediately, as needed. Bikeways on arterial and collector streets should be swept twice a month and more frequently in the winter months as sand and debris collect in the bikelanes. During the summer, the Bike Ranger rides the bikeways weekly and provides minor cleaning where needed.

Overhanging tree limbs or shrubs encroaching into the bikeways are often identified by citizens or the Bike Ranger and are trimmed by the Forestry Division as needed.

Signs and pavement markings should be inspected semi-annually and kept in good condition. Stamark bicycle stencils should be used on roadways not scheduled for street overlay or rehabilitation.
### Common Bike Signs and Symbols:

<table>
<thead>
<tr>
<th>Sign</th>
<th>Description</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Bike Path" /></td>
<td>Indicates bicycle lane access ahead.</td>
<td>Used on arterials and collectors. Articulates the right lane for bicycle travel only.</td>
</tr>
<tr>
<td><img src="image" alt="Bike Path" /></td>
<td>Used on collector roads to designate a 6' bike lane adjacent to a 8' parking area.</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Bike Path" /></td>
<td>Bike Route 90x15.</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Bike Path" /></td>
<td>Identifies bike parking location.</td>
<td></td>
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</tbody>
</table>

**Traffic Loop:** If you ride your bicycle over the symbol, it will cause the signal to change.
- Could be placed on a standard 36"x48" sign blank ($59.49)
- Telepo - 10' - 12' (2031)
- Extension ($24.29)
RECOMMENDED TYPICAL CROSS SECTIONS
FOR NEW DEVELOPMENT

COLLECTOR
INTERSECTION/TURN LANE
(BIKE LANES, NO PARKING)

COLLECTOR
(WITH PARKING AND BIKE LANES)
RECOMMENDED TYPICAL CROSS SECTIONS
FOR NEW DEVELOPMENT

100' RIGHT OF WAY

ARTERIAL STREET
(4 TRAVEL LANES, NO BIKE LANES)

100' RIGHT OF WAY

ARTERIAL STREET
(4 TRAVEL LANES WITH BIKE LANES)
Figure 1  Bicycle Lanes Approaching Motor Vehicles Right-Turn-Only Lanes.
COLORADO STATE UNIVERSITY

BIKEWAYS LONG RANGE PLAN

APPENDIX C

AASHTO Guide for the Development of Bicycle Facilities
Guide for the Development of Bicycle Facilities

August 1991

Prepared by the AASHTO Task Force on Geometric Design

Published by the American Association of State Highway and Transportation Officials
American Association of State Highway and Transportation Officials

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Executive Director: Francis B. Francois
**Task Force on Geometric Design**

**Officers:**

<table>
<thead>
<tr>
<th>Name</th>
<th>State</th>
<th>Position</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hugh G. Downs</td>
<td>Maryland</td>
<td>Chairman</td>
<td>1975-77</td>
</tr>
<tr>
<td>* Donald B. Jackson</td>
<td>Mississippi</td>
<td>Chairman</td>
<td>1978-81</td>
</tr>
<tr>
<td>Brooks O. Nichols</td>
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INTRODUCTION

Increasingly, transportation officials throughout the United States are recognizing the bicycle as a viable mode of transportation. Since the early 1970's, bicycling for commuting, for recreation, and for other travel purposes has increased in popularity. Nationwide, people are increasingly recognizing the energy efficiency, the economy, the health benefits, the pollution-free aspects, and the many other advantages of bicycling.

Local, state, and federal agencies are responding to the increased use of bicycles by implementing a wide variety of bicycle-related projects and programs. The emphasis now being placed on bicycle transportation requires an understanding of bicycles, bicyclists, and bicycle facilities. The bicycle, if adequately planned for and utilized, can play an important role in the overall transportation system.

Research is currently underway to develop additional criteria for the design of bicycle facilities. Specifically, additional information is needed regarding the selection of an appropriate type of bicycle facility. The selection of a bicycle facility may depend on vehicular and bicycle traffic characteristics, adjacent land use, and expected growth patterns as well as other factors. Should future research provide improved selection criteria in this area, or in other bicycle facility design areas, that information will be included in subsequent publications of this guide.

Purpose

Safe convenient, and adequate facilities are essential to encourage bicycle riding. The purpose of this guide is to provide information on the development of new facilities to enhance and encourage safe bicycle travel. The majority of bicycling will take place on ordinary roads with no dedicated space for bicyclists. Bicyclists can be expected to ride on almost all roadways; and sometimes they use sidewalks as joint bicycle and pedestrian facilities.

This guide provides information to help accommodate bicycle traffic in all riding environments. It is not intended to set forth strict standards, but, rather, to present sound guidelines that will be valuable in attaining good design sensitive to the needs of both
bicyclists and other highway users. However, in some sections of this guide, design criteria include minimums. These are established only where further deviation from desirable values would result in unacceptable safety compromises.

Chapter 1 provides an overview of planning considerations for bicycles, a discussion of the types of facility improvements, and a description of factors to consider when locating a facility. Chapter 2 provides guidelines to follow when constructing or improving highways and when designing and constructing bicycle facilities. Chapter 3 provides recommendations on the operation and maintenance of facilities for bicycles. The appendix provides a review of the legal status of bicycles.

Scope

This guide provides part of the information necessary for a safe bicycling environment. Facilities are only one of the several elements essential to a community's overall bicycle program. Bicycle safety education and training, bicycle use encouragement, and the application and enforcement of the Rules of the Road as they pertain to bicyclists should all be combined with facilities to form a comprehensive community approach to bicycle use. This guide provides information on facilities. Information on other elements of an overall bicycle program can be found in other publications.

The provisions for bicycle travel are consistent with and similar to standard highway engineering practices. Signs, signals, and markings for bicycle facilities which are presented in the Manual on Uniform Traffic Control Devices (MUTCD) should be used in conjunction with this guide. State and local specifications for the construction of roads and constructing bicycle facilities and projects.

Definitions

_BICYCLE_ - A vehicle having two tandem wheels, either of which is more than 16" in diameter or having three wheels in contact with the ground any of which is more than 16" in diameter, propelled solely by human power, upon which any person or persons may ride.

_BICYCLE FACILITIES_ - A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking facilities, mapping all bikeways, and shared roadways not specifically designated for bicycle use.
**BICYCLE LANE (BIKE LANE)** - A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

**BICYCLE PATH (BIKE PATH)** - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right of way or within an independent right of way.

**BICYCLE ROUTE (BIKE ROUTE)** - A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without specific bicycle route number.

**BIKEWAY** - Any road, path, or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

**HIGHWAY** - A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

**RIGHT OF WAY** - A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

**RIGHT OF WAY** - The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

**ROADWAY** - The portion of the highway, including shoulders, for vehicle use.

**SHARED ROADWAY** - Any roadway upon which a bicycle lane is not designated and which may be legally used by bicycles regardless of whether such facility is specifically designated as a bikeway.

**SIDEWALK** - The portion of a highway designed for preferential or exclusive use by pedestrians.
Chapter 1  PLANNING

Bicycle facility planning is commonly thought of as the effort undertaken to develop a separated bikeway system composed of bicycle paths and lanes all interconnected and spaced closely enough to satisfy all the travel needs of bicyclists. In fact, such systems can be unnecessarily expensive and do not provide for the vast majority of bicycle travel. Existing highways, often with relatively inexpensive improvements, must serve as the base system to provide for the travel needs of bicyclists. Bicycle paths and lanes can augment this existing system in scenic corridors or places where access is limited. Thus, bicycle transportation planning is more than planning for bikeways and is an effort that should consider many alternatives to provide for safe and efficient bicycle travel.

Planning for bicycle facilities must be conducted in conjunction with planning for other transportation modes. Often an improvement which enhances bicycle travel will also benefit other modes of travel. Conversely, highway improvements through appropriate planning and design can enhance bicycle travel. Plans for implementing bicycle projects must be in harmony with a community’s overall goal for transportation improvements, which, in turn, should be consistent with overall community goals.

The differences among bicyclists’ abilities and purposes for riding must be understood before planning for bicycle transportation improvements. In general, bicycle trip purposes can be divided into two broad types, utilitarian and recreational. For a bicyclist on a utilitarian trip, the primary objective is reaching a specific destination quickly with few interruptions. The bicycle is simply the chosen mode of transportation. On the other hand, a bicyclist on a recreational trip is riding for pleasure; the destination is of less importance. Of course, for the vast majority of trips, these purposes are not absolute or mutually exclusive. That is, most trips will have some utilitarian and some recreational purposes. Also, a practical means of obtaining trip purpose data is often not available. New bicycle facilities, therefore, should be designed to accommodate the needs of the anticipated mix of bicyclists.

Bicyclists differ widely in their abilities and in their preferences for riding environments. Some bicyclists place high importance on directness and have the ability to ride safely and confidently in heavy traffic. They will often choose to travel on arterial streets in lieu of quieter, more aesthetically pleasing alternate routes because arterial streets are more direct and result in actual or perceived time savings. Other bicyclists place more importance on the quality of the trip and are willing to go out of their way to ride on residential streets or paths. While it is important to understand that a range of bicyclists’ abilities and preferences exists, it will usually
be a mistake to plan or design bicycle facilities primarily or exclusively around the needs of bicyclists at either end of this spectrum. Rather, bicycle facilities should be planned and designed to accommodate a broad range of bicyclists.

Inventory of Existing Conditions

Planning for bicycle facilities begins with observing and gathering data on the existing conditions for bicycle travel. Problems, deficiencies, safety concerns, and bicyclists' needs must be identified. The existing bicycling environment should be observed. Bikeways, roadways where bicyclists ride and roadways where bicyclists do not ride should be examined for their suitability for bicycling. Obstructions and impediments on existing highways, such as unsafe grates, debris, shoulder rumble strips, narrow lanes, driveways, rough pavements, high-speed or high-volume traffic, high truck volume, curbside auto parking, bridge expansion joints, metal grate bridge decks, and traffic signals that are not responsive to bicycles should be considered for their effect on bicycling. The existing bicycle parking situation should be examined for its adequacy.

Areas near bicycle traffic generators, such as major employment centers, schools, parks and shopping centers, should be reviewed to identify existing or potential bicycle travel. Convenient access for bicyclists to mass transit stations and other intermodal transfer points should be checked. Barriers, such as rivers and freeways, should be identified and examined for their effects on bicycling.

Bicycle accident locations should be investigated to identify any physical obstructions which may contribute to accidents. Data on the amount of recreational versus utilitarian riding, and on the ages and experience of bicyclists, should be collected.

Public participation is essential during the inventory of existing conditions. Observations and surveys of active and potential bicyclists will be useful, as will the views of the nonbicycling public. The attitudes and needs of destination-oriented, traffic-tolerant bicyclists greatly differ from those of casual, traffic-intolerant bicyclists. Citizen bicycle advisory committees and groups and individuals responsible for recreation planning can also be good sources of information. Thus, a wide variety of views should be sought. The views of all of these various groups should be weighed against each other and tempered with sound professional judgment.

Besides the inventory of physical factors affecting bicycle transportation, education, existing laws affecting bicycling, and enforcement programs should be examined for their effectiveness.
Analysis of Improvements

Bicycle-use goals and objectives should be in harmony with the overall transportation policy of the community or state. The inventory of existing conditions provides an opportunity to modify and/or refine bicycle-use goals and objectives. With established goals and objectives in hand, the existing conditions are analyzed and a plan is developed. Programs and projects for bicycle user encouragement, enforcement, education, and improvements complement each other and are all options that should be considered. The end result is a plan of proposed improvements for bicycle travel.

A wide range of improvements should be considered in the facility improvement portion of a plan. Roadway improvements and maintenance, bikeways, and bicycle parking facilities should be considered.

Roadway and roadway maintenance improvements can reduce conflicts between pedestrians, bicyclists, and motorists and can correct conditions unsafe for bicycle riding. Improvements to drainage grates, railroad grade crossings, pavement surfaces, traffic signals, signing and markings will be beneficial.

Bicycle routes can provide continuity to other bicycle facilities or designate preferred routes.

Bicycle lanes, together with signs and pavement markings, can improve conditions in corridors where there is significant or potential bicycle demand by delineating the intended or preferred path of travel and by encouraging the separation of bicycles and motor vehicles. Bicycle lanes also help to increase the total capacities of highways carrying mixed bicycle and motor vehicle traffic.

Bicycle paths can provide enjoyable recreational opportunities as well as desirable commuter routes. Bicycle paths can create opportunities not provided by the road system.

Sidewalks are generally not acceptable for bicycling. However, in a few limited situations, such as on long and narrow bridges and in other instances where sidewalks have the same characteristics as one-way bicycle paths, and bicyclists are incidental or infrequent users, designation of the sidewalk as an alternate facility can be beneficial.

Bicycle parking facilities are essential to encourage utilitarian bicycling. To be effective, bicycle parking must offer protection from theft and vandalism. Desirably, it should also provide protection from weather damage. In general, provisions for bicycle parking should be considered at all major traffic generators, especially where motor vehicle parking is provided, and at mass transit stations to encourage intermodal travel.
Selection of a Facility

When a facility improvement is desired, its primary purpose (e.g., utilitarian or recreational) and the following factors should be considered to determine its type, location, and priority:

1. **Barriers** — In some areas, there are physical barriers to bicycle travel, caused by topographical features, freeways or other impediments. In such cases, providing a facility to overcome a barrier can create new opportunities for bicycling.

2. **Accidents** — The reduction or prevention of bicycle accidents (i.e., bicycle/motor vehicle, bicycle/bicycle, bicycle/pedestrian and single bicycle accidents) along routes is important. The potential for alleviating accident problems through the improvement of a facility should be assessed. Plans should be reviewed to eliminate the introduction of new accident problems.

3. **Directness** — For utilitarian bicycle trips, facilities should connect traffic generators and should be located along a direct line convenient for users.

4. **Access** — In locating a bicycle path, consideration should be given to the provision for frequent and convenient bicycle access, especially in residential areas. Adequate access for emergency, maintenance and service vehicles should also be considered.

5. **Attractiveness** — The scenic value is particularly important along a facility intended to serve a primarily recreational purpose.

6. **Security** — The potential for criminal acts against bicyclists, especially along remote bicycle paths, and the possibility of theft or vandalism at parking locations should be considered.

7. **Delays** — Bicyclists have a strong inherent desire to maintain momentum. If bicycles are required to make frequent stops, they may tend to avoid the route or disregard the traffic controls.

8. **Use conflicts** — Different types of facilities introduce different types of conflicts. Facilities on the roadway can result in conflicts between bicyclists and motorists. Bicycle paths can involve conflicts between bicyclists, moped operators, roller skaters and pedestrians on the facility and between bicyclists and motorists at highway and driveway intersections.

9. **Maintenance** — Maintenance-sensitive design is an important feature. An improperly maintained bikeway will often be shunned by bicyclists in favor of a parallel roadway.

10. **Pavement surface quality** — Bikeways must be free of bumps, holes and other surface irregularities if they are to attract and satisfy the needs of bicyclists. Utility covers and drainage grates should be at grade and, if possible, outside the expected area of travel. Approaches to railroad crossings should be improved as necessary to provide for safe bicycle crossings.
11. **Truck and bus traffic** — Because of their aerodynamic effect and width, high-speed trucks, buses, motorhomes, and trailers can cause special problems for bicyclists. Where bus stops are located along a route, conflicts with bus loading and discharge and pavement deterioration may also be problems.

12. **On-street motor vehicle parking** — The turnover and density of on-street parking can affect bicyclist safety (e.g., opening car doors and cars leaving angle parking spaces).

13. **Traffic volumes and speeds** — For facilities on roadways, traffic volumes and speeds must be considered along with the roadway width. Commuting bicyclists frequently use arterial streets because they minimize delay and offer continuity for trips of several miles. It can be more desirable to improve heavily traveled high-speed streets than adjacent streets, if adequate width for all vehicles is available on the more heavily traveled street. When this is not possible, a nearby parallel street may be improved for bicyclists, if stops are minimal and other route conditions are adequate. When such a parallel facility is improved, care must be taken that motor vehicle traffic is not diverted. In general, inexperienced bicyclists will not ride on heavily traveled high-speed arterials but will prefer quieter streets. Thus, cyclists' preferred routes may change over time as their skill levels change.

14. **Cost/funding** — Location selection will normally involve a cost analysis of alternatives. Funding availability can limit the alternatives; however, it is important that a lack of funds not result in a poorly designed or constructed facility. It is usually more desirable to construct a bicycle facility than to construct a poorly planned or designed facility. The decision to implement a bikeway plan should be made with a conscious, long-term commitment to a proper level of maintenance. If only a small amount of funds is available, emphasis should usually be given to low-cost improvements (e.g., bicycle parking, removal of barriers and obstructions to bicycle travel, roadway improvements, and nonconstruction projects such as mapping).

15. **Local laws** — Bicycle programs must reflect local laws and ordinances. Bicycle facilities must not encourage or require bicyclists to operate in a manner inconsistent with the adopted Rules of the Road.

16. **Bridges** — Bridges can serve an important function by providing bicycle access across barriers. However, some features found in bridges can be unsuitable where bicyclists are to be accommodated. The most common of these are curb-to-curb widths that are narrower than the approach roadways (especially where combined with relatively steep grades), open grated metal decks found on many movable spans, low railings or parapets, and certain types of expansion joints that can cause bicyclists steering difficulties.

17. **Intersection conditions** — A high proportion of bicycle accidents occur at intersections. Facilities should be selected so as to minimize the number of crossings.
Chapter 2  DESIGN

There is a wide range of facility improvements which can enhance bicycle transportation. Improvements can be simple and involve minimal design consideration (e.g., changing drainage grate inlets) or they can involve a detailed design (e.g., providing a bicycle path). The controlling feature of the design of every bicycle facility is its location (i.e., whether it is on the roadway or on an independent alignment). Roadway improvements such as bicycle lanes depend on the roadway's design. On the other hand, bicycle paths are located on independent alignments; consequently, their design depends on many factors, including the performance capabilities of the bicyclist and the bicycle.

Improvements for motor vehicles through appropriate planning and design can enhance bicycle travel, and, in any event, should avoid adverse impacts on bicycling. A community's overall goals for transportation improvements should, whenever possible, include the enhancement of bicycling. Public involvement in the form of public meetings or hearings or bicycle advisory groups is desirable during the design process.

Guidelines are presented in this chapter to help design and construct both roadway improvements and separate paths that accommodate the operating characteristics of "bicycles" as defined in this guide. Modifications to facilities (e.g., widths, curve radii, superelevations, etc.) that are necessary to accommodate adult tricycles, bicycle trailers, and other special purpose human-powered vehicles and accessories should be made in accordance with the expected use, using sound engineering judgment.

Roadway Improvements

To varying extents, bicycles will be ridden on all highways where they are permitted. All new highways, except those where bicyclists will be legally prohibited, should be designed and constructed under the assumption that they will be used by bicyclists. Bicycle-safe design practices, as described in this guide, should be followed to avoid the necessity for costly subsequent improvements. Because most highways have not been designed with bicycle travel in mind, there are often many ways in which roadways should be improved to more safely accommodate bicycle traffic. Roadway conditions should be examined and, where necessary, safe drainage grates and railroad crossings, smooth pavements, and signals responsive to
bicycles should be provided. In addition, the desirability of adding facilities such as bicycle lanes, shoulder improvements, and wide curb lanes should be considered. Information on each of the different roadway improvements is contained in this section.

**Drainage Grates**

Drainage grate inlets and utility covers are potential problems to bicyclists. When a new roadway is designed, all such grate and covers should be kept out of bicyclists’ expected path. On new construction where bicyclists will be permitted, curb inlets would be used wherever possible to completely eliminate exposure of bicyclists to grate inlets. It is important that grates and utility covers be adjusted flush with the surface, including after a roadway is resurfaced.

Parallel bar drainage grate inlets can trap the front wheel of a bicycle causing loss of steering control and, often, the bar spacing is such that they allow narrow bicycle wheels to drop into the grates, resulting in serious damage to the bicycle wheel and frame and/or injury to the bicyclist. These grates should be replaced with bicycle-safe and hydraulically efficient ones. When this is not immediately possible, consideration should be given to welding steel cross straps or bars perpendicular to the parallel bars to provide a maximum safe opening between straps. This should be considered a temporary correction.

While identifying a grate with a pavement marking would be acceptable in some situations, as indicated in the MUTCD, parallel bar grate inlets deserve special attention. Because of the serious consequences of a bicycle missing the pavement marking in the dark or being forced over such a grate inlet by other traffic, these grates should be physically corrected, as described above, as soon as practicable after they are identified.

**Railroad Crossings**

Railroad-highway grade crossings should ideally be at a right angle to the rails. The greater the crossing deviates from this ideal crossing angle, the greater is the potential for a bicyclist's front wheel to be trapped in the flangeway causing loss of steering control. It is also important that the roadway approach be at the same elevation as the rails.

Consideration should be given to the materials of the crossing surface and to the flangeway depth and width. If the crossing angle is less than approximately 45 degrees, consideration should be given to widening the outside lane, shoulder, or bicycle lane to allow bicyclists adequate room to cross the tracks at a right angle. Where this is not possible, commercially available compressible flangeway fillers can enhance bicyclist safety. In some cases, abandoned tracks can be removed. Warning signs and pavement markings should be installed in accordance with the MUTCD.
Pavements

Pavements' surface irregularities can do more than cause an unpleasant ride. Gaps between pavement slabs or drop-offs at overlays parallel to the direction of travel can trap a bicycle wheel and cause loss of control; holes and bumps can cause bicyclists to swerve into the path of motor vehicle traffic. Thus, to the extent practicable, pavement surfaces should be free of irregularities and the edge of the pavement should be uniform in width. On older pavements it may be necessary to fill joints, adjust utility covers or, in extreme cases, overlay the pavement to make it suitable for bicycling.

Traffic Control Devices

At intersections where bicycle traffic exists or is anticipated, bicycles should be considered in the timing of the traffic signal cycle, as well as the traffic detection device. Normally, a bicyclist can cross an intersection under the same signal phasing arrangement as motor vehicles; however, on multi-lane streets special consideration should be given to ensure that short clearance intervals are not used. If necessary, an all-red clearance interval may be used.

To check the clearance interval, a bicyclist's speed of 10 mph (16 km/h) and a perception/reaction/braking time of 2.5 seconds should be used. Detectors for traffic-actuated signals should be sensitive to bicycles and should be located in the bicyclist's expected path, including left turn lanes. In some situations, the use of pedestrian actuated buttons may be a preferred alternative to the use of detectors provided they do not require bicyclists to dismount or make unsafe leaning movements. Where programmed visibility signal heads are used, they should be checked to ensure that they are visible to bicyclists who are properly positioned on the road.

The MUTCD should be consulted for guidance on signs and pavement markings. Where bicyclists are expected to use different routings than motorists, directional signing should be used to confirm to bicyclists that the special routing leads to their destination.

Shoulders

Wide curb lanes and bicycle lanes are usually preferred in restrictive urban conditions and the widened shoulder will generally be more accommodating in rural circumstances. Where it is intended that bicyclists ride on shoulders, smooth paved shoulder surfaces should be provided and maintained as shown in Figure 1. Pavement edge lines supplement surface texture in delineating the shoulder from the motor vehicle lanes. Rumble strips can be a deterrent to bicycling on shoulders and their benefits should be weighed against the probability that bicyclists will ride in the motor vehicle lanes to avoid them.
Shoulder width should be a minimum of 4 feet (1.2 m) when intended to accommodate bicycle travel. Roads with shoulders less than 4 feet (1.2 m) wide normally should not be signed as bikeways. If motor vehicle speeds exceed 35 mph (55 km/h), if the percentage of trucks, buses, and recreational vehicles is high, or if static obstructions exist at the right side, then additional width is desirable.

Adding or improving shoulders can often be the best way to accommodate bicyclists in rural areas, and they are also a benefit to motor vehicle traffic. Where funding is limited, adding or improving shoulders on uphill sections first will give slow moving bicyclists needed maneuvering space and decrease conflicts with faster moving motor vehicle traffic.

Wide Curb Lanes

On highway sections without bicycle lanes, a right lane wider than 12 feet (3.7 m) can better accommodate both bicycles and motor vehicles in the same lane and thus is beneficial to both bicyclists and motorists. In many cases where there is a wide curb lane, motorists will not need to change lanes to pass a bicyclist. Also, more maneuvering room is provided when drivers are exiting from driveways or in areas with limited sight distance.
In general, a lane width of 14 feet (4.3 m) of usable width is desired. Usable width would normally be from curb face to lane stripe, or from edge line to lane stripe, but adjustments need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. Widths greater than 14 feet (4.3 m) may encourage the undesirable operation of two motor vehicles in one lane, especially in urban areas, and consideration should be given to striping as a bicycle lane when wider widths exist.

Restrriping to provide wide curb lanes may also be considered on some existing multi-lane facilities by making the remaining travel lanes and left turn lanes narrower. This should only be performed after careful review of traffic characteristics along the corridor.

### Bicycle Routes

It may be advantageous to sign some urban and rural roadways as bicycle routes. When providing continuity to other bicycle facilities, a bicycle route can be relatively short. However, a bicycle touring route can be quite long. For long bicycle routes, a standard bicycle route marker with a numerical designation in accordance with the MUTCD can be used in place of a bicycle route sign. The number may correspond to a parallel highway, indicating the route is a preferred alternate route for bicyclists. It is often desirable to use supplemental plaques with bicycle route signs or markers to furnish additional information, such as direction changes in the route and intermediate range distance and destination information. Bicycle route signing should not end at a barrier. Information directing the bicyclist around the barrier should be provided.

Overall, the decision whether to provide a bicycle route should be based on the advisability of encouraging bicycle use on a particular road, instead of on parallel and adjacent highways. The roadway width, along with factors such as the volume, speed, and type of traffic, parking conditions, grade, and sight distance should be considered when determining the feasibility of a bicycle route.

Generally, bicycle traffic cannot be diverted to a less direct alternate route unless the favorable factors outweigh the inconvenience to the bicyclist. Roadway improvements, such as adequate pavement width, drainage grates, railroad crossings, pavement smoothness, maintenance schedules, and signals responsive to bicycles, should always be considered before a roadway is identified as a bicycle route.

Further guidance on signing bicycle routes is provided in the MUTCD.
Bicycle Lanes

Bicycle lanes can be considered when it is desirable to delineate available road space for preferential use by bicyclists and motorists, and to provide for more predictable movements by each. Bicycle lane markings, as exemplified in Figure 2, can increase a bicyclist’s confidence in motorists not straying into his/her path of travel. Likewise, passing motorists are less likely to swerve to the left out of their lane to avoid bicyclists on their right.

Bicycle lanes should always be one-way facilities and carry traffic in the same direction as adjacent motor vehicle traffic. Two-way bicycle lanes on one side of the roadway are unacceptable because they promote riding against the flow of motor vehicle traffic. Wrong-way riding is a major cause of bicycle accidents and violates the Rules of the Road stated in the Uniform Vehicle Code. Bicycle lanes on one-way streets should be on the right side of the street, except in areas where a bicycle lane on the left will decrease the number of conflicts (e.g., those caused by heavy bus traffic).
(a) CURBED STREET WITH PARKING

(b) CURBED STREET WITHOUT PARKING

(c) STREET OR HIGHWAY WITHOUT CURB OR GUTTER

Figure 3. Typical Bicycle Lane Cross Sections.
Bicycle Lane Widths

Under ideal conditions, the minimum bicycle lane width is 4 feet (1.2 m). However, certain edge conditions dictate additional desirable bicycle lane width. To examine the width requirements for bicycle lanes, Figure 3 shows three usual locations for such facilities in relation to the roadway. Figure 3(a) depicts bicycle lanes on an urban curbed street where a parking lane is provided. The recommended bicycle lane width for this location is 5 feet (1.5 m). Bicycle lanes should always be placed between the parking lane and the motor vehicle lanes. Bicycle lanes between the curb and the parking lane can create obstacles for bicyclists from opening car doors and poor visibility at intersections and driveways, and they prohibit bicyclists from making left turns; therefore this placement should not be considered.

Where parking is permitted but a parking lane is not provided, the combination lane, intended for both motor vehicle parking and bicycle use, should be a minimum of 12 feet (3.7 m) wide. However, if it is likely the combination lane will be used as an additional motor vehicle lane, it is preferable to designate separate parking and bicycle lanes as shown in Figure 3(a). In both instances, if parking volume is substantial or turnover is high, an additional 1 or 2 feet (0.3 or 0.6 m) of width is desirable for safe bicycle operation.

Figure 3(b) depicts bicycle lanes along the outer portions of an urban curbed street where parking is prohibited.

Bicyclists do not generally ride near a curb because of the possibility of debris, of hitting a pedal on the curb, of an uneven longitudinal joint, or of a steeper cross slope. Bicycle lanes in this location should have a minimum width of 5 feet (1.5 m) from the curb face. If the longitudinal joint between the gutter pan and the roadway surface is uneven and falls within 5 feet (1.5 m) of the curb face, a minimum of 4 feet (1.2 m) should be provided between the joint and the motor vehicle lanes.

Figure 3(c) depicts bicycle lanes on a highway without curb or gutter. Bicycle lanes should be located between the motor vehicle lanes and the roadway shoulders. Bicycle lanes may have a minimum width of 4 feet (1.2 m), where the shoulder can provide additional maneuvering width. A width of 5 feet (1.5 m) or greater is preferable; additional widths are desirable where substantial truck traffic is present, or where vehicle speeds exceed 35 mph (55 km/h).

Intersections With Bicycle Lanes

Bicycle lanes tend to complicate both bicycle and motor vehicle turning movements at intersections. Because they encourage bicyclists to keep to the right and motorists to keep to the left, both operators are somewhat discouraged from merging in advance of turns. Thus, some
bicyclists will begin left turns from the right side bicycle lane and some motorists will begin right turns from the left of the bicycle lane. Both maneuvers are contrary to established Rules of the Road and result in conflicts.

At intersections, bicyclists proceeding straight through and motorists turning right must cross paths. Striping and signing configurations which encourage these crossings in advance of the intersection, in a merging fashion, are preferable to those that force the crossing in the immediate vicinity of the intersection. One example of such a configuration is given in Figure 4. To a lesser extent, the same is true for left turning bicyclists; however, in this maneuver, most vehicle codes allow the bicyclist the option of making either a "vehicular style" left turn (where the bicyclist merges leftward to the same lane used for motor vehicle left turns) or a "pedestrian style" left turn (where the bicyclist proceeds straight through the intersection, turns left at the far side, then proceeds across the intersection again on the cross street).

Figure 5 presents examples of details on pavement markings for bicycle lanes approaching motorist right-turn-only lanes. Where there are numerous left turning bicyclists, a separate turning lane, as indicated in the MUTCD, should be considered. The design of bicycle lanes should also include appropriate signing at intersections to reduce the number of conflicts. General guidance for pavement marking of bicycle lanes is contained in the MUTCD.

Adequate pavement surface, bicycle-safe grate inlets, safe railroad crossings, and traffic signals responsive to bicycles should always be provided on roadways where bicycle lanes are being designated. Raised pavement markings and raised barriers can cause steering difficulties for bicyclists and should not be used to delineate bicycle lanes.
Figure 5. Bicycle Lanes Approaching Motor Vehicles Right-Turn-Only Lanes.
Bicycle Paths

Bicycle paths are facilities on exclusive rights of way and with minimal cross flow by motor vehicles. Bicycle paths can serve a variety of purposes. They can provide a commuting bicyclist with a shortcut through a residential neighborhood (e.g., a connection between two cul-de-sac streets). Located in a park, they can provide an enjoyable recreational opportunity. Bicycle paths can be located along abandoned railroad rights of way, the banks of rivers, and other similar areas. Bicycle paths can also provide bicycle access to areas that are otherwise served only by limited access highways closed to bicycles. Appropriate locations can be identified during the planning process. Examples of bicycle paths are shown in Figure 6 and Figure 7.

Bicycle paths should be thought of as extensions of the highway system that are intended for the exclusive or preferential use of bicycles in much the same way as freeways are intended for the exclusive or preferential use of motor vehicles. There are many similarities between the design criteria for bicycle paths and those for highways (e.g., in determining horizontal alignment, sight distance requirements, signing, and markings). On the other hand, some criteria (e.g., horizontal and vertical clearance requirements grades, and pavement structure) are dictated by operating characteristics of bicycles that are substantially different from those of motor vehicles. The designer should always be conscious of the similarities and the differences between bicycles and motor vehicles and of how these similarities and differences influence the design of bicycle paths. The following sections provide guidance for designing a safe and functional bicycle path.

Figure 6. Example of Bicycle Path.
Separation Between Bicycle Paths and Roadways

When two-way bike paths are located immediately adjacent to a roadway, some operational problems may occur. Some problems with bike paths located immediately adjacent to roadways are as follows:

1. Unless paired, they require one direction of bicycle traffic to ride against motor vehicle traffic, contrary to normal Rules of the Road.

2. When the bicycle path ends, bicyclists going against traffic will tend to continue to travel on the wrong side of the street. Likewise, bicyclists approaching a bicycle path often travel on the wrong side of the street in getting to the path. Wrong-way travel by bicyclists is a major cause of bicycle/automobile accidents and should be discouraged at every opportunity.

3. At intersections, motorists entering or crossing the roadway often will not notice bicyclists coming from their right, as they are not expecting contra-flow vehicles. Even bicyclists coming from the left often go unnoticed, especially when sight distances are poor.

4. When constructed in narrow roadway right of way, the shoulder is often sacrificed, thereby decreasing safety for motorists and bicyclists using the roadway.
5. Many bicyclists will use the roadway instead of the bicycle path because they have found the roadway to be safer, more convenient, or better maintained. Bicyclists using the roadway are often subjected to harassment by motorists who feel that in all cases bicyclists should be on the path instead.

6. Bicyclists using the bicycle path generally are required to stop or yield at all cross streets and driveways, while bicyclists using the roadway usually have priority over cross traffic, because they have the same right of way as motorists.

7. Stopped cross street motor vehicle traffic or vehicles exiting side streets or driveways may block the path crossing.

8. Because of the closeness of motor vehicle traffic to opposing bicycle traffic, barriers are often necessary to keep motor vehicles out of bicycle paths and bicyclists out of traffic lanes. These barriers can represent an obstruction to bicyclists and motorists, can complicate maintenance of the facility, and can cause other problems as well.

For the above reasons, bicycle lanes, wide curb lanes or shared roadways may be the best way to accommodate bicycle traffic along highway corridors depending upon traffic conditions.

**Width and Clearance**

The paved width and the operating width required for a bicycle path are primary design considerations. Figure 8 depicts a bicycle path on a separated right of way. Under most conditions, a recommended all paved width for a two-directional bicycle path is 10 feet (3 m). In some instances, however, a minimum of 8 feet (2.4 m) can be adequate. This minimum should be used only where the following conditions prevail: (1) bicycle traffic is expected to be low, even on peak days or during peak hours (2) pedestrian use of the facility is not expected to be more than occasional, (3) there will be good horizontal and vertical alignment providing safe and frequent passing opportunities, (4) the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage. Under certain conditions it may be necessary or desirable to increase the width of a bicycle path to 12 feet (3.7 m); for example, because of substantial bicycle volume, probable shared use with joggers and other pedestrians, use by large maintenance vehicles, steep grades and where bicyclists will be likely to ride two abreast.

The minimum width of a one-directional bicycle path is 5 feet (1.5 m). It should be recognized, however, that one-way bicycle paths often will be used as two-way facilities unless effective measures are taken to assure one-way operation. Without such enforcement, it should be assumed that bicycle paths will be used as two-way facilities and designed accordingly.
A minimum of 2-foot (0.6 m) width graded area should be maintained adjacent to both sides of the pavement; however, 3 feet (0.9 m) or more is desirable to provide clearance from trees, poles, walls, fences, guardrails, or their lateral obstructions. A wider graded area on either side of the bicycle path can serve as a separate jogging path.

A wide separation between a bicycle path and adjacent highway is desirable to confirm to both the bicyclist and the motorist that the bicycle path functions as an independent highway for bicycles. When this is not possible and the distance between the edge of the roadway and the bicycle path is less than 5 feet (1.5 m), a suitable physical divider may be considered. Such dividers serve both to prevent bicyclists from making unwanted movements between the path and the highway shoulder and to reinforce the concept that the bicycle path is an independent facility. Where used, the divider should be a minimum of 4.5 feet (1.4 m) high, to prevent bicyclists from toppling over it, and it should be designed so that it does not become an obstruction in itself.
The vertical clearance to obstructions should be a minimum of 8 feet (2.4 m). However, vertical clearance may need to be greater to permit passage of maintenance vehicles and, in undercrossings and tunnels, a clearance of 10 feet (3 m) is desirable for adequate vertical shy distance.

■ Design Speed

The speed that a bicyclist travels is dependent on several factors, including the type and condition of the bicycle, the purpose of the trip, the condition and location of the bicycle path, the speed and direction of the wind, and the physical condition of the bicyclist. Bicycle paths should be designed for a selected speed that is at least as high as the preferred speed of the faster bicyclists. In general, a minimum design speed of 20 mph (32 km/h) should be used; however, when the grade exceeds 4 percent, or where strong prevailing tailwinds exist, a design speed of 30 mph (48 km/h) is advisable.

On unpaved paths, where bicyclists tend to ride slower, a lower design speed of 15 mph (24 km/h) can be used. Similarly, where the grades or the prevailing winds dictate, a higher design speed of 25 mph (40 km/h) can be used. Since bicycles have a higher tendency to skid on unpaved surfaces, horizontal curvature design should take into account lower coefficients of friction.

■ Horizontal Alignment and Superelevation

The minimum radius of curvature negotiable by a bicycle is a function of the superelevation rate of the bicycle path surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle. The minimum design radius of curvature can be derived from the following formula:

\[ R = \frac{v^2}{15 (e+f)} \]

where:

- \( R \) = Minimum radius of curvature (ft),
- \( v \) = Design Speed (mph),
- \( e \) = Rate of superelevation,
- \( f \) = Coefficient of friction.
For most bicycle path applications the superelevation rate will vary from a minimum of 2 percent (the minimum necessary to encourage adequate drainage) to a maximum of approximately 5 percent (beyond which maneuvering difficulties by slow bicyclists and adult tricyclists might be expected). The minimum superelevation rate of 2 percent will be adequate for most conditions and will simplify construction.

The coefficient of friction depends upon speed; surface type, roughness, and condition; tire type and condition; and whether the surface is wet or dry. Friction factors used for design should be selected based upon the point at which centrifugal force causes the bicyclist to recognize a feeling of discomfort and instinctively act to avoid higher speed. Extrapolating from values used in highway design, design friction factors for paved bicycle paths can be assumed to vary from 0.30 at 15 mph (24 km/h) to 0.22 at 30 mph (48 km/h). Although there are no data available for unpaved surfaces, it is suggested that friction factors be reduced by 50 percent to allow a sufficient margin of safety.

Based upon a superelevation rate (e) of 2 percent, minimum radii of curvature can be selected from Table 1.

<table>
<thead>
<tr>
<th>Design Speed—V (mph) (1 mph = 1.6 km/hr)</th>
<th>Friction Factor—f</th>
<th>Minimum Radius—R (Feet) (1 ft = 0.3 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.27</td>
<td>95</td>
</tr>
<tr>
<td>25</td>
<td>0.25</td>
<td>155</td>
</tr>
<tr>
<td>30</td>
<td>0.22</td>
<td>250</td>
</tr>
<tr>
<td>35</td>
<td>0.19</td>
<td>390</td>
</tr>
<tr>
<td>40</td>
<td>0.17</td>
<td>565</td>
</tr>
</tbody>
</table>

When substandard radius curves must be used on bicycle paths because of right of way, topographical or other considerations, standard curve warning signs and supplemental pavement markings should be installed in accordance with the MUTCD. The negative effects of substandard curves can also be partially offset by widening the pavement through the curves.
Grade

Grades on bicycle paths should be kept to a minimum, especially on long inclines. Grades greater than 5 percent are undesirable because the ascents are difficult for many bicyclists to climb and the descents cause some bicyclists to exceed the speeds at which they are competent. Where terrain dictates, grades over 5 percent and less than 500 feet (150 m) long are acceptable when a higher design speed is used and additional width is provided. Grades steeper than 3 percent may not be practical for bicycle paths with crushed stone surfaces.

Sight Distance

To provide bicyclists with an opportunity to see and react to the unexpected, a bicycle path should be designed with adequate stopping sight distances. The distance required to bring a bicycle to a full controlled stop is a function of the bicyclist's perception and brake reaction time, the initial speed of the bicycle, the coefficient of friction between the tires and the pavement, and the braking ability of the bicycle.

Figure 9 indicates the minimum stopping sight distance for various design speeds and grades based on a total perception and brake reaction time of 2.5 seconds and a coefficient of friction of 0.25 to account for the poor wet weather braking characteristics of many bicycles. For two-way bicycle paths, the sight distance in descending direction, that is, where "G" is negative, will control the design.

Figure 10 is used to select the minimum length of vertical curve necessary to provide minimum stopping sight distance at various speeds on crest vertical curves. The eye height of the bicyclist is assumed to be 4.5 feet (1.4 m) and the object height is assumed to be zero to recognize that impediments to bicycle travel exist at pavement level.

Figure 11 indicates the minimum clearance that should be used to line of sight obstructions for horizontal curves. The lateral clearance is obtained by entering Figure 11 with the stopping sight distance from Figure 9 and the proposed horizontal radius of curvature.

Bicyclists frequently ride abreast of each other on bicycle paths and, on narrow bicycle paths, bicyclists have a tendency to ride near the middle of the path. For these reasons, and because of the serious consequences of a head on bicycle accident, lateral clearances on horizontal curves should be calculated based on the sum of the stopping sight distances for bicyclists traveling in opposite directions around the curve. Where this is not possible or feasible, consideration should be given to widening the path through the curve, installing a yellow center stripe, installing a curve ahead warning sign in accordance with the MUTCD, or some combination of these alternatives.
\[ S = \frac{v^2}{30(t^2 + G)} + 1.67 \cdot v \]

Where:

- \( S \): Minimum Sight Distance, Ft.
- \( V \): Velocity, mph
- \( t \): Coefficient of Friction (use 0.25)
- \( G \): Grade Ft/Ft, (rise/run)

(Metric Conversion: 1 Ft. = 0.3 m, 1 mph = 1.6 km/h)

**Figure 9. Minimum Stopping Sight Distances.**
\[ L = 25 \cdot \frac{200(\sqrt{h_1} - \sqrt{h_2})^2}{a} \quad \text{when } S \geq L \]
\[ L = \frac{45^2}{100(\sqrt{2h_1} - \sqrt{2h_2})^2} \quad \text{when } S < L \]

\( L_{\text{min}} = 2v \)

Figure 10. Minimum Length of Vertical Curves.
Sight distance is measured along this line.  

\[ S = \text{Sight distance in feet.} \]
\[ R = \text{Radius of } S \text{ inside lane in feet.} \]
\[ m = \text{Distance from } S \text{ inside lane in feet.} \]
\[ v = \text{Design speed for } S \text{ in mph.} \]

Angle is expressed in degrees.

\[ m = R \left( \frac{\sin 18.55}{R} \right) \]

\[ S = \frac{R}{28.85} \left( \cos \left( \frac{R-m}{R} \right) \right) \]

Formula applies only when \( S \) is equal to or less than length of curve.

* Lateral clearances on horizontal curves should be calculated based on the sum of the stopping sight distances for bicyclists traveling in opposite directions around the curve. See text for additional discussion.

**Figure 11. Minimum Lateral Clearances on Horizontal Curves.**
Intersections

Intersections with roadways are important considerations in bicycle path design. If alternate locations for a bicycle path are available, the one with the most favorable intersection conditions should be selected. For crossings of freeways and other high-speed, high-volume arterials, a grade separation structure may be the only possible or practical treatment. Unless bicycles are prohibited from the crossing highway, providing for turning movements must be considered. In most cases, however, the cost of a grade separation will be prohibitive.

When intersections occur at grade, a major consideration is the establishment of right of way. The type of traffic control to be used (signal, stop sign, yield sign, etc.), and location, should be provided in accordance with the MUTCD.

Sign type, size and location should also be in accordance with the MUTCD. Care should be taken to ensure that bicycle path signs are located so that motorists are not confused by them and that roadway signs are placed so that bicyclists are not confused by them.

It is preferable that the crossing of a bicycle path and a highway be at a location away from the influence of intersections with other highways. Controlling vehicle movements at such intersections is more easily and safely accomplished through the application of standard traffic control devices and normal Rules of the Road. Where physical constraints prohibit such independent intersections, the crossings may be at or adjacent to the pedestrian crossing. Right of way should be assigned and sight distance should be provided so as to minimize the potential for conflict resulting from unconventional turning movements. At crossings of high volume multi-lane arterial highways where signals are not warranted, consideration should be given to providing a median refuge area for bicyclists.

When bicycle paths terminate at existing roads, it is important to integrate the path into the existing system of roadways. Care should be taken to properly design the terminals to transition the traffic into a safe merging or diverging situation. Appropriate signing is necessary to warn and direct both bicyclists and motorists regarding these transition areas.

Bicycle path intersections and approaches should be on relatively flat grades. Stopping sight distances at intersections should be checked and adequate warning should be given to permit bicyclists to stop before reaching the intersection, especially on downgrades.

Ramps for curb cuts at intersections should be the same width as the bicycle paths. Curb cuts and ramps should provide a smooth transition between the bicycle paths and the roadway.
Signing and Marking

Adequate signing and marking are essential on bicycle paths, especially to alert bicyclists to potential conflicts and to convey regulatory messages to both bicyclists and motorists at highway intersections. In addition, guide signing, such as to indicate directions, destinations, distances, route numbers and names of crossing streets, should be used in the same manner as they are used on highways. In general, uniform application of traffic control devices, as described in the MUTCD, will tend to encourage proper bicyclist behavior.

A designer should consider a 4 inch (10 cm) wide yellow centerline stripe to separate opposite directions of travel. This is particularly beneficial in the following circumstances: (1) for heavy volumes of bicycles, (2) on curves with restricted sight distance, and (3) on unlighted paths where nighttime riding is expected. Edge lines can also be very beneficial where nighttime bicycle traffic is expected.

General guidance on signing and marking is provided in the MUTCD. Care should be exercised in the choice of pavement marking materials. Some marking materials are slippery when wet and should be avoided in favor of more skid resistant materials.

Pavement Structure

Designing and selecting pavement sections for bicycle paths is in many ways similar to designing and selecting highway pavement sections. A soils investigation should be conducted to determine the load carrying capabilities of the native soil and the need for any special provisions. The investigation need not be elaborate, but should be done by, or under the supervision of a qualified engineer.

In addition, there are several basic principles that should be followed to recognize some basic differences between the operating characteristics of bicycles and those of motor vehicles. While loads on bicycle paths will be substantially less than highway loads, paths should be designed to sustain without damage wheel loads of occasional emergency, patrol, maintenance, and other motor vehicles that are expected to use or cross the path.

Special consideration should be given to the location of motor vehicle wheel loads on the path. When motor vehicles are driven on bicycle paths, their wheels will usually be at or very near the edges of the path. Since this can cause edge damage that, in turn, will result in the lowering of the effective operating width of the path, adequate edge support should be provided. Edge support can be either in the form of stabilized shoulders or in constructing additional pavement width. Constructing a typical pavement width of 12 feet, where right of way and other conditions permit, eliminates the edge raveling problem and offers two other additional
advantages over shoulder construction. First, it allows additional maneuvering space for bicyclists and second, the additional construction cost can be less than for constructing shoulders because the separate construction operation is eliminated.

It is important to construct and maintain a smooth riding surface on bicycle paths. Bicycle path pavements should be machine laid; soil sterilants should be used where necessary to prevent vegetation from erupting through the pavement; and, on portland cement concrete pavements, transverse joints, necessary to control cracking, should be saw cut to provide a smooth ride. On the other hand, skid resistance qualities should not be sacrificed for the sake of smoothness. Broom finish or burlap drag concrete surfaces are preferred over trowel finishes, for example.

In areas where climates are extreme, the effects of freeze-thaw cycles should be anticipated in the design phase. At unpaved highway or driveway crossings of bicycle paths, the highway or driveway should be paved a minimum of 10 feet on each side of the crossing to reduce the amount of gravel being scattered along the path by motor vehicles. The pavement structure at the crossing should be adequate to sustain the expected loading at that location.

Hard, all weather pavement surfaces are usually preferred over those of crushed aggregate, sand, clay, or stabilized earth since these materials provide a much lower level of service.

Good quality pavement structures can be constructed of asphaltic or portland cement concrete. Because of wide variations in soils, loads, materials and construction practices, it is not practical to present specific or recommended typical structural sections that will be applicable nationwide. Attention to the local governing conditions and to the principles outlined above is needed. Experience in highway pavement, together with sound engineering judgment, can assist in the selection and design of a proper bicycle path pavement structure and may identify energy conserving practices, such as the use of sulfur extended asphalt, asphalt emulsions and fused waste.

# Structures

An overpass, underpass, small bridge, drainage facility or facility on a highway bridge may be necessary to provide continuity to a bicycle path. An example of a small bridge structure used to provide bicycle path continuity is shown in Figure 12. A bicycle facility on a highway structure is shown in Figure 13.

On new structures, the minimum clear width should be the same as the approach paved bicycle path; and the desirable clear width should include the minimum 2 foot (0.6 m) wide clear areas. Carrying the clear areas across the structures has two advantages. First, it provides a minimum horizontal shy distance from the railing or barrier, and second, it provides needed maneuvering space to avoid conflicts with pedestrians and other bicyclists who are stopped on the bridge. Access by emergency, patrol, and maintenance vehicles should be considered in
establishing the design clearances of structures on bicycle paths. Similarly, vertical clearance may be dictated by occasional motor vehicles using the path. Where practical, a vertical clearance of 10 feet (3 m) is desirable for adequate vertical shy distance.

Railings, fences, or barriers on both sides of a bicycle path structure should be a minimum of 4.5 feet (1.4 m) high. Smooth rub rails should be attached to the barriers at handlebar height of 3.5 feet (1.1 m).

Bridges designed exclusively for bicycle traffic may be designed for pedestrian live loadings. On all bridge decks, special care should be taken to ensure that bicycle safe expansion joints are used.

Where it is necessary to retrofit a bicycle path onto an existing highway bridge, several alternatives should be considered in light of what the geometrics of the bridge will allow.

One option is to carry the bicycle path across the bridge on one side. This should be done where (1) the bridge facility will connect to a bicycle path at both ends, (2) sufficient width exists on that side of the bridge or can be obtained by widening or restriping lanes and (3) provisions are made to physically separate bicycle traffic from motor vehicle traffic as discussed above.

A second option is to provide either wide curb lanes or bicycle lanes over the bridge. This may be advisable where (1) the bicycle path transitions into bicycle lanes at one end of the bridge, and (2) sufficient width exists or can be obtained by widening or restriping.

A third option is to use existing sidewalks as one-way or two-way facilities. This may be advisable where (1) conflicts between bicyclists and pedestrians will not exceed tolerable limits and (2) the existing sidewalks are adequately wide. Under certain conditions, the bicyclist may be required to dismount and cross the structure as a pedestrian.
Because of the large number of variables involved in retrofitting bicycle facilities onto existing bridges, compromises in desirable design criteria are often inevitable. Therefore, the width to be provided is best determined by the designer, on a case-by-case basis, after thoroughly considering all the variables.

**Drainage**

The recommended minimum pavement cross slope of 2 percent adequately provides for drainage. Sloping in one direction instead of crowning is preferred and usually simplifies the drainage and surface construction. A smooth surface is essential to prevent water ponding and ice formation.

Where a bicycle path is constructed on the side of a hill, a ditch of suitable dimensions should be placed on the uphill side to intercept the hillside drainage. Such ditches should be designed in such a way that no undue obstacle is presented to bicyclists. Where necessary, catch basins with drains should be provided to carry the intercepted water under the path. Drainage grates and manhole covers should be located outside of the travel path of bicyclists. To assist in draining the area adjacent to the bicycle path, the design should include considerations for preserving the natural ground cover. Seeding, mulching, and sodding of adjacent slopes, swales and other erodible areas should be included in the design plans.
■ Lighting

Fixed-source lighting reduces conflicts along paths and at intersections. In addition, lighting allows the bicyclist to see the bicycle path direction, surface conditions, and obstacles. Lighting for bicycle paths is important and should be considered where riding at night is expected, such as bicycle paths serving college students or commuters, and at highway intersections. Lighting should also be considered through underpasses or tunnels, and when nighttime security could be a problem. Depending on the location, average maintained horizontal illumination levels of 0.5 foot-candle (5 lux) to 2 foot-candles (22 lux) should be considered. Where special security problems exist, higher illumination levels may be considered. Light standards (poles) should meet the recommended horizontal and vertical clearances. Luminaires and standards should be at a scale appropriate for a pedestrian or bicycle path.

■ Restriction of Motor Vehicle Traffic

Bicycle paths often need some form of physical barrier at highway intersections to prevent unauthorized motor vehicles from using the facilities. Provisions can be made for a lockable, removable post to permit entrance by authorized vehicles. The post should be permanently reflectorized for nighttime visibility and painted a bright color for improved daytime visibility. When more than one post is used, a 5-foot (1.5 m) spacing is desirable. Wider spacing can allow entry to motor vehicles, while narrower spacing might prevent entry by adult tricycles and bicycles with trailers.

An alternative method of restricting entry of motor vehicles is to split the entry way into two 5-foot (1.5 m) sections separated by low landscaping. Emergency vehicles can still enter if necessary by straddling the landscaping. The higher maintenance costs associated with landscaping should be acknowledged, however, before this alternative method is selected.

■ Multi-Use

In general, multi-use paths are undesirable; bicycles and pedestrians do not mix well. Whenever possible, separate bicycle and pedestrian paths should be provided. If this is not feasible, additional width, signing and striping should be used to minimize conflicts.

Providing a sidewalk bicycle path is unsatisfactory for a variety of reasons. Sidewalks are typically designed for pedestrian speeds and maneuverabilities and are not safe for higher speed bicycle use. Conflicts are common between pedestrians traveling at low speeds (or exiting stores, parked cars, etc.) and bicyclists, as are conflicts with fixed objects (e.g., parking meters, utility
poles, sign posts, bus benches, trees, fire hydrants, mail boxes, etc.) Walkers, joggers, skateboarders, and roller skaters can, and often do, change their speed and direction almost instantaneously leaving bicyclists insufficient time to react to avoid collisions.

Similarly, pedestrians often have difficulty predicting the direction an oncoming bicyclist will take. At intersections, motorists are often not looking for bicyclists (who are traveling at higher speeds than pedestrians) entering the crosswalk area, particularly when motorists are making a turn. Sight distance is often impaired by buildings, walls, property fences, and shrubs along sidewalks, especially at driveways.

Bicyclists riding on sidewalks can be expected in residential areas with young children. With lower bicycle speeds and lower motor vehicle speeds, potential conflicts are somewhat lessened, but still exist. This type of sidewalk bicycle use is generally accepted, but it may be inappropriate to sign a sidewalk as a bicycle path or bicycle route if to do so would prohibit bicyclists from using an alternate facility that might better serve their needs.

It is important to recognize that the development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel. Wide sidewalks encourage higher speed bicycle use and can increase potential for conflicts with motor vehicles at intersections, as well as with pedestrians and fixed objects.

It is also undesirable to mix mopeds and bicycles on the same facility. Where it is necessary to do so, the facility should be designed to account for the higher operating speeds of mopeds, the additional maneuvering requirements of mopeds, and the increased frequency of passing maneuvers. Many of the design guidelines prescribed in Chapter 2, "Bicycle Paths" (e.g., widths, speeds, horizontal alignments, grades, etc.) would be inadequate for facilities intended for moped use. Mopeds also contribute to a lessening of the quiet, relaxing experience most bicyclists desire on bicycle paths.

Using a path for bicycles and horses creates an unsatisfactory and possibly dangerous mix. Horses startle easily and may kick out suddenly if they perceive bicyclists as a danger. A bicycle path and a bridle path are also incompatible in their surface design requirements. Bicycles function best on hard surfaces; horses function best on soft surfaces. A compromise to accommodate both would result in a less than adequate surface for both.

During the winter months, where there is insufficient bicycle traffic to justify plowing snow, operators of bicycle paths may allow them to be used by cross country skiers or snowmobile operators.
Supplemental Facilities

Providing bicycle parking facilities is an essential element in an overall effort to promote bicycling. People are discouraged from bicycling unless adequate parking is available. Bicycle parking facilities should be provided at both the trip origin and trip destination and should offer protection from theft and damage.

The wide variety of bicycle parking devices fall into two categories of user needs: commuter or long-term parking, and convenience or short-term parking. The minimum needs for each differ in their placement and protection. Long-term parking is needed at locations such as employment centers, transit or subway stations, and multi-family dwellings. Facilities should be provided which secure the frame, both wheels, and accessories and which offer protection from the weather. Bicycle lockers and attended storage areas are good examples of long-term parking facilities. Short-term parking is needed at locations such as shopping centers, libraries, recreation areas, and post offices. Facilities should be very convenient and be near building entrances or other highly visible areas which are self policing. The facility should be designed so that it will not damage bicycles (bent rims are common with racks that only support one wheel). If bicycle parking is not properly designed and located, bicyclists will use trees, railings, and other appurtenances. This practice can damage the appurtenances and create an obstruction for pedestrians.

Several factors should be considered when planning and providing bicycle parking facilities. Care should be given in selecting the location to ensure that bicycles will not be damaged by motor vehicles. Parking facilities should not interfere with the normal pedestrian flow. Also, facilities should be designed so that persons parking their bicycles will not disturb other parked bicycles. The amount of security needed to prevent theft needs to be evaluated for each area.

Facilities should be able to accommodate a wide range of bicycle shapes and sizes including tricycles and trailers if used locally. Finally, facilities should be simple to operate. If possible, signs depicting how to operate the facility should be posted.

In addition to bicycle parking facilities, there are several other improvements that complement bicycle paths and roadway improvements. For example, on long, uninterrupted bicycle paths, turnouts or rest areas may be provided. Provisions should be considered for interfacing bicycle travel with public transit, such as racks on buses, buses converted to carry bicycles aboard, or allowing bicycles on rapid rail facilities. Printing and distributing bicycle route maps is a high benefit, low cost project that is easily accomplished.
Maps can help bicyclists locate bikeways, parking facilities, and identify the relative suitability of different segments of the road system. Also, maps can help bicyclists avoid narrow, high speed, or high volume roads, one-way streets, barriers, and other problems. In addition, maps can provide information on Rules of the Road, bicycle safety tips, and interfacing with mass transit.
Chapter 3  OPERATION and MAINTENANCE

The agency responsible for the control, maintenance, and policing of bicycle facilities should be established prior to construction. The costs involved with the operation and maintenance should be considered and budgeted for when planning a facility. Neglected maintenance will render bicycle facilities unrideable, and the facilities will become a liability to the state or community. Bicyclists should be encouraged to report bicycle paths and roadways needing maintenance. A central contact person with authority to authorize maintenance work should be designated to receive such reports.

Bikeways, and roadways with bicycle traffic are often susceptible to having debris, such as glass or sand, accumulate in the area where bicyclists ride; therefore, regular sweeping is necessary. A smooth surface, free of potholes and debris, should be provided. The pavement edges should be uniform and not have sharp dropoffs. Signs and pavement markings should be inspected regularly and kept in good condition. Highways with bicycle traffic may require a more frequent and a higher level of maintenance than other highways.

For bicycle paths, attention should be given to maintaining the full paved width and not allowing the edges to ravel. Trees, shrubs, and other vegetation should be controlled to provide adequate clearances and sight distances. Trash receptacles should be placed and maintained at convenient locations. Seeded and sodded areas in the vicinity of bicycle paths should have a regular schedule of mowing. If winter warrants snow removal, it should be in the form of plowing, since deicing agents and abrasives can damage bicycles. Also, enforcement is usually necessary to prevent unauthorized motor vehicles from using a bicycle path.

The routine maintenance of roadways provides an excellent opportunity to improve the bicycle travel on those roads. Several bicycle facilities described in this guide can be implemented during routine maintenance activities. When lane markings for four or six lane streets are restriped, consideration can be given to adjusting the lane widths and providing a wide curb lane for bicycles. Addition of edge lines can better delineate a shoulder, especially at night. When shoulders are resurfaced, a smooth surface suitable for bicycle riding should be considered.
APPENDIX

Review of Legal Status

Bicycle programs must reflect applicable laws and ordinances. Bicycle facilities must not encourage or require bicyclists, pedestrians, or motorists to operate in a manner inconsistent with the adopted Rules of the Road as described in Chapter 11 of the *Uniform Vehicle Code*.

The National Committee on Uniform Traffic Laws and Ordinances, a group of more than 140 individuals involved in the complex problems of highway transportation, has developed and recommended the Uniform Vehicle Code (UVC) as a comprehensive guide or standard for state motor vehicle and traffic laws. In addition, the provisions of the Model Traffic Ordinance (MTO) have been designed as a guide for municipalities to follow in considering the development or revision of their traffic ordinances. Since bicycles are defined as vehicles, familiarity with the provisions in the UVC and MTO is important when developing bicycle facilities. The UVC and state and local laws and ordinances should be reviewed before decisions are made on the type of facilities desired. Sections 1-158, 11-201, 11-313, 11-1202, 11-1205, 11-1205.1, 11-1209, and 11-1210 of the UVC should be compared with corresponding state and municipal provisions.
REFERENCES


COLORADO STATE UNIVERSITY

BIKEWAYS LONG RANGE PLAN

APPENDIX D

Colorado State University Bicycle Regulations, January 1995
COLORADO STATE UNIVERSITY BICYCLE REGULATIONS

I. INTRODUCTION

A. BICYCLE EDUCATION and ENFORCEMENT PROGRAM (BEEP)

The purpose of BEEP is to educate bicyclists and enforce rules and regulations pertaining to the operation of bicycles, and skateboards on campus. The goal of the program is to provide a safe traffic environment so that all modes of transportation can coexist.

BEEP is a unit of the Colorado State University Police Department (CSUPD). Administration of the program is the responsibility of the BEEP Coordinator who is assigned by the Chief of Police. Enforcement is the responsibility of Patrol supervisors via the commander of the Patrol Division.

1. Enforcement - includes targeting specific violations and/or locations as recommended by the BEEP coordinator based on violation trends, complaints, accidents, circulation patterns, road and weather conditions and other factors.

2. Education - is achieved through brochures, media releases, personal contact at bicycle licensing sessions and enforcement warning periods, and a bicycle safety seminar hosted by the Choice City Coalition for Cycling (C4), among other efforts.

The BEEP Coordinator, with the knowledge and approval of the Chief of Police, has discretionary authority to establish police department policies and procedures consistent with the purpose and goals of the program, which are subject to review by the BEEP Advisory Board.

B. BEEP ADVISORY BOARD

The BEEP Advisory Board will meet at least twice per year. This board will review current regulations, policy and procedures, safety issues and circulation conditions on campus and make recommendations to the BEEP Coordinator and the Chief of Police for revisions.
The board will consist of 2 undergraduate students, 2 graduate students, 1 faculty, 1 administrative professional, 1 state classified staff, a representative from BEEP, a member of the University Safety Committee and a representative from an appropriate City department, all appointed as active representatives by their respective constituent organizations.

The term lengths for board members will be 2 years.

C. SCOPE OF REGULATIONS

Colorado State Bicycle Regulations supplement all state laws (herein referred to as CRS), the Model Traffic Code as adopted by the City of Fort Collins (herein referred to as MTC), and all applicable City ordinances.

These Bicycle Regulations are in effect at all times and apply to all persons while on the Colorado State campus. Visitors are subject to citations that may result in an appearance before a state or municipal judge. Faculty, staff and students are subject to university violation notices that may result in an appearance before a Judicial Affairs officer and/or a Bicycle Regulations hearing officer.

D. GRANTING AUTHORITY

Colorado Revised Statute (CRS) 23-5-106 gives the governing board of any state institution of higher education the authority to promulgate rules and regulations for the safety and welfare of students, employees and property.

CRS 23-5-107 gives the governing board of any state institution of higher education the authority to promulgate rules and regulations providing for the operation and parking of vehicles upon the grounds, driveways, or roadways within the property under the control of the governing board.

Colorado State Bicycle Regulations are approved by the State Board of Agriculture in accordance with the authority granted by these statutes.
II. DEFINITIONS

A. Bicycle means any device propelled solely by human power upon which a person can ride, which may have one or more wheels. CRS classifies a bicycle as a vehicle.

B. Skateboard means any device consisting of a footrest mounted on wheels less than fourteen inches (14") in diameter, upon which a person may ride, that is propelled solely by human power. This includes rollerskates and in-line skates (rollerblades).

C. Bicycle License means the uniquely numbered adhesive sticker purchased from the university police department and supplied as evidence of bicycle registration.

D. Dismount Zone means and includes all areas of the University posted for no bicycle riding and marked with ground graphics and/or "Dismount" signs. All Dismount Zones apply to skateboards as well.

1. Dismount is defined as "walking beside the bicycle with both feet off the pedals at the same time."

E. Bicycle Lane means a portion of a roadway designated for bicycles distinguished by a paint stripe, ground graphics, curb or similar device.

F. Bicycle Path means a separate path, trail or portion of a sidewalk completely separated from the roadway, used primarily for bicycles.

G. Sidewalk means a pathway constructed primarily for use by pedestrians.

H. Visitor includes all persons not classified as faculty, staff or students of Colorado State University.

I. Pedestrian is any person afoot, or any person with mobility impairment who may need a mechanical device for transportation.
J. **Police Bicycle** is a bicycle with special equipment operated by a police officer which may be exempt from parking and moving regulations.

K. **CSU Business Day** is a day the University is open for business even though classes may not be scheduled.

L. **Bicycle Violation Notice** is the printed form completed by the police officer (or police department employee) that serves notice and information to a person alleged to have committed a violation of these Bicycle Regulations.

### III. BICYCLE REGISTRATION

#### A. REGISTRATION REQUIRED

All bicycles *ridden* or *parked* on the Colorado State campus must be registered with the CSUPD. An exception will be made for bicyclists who are *visitors* to campus. The registration decal will also be known as a bicycle (or bike) license, which is valid for 5 years.

#### B. COST

Effective August 1993 the cost of registration is $5.00. The cost is subject to change by approval of the Chief of Police after hearing recommendations by the BEEP Advisory Board.

#### C. TRANSFER OF REGISTRATION

If ownership of a registered bicycle changes the *new owner* is to notify CSUPD if they are faculty, staff or a student of Colorado State. Registrations are not transferable and the new owner must register the bicycle under their name. The new (or previous) owner must also insure that an old bicycle license has been removed when possession of the bicycle has changed. Only one CSU bike license can be affixed to any bicycle at one time.

If a bicycle is stolen, lost or destroyed the owner should notify CSUPD so that a notation can be made on the registration form.
If the bicycle is stolen it is highly recommended that the owner make a police report.

D. REGISTRATION FORM

The registration form provided by CSUPD should be completed with all information requested. The serial number of the bicycle must be recorded. If the bicycle does not have a serial number it is the responsibility of the registrant to select a unique number and have it inscribed on the frame. A Colorado State ID number is recommended.

E. LICENSE ATTACHMENT

The license decal is supplied with an adhesive backing to be attached to the main frame on the center post of the bicycle below the seat. The license is to be affixed so that it is clearly visible.

IV. MOVING REGULATIONS

A. MOTOR VEHICLE TRAFFIC LAWS APPLY

Every person riding a bicycle is required to obey the same applicable traffic regulations as the driver of an automobile including those set aside specifically for bicycles. Bicyclists and skateboarders are also required to obey all traffic control devices specific to this campus.

B. PEDESTRIAN RIGHT-OF-WAY

1. Pedestrians have the right-of-way on all sidewalks and crosswalks.

2. Bicyclists and skateboarders must give an audible signal before overtaking a pedestrian. An audible signal can be a bell, horn or voice - anything to alert a pedestrian of an approaching bicycle or skateboard and the direction they are going.
C. SPEED LIMITS

Bicyclists will obey the posted speed limits of 20 miles per hour on campus streets and 10 miles per hour in parking lots. When riding on a bicycle path or other area shared with pedestrians, a bicyclist or skateboarder will not exceed a speed that is reasonable and prudent with respect to visibility, traffic, weather and surface conditions, but in any case will be less than the speed allowed on campus streets and parking lots.

D. RIDING PROHIBITED

Bicyclists will use roadways, bicycle lanes and (skateboarders may use) paths and other maintained ways, unless otherwise posted, and will not infringe upon landscaped areas or any other areas that are under cultivation. This includes benches, stairs, or other architectural components.

Bicyclists will not ride on those sidewalks that are adjacent to streets, unless posted otherwise. Other sidewalks may be used providing that bicyclists yield right-of-way to pedestrians. Bicyclists and skateboarders will dismount on any sidewalk where riding is impractical due to heavy pedestrian use or other conflict.

Per university policy, skateboards may not be used inside buildings or in posted areas of the campus. Police officers or other university officials may impound a skateboard (for no longer than necessary) to determine identity of the user and/or to facilitate contact with a parent in the case of a juvenile violator.

E. RIDING AT NIGHT

When riding at night (between sunset and sunrise), anywhere on campus, bicycles will be equipped with a light that is visible for a distance of 500 feet to the front and a reflector that is visible from 600 feet to the rear in the lower beams of an approaching car.
F. POLICE BICYCLES

A police bicycle may be used to respond to emergencies or pursue violators. In those circumstances officers are exempt from the provisions set forth in these regulations except that they must use due regard for the safety of others (consistent with CRS 42-4-106) and give audible signals to alert others while exercising these privileges when appropriate.

V. PARKING REGULATIONS

A. PARKING PERMITTED

Bicycles will be parked only at bicycle racks, bicycle garages or other approved bicycle parking areas unless they are stored within the residence of the owner or authorized user. In order to promote security, bicycles should be locked to the rack.

The use of bicycle racks are provided on a "first come, first served" basis. Registration of a bicycle does not guarantee a space in a bicycle rack.

Police bicycles may be parked in violation of regulations to allow officers quick response to calls/circumstances.

B. PARKING PROHIBITED

Bicycles will not be parked in any University building unless authorized.

The following areas are not to be used for bicycle parking; landscaped areas or areas under cultivation, service driveways, building entrances, driveways, bikeways, walkways, ramps or any other passageway to which emergency equipment, wheelchairs, pedestrians or service equipment may need access.

The following objects are not to be used for bicycle parking; trees, plants, signs, fences, railings, posts, fire hydrants, buildings or other objects either living or artificial other than bicycle racks or bike garages.
C. ABANDONMENT

A bicycle will be considered abandoned if it has not been moved after 7 days, and will be subject to impoundment. Reasonable efforts will be made to advise the owner that the bicycle is subject to abandonment status and subsequent impoundment if it is not moved or claimed.

D. IMPOUNDMENT/SAFEKEEPING

When a bicycle is abandoned, found or is in violation of Colorado State bicycle regulations any University police officer, or other person authorized by the Chief of Police, may remove the lock or securing mechanism, if necessary, and impound or provide safekeeping of the bicycle. Whenever practical the bicycle may be "field impounded" (secured with a police department lock at the location).

A bicycle owner can appeal any fees/fines incurred as a result of their bicycle being impounded (See VII. C.).

E. LIABILITY/TAMPERING

The University will not be liable to the owner of the bicycle or owner of the lock/securing mechanism for the cost of repair or replacement of any property caused as a result of safekeeping/impoundment. Tampering with a bicycle (and/or police department lock) that has been impounded may subject the owner or other person to additional sanctions, including criminal charges.

F. RELEASE

The release of a impounded bicycle requires a person to:

1. provide proof of ownership,
2. pay impound fees (see FINES/FEES {paragraph VI}),
3. pay any outstanding violation notices,
4. register the bicycle (if necessary).
Impounded bicycles will be held for a minimum of 90 days before being sent to Surplus Property for disposal at auction. A reasonable attempt will be made to contact the owner during this time. Severely damaged or inoperable bicycles will be disposed of within 30 days.

VI. VIOLATIONS/FINES/FEES

Violation of any Colorado State bicycle regulation may result in the issuance of a University Bicycle Violation Notice to the owner and/or operator of a bicycle or skateboard on the Colorado State campus.

A. SAFETY VIOLATIONS

The following actions are considered to be safety violations and subject the violator to a $15.00 fine:

1. Riding in a Dismount Zone
2. Failure to obey traffic control device (to wit:)
3. Rode the wrong way on a one way street or zone
4. Rode without lighting equipment
5. Riding double (single seat bicycle)
6. Failed to yield right-of-way
7. Failed to signal
8. Clinging to moving vehicle
9. Riding on/in a landscaped area
10. Riding on a sidewalk as described in IV. D.

Other moving violations, as defined by CRS and MTC, are considered safety violations as well and may be cited by the officer.

More than one safety (and/or parking) violation can be cited on the same Violation Notice.

B. ACCIDENTS

All traffic accidents involving a bicycle are subject to a police investigation if required by law. Bicyclists may be subject to a county or municipal summons in these cases. In those cases where formal investigation is not
required and the accident is a result of a safety violation, the fine will be doubled for that violation only.

C. PARKING VIOLATIONS

The following actions are considered to be parking violations and subject the violator to a $8.00 fine;

1. Operated or parked without a required license
2. Parked in a university building or other no parking area as described in paragraph V (B).

D. OTHER VIOLATIONS

Attached bicycle to a handicap ramp/accessway - $25.00.
Provided false information/identification - $50.00.
Disobeyed a police officer - $50.00.

E. OTHER SANCTIONS

In addition to the issuance of a Bicycle Violation Notice, violators may also be referred for appropriate University discipline within their constituency groups for repeated violations, personal conduct or other issues of concern.

F. FINE/FEE SCHEDULES

Fines for violations of bicycle regulations were established and approved August 1, 1993. Changes to the fine schedule can be requested of the State Board of Agriculture via recommendations of the BEEP Advisory Board and Chief of Police.

Fees for police department services are set by the Chief of Police. Impound fees include storage charges and a fee for removing a lock or securing mechanism.
VII. HANDLING A VIOLATION NOTICE

A. PAYMENT

The fine can be paid within eight (8) CSU business days of the issuance of the notice.

B. SAFETY SEMINAR

Persons suspected of violating a safety regulation(s) can choose to attend a Bicycle Safety Seminar. These seminars are generally held once a month. The person must sign up for a seminar within eight (8) CSU business days after issuance of the Bicycle Violation Notice.

Persons attending the seminar will have their fine reduced by half. If a person signs up for a seminar but fails to attend, the original fine doubles. If they attend but fail to pay the halved amount within 8 CSU business days, the fine returns to the original amount.

A person may only attend one safety seminar.

C. APPEAL PROCESS

The Bicycle Violation Notice may be appealed in one of the following two ways:

1. Written Appeal - A written appeal must be filed to the BEEP coordinator within eight (8) CSU business days of issuance of the Bicycle Violation Notice. Initiation of an appeal stays the penalty until a ruling is made. A hearing referee will consider the written appeal and information on the notice, including written comments by the officer, and make a decision to uphold the charge or dismiss the notice.

Written appeals will be considered during the next scheduled oral appeals session. The person appealing will be notified within five (5) CSU business days of the decision after the date the appeal was considered.
2. Oral Hearing - the person appealing may choose to have an oral hearing before the hearing referee. A request for an oral appeal must be filed to the BEEP coordinator within eight (8) CSU business days. A request for an oral appeal stays the penalty until a ruling is made or the person fails to appear at the hearing. The person appealing will be notified of the time and location of the hearing.

The person appealing will be able to present evidence and/or witnesses. The officer that issued the Bicycle Violation Notice may be called to testify but is not required to attend unless the person appealing requests otherwise. A hearing referee may consider information on the notice including written comments made by the officer. The burden of proof in the appeal rests with the officer or employee signing the notice.

If an officer is requested to attend an oral hearing, s/he will be given a minimum of five (5) CSU business days notice (by BEEP staff) and the appeal will be scheduled accordingly.

3. Impoundment appeals - are handled in the same manner as bicycle violation notice appeals. A bicycle owner may make a written or oral appeal to recover any fees that were charged as a result of their bicycle being impounded. To be able to file an appeal, fees and fines must be paid prior to the bicycle being released.

4. Hearing fees - a hearing fee of up to $10.00 per Bicycle Violation Notice (to a maximum of $25.00 per appeal hearing) will be assessed for notices that are upheld in the hearing process. This applies to both written and oral appeals.

5. Closure - the hearing referee's decision on the matter in both written and oral appeals is final and not subject to additional administrative appeal.
D. ADDITIONAL SANCTIONS

If the fine is not paid, an appeal filed or the person fails to sign up for a safety seminar within eight (8) CSU business days of issuance of a Violation Notice, the fine will double. Delinquent faculty and staff fines will be deducted from the employee's paychecks. Delinquent student fines will be sent to Accounts Receivable for collection and/or may subject the student to denial of registration, transcripts and diplomas.

Revised January 1995
Traffic Controls for Bicycle Facilities from Manual of Uniform Traffic Control Devices (MUTCD)
PART IX. TRAFFIC CONTROLS FOR BICYCLE FACILITIES

A. GENERAL

9A-1 Requirements for Bicyclist Traffic Control Devices

Traffic control devices, whether they are intended for motorists or bicyclists, must adhere to five basic requirements to be able to perform their intended function. They must:

1. Fulfill a need.
2. Command attention.
3. Convey a clear, simple meaning.
4. Command respect of road users.
5. Give adequate time for proper response.

The design, placement, operation, maintenance, and uniformity of traffic control devices must be considered to meet the above requirements. Design is a critical feature to permit the device to fulfill a need and to command respect of road users. The placement—lateral, vertical, and longitudinal—plays an important part in making the device effective and in giving adequate time for proper response. The operation of traffic in response to the device is, of course, the critical test of the device’s effectiveness and a check on all five of the basic requirements.

Uniformity, achieved by following the recommendations and standards of this Manual, greatly enhances the ability of a device to convey a clear, simple meaning to the user.

Whenever devices are installed, they should be warranted and based on a prior engineering study. Where the guidance provided by this part of the Manual does not fully define where particular devices should be used, qualified traffic engineers should determine the application of devices on any bicycle facility before installation is made. It is intended that this Manual define the standards for traffic control devices, but shall not be a legal requirement for their installation.

9A-2 Scope

This Part covers bicycle-use related signs, pavement markings and signals which may be used on highways or bikeways.
9A-3 Definitions Relating to Bicycles

The following terms are used throughout Part IX:

1. Bikeway—Any road, street, path, or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

2. Bicycle Trail—A separate trail or path from which motor vehicles are prohibited and which is for the exclusive use of bicycles or the shared use of bicycles and pedestrians. Where such trail or path forms a part of a highway, it is separated from the roadways for motor vehicle traffic by an open space or barrier.

3. Designated Bicycle Lane—A portion of a roadway or shoulder which has been designated for use by bicyclists. It is distinguished from the portion of the roadway for motor vehicle traffic by a paint stripe, curb, or other similar device.

4. Shared Roadway—A roadway which is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.

5. Bicycle Route—A system of bikeways designated by appropriate route markers, and by the jurisdiction having authority.

9A-4 Standardization of Devices

Standards for basic design elements and devices using these standards are given in this Manual. These standard devices generally will serve most applications. Where particular conditions require the use of a device that is not included in this Manual, the general principles in this Manual as to color, size, and shape should be followed wherever practical. Such devices should also follow the design, installation and application concepts contained in the Manual.

9A-5 Maintenance

Bicycle signs and markings should be properly maintained to command respect from both the motorist and the bicyclist. When installing signs and markings on bicycle facilities, care should be taken to have an agency designated to maintain these devices.

9A-6 Placement Authority (Refer to Section 1A-3.1)

9A-7 Meanings of “Shall,” “Should,” and “May”

In this Part as in other parts of the Manual, the words “shall,” “should,” and “may” are used to describe specific conditions concerning traffic control devices. To clarify the meanings intended by use of these words, the following definitions are provided:

1. SHALL—A mandatory condition. Where certain requirements in the design or application of the device are described with the “shall” stipulation it is mandatory that these requirements be met.

2. SHOULD—An advisory condition. Where the word “should” is used, it is considered to be advisable usage, recommended but not mandatory.

3. MAY—A permissive condition. No requirement for application is intended. If a particular device is used under a “may” condition, however, its design shall follow the prescribed format.

9A-8 Relation to Other Documents

The Uniform Vehicle Code and Model Traffic Ordinance published by the National Committee on Uniform Traffic Laws and Ordinances, have provisions for bicycles and are used as the legal basis for the control devices included herein. Under the Uniform Vehicle Code, bicycles are generally considered to be vehicles, so the bicyclists have the same privileges and obligations as other drivers.

Informational documents used during the development of the signing and markings recommendations in this part of the Manual include the following:


5. State and municipal design guides.

Other documents which relate to the application of traffic control devices in general, are listed in section 1A-7 of this Manual.

9A-9 Colors

The use of colors for bicycle facility traffic control devices should conform to the color code specified in section 1A-8 for signs and markings. This in part is as follows:

YELLOW—General warning.

RED—Stop or prohibition.

BLUE—Service guidance.

GREEN—Indicated movements permitted, direction guidance.

BROWN—Public recreation and scenic guidance.

ORANGE—Construction and maintenance warning.

BLACK—Regulation.

WHITE—Regulation.
B. SIGNS

9B-1 Application of Signs

Bicycle-use related signs on highways and bikeways serve three basic purposes: regulating bicycle usage, directing bicyclist along preestablished routes, and warning of unexpected conditions. Care should be taken not to install too many signs. A conservative use of regulatory and warning signs is recommended as these signs, if used to excess, tend to lose their effectiveness. The frequent display of guide signs, however, aids in keeping the bicyclist on the designated route and does not lessen their value. Some signs for the bicyclist can also serve the motorist and the pedestrian.

9B-2 Location and Position

Where signs are to serve both bicyclists and motorists, mounting heights and lateral placement shall be as specified in Part II, Signs, Figure 9-1 illustrates typical signing placement for bicycle trails. Overhead sign clearance on bicycle trails shall be a minimum of 8 feet. The clearance provided should also be adequate for the typical maintenance vehicles used on the bikeway. Where signs are for the exclusive use of bicyclists, care should be taken that they are located so that motorists are not confused by them.

![Figure 9-1. Bicycle sign placement on a trail.](image)

9B-3 Design

The design of signs for bicycle facilities should, whenever possible, be identical to that specified in this Manual for motor vehicle travel. Uniformity in design includes shape, color, symbols, wording, lettering, and illumination or reflectorization. Detailed drawings of the standard
signs illustrated in this Manual are available to State and local highway and traffic authorities, sign manufacturers, and similar interested agencies. Standardization of these signs does not preclude further improvement by minor changes in the proportion of symbols, stroke width, and height of letters, or width of borders. However, all shapes and colors shall be as indicated, all symbols shall be unmistakably similar to those shown and (where a word message is applicable) the wording shall be as provided herein.

The sign dimensions shown in this part of the Manual shall be considered standard for application on all types of bicycle facilities. Where signs shown in other parts of this Manual are intended for exclusive bicycle use, smaller sign sizes from that specified may be used. Incremental increases in special bicycle facility signs are also desirable to make the signs compatible with signs for motor vehicles, where both motorists and bicyclists benefit by a particular sign.

The sign lettering shall be in upper-case letters of the type shown in the Standard Alphabets for Highway Signs Markings.*

All signs should be reflectorized for bicycle trails as well as for shared roadway and designated bicycle lane facilities.

9B-4 Regulatory Signs

Regulatory signs are to inform bicyclists, pedestrians and motorists of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.

Regulatory signs normally shall be erected at the point where the regulations apply. The sign message shall clearly indicate the requirements imposed by the regulations and shall be easily visible and legible to bicyclists and where appropriate, motorists and pedestrians.

9B-5 Bicycle Prohibition Sign (R5–6)

This sign is intended for use at the entrance to facilities, such as freeways, where bicycling is prohibited. Where pedestrians and motor-driven cycles are also prohibited from using these facilities, it may be more desirable to use the R5–10a word message sign (sec. 2B–28).

In reduced size (18 × 18 inches), this sign may be used on sidewalks where bicycle riding is prohibited.

9B-6 Motor Vehicle Prohibition Sign (R5–3)

This sign is intended for use at the entrance to a bicycle trail.

* Available from the Federal Highway Administration (HTO–20), Washington, D.C., 20590.
9B-7 Bicycle Restriction Signs (R9-5 & 6)

This series of signs is intended for use where pedestrian facilities are being used for bicycle travel. They should be erected off the edge of the sidewalk, near the crossing location, where bicyclists are expected to dismount and walk with pedestrians while crossing the street.

The R9-5 sign may be used where bicycles can cross the street only on the pedestrian walk signal indication.

The R9-6 sign may be used where bicycles are required to cross or share a facility used by pedestrians and are required to yield to the pedestrians.

9B-8 Designated Lane Signs (R3-16 & 17)

The R3-16 sign should be used in advance of the beginning of a marked designated bicycle lane to call attention to the lane and the possible presence of bicyclists. The R3-16 and R3-17 signs should be used only in conjunction with the Preferential Lane Symbol pavement marking and erected at periodic intervals along the designated bicycle lane and in the vicinity of locations where the preferential lane symbol is used (sec. 9C-4).

Where appropriate, the message ENDS may be substituted for AHEAD on the R3-16 sign and LEFT or CURB can be substituted for RIGHT on the R3-17 sign.

9B-9 Travelpath Restriction Signs (R9-7)

The R9-7 sign is intended for use on facilities which are to be shared by pedestrians and bicycles and on which a designated area is provided for each (sec. 9C-3). Two of these signs may be erected back-to-back with the symbols reversed for the opposite direction.

9B-10 STOP and YIELD Signs (R1-1,2)

STOP signs are intended for use on bicycle facilities where bicyclists are required to stop. Where conditions require bicyclists and not motorists to stop, care should be taken to place the sign so it is not readily visible to the motorists.

YIELD signs are intended for use where the bicyclist can see approaching traffic and where bicyclist must yield the right of way to that traffic. The visibility of approaching traffic must be adequate to permit the bicyclist to stop or to take other measures to avoid that traffic.

For added emphasis STOP and YIELD signs in regular 30 × 30-inch and 36 × 36 × 36-inch sizes may be used.

The smaller signs shown below are intended for use on bicycle trails where bicyclists are required to stop or yield the right of way. If the sign applies to motorists and bicyclists, then the size should be as shown in Part II-B.
9B-11 No Parking Signs (R7-9, & 9a)
Where it is necessary to restrict parking, standing, or stopping in a designated bicycle lane, appropriate signs as described in sections 2B-31 through 2B-33 may be used, or signs R7-9 or R7-9a shall be used.

9B-12 Lane-Use Control Signs (R3-7, R4-4)
Where right turning motor vehicles must merge with bicycle traffic on designated bike lanes, the R3-7 and R4-4 signs may be used. The R4-4 sign is intended to inform both the motorist and the bicyclist of this merging maneuver. Where a designated bicycle lane is provided near the stop line, an R3-7 sign may be used to prevent motorists from crossing back over the bike lane.

9B-13 Warning Signs
Warning signs are used when it is deemed necessary to warn bicyclists or motorists of existing or potentially hazardous conditions on or adjacent to a highway or trail. The use of warning signs should be kept to a minimum because the unnecessary use of them to warn of conditions which are apparent tends to breed disrespect for all signs.

Warning signs specified herein cover most conditions that are likely to be met. If other warnings are needed, the signs shall be of standard shape and color for warning signs, and the legends shall be brief and easily understood.

9B-14 Bicycle Crossing Sign (W11-1)
The Bicycle Crossing sign is intended for use on highways in advance of a point where a bikeway crosses the roadway. It should be erected about 750 feet in advance of the crossing location in rural areas where speeds are high, and at a distance of about 250 feet in urban residential or business areas, where speeds are low.

If the approach to an intersection is controlled by a traffic control signal, stop sign or yield sign, the W11-1 sign may not be needed.

9B-15 Hazardous Condition Sign (W8-10)
The Hazardous Condition sign is intended for use where roadway or bicycle trail conditions are likely to cause a bicyclist to lose control of his bicycle. These conditions could include slippery pavement, slick bridge decking, rough or grooved pavement, or water or ice on the roadway. The W8-10 sign may be used with a supplemental plaque describing the particular roadway or bicycle trail feature which might be of danger to the bicyclist such as SLIPPERY WHEN WET, STEEL DECK, ROUGH PAVEMENT, BRIDGE JOINT, or FORD.
9B-16 Turn and Curve Signs (W1-1,2,4,5,6,7)
On bicycle trails where it is necessary to warn bicyclists of unexpected changes in path direction, appropriate turn or curve signs should be used. They should normally be installed no less than 50 feet in advance of the beginning of the change of alignment.

9B-17 Intersection Signs (W2-1, 2, 3, 4, 5)
Intersection signs are intended for use as appropriate to fit the prevailing geometric pattern on bike trails where connecting routes join and where no STOP or YIELD signs are required. They should be used wherever sight distance at the intersection is severely limited, and may be used for supplemental warning at intersections where STOP and YIELD signs are erected.

9B-18 Other Warning Signs
Other warning signs may be required on bicycle facilities to warn riders of unexpected conditions. The intended use of these signs generally is self-explanatory. They should normally be installed no less than 50 feet in advance of the beginning of hazards.

Where construction or maintenance activity is present on bicycle trails, appropriate signs from Part VI of the Manual should be used.

9B-19 Guide Signs
On highways where a bicyclist is sharing a lane with motor vehicles or is using an adjacent bikeway, the regular guide signing as described in Part II of this Manual will serve both modes of travel. Where a designated bikeway exists, special bicycle route signing should be provided at decision

- STOP AHEAD
- BIKEWAY NARROWS
- W3-1
  18" x 18"
- W3-3
  18" x 18"
- W5-4
  18" x 18"
- W7-6
  18" x 18"
- W11A-2
  18" x 18"
- W12-2
  18" x 18"
- R
  18" Diameter
- W10-1
points along the bikeway, including signs to inform cyclists of bicycle route direction changes and confirmatory signs to ensure that route direction has been accurately comprehended.

Figure 9-2 shows an example of the signing for the junction of a bicycle trail with a highway. Figure 9-3 shows the signing and marking for the beginning and ending of designated bikeways. Guide signing should be repeated at regular intervals to ensure that bicyclists approaching from side streets know they are traveling on an officially designated bikeway. Similar guide signing should be used for shared lane bikeways with intermediate signs placed frequently enough to ensure that cyclists already on the bikeway do not stray from it and lose their way.

9B-20 Bicycle Route Sign (D11-1)
This sign is intended for use where no unique designation of routes is desired. It should be placed at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

9B-21 Bicycle Route Markers (M1-8, M1-9)
Where it is desired to establish a unique identification (route designation) for a State or local bicycle route, the standard Bike Route Marker (M1-8) should be used. The route marker (M1-8) shall contain a numerical designation and shall have a green background with a reflectorized white legend and border.

Where a bicycle route extends for long distances in two or more States, it is desirable to establish a unique numerical designation for that route. A coordinated submittal by the affected States for assignment of route number designations should be sent to the American Association of State Highway and Transportation Officials, 444 North Capitol Street NW, Suite 225, Washington, D.C. 20001. The route marker (M1-9) shall contain the assigned numerical designation and have a black legend and border with a reflectorized white background.

Bike Route Markers are intended for use on both shared facilities and on designated bikeways, as required, to provide guidance for bicyclists.
9B-22 Supplemental Plaques for Route Signs and Route Markers

Where desired, supplemental plaques can be used with the D11-1 and M1-8 signs to furnish additional information, such as directional changes in the route, and intermediate range distance and destination information. The M4-11 through M4-13 signs may be mounted above the appropriate Route Signs or Route Marker. Supplemental plaques D1-1b and c are intended for use with the D11-1 Bicycle Route Sign. The appropriate arrow sign (M7-1 through M7-7), if used, should be placed below the Route Sign or Route Marker. These signs shall have a white arrow on a green background.

Figure 9-3. Typical signing for beginning and ending of designated bicycle lane.

9B-12
23 Bicycle Parking Area Sign (D4-3)
The Bicycle Parking Area sign may be used where it is desired to show
direction to a designated bicycle parking area within a parking facility
at other locations. The sign shall be a vertical rectangle of a standard
of 12 by 18 inches. It shall carry a standard bicycle symbol, the word
PARKING, and an arrow. The legend and border shall be green on a
ectorized white background.

IX-2 (c)

C. MARKINGS

9C-1 Functions and Limitations of Markings
Markings are important on roadways that have a designated bicycle
lane. Markings indicate the separation of the lanes for motor vehicles and
bicycles, assist the bicyclist by indicating assigned travel paths, and can
provide advance information for turning and crossing maneuvers.

9C-2 General Principles
Although bicycles are generally not equipped with strong lighting
equipment, the added visibility of reflectorized pavement markings is
desirable even where there is exclusive use by bicyclists.

Markings shall be reflectorized on bicycle trails and on facilities used by
both motor vehicles and bicycles.

Recognized bikeway design guides should be used when laying out
markings for a bicycle lane on a highway facility (sec. 9A-8).

The frequent use of symbols and word messages stenciled in the bike
lanes, is a desirable method of supplementing sign messages. Figures 9-4
through 9-6, show acceptable examples of the application of lines, word
messages and symbols on designated bikeways with and without parking
for motor vehicles.

If a specific path for a bicyclist crossing an intersection is to be
designated, a dotted line may be used to define such a path.

9C-3 Marking Patterns and Colors
The color and type of lines used for marking bicycle facilities shall be as
defined in section 3A-7. Normally, center lines would not be required on
bicycle paths. Where conditions make it desirable to separate two
directions of travel at particular locations, a double solid yellow line
should be used to indicate no passing or no traveling to the left of the line.

Where bicycle paths are of sufficient width to designate two minimum
width lanes, a broken yellow line may be used to separate the two
directions of travel.

Broken lines used on bicycle paths should have the normal 1 to 3
segment-to-gap ratio. To avoid having gaps excessively long, a nominal
3-foot segment with a 9-foot gap is recommended.

Where bicycles and pedestrians use a common facility, it may be desired
to separate the two traffic flows. A solid white line should be used to mark
this separation of path use. The R9-7 sign may be used to supplement the
pavement marking (sec. 9B-9).
9C-4 Marking of Designated Bikeways

The diamond-shaped Preferential Lane Symbol is intended for use on highway facilities where lanes are reserved for exclusive use by a particular class of vehicle. Designated bikeways are considered as this type of lane and shall include use of the Preferential Lane Symbol as a pavement marking and on appropriate signing (sec. 9B-8). The symbols as a pavement marking shall be white and shall be used immediately after an intersection to inform motorists turning of the restricted nature of the lane. If the Preferential Lane Symbol is used in conjunction with other word or symbol messages, it shall precede them. A supplemental lane symbol or word may be used following as shown in figures 9-4 through 9-6.

9C-5 Word Messages and Symbols Applied to the Pavement

Where messages are to be applied on the pavement, smaller size letters can be used on exclusive bike lanes than are used on regular highways. Where arrows are needed, half-size layouts of the arrows can be used (sec. 3B-17). Optional word and symbol markings considered appropriate for use with the Preferential Lane Symbol marking are shown in figure 9-6. Standard pavement marking alphabets and symbols have been prepared.*

9C-6 Object Markings on Bicycle Trails

There may be hazardous objects located adjacent to bicycle trails which, if visible to the rider, can be avoided with little difficulty. Such objects can be marked with highly visible markings to make their identification by approaching riders more certain. Care should be taken to avoid having object markers become hazardous objects. Corners of object markers as well as designs should be rounded to prevent their becoming a hazard. All object markers should be designed using reflective materials or coatings. Where practical, markers such as those described in section 3C-1 of this Manual should be used.

* Available from the Federal Highway Administration (HTO-20), Washington, D.C. 20590.
Where a storm drain hazard cannot be eliminated, it may be made more visible to bicyclists by defining with a white marking applied as shown in figure 9-7.

![Diagram of storm drain hazard with white marking](image)

**Figure 9-7. Typical marking in advance of drainage hazard.**

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**D. SIGNALS**

9D-1 Application

It is rare when a traffic signal is installed solely for bicyclists; however, at some locations there may be a need to install signal devices to facilitate bicycle travel through the intersection. For warrants and other requirements relating to signal installations, see Part IV of this Manual. Warrants used for motor vehicles are considered appropriate for use in determining the need for signals to serve bicyclists. Warrant Four for school crossings is considered to be appropriate for bicyclists also.

9D-2 Visibility Requirements

At installations where programmed signals are used, special attention should be given to adjusting the signals so bicyclists on the regular bicycle lanes or travel paths can see the signals. If programmed signals cannot be aimed to serve the bicyclist, then separate signals shall be provided.

9D-3 Signal Operation for Bicycles

Bicycles generally can cross intersections under the same signal timing arrangement as motor vehicles. Where bicycle use is expected, extremely short change intervals should not be used and an all red clearance interval may be necessary.
COLORADO STATE UNIVERSITY
BIKEWAYS LONG RANGE PLAN
APPENDIX F

Cordon Study
January 29, 1996

Facilities Management Department
Fort Collins, Colorado 80523

TO: Hetty Bixby  John Gross
    Betty Drake       Tommy Moss
    Robert Chaffee    Christopher Wolf
    John Higney

FROM: Nancy Gilchrist

SUBJECT: Bikeways Long Range Plan - Final

A copy of the final Bikeways Long Range Plan is attached for your use. Even though it's a long range plan, we should see just a few items implemented in the near future. The east half of the diagonal through the intramural fields (just south of the Rec Center) has already been funded. We are requesting 1996/97 funds for some additional bike racks and for striping the small section of Mason from Old Main Drive to Laurel.

Thanks for everybody's participation. It's a good plan!

cc: J. Bilotta

Enclosure