



The Regional Bicycle Plan

DURHAM AND ORANGE COUNTIES, NC

prepared for:

**The Transportation Advisory
Committee for the Durham-
Chapel Hill-Carrboro Urban Area**

prepared by:

Greenways Incorporated

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Section 1:

Executive Summary

Purpose of the Regional Bicycle Plan

Bicycling has become an increasingly popular mode of transportation throughout the United States and within the Durham/Orange County regional communities of Chapel Hill, Carrboro, Durham and Hillsborough. Due to the region's physiographic make-up and mild year round climate, cycling is viewed as a viable alternative to automobile transportation. The bicycle is an efficient, pollution-free mode of transportation, which can offer effective transportation to a wide range of users groups irrespective of age and socioeconomic make-up.

However, despite the popularity of cycling, the Durham and Orange Counties region lacks adequate bicycle facilities necessary to encourage motorists to abandon their automobiles in favor of this alternative mode of travel. Our existing transportation system impedes rather than enhances cycling, due to restricted roadway design development, and an over-emphasis on accommodating the automobile. This is compounded by the fact that the promotion of cycling, bicycle education and the enforcement of policies and laws are generally lacking and uncoordinated not only throughout the Durham/Orange County region, but also within each local jurisdiction. For example, many motorists are unaware that the bicycle is classified as a vehicle by North Carolina law, and is entitled to use the roadway in much the same manner as any other legally classified vehicle.

In the Fall of 1991, Congress renewed our nation's commitment to a comprehensive national transportation policy and enacted the Intermodal Surface Transportation Efficiency Act (ISTEA, pronounced Ice-Tea). ISTEA contains several important mandates that will serve to guide transportation planning and development for the next decade. Of particular interest to States and Metropolitan Planning Organizations (MPO's) is a new emphasis on transportation planning that incorporates alternative modes of travel as methods to reduce traffic congestion, improve air quality, increase the efficiency and capacity of roads and highways, and improve transportation safety and education.

The Regional Bicycle Plan is unique in that it is among the first local plans in the country to follow the mandates set forth by ISTEA. This legislation requires that each State and MPO develop a comprehensive approach to transportation planning in order to qualify for a variety of traditional funding sources. This federal mandate, along with the increased interest and popularity of cycling in the Durham-Chapel Hill-Carrboro Urban Area serve as the foundation for the preparation of the Regional Bicycle Plan.

Goals of this Plan

A number of goals were developed to guide the preparation of this Plan. These goals were formulated and adopted through a series of regional meetings with citizen groups and representatives from local jurisdictions. Eight goals were defined:

- Encourage and increase bicycle use throughout the region
- Plan and establish a comprehensive regional bicycle route network
- Improve bicycle access by providing and upgrading facilities that create a complete and efficient system for cycling, and enhance the safety of cyclists
- Integrate regional bicycling with existing and future transportation systems
- Develop an on-going bicycle education program that is flexible and responsive to the needs of Durham and Orange County residents
- Develop a regional law enforcement program to maintain a safe bicycling environment for residents of the region
- Encourage the public and private sector to increase opportunities for bicycling to work, school, shopping and tourism facilities
- Utilize bicycles as a component of automobile trip reduction to improve air quality and reduce traffic congestion

Each goal was thoroughly addressed during the planning process, and through the Regional Bicycle Plan report. This report is supported by two complementary documents: the Education and Enforcement Report; and an Engineering Supplement. Each supplies more detail on their

respective subjects. Together, these documents comprise the Regional Bicycle Plan for Durham and Orange Counties.

Key Recommendations

The Regional Plan provides numerous recommendations for how individual communities, transportation planning agencies, elected officials and the private sector can support and encourage increased use of the bicycle for transportation purposes. These recommendations are described in detail within each chapter of this report, and in the text of supporting documents. The following key recommendations are set forth by this Plan:

Develop a "Bicycle-Friendly" Region.

One of the most important pursuits that the region should undertake is to welcome the bicycle as a viable mode of transportation and strive to become a bicycle-friendly region. An essential trait of a bicycle-friendly region is innovative transportation agencies who strive to accommodate alternative modes of travel in order to provide citizens with effective and energy efficient links between popular origins and destinations. This Plan strongly recommends the establishment of local bicycle/pedestrian coordinator positions within transportation planning departments. This Plan recommends several additional actions that are necessary for the Durham-Orange County Region to become bicycle-friendly, including:

- adopting up-to-date local bicycle transportation policies
- institutionalizing cycling within government policies and programs so that it becomes wholly integrated within the transportation system
- encouraging citizen involvement in cycling to ensure advocacy and long term support for bicycle facility development
- educating the cyclist and motorist to share the road
- developing a local enforcement program for bicycle laws
- offering incentives to commuting cyclists
- marketing and promoting cycling as a viable form of transportation

Adopt State-of-the-Art Facility Design and Engineering Standards.

To ensure that the Durham-Orange Counties region is in fact a bicycle-friendly region, progres-

sive planning guidelines and design standards should be adopted and implemented as a matter of policy and procedure by each jurisdiction. The guidelines and standards included within this Plan represent the state-of-the-art in bicycle facility development. This Plan recommends that bicycle facilities should be integrated into the existing transportation network and not established as a separate transportation system throughout the region. Likewise bicycle planning and engineering standards should be integrated with other transportation standards and guidelines.

The primary goal of the Regional Bicycle Plan is to increase the number of cyclists in the region and enhance their safety. A primary step in achieving this goal is to create bicycle facilities for cyclists of all abilities. A recent national case study for the Federal Highway Administration estimates that basic and child ("B/C") cyclists, or casual and novice riders, make up 95% of cyclists (the remaining 5% of cyclists are experienced riders). This ratio holds true in Durham and Orange counties, where novice cyclists have few places to ride because of congested urban traffic. The Regional Bicycle Plan targets B/C cyclists, as they are the majority. These cyclists can be coaxed out of their automobiles and onto their bicycles for utilitarian trips, given adequate space on the roadway. The bikelane is the preferred facility for the B/C cyclist, as it provides a well-defined area specifically intended for bicycle travel. As these facilities are built, it will be important that cyclists and motorists are taught to share the roadway, as these new facilities cause changes in traffic patterns that everyone must become accustomed to.

Other recommendations contained within this section of the Plan include:

- defining six different types of bicycle facility development strategies
- providing state-of-the-art national guidelines and standards
- addressing and resolving bicycle facility development issues specific to this region

Implement a Regional Bicycle Routing Plan.

The jurisdictions that joined together to create the Regional Bicycle Plan did so in order to create a coherent bicycle transportation network that flows across county lines and jurisdictional bound-

aries. Bicycle routing recommendations contained within this Plan are not intended to constitute a complete development strategy for all required bicycle facilities on a local level, rather, the Urban Route and Rural Route maps provide fundamental recommendations for regionally significant routes. The routing plans recognize both independent and incidental projects that should be undertaken to provide a comprehensive network of bicycle facilities. The Plan defines important regional linkages that should be developed, including:

- Durham to Chapel Hill-Carrboro
- Chapel Hill-Carrboro to Research Triangle Park
- Durham to Research Triangle Park
- Chapel Hill-Carrboro to Hillsborough
- Durham to Hillsborough
- Durham/Orange County to Wake County and Raleigh

This report also defines a step-by-step process for implementing the regional routing plan. This prioritization process assesses the feasibility of each nominated or candidate bikeway and assigns a regional priority to each project so that orderly route development can proceed.

Implement a Regional Action Plan.

The Action Plan provides a phased development strategy for all recommendations contained within the Regional Bicycle Plan. Each recommendation is placed into a Phase I -- zero to first five years, Phase II -- year six to year ten, and Phase III -- year eleven to year twenty schedule. The Action Plan also contains a graphic chart which illustrates the local government agency or community group responsible for overseeing the implementation of each Plan recommendation, including governing boards, the Transportation Advisory Committee, bicycle advisory committees, law enforcement agencies, City/County planning departments, transportation planning departments, local bicycle/pedestrian coordinators, local advocacy groups, public works departments, public schools, parks and recreation departments, and NCDOT.



Introduction

The Bicycle: An Alternative to the Automobile

Bicycling has become an increasingly popular mode of transportation throughout the United States. The Bicycle Institute of America (BIA) estimates that the total number of U.S. bicyclists in 1991 was 96 million - an increase of 14 million cyclists since 1986. Bicycle commuters comprised 4 million of these cyclists in 1991, and BIA estimates that bicycle commuting will increase by 20% in 1992. A 1991 Louis Harris poll found that 20% of all U.S. adults would bicycle to work if safe bike lanes were available. A 1992 Louis Harris Poll for Rodale Press further clarifies the increasing potential of bicycle transportation: the poll found that only 7% of the respondents recently had ridden their bikes to work, and yet 46% said they would consider riding to work if there were safe bike lanes on existing roads.

The nation-wide trend towards cycling can easily be documented in the Durham-Chapel Hill-Carrboro urban area: bicycle sales have increased dramatically, bicycle clubs have become more active in recent years, and more cyclists than ever before are making use of roadways for commuting and recreation. The bicycle boom in this region began in the 1970's, when the first "wave" of bicycle shops opened their doors in Durham, Chapel Hill and Carrboro. In those days, a local bicycle shop could expect to sell an average of 300 bikes per year. In the 1990's, these same shops sell 3000 bicycles per year - a ten fold increase. Transportation officials for both UNC-Chapel Hill and Duke University describe greater numbers of cyclists on campus in recent years. UNC-CH, for example, recently estimated that there are more than 4,000 cyclists on campus per day.

The Durham-Orange Counties region is an ideal physiographic region for cycling. The terrain and climate of North Carolina's Piedmont region is well-suited for bicycle transportation, and is generally characterized by gentle slopes, with occasional steeper inclines. The climate of the region lends itself to year-round cycling, since the winters are relatively mild and the percentage of fair weather days outnumbers inclement days.

Bicycling has begun to make inroads into urban growth planning strategies of Triangle municipalities. Chapel Hill and Durham City Councils have mandated bicycle advisory committees to address issues of bicycle transportation improvements, bicycle encouragement and education. Bicycle transportation issues are gradually becoming a standard part of urban planning, in areas such as new development ordinances, updated traffic codes, urban transportation corridor analysis and roadway design. Due to the increased demand for bikeways, local transportation officials in Durham and Orange Counties have begun to include bicycle facilities as a standard part of transportation improvement schedules.

Several bikeways have been built in Durham and Orange Counties during the past decade. Chapel Hill produced its first Bikeway Plan in 1977, and has since developed roadside bike paths and bike lanes, with plans for future roadway widening projects and off-road bicycle paths. Chapel Hill has included bicycle considerations in the 1989 Town Comprehensive Plan. Durham designated its first bicycle route in 1987, and has planned more than twenty on-road bicycle facilities. Carrboro has several bike lanes and an off-road bike path, the Libba Cotton Bikeway. One of the best sources of support for local bicycle efforts is the NCDOT Office of Bicycle and Pedestrian Transportation (hereafter called the "Bicycle Program"), generally regarded as one of the most progressive programs in the nation. The Bicycle Program was created by the NC Bicycle and Bikeways Act of 1974 (Article 4A). Its stated purpose is to assist local governments in the development and construction of local and regional bikeway projects, establish policies and standards for planning and design of bicycle facilities, develop safety training programs, and develop and construct a State bikeway system. Since 1987, the Bicycle Program has allocated \$250,000 to \$500,000 per year for bicycle improvement projects across the state. As a result of ISTEA, funding for independent bicycle projects increased to two million dollars in fiscal year 1992.

The recent availability of state and federal funds has provided a substantial boost to local bicycle planning efforts. With the new Intermodal Surface Transportation Efficiency Act of 1991, even more funds will be available to urban areas across the nation that can document their need for bicycle facilities, and develop specific programs for bicycle facility development. Now, more than ever, a regional plan for bicycle transportation in Durham and Orange Counties is necessary.

The Mandate for a Regional Bicycle Plan

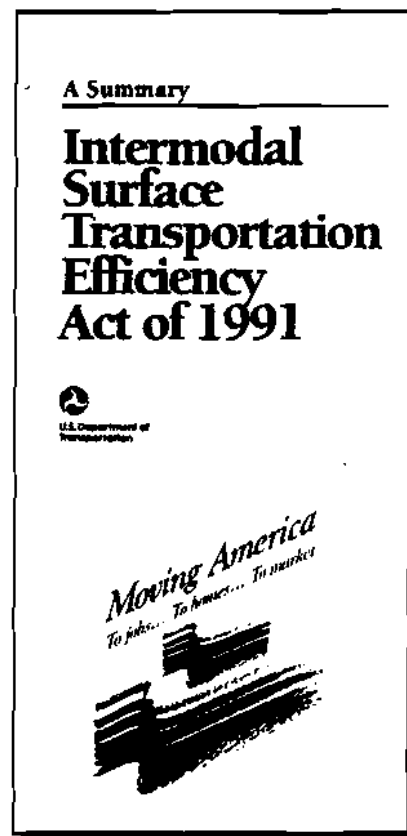
In November 1991, the 102nd United States Congress enacted sweeping legislation that placed new emphasis on transportation planning, programming and project selection by both Metropolitan Planning Organizations (MPO's) and state Departments of Transportation. The Intermodal Surface Transportation Efficiency Act (ISTEA) strengthens previous federal requirements for comprehensive planning of transportation systems. Several provisions within ISTEA place new emphasis on bicycle and pedestrian facility development, programming and education. Specifically:

- *Sections 1024 and 1025* require that States and MPO's include bicycle and pedestrian transportation facilities in all annual and long range Transportation Improvement Plans (TIP).
- *Section 217* defines that States may use funds from the Surface Transportation Program, Congestion Mitigation Program, National Highway System projects, and Federal Lands Highway program to develop pedestrian walkways and bicycle transportation facilities. Additionally, each State is now required to have a full-time Bicycle and Pedestrian Coordinator before it can access allocated ISTEA funds, prior to the start of fiscal year 1993.
- *Section 132* defines bicycling and walking facilities as one of ten Transportation Enhancements eligible for funding under Surface Transportation Program funding.

Further, ISTEA mandates consistency with the requirements of the Clean Air Act (*Section 135 c*). In metropolitan areas of 200,000 or more, MPO's must now develop Congestion Management Systems (CMS) that "provide for effective management of new and existing transportation facilities . . .

through the use of travel demand reduction and operational management strategies" to reduce congestion and improve air quality. ISTEA also requires States and MPO's to examine overall social, economic, energy and environmental effects of transportation decisions, and to develop comprehensive plans that improve the efficiency and effectiveness of transportation systems. Alternative modes of travel are highly regarded as one of the best methods for meeting Clean Air Act requirements.

Currently, Durham County is regarded by the Environmental Protection Agency (EPA) as a "non attainment area" - meaning that our air quality does not meet federal air pollution standards. It is likely that funding for bicycle facilities in Durham County can be obtained through Congestion Mitigation and Air Quality (CMAQ) funds in the future. Every attempt should be made to access these funds in order to implement this Plan. Since Orange County meets federal air pollution requirements, CMAQ funds are not available to Chapel Hill, Carrboro or Hillsborough.



The Regional Bicycle Plan for Durham and Orange Counties is one of the first MPO planning efforts in the nation to address the new requirements of ISTEA, and to provide recommendations that encourage an increase in cycling as a viable and alternative means of transportation. The primary emphasis of this Plan is to examine the use of the bicycle for transportation purposes. This emphasis is necessary in order to specifically address the transportation mandate set forth by ISTEA. Purely recreational use of the bicycle is not thoroughly addressed in this Plan, although the obvious health benefits of this type of cycling are recognized. In reality, recreational cyclists will inevitably benefit from a bicycle friendly region.

The Regional Bicycle Plan addresses both urban and rural use of the bicycle for transportation purposes. It is interesting to note that the Durham and Chapel Hill city limits abut each other, and the downtowns of these cities are only 10 miles apart -- close enough for people to commute between each community by bicycle. The opportunity to develop an effective region-wide bicycle plan for transportation purposes is realistic and fully warranted.

A sound regional plan for cycling should address not only the physical aspects of bicycle transportation, but also the region's attitude toward cycling in general. Cyclist and motorist education, enactment of bicycle policies, cyclist encouragement programs, and modern bicycle traffic laws are all essential elements to make cycling a safe and viable form of transportation. This Plan thoroughly addresses these issues and more, and provides the local jurisdictions of the region with a comprehensive approach and action plan to meet the new requirements of ISTEA, and create a bicycle-friendly region for the 21st Century.



Section 3:

Goals and Objectives

Goals and objectives for the Regional Bicycle Plan were established by the Bicycle Task Force early in the planning process, and define both a short term and long range vision for bicycling in Durham and Orange Counties. Eight goals were identified, and are described below (order does not indicate importance). These goals formed the basis for the recommendations contained within this Plan.

Goal One:

Encourage bicycle use.

- Encourage bicycle use for utility riding in place of motor-vehicle use by providing bikeways that are safer for commuting cyclists.
- Encourage bicycling as a viable form of transportation by promoting the benefits of bicycling, including: physical fitness, decreased pollution and traffic congestion, less fossil fuels and raw materials used, reduced need for new roadways and less parking spaces.
- Encourage cycling by formulating a "Regional Bicycle Friendly Policy" that can be adopted and implemented by local jurisdictions.

Goal Two:

Plan and establish a comprehensive regional bicycle route network.

- Ensure that the bicycle route plans of each jurisdiction are appropriately integrated to provide linkages between communities.
- Explore the possibilities of linking bicycle and transit routes.
- Ensure that routes within the region link with routes and facilities of neighboring jurisdictions outside the region, and with State routes.
- Establish a coordinated and formal system of communication about bicycle issues between jurisdictions within the region.
- Incorporate bicycle planning, design, implementation and maintenance in the operating policies of local jurisdictions within the region.

Goal Three:

Integrate regional bicycle network with existing and future transportation planning, design, and development.

- Educate transportation planners and officials regarding the importance of bicycle planning,

design and implementation for local and regional roadway systems.

- Incorporate bicycling in regional mass transit studies and corridor analyses.
- Create priorities for Capital Improvements Programs for local bicycle facility and route development.
- Adopt development ordinances that require bicycle friendly Transportation Management Plans.

Goal Four:

Improve bicycle access by providing and upgrading facilities that create a safe, complete, and efficient system for bicycling.

- Establish uniform regional design/development standards and policies for routing, facility development, signage, intersecting uses, etc.
- Pursue access linkages via railroad and river corridors, unimproved street right-of ways, utility corridors, and other linear corridors that provide effective transportation of bicycle commuters.
- Integrate consideration for bicycles into all planning, design, and construction of new roads, public parks and urban centers.
- Incorporate maintenance of bicycle facilities within existing local programs to provide for safer bikeways.

Goal Five:

Develop an on-going bicycle education program that is flexible and responsive to the needs of regional residents.

- Provide quality bicycle education to school age bicyclists, adult bicyclists and law enforcement agencies regarding bicycle safety, maintenance and rules of the road.
- Encourage bicycle safety education programs in local governmental agencies, schools, bicycle clubs, universities, etc.
- Educate motorists on cyclists rights to use the road, and how to share the road with bicycles.
- Establish standards for bicycle educators who are responsible for educating the cycling public.
- Establish an on-going fund for bicycle education.
- Provide a formal and clear format for the dispersal of education materials.

Goal Six:

Develop a regional law enforcement program to maintain a safe bicycling environment for residents of the Region.

- Encourage compliance with bicycle laws by cyclists and motorists.
- Update city ordinances pertaining to cycling.
- Establish a bicycle law enforcement policy that can be adopted for use within each jurisdiction.
- Monitor bicycle accident data through local hospitals and police departments as a feedback mechanism for bicycle safety.
- Explore innovative law enforcement techniques for ease and uniformity of application.

Goal Seven:

Encourage the private sector to increase opportunities for bicycling to work, school, shopping, and tourism facilities.

- Adopt land development (and re-development) regulations requiring provisions for bicycle commuting, including parking, storage and shower requirements.
- Encourage local jurisdictions and State Bicycle Program to provide technical assistance for high quality solutions to bicycling needs.
- Educate the private sector about benefits of commuter cycling.
- Encourage employers to provide employees with education materials about commuter cycling, and offer incentives to employees who commute to work via bicycle.
- Encourage bicycle shops and bike clubs to provide mechanical skills education.

Goal Eight:

Utilize bicycles as a component of trip reduction to achieve better air quality standards and reduce traffic congestion.

- Coordinate regional efforts between bicycling and mass transit to make bike/bus trips a viable form of transportation.
- Coordinate ridesharing and vanpool modes of transportation to include bicycling.
- Achieve a 5% mode share for bicycle transportation by the year 2000.
- Develop high visibility bicycle demonstration projects in each jurisdiction, to demonstrate the use of bicycles as an effective short distance transportation mode.

Section 4:

How Can We Make This Region Bicycle-Friendly?

A "bicycle-friendly region" is one that takes a holistic approach to bicycling as a mode of transportation. Bicycle-friendly regions are recognizable not only for the special facilities they provide for cyclists (on-road and off-road bikeways, parking, etc.), but also for the programs that insure these facilities are well-used. Educational programs for cyclists and motorists, progressive law enforcement for bicycle offenders, incentives for bicycle commuting, development ordinances and policies to encourage the growth of the bicycle transportation system, and a strong commitment to bicycling through local advocacy groups are all essential to the success of the Regional Bicycle Plan.

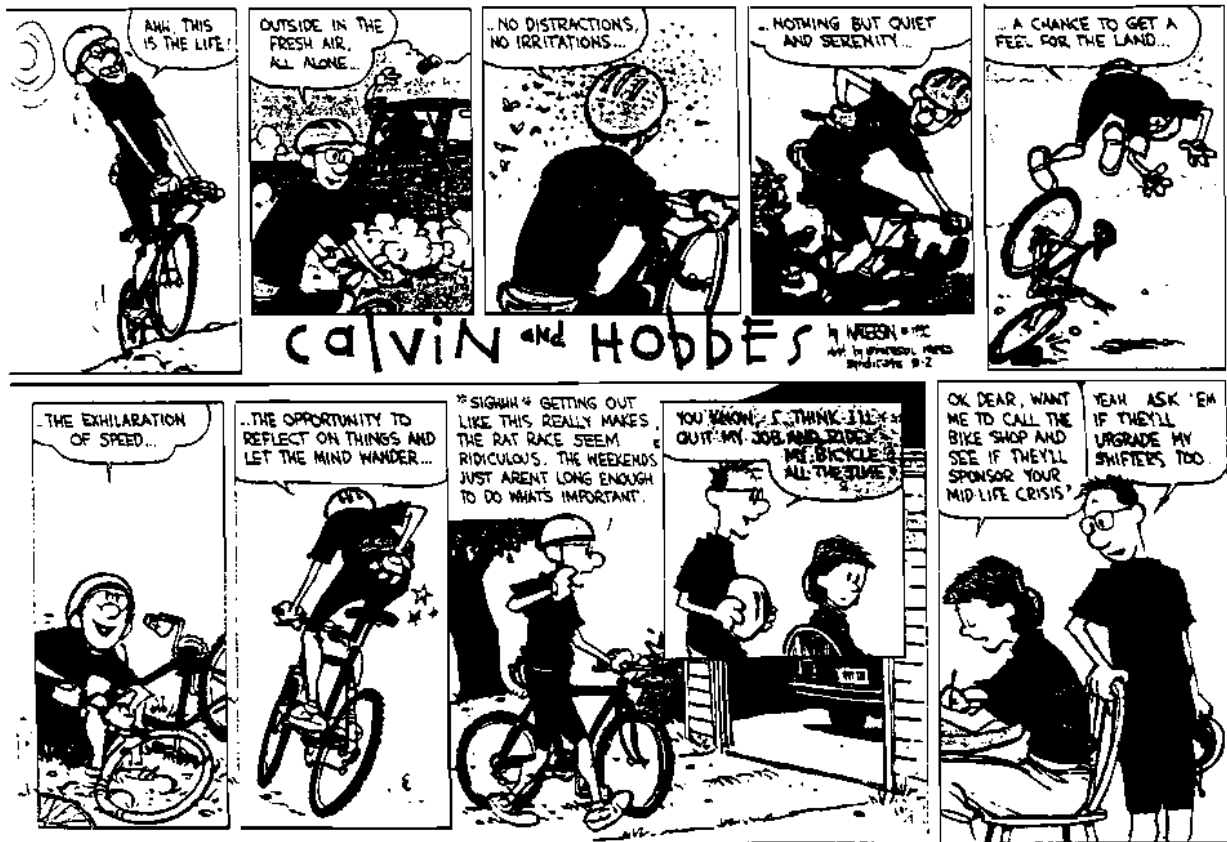
Communities across the U.S. with solid bicycle transportation systems often have a 20-year history of bicycle encouragement. Extensive research of these communities was conducted as part of this report, to determine how their programs have achieved success. Durham and Orange Counties

can capitalize on the knowledge of these communities, and build a local bicycling system based on the most modern and successful practices.

The following bicycle-friendly communities were researched in developing the Regional Bicycle Plan:

- | | |
|----------------------|----------------------|
| Eugene, Oregon | Davis, California |
| Madison, Wisconsin | Pasadena, California |
| Cranford, New Jersey | Ann Arbor, Michigan |
| Dallas, Texas | Gainesville, Florida |
| Missoula, Montana | Washington, DC |
| Phoenix, Arizona | Seattle, Washington |

The following recommendations provide a long-range vision for bicycle encouragement in Durham and Orange Counties. Section 7 of this report provides detailed 0-5 Year, 5-10 Year and 10-20 Year Action Plans. Existing programs should be strengthened and new programs added as bicycle transportation grows in the region.



Bicycle Transportation Policy Statement

A Bicycle Transportation Policy Statement should be adopted by each local jurisdiction. As part of this report, a model draft policy has been written:

"The City (Town)/County of _____ hereby states that bicycling is a mode of transportation to be encouraged and fostered. We are committed to providing better facilities for cyclists, educational programs for cyclists and motorists, and incentives to encourage cycling as a viable form of transportation. Bicycling shall become a standard element of all transportation planning and comprehensive planning for the City (Town)/County."

This stated policy should serve as the basic operating philosophy for all future municipal bicycle programs. Bicycle policies should also be addressed in the Comprehensive Plan for each municipality/county, and should be updated to reflect contemporary bicycle issues.

Make Bicycle Transportation a Standard Governmental Procedure

National trends show that bicycle-friendly communities most effectively address bicycle issues as a matter of policy. Governmental procedures at all levels should support bicycle facility planning, design, implementation and maintenance. The following policy recommendations are made:

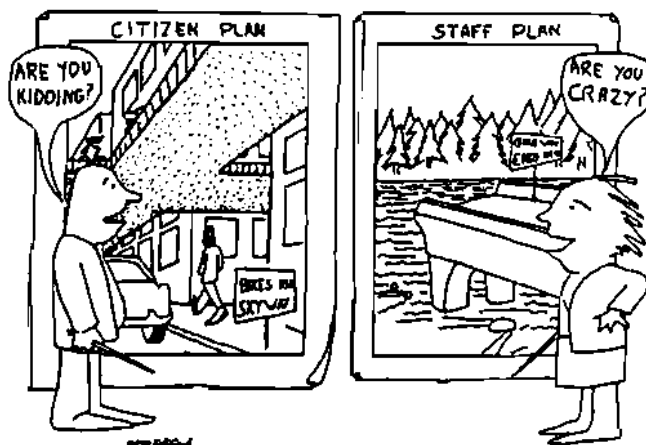
1. Make bicycling a standard part of transportation planning.

In general, all transportation programs should resolve to make bicycling a viable form of transportation. All new roadways (or scheduled roadway improvements) should be planned, designed, constructed and maintained to facilitate shared usage by bicycles and motor vehicles. In accomplishing these objectives:

- Appropriate measures should be taken to provide in-service training for urban planning and transportation staff, since most traditional education programs do not address non-motorized transportation. Training can be arranged through the NCDOT Bicycle Program. Staff should also attend conferences on bicycling such as the Pro-Bike Conference (held every two years in North America), NC Greenways Conference, Rails-

to-Trails conferences, and those periodically held by the NCDOT Bicycle Program.

- Bicycle travel should be an integral portion of future corridor studies.
- Statistics on bicycle use and accident rates should be maintained in such a way that they are comparable with those for motor vehicles. All transportation information systems should include bicycling statistics. Local hospitals and police departments may provide assistance in these efforts.
- Local planning and transportation engineering departments should regularly consult with citizen's bicycle advisory committees. These committees should be composed of cyclists of all abilities who are knowledgeable about bicycling issues. Regularly monthly dialogue will help to establish city staff/citizen consensus for bicycle facility implementation and education, enforcement, and encouragement programs.



2. Establish local bicycle coordinator positions.

Research from across the US has shown that the success of local bicycle programs depends on the availability of local staff to focus on bicycle transportation. The appointment of local coordinators will be vital in order to accomplish the myriad of tasks outlined in this Regional Bicycle Plan. It is appropriate to designate this new position as a bicycle and pedestrian coordinator, since similar issues face both and can be addressed jointly.

In other bicycle-friendly communities in the U.S., local bicycle coordinators have been successfully integrated through local transportation planning departments. Coordinators will organize all local efforts to implement this Regional Bicycle Plan, as well as network with neighboring urban areas on regional bicycle transportation issues. It may be possible for local jurisdictions to combine efforts with local universities in order to fund these positions.

3. Make local zoning and development ordinances programs bicycle-friendly.

The Durham and Orange County region should develop standard planning policies that make the bicycle a more viable form of transportation. Existing land use policies and guidelines should be reviewed and modified to encourage land use patterns that can be more effectively traversed by bicycle. This will also ensure that the private sector shares the responsibility of encouraging alternative modes of transportation. Specific recommendations include:

- Encouragement of land development patterns that minimize direct access onto collector and arterial roads.
- Encourage standard practices of obtaining sufficient right-of-way and building setbacks to provide for future bicycle capacity in transportation corridors.
- Discourage land development patterns that create cul-de-sacs and local deadend streets. Require bicycle connections between and within adjacent developments through capital planning, refinement planning and local development review processes.
- Obtain dedications of land or easements for bicycle paths in connection with utility rights-of-way, drainage ditches, or other corridors, where such paths would enhance the bicycle transportation system.
- Develop bicycle parking ordinances for urban areas, with a required amount of spaces per number of employees or expected customers. (Both Tucson, Arizona and Madison, Wisconsin have excellent local bicycle parking ordinances. Copies can be found in the Appendix.)

4. Develop bicycle-friendly Transportation Management Programs.

Adopt development ordinances that require Transportation Management Plans (TMP's) that encourage bicycling. These programs can effectively maintain and enhance the "bicycle-friendliness" of the existing transportation system. Traffic calming strategies should be employed, as well as traffic management programs that discourage through traffic on local residential streets. Specific measures include restricted turning movements, traffic diverters, landscaped or narrowed entrances, traffic circles, and truck restrictions.

5. Develop a maintenance program for bicycle facilities.

Bicycle facility maintenance issues should be considered during the planning and design of new bicycle facilities, and plans should be reviewed by maintenance superintendents. Before construction begins, every bikeway should include an appropriate maintenance commitment by the local jurisdiction, and the maintenance schedule should be included within the local budget. Cyclist-reported hazards should be given a high priority. Specific maintenance needs include:

- Sweeping and cleaning of designated on-street bikeways should be incorporated into regular street cleaning schedules. High priority should be given to those streets with designated bicycle lanes. Regular street sweeping and cleaning operations should pay particular attention to the right hand portion of outside travel lanes and shoulders.
- Pavement striping on bicycle facilities should always be highly visible, and should be included in regular striping schedules. This is necessary in order to avoid confusion caused by faded markings. Thermoplastic pavement striping should not be used on bicycle facilities because the material becomes slippery when wet and may cause the cyclist to slide.
- A regular schedule for sweeping bicycle paths should be established by the agency responsible (Public Works, DOT, Parks and Recreation Department, etc.). The full width of bicycle paths should be maintained to prevent deterioration of pavement edges.

- Tree and shrub cleaning should provide a minimum of 8 foot vertical and 2 foot horizontal clearance on both sides of on-road and off-road bikeways at all times.

3. Develop a Citizen's Improvements Request program.

City governments should set up programs to deal with cyclists' complaints about roadway hazards such as pot holes, roadside debris, obstructions, etc. Facility maintenance is essential, not only for cyclists' safety but also for liability purposes. In Seattle, Washington, a successful program enables cyclists to fill out a "Citizen Bicycle Improvements Request". The Seattle Engineering Department handles the requests by inserting the items into the regular roadway maintenance schedule.

CITIZEN BICYCLING IMPROVEMENT REQUEST CITY OF SEATTLE BICYCLE PROGRAM	
<small>The Blue Star program makes low cost improvements to enhance cyclist safety and access. We do maintenance work, signs and striping, and small construction jobs. Almost anything is possible!</small>	
LOCATION: Roadway Name _____ Landmarks (cross street, # of feet from curb, address). Be specific! _____	
DESCRIPTION OF PROBLEM (What is it, and why is it a problem) _____ _____	
Where did you get this form? _____	
REPORTED BY: Name _____	Day Phone _____
Address _____	Zip _____ Date _____
<small>Form 10 Seattle Engineering Department Blue Star Program Issue 01-92 Revised 10/90, Seattle, WA 98101</small>	<small>For further information contact City Clerk or Peter Laguarda at 626-1177</small>

Seattle's Bicycling Improvements Request form

Educate the Cyclist and Motorist

Bicycle education makes the difference between successful and unsuccessful bicycle transportation programs. Fortunately, several fundamental components for comprehensive education are already in place and have been operating independently of each other in this region during the past 10 to 15 years. The greatest problem is the lack of a coordinated and unified approach to bicycle education.

The Triangle region has witnessed more frequently occurring bicycle/motor vehicle conflicts in recent years, as well as discourteous behavior between users. The development of new bicycle facilities alone will not ensure that motorists and cyclists understand their responsibilities to share the

road. A full-scale education and awareness program for both cyclists and motorists must accompany bicycle facility development.

The following recommendations are made to develop a bicycle education program in the region: (a full Education and Enforcement Report is separate from this report, and contains a more in-depth discussion of bicycle education)

1. Institutionalize bicycle education within public schools.

We recommend that bicycle education be available to all children through the public school system. The bicycle education program can include a kindergarten traffic safety program, the Basics of Bicycling curriculum developed by the NCDOT Bicycle Program, and a middle school/high school course.

The Basics of Bicycling curriculum for fourth and fifth graders was implemented for the first time in Chapel Hill-Carrboro Schools in 1992, and was a popular program. This and other programs will need support from local governments and private citizens in order to continue (and to even get started) in other areas of the region. Volunteers from local cycling groups, including Carolina Tarwheels, should help in these efforts.

2. Provide bicycle instruction to adult cyclists.

There is a severe lack of adult cycling education programs, not only in this region, but throughout the United States. Although adults may have been riding their bikes for years, many have not mastered the basic techniques of riding in traffic. The need for bicycle education programs for adults will increase as more facilities are constructed and more adults begin to commute to work.

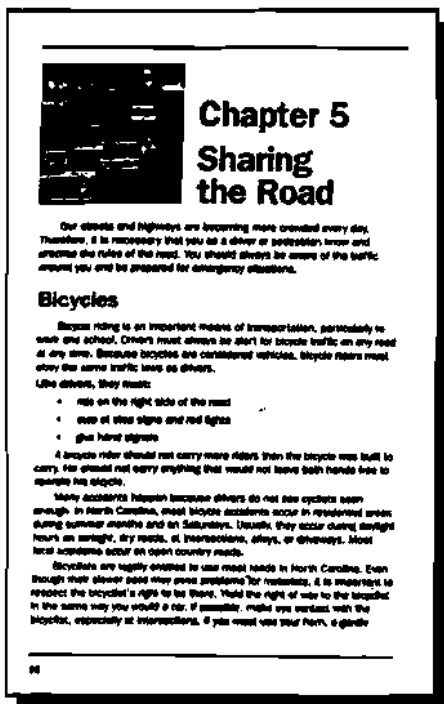
Local governments should develop cooperative relationships with area universities in order to educate adult cyclists. Universities attract huge quantities of cyclists to both Durham and Chapel Hill. Bicycling is very popular among students -- UNC-Chapel Hill freshmen are prohibited from bringing their automobiles during the first year of school, and therefore must consider alternative forms of transportation. Universities should take a pro-active role in educating college students to follow the

rules of the road by including bicycle education within curriculums. (An example curriculum from Arizona State University can be found in the appendix of the Education report.)

Set apart from university courses, adult bicycle education classes have usually been unsuccessful throughout the U.S., for the simple reason that most adult cyclists feel that they already know how to ride their bikes well enough. Until local bicycle clubs develop the resources to target adults, their education can be best achieved through publicity programs such as public service announcements, Bike-to-Work promotions, Bicycle Festivals, safety brochures given to every person who buys a new bicycle, etc. (see the Education and Enforcement Report for additional ideas).

4. Educate motorists to share the road with cyclists.

Some motorists in the Triangle region believe that bicycles have no right to be on the roads. This myth must be dispelled swiftly as their driving habits often endanger cyclists. Motorist education programs are essential, and can be achieved in several ways:



The 1991 revision of NC's Driver's Handbook includes a new chapter describing the responsibilities of both cyclists and motorists.

- New drivers should be taught how to share the road with bicycles through Driver's Education courses. North Carolina's 1992 Driver's Education curriculum includes a new Share the Road section.

- The North Carolina Driving Examination should incorporate questions that involve bicyclists and pedestrians. In particular, motorists should be reminded that bicyclists are legitimate highway users, and have a right to share the road. Displays and posters at local Division of Motor Vehicles offices can help to reinforce this message.

- License renewals and automobile tax reminder notices should include brochures or flyers to remind motorists to share the road with bicycles.

- Public service announcements should be aired to raise the general public's awareness of sharing the road with cyclists. These should be funded by local governments and other groups such as health care organizations, pediatrician associations, hospitals, and child care institutions.

5. Establish a local fund for bicycle and motorist education.

In order to achieve an organized bicycle education program that reaches more of the general public, local jurisdictions must provide guidance and monetary assistance. An on-going local fund should be created to serve the needs of bicycle education programs such as helmet promotion campaigns, bicycle education in public schools, bicycle safety pamphlet distribution, public service announcements, and other items. Some of these activities have already begun within the region, and should continue to operate in the future.

Enforce the Rules of the Road

Effective enforcement of traffic laws is essential to the rights of both cyclists and motorists. This has become increasingly evident in this region, as lack of courtesy between users has created dangerous situations. Cyclists and motorists must learn to share the road -- law enforcement agencies in the Triangle have a crucial role to play in assuring that everyone follows the rules.

The following recommendations are made to develop a local law enforcement program for a shared transportation system:

1. Update bicycle traffic laws.

Appropriate and updated bicycle traffic laws are an important first step in developing an adequate enforcement program. The most effective bicycle ordinances distinguish between bicycles and motorized transportation, and clarify the manner in which cyclists shall lawfully share the roadways.

Several jurisdictions within the region have inadequate bicycle ordinances. In Durham and Hillsborough, traffic regulations are insufficient to promote the safe and expeditious flow of bicycles and motor vehicle traffic. Chapel Hill's ordinance has been updated over recent years, but needs some additions. It is recommended that each of these jurisdictions adopt new and revised bicycle ordinances. A model bicycle traffic ordinance can be found in the Education and Enforcement Report.

2. Develop an active enforcement program.

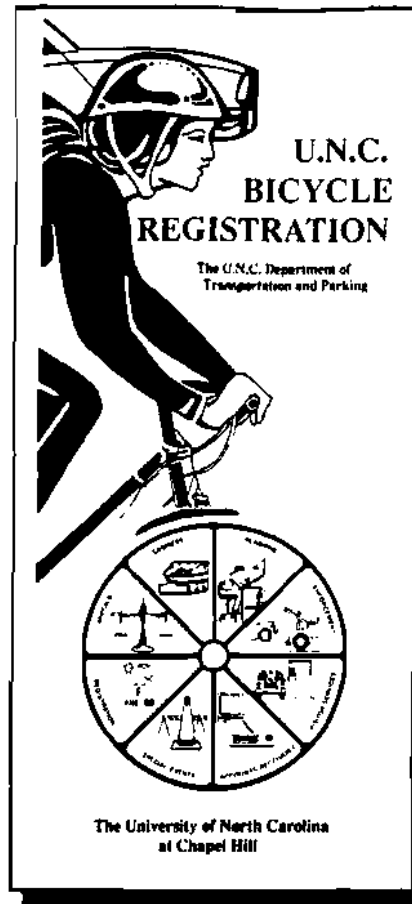
It is recommended that local law enforcement agencies, including university public safety offices, take an active role in bicycle enforcement. The Education and Enforcement Report outlines a basic plan for enforcement based on a positive public relations approach, modeled after the most successful programs in the country.

3. Develop a bicycle registration program.

Bicycle registration is important as a theft deterrent, as a method of recording the number of offenses a cyclist has, and in identifying an injured cyclist in a serious accident. It is recommended that local law enforcement agencies develop a bicycle registration program modeled after Cranford, New Jersey's successful example. Bicycle serial number and owner information is kept in readily accessible computer files, and registration drives are conducted annually.

4. Appoint a "Bicycle Liaison Officer".

It is recommended that law enforcement agencies designate one "bicycle officer" who can serve as the department's liaison to the local planning department, city council, and other bicycle enforcement agencies within the region.



UNC-Chapel Hill conducts an annual registration drive each fall semester, and distributes registration information to freshmen students.

This officer should be a cyclist. He/she can serve to answer any questions that community residents or local officials may have about bicycle law enforcement, as well as coordinate the police department's bicycle law enforcement program.

5. Develop a "Cops on Bikes" program.

Bicycle-mounted police patrols should be encouraged in urban law enforcement agencies, including public safety offices on college campuses. These programs have proven successful in Raleigh and Chapel Hill, and across the United States. (A recent article on these types of programs can be found in the Appendix of this report.) Some communities and universities have successfully recruited students to help with bicycle enforcement -- they serve to educate child cyclists and students who do not follow campus cycling rules.

A complete explanation of the proposed enforcement program for this region can be found in the Education and Enforcement Report, which can be obtained separately from this report.

Provide Incentives for Bicycle Commuting

In several communities across the U.S., bicycle commuting incentives have successfully enticed citizens out of their cars and onto their bicycles. An incentives program is highly recommended for Durham and Orange Counties, and should include:

1. Incentives should be offered by local governments to employers to encourage employee bicycle commuting.

Employers should be offered tax credits or other monetary incentives for providing support facilities such as showers and lockers for bicycle commuters (bicycle parking should be required by local zoning ordinances). Governmental subsidies can also be provided to employers who offer cash incentives to employees who commute by bicycle. It is anticipated that this program could be funded, at least in Durham County, through the air quality attainment program (refer to Section 135C of ISTEA).

2. Conduct a well-publicized annual "Bike-to-Work" week.

An annual Bike to Work day can greatly increase awareness of bicycle commuting. The same groups involved in the Bicycle Festival should join to organize this type of event.



Denver, CO sponsors an annual Bike-to-Work Day. Events include safety seminars, prizes, free continental breakfast, bicycle maintenance clinics, and free monitored parking. This brochure is one example of Denver's successful promotion of this event.

3. Develop local Bikes-on-Bus programs.

Local jurisdictions should provide guidance and encouragement to a "Bikes-on-Bus" program. (Chapel Hill plans to begin a pilot Bikes-on-Bus program in 1992, on the "Blue-Line" route.) Phoenix, Arizona provides an extremely successful example. Bicycle racks have been placed on buses that run high commuter routes, such as those near the university. During the pilot program, it was determined that bicycle commuters did not interrupt the bus schedule since the racks are quick and easy to use. The program has met phenomenal success, and there are now plans to put racks on all city buses.

4. Provide support facilities at transit stations.

As the Triangle region develops a mass transit system, bicycle storage (such as lockers and racks) should be provided at all mass transit and multi-modal stations, including park and ride facilities.

Community-Based Support

Citizen involvement is essential in a bicycle-friendly region. Local cyclists be included in decision making processes, as they can supply important information about riding conditions within the urban and rural areas of the region. Local cyclists from Durham, Chapel Hill, Carrboro, and Hillsborough were consulted throughout the planning process for the Regional Bicycle Plan, and were found to be extremely enthusiastic and knowledgeable.

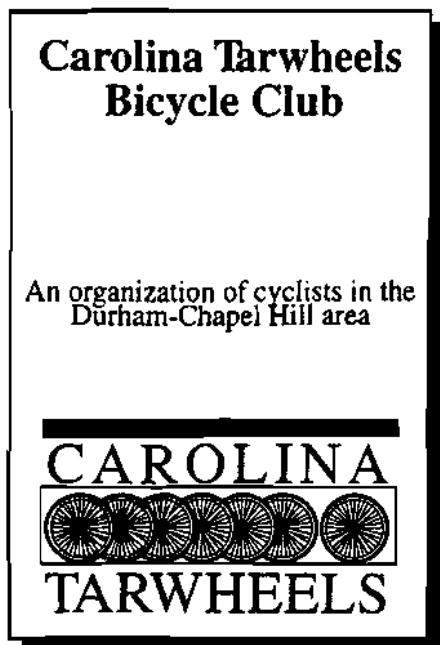
The following recommendations are made to effectively gain citizen involvement in developing policies, program and plans:

1. Develop a bicycle advocacy group.

This region should develop a bicycle advocacy group to provide strong local support in the MPO's efforts to obtain funding for bicycle facilities. Citizen support will be essential in gaining access to funds for bicycle facilities. This advocacy group should also join in statewide efforts to make alternative transportation a standard item on the North Carolina Board of Transportation's agenda.

Fortunately, a local group already exists, and has expressed a desire to meet this challenge. The Regional Bicycle Plan was formally presented to the Carolina Tarwheels, a group of

Durham and Chapel Hill cyclists, on June 18, 1992, and was met with their approval. The group will need instructions and support to build a regional advocacy group -- bicycle advisory committees and local bicycle/pedestrian coordinators should provide assistance as necessary. The Carolina Tarwheels should be commended for their willingness to meet this challenge.



Promotional Brochure developed by the Carolina Tarwheels

2. Develop cooperative relationships.

Citizens and local government should work together to promote bicycling. Durham and Chapel Hill have developed bicycle advisory committees to address local cycling issues and make recommendations to their respective City Councils (in Durham, the bicycle advisory committee is a subcommittee of the Durham Urban Trails and Greenways Commission). It is recommended that representatives from these groups meet with the Carolina Tarwheels to discuss the current status of the organization, and the kind of support that is needed to strengthen it. It is envisioned that one show of support might include a one-time grant from each municipal and county government that would enable Carolina Tarwheels to upgrade communication services and conduct a membership drive.

It is recommended that these groups develop a long-term cooperative relationship with each other and the Carolina Tarwheels, working together to meet educational needs, publicity and promotional event planning and financial support, and advocacy at the state and local level.

3. Develop a publicity campaign to raise awareness of cycling issues.

Public service announcements for radio and television can serve as an effective method of addressing a wide variety of bicycle issues from motorist education to "Bike-to-Work Week" promotions. Local bicycle advocacy groups, bicycle advisory committees, hospitals, and health departments can prepare public service announcements - local stations may consent to free air-time for short messages. The NCDOT Bicycle Program may offer help with these efforts - funds have been allocated through the TIP to develop public service announcements for radio and television in 1994.

4. Conduct an annual Regional Bicycle Festival.

It is recommended that BAC's, the Carolina Tarwheels, bicycle shop sponsors and local Parks and Recreation Departments from both counties combine their efforts to organize an annual Regional Bicycle Festival. Start-up funds for this event should be provided by each jurisdiction, however it is anticipated that the Festival will eventually become self-supporting. The highlight of the Festival should be large-scale organized bicycle tours either through the Triangle region or to a North Carolina destination.

5. Publicize the Durham and Orange County region as "bicycle-friendly".

Welcome guides, tourist and convention information should make reference to the region as "bicycle-friendly". It may be necessary to provide sample text to tourist and publicity agencies for inclusion in their maps and guides.

Section 5:

Bicycle Facility Planning Guidelines and Design Standards

In order to ensure that the Durham and Orange County region of North Carolina is in fact a "bicycle-friendly" region, progressive planning guidelines and design standards should be adopted and incorporated as a matter of policy, procedure and practice by all government jurisdictions within the two county region. It must always be remembered that under North Carolina law, the bicycle is a vehicle and is subject to the same rules and regulations as other vehicles. In fact, the 1974 North Carolina Bicycle and Bikeways Act defines bicycling as "a bonafide highway purpose subject to the same rights and responsibilities and eligible for the same considerations as other highway purposes..." The Board of Transportation further endorses the fact that bicycle transportation is an integral part of North Carolina's transportation system, and that bicycle facilities can be constructed within highway rights-of-way - except on fully controlled access highways.

Additionally, other bicycle facility providers, including the private sector, should be made aware of state-of-the-art, and state-of-the-practice guidelines and standards for facility development. If this is achieved, the Region will be able to develop an effective, comprehensive and accessible alternative form of transportation, offering local residents a choice in travel mode.

This section of the Plan recommends specific planning guidelines and design standards that should be included as components of transportation, public utilities, public works and development strategies. It is divided into areas of major concern, including definition of facility type, methodology for establishing regional guidelines and standards, and issues of design and safety specific to the Region.

Bicycle Facility Types

In accordance with national standards, there are several specific bicycle facilities that should be included within all bicycle friendly areas. The term "facility" is used herein to define provisions for, or improvements made to accommodate and

encourage bicycling. For the purpose of the Regional Bicycle Plan for Durham and Orange Counties, there are six primary types of bicycle facilities that are defined within this Plan, including Shared Roadways, Bicycle Routes, Bicycle Lanes, Bicycle Paths, Intermodal and Supplemental Facilities.

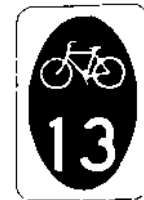
Shared Roadway - is any roadway upon which a bicycle lane is not designated and which may be legally used by cyclists regardless of whether such facility is specially designated as a bicycle route.



Bicycle Route - is a segment of a system of bike-ways that have been designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number. Bicycle routes offer a "suggested way" to get from a point of origin to a destination.

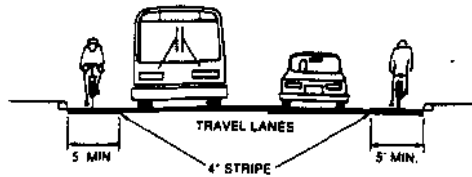


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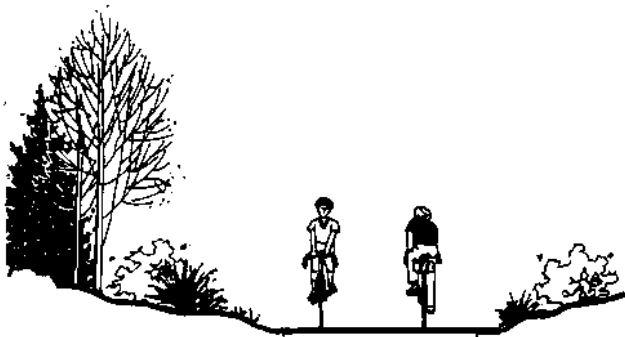


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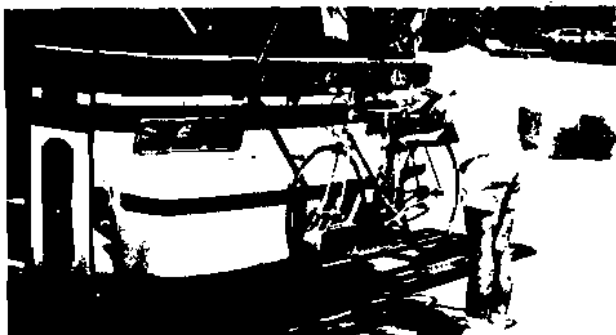
Bicycle Lane - is a physical portion of the roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of the cyclist. Bicycle lanes should always be one way facilities and carry traffic in the same direction as adjacent motor vehicle traffic.



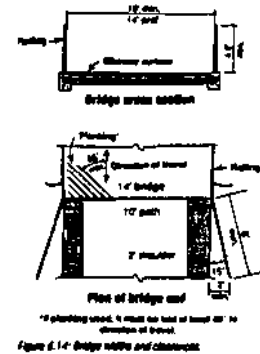
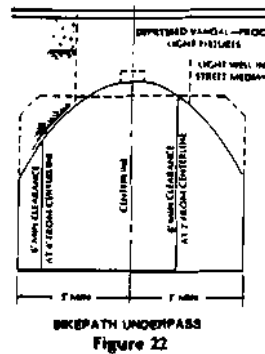
Bicycle Path - is a bikeway that is physically separated from motor vehicle traffic and built either within the highway right-of-way or within an independent right-of-way. Properly designed greenways and rail-trails can serve as bicycle paths. Bike paths offer an opportunity for convenient short cuts not provided by other transportation systems, and should be regarded as non-motorized extensions of the highway system.



Intermodal Facilities - is a specially constructed facility that enables cyclists to make use of mass transit systems, including community bus service, van and car pools, commuter trains, park and ride parking facilities, and other regional transit services.



Supplemental Facilities - are those items which serve to support cycling and provide essential information to the cyclist to encourage safe and efficient use of a bicycle transportation network. These can include signage and pavement markings, bicycle parking, bridges, tunnels, lighting, loop detectors, mapping, and other appropriate facilities.



Methodology for developing Guidelines and Standards

During the course of preparing this Regional Bicycle Plan, the consultant was also under contract with the Federal Highway Administration to examine state-of-the-art planning guidelines and design standards currently being used by State and local agencies for the development of bicycle and pedestrian facilities. The consultant evaluated more than 70 planning, design and engineering publications, and contacted 16 of the most progressive national, state and local bicycle agencies to define the current state-of-the-art and state-of-the-practice.

Exemplary guidelines and standards represent only one piece of the larger bicycle facility development puzzle. The other critical concern, with respect to implementing state-of-the-art guidelines and standards, is to define who is being served - otherwise referred to as the "design cyclist." Once it is understood who the design cyclist is, then an effective use of exemplary guidelines and standards can be realized.

Throughout this regional planning process, various government agencies and cycling advocates have defined a number of different cyclists, and described their ideas for successful bicycle facilities. However, in order to define the design cyclist, it is necessary to restate the overall purpose

of the Plan: to encourage an increase in cycling as a viable and alternative means of transportation. Therefore this Regional Plan recognizes that there are three primary types of cyclists in the Triangle region:

Advanced Cyclist - an experienced cyclist who desires direct, maximum speed access to destinations, and is relatively comfortable operating in normal roadway traffic, given sufficient space to maneuver.

Basic Bicyclist - a casual, novice or occasional cyclist who is usually uncomfortable in traffic, who desires a well-defined separation between bicycles and motor vehicles, and as direct a route as possible.

Child Cyclist - a pre-teen cyclist who need access to specific destinations within communities, who also desires a well-defined separation between bicycles and motor vehicles.

Recently, the Bicycle Federation of America estimated that less than 5% of the people who own bicycles in the United States are considered to be Advanced Cyclists. These cyclists require facilities such as paved shoulders and wide outside lanes in order to make efficient use of community transportation networks. In fact, this group is best served by having all roadways built to accommodate shared use by motor vehicles and bicycles.

The needs of the remaining 95% of cyclists, who are less experienced than Advanced Cyclists, constitutes the primary emphasis of this Plan, both in terms of recommendations for Regional Routing (Section 6) as well as recommendations for planning guidelines and design standards. For the purposes of this Plan, the Basic and Child Cyclists are combined into a single group because their needs are very similar: they require designated bicycle facilities (bike lanes, separate bike paths, and signed routes) along transportation routes typically served by arterial and collector streets.

This approach to bicycle facility planning and design is necessary if Durham County and Orange County residents are to be encouraged to use their bicycles for transportation. In essence, we are recommending a mix of "supply side" and "demand" generated facility development. To a large ex-

tent, cyclists will begin using facilities more frequently if they are constructed and can offer viable routes of travel - the logic being "if you build it, they will come." To a lesser extent, some bicycle facilities will be required based on a demonstrated need that is defined by an origin/destination study. After more than 20 years of bicycle research and development in the United States, this is the recent state-of-the-practice conclusion of many national bicycle experts.

State-of-the-Art Bicycle Facility Guidelines and Standards

Bicycle facility planning and design has entered a new era in terms of what is regarded as successful. From the 1970's through the 1980's many facility development projects were oriented toward removing the cyclist from the roadway system in order to reduce opportunities for conflict. This resulted in the development of off-highway bike paths, many of which were built parallel to roadways to separate cyclists from motorists. However, with the development of these facilities two important facts were discovered: 1) separate facilities are expensive to build and must be developed to near highway/roadway standards to be acceptable for bicycle use; 2) parallel off-road paths conflict with turning vehicle traffic, private driveways, intersecting roadways and ancillary roadway facilities, and have been proven to make cycling more dangerous for both the cyclist and motorist.

With the enactment of the Intermodal Surface Transportation Efficiency Act, Congressional leaders and federal transportation officials recognize the ability of cycling to offer an effective alternative mode of transportation, and believe that it should be integrated within traditional motor vehicle transportation facilities. Further, off-road paths are now viewed as extensions of the highway/roadway system, rather than as means of separating different cyclists from motor vehicle traffic. These fundamental issues form the basis for the facility design and engineering recommendations of this Plan.

In conjunction with the development of this Plan, the North Carolina Department of Transportation Bicycle Program is also concluding a multi-year evaluation and re-draft of its facility design/development standards. Recently, NCDOT completed a revised design manual to guide bicycle facility development throughout the State.

Entitled the *North Carolina Bicycle Facilities Planning and Design Guidelines*, this design manual provides state-of-the-art criteria for a wide range of bicycle facilities. This manual is one of the most progressive in the nation and should be used as a reference for bicycle facility development throughout the Durham and Orange Counties Region.

Other state-of-the-art guidelines and standards are further defined in the following text. Many of these standards have been produced by various state and/or local transportation agencies, bicycle organizations and federal agencies. All facility guidelines and standards are based on the recommendations of the American Association of State Highway Transportation Officials (AASHTO), which publishes *The Guide for the Development of Bicycle Facilities*. This guide provides the legal, practical and minimum guidelines and design standards for bicycle facilities. It was first published in 1981 and recently revised in 1991. Most state and local bicycle programs, including North Carolina DOT, use this manual as the basis for all bicycle facility development projects. The manual also references two other important sources, the United States *Uniform Vehicle Code* (UVC), and the *Model Traffic Ordinance* (MTO) which offers continuity with guidelines and standards for other modes of travel.

The Manual on Uniform Traffic Control Devices (MUTCD) is another important manual that provides legal, practical and minimum standards for traffic control devices and warrants, such as signage, pavement markings, signals and islands, to ensure the safe, orderly and predictable movement of motorized and nonmotorized traffic. All states and localities that encourage bicycle development use MUTCD as the standard for signing and marking bicycle facility projects.

Bicycle Facility Development Issues Specific to the Durham and Orange Counties Region

Based on discussions with the Regional Bicycle Task Force, the Technical Coordinating Committee and the consultant's review of state-of-the-art guidelines and standards for bicycle fa

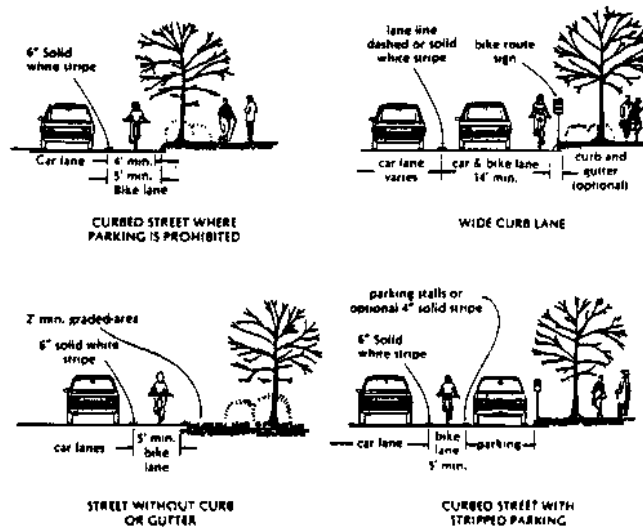
cility development, the following issues are regarded as critical to the future success of the Durham-Orange Counties Regional Bicycle Plan.

Bicycle Lanes

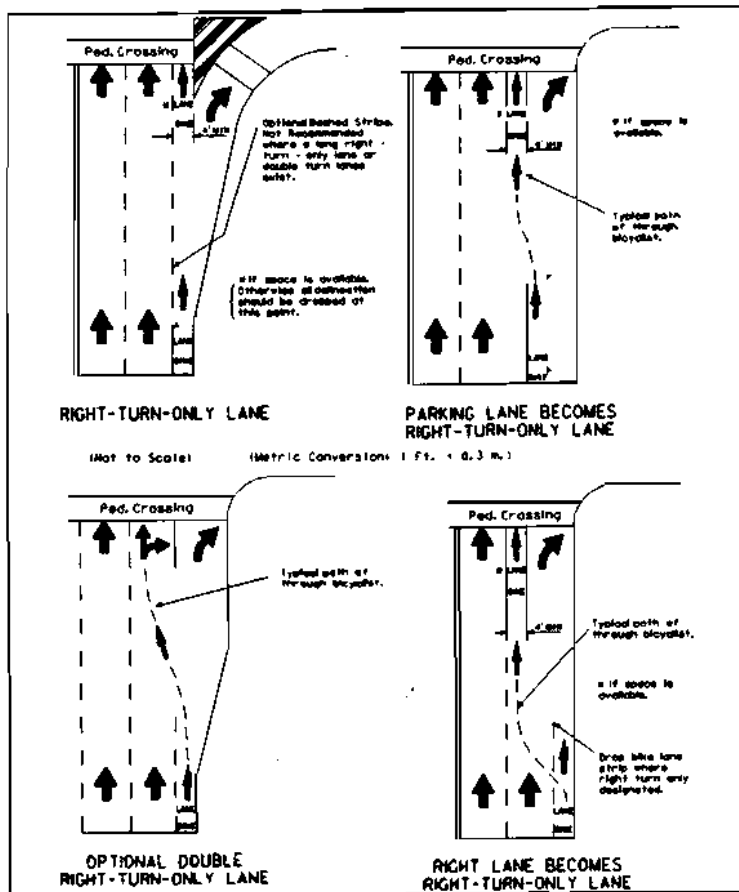
The most effective way for the Region to encourage an increase in cycling, as an alternative mode of transportation, is to develop more bicycle lanes. This conclusion is supported by a national study completed in May 1992 by the Bicycle Federation of America, entitled "*The Effects of Bicycle Accomodations on Bicycle/Motor Vehicle Safety and Traffic Operations*." The purpose of the study was to further refine the Federal policy goal of USDOT, which is to encourage an increase in bicycling while enhancing safety. Bicycle lanes offer the best compromise to issues central to safe, effective cycling. They provide a dedicated travel lane for cyclists that are clearly delineated in a manner that is recognizable to both the cyclist and the motorist, and offer the 95% pool of Basic and Child cyclists with an opportunity to make use of designated bicycle facilities, as a component of the normal overall community transportation system.

Bicycle lanes are striped and signed, one-way facilities that flow in the direction of motor vehicle traffic. The most desirable width for a bicycle lane is 5 feet, however 4 feet is also acceptable. Bicycle lanes should always be constructed to the same quality standards as the adjacent roadway surface. The surface should be free of pavement irregularities, including potholes, and must be maintained to the same standards as a motor vehicle travel lane. This Plan recommends that bicycle lanes be installed primarily in urban areas of the region, as defined on the Urban Route Plan. Graphic illustrations on the next page depict a variety of applications for bicycle lanes within different roadway landscapes.

One of the most critical considerations in developing bicycle lanes occurs at roadway intersections. Due to a variety of conditions, and physical differences between motor vehicles and bicycles, roadway intersections require careful attention to the travel needs of both the motorist and cyclist. Graphic illustrations on the next page depict four intersection resolutions that offer safe and effective travel for both motorists and cyclists.



Source: Arizona's Bicycle Facilities Planning and Design Guidelines



Source: AASHTO standards for bicycle lanes approaching motor vehicles right-turn-only lanes.

Bicycle lanes will not always be the best solution for regional cycling needs. Both AASHTO and the North Carolina DOT Bicycle Program note several problem areas that should be addressed with respect to bicycle lane development:

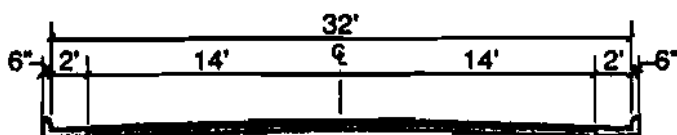
- roadways along commercial strip developments are the least compatible with bicycle lanes, due to the frequency of turning traffic -- both right turning as well as left turning vehicles.
- high speed, heavily congested roadways present a safety problem for all types of vehicles. Cyclists and motorists may perceive a bicycle lane to be safer than it actually is in reality. In these situations, careful attention must be paid to the design, signing and other aspects of facility development to enhance the safety of all vehicle operators.
- the entire width and length of the bicycle lane must be developed and maintained to a quality equal to that of the adjacent roadway, and to the minimum acceptable standards of AASHTO and NCDOT. If this can not be accomplished, for any reason, an alternative facility type should be considered and developed.
- the width of bicycle lanes should be carefully addressed for each facility application. If heavy use is anticipated, the bicycle lane may need to provide areas where a faster cyclist can safely pass a slower cyclist. Other considerations include the longitudinal gradient of the facility - - downhill travel may result in faster speeds and less maneuverability of the cyclist and could lead to accidents.

Bicycle lanes offer the region with an opportunity to provide improved on-road facilities for the Basic and Child cyclists, the largest pool of potentially active cyclists. For short commuter routes (less than 2 miles) between heavily traveled origin/destinations, they can effectively accommodate a variety of cyclists in a safe and efficient manner.

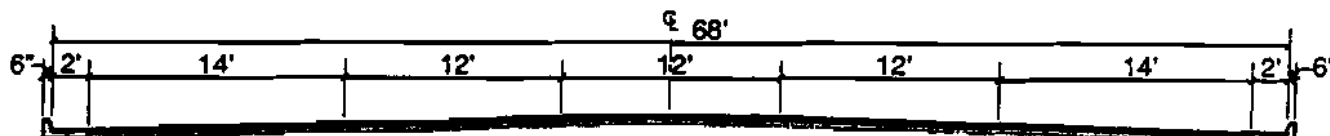
Wide outside lanes

One way for the Region to improve cycling for the Advanced Cyclist is to design and develop roadway cross sections for major and minor thoroughfares, collector streets and other arterial roadways, so that they include wide outside lanes. It should become the policy of each jurisdiction within the Durham/Orange County region to change roadway design standards so that when new highways and roads are built, or existing roads are widened, the right-hand outside lane is wide enough to accommodate bicycles. This should be true for all major roads and highways, except those with posted speeds above 55 mph, or those limited access highways.

A wide outside lane can be an expanded road shoulder or an expanded curb lane, and is always located in the right hand lane of the road. National standards indicate that they should be at least 14 feet wide. They can be designated as a Shared Roadway or Bike Route. As a long distance commuter route, they are most applicable for use by the Advanced Cyclist.



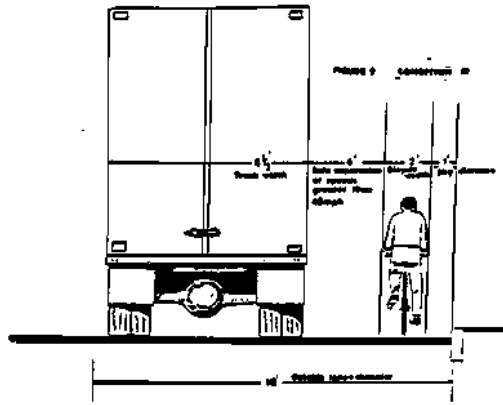
Two-lane roadway with wide lanes



Five-lane roadway with curb & gutter, standard 12' inside lanes, and widened curb lanes

Source: Draft North Carolina *Bicycle Facilities Planning & Design Guidelines*

Several national models exist which demonstrate the effectiveness of wide outside lanes as successful components of urban transportation systems. The State of New Jersey's *Bicycle Compatible Roadways* provides a wealth of design and engineering recommendations for typical urban roadway improvements that foster increased cycling on existing roads and highways.



Source: New Jersey *Bicycle Compatible Roadways*

The City of Tucson, Arizona has one of the most progressive Alternative Modes programs in the nation, and promotes a wide outside lane for every Major Street and Thoroughfare. Tucson is very concerned with congestion mitigation and making significant improvements to air quality. The city is implementing a Travel Reduction Program which incorporates bicycle usage, transit and pedestrian travel as alternative modes to the motor vehicle. Tucson views the development of wide outside lanes as a method for increasing the capacity of its transportation system with minimal disruption to adjacent land uses.

Upon further, site specific evaluation of a roadway, it may be possible to re-stripe some roads and highways within the region so that a wide outside lane is established for bicycle travel. This can be a quick and inexpensive method for establishing a wide outside lane to offer commuters a choice in their mode of travel.

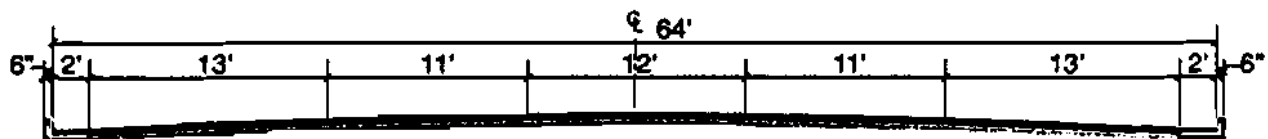
Bike Path Development

Bike paths for transportation purposes should be regarded as extensions of the urban roadway and highway system. If this is effectively understood by regional transportation planners, cycling advocates, local politicians and trail enthusiasts, then needless duplication of transportation facilities can be eliminated. Bike paths are most applicable when they offer the cyclist a safe and time efficient route of travel on an independent right-of-way - a corridor specifically designated for a path, or one that is acquired for multiple purposes such as for a utility and bike path.

Bike paths parallel to roadways have been proven, through numerous national studies, to be dangerous to both cyclists and motorists. In fact the American Association of State Highway Transportation Officials (AASHTO) states that parallel bike paths may:

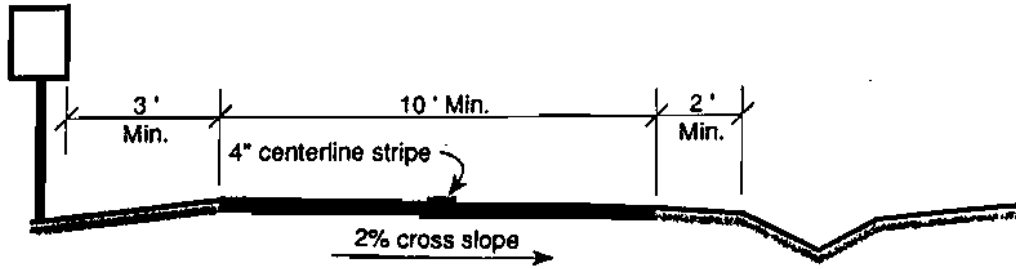
- encourage wrong way riding, a major cause of bicycle-car accidents.
- cause cyclists to appear "as if from nowhere" at intersections, possibly going unnoticed by motorists.
- subject Advance Cyclists choosing to use a roadway to harassment from motorists who feel that they should, in all cases, be using the path
- result in stopped cross-street vehicles, or vehicles exiting side streets and driveways, blocking the path
- cause accidents due to the cyclists failure to yield the right of way to turning motor vehicle traffic.

AASHTO and other national sources provide very specific design criteria for bike path development. Currently, two way bike paths should be a minimum of 10 feet wide. One way bike paths should be 6 feet wide. Should local governments within the region choose to implement bike paths as a component of the overall transportation system, this criteria must be implemented for all bike path projects without exception (see next page).



Typical 5-lane roadway with curb and gutter and differential striping

Source: Draft North Carolina *Bicycle Facilities Planning & Design Guidelines*



Typical bicycle path cross section

Source: Draft North Carolina *Bicycle Facilities Planning and Design Guidelines*

Signage for urban and rural areas

Bicycle signage for all types of facilities has become standardized, and is provided in the Manual of Uniform Traffic Control Devices (see earlier text). These standards are the legal basis by which the State of North Carolina ensures the safe and orderly movement of all traffic. One critical issue related to the implementation of signage is its location and position in the landscape. Signs must be installed at appropriate heights, and far enough in advance of a condition so as to provide adequate warning to the cyclist and other vehicle operators. These issues are thoroughly addressed within MUTCD and should be followed without exception.

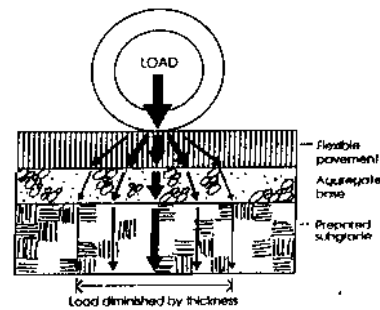
In developing its Bicycle Master Plan, the State of Oregon found the need to supplement both AASHTO and MUTCD with regulatory and warning signs specifically developed for bicycle facilities (see following detail drawings from Oregon's Bicycle Master Plan). The State of Arizona has also produced a full set of engineering drawings that illustrate the most applicable signage for bicycle facilities. These drawings are included within a Engineering Supplement to this report.

At times, special signage systems will be developed by local agencies for use on trails, greenways, rail-trails and off-road bike paths. This signage should be developed to be compatible with MUTCD, and not offer confusing or conflicting messages to the public.

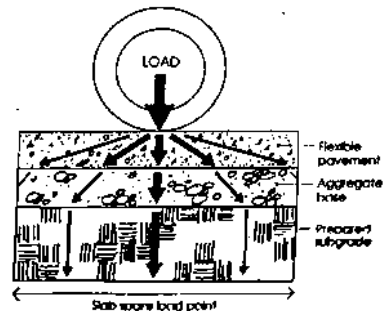
Surface type and depth.

The most frequently used surface for bicycle routes, lanes and paths is asphalt. The other surface most often used is concrete. Loose aggregate surface materials, such as limestone screenings, washed stone, gravel and crusher run are unaccept-

able for bicycle facilities. Cyclists need a firm, smooth, dry surface to ride on, much the same as automobiles. The major difference between a roadway built to handle auto and truck traffic, and a bicycle path built to support a cyclist, is the depth of pavement required and the design load (gross vehicle weight) that must be supported. Most roadways are designed, at a minimum, to support HS-20 loading - generally a 20-ton vehicle traveling at a prescribed speed. Bicycle paths should be developed to support a design load of 5 tons, or 10,000 pounds. On-road bicycle facilities should have a surface depth and design that equals the adjacent travel lanes.



Flexible Pavement Structure

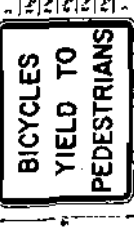
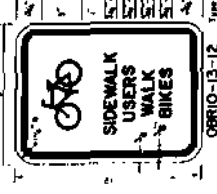
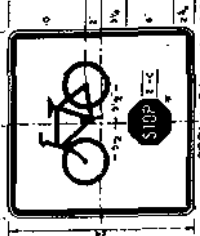
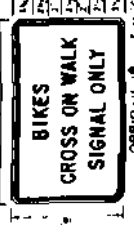
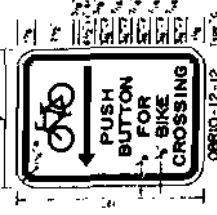
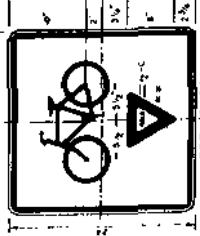
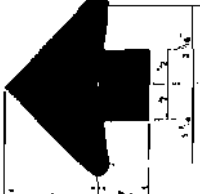
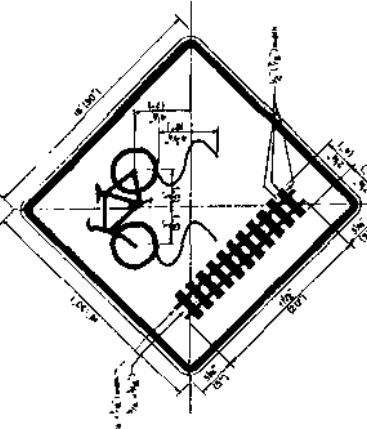
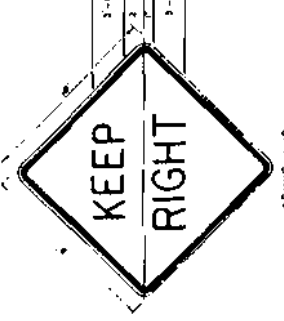
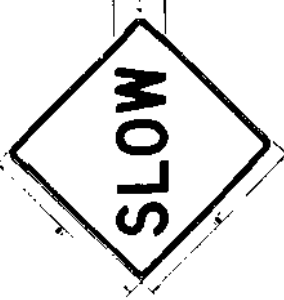
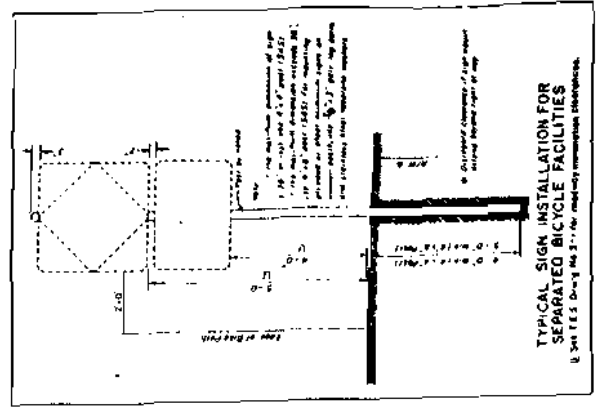
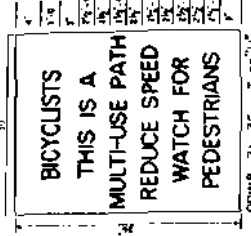
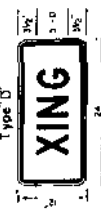
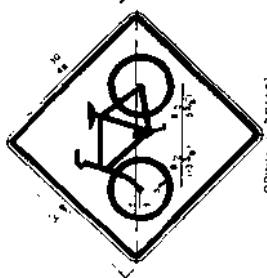


Rigid Pavement Structure

1. 4 1/4" on this sheet shall be the "rod" spaced, and these spacings shall meet the following conditions:

The signs shall be placed in the following order: (1) "XING" sign, (2) "ON BRIDGE ROADWAY" sign, (3) "ON ROADWAY" sign, (4) "BICYCLISTS THIS IS A MULTI-USE PATH REDUCE SPEED WATCH FOR PEDESTRIANS" sign, (5) "SLOW" sign, (6) "KEEP RIGHT" sign, (7) "NARROW" sign, (8) "LOW" sign, (9) "BICYCLE CROSSING" sign, (10) "BICYCLES CROSS ON WALK SIGNAL ONLY" sign, (11) "BICYCLES YIELD TO PEDESTRIANS" sign, (12) "STOP" sign, (13) "SIDEWALK USERS WALK BIKES" sign, (14) "BICYCLES CROSS ON WALK SIGNAL ONLY" sign, (15) "BICYCLES YIELD TO PEDESTRIANS" sign.

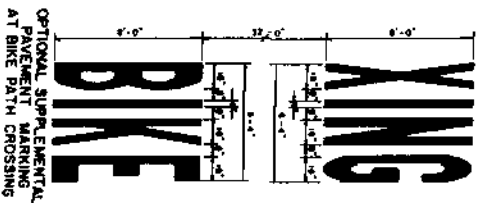
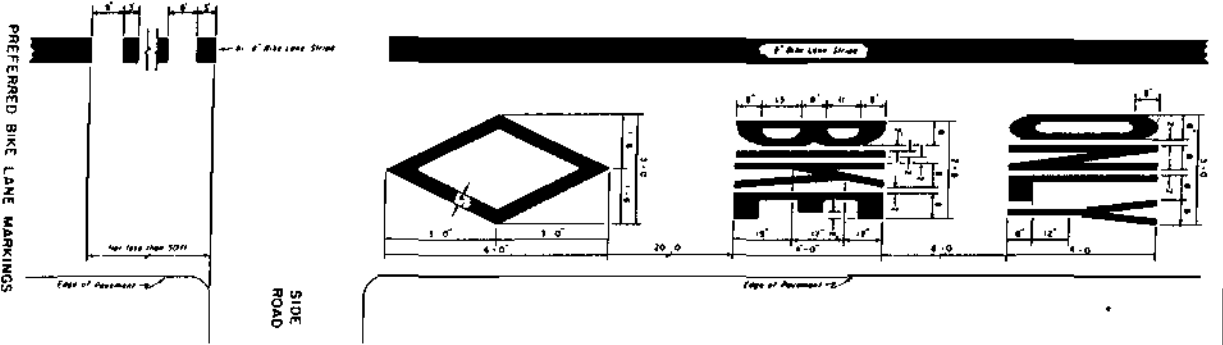
BOARD DIMENSIONS		BORDER MARGIN	
1" x 1" or 2" x 2" or 3" x 3"	1/8"	1/8"	1/8"
4" x 4" or 5" x 5" or 6" x 6"	1/4"	1/4"	1/4"
8" x 8" or 10" x 10" or 12" x 12"	3/8"	3/8"	3/8"
16" x 16" or 20" x 20" or 24" x 24"	1/2"	1/2"	1/2"
30" x 30" or 36" x 36" or 42" x 42"	5/8"	5/8"	5/8"
48" x 48" or 60" x 60" or 72" x 72"	1"	1"	1"



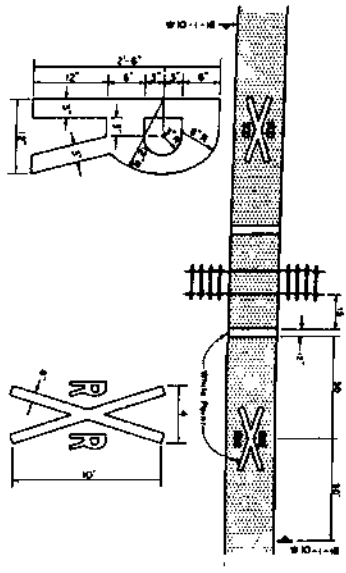
OREGON STATE HIGHWAY DIVISION
TRAFFIC ENGINEERING SECTION
STANDARD
BICYCLE SIGNING DETAILS
REGULATORY SIGNS & WARNING
SIGNS

DATE: 10/15/11
BY: [Signature]

11. 1996. 00. S-16.



TYPICAL BIKE PATH PAVEMENT MARKING AND SIGNING AT RAILROAD CROSSING



DATE	DESCRIPTION	BY	CHECKED

APPROVED: *[Signature]*

DATE: *05/09/18*

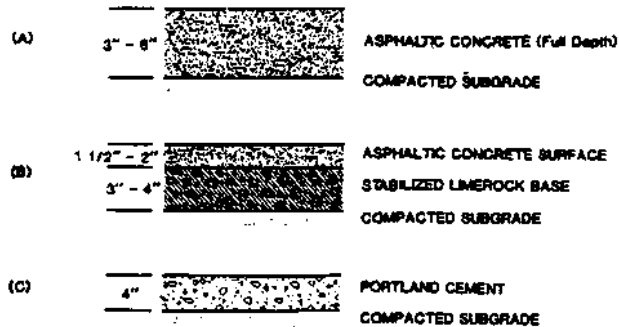
OREGON STATE HIGHWAY DIVISION
TRAFFIC ENGINEERING SECTION

STANDARD PAVEMENT MARKING AND SIGNING

DATE: *NOV 05 2018*

14 000 5-15

Various types of pavement cross sections are applicable to the development of bicycle paths. The following graphically illustrate typical pavement design that is acceptable:



TYPICAL PAVEMENT STRUCTURAL SECTIONS FOR BIKEPATHS

Source: *Arizona Bicycle Facilities Planning & Design Guidelines*

Interim and substandard bicycle facilities

As local governments within the Region begin to implement this Plan, they will invariably encounter situations and circumstances which require the development of an interim bicycle facility, or which are substandard. In addition, some municipalities are currently promoting the use of certain facilities which are in fact substandard. Encouraging the use of interim and substandard bicycle facilities increases the liability of these local governments. However, actions can be taken to decrease the municipalities exposure to a litigious situation, and to increase the safety and security of cyclists.

First, for those existing facilities that are known to be substandard, but which offer the cyclist an alternative mode of travel, it is recommended that formal signage and pavement markings that designate the route as suitable for cycling be removed. Such change in designation should be properly announced through community newspapers, municipal literature and local media outlets, so that the public is made aware of the change. It may also be necessary to install a sign that denotes the change in status.

Second, for those proposed bicycle facilities which must make use of a substandard condition,

the local government should appropriately sign the facility and provide the cyclist with accurate information that enables an appropriate choice to be made. This will reduce the severity of the liability, but may not all together eliminate the municipality's total exposure.

Third, where interim or substandard facilities are employed, it may be necessary, and is in fact appropriate to require the cyclist to dismount his/her bike and become a pedestrian for a designated distance.

It should be remembered that *negligence* is conduct which creates an unreasonable risk of harm to others. In determining negligence, an injured cyclist would have to prove that the local government had a duty to perform, in order to conform to a particular standard, and that the government failed to fulfill this duty, which lead to injury of the cyclist.

Transition zones between facility types

In the course of developing a particular bicycle facility, several different types of facilities may be used to complete the entire length of the project. Designing, developing and managing the transition zones between these different facility types is very important to ensure the safety of the cyclist. Signage systems are the key to smooth transitions. Not only should the cyclist be informed of upcoming transitions, but so should the motorist. Pole mounted signs and pavement markings used jointly are the most effective way to ensure that the transition occurs properly.

Bicycle facility maintenance

This subject is covered in depth within Section 4, Bicycle-Friendly Region. With regard to facility design standards, those facility projects that are properly developed will be easier to manage and maintain than those that do not adhere to national standards and guidelines.

Bicycle Safety Issues Unique to Durham/Orange Counties

Based on our discussions with the Regional Bicycle Task Force, the Technical Coordinating Committee and the public response received during the planning process, the following issues were identified as foremost concerns regarding bicycle safety.

The perception of safety versus actual safety

Mixing cyclists and motor vehicle traffic creates the potential for conflict. But actual conflict may be reduced if rules and regulations are followed. Appropriate facility development effectively diminishes conflict and can create a harmonious relationship between cyclists and motor vehicles. However, care must always be exercised, especially where shared facilities, bike routes and bike lanes are developed.

Advanced cyclists are more experienced at dealing with conflict with motor vehicles than are basic and child cyclists. Perhaps the greatest sense of false security can be derived from striping a bike lane for use by cyclists. The cyclist may incorrectly assume that as long as they remain within the striped lane, they will not be in conflict with adjacent motor vehicle traffic. The most effective safety is derived from comprehensive and thorough education of both motorists and cyclists regarding the use of roadways for cycling. In addition, uniform application of design and engineering guidelines and standards throughout the region will help to eliminate confusion and improve the safety of shared use.

Bicycle hazards

Most unsafe conditions for cyclists are generated not only by motor vehicles and congested and narrow urban roads, but also because of obstacles in the path of travel and poorly maintained travel lanes. There are three types of hazards that cyclists typically encounter: surface hazards, geometric hazards and operational hazards.

National studies indicate that the most serious surface hazards to cycling include:

- Potholes, bumps, corrugations, seams and unravelled pavement along roadways and paths, and bridge expansion joints and/or metal grates.
- Roadway drainage grates that are installed so that inlet slots are parallel to the roadway, which traps bicycle wheels.
- Sign posts, mailboxes, utility poles, and other objects that are placed closer than one foot from the edge of the roadway.
- Unimproved intersecting streets (gravel and dirt roads) and gravel driveways that often eject debris into the paved roadway causing a hazard to the cyclist.

- Railroad tracks that cross at an angle, creating a trap for bicycle wheels.
- Temporary roadway construction/improvements such as milled pavement, sudden pavement changes due to roadway re-surfacing, and the construction of new roadway utilities, can be hazardous and should always be signed for both motorists and cyclists.

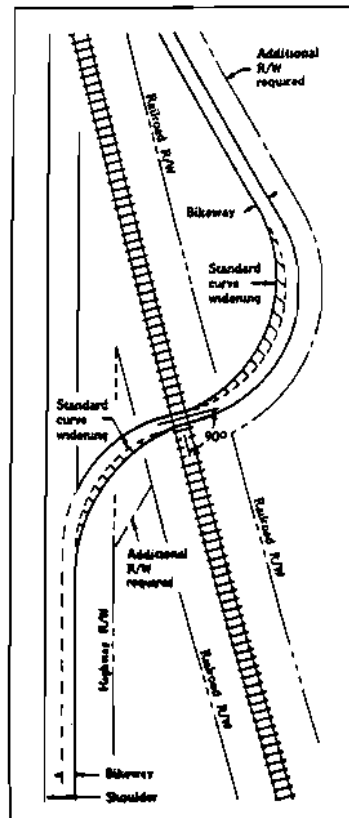
Geometric hazards include:

- narrow lanes and structures
- high volume driveways
- sight obstructions
- traffic signals that are not bicycle responsive

Operating hazards include:

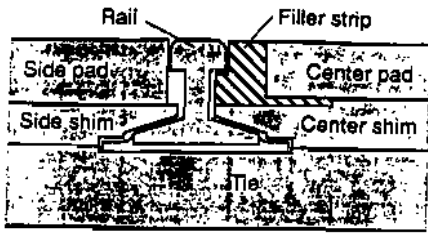
- high speed traffic
- high volume traffic
- truck traffic
- curbside automobile parking

Some of the ways in which these hazards can be resolved are provided below and on the next page:



Intersection of railroad and bikeway

Source: Minnesota Bikeway Design Manual



Cross-section of rubberized railroad crossing with flangeway filler strip; for low-speed angle crossings

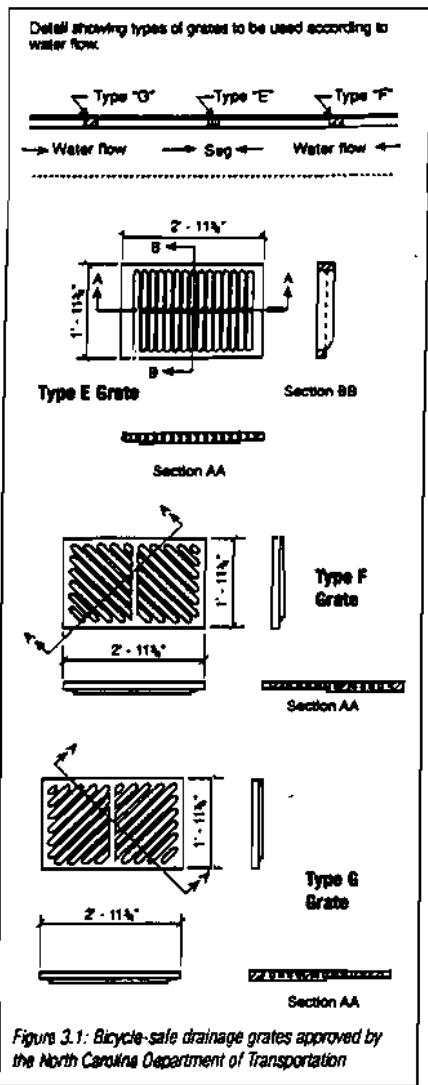


Figure 3.1: Bicycle-safe drainage grates approved by the North Carolina Department of Transportation

Bicycle-safe drainage grate design
Source of both details above: Draft NC Bicycle Facilities Planning & Design Guidelines

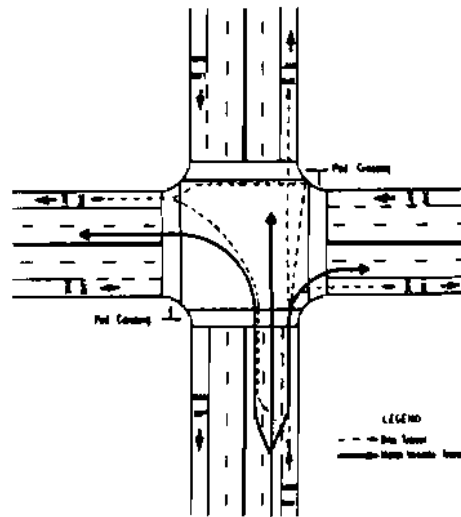
Most of these hazards are easily corrected by implementing proper planning guidelines and design standards for bicycle facilities, and by extending traditional maintenance of transportation arteries to include the bicycle travel way.

Street intersections/crossings

The bicycle and motor vehicle intersection has traditionally been one of the most thoroughly researched and designed components of facility development. A number of issues are generated by this type of intersection:

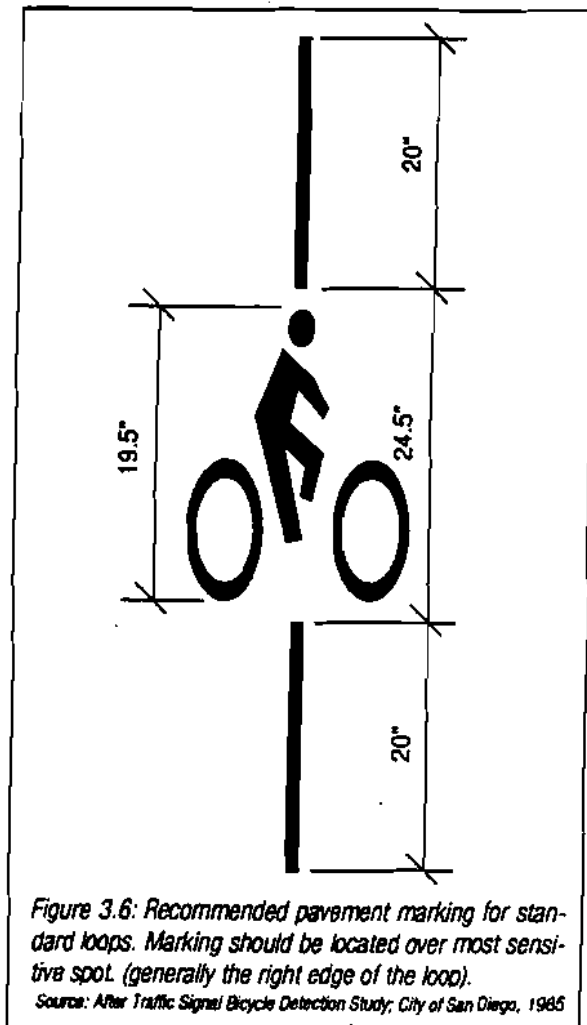
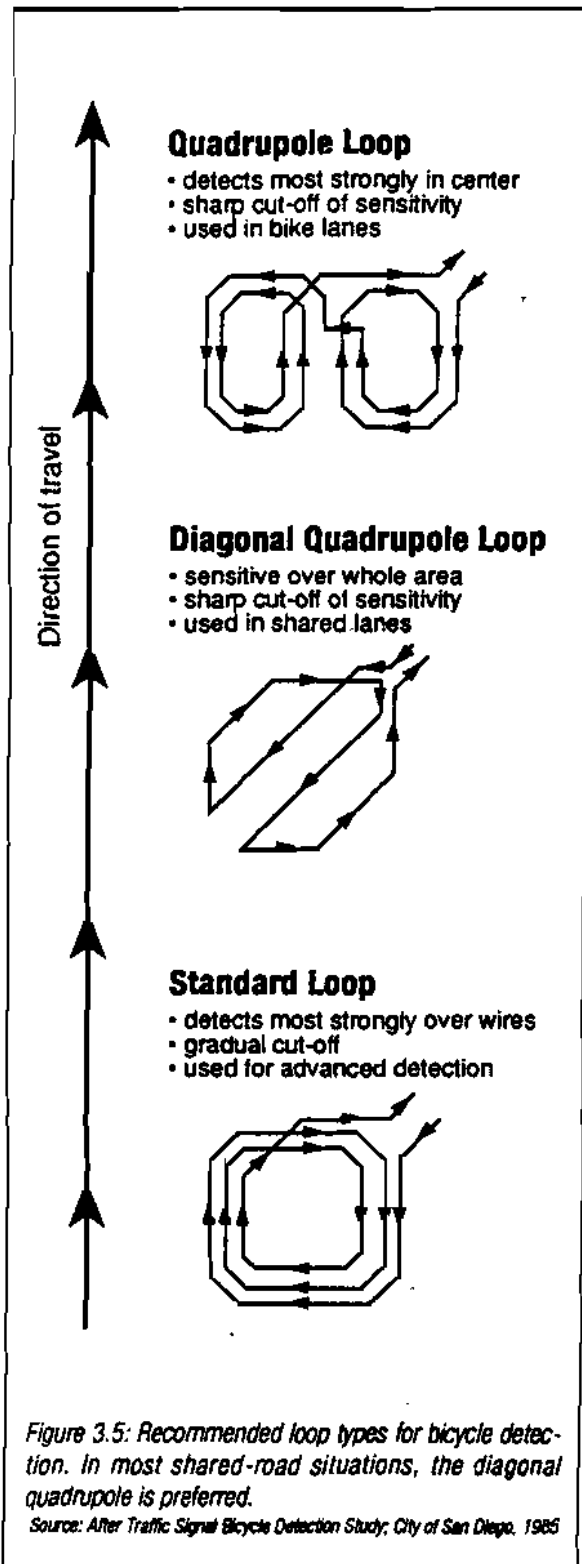
- how a vehicle turns right while the cyclist proceeds straight
- how a cyclist moves across traffic to make a left hand turn
- how vehicles and cyclists make the same turn simultaneously

Several design standards have been developed to ensure that these and other issues are successfully resolved.



Typical Bicycle/Auto Movements at Intersections of Multilane Streets (source: originally adapted from CALTRANS *Highway Design Manual*)

One of the principal issues raised in public discussions regarding this Regional Plan was how a cyclist can activate a signalized intersection. The California Department of Transportation is a pioneer in this area, and has developed the following design solutions to assure that cyclists are able to be detected at traditional intersections (see following page):



Quadrupole loop types recommended for bicycle detection
Source: San Diego Traffic Signal Bicycle Detection Study

Lighting

The mild climate of the Durham-Orange Counties region permits year round cycling. This means that many commuting cyclists will make use of the transportation system before sunrise and after sunset. Artificial lighting of roadways and off-road paths is necessary in order to provide safe routes of travel during periods of darkness. There are three primary facility issues related to lighting bicycle facilities: 1) lighting roadways to accommodate cycling; 2) lighting off-road paths to accommodate cyclists; 3) lighting supplemental facilities such as bridges, tunnels and signage systems.

The Illuminating Society of North America (IES) recommends that bikeways and walkways be lighted to 1.0 footcandles, and pedestrian/bicycle underpasses be lighted to 4.0 footcandles. These considerations should be taken into account when developing bicycle facilities, irrespective of their location in the transportation network.

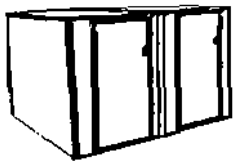
Bicycle Parking Facilities

To effectively promote cycling as an alternative mode of travel, bicycle parking is an essential facility element which should be included as a component of other facility projects. Inadequate bicycle parking can result in the creation of hazardous conditions for pedestrians and motorists, as cyclists attempt to secure their vehicles to trees, railings, posts, and other objects.

There are numerous bicycle parking devices available on the commercial market. Selecting an appropriate parking device depends on: 1) defining the level of security needed; 2) determining the ease of use; 3) determining the number of spaces needed; 4) evaluating the potential for vandalism; 5) selecting a cost effective device based on budget.

Locating a bicycle parking device within the overall transportation system also requires careful planning and design, including: 1) distinguishing between long term and short term parking; 2) locating bike parking in visible areas; 3) protecting bike parking located adjacent to automobile parking; 4) avoiding pedestrian travel lanes; 5) protecting parking areas from inclement weather; 6) providing space for parking expansion.

The City of Tucson has created a bicycle parking ordinance which provides a list of those commercial vendors that sell bicycle parking devices. A copy of this list is illustrated on the following page (also see Bicycle-Friendly Region, page 9).



LOCKER (CLASS I)



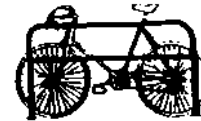
RIBBON RACK



RACK



RACK/RAIL



RAIL/BAR



POST

#	MANUFACTURER	TYPE OF FACILITY	LEVEL OF SECURITY	BICYCLE CAPACITY	LENGTH	UNIT COST	MEETS PARKING ORDINANCE	COMMENTS
1	AMERICAN BICYCLE SECURITY CO.	LOCKERS	★★★★★	1-2/UNIT	6'-0"	\$449-\$1,190	YES	
2	BIKE SECURITY RACKS CO.	POST	★★★★	1-5	0'-9" - 8'-3"	\$85-\$435	YES	WALL MOUNT FOR NARROW SITES
		POST	★★★★	1-2 EACH	2'-0"	\$135-\$225	YES	
		RACK	★★★	4-24	2'-8" - 16'-0"	\$195-\$880	YES	
		RIBBON	★★★	2-12	1'-6" - 16'-6"	\$110-\$950	YES	
		RAIL	★★★	4-24	28" - 16'0"	\$335-\$945	YES	
		BAR	★★★	1 EACH	2'-6"	\$60-\$75	YES	
		HOOP	★★★★	2 EACH	3'-0"	\$205-\$275	YES	
3	DAVE BANG ASSOC., INC.	RACK	★★	1-18	5'-0" - 10'-0"	\$248-\$425	YES*	SEE NOTE ON REVERSE SIDE
	PLAYWORLD SYSTEMS	POST	★★	4	-	\$179-\$198	YES*	SEE NOTE ON REVERSE SIDE
	HUNTCO SUPPLY, INC.	CONC. BASE	★★	1 EACH	-	\$39 EACH	NO	NOT U-LOK COMPATIBLE
		RIBBON	★★★	3-11	1'-2" - 9'-2"	\$139-\$379	YES	
	DUMOR, INC.	RACK	★★	4-18	5'-0" - 10'-0"	\$149-\$258	YES*	SEE NOTE ON REVERSE SIDE
	KAY PARK-REC CORP.	RACK	★★	4-18	5'-0" - 10'-0"	\$110-\$425	YES*	SEE NOTE ON REVERSE SIDE
		LOOP RACK	★★	4-14	5'-0" - 10'-0"	\$138-\$284	NO	DOES NOT SUPPORT BIKE FRAME
		LOW PROFILE RACK	★★	12	10'-0"	\$235	NO	DOES NOT SUPPORT BIKE FRAME
	BCI BURKE COMPANY, INC.	RACK	★★	1-20	5'-0" - 15'-0"	\$175-\$403	YES*	SEE NOTE ON REVERSE SIDE
		RIBBON	★★★	1-9	3'-3" - 7'-4"	\$159-\$199	YES	
4	BIKE LOCKR MFG. CO.	LOCKER	★★★★★	1-2/UNIT	6'-2"	\$637-\$750	YES	

Tucson, Arizona Bicycle Parking Information Sheet

#	MANUFACTURER	TYPE OF FACILITY	LEVEL OF SECURITY	BICYCLE CAPACITY	LENGTH	UNIT COST	MEETS PARKING ORDINANCE	COMMENTS
5	BRANDIR INTL., INC.	RIBBON	***	5-11	3'-2"-9'2"	\$395-\$765	YES	
6	CANTERBURY INTERNATIONAL	RACK POST	*** **	1-2 2	6'-0"	N/A N/A	YES NO	NOT U-LOCK COMPATIBLE
7	CYCLE SAFE INC.	LOCKER	*****	2/UNIT	6'-5"	\$1,300/UNIT	YES	
8	ENVIRONMENTAL FEATURES	CONC. BASE	**	6 EACH	-	\$1,010	NO	NOT U-LOCK COMPATIBLE.
9	GRABER PRODUCTS, INC.	RACK WALL MOUNT	*** **	3-18 3-5	2'-11"-9'-2" 5'-0"	\$100-\$467 \$140-\$180	YES* YES	SEE NOTE BELOW
10	GRACIE ENTERPRISES	RACK	**	4	3'-2"	\$135	NO	NOT U-LOCK COMPATIBLE
11	HITCH-2 INC.	RAIL	***	2	3'-0"	\$150-\$175	YES	
12	J.G. WILSON CORP.	LOCKER	*****	4-10	12'-0"	\$1997-3467	-	
13	KRYPTONITE CORPORATION	POST	***	1/2	-	N/A	YES	
14	MADRAX, INC.	BIKE/BENCH RIBBON RAIL RACK	*** *** *** **	4 EACH 4-10 2 EACH 4-10	6'-6" 3'-3"-9'-6" 5'-0" 4'-1"-18"-4"	\$190-\$240 \$119-\$729 \$155-\$180 \$155-\$259	YES YES YES YES	#BB100 NOT U-LOCK COMPATIBLE
15	PARK RITE CO.	SINGLE RACK DOUB. RACK	*** **	1-8 4-16	3'-9'-7" 1'-8"-9'7"	\$120-\$275 \$178-\$385	YES -	
16	PATTERSON-WILLIAMS CO.	RACK	***	3-28	2'-2"-20'-6"	\$125-\$485	YES	LOOP & ARCH-TYPE MODELS SECURE ONE WHEEL ONLY.
17	RACK III	RACK	****	1/POST	VARIES	\$188 PER DBL. UNIT	YES	
18	RIB RACK	RACK	***	2-10	3'-10'-0"	\$190-\$355	YES	
19	SUNSHINE U-LOK CO.	POLE MOUNT POST WALL MOUNT	* * *	1 2-4 1	- 1'-0"-4'6" -	\$45 \$75-\$120 \$45	YES YES YES	ADDITIONAL CABLE REQUIRED TO SECURE WHEELS. ALL MODELS NOT U-LOCK COMPATIBLE.

* A BICYCLE RACK IS DEFINED AS A RACK, POST, OR OTHER DEVICE WHICH IS ANCHORED SECURELY & WILL DIRECTLY SUPPORT THE BIKE FRAME IN A STABLE POSITION WITHOUT DAMAGE TO THE WHEELS, FRAME, OR COMPONENTS. FOR THIS REASON, THE SUGGESTED MANUFACTURER'S RACK CAPACITY MAY BE LOWER PER LOCAL ORDINANCE REQUIREMENTS.

* SECURES FRAME ONLY
** SECURES ONE WHEEL ONLY

*** SECURES FRAME & ONE WHEEL ONLY
**** SECURES FRAME & BOTH WHEELS

***** BICYCLE LOCKER, MAXIMUM SECURITY/ PROTECTED FROM WEATHER



The Regional Bicycle Route Plan

With some encouragement, it is likely that many Durham and Orange County motorists can be enticed to use their bicycles for short trips and commuting purposes. In its present state, however, the region's transportation system does not adequately accommodate bicycles and is often a serious deterrent to bicycle travel.

An integral component of the Regional Bicycle Plan is a **Bicycle Route Plan**, which is composed of two parts: the **Urban Route Plan** and the **Rural Route Plan**. The purpose of these plans is to develop a complete and coherent transportation system for bicycles, so that a cyclist may commute between and within urban areas in a more suitable and less volatile riding environment.

It is important to understand however, that the Regional Bicycle Plan is not intended to serve as a complete local bicycle facility development strategy for Durham or Chapel Hill. The Plan will solve some local bicycle transportation needs, where those needs have regional significance. Each community is encouraged to make local additions to the Regional Plan wherever necessary. The Regional Bicycle Plan serves as the basis from which future local bicycle route planning can occur.

Route Planning Methodology

The Bicycle Route Plan was developed through the understanding of some basic truths about utilitarian cycling. In traveling from Point A to Point B, the commuting cyclist will usually take the most direct and continuous route possible, unless the most direct route is perceived to be overly congested and unsafe. Commuter cyclists use the most direct route for the same reason that motorists do: they want to get to their destination quickly.

The most direct and continuous routes in the Durham-Chapel Hill-Carrboro urban area are major and minor thoroughfares. In many cases, thoroughfares have gentler grades than adjacent neighborhood streets, since they are designed to handle larger volumes of traffic at a faster speed. Research of successful bicycle transportation systems in the U.S. confirms that "improved thor-

oughfare bikeways" provide the most effective and popular routes for utilitarian cyclists. Higher priority should be given to thoroughfares near college campuses, recreational facilities, and high density residential areas, since these destination points produce a disproportionately large share of bicycle trips.

Not all urban thoroughfares are desirable for regional bicycle use. In some cases, strip-developed thoroughfares are inappropriate for bicycle facilities. These roadways carry high volumes of traffic at all hours of the day, with substantial quantities of turning, entering and exiting traffic. Roxboro Road in northern Durham is a prime example. Although many bicycle trip generators are located along this thoroughfare, it is unlikely that bicycle improvements could ever transform it into a desirable facility for cyclists. Resources are best spent on alternative side routes to safely accommodate cyclists. Neighborhood streets can provide vital bicycle connections through congested urban areas when no safe alternative exists. Neighborhood streets also provide a vital link between residential areas and urban thoroughfares.

Urban freeways with speed limits above 45 miles per hour are generally unsuitable for bicycling. Median width on these roadways is rarely adequate to buffer the cyclist from wind currents created by high speed truck traffic. However, there are possibilities that urban freeways can provide a feasible commuter route when no other reasonable alternative exists. The Urban Route Plan identifies the I-40 corridor from NC 86 to Hillsborough as a possible route for an off-road bicycle path within the 300'+ highway right-of-way, should neither Old NC 86 (SR 1009) or new NC 86 provide a feasible route. More study is needed on the legal aspects of allowing bicycle access to restricted highway rights-of-way in North Carolina.

Urban Bicycle Route Planning

The Urban Bicycle Route Plan serves as a master transportation system for bicycles within the metropolitan area of Durham and Chapel Hill-

Carrboro (see Urban Bicycle Route Map). This system is composed of linkages between major destinations and between urban centers. Again, the Regional Urban Route Plan is not intended to address all local bicycle routing needs. It is anticipated that each municipality will augment the Regional Bicycle Plan with important local bicycle improvements where needed.

Furthermore, the Regional Bicycle Plan makes no determination of the type of bicycle facility that should be constructed on each designated roadway on the Urban Route Plan. In other words, the Plan does not declare one type of facility to be appropriate for every situation in Durham and Orange counties. The most appropriate design should be determined for each roadway according to the guidelines provided in Section 5: Facility Design and Engineering Standards.

In developing the Urban Bicycle Route Plan, previous plans for bicycle facilities within urban areas were reviewed for their regional significance. This review included facilities listed within the 1992 Transportation Improvement Plan (TIP) produced by the NCDOT Bicycle Program. In past years Durham, Chapel Hill and Carrboro have received funding for bicycle facilities through the Bicycle TIP. The Bicycle Program reviews a variety of funding requests each year, allotting monies in the following two categories:

Independent projects

These are bicycle facilities funded separately from any other scheduled roadway improvements. Examples would include bicycle paths, bicycle parking facilities, signage projects, bicycle maps, and roadway improvement projects specifically for bicycles that are separate from general roadway improvements. This portion of the TIP is composed of a 4-year schedule of projects.

Incidental projects

These are bicycle facilities that are added to scheduled roadway improvement projects including bridge improvements, road widening projects, bicycle-safe drainage grates, intersection improvements, and parallel off-road bicycle paths. The TIP lists these planned bicycle improvements even if the general roadway improvements have not yet been assigned a construction date.

In the 1992 Bicycle TIP funding schedule, Orange

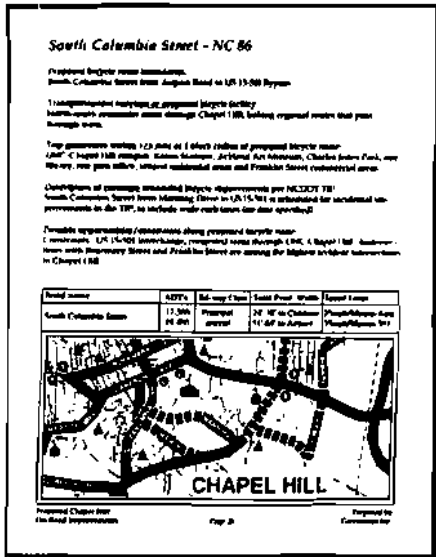
County is provided with 6 independent projects and 14 incidental projects. Durham County has 3 independent projects and 29 incidental projects. Nearly all projects are located within the Durham-Chapel Hill-Carrboro urban area (including RTP), while only one project is in northern Orange County and none in Hillsborough.

Beyond the improvements already scheduled in the TIP, a substantial amount of information was gathered in order to develop and define the Urban Bicycle Route Plan. The following information was taken into consideration:

- Discussions with local bicycle commuters about which routes they currently travel and which routes they would like to travel.
- Input from local cyclists and advocates, transportation planners, city and county staff, and from comments received at the Public Forum held in Chapel Hill on April 28th, 1992.
- "Trip generators" (origin and destination points) were identified in order to determine the transportation needs of cyclists. Trip generators are identified on Regional Route Plan maps, and include shopping centers, malls, schools, universities, libraries, post offices, historical sites, museums, parks, community centers, and YMCA's.
- Off-road trails with "bikeway potential" were identified, i.e. proposed trails that will likely be designed to meet bicycle facility standards for off-road trails. Examples include the American Tobacco Trail, the Bolin Creek Bikeway and the Booker Creek Bikeway in Chapel Hill.
- Plans for new roadways and improvements to existing roadways were reviewed, per the new Recommended Thoroughfare Plan for the Durham-Chapel Hill-Carrboro Urban Area (October, 1991)
- Proposed parks and recreational facilities were placed on the map, as these will be future destination points.
- Connections to Raleigh's bicycle system per the Raleigh Bicycle Plan of 1991 were identified, in order to provide Triangle-wide transportation linkages.

- Connections to existing statewide bicycle routes in adjacent counties.
- Plans developed by local universities for campus bicycle routes.

Through the synthesis of the information gathered, Urban and Rural Regional Route Plans were developed. For each roadway designated in the Urban Route Plan, a technical evaluation was completed (see the Engineering Supplement). The evaluation includes proposed route boundaries, transportation function of the proposed facility, trip generators within 1/4 mile or 2 block radius, description of currently scheduled bicycle improvements, possible opportunities and constraints of the route, average daily traffic counts (ADT's), roadway classification, total pavement width, and speed limit of the roadway.



Example Technical Evaluation completed for the Regional Bicycle Plan

Regional Urban Linkages

One specific purpose of the Regional Bicycle Plan is to create bicycle connector routes for commuting between urban areas in Durham and Orange Counties. Five specific zones of connection were recognized as requiring attention: Durham to Chapel Hill, Chapel Hill to Research Triangle Park, Durham to Research Triangle Park, Chapel Hill to Hillsborough, and Durham to Hillsborough (see Urban Bicycle Route Map).

Through route planning discussions with bicycle commuters and city planners, it was determined that there were usually several options available for each regional bicycle connection. These routes are listed below. At least one route from each group should be considered initially, and additional routes should be considered as funds permit (in most cases, each route serves a different urban zone).

Durham - Chapel Hill/Carrboro:

- Route a: Erwin Road
Northern and central Durham connection to northern Chapel Hill
- Route b: Picket Road to Erwin Road
Central Durham connection to northern Chapel Hill
- Route c: Old Durham/Chapel Hill Road
Central Durham connection to northern Chapel Hill
- Route d: Old Durham/Chapel Hill Rd. to Farrington to Ephesus Church Road
Central Durham connection to northern Chapel Hill
- Route e: Option 1:
NC 751 Hope Valley Road to NC 54
Central Durham connection to southern Chapel Hill
- Option 2:
South Roxboro Road to NC 54:
Central Durham connection to southern Chapel Hill

Special consideration:

US 15-501 should be examined through future Corridor Study as to the possibility of including bicycle facilities. A bicycle route within this corridor may eliminate the immediate need for bicycle facilities along other alternatives.

Chapel Hill-Carrboro - Research Triangle Park

- Route a: NC 54 to Barbee Chapel Road to Stagecoach Road to Massey Chapel Road to Barbee Road to NC 54
Southern Chapel Hill connection to RTP via southern Durham County

Route b: Old Durham-Chapel Hill Road to
Martin Luther King Jr. Parkway
Northern Chapel Hill connection to RTP

Route c: Option 1:
NC 54
Southern Chapel Hill connection to RTP

Option 2:
NC 54 to Woodcroft Parkway
Southern Chapel Hill connection to RTP

Durham - Research Triangle Park

Route a: Cornwallis Road
Central Durham connection to northwest
RTP

Route b: Martin Luther King Jr. Parkway
Southern Durham connection to north-
west RTP

Route c: American Tobacco Trail to Cornwallis
Drive
Downtown Durham connection to north-
west RTP

Route d: Midland Terrace to Lynn Road to Angier
Avenue to South Miami Blvd.
North-eastern Durham connection to
eastern RTP

Route e: Eno Drive Extension to Sherron Road to
South Miami Blvd.
North-eastern Durham connection to
eastern RTP

Route f: Option 1:
Alston Avenue
Central Durham connection to RTP

Option 2:
Briggs Avenue to Northeast Creek
Parkway
Eastern central Durham connection to
northwest RTP

Chapel Hill-Carrboro - Hillsborough

Route a: Option 1:
NC 86
Northern Chapel Hill connection to
Hillsborough

Option 2:
Old NC 86
Western Chapel Hill connection to
Hillsborough

Option 3:
I-40 corridor pathway
Northern Chapel Hill connection to
Hillsborough

Durham - Hillsborough

Route a: Old NC 10 Road to NC 86
Northern Durham connection to southern
Hillsborough

**Process for Implementing Urban Route
Plan**

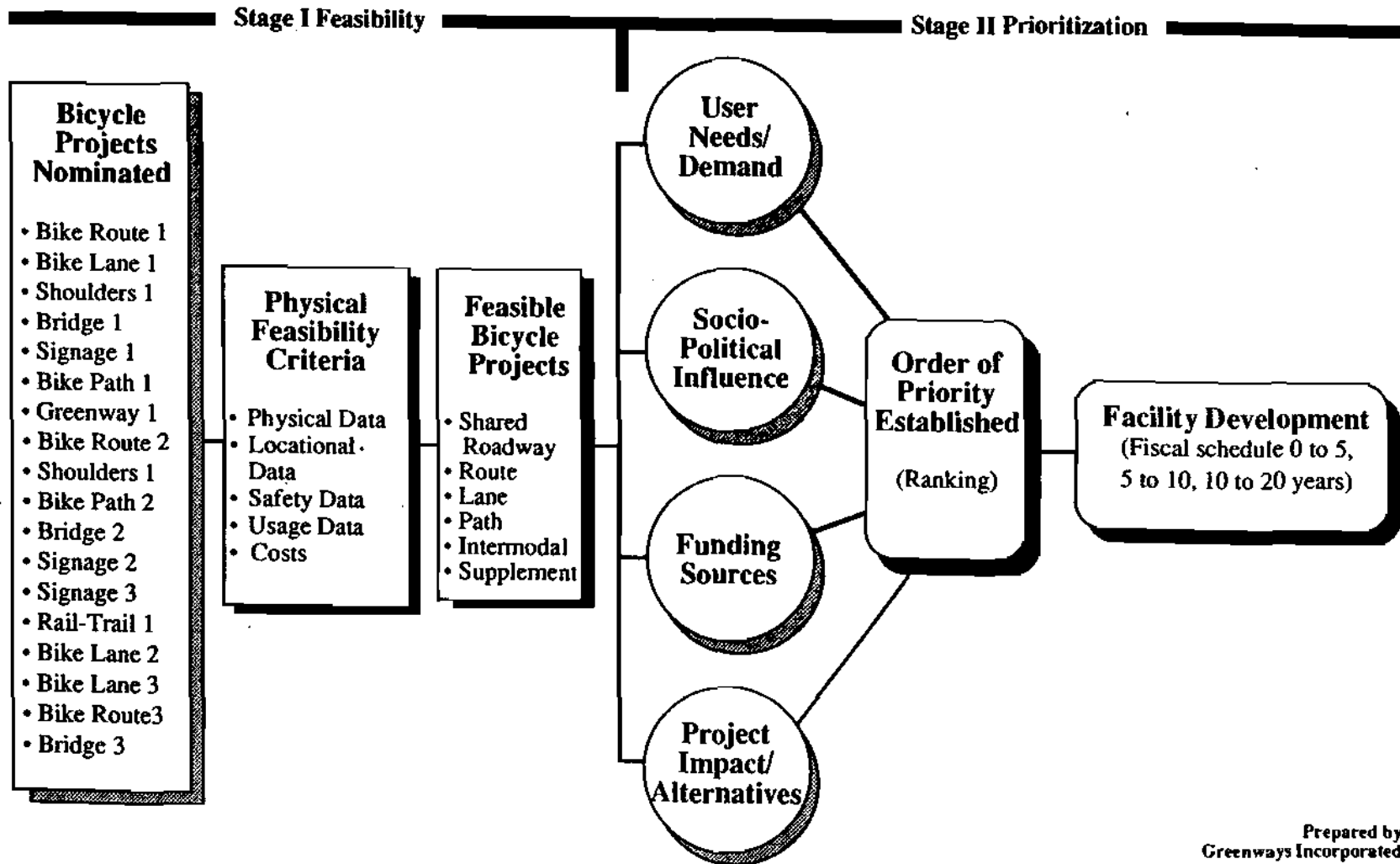
The Regional Bicycle Plan sets forth the follow-
ing process for developing bicycle facilities along
roadways identified in the Urban Route Plan:

- 1) Prioritize all proposed urban bicycle facility projects. In order to achieve a unified and orderly implementation of new urban bicycle facility projects, both those proposed by the Regional Bicycle Plan and future nominated projects, a detailed mechanism for prioritization has been developed. The Regional Bicycle Plan establishes a process by which a candidate or nominated regional bicycle facility can be objectively evaluated for future development potential (see the Process Chart on the following page, and Feasibility and Prioritization forms in the appendix).

The Stage I Feasibility Evaluation provides a primary step in determining if a proposed bikeway can be realistically developed. This process is not intended to be a **comprehensive** assessment of feasibility, but a preliminary assessment. (The technical evaluation sheets in the Engineering Supplement provide a foundation for this exercise.) Some projects may be "weeded out" during this feasibility evaluation, should they be found inappropriate for bicycles, impossible to build, or prohibitively expensive. The result of Stage I Feasibility is a solid foundation of knowledge about each proposed bicycle project, to be further defined in Stage II Prioritization.

Durham-Orange County Regional Bicycle Plan

Process for Defining and Prioritizing Regional Bicycle Capital Improvements Projects



This mechanism provides the regional community with a uniform method of interpreting individual requests, whether they are made by city staff, cycling advocates, NCDOT, local elected officials, etc. This evaluation system is composed of two stages: 1) a feasibility study of the proposed bicycle facility project; 2) prioritization of bicycle facility projects through an objective set of criteria.

- 2) Should it be found that suitable bicycle improvements are not achievable within the immediate future, the route should be temporarily improved –through hazard removal or additional roadway width – until such time as standard bicycle improvements can be made. These interim facilities should not be signed as bicycle facilities unless they are built to state and federal standards.
- 3) Should suitable improvements on a route be completely impossible, an alternate route should be identified and planned by using the methodology described in this Regional Bicycle Plan. The route alternative should be examined to determine if it meets the needs the original route was intended to serve.
- 4) All new local and state roadway plans and roadway widening plans should be updated to include standard bicycle facilities. Adequate rights-of-way should be obtained to accommodate additional width for bicycles.

Rural Bicycle Route Planning

Much like the Urban Route Plan, the Rural Bicycle Route Plan will serve as a county-wide transportation system for cyclists. Proposed bicycle routes link small towns and rural communities, county recreation areas, and out-of-county bicycle routes.

Shared-use bicycle facilities are recommended for designated rural routes -- specifically 4' paved shoulders. It is recommended this additional width be obtained through incidental projects. Due to the low transportation demand for bicycle facilities on these routes, it is not recommended that independent widening projects be planned for these roadways. Exception will be granted when traffic volumes rise significantly, or transportation value of the bicycle route increases. For

example, University Station is a proposed 600-acre rural village that may one day be located southeast of Hillsborough. If this large scale mixed-use development occurs, nearby bicycle routes to Durham, Chapel Hill and Hillsborough should be re-evaluated for an increased potential for commuting cyclists.

The Rural Bicycle Route Plan was developed through an informal inventory of roadways that cyclists currently travel. Base maps of the two-county area were placed in bicycle shops, sports stores, libraries, and department stores, and cyclists were asked to indicate the roads they most often ride. Rural route planning was largely based on citizen input, along with considerations for routes that had obvious transportation value. Additionally, a preliminary evaluation of each roadway was conducted, identifying average daily traffic count, right-of-way width, pavement width, lane width, and roadway class (see Engineering Supplement). Roadways proposed for bicycle routes on the Rural Bicycle Route Plan were found to have no obvious deficiencies that would adversely effect bicyclists. A complete evaluation, however, has not yet been made and will be necessary in the future.

The following recommendations are made for rural bicycle routes, as designated on the Rural Bicycle Route Map:

- 1) Since the roadways identified in the rural route plan were determined to be popular rural routes, it is recommended that "Share the Road" signs shall be placed along each route to warn the motorist that cyclists more frequently use these roads. According to the Draft North Carolina *Bicycle Facilities Planning and Design Guidelines*, the specific purpose of this sign is "to increase bicyclists' visibility without designating the signed roadway as a preferred route."
- 2) Each proposed route should be assessed for possible hazards to cyclists, and these hazards should be removed in all cases where possible (see Section 5 for listing of bicycle hazards and appropriate methods of removal). If a hazard cannot be removed, special signage shall warn the cyclist of the upcoming hazard, per NCDOT's suggested signage program.

-
- 3) Upon removal of hazards, local planning agencies may choose to place bicycle route signs along the designated bikeways, per the Manual of Uniform Traffic Control Devices standards (see Section 5).
 - 4) Upon removal of hazards, local planning agencies may also choose to develop rural route maps to provide to cyclists. All bicycle maps should contain a disclaimer absolving the city or county of any liability should a bicycle accident occur. Under no circumstances should the bike routes indicated on the map be described as "safe" for cyclists, as this may also cause liability problems.

Special Consideration for Rural Route Plan

NCDOT has plans to widen I-85 west of Hillsborough, and in this widening may block access from Ben Johnson Road to West Ten Road. These roadways are designated for a proposed bicycle route for two reasons:

- 1) The Ben Johnson/West Ten underpass is the only viable north-south bicycle connection between Mebane and Hillsborough.
- 2) The route is already popular with cyclists.

It is the recommendation of this Regional Bicycle Plan that the intersection of the I-85/U.S. 70 Connector be carefully studied to determine if bicycles and pedestrians can safely be accommodated with standard bicycle and pedestrian facilities. If they cannot be accommodated to national safety standards, then the Ben Johnson/West Ten access **should under no circumstances be blocked**, as it serves as the only viable non-motorized transportation route between northern and southern Orange County through Efland.



Section 7:

A Regional Bicycle Action Plan

The Regional Bicycle Plan is comprehensive in scope, addressing a multitude of regional bicycling needs. The following Action Plan is established as a guide for citizens, cycling advocates, transportation planners and decision makers. The goals, objectives, programs and policies that have been expressed throughout this report have been appropriately assigned to a progressive strategy for development. This action plan is divided into three distinct phases of development: Phase I - Zero to 5 year developments; Phase II - 5 to 10 year developments; and Phase III - 10 to 20 year developments.

It is recommended that this entire Plan be reviewed at the end of the first Phase to be revised and brought up-to-date with current bicycle facility development policies, procedures and the state-of-the-practice.





Phase I: 0-5 Year Action Plan

This agenda briefly describes those tasks that must be embarked upon as soon as possible to meet the immediate bicycle needs of the regional community. The following recommendations should be undertaken between fiscal year 1993 and 1997.











- Each jurisdiction should adopt a Bicycle Transportation Policy Statement, and include bicycling in Comprehensive Plans.
- Bicycle/pedestrian coordinators should be appointed by both Durham and Chapel Hill. Coordinators will manage local efforts to implement the Regional Bicycle Plan, and will organize regional efforts as outlined in the Plan. This step is critical in implementing the Regional Bicycle Plan. Without a coordinator, it will be extremely difficult to accomplish this Action Plan.
- In service staff training programs should be provided for city and county transportation and planning staff.
- Substandard facilities should be identified and corrected, to avoid municipal liability.
- Local jurisdictions should prioritize proposed urban bicycle routes and begin developing high priority routes. Every attempt should be made to access ISTEA funds for this purpose, including Congestion Mitigation and Air Quality funds, National Highway Systems Project funds, Federal Lands Highway Program funds, Transportation Enhancement Funds, and Flexible Funds.
- Rural route hazard removal should be initiated, "Share the Road" signs should be installed on rural roadways identified by Rural Bicycle Route Plan.
- Local jurisdictions should adopt zoning ordinances, development ordinances and standard practices that ensure bicycle friendly land use development.
- All outdated bicycle traffic ordinances should be brought to modern standards. Each jurisdiction should adopt progressive bicycle parking ordinances.
- Bicycle facility maintenance programs should be initiated. All new and existing bikeways should be placed on regular maintenance schedules.
- Full scale helmet promotion campaigns should be implemented in each locality. The bicycle education plan should be implemented, concentrating on Basics of Bicycling in public schools. Adult education efforts should begin, primarily through universities and public service announcements.
- The new "Share the Road" segment of the Driver's Education curriculum should be implemented across the region, in public schools and through private driver's training courses. Local bicycle advisory committees should contact local Driver's Education instructors and encourage use of new curriculums.
- The Carolina Tarwheels should expand the scope of their organization through the following: a) conducting popular bicycle events (coordinated with city agencies); b) providing

Legend

Bicycle Routes

-  Roadways designated for bicycle improvements
-  Parallel bikeway options
-  Proposed off-road bicycle paths
-  Study area: possible bicycle facilities

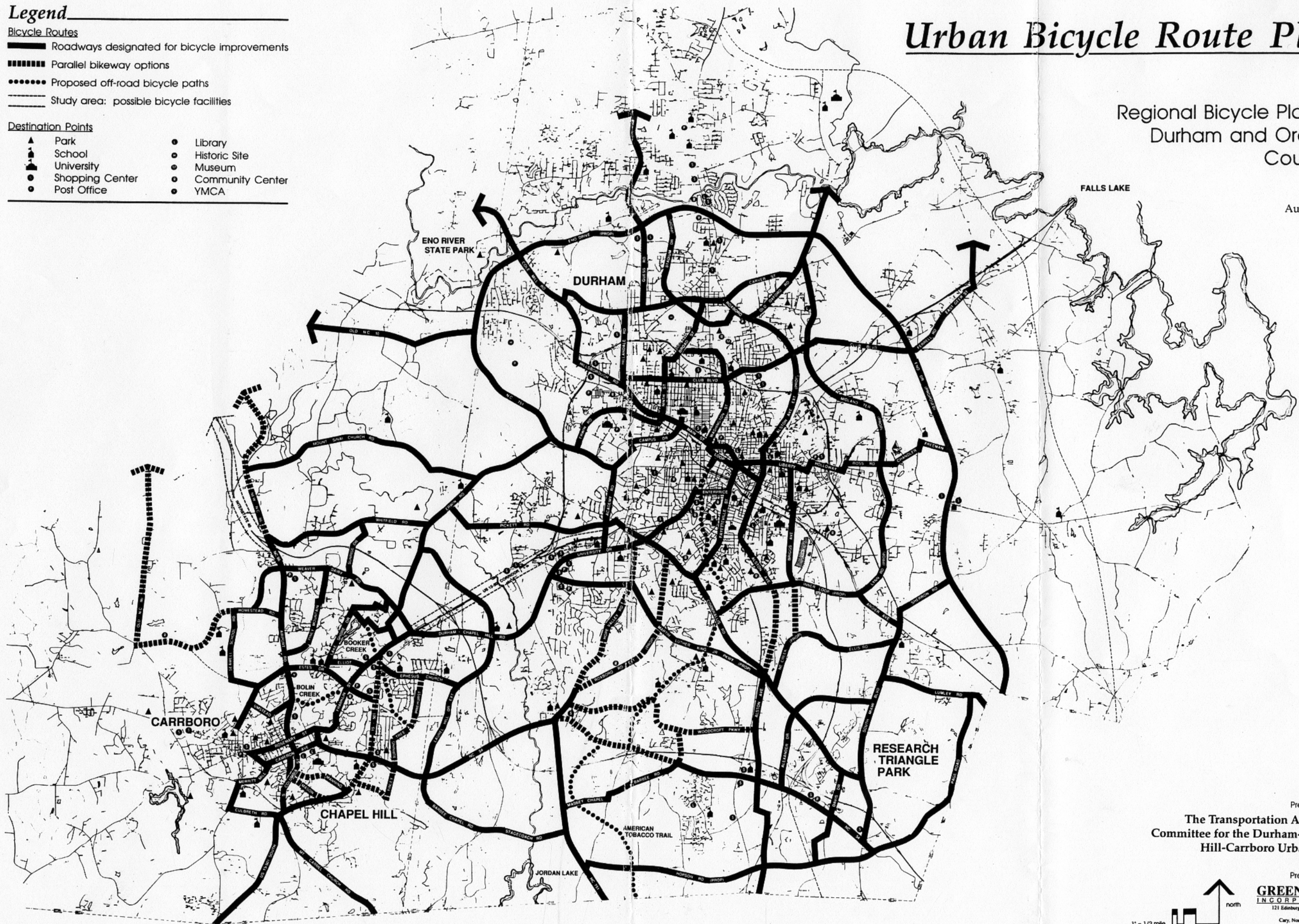
Destination Points

- | | |
|---|--|
|  Park |  Library |
|  School |  Historic Site |
|  University |  Museum |
|  Shopping Center |  Community Center |
|  Post Office |  YMCA |

Urban Bicycle Route Plan

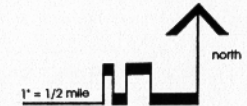
Regional Bicycle Plan for
Durham and Orange
Counties

August 1992



Prepared for:
The Transportation Advisory
Committee for the Durham-Chapel
Hill-Carrboro Urban Area

Prepared by:
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Rural Bicycle Route Plan



Regional Bicycle Plan for
Durham and Orange
Counties

Legend

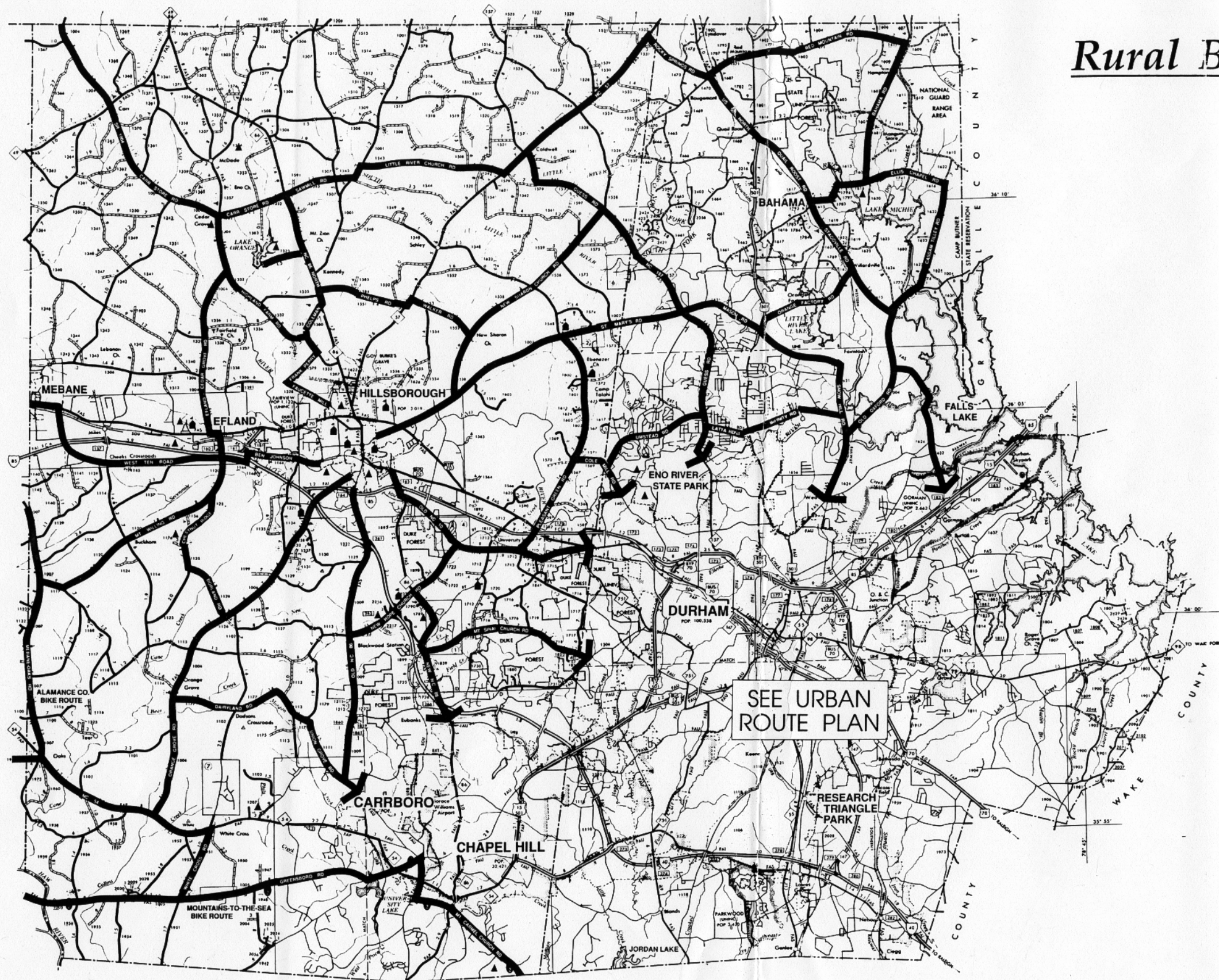
Bicycle Routes

 Roadways designated for limited bicycle improvements

Destination Points

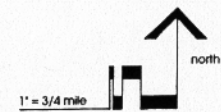
 Park
 School

August 1992



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support for funding requests by the region through letter writing campaigns and attending important meetings with NCDOT; and c) organizing a lobbying effort to address bicycle transportation needs locally and at the state level.

- Bicycle registration programs should be initiated, or strengthened in areas where they already exist.
- Durham Area Transit Authority and Chapel Hill Transit should develop a "Bikes-on-Bus" pilot program on several key bus routes. Program should be expanded as success dictates.

Phase II: 5-10 Year Action Plan

This agenda briefly describes those tasks that should be further evaluated and implemented to meet the mid-term cycling needs of the regional community. The following recommendations should be undertaken between fiscal year 1998 and 2002.

- Local and regional routing plans should be formally reviewed to determine if they meet their intended purpose. Plans should be changed accordingly.
- Bicycle facilities should continue to be developed, goals should be set for # of miles to be constructed each year.
- In-service training for government staff should continue, in order to keep abreast of current bicycle facility design and planning issues.
- Bicycle-friendly transportation and traffic management systems should be fully developed to encourage bicycling.
- Urban and rural bicycle maps should be developed and distributed within the community. Durham and Chapel Hill may wish to combine their efforts and produce one regional map. Funding through the NCDOT Bicycle TIP should be sought for this purpose. Originals should be housed by the lead planning agency so that reprints are possible - it is anticipated that these maps will need to be periodically updated as more facilities are constructed.
- Citizen's Improvements Request forms should be developed. A hierarchy should be developed to

formally deal with these requests.

- Develop full maintenance programs for bicycle facilities, regular schedules for repairs and improvements.
- Each jurisdiction should review and revise bicycle traffic ordinances as necessary.
- Local jurisdictions should develop bicycle commuter incentive programs.
- Full scale child and adult education programs should be in place, through efforts of local schools, Carolina Tarwheels, and local bicycle coordinators.
- Localities should conduct annual bicycle registration drives.
- Local law enforcement agencies should develop a "Cops-on-Bikes" Program.

Phase III: 10-20 Year Action Plan

This agenda briefly describes those tasks that should be further evaluated and implemented to meet the long-term cycling needs of the regional community. The following recommendations should be undertaken between fiscal year 2003 and 2012.

- Full re-evaluation of all bicycle programs should occur. New goals and objectives should be developed, problem areas should be addressed.
- Bicycle facility prioritization should be reviewed, new population areas should be identified for bicycle facility needs.
- Bicycle facility development should continue. Goal: a complete bicycle transportation system.
- Facility maintenance and repair programs should continue operations.
- In-service training for government staff should continue.
- Urban and rural bicycle maps should be updated to reflect new bicycle facilities as needed.

-
- Bicycle traffic codes should be reviewed and revised.
 - Selective bicycle law enforcement policies should be in place within local law enforcement agencies.
 - All cyclists should be reached with bicycle education. All gaps in bicycle education program should be filled. Helmet promotion campaigns should continue as long as needed.
 - Set goals to reach 100% bicycle registration.

Action Plan Charts

The following charts graphically illustrate these recommendations and assign agency and community groups/organizations that should take responsibility for implementing these recommendations. As stated earlier in this Plan, one of the keys to implementation of the Regional Bicycle Plan is the appointment of a full-time bicycle coordinator. This government staff person, in partnership with private sector cycling advocates, would hold primary responsibility for implementing the recommendations of this Plan.



AGENCIES INVOLVED

FIVE-YEAR ACTION PLAN	Govern. Boards	TAC	Bike Advis Comm.	Law Enforc.	City/Co. Planning	Transp. Planning	Carolina Tarwheels	Public Works	Public Schools	Parks & Rec.	NC DOT
Develop and adopt bicycle policy statement	•	•	•	•	•	•	•	•	•	•	
Make additions to Comprehensive plans	•	•	•		•	•				•	
Appoint bicycle coordinators/liaison officers	•			•	•	•	Bike Coord.				
In-service staff training programs			•		•	•	•	•			•
Deal with existing substandard facilities		•	•			•	•	•		•	•
Develop high profile local bicycle facilities		•	•			•	•	•		•	•
Remove hazards on rural routes			•		•	•	•	•		•	•
Develop bicycle-friendly zoning practices					•		•				
Develop bicycle parking ordinances/Bikes-on-Buses	•		•		•	•	•				
Maintenance programs for bikeways		•	•		•	•	•	•		•	
Initiate education programs and helmet promotions	•		•	•			•	•		•	•
New motorist education programs in Driver's Ed.			•	•			•	•		•	•
Initiate/strengthen bicycle registration programs	•			•			•	•		•	•
Organize bicycle events (Bike to Work Day, Festival)			•		•		•	•		•	•







Appendix A:

Preliminary Feasibility Study and Prioritization Form



Methodology for Prioritizing Regional
Capital Improvements Projects

Stage I Evaluation:

FEASIBILITY STUDY

Developed by
Greenways Incorporated
August 1992

Introduction

Many factors must be taken into consideration in defining the feasibility of a proposed bikeway. Upon identification of proposed bikeway projects, a Stage I feasibility study should be performed. This feasibility study is not intended to be a complete and comprehensive evaluation, since equally important subjective criteria must be considered later in Stage II: Prioritization.

Projects will be reviewed during Stage I through the criteria listed below. Some proposed bikeways will be "weeded out" during this stage should they be found unfeasible or cost prohibitive for construction. Stage I evaluation is vital: it provides a solid and realistic foundation for Stage II prioritization.

Project Description

1. Boundaries of proposed bicycle facility:
from _____
to _____
2. Stated transportational value of proposed bicycle facility

3. Description of currently scheduled bicycle improvements

4. Description of currently scheduled roadway improvements, resurfacing schedule

Criteria

1. **Physical development data:** Can the proposed bikeway be constructed in a cost effective manner?
 - a. Width of the existing ROW _____
 - b. Constraints due to roadside topography _____

- c. Constraints due to roadside utilities _____
 - d. Total number of lanes and width of lanes - possibilities for re-striping

 - e. Shoulder treatment - curb and gutter and/or grassy shoulder previously
constructed _____
 - f. Drainage considerations _____
 - g. Number of bridges along roadway too narrow to adequately accommodate
bicycles _____
 - h. Estimated cost of bicycle facility development _____
 - i. Estimated improvements proposed to make this a safe and effective bicycle
facility _____
2. **Locational data** - Is the proposed bikeway a feasible transportation route? Is there
a transportation need to be met through bicycle facility development?
- a. Population count within 1/4 mile of the proposed bikeway _____
 - b. Number of residential units within 1/2 mile of the proposed bikeway

 - c. Will this facility serve a specialized population likely to commute to a set
destination point? (such as college students in off-campus housing) _____
 - b. Number of schools within 1/4 mile of the proposed bikeway
 - Elementary _____
 - Secondary _____
 - Technical/Trade _____
 - University/College _____
 - c. Quantity and size of parks/recreation facilities within 1/4 mile of proposed
bikeway
 - d. Number of public/cultural facilities within 1/4 mile of proposed bikeway
(libraries, museums, art centers, post offices, historic sites)
 - e. Number of major shopping malls within 1/4 mile of proposed bikeway
 - f. Number of shopping centers within 1/4 mile of proposed bikeway
 - g. Number of employment centers (over 50 employees each) within 1/4 mile

h. Number of bicycle parking facilities within 1/4 mile

3. **Safety data:** Will the proposed facility be feasibly safe?

a. Average or estimated motor vehicle traffic counts _____

b. Motor vehicle accident counts _____

b. Number of intersections located along proposed route?

• Roadways _____

• Driveways _____

c. Posted speed limit _____

d. Number of locations where sight distance is less than 800 feet _____

e. Number of roadway inclines over 5% _____

f. Condition of existing pavement (proposed roads automatically get high value) _____

4. **Long term usage data:** Will the proposed bikeway be effected by future roadway plans? Will future land use development influence the bikeway? How?

a. Future roadway upgrades _____

b. Proposed thoroughfare intersections _____

c. Traffic count estimates for 20 years in the future _____

d. Adequate right-of-way for future road widening _____

e. Possibility of designation as a future truck route _____

f. Local division plans for roadway - resurfacing schedules

g. Type of proposed land use development activities _____

h. Number of potential bicycle trips to be generated by proposed land use



Methodology for Prioritizing Regional Bicycle
Capital Improvement Projects

Stage II Evaluation:

PRIORITIZATION

Developed by
Greenways Incorporated
August 1992

Introduction

The following methodology provides an opportunity to determine an appropriate hierarchy and uniform procedure for developing a regional system of bicycle facilities. Through systematic decision making, on-street and off-street segments in the form of bike routes, bike lanes, bike paths, greenways, rail-trails, and other transportation arteries would be developed on the basis of priority.

The methodology defines a set of criteria for objectively evaluating proposed bicycle facilities that have already been determined as feasible in Stage I. The purpose of further evaluation, through Stage II, is to determine the Regional Priority of the project based on the need for development.

Criteria

The criteria on the following pages would be used to determine the priority by which Regional Bicycle Capital Improvement Projects are implemented. Provided below is an evaluation system that assigns a numerical score to each criterion. The higher values within each criteria represent the degree of importance for regional bicycle facility development. From the range of values provided, each criterion is defined by the value score (1-5), and then combined with other criterion scores to define the total score. When the total scores of each project are compared against the other projects, an order of importance and regional ranking is established. Then a regional priority level is assigned.

- A) Demand is measured in terms of usage or potential usage of a bicycle facility. This is traditionally a measurement of trip generation during peak hours* between known origins and destinations, such as high density residential areas to major activity centers. For bicycle planning and design, activity centers would include employment areas, schools, parks, shopping centers and areas, downtown business district, hospitals, churches, community centers. Commuter and recreation travel may in fact be difficult to distinguish, therefore demand is a measurement of both.

5 - Demand for facility is extremely high, anticipated usage will equal or exceed

- 100 cyclists per hour.
- 4 - Demand for facility is moderately high, anticipated usage will equal or exceed 50 cyclists per hour.
 - 3 - Demand for facility is moderate, anticipated usage will equal or exceed 25 cyclists per hour.
 - 2 - Demand for facility is low, anticipated usage will equal or exceed 10 cyclists per hour.
 - 1 - There is very little demand for project, anticipated usage is below 5 cyclists per hour.
 - 0 - There is no demand for cycling in the study area.

*Source: National Bicycle and Walking Study Case Study #11: Transportation Potential and Other Benefits of Off-Road Bicycle and Pedestrian Facilities.

B) Connectivity addresses the projects ability to link together different activity centers with a number of origins. The more linkage that occurs the higher rating the project receives based on connectivity. Connectivity also measures the effectiveness of the project to complete the regional network of bicycle facilities.

- 5 - Project will link seven or more origins and destinations that possess high volume bicycle usage.
- 4 - Project will link six origins and destinations that possess high volume bicycle usage and links to components of the Regional Bicycle System.
- 3 - Project will link three origins and destinations that possess high volume bicycle usage, and links one component of the Regional Bicycle System.
- 2 - Project will link two origins and destinations that possess high volume bicycle usage, but does not link together any other component of the Regional Bicycle System.
- 1 - Project will link one origin and destination that possess high volume bicycle usage, but does not link together any other component of the Regional Bicycle System.
- 0 - Project does not link any origins and destinations that possess high volume bicycle usage, and does not link together any other component of the Regional Bicycle System.

C) Environmental Impact measures the impact of the project on native ecological systems, and defines the ability of the project to offset potential air and water pollution caused by conventional modes of transportation.

- 5 - Project will be very beneficial to the natural environment. Development impacts on the natural environment are negligible, and air and water quality will benefit from high expected bicycle usage.
- 4 - Project does not significantly alter existing natural environment, will have few negative environmental impacts, and will benefit air and water quality.

- 3 - Project will create minor alterations to the existing natural environment, all environmental impacts will be minimized during development, and the project will benefit air and water quality.
- 2 - Project will require significant alterations to the existing natural environment, environmental impacts will require mitigation, and the project does not serve to benefit air and water quality
- 1 - Project significantly alters the existing natural environment, it is unknown whether environmental impacts can be successfully mitigated, and the project does not serve to benefit air and water quality.
- 0 - Project will have a negative impact on the natural environment and is deemed to be more harmful than good.

D) Facility Characteristics defines the physical properties of each bicycle facility project and the development opportunities and constraints that are likely to be encountered.

- 5 - Project is very easy to build, no unusual physical constraints to bicycle development are known.
- 4 - Project has some known minor physical constraints which are resolvable and should not cause unreasonable delay in project development.
- 3 - Project has several serious physical constraints which require intensive design consideration and resolution, and which will extend the timeframe for project development.
- 2 - Project will be difficult to build , physical constraints require a comprehensive design evaluation and will delay project development by more than two years.
- 1 - Project is very difficult to build, it is doubtful that the physical constraints are resolvable without considerable investment of capital resources.
- 0 - Project cannot be developed, severe physical constraints prohibit bicycle facility construction.

E) Public Health and Safety measures the projects ability to remove, replace, repair or improve a hazardous condition

- 3 - Project development will replace and significantly improve a known condition that is potentially hazardous to bicyclists and which poses a possible threat to public safety.
- 2 - Project development will repair a condition that is undesirable for cycling, or is regarded as hazardous under certain circumstances.
- 1 - Project development will improve a condition that is undesirable for cycling.
- 0 - Project development will have no measurable benefit for public safety.

F) Private Property Impact defines the Project in terms of its impact on adjacent or contiguous private property. This impact can include noise generated from cyclists, interference with operation of private land use due to intersection with bicycle facility development, and/or visual intrusion into the unalienable rights of the private land owner.

- 5 - Bicycle facility development will have no impact on adjacent or contiguous private properties along the entire route of project.
- 4 - Bicycle facility development will have a minor impact on less than 20% of the adjacent or contiguous private properties located along the route of project, and these impacts can be mitigated.
- 3 - Bicycle facility development will impact approximately 50% of the adjacent or contiguous private properties located along the route of project, and most of these impacts can be mitigated.
- 2 - Bicycle facility development will impact more than 50% of the adjacent or contiguous private properties along the entire route of project, and only a few of these impacts can be mitigated.
- 1 - Bicycle facility development will significantly impact adjacent or contiguous private properties along the entire route of project, mitigation of these impacts is not possible.
- 0 - Bicycle facility development will have a severe and detrimental impact on adjacent or contiguous private properties along the entire route of project and should be carefully reconsidered for future development.

G) Availability of Alternative Routes defines the ability of alternative routes or corridors that are already in existence or that are proposed for immediate development, which are capable of serving a similar function even though they may not be located within the alignment of the target project area. These alternative routes might include abandoned railroad corridors, power line corridors, state or federal land, abandoned roadways, sidewalks or other established pedestrian ways.

- 5 - Alternative route is not available, target alignment is needed to satisfy other development factors.
- 4 - An alternative route is available, however it is too far away from the target alignment to satisfy bicycle facility development needs.
- 3 - An alternative route is available, but only portions of its alignment can be used to satisfy bicycle facility development needs.
- 2 - An alternative route is available, and would serve most of the bicycle facility development needs of the target alignment, however, portions of the target alignment will still require development.
- 1 - A high quality alternative route already exists in close proximity to the target alignment and should be capable of satisfying cycling needs.

H) Available funding defines the source of funding for bicycle facility development and maintenance. This source might be derived from several sources, including Federal Aid dollars via the NCDOT, State dollars through an applicable agency, local dollars from a line-item program or the general fund. For the purpose of bicycle facility development, a higher rating will be given for a mix of funding that supports both development and maintenance.

- 5 - Project qualifies for Federal and State funding for facility development, State funds supplemented with local matching funds from a line-item program can be committed for facility maintenance.
- 4 - Project qualifies for Federal and State funding for facility development, local funds are committed from a line-item program to support facility maintenance.
- 3 - Project qualifies for State funding for facility development, local funds are required from the general fund to support facility maintenance
- 2 - Project does not qualify for State funding, however local dollars are available for facility development. Maintenance dollars are needed and will have to be derived from the general fund or through a public-private partnership.
- 1 - Local funds are required for facility development and maintenance, additional dollars are needed to support development and will have to be derived from a public-private partnership.
- 0 - Funding is not currently available for project development from any source.

I) Social and political support measures the general public and political support for project development.

- 5 - Strong public support exists for facility development political support is strong.
- 4 - Strong public support exists for facility development however political support is strong to moderate.
- 3 - Moderate public support exists for facility development and political support is moderate.
- 2 - Low public support exists for facility development and political support is moderate
- 1 - No public support exists and political support is low
- 0 - No public or political support for the project exists



Methodology for Prioritizing Regional Bicycle
Capital Improvement Projects

Stage II Evaluation:

PRIORITY FORM

Developed by
Greenways Incorporated
August 1992

Introduction

The following form should be used to assess the priority of each feasible bicycle facility project.

Project Name: _____

Project Type/Length: _____

Location: _____

Sponsoring Agency: _____

Project Development Costs: _____

Funding Source 1: _____ **Amount 1:** _____

Funding Source 2: _____ **Amount 2:** _____

Project Developer: _____

Maintenance Provider: _____

<u>Criteria</u>	<u>Numerical Score</u>
Demand	_____
Connectivity	_____
Environmental Impact	_____
Facility Characteristics	_____
Public Health and Safety	_____
Private Property Impact	_____
Availability of Alt. Routes	_____
Available Funding	_____
Social/Political Support	_____
TOTAL SCORE	_____
REGIONAL RANKING	_____
PRIORITY LEVEL	_____

Appendix B:

Example Bicycle Parking Ordinances



BICYCLE PARKING IN MADISON

On March 1, 1988, the Madison Common Council passed an ordinance requiring the provision of off-street bicycle parking in new developments, expansion of existing developments, and changes in use that would require additional parking.

For expansions or changes in use, bicycle parking would be required based only on the amount needed by the addition or change in use, not for the entire project. This is similar to the way in which off-street automobile parking requirements work. In fact, the bicycle parking requirement is simply an amendment to zoning ordinance section 28.11 dealing with off-street parking and loading facilities. A copy of relevant sections of MGO 28.11 is attached as Appendix A.

The number of bicycle parking spaces required for a development is determined by the Zoning Administrator based on guidelines included in the ordinance. Bicycle parking facilities are required in all districts, including the Central Area.

The purpose of the ordinance is to provide adequate and safe facilities for the storage of bicycles. The size of a bicycle parking space is specified as at least two feet by six feet with a five-foot access aisle and a six-foot vertical clearance. Security requires provision of lockers, racks or equivalent structures in or upon which the bicycle may be locked by the user.

Racks must be designed to accommodate U-shaped locks. These high security locks are increasing in popularity due to high levels of bicycle theft and the rising price of new bicycles. U-shaped locks are designed to allow the bicyclist to lock both wheels and the bicycle frame to a stationary object when the front wheel is removed. Some bicycle racks do not facilitate this locking procedure, while there are several new bicycle rack designs that fully accommodate these locks. Manufacturer's information for several bike rack designs that meet these criteria is included in Appendix B.

Finally, bicycle parking needs to be in a clearly designated, safe and convenient location. A safe bicycle parking location is one in which activity around the bicycle rack is easily observable. Bike racks located in dark alleys or behind shrubbery give bike thieves time to work. A safe location would also ensure adequate separation of parked bicycles from motor vehicles and pedestrians.

A convenient location is close to the bicyclist's destination. Usually this will be a building entrance. The ordinance specifies that bicycle parking must be at least as convenient as the majority of automobile parking spaces provided.

Safe and convenient bicycle parking could also be provided indoors, especially for employees or residents.

For further information on this ordinance, contact either the Zoning Administrator at 266-4569 or the Pedestrian-Bicycle Safety Coordinator at 266-6225.

APPENDIX A

**Madison General Ordinance 28.11
Requiring Bicycle Parking Facilities**

Sec. 28.11

ZONING CODE

28.11 OFF-STREET PARKING AND LOADING FACILITIES.

(1) Statement Of Purpose. The purpose of this section is to provide for the regulation of accessory off-street parking and loading facilities, and to specify the requirements for off-street parking and loading facilities for different uses. The regulations and requirements which follow are established to promote the safety and general welfare of the community by:

- (a) Increasing the safety and capacity of public streets by requiring off-street parking or off-street loading facilities to be provided.
- (b) Minimizing adverse effects of off-street parking and off-street loading facilities on adjacent properties through the requirement of design and maintenance standards.
- (c) Lessening congestion and preventing the overtaking of public streets by regulating the location and capacity of accessory off-street parking or off-street loading facilities.
- (d) Providing adequate and safe facilities for the storage of bicycles.

(Am. by Ord. 9426, 3-11-88)

(2) General Regulations.

(a) Scope Of Regulations. The off-street parking and loading provisions of this ordinance shall apply as follows:

1. For all buildings and structures erected and all uses of land established after the effective date of this ordinance, accessory parking and loading facilities shall be provided as required by the regulations of the districts in which such buildings or uses are located. However, where a building permit has been issued prior to the effective date of this ordinance, and provided that construction is begun within ninety (90) days of such effective date and diligently prosecuted to completion, parking and loading facilities in the amounts required for the issuance of said building permit may be provided in lieu of any different amounts required by this ordinance.
2. When the intensity of use of any building, structure or premises shall be increased through addition of dwelling units, gross floor area, seating capacity or other units of measurement specified herein for required parking or loading facilities, parking and loading facilities as required herein shall be provided for such increase in intensity of use.
3. Whenever the existing use of a building or structure shall hereinafter be changed to a new use, parking or loading facilities shall be provided as required for such new use. However, if the said building or structure was erected prior to the effective date of this ordinance, additional parking or loading facilities are mandatory only in the amount by which the requirements for the new use would exceed those for the existing use if the latter were subject to the parking and loading provisions of this ordinance.
4. Bicycle parking facilities shall be provided as required for all new structures and uses established as provided in Sec. 28.11(2)(a)1. or to changes in uses as provided in

Secs. 28.11(2)(a)2. and 3.; however, bicycle parking facilities shall not be required until the effective date of this paragraph. Notwithstanding Secs. 28.08(1)(i), 28.09(1)(i) and 28.09(5)(a), bicycle parking facilities shall be provided in all districts including districts in the Central Area. (Cr. by Ord. 9426, 3-11-88)

- (3) Off-Street Parking Facilities. Off-street parking facilities accessory to uses allowed by this ordinance shall be provided in accordance with the regulations set forth herein as well as in subsection (2) above.

(a) Utilization.

1. In the residence district, accessory off-street parking facilities provided for uses listed herein shall be solely for the parking of passenger automobiles and bicycles of patrons, occupants or employees and not more than one truck limited to one (1) ton capacity. (Am. by Ord. 9426, 3-11-88)

- (e) Size. Off-street parking spaces shall comply with the minimum width, length and access requirements as specified in Sec. 10.08 of the Madison General Ordinances. Required bicycle parking spaces shall be at least 2 feet by 6 feet. An access aisle of at least 5 feet shall be provided in each bicycle parking facility. Such space shall have a vertical clearance of at least 6 feet. (Am. by Ord. 9426, 3-11-88)

(h) Design and Maintenance.

2.

- d. Bicycle Parking Facilities. Accessory off-street parking for bicycle parking shall include provision for secure storage of bicycles. Such facilities shall provide lockable enclosed lockers or racks or equivalent structures in or upon which the bicycle may be locked by the user. Structures that require a user-supplied locking device shall be designed to accommodate U-shaped locking devices. All lockers and racks must be securely anchored to the ground or the building structure to prevent the racks and lockers from being removed from the location. The surfacing of such facilities shall be designed and maintained to be mud and dust free. (Cr. by Ord. 9426, 3-11-88)

(i) Location.

3. Bicycle parking facilities shall be located in a clearly designated, safe and convenient location. The design and location of such facility shall be harmonious with the surrounding environment. The facility location shall be at least as convenient as the majority of auto parking spaces provided. (Cr. by Ord. 9426, 3-11-88)

11(3)(1) Schedule Of Required Off-Street Parking Facilities. Necessary off-street parking spaces shall be provided as required hereinafter for the following uses.

1. Bicycle parking facility spaces shall be provided in adequate number as determined by the Zoning Administrator. In making the determination, the Zoning Administrator shall consider when appropriate, the number of dwelling units or lodging rooms, the number of students, the number of employees, and the number of auto parking spaces in accordance with the following guidelines:

Off-Street Bicycle Parking Guidelines

<u>Land Use</u>	<u>Bike Space</u>
Dwellings/lodging rooms	1 per dwelling unit or 3 lodging rooms
Clubs/lodges	1 per lodging room plus 3% of person capacity
Fraternities/sororities	1 per 3 rooms
Hotels/lodging houses	1 per 20 employees
Galleries/museums/libraries	1 per 10 auto spaces
Colleges/universities/ junior and high schools	1 per 4 employees plus 1 per 4 students
Nursery/elementary schools	1 per 10 employees plus students above second grade
Convalescent and nursing homes/institutions	1 per 20 employees
Hospitals	1 per 20 employees
Places of assembly, recreation, entertainment and amusement	1 per 10 auto spaces
Commercial/manufacturing	1 per 10 auto spaces
Miscellaneous/other	To be determined by the Zoning Administrator based on the guideline for the most similar use listed above

- a. In all cases where bicycle parking is required, no fewer than two (2) spaces shall be required.
- b. After the first fifty (50) bicycle parking spaces are provided, additional bicycle parking spaces required are 0.5 (one half) space per unit listed.
- c. Where the expected need for bicycle parking for a particular use is uncertain due to unknown or unusual operating characteristics of the use, the Zoning Administrator may authorize that construction and provision of not more than fifty (50) percent of the bicycle parking spaces be deferred. Land area required for provision of deferred bicycle parking spaces shall be



DEVELOPMENT STANDARD No. 2-09.0

Relating to:

May 9, 1990

Effective date

BICYCLE PARKING FACILITY DESIGN REQUIREMENTS

Page 1 of 11

This Standard has been reviewed as required by Administrative Directive 1.02-9 Procedures for the Establishment of Development Standards and Policies (Development Standard 1-01.0).

The Tucson Zoning Code, Article IV, Off-Street Parking, requires that bicycle parking be provided. This Standard provides design guidelines for bicycle parking facilities.

The Planning Director and the Transportation Director will review this Standard annually or as necessary.

William D. Vento
Planning Director

6/12/90
Date

Année E. Davis
Transportation Director

6/14/90
Date

for Thomas J. Wilson
City Manager

6-18-90
Date

2-09.0 BICYCLE PARKING FACILITY DESIGN REQUIREMENTS

1.0 GENERAL

1.1 Purpose

The purpose of this Development Standard is: 1) to carry out the purpose of Article IV of the Zoning Code which is to provide reasonable requirements for off-street parking for vehicles and bicycles, and 2) to provide design guidelines for bicycle facilities in accordance with regulations listed in the Zoning Code.

1.2 Application

This Standard will apply when required by the Zoning Code or when mandated by regulations enforceable by the City.

1.3 Definitions

BICYCLE means every device propelled by human power upon which any person may ride, having two tandem wheels either of which is more than sixteen inches in diameter or having three wheels in contact with the ground any of which is more than sixteen inches in diameter.

BICYCLE LOCKER is a fully enclosed space of sufficient size to park a two wheeled bicycle with its accessories accessible only to the operator of the bicycle.

BICYCLE PARKING FACILITY means an area located on a site and used specifically for parking of bicycles.

BICYCLE PARKING SPACE is an area allowance within a facility for the use of an individual bicycle.

BICYCLE SUPPORT is a rack, post, or other device which is anchored securely and will directly support the bicycle frame in a stable position without damage to the wheels, frame, or components.

CHECK-IN FACILITY is a system of parking under which the bicycle is delivered to an attendant and retrieved upon identification from the bicycle operator. The stored bicycles are accessible only to the attendant.

1.3 Definitions (Cont'd)

RESTRICTED ACCESS PARKING provides Class 2 facilities within a locked room, garage, or locked enclosure accessible only to the operators of the bicycles parked within.

2.0 FACILITY SERVICE LEVELS

2.1 The minimum requirements for classes of bicycle parking facilities required by Zoning Code Sections 23-601 and 23-602 are described below.

2.2 Class 1 -- Long-Term Bicycle Parking

A. The covered, secured bicycle parking facility protects against direct sunlight and theft of the entire bicycle and of its components and accessories by the use of:

1. Bicycle Lockers;
2. Check-In Facilities;
3. Monitored Parking;
4. Restricted Access Parking; or
5. Other means which provide the above level of security as approved by the Planning Director.

2.3 Class 2 -- Short-Term Bicycle Parking

The facility provides a stationary object to which the operator can lock the bicycle (refer to 6.3 and Exhibits I and II).

3.0 ACCESS TO BICYCLE PARKING FACILITY

3.1 Access from a public right-of-way to on-site bicycle facilities will be provided.

3.2 The bicycle access through the development will be separate from pedestrian ways. Vehicular access may be used as bicycle access. Bicycle access to a parking facility may cross a pedestrian way at a right angle.

4.0 PARKING LOCATION

All required bicycle parking facilities will be located on-site with access both to the public right-of-way and with pedestrian access to the main entrance of the principal use. Employee bicycle facilities may be separated from patron bicycle facilities.

4.1 Class 2 bicycle parking facilities will be conveniently located to the main building entrance(s).

4.2 Class 1 bicycle parking facilities will be located as reasonably as possible for the convenience of the employee.

4.3 Bicycle parking facilities will be separated from vehicular parking and drive areas by a barrier or sufficient distance to prevent damage to the parked bicycles.

4.4 Class 2 bicycle parking facilities will be clearly visible from the adjacent sidewalks, drives, and the main entrance(s), or signed as per 5.0.

5.0 SIGNAGE

5.1 Where not directly visible and obvious from the public right(s)-of-way, project entry and directional signs will be provided to direct bicyclists from the public right-of-way to the bicycle parking facility.

6.0 BICYCLE PARKING LAYOUT AND SECURITY MEASURES

The following design criteria apply primarily to Class 2 facilities. Class 1 facilities, because of the additional security level, may not be subject to all of the design requirements. Class 1 facility layout is determined on a case-by-case review.

The design of a bicycle parking facility will ensure that required bicycle supports are designed so that bicycles may be securely locked to them without undue inconvenience. Each required bicycle parking space will be accessible without moving another bicycle (Exhibit III).

- 6.0 BICYCLE PARKING LAYOUT AND SECURITY MEASURES (Cont'd)
- 6.1 Bicycle parking facilities typically provide for row parking with a rack or for paired parking using a center post as the anchor. Supports may also be anchored to buildings or walls to allow bicycle parking parallel to the wall.
- A. Row or continuous rack parking will allow a minimum 72 inch length and a minimum 18 inch width per bicycle parking space (Exhibit III. A).
 - B. Double parking stalls utilizing a center post or rack will allow a minimum 72 inch length per bicycle parking space and a minimum of 28 inches between outer faces of posts or supports (Exhibit III. B).
 - C. A minimum of ten inches will be provided between a bicycle parking space and a wall or other obstruction unless the spaces are in a single row along the wall.
- 6.2 A five foot wide access aisle measured from the front or rear of the 72 inch long parking space will be provided beside each row or between two rows of bicycle parking.
- 6.3 The bicycle supports will accommodate:
- A. Locking the frame and both wheels to the support with a U-shaped shackle lock if the front wheel is removed.
 - B. Locking the frame and one wheel to the support with a U-shaped lock if both wheels are left on the bicycle.
 - C. Locking the frame and both wheels to the rack with a chain or cable not longer than six feet without removal of the front wheel.
- 6.4 Lighting will be provided in a bicycle parking area such that all facilities are thoroughly illuminated and visible from adjacent sidewalks or parking lots, during hours of use.
- 6.5 Covering for Class 1 bicycle parking facilities may include any durable material that provides shade protection.
- 6.6 The parking area will be delineated by striping, curbing, or by other equivalent method.
-

7.0 FACILITY MAINTENANCE

All bicycle parking facilities will be maintained in a manner which accommodates the use for which they are required.

7.1 Bicycle parking facilities will be maintained in good condition and kept clear of debris or other accumulated refuse.

7.2 The surface of an outdoor parking facility may be surfaced in the same manner as the motor vehicle parking area or with a minimum of one (1) inch thickness of one quarter (1/4) inch aggregate material. This surface will be maintained in a smooth, durable, and well-drained condition.

8.0 MODIFICATIONS AND APPEALS

8.1 In the event a proposal for a bicycle parking facility layout or furnishings does not meet the specified requirements of this Standard but does, in the opinion of the applicant, provide equal or greater specifications, the applicant may request a review by the CDRC.

The applicant will file a letter asking for review of the proposal. The letter will describe the proposed facility and related components and describe how it meets the intent of the Standard.

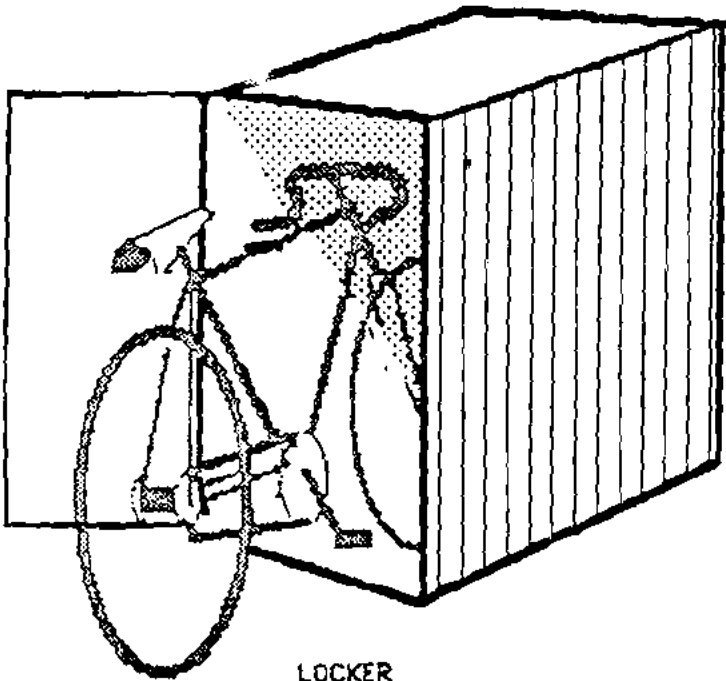
The CDRC will respond to the applicant within six working days unless the modification request is submitted with an initial CDRC submittal; then response will follow CDRC comment schedule, either allowing the modification or requesting a redesign.

8.2 The requirements of this Standard may be appealed per Code Section 23-497.B.5.

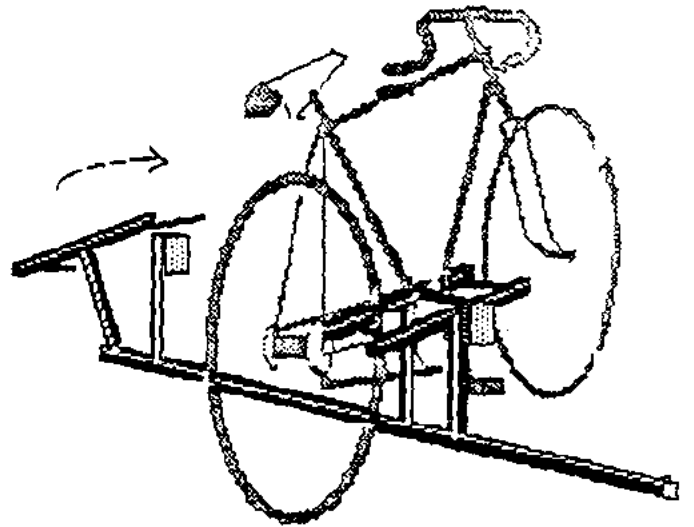
9.0 EXHIBITS

- I. Self Securing Bicycle Racks
 - II. Operator Secured Bicycle Racks
 - III. Facility Layout
-

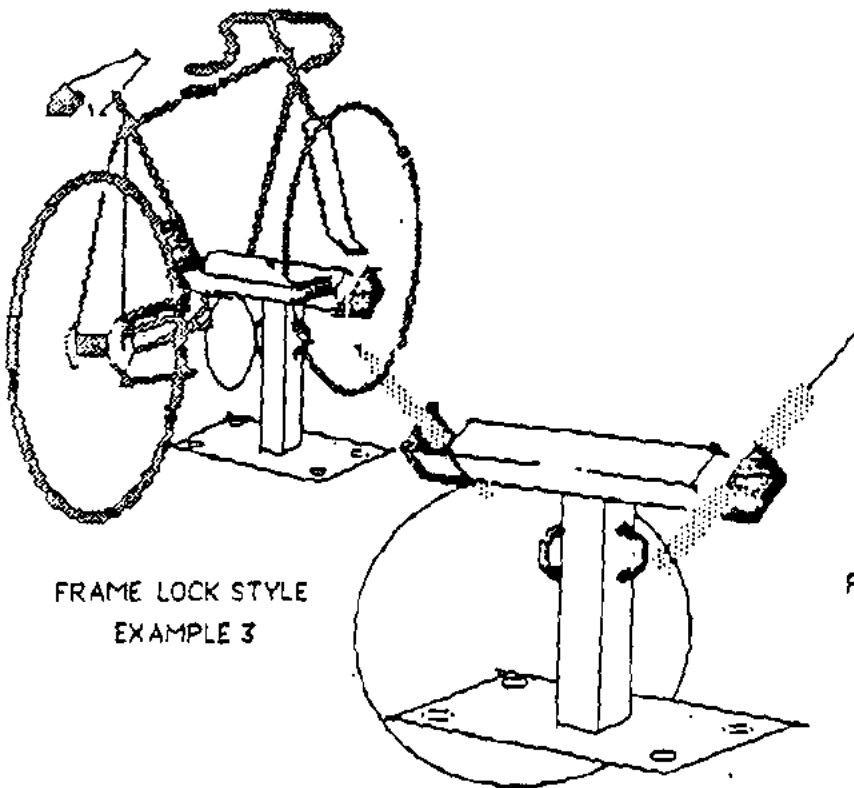
Self Securing Bicycle Racks



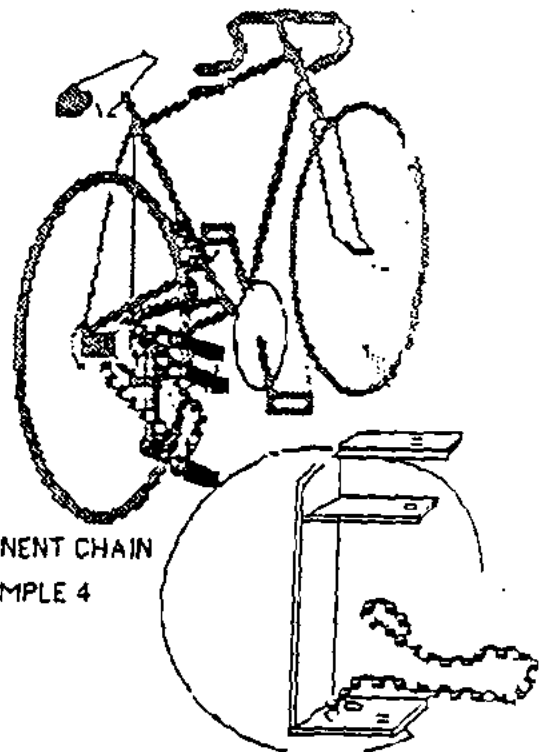
LOCKER
EXAMPLE 1



MOVABLE ARM
EXAMPLE 2



FRAME LOCK STYLE
EXAMPLE 3



PERMANENT CHAIN
EXAMPLE 4

EXHIBIT II

Operator Secured Bicycle Racks

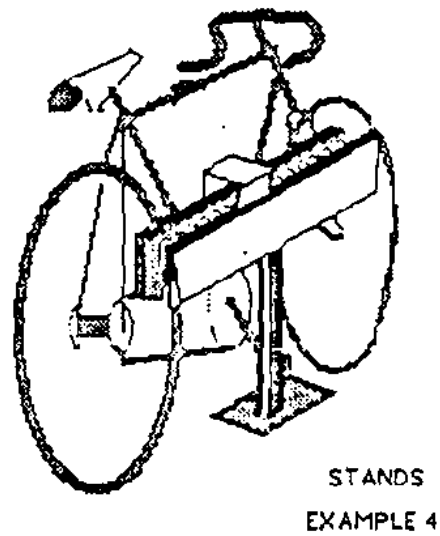
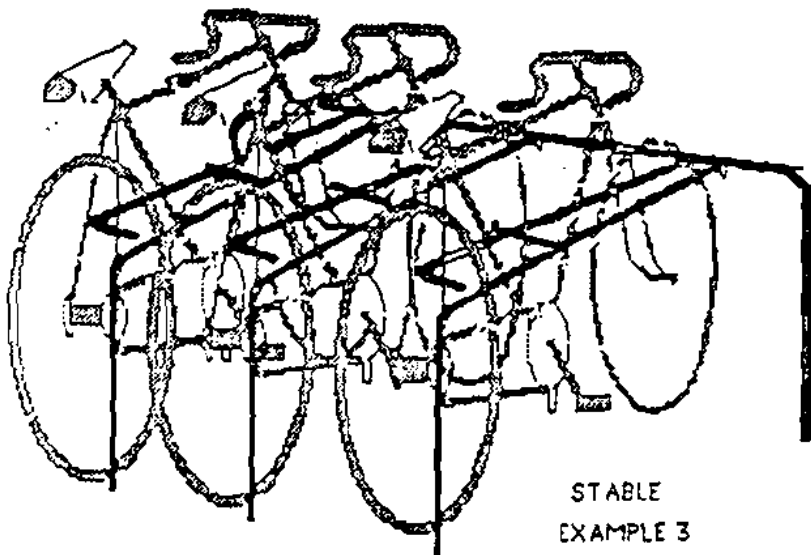
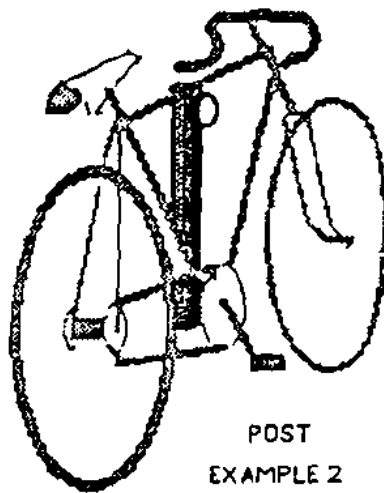
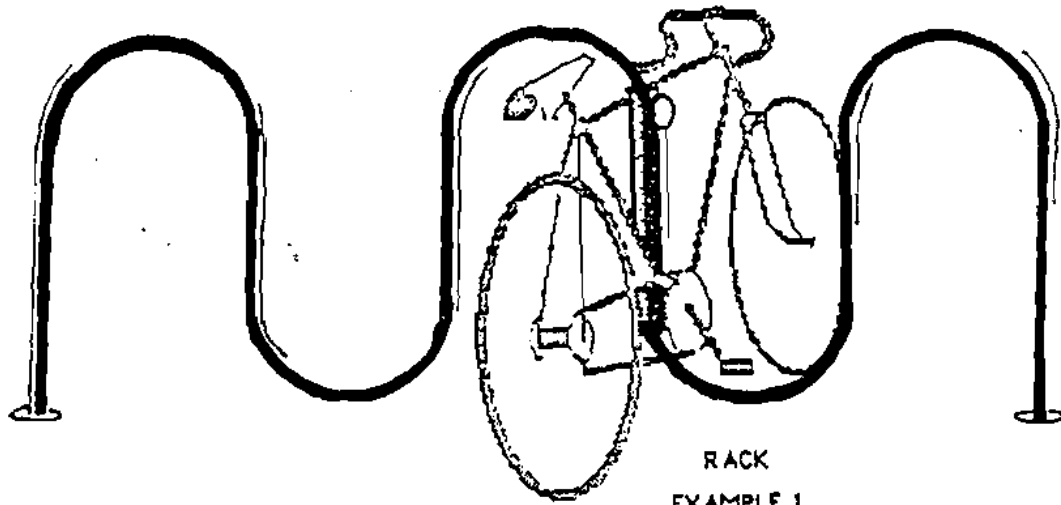
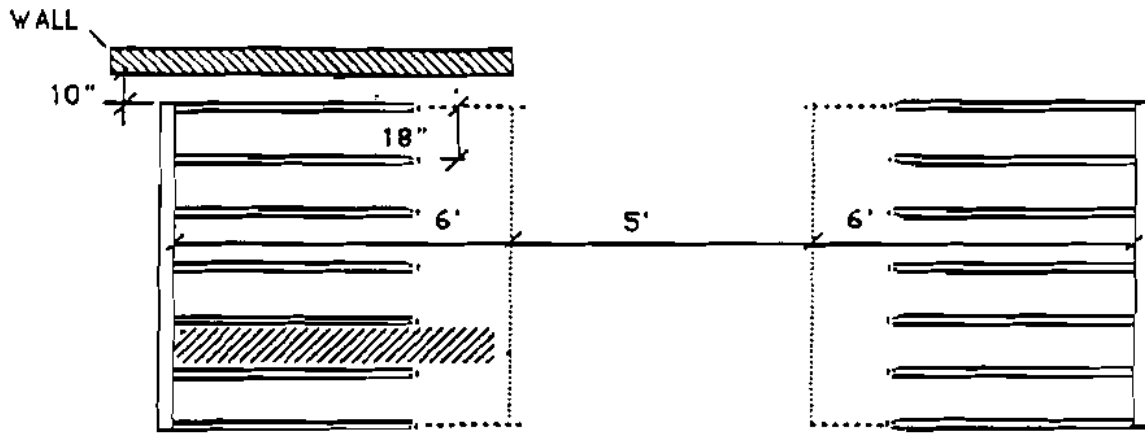
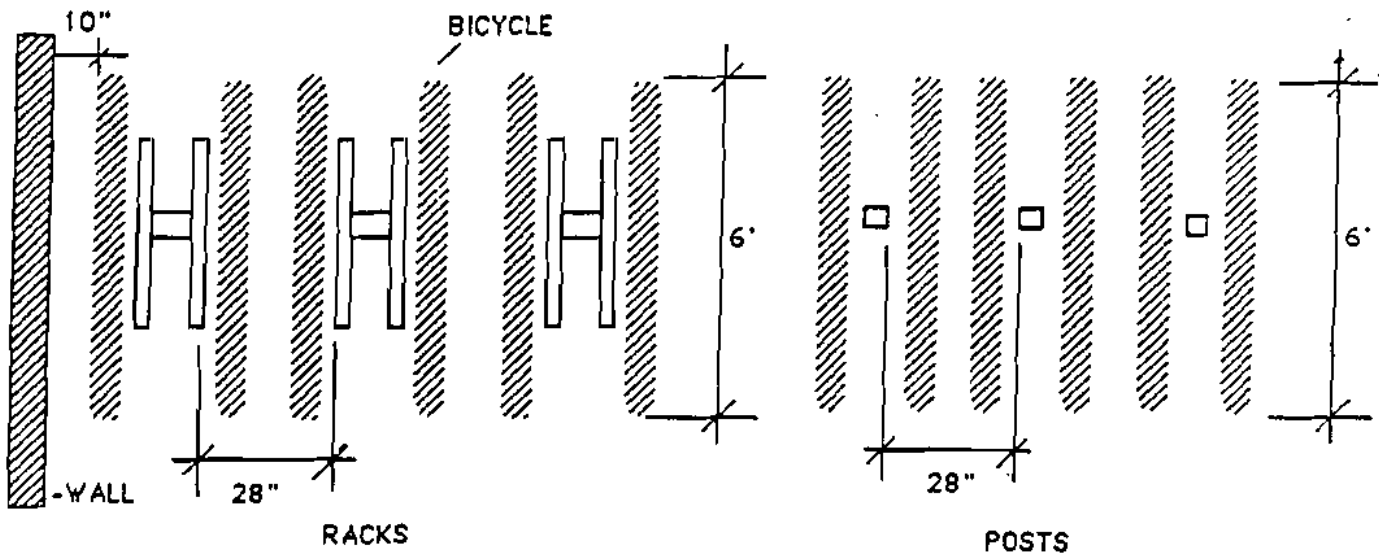


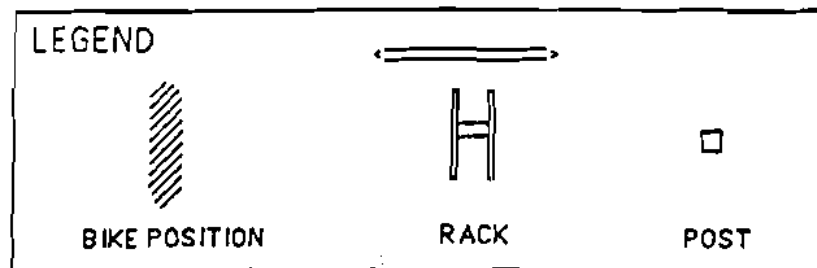
EXHIBIT III
Facility Layout



RACKS
III. A



III. B





Appendix C:

*Carolina Tarwheels Bicycle Club
Membership Description*



Membership Application: Carolina Tarwheels Bicycle Club

Name _____

Address _____

City _____ State _____ Zip _____

Phone(h) _____ (w) _____

Individual \$12.00 () Family \$15.00 () Number in Family ()

Number of family members in each age group:
 ≤12 _____ 13-18 _____ 19-24 _____ 25-34 _____ 35-44 _____ 45-54 _____ 55-64 _____ ≥65 _____

Fine Print: In consideration of my (our) membership, I (we) will not hold the Carolina Tarwheels Bicycle Club or its members or leaders liable for any injury or damage, however caused, which may result from participation in any event sponsored by the Carolina Tarwheels. I understand that Helmets are REQUIRED for all Carolina Tarwheels bicycling events.

Signatures: _____ Date: _____

X _____

X _____

The second line for signature of spouse for family membership or signature of guardian if applicant is under 18.

In each of the boxes below please check your current interests
 Check as many in each block as apply

<input type="checkbox"/> Day Rides <input type="checkbox"/> Off Road Biking <input type="checkbox"/> Overnight Tours <input type="checkbox"/> Cycle Camping <input type="checkbox"/> Commuting	<p>Miles Per Ride</p> <input type="checkbox"/> 5-10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> 50-80 <input type="checkbox"/> >80	<p>Pace</p> <input type="checkbox"/> 10-12 MPH <input type="checkbox"/> 12-14 MPH <input type="checkbox"/> 14-16 MPH <input type="checkbox"/> 16-18 MPH <input type="checkbox"/> 18-20 MPH <input type="checkbox"/> >20
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Willing to Contribute:

- | | |
|--|--|
| <input type="checkbox"/> Lead Club Rides | <input type="checkbox"/> Other |
| <input type="checkbox"/> Contribute to Newsletter | Please list on another sheet your additional interests, concerns and ways you wish to contribute to your Bicycle Club. |
| <input type="checkbox"/> Give Presentation at Monthly Club Meeting | |
| <input type="checkbox"/> Help with Bikefest | |

Check Here if you DO NOT WANT your Personal Information Published

Make check payable to
CAROLINA TARWHEELS
 and mail to: _____

Carolina Tarwheels
 c/o John Cleaveland
 16 Creekview Lane
 Durham, NC 27705-5581

Carolina Tarwheels Bicycle Club

An organization of cyclists in the
 Durham-Chapel Hill area



Membership Benefits and Club Activities

The Cog Hauler

Bimonthly newsletter for members that includes a ride list, information about club activities and events, and interesting, informative and humorous member-submitted articles

Monthly Meetings

Meetings are held in various local restaurants and include a presentation about some aspect of cycling (health, equipment, clothing, touring, *etc*). The meetings also include several picnics and a Thanksgiving extravaganza.

Club Equipment Rental

The club owns two hard shell bicycle cases that can be rented by members.

Discounts at Local Cycling Shops

Many shops offer discounts to members, ask each shop about its policy.

Bull Durham Bikefest

The club sponsors this two day event in June of each year. It includes a ride through historic Durham and sagged century, metric century and quarter century rides.

Membership in Cycling Organizations

The club is affiliated with the North Carolina Bicycle Federation, The League of American Wheelmen/Bicycle USA and American Youth Hostels. NCBF and LAW support local and national cycling related legislation and the Club AYH membership can be used by members planning club rides that stay at hostels.

Scheduled Group Rides

A ride list is published in the Cog Hauler and distributed to local membership. The rides are lead by members of the club and usually at least four rides are scheduled for each weekend (rides leave from Durham and Chapel Hill). Rides are available for riders of all abilities. The rides vary in distance from 10 to 100 miles and the pace of rides from novice, <10 mph, to fast >18 mph, with most rides falling somewhere in between. These rides are a great way to meet other cyclists, learn new routes and share your favorite routes with others.

Bicycle Tours

Members of the club often lead tours of various lengths. In the past these have included trips to the mountains, the beach, the zoo and to Kerr Lake.

Interesting Members

Members of the Tarwheels are persons of all ages and have a wide variety of professions. They are interested in various aspects of cycling, from pleasure rides to long distance touring to bicycle commuting to off road riding to bicycle related legislation. They are interested in rides varying from short rides ending at ice cream parlors to trans-USA tours. They know about aspects of cycling varying from how to build a bicycle frame to nutrition to the best routes for commuting. By joining the Tarwheels and participating in our events you will have the opportunity to make new and interesting acquaintances and friends.



Appendix D:

Article: Police on Bikes



The Heat on Chills/ Police on Bikes

by John Olsen

"The burglary suspect crouched in the bushes until the patrol car passed by and then boldly came out of hiding into the waiting—and arresting—arms of Carlsbad's police officers on bicycles." San Diego Tribune, Sept. 10, 1991

"The two-month-old bike patrol has been so effective and so popular with the public that police will add more cycling officers within three weeks." The Charlotte Observer, Aug. 13, 1991

All over the world police departments are discovering an efficient new tool in their fight against crime. This tool allows officers to move quickly, but silently, through stalled traffic and heavy crowds, and to glide stealthily down narrow passages and alleyways. A well-muffled rocket backpack, you might guess? Levitation boots? No, not exactly: it's the mountain bike, not the anti-vision force field, which has become the latest innovation for forward-thinking police departments in the U.S. and Europe.

As "traditional" crimes have been joined by the upward spiral of gang violence and drug crimes, police departments in many of our cities are having to look beyond "traditional" methods of law enforcement. This means improvising—trying to come up with new and even unusual methods, tools, and strategies that don't require big increases in staff and budget, endanger the citizenry, or violate its civil rights—to fight these crimes.

In 1987 two creative police officers from Seattle had an idea. Officers Paul Grady and Mike Miller, who are active cyclists (and apparently good salesmen as well), convinced their bosses that modified mountain bikes could multiply the effectiveness of a patrolling officer on foot. Interested members of the bicycle industry in Seattle and the local cycling community enthusiastically embraced the concept and contributed resources to help it grow. The local Cascade Bicycle Club bought jerseys and equipment, Raleigh provided "Chill" mountain bikes, and Lloyd Tamura from Velosport bike shop assisted with parts and maintenance. Officers Grady and Miller chipped in from their own pockets as well. The Seattle experiment succeeded beyond anyone's expectations, proving that mountain bikes

are effective in combating urban crime. The bicycle officers found that while they could be very visible when the situation required an obvious police presence, they could also descend unseen when stealth was needed, like hawks on an unsuspecting prey. Now—Sergeant Paul Grady remains the pre-eminent spokesman for the concept, even as he does his daily (or nightly) bicycle beat. He is the author of the definitive textbook for nascent bicycle police officers (*Policing by Mountain Bike*, PDG Enterprises, P.O. Box 14255, Seattle, WA, 98114, \$45.00), and he now travels the world giving seminars and instruction on the finer points of policing while pedaling.

As an example of the strategy and teamwork evolved by the Seattle police force around the capabilities of the bike squads, consider the following:

A police officer with binoculars and a radio is stationed in a window on the fourth floor of a downtown building, overlooking an area in which drug sales are common. The officer scans the crowds below, searching for the tell-tale signs of an impending drug sale. He sees a wary young male approach a stopped car, head scanning constantly for any sign of the police. As a bag is passed into the car and money is exchanged, the watching officer uses the radio to call to two waiting

officers on bicycles, hidden half a block away from the scene of the drug sale in an alley. The bike officers, waiting for the call, sprint down the alley and onto the sidewalk, moving rapidly but silently. They are on the scene in seconds and apprehend both the astonished seller (still in the act of folding his cash) and the equally surprised customer, all done with no resistance. A squad car is called to take the miscreants into jail. The process is soon repeated, resulting in four such arrests in one afternoon.

At this rate it doesn't take long for word to get around that the particular area isn't a good one for drug sales.

In another prominent arrest, officers Pete Rosen and Steve Freese chased a stolen car one and one-half miles through Seattle's congested Chinatown district, finally forcing the perpetrator to abandon the car and run for it. He didn't get far.

So far, Seattle bike cops have chased and caught five stolen cars—an impressive tally! Of course, this number is aided by the fact that the Seattle bike squads now total 60 men and women.

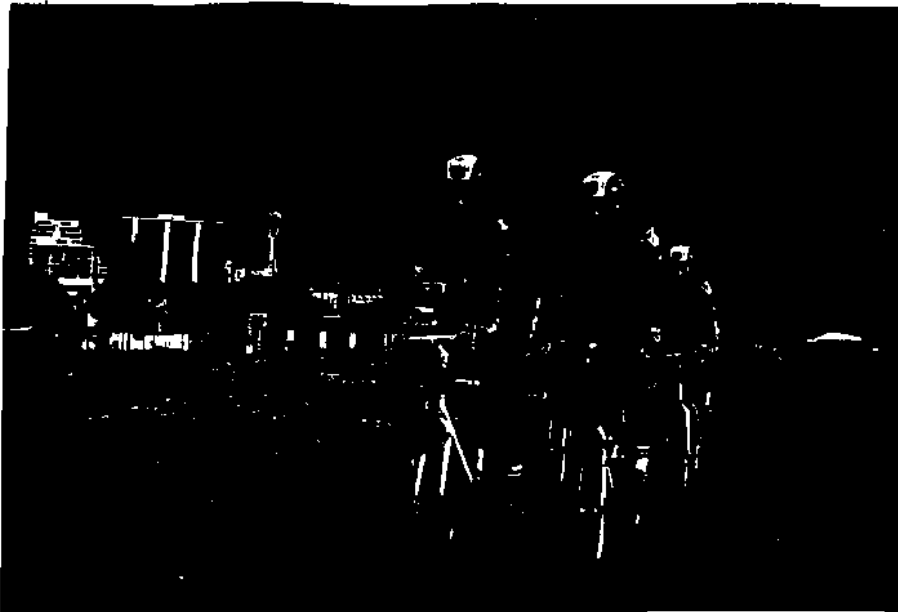
In any case, it didn't take long for the word about the efficiency of the bike squads to spread to neighboring police districts and communities either. Soon there were mountain bike police squads all around the Northwest, and shortly thereafter, all over the country. It is estimated that there are now 300 to 350 bike patrols nationwide, and the number is growing every day.

Currently the largest numbers of bicycle officers are found in the United States' sun belt states from Florida to California, and up the West Coast. A number of Canadian cities and parks have bicycle patrols, and Grenoble, France has its own patrol. The Seattle Police Department regularly sends out over 600 information packets to interested agencies all over the world. Sergeant Grady, in fact, is going to St. Petersburg, Russia, in June, to help the St. Petersburg police get started.

Aiding the acceptance and rapid spread of the police-on-bikes concept was its relatively low cost: a mountain bike equipped for police work can be had for well under \$1,000, or about the cost of

Dennis Coello photo





Karl Weatherly photo

two pistols. Given that many police officers are athletically active anyway, finding interested volunteers for the police squads proved to be no problem. In fact, most departments with bike patrols have waiting lists for officers eager to make the switch from feet, motorcycles, or patrol cars to the bike squads.

A mountain bike equipped for police work can be had for well under \$1000, or about the cost of two pistols.

When it comes to equipment, police departments typically use standard mountain bikes with only a few modifications. Mountain bikes are preferred for an obvious reason — they're tough. Strong rims and stout frames allow the bikes and riders to descend stairways and jump curbs at top speed.

Some departments install shorter handlebar stems and handlebars with a slight rise to accommodate officers who prefer a more upright riding position. Other officers prefer a more athletic (and less upright) position afforded by the longer stem and flat bar of today's typical mountain bike. Sometimes, bar-end extensions are installed to allow the rider to assume a lower, more streamlined posture.

Two-inch wide knobby tires usually fitted to mountain bikes are almost always replaced with 1.5" (or so) city bike tires of moderate tread to increase speed and

reduce rolling resistance. Kickstands are often added. Racks are always present, usually carrying a single rack bag containing miscellaneous gear — not spare bullets and Power Bars, as you might think, but citation books, report forms, first aid kits, and evidence bags.

When questioned about the safety of patrolling at night on a bicycle, Sergeant Grady says, "I'd call it less dangerous than during the day. There's less than half the traffic, for one thing. We can usually see enough without our lights on, and we can sneak up on drug dealers really well. We turn the lights on when we go out on the road and turn them off when we need to." Helping the night-riding officers achieve this effectiveness in the dark are first-rate bike lights. The double halogen lights are adjustable and can give either general illumination, or a focused, spotlight beam. A five and one-half hour-life ni-cad battery provides the power.

The enthusiasm with which urban police departments around the country jumped on the mountain bike patrol concept can't be ascribed purely to the low cost of trying it out. The main reason was that, when used properly, with strategy and teamwork, the patrols simply worked very well.

Bike patrols allow a limited number of policemen and policewomen to patrol a given area more effectively, producing better results in fighting certain types of crime than do traditional methods. A mountain bike can go places in pursuit that neither a car or a motorcycle can go and can do so more rapidly (and much, much farther) than could an officer on foot. And yet an officer on a bike can become an officer on foot in seconds. A sturdy mountain bike can be flung to the ground in full stride with little damage, allowing a nearly instantaneous transition from riding to running pursuit. This is not

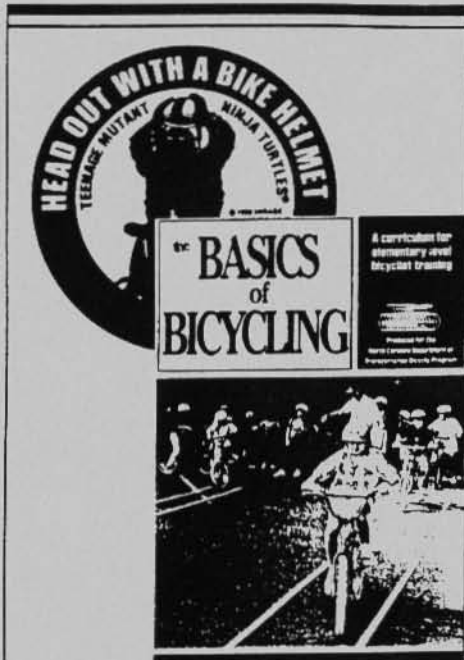
true of a police cruisers or motorcycles!

As a side benefit, bike patrols have been universally well liked by citizens and business owners alike. A policeman or policewoman on a bicycle seems, perhaps, less remote and threatening than an officer in a police car — more like "one of us" to the average person on the street. An officer on a bike (like the patrol person walking the beat) can smile and nod to passers-by, and can become part of a crowd. A cop on a bicycle is a person, but a cop in a black-and-white cruiser is part of a machine. While the novelty of cops on bikes certainly contributes to the universal public approval of newly-formed bike squads, the inherent friendliness of the bicycle seems to keep the vibrations positive even in cities that have had active bike patrols for five years. Okay, so mountain bikes are making a big hit with the police forces of the world. What's in it for cyclists? A lot, that's what. Cops on bikes bring all bicyclists a little more respectability in the eyes of the public.

In addition, police on bikes will inevitably gain a better perception of the needs of cyclists in the areas that they patrol. Even those officers not on bicycles are bound to get feedback and insights from those who are, and that simply has to help bicycling. Cops will realize that cycling isn't just a kid's activity, and that many cyclists are serious and legitimate road users with rights and responsibilities that need protection. Police officers on bikes are also the best equipped to issue tickets to bicyclists who violate traffic laws, and certainly any reduction in reckless cycling stands to help bicycling's reputation with motorists.

John Olsen is an Acoustics, Vibration, and Suspension Engineer. What makes him qualified to write an article about Police on Bikes? Plenty. He was the "hare" at a recent national bike police athletic competition, posing as a purse snatcher. He eluded four of the contestants successfully until he slipped and fell giving himself a bad case of runner's road rash! As an active bicyclist in Seattle, John's been close to police bike action since its inception. He also writes for *Bicycling*, *Bicycle Guide*, and *Mountain Biking* magazine among others.

For more information about police on bikes, contact Susie Jones at the League of American Wheelmen (L.A.W.), 190 W. Ostend Street, Suite 120 Baltimore, MD 21230, (410) 539-3399. Recently, the League conducted its 2nd Annual Police on Bikes Conference where a new membership organization, the International Police Mountain Bike Association, was formed. If you missed the conference, you may still purchase conference materials from the L.A.W. for \$23. The price includes handling and shipping



Education and Enforcement Report

REGIONAL BICYCLE PLAN FOR DURHAM AND ORANGE COUNTIES

Streetwise Cycling



a Guide to Safe Bicycling in North Carolina

THE BICYCLE LAW

1. Never ride on the freeway, yourself to other vehicles using
2. Ride only on the permanent seat of your bicycle. Don't carry parcels or other articles that prevent you from keeping at least on the handlebars.
3. Don't ride more than two abreast in a single lane, except on paths set for the exclusive use of bicycles. In some cases, riding two abreast is preferable to riding one abreast because it prevents you from being swined when the road pavement

prepared for:

The Transportation Advisory Committee for the Durham-Chapel Hill-Carrboro Urban Area

prepared by:

Greenways Incorporated

August, 1992

Acknowledgements

This Education and Enforcement Report is a supplement to the Regional Bicycle Plan for Durham and Orange Counties. This report was produced by Greenways Incorporated for the Transportation Advisory Committee of the Durham-Chapel Hill-Carrboro Urban Area. The Regional Bicycle Plan represents the collaborative efforts of four local jurisdictions: the Town of Chapel Hill, Orange County, the City of Durham and Durham County. This supplement provides a detailed plan for building a comprehensive bicycle education and enforcement program in Durham and Orange Counties.

A special thanks to Mary Meletiou of the NCDOT Bicycle Program for her help on issues of bicycle education.

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Introduction

Cycling has clearly begun to emerge as a viable transportation alternative for the future of the United States. Simultaneously, progressive communities have begun to recognize the need for comprehensive education programs for cyclists of all ages. The addition of bicycles to our congested transportation system necessitates not only the building of new bikeways, but also a well-informed travelling public. In the future, it will become even more critical that both cyclists and motorists learn to share the road.

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Section 1:

Existing Bicycle and Motorist Education Programs

Many strides have been taken in recent years to provide bicycle safety education to the residents of Durham and Orange Counties. Various public and private agencies have developed successful bicycle education classes and events, however these programs are only able to reach a fraction of the bicycling population each year. Agencies are sometimes unaware of other bicycle education resources in the region. This Education and Enforcement Plan will provide a blueprint for a clear network among existing programs, and suggest future programs that can help to close the "bicycle education gap".

State-Wide Bicycle Education Resources

The following is a description of state-wide bicycle education resources, which include the North Carolina Department of Transportation Office of Bicycle and Pedestrian Transportation, the North Carolina Division of Motor Vehicles, and the North Carolina Department of Environment, Health and Natural Resources Children and Youth Section.

NCDOT

Office of Bicycle and Pedestrian Transportation

The NCDOT Office of Bicycle and Pedestrian Transportation (hereafter referred to as the Bicycle Program) provides a wealth of bicycle education resources to the community. The Bicycle Program is actively involved in developing new education curriculums, and is an important source of a variety of educational pamphlets, manuals, posters, films and videos.

Materials distribution is one of the Bicycle Program's most important services. Bicycle Program staff actively seek out and acquire state-of-the-art bicycle educational materials for distribution throughout the state. In subject areas where there is a lack of information, the Bicycle Program has developed its own materials.

Multiple copies of these bicycle education materials are available free of charge to North Carolina

communities and residents (as many as 500 copies in some cases). Ms. Mary Meletiou, Assistant Bicycle Coordinator has indicated that she can help agencies to find other ways to obtain copies of materials, should they need more copies than the Bicycle Program can supply. A complete listing of all films and other materials available through the Bicycle Program is provided in Appendix B.

The Program's bicycle safety film and video library is one of the largest in the country, containing over 20 educational movies that range in topic and targeted age group. The Bicycle Program also distributes over 40 different safety awareness pamphlets, posters, manuals and guidebooks. Bicycle Program staff can help to choose which materials would be the best for your particular bicycle education program.

NCDOT Office of Bicycle/Pedestrian Transp.
P.O. Box 25201
Raleigh, NC 26611-5201

(919) 733-2804

Attn: Ms. Mary Meletiou

The Bicycle Program has an active agenda for developing safety education programs that will be of great use to Durham and Orange Counties. The Bicycle Program has developed an excellent bicycle education curriculum - Basics of Bicycling. Plans have been made to actively market this program in North Carolina schools, as well as provide training for teachers on how to implement the curriculum in fourth grade physical education classes. (The Basics of Bicycling curriculum is described in more detail in Section 2: Plan for Developing Bicycle Education in Public Schools)

The Bicycle Program has funded several new bicycle education programs in the January 1992 TIP Schedule. Bicycle safety and helmet promotion public service announcements for radio and television are scheduled to be developed and

distributed in 1994. Funds have also been allocated to develop an adult cycling curriculum in 1995. The new curriculum will be timely. There is a need for adult bicycle education within Durham and Orange Counties, yet few adult curriculums available within the United States.

In 1992, the Bicycle Program conducted a bicycle workshop for law enforcement agencies in Wrightsville Beach, North Carolina. The workshop provided an overview of types of bicycle education programs that law enforcement agencies might undertake, such as a helmet promotion campaign or the Basics of Bicycling program. The workshop also introduced new mini-grants available through the Bicycle Program. These grants (maximum \$3,000.00) are available only to law enforcement agencies for bicycle safety education purposes (contact Mary Meletiou for more information).

The NCDOT Bicycle Program is the largest single resource available to Durham and Orange counties. In order to adequately use the vast resources available from the Bicycle Program, local bicycle educators should maintain contact with the Bicycle Program, keeping abreast of their latest education-oriented activities.

Division of Motor Vehicles School Bus and Traffic Safety Section

The Division of Motor Vehicles School Bus and Traffic Safety Section typically conducts a brief bicycle safety education program within elementary schools throughout North Carolina. However, both Durham and Orange County offices have been unable to implement these programs over the past decade due to time limitations. Furthermore, there are no current resources (time or money) within the Durham and Orange County DMV offices to implement the bicycle safety program.

The DMV has a bicycle safety slide show, however it is dated and has no sound track. The School Bus and Traffic Safety Section has also developed several bicycle tests that may be useful for school bicycle education programs (we have not reviewed these tests).

One interesting development within the NC DMV is a new Driver's Education curriculum. We discussed the possibility of developing a "Share the Road" lesson in the new curriculum with Mr. Mark Fountain, Assistant Director of School Bus and Traffic Safety. He has agreed to include such a lesson in the 1992 Driver's Education Curriculum, which will be used throughout North Carolina. The NCDOT Bicycle Program is currently working with the DMV to develop the text for the new curriculum.

The NC DMV has also included a "Share the Road" segment in the new edition of the Driver's Manual (Chapter 5). This study guide is available through local DMV Driver's License offices, and serves as the basis for their written examinations. Chapter 5 includes special instructions to motor vehicle operators on how to pass a cyclist, how to be alert for roadside hazards that may cause a cyclist to swerve, and safe driving habits when approaching an intersection with a cyclist. This Chapter explains cyclists' responsibilities, and encourages drivers to respect cyclists' right to use the roadways.

North Carolina Department of Environment, Health and Natural Resources (NC DEHNR) Children and Youth Section

The Children and Youth Section of the NC DEHNR provides mini-grants for implementation of all types of safety and injury prevention programs, including bicycle safety. Durham County Health Department received a grant to conduct a helmet promotion campaign through this program. Although the 1992 application deadline has expired, funds for seven grants will be available in 1993. The average grant is \$5,000 to \$6,000. Contacts for this program are Ms. Donna Scandlin and Ms. Paula Strickland:

NC DEHNR Children and Youth Section
P.O. Box 27687
Raleigh, NC 26611-7687

(919) 733-0385

A sample copy of the 1992 grant application form is located in Appendix C. The Children and Youth Section has funded several helmet promotion campaigns in the past, including a pilot pro-

gram for the new NCDOT Bicycle Program Helmet Campaign Guide in Greenville, NC. Since this agency focuses on children's safety issues of all types, it is possible that other types of bicycle safety programs could receive funding. We encourage educators to consider this source for funding bicycle rodeos, safety workshops, summer day camp programs, public school programs, etc.

In the past, the NC DEHNR has distributed various bicycle education materials. However, the office no longer provides this service, usually directing material requests to the NCDOT Bicycle Program.

Existing Bicycle Education Programs in Durham County

Community-based education programs have made great strides in recent years to provide bicycle education to children within Durham County. Various city agencies have developed a network of support, so that the burden of implementing bicycle education is not the responsibility of a single agency. Durham County has not "institutionalized" bicycle education, that is, public schools and universities have not developed active and continuous education programs for cyclists.

Durham Public Schools

Durham City Schools have few bicycle education programs currently underway. However, the school system is launching a new "Safety at School" program in 1993, and some educators have indicated that a pedestrian/bicycle traffic safety curriculum would be timely.

Durham City and County Schools are moving towards consolidation in the near future, and are therefore undergoing many changes. Bicycle education within the public schools faces several obstacles:

- Upheaval caused by consolidation must settle before educators can focus their energies on a new program of this type.
- The general feeling among educators is that bicycle education is not a responsibility of public

schools, since few children ride their bicycles to school. Also mentioned: "the school day is too full to implement this additional program."

- Other educators have indicated that some children in inner-city Durham neighborhoods are unable to ride (or even own) bicycles due to the high crime rate - bicycles are regularly stolen.

Despite the obstacles, we believe that institutionalized bicycle education is necessary and viable in Durham County. Our recommendations for developing a program in Durham County, as well as in other school systems reluctant to develop bicycle education is described in Section 2: Plan for Developing Bicycle Education in Public Schools.

Durham Police Department

The Community Relations Department handles bicycle educational activities within the Durham Police Department. Since its formation in 1988, the Community Relations Department has begun to build a bicycle safety education program by networking with the Health Department and Cooperative Extension Service to reach Durham's youth.

Established programs provided by the Community Relations Department include bicycle safety presentations and summer bicycle rodeos. Sergeant Steve Chalmers indicated that bicycle safety presentations are conducted by request to scouts, church groups and 4-H groups. The department typically makes seven to nine of these presentations per year. Materials and visual aides are obtained from the NCDOT Bicycle Program, including pre-tests and post-tests, rules of the road pamphlets, posters and brochures.

The Community Relations Department recently received a \$3,000 mini grant from the NCDOT Bicycle Program to develop a helmet promotion campaign in Durham. Officer Mayfield, one of the departments' bicycle safety educators, indicated that the program will be conducted in three elementary schools: RN Harris, Burton, and CC Spalding. The Department plans to conduct presentations on bicycle safety and the importance of wearing helmets, and then distribute helmets free-of-charge to the children (the grant money will be applied to the cost of the helmets).

Officer Mayfield indicated that the police department would like to obtain future grants and expand its program, and would like to network with other helmet campaigns in the region.

Durham City/County Parks and Recreation Department

The Parks and Recreation program is in the early stages of developing a summer day camp bicycle education program. These popular day camps typically attract 1,000 Durham youth per year. Plans for summer of 1992 include six hours of bicycle education per camp, to be conducted by a park ranger who is skilled in bicycle safety techniques.

The Parks and Recreation Department hopes to obtain some bikes for the project from local bicycle shops, and may work with these shops to repair old bikes so that they can be used for the project. This education program will stress helmet use, however due to limited funds the Parks and Recreation Department will not be able to conduct a helmet distribution campaign.

Durham County Health Department

As previously mentioned, the Durham County Health Department has received a grant from the Children and Youth Section of the NC DEHNR to implement a one-year helmet distribution campaign and bicycle education program in two elementary schools. The program will focus on fifth grade students. Ms. Wanda Woods, Health Educator for the Health Department is in charge of the project, and has developed her own curriculum through materials supplied by the NCDOT Bike Program and the Durham Police Department, including helmet hangtags, the helmet campaign manual, and various brochures.

There are future plans to network with Durham City/County Schools, the Parks and Recreation Department, and the Police Community Relations Department to try to obtain a larger grant from a private foundation for an expanded helmet promotion campaign throughout the public school system.

Ms. Wanda Woods, Health Educator
Durham County Health Department
(919) 560-7600

Durham County Cooperative Extension Service

The Durham County Cooperative Extension Service has a very active bicycle safety education program that varies in scope from year to year. Mr. James Miller heads the program, which relies on materials supplied by the NCDOT Bike Program and the State 4-H Office. In 1990, the program consisted of 3 parts: safety/maintenance presentations, enforcement presentations, and rodeo/bicycle tours. In 1991 the agency conducted 15 to 20 neighborhood bicycle clinics, culminating in a city-wide bicycle rodeo at the end of the summer. This year, the Extension Service is networking with the Health Department to conduct a helmet campaign in two elementary schools. Volunteers from local bike shops will be involved, also, by presenting the basics of bicycle maintenance to the children.

Although the Extension Service will not be able to conduct neighborhood clinics this year, Mr. Miller indicated that next year they plan to expand the clinic program to more neighborhoods. The bicycle rodeo will be held again this year, as it has become a popular summer event in Durham, attended by children and parents alike. The rodeo begins with a bicycle inspection conducted by the Police Department. The rodeo includes eight skills courses.

Mr. Miller explained that part of his program's success is its ability to network with other state agencies "and anyone else who is interested" to provide bicycle safety education to as many children as possible.

Existing Bicycle Education Programs in Orange County

Several public schools within Durham and Orange Counties are in the beginning stages of developing bicycle safety education programs. These recent efforts are the result of an increase in public awareness of bicycling issues and new bicycling laws.

Chapel Hill-Carrboro City Schools

In past years, the bicycle safety education program in Chapel Hill-Carrboro City Schools has consisted of periodic bicycle safety presentations made by local police officers, and in-class bicycle

safety sessions for second graders. Efforts were begun in 1992 to institutionalize bicycle education for the first time in Chapel Hill-Carrboro Schools. These recent activities are largely due to the increased attention to bicycle safety spurred by Chapel Hill's new helmet law. This law went into effect in the Spring of 1992, requiring children under 15 to wear helmets while riding their bicycles on city roads and public property.

Ms. Stephanie Willis, Health Educator for Chapel Hill-Carrboro City Schools has led the effort to implement the NCDOT Basics of Bicycling program in fourth grade PE classes. She plans to condense the lessons to fit the time constraints of this first year of implementation. In future years, however, she hopes to teach the full curriculum.

Ms. Willis has been quite resourceful in developing this program. She is in the process of locating bicycles for the program, and has been fortunate to obtain several from the Police Department. Some of these bicycles are larger in size, and may be used to teach bicycle safety to middle school children. Ms. Willis needs more bicycles, helmets, and storage space in order to fully implement the bicycle education programs.

Ms. Stephanie Willis
Chapel Hill-Carrboro City Schools
Lincoln Center, Merritt Mill Road
Chapel Hill, NC 27516

(919) 967-8211 ext. 217

Orange County Schools

Orange County Schools have no current bicycle education programs, however some educators have expressed an interest in the concept (we spoke with Ms. Linda Howell, Director of Instruction, and Ms. Donna Williams, Health Educator with Orange County Schools). Ms. Williams will review bicycle education curriculums and then hold an orientation meeting for individual grade chairpersons to introduce the program. We recommend that she contact Ms. Mary Meletiou with the NCDOT Bicycle Program (733-2804) to obtain the Basics of Bicycling curriculum, and to solicit her assistance in introducing the curriculum to Orange County school teachers and principals.

We also recommend that Orange County Schools work with Chapel Hill-Carrboro City Schools in their efforts to implement the Basics of Bicycling. We anticipate that one "fleet" of bicycles could be effectively used by the entire county. This will involve coordination between the programs, and sharing in the maintenance of the bicycles. Mr. James Davis of Mopaco Motorcycles in Hillsborough (732-2331) has indicated that he may be willing to donate time to maintain the bicycles.

Chapel Hill Police Department

Officer Everet Johnson of the Community Relations Department described the Chapel Hill Police Department's bicycle safety education program. Officers conduct bicycle safety presentations at each elementary school in Chapel Hill once a year, testing them afterwards. Materials for the tests are provided by the NCDOT Bicycle Program.

The police department conducts a yearly bicycle rodeo in June which has become quite popular. The rodeo is usually held at the University Mall, and includes skills courses, bike inspections, and hazard avoidance methods. Materials for the rodeo are supplied by the NCDOT Bicycle Program.

In addition to the school program and bicycle rodeo, officers make bicycle safety presentations to civic groups on request. However, Officer Johnson indicated that these take place only once or twice per year.

Officer Rex Gibson described the police department's role in using law enforcement as an educational tool. Warning citations are given to cyclists who are first-time offenders, for violations such as running stop lights, riding on sidewalks, riding on the wrong side of the road, etc. While issuing the warning citation, the officer thoroughly explains the laws that apply to cyclists. Upon a second traffic offense, the cyclist is given a ticket.

Chapel Hill Parks and Recreation Department

Chapel Hill Parks and Recreation Department has no active bicycle education programs, although they have attempted to conduct bicycle

rodeos in the past. These rodeos were not well-attended, and were therefore discontinued.

Orange County Parks and Recreation Department
Bicycle rodeos have been the only safety education program conducted by the Orange County Parks and Recreation Department. MaryAnn Moore, Director of Recreation and Parks described a bicycle rodeo that was held in a shopping mall parking lot several years ago. The rodeo was a success, however, the location caused traffic problems. The rodeo was discontinued because of this.

**Orange County Cooperative Extension Service:
4-H Club**

The 4-H Club conducts bicycle safety education classes each summer. Young teens make bicycle safety presentations as an exercise in public speaking. The youth are given workbooks provided by the State 4-H Office, however they are not formally trained to make the presentations. These speeches occur several times during the year, and are given to scouts, youth groups, and church groups.

Ms. Mary Morrison, Extension Agent
Orange County Cooperative Extension Service -
4H Program

(919) 688-7333 ext. 2059

Orange County Health Department

The Orange County Health Department has no current bicycle safety education programs, however, the education coordinator mentioned that the agency would be willing to consider such a program in the future.

Ms. Louis Echols, Health Educator
Orange County Health Department

(919) 732-8181 ext. 2413

Section 2:

Bicycle Education Recommendations for Durham and Orange Counties

Untrained cyclists are particularly vulnerable to injury. They often act unpredictably because they do not understand the basics of operating a bicycle in traffic. With more cyclists using new bicycle facilities in Durham and Orange counties, education will be critical to insure the safety of all.

Through our research, we learned that the most successful bicycle education programs in the United States are partnerships between the public and private sector. Grass-roots bicycle organizations in Durham and Orange counties can develop a pro-active role in bicycle education, working in conjunction with established programs conducted by public agencies. Our recommendations for a comprehensive education program are based upon this type of partnership.

RECOMMENDATION #1: Educate cyclists of all ages to follow the rules of the road and develop safe riding techniques.

Both Durham and Orange counties are in need of additional bicycle education programs in order to reach cyclists of all ages and capabilities. This can be achieved through the following action plan:

Institutionalize bicycle education in the public school system.

We recommend that bicycle education be available to all children through the public school system. This bicycle education program can include the following (see Section 2: Plan for Developing Bicycle Education in Public Schools for a full description of an institutional bicycle education program):

- A kindergarten through second grade pre-bicycle traffic education curriculum that teaches young children how to conduct themselves as pedestrians. This program was developed in Florida, and has proved successful in pilot programs.

- The Basics of Bicycling curriculum for fourth and fifth graders, which emphasizes on-bike training, helmet use and hazard avoidance skills. This program was developed in North Carolina, and has gained a reputation for being one of the best curriculums in the country.

- Middle school and high school courses that focus on the sporting aspects of bicycling. Volunteer cycling advocates can help to implement this program, which could include training for cycle tours, sport racing and mountain biking.

Provide instruction through local universities.

Universities attract large numbers of cyclists in both Durham and Chapel Hill. Bicycling is very popular among students - UNC Chapel Hill freshmen are prohibited from bringing their automobiles during the first year of school, and therefore must consider alternative forms of transportation.

Universities should take a pro-active role in educating college students to follow the rules of the road by including bicycle education within curriculums. College students are the most frequent violators of traffic rules, due to the myriad of environments that students cross in traveling to and from classes: open space areas to wide plazas to public roadways.

Both UNC-Chapel Hill and Duke University have printed educational handouts for student cyclists, and both universities have developed voluntary registration programs. North Carolina Central University has not developed a bicycle information packet, nor has Durham Technical College. We propose that this information be included in freshman orientation packets in each of these universities.

Considering the popularity of cycling on college campuses, we feel that a bicycling course through the PE Department of each university would be well-received by students of both schools. This course should be aimed at cyclists of novice-to-in-

intermediate ability, and should focus on safe cycling techniques in traffic. The course should be entitled "Bicycling in Traffic" so the utilitarian nature of the course is clear.

Other college campuses, such as Arizona State University, have adapted the League of American Wheelmen's Effective Cycling curriculum for use as a one-semester physical education class. This curriculum is the process of being updated - a description can be found in Appendix D, along with a course description from Arizona State University (Appendix E). For information on how to develop a college cycling course, contact:

Yvonne Morrison, Former Bicycle Instructor
Arizona State University
8238 East Rancho Vista
Scottsdale, AZ 85251

(602) 949-1517
(602) 998-2219

To obtain the new Effective Cycling curriculum, contact:

Susan Jones, Education Director
League of American Wheelmen
190 W. Osten Street, Suite 120
Baltimore, MD 21230

(301) 539-3399

Provide education to adult cyclists.

There is a severe lack of adult cycling education programs, not only in this region, but throughout the United States. The Effective Cycling program is an exception to the rule, however, cycling educators from across the country have indicated that the course is sometimes too intensive for the average adult cyclist. The main issue in educating adult cyclists is achieving participation. Although adults may have been riding their bikes for years, most have not mastered the basic techniques of riding in traffic. The need for bicycle education programs for adults will increase as more facilities are constructed and more adults begin to commute.

We propose that adult bicycle education be a primary function for a regional bicycle organization (see Carolina Tarwheels Bicycle Club on the next

page) for Durham and Orange Counties. Bicycle clubs across the country, including the Cascade Bicycle Club in Seattle, Washington, and the Hawaii Bicycle League in Honolulu, Hawaii, have developed successful education programs. These clubs have generated strong funding sources through corporate sponsorship and well-publicized bicycle tours. We have provided names and addresses of bicycle clubs that have developed active bicycle education programs in the appendix of this report.

A regional bicycle organization can provide the leadership to establish an adult bicycle education program, and provide help to public school programs where needed. We suggest the following agenda for adult education, based on our knowledge of resources within the region.

- We recommend that the regional bicycle club organize a region-wide "Bike to Work" day, in conjunction with other bicycling clubs within the Triangle (see contact names below). A high profile publicity campaign will be necessary, and should be achievable through the myriad of media outlets in the Triangle. Since a "Bike to Work" day is an environmental cause, the media may be willing to publicize the event free-of-charge. Corporate sponsorship can be solicited for this event, also. Contact fast-food chains, bicycle/outdoor sports shops, and Research Triangle Park corporations.
- Organize volunteers within the regional bicycle club to conduct a lunchtime traffic cycling session during "Bike to Work" day, at major business centers throughout the Triangle. It will be necessary to conduct an orientation for volunteers, so that they are well-prepared to lead these classes. The NCDOT Bicycle Program may be able to help in this effort.
- The regional bicycle club can also develop traffic cycling training sessions, advertised through local bicycle and sports shops, for adult cyclists. We also suggest that training sessions be advertised to apartment and townhouse communities - especially near college campuses. Most communities have monthly newsletters, and will be able to easily publicize bicycle education information.

Volunteers from the regional bicycle coalition can conduct adult education classes at local community centers and parks. Parks and Recreation Departments in both Durham and Orange counties have offered to provide space for this purpose. Adults' interest in cycling classes will grow as more bicycle facilities are constructed throughout the region. The NCDOT Bicycle Program plans to develop an adult cycling curriculum in 1995. Until this curriculum is developed, however, either an abbreviated form of Effective Cycling or the Bicycle Program's Streetwise Cycling in NC can be used to conduct adult education classes.

- The regional bicycle coalition can also conduct a large bicycle tour to a specific destination within North Carolina. This can serve to generate a great deal of funds, as well as an opportunity to provide bicycle education. We propose that the regional bicycle coalition work with the Bicycle Program to distribute copies of Streetwise Cycling (or a similar adult text) to tour participants prior to the tour date. This event will also necessitate a full-scale publicity campaign.

Several popular bike tours across the country can serve as models. The Cascade Club in Seattle, Washington (a private non-profit group) conducts several successful bike tours each year, attracting from 2,000 to 5,000 to 10,000 cyclists. These tours generate funds that enable the Club to conduct a free bicycle education program for the entire city.

A regional bicycle club has already been formed to serve Durham-Chapel Hill area cyclists. Carolina Tarwheels Bicycle Club is an organization with approximately 250 members. The club presently publishes a bimonthly newsletter called The Cog Hauler, holds monthly meetings, offers organized group rides and the "Bull Durham Bikefest". However, the club has had difficulty in the past in sustaining a viable membership, and currently operates without a president.

Ideally, the Carolina Tarwheels can serve as the regional bicycle organization mentioned in this recommendation, and be able to expand its membership and scope of community services to provide adult education for the two-county area.

Another possibility would be to develop an entirely new Bicycle Safety Coalition composed of members of the North Carolina Bicycle Club, Carolina Tarwheels, educators who have become involved in bicycle education, representatives of the Bicycle Advisory Committees, etc. A Bicycle Safety Coalition could capitalize on the diverse interests and abilities of its membership. An organization of this type was formed a few years ago in Chapel Hill, called the Chapel Hill League for Safe Cycling, however this group has not recently been active. (contact Dick Terry at 248-5303).

Kathy Trotter, President
North Carolina Bicycle Club
(919) 548-5747

Beth Gregory, Bing Brogden
Carolina Tarwheels Bicycle Club
P.O. Box 111
Durham, NC 27702
(919) 493-0761

Dale Roenigk
Carolina Tarwheels Bicycle Club
(919) 490-5702

RECOMMENDATION #2: Educate motorists to share the road with cyclists.

Several steps have already been taken in providing education to motorists on sharing the road. As mentioned in more detail in Section 1 of this report, the NC Division of Motor Vehicles has included a segment in Chapter five of the 1992 Driver's Manual entitled "Sharing the Road".

As previously described, the new statewide curriculum for Driver's Education classes will include a "Share the Road" lesson, also. It will be necessary for cycling advocates to encourage local driver's education companies (and Driver's Ed teachers within the local schools) to implement the new curriculum. This program will teach new drivers to respect bicyclist's rights to use the roadways, and to develop safe driving habits when sharing the road with cyclists.

Cyclists can lobby DMV offices in Durham and Orange Counties to take a more active role in mo-

torist education, by publicizing the "Share the Road" message through Public Service Announcements. We recommend that local DMV offices include questions on driver's examination tests about sharing the road with bicycles - this will help to ensure that current drivers understand cyclists rights. DMV offices should also display "Share the Road" posters (available from NCDOT Bicycle Program).

We recommend that Public Service Announcements be aired on local radio and television stations. It may be possible for the regional bicycle club to work with the NCDOT Bicycle Program to develop these advertisements. The Bicycle Program plans to develop several PSA's in 1994 - the regional bicycle club could help to produce a "Share the Road" message for one ad, which could be aired throughout the Triangle.

RECOMMENDATION #3: Develop public awareness and encouragement of bicycling.

The recommendations made thus far will do much to increase public awareness of bicycling, however, we believe that several additional measures are essential.

Helmet Promotion Campaigns

We recommend that the Bicycle Advisory Committees (BAC's) from both Durham and Chapel Hill work together to develop a region-wide helmet promotion campaign.

Chapel Hill's BAC has already taken steps to begin a program of this type - the committee has received a \$4,000.00 grant from the NC DEHNR Children and Youth Section to implement the campaign, which will include helmet distribution. The NCDOT Bicycle Program can offer instruction in this effort, and can provide the North Carolina Bicycle Helmet Campaign Guide, which is a step-by-step manual that explains how to conduct local helmet awareness campaigns.

Several agencies within the region have also begun helmet promotional efforts. Within Durham County, Ms. Wanda Woods with the Health Department is conducting a helmet distribution campaign within two elementary schools. Both the Durham Police Community Relations Department and the Chapel Hill Bicycle

Advisory Committee have received grants for helmet campaigns. The Orange County Health Department has expressed an interest in helping with a helmet promotion campaign (contact listed below).

We recommend that these programs coordinate their efforts, especially when generating publicity for their campaigns, since most of the major radio and television stations cover the entire region. As an example of how this could be done, a Chapel Hill agency could produce and distribute a PSA for television that would be broadcast to both counties, and a Durham agency could develop written media announcements and radio PSA's. In this manner, money and time can be conserved with optimal results.

Additional grants will be available in 1993 through NC DEHNR Children and Youth Section for helmet promotion campaigns (see sample grant application in Appendix C). The NCDOT Bicycle Program has not yet determined whether there will be mini-grants available in future years for law enforcement agencies.

Mr. Wayne Pein, Chairman
Town of Chapel Hill Bicycle Advisory
Committee
144 Hamilton Road
Chapel Hill, NC 27514
(919) 942-6051

Sergeant Steve W. Chalmers
Community Relations Division
Durham Police Department
314 Mangum Street
Durham, NC 27701
(919) 560-4317

Ms. Donna Scandlin
North Carolina DEHNR - Children and Youth
Section
P.O. Box 27687
Raleigh, NC 27611-7687
(919) 733-0385

Ms. Wanda Woods, Health Educator
Durham County Health Department
414 E. Main Street
Durham, NC 27701
(919) 560-7600

Ms. Louise Echols, Health Educator

Orange County Health Department
300 W. Tryon Street
Hillsborough, NC 27278
(919) 732-8181 ext. 2413

Encourage bicycling through community awareness campaigns.

In addition to a helmet promotion campaign, a general awareness campaign for cycling can do much to educate citizens of bicycle safety issues. Cranford, New Jersey offers an excellent example of a successful community-based awareness campaign that began in the 1970's, and is still active today. The program was started by a PTA President and a local police officer, and focuses around a "Bicycle Safety Alert" program held each summer. The program stresses bicycle registration, and simple bicycle safety slogans which are emblazoned on banners, on buttons and placemats at local restaurants (see the full description of Cranford's program in the appendix of this report).

This type of campaign could be an additional boost to cycling within the Durham-Orange county area. Local PTA's could be asked to take on a summer community awareness program of this type. We suggest that PTA representatives be approached and asked to locate PTA members (cyclists, preferably) who could lead this type of program, in conjunction with local police. Of particular importance is the bicycle registration drive, as stolen bicycles can be more easily located if they are registered.

PTA Contacts:

Ms. Martis King, PTA Council President
P.O. Box 15623
Durham, NC 27704

Jim Drennan
PTA Representative, Durham County
2716 Old Sugar Road
Durham, NC 27707

Debra Kornegy
PTA Representative, Orange County Schools
2607 Buckboard Dr.
Hillsborough, NC 27278

Summary of Recommendations

Throughout our recommendations, we have described the roles that various public agencies and private organizations can play in providing bicycle education opportunities to residents of Durham and Orange Counties. We want to stress that much of the fundamental components for comprehensive education are already in place and have been operating independently of each other in this region during the past 10 to 15 years. The greatest problem we see is the lack of a coordinated and unified approach to bicycle education. This could be easily resolved by a few simple and inexpensive actions on the part of the regional community, once again these include:

- 1) Support the development and active operation of a private sector regional bicycle organization to assist public sector agencies with education. We believe that this can be resolved by supporting the Carolina Tarwheels Bicycle Club. We recommend that Bicycle Advisory Committees from Durham and Chapel Hill meet with representatives of Carolina Tarwheels to discuss the current status of the organization, the kind of support that is needed to strengthen the organization, and define education programs that should be implemented through a new cooperative relationship. We envision that one show of support might include a one time grant from the general fund of each municipal and county government that would enable Carolina Tarwheels to upgrade communication services and begin implementation of education programs.
- 2) Encourage the University of North Carolina and Duke University to participate in active bicycle education programs. The administrations of these campuses need to be involved in regional bicycle education programs administered by both the public and private sector. We suggest that the Universities appoint liaisons to work with the Carolina Tarwheels and Bicycle Advisory Committees to implement a coordinated bicycle education curriculum not only for students of the campuses, but also for adults in the region.
- 3) Implement bicycle education programs in local school systems. The Durham and Orange County public schools should continue an aggressive campaign to educate children with regard to bi-

cycling. The NCDOT Bicycle Program has developed one of the nation's model bicycle education programs, and it should be implemented within every school in the two-county area.

- 4) Encourage local community leaders to include bicycle education within general fund expenditures. Local elected officials must understand the importance of bicycle education and make it a priority for future general fund expenditures. Quite frankly, if the region is to maintain the quality of life that has been enjoyed for many decades, it must incorporate alternative transportation as an effective mode of urban mobility and travel. Expending capital improvement funds for bicycle facility development is only half of the issue. Bicycle and motorist education is vital to ensure that transportation modes do not conflict.
- 5) Local governments should establish the position of bicycle and pedestrian coordinator within transportation departments. Bicycle education will be a primary duty of these local coordinators. It is suggested that they serve as a sanctioned liaison to local private sector and institutional partners for bicycle education. Without a local coordinator, it is unlikely that the myriad of bicycle education resources in the region will be able to form a fully comprehensive program.
- 6) Encourage residents of the region to become more involved in bicycle education. Local residents of the region must support and promote bicycle education as a necessary component of a "bicycle friendly" region. Public sector partners can not be expected on to serve as the primary guiding force for regional education programs. Competing interests will continue to cause variations in support and programs. A strong, cohesive and coordinated private sector is needed to maintain continuity among programs and activities related to bicycle education.

Section 3:

Bicycle Education Plan for Public Schools

Institutionalizing bicycle education is an important part of a comprehensive bicycle education program within our community. The public school system provides the most efficient method of reaching youth with bicycle education. However, the issue of convincing public school administrators to implement bicycle education must be approached with sensitivity to the myriad demands that are placed on teachers.

Fortunately, there have been several new bicycle education curriculums developed that are designed for ease of implementation in public schools. In school systems where bicycle education has not been implemented, we suggest that the following steps be taken:

- 1) Locate parents, teachers, curriculum coordinators, and principals who are concerned about bicycle safety, or who are bicycle enthusiasts. Present bicycle safety curriculums to these people (the most appropriate curriculums are further described later in this section). The success of programs such as Basics of Bicycling can be documented - contact Alec French, Health Educator for Alamance County Schools. Convince others within the school system that a bicycle education program would be worthwhile and fun for the children.
- 2) In convincing skeptics, statistics can be helpful. The need for bicycle and traffic safety education is easily demonstrated by the numbers of children that are injured or killed in our communities each year. The NCDOT Bicycle Program can be helpful in obtaining these statistics.
- 3) Develop a plan for implementing bicycle education in a few schools. The Basics of Bicycling curriculum booklet has a complete program for implementation that can be quite helpful in this effort.
- 4) Once a curriculum has proved successful in a few schools, branch out to other schools. Eventually,

bicycle education can become a standard part of the school year.

We researched bicycle education curriculums from across the United States, and found that several outstanding curriculums have been developed. We have provided complete descriptions of the best curriculums on the following pages. We highly recommend these programs for implementation in Durham and Orange county's school systems.

General Traffic Safety Program: Kindergarten to Second Grade

The child's perception of traffic is quite different than the adult's. Traffic safety is an invaluable part of overall bicycle safety education, as it helps children understand traffic situations before they begin training to ride their bicycle. Studies have shown children under the age of 8 are particularly vulnerable, for the following reasons: (obtained from the National Safe Kids Campaign)

- Young children believe if they can see a driver, a driver can see them.
- They think cars can stop instantly.
- They have a hard time distinguishing where a sound is coming from.
- Few can judge how fast traffic is moving.
- Their field of vision is one-third that of adults.
- They often don't recognize danger and react to it.
- Very young children often see cars as friendly, living creatures.

Younger children may not be ready for bicycle training - however they can learn the basic rules of traffic safety as a precursor to later bicycle safety classes.

The Florida Division of Transportation Bicycle Program recently developed a state-of-the-art traffic safety education and pre-bicycling curriculum for kindergarten through second grade - the first of its type in the country. This curriculum has been piloted in several states, and has proven to

be successful. We recommend the use of this safety education program in Durham and Orange County Public Schools.

We recently received a draft version from Mr. Dan Burden, Bicycle Coordinator for the Florida DOT Bicycle Program. The kindergarten traffic safety course includes seven lessons, each lasting approximately 30 minutes long. Lessons focus on specific activities, such as crossing the street, what to do when visual barriers block your view, traffic identification, etc. This curriculum includes a series of video tapes that are played during instruction, which depict young children following the traffic safety rules that are being taught during the lesson, as well as a complete list of questions for the teacher to ask the class. The lessons culminate in an actual street crossing in an area with a visual barrier. An excerpt from this curriculum can be found in Appendix F.

The first and second grade traffic safety curriculums focus on increasingly complex traffic issues, such as calculating the amount of time it will take to cross a street, determining gaps within traffic, learning safe and predictable pedestrian and bicycle behavior, dismounting vehicles in heavy traffic, and how to pick the safest routes of travel.

The kindergarten through second grade curriculum is relatively inexpensive to implement. The program has been successfully piloted in several states, and is currently undergoing final revisions. The curriculum will be available for distribution in the fall of 1992. Mr. Burden has estimated that the curriculum package, including video and a curriculum guide for K-2, will cost @ \$50.00 per set.

Mr. Dan Burden, Bicycle Coordinator
Florida DOT Bicycle and Pedestrian Program
(904) 487-1200

We recommend that bicycle safety educational materials be provided to parents beginning in the first grade, as some children will begin learning to ride a bicycle at this age. Several excellent brochures can be obtained free-of-charge from the NCDOT Bicycle Program. These materials include: "Bicycle Safety: What Every Parent Should Know", and "Do Your Kids Need Bicycle Helmets?" These brochures will enable parents to

attain the "right frame of mind" as their children begin to learn to ride bicycles.

The NCDOT Bicycle Program has developed an excellent bicycle educational series for first and second graders that follows the story of Namron, an alien who learns to bicycle from young earthlings. These materials are colorful and humorous, and include a 36-page story/coloring book and 5 colorful connect the dot worksheets with bicycle safety tips (see examples at the end of this chapter). These materials can be utilized in the first and second grade curriculum where appropriate. To obtain copies of materials, contact Ms. Mary Meletiou with the NCDOT Bicycle Program. Ms. Meletiou has indicated that a maximum of 250 to 500 copies of brochures can be ordered, however, the Bicycle Program is willing to work with the public schools to determine other ways to obtain copies.

We have reviewed additional safety educational materials for children in these age-groups, and have determined that several could serve as adequate supplements to the K-2 Traffic Safety Curriculum. This list includes an informational brochure for parents produced by the National Safe Kids Campaign. "How to Protect Your Child From Injury" is a 15-page injury prevention booklet that covers a variety of safety issues including traffic and bicycle safety. This brochure could serve as "take-home" items, if funds permit. For a quantity of 600 booklets, the price is \$114.00.

Order forms from bicycle education publishers can be found in Appendix G.

Basics of Bicycling: **Fourth and Fifth Grade**

The NCDOT Bicycle Program has developed a highly successful bicycle education program for fourth and fifth grade students call the Basics of Bicycling program. This program has become popular with bicycle educators throughout the United States as comprehensive and easy to implement. This curriculum, including an instruction manual and videotape, and is free to all North Carolina school teachers. The program was recently piloted in Alamance County Schools. Contact Mr. Alec French, Health Educator for Alamance County Schools (919) 226-8465 for an overview of the success of the program. Several other school

districts are preparing to implement the program, which has gained a reputation as one of the best bicycle education curriculums in the country.

The curriculum requires seven 40-minute class periods consisting of two lessons in the classroom and 4 lessons on bikes (usually conducted in the gymnasium or a nearby parking lot). The lessons are most easily taught to groups of 12 to 20 students. The curriculum strongly emphasizes helmet use, and students are taught simple skills, hand signals, riding with other cyclists, and simulated road situations. Often times, the course is conducted during health or physical education classes. Should teachers need assistance with the program, parents, regional bicycle club members, local police officers and park rangers can be contacted (see Community Contacts List in Appendix A).

Since very few children in Durham and Orange Counties ride their bicycles to school, and some children do not own bicycles, it is unrealistic to assume that children can provide bicycles for the lessons. Therefore, the largest obstacle to implementing the Basics of Bicycling program is locating bicycles and helmets for the children to use. (Standard single gear 20-inch BMX bikes are suggested) There are several possibilities for obtaining bicycles and helmets, including:

- Large department stores - places like K-Mart, Wal-Mart, Sears, Toys R Us, etc. can be solicited for donations. When applying for these donations, be sure to mention the large amount of students that will use the bicycles - children that will go home and ask their parents to buy them a bicycle "just like the one they rode in class." This could be a very effective marketing tool for the contributing retailer. Twenty-inch BMX bikes can cost @ \$80.00 apiece. We estimate that it would be reasonable to ask for three to five bikes from each store. We have made one contact with the Wal-Mart in Hillsborough about donating bicycles for the program. The manager has indicated that a written request must be submitted to the following address:

Alan Blakeborough, Store Manager
WALMART
113 Mayo Street
Hillsborough, NC 27278
(919) 732-9172

School systems can share bicycles. Specifically, we suggest that Orange County Schools and Chapel Hill-Carrboro Schools work together to obtain bicycles and helmets, and schedule for sharing them.

- Bicycles may be obtained from the manufacturers directly - solicit bicycles and helmet donations in the same way as you would from department stores. Manufacturers include Huffy, Rand, Nice, Rallyekia, Rallymurry, Murry, Roadmaster, and Trendz (we were unable to locate addresses).
- Ask local civic clubs such as Kiwanis, Optimist, Jaycees, etc. if they could conduct a fund-raising effort to help pay for bicycles and/or helmets. The names and phone numbers of local civic leaders can be found in Community Contacts List in the appendix of this report.
- Contact local police departments to find out if they have any lost or unclaimed bicycles that they could donate. (see Community Contacts List in appendix)
- Contact local bicycle shops and bicycle clubs to solicit donations of bicycles and helmets, discounted prices on bicycles and helmets, or free repair services for bicycles already obtained that need servicing (see Community Contacts List).

Bicycle storage is another issue in implementing this program. We recommend that the school system work with the local Parks and Recreation Department and other municipal agencies to locate places to store the bicycles. An old bus with all the seats removed can be used to transport the bicycles from school to school - this has proved to be an effective method of transporting bicycles in Alamance County.

The North Carolina Cooperative Extension Service has developed a work book for students that can be used in conjunction with the Basics of Bicycling program. Bicycle Whiz'ardry is a 30-page book with short exercises that include true/false tests, unscramble words, mix and match games, fill-in-the-blanks, and map-making games. These exercises focus on how to choose a bicycle, bicycle maintenance, defining different bi-

cycle types, and identifying hazards. Mr. Ed Maxa, Director of the Cooperative Extension Service has indicated that copies of the workbook can be obtained in mass quantity for the cost of printing them.

Ed Maxa, Director
Cooperative Extension Service
4-H Youth Development
Box 7606
North Carolina State University
Raleigh, North Carolina 27695-7606
(919) 515-3242

One way of culminating a bicycle education program is to conduct a year-end bicycle rodeo. This can be held after school, or on a Saturday, in a large parking lot near the school. We recommend that local bicycle enthusiasts, parents, the Police Department, and the Parks and Recreation Department be asked to help with rodeo, as these events require many adult supervisors. Bicycle rodeos have been implemented in both Durham and Orange Counties in the past. Organizing a rodeo may simply be a matter of "joining forces" with another agency (see agency descriptions in Section 1).

BikeCentennial's Guide to Bicycle Rodeos is an excellent handbook that can be obtained for free from the NCDOT Bicycle Program. This guide explains the planning and implementation of bicycle rodeos in detail. Eight skills courses (stations) are suggested, each focuses on teaching the cyclist to avoid major causes of accidents. Bicycle rodeos require materials - Rodeo Kits can be purchased from Outdoor Empire Publishing, if need be, or materials can be obtained through donations.

Middle School/High School Bicycle Education

Bicycle education in the upper grades is practically non-existent in the United States. Generally speaking, teenagers are not as interested in bicycling. They are much more interested in learning to drive cars than riding their bicycles. (As previously mentioned, these new drivers will be educated to share the road with cyclists through the new Driver's Education curriculum.) However, we believe there is an opportunity to develop a bicycle education program in middle schools and high schools.

Bicycle education can be a popular component of high school PE courses, if given a "Euro-sport" flair. Older students are usually quite interested in competitive and endurance sports, and bicycling most definitely fits into this category. Safety education can make up a significant portion of this type of training.

We also recommend that teachers be provided with modern, up-to-date bicycle safety videos. One excellent film has been produced by the Los Angeles Police Department called "Be Safe on Your Bike" (most appropriate for middle school-ages). This video is available for a \$50.00 donation from the LAPD. (The NCDOT Bicycle Program has a copy in the video library for loan, also.)

Mr. Forest Wilkins
Los Angeles Police Department
(213) 485-7782

The problem lies in the lack of available curriculums for this age group. The Florida DOT Bicycle Program has plans to develop a curriculum in future years, and has been attempting to implement Effective Cycling in ninth grade classes in the interim, with limited success.

We recommend that middle school and high school bicycle training courses be implemented much in the same way as adult cycling education in this region. Local bicycling enthusiasts can lead short training courses in PE classes, and cover such topics as professional racing, mountain biking skills, and bicycle touring. Bicycle safety skills should be constantly interwoven into these lessons. The NCDOT Bicycle Program's Streetwise Cycling can be used to teach this course until the new adult education curriculum is produced in 1995. The State 4-H office has developed a Cycle Carolina manual for 12-14 year olds that focuses on cycle touring. This could serve as a supplemental resource for bicycle education in middle schools.

Section 4:

Bicycle Ordinances in Durham and Orange Counties

As cycling has become increasingly popular in the United States, many state and local jurisdictions have begun to re-evaluate law enforcement policies regarding bicyclists. Within this region, both Chapel Hill and Carrboro have revised traffic codes to more adequately address cycling issues. With new rules have come new policies for enforcing rules. In downtown Chapel Hill, bicycle patrol officers first issue warning citations to cyclists who violate traffic laws, and issue tickets to repeat offenders.

However, most police officers do not feel comfortable ticketing a cyclist. Officers feel that issuing tickets to cyclists (especially children) causes problems with public relations. The passing public may wonder why the officer has "nothing better to do." Indeed, many police officers have limited time for law-breaking cyclists due to a crime rate that has skyrocketed in recent years. Additionally, ticketing can be difficult because some cyclists do not carry proper identification when riding.

However, more cyclists have begun to share the roadways in recent years, and the majority of these cyclists are adults. With the arrival of new on-road bicycle facilities (wider roads and striped bikelanes), bicycling will become an even more popular mode of transportation and recreation in the Triangle region. As traffic situations become more complex, it will be vitally important that both cyclists and motorists abide by the rules of the road. The time has come to develop an enforcement agenda for this region.

The first step in developing a bicycle enforcement program is to adopt ordinances that clearly define the responsibilities of cyclists and the relationship of cyclists to other vehicles. Before embarking upon this task, we have provided a list of all ordinances that could be found and that apply to bicycling in North Carolina, as well as within the local jurisdictions of Durham and Orange counties.

Existing State Bicycle Ordinances

North Carolina State Statutes

- Defines the bicycle as a non-motor vehicle subject to the same traffic laws as motorized vehicles.
- Requires lights and reflectors for night time use.

North Carolina Bike and Bikeway Act of 1974:

- Defines bicycle and bikeway.
- Establishes intent to develop a statewide bikeways program, and develop bike facilities.
- Establishes the North Carolina Department of Transportation Bike Program.

Existing Orange Co. Bicycle Ordinances

Chapel Hill Traffic Code - Articles 5 and 21

- Section 5.6: Authorizes the town to develop and adopt regulations for the use of bicycles within town limits. Authorizes the establishment of bikeways.
- Section 21-3: It is unlawful for anyone to ride bicycles, roller skates and scooters on certain sidewalks (the sidewalks are defined). Penalty of \$5.00.

Chapel Hill Traffic Code - Articles 6: Bicycles

- Section 21-41: Defines bicycle, bikeway, bike lanes, bike trails, and moped.
- Section 21-42: Designates bike paths, requires placement of appropriate signs and lane striping.
- Section 21-43: Addresses shared use of facilities, including situations in which pedestrians use bikeways, cyclists use sidewalks, cyclists on roadways, and riding single file in all instances.
- Section 21-45: Declares that cyclists shall be granted the rights and be subject to the rules that apply to vehicle drivers.
- Section 21-46: Cyclists must obey traffic control signs and devices.

- Section 21-47: Cyclists entering a bikeway or a roadway must yield to all other cyclists, pedestrians, and vehicles.
- Section 21-49: Designates bikeways with two-directional travel.
- Section 21-50: Defines right-of-way at intersections - bicycles using bike lanes and paths have the right-of-way over vehicles making turns.
- Section 21-51: A person walking a bike is subject to the same rules applicable to pedestrians.
- Section 21-52: Motorized vehicles are not allowed on bikeways except at street intersections or to enter driveways. Vehicles must yield to cyclists before crossing bikeway.
- Section 21-53: When used at night, bicycles must be equipped with a light on the front and a reflex mirror or red lamp on the back.
- Section 21-53.1: States that bicyclists fifteen years or younger must wear a helmet. Bike passengers under four years of age must ride in safe seats. All bike passengers (regardless of age) must wear helmets. Violators are fined a civic penalty of \$10.00.
- Section 21-54: Statement of intent to develop a program by which cyclists can be educated and all bicycles inspected and registered.
- Section 21-55: Bicycles must be registered with the town and at all times bear a registration decal.
- Section 21-56: All bicycles temporarily operated in the town must also be registered.
- Section 22-56: Transfer of ownership of bicycles must be reported and new registration be obtained within thirty days.
- Section 21-58: Registration is valid for two years, unless the decal becomes illegible, in which case the owner must apply for a new decal.
- Section 21-60: Any person who has not registered their bicycle shall be given a 7-day warning. If the bicycle is not registered within 7 days, the owner shall be subject to penalties.
- Section 21-61: Penalty for violators of Section 21-55, 21-57, or 21-58 is \$10.00.
- Section 21-62: Mopeds are prohibited on sidewalks, bike paths, and bike trails. Penalty of \$5.00.

UNC-Chapel Hill : Traffic Ordinances

- Article I, Section 1-1: Defines "bicycle."

- Article III, Section 3-20: Declares that bicycles parked illegally shall be impounded. Bicycles shall not park in any University building, against or attached to any tree, plant or foliage, against or attached to any lamp post, sign post, railing, public seating, or emergency safety device.
- Article V, Section 5-3: It is unlawful to operate a bicycle on campus in a manner that jeopardizes pedestrian safety, or state or private property.
- Article V, Section 5-4.3: It is unlawful to operate a bicycles on campus pedestrian walkways at a speed that would prove hazardous for the safety of pedestrians. Bicycles must have a warning device to alert pedestrians of their approach.
- Article VI, Section 6-9: University has the right to impound any bicycle considered abandoned. (Bicycles that remain stored for more than thirty days at the end of the academic term will be considered abandoned)
- Article VI, Section 6-10: Letters shall be sent to bicycle owners when vehicles have been impounded - bicycles unclaimed ninety days after the impoundment shall be University property.

Town of Carrboro: Traffic codes

Additions to the traffic code regarding bicycles have been proposed, and are subject to public hearing.

Town of Hillsborough

No ordinances related to bicycling are known to exist at the present time.

Existing Durham Co. Bicycle Ordinances

Durham City Code Book Article 5 :

Bicycles, Toy Vehicles

- Section 20-170: Bicycles must have lights and reflectors for night time use. (Refers to State Statute defining bicycles)
- Section 20-171: Speed limits for bicyclists: 10 mph within fire limits and 15 mph outside fire limits.
- Section 20-172: It is unlawful for cyclists to ride on sidewalks.
- Section 20-173: Cyclists or passengers shall not ride on the handlebar, frame or tank of the bicycle.

- Section 20-174: Bicyclists shall not cling to any moving vehicle upon a roadway.

Duke University

Voluntary bicycle registration program. New booklet entitled The User's Guide to Bicycling at Duke explains bicycle safety tips for University students, and outlines traffic areas on campus that are often congested. Acceptable parking areas are also designated. The manual does not declare the bicycle policies to be "rules," nor does it impose fines for non-compliance. There are no current plans to enforce bicycle rules.

A Model Bicycle Ordinance

As in all 50 states, the bicycle is considered to be a vehicle in North Carolina and is subject to the same laws as motorized vehicles. Obviously, the bicycle is a unique type of vehicle. The most effective bicycle ordinances distinguish between the bicycle and motorized modes of transportation, and clarify the manner in which cyclists shall lawfully share the roadways. This is important, as confusing traffic codes may represent a liability to the responsible jurisdiction.

With the variety of new bicycle facilities that are being constructed, completely new traffic scenarios have been created within our cities - situations that have never before existed. For example, what rules shall apply to cyclists and motorists at intersections which include bicycle lanes? What are the rules affecting cyclists who must merge with traffic when a bike lane ends? Who has the right-of-way on bike paths that parallel roadways?

Several jurisdictions within the region have inadequate bicycle ordinances. In Durham and Hillsborough specifically, traffic regulations are insufficient to promote the safe and expeditious flow of bicycles and motor vehicle traffic. We recommend that these jurisdictions adopt new bicycle ordinances that clarify the rules of the road as they apply to cyclists and motorists.

The Town of Chapel Hill's traffic code provides a good foundation to build a complete bicycling ordinance. From bicycle laws we have assimilated from across the United States, we have found several key ordinances that we feel provide addi-

tional clarification of how cyclists must conduct themselves on public roadways. Please be advised that this by no means represents a complete model bicycle ordinance, but rather, some important additions to Chapel Hill's existing ordinance. Local government staff can conduct further research to develop necessary legal language for these ordinances.

Clarifications of special traffic situations pertaining to bicycles:

- Bicycles, the same as all slow moving vehicles, must be as far to the right of the road as is practicable and safe. Bicyclists may move away from the right side of the road to pass other vehicles, to avoid parked cars, debris, and other obstacles, to make left hand turns, and to allow only safe overtaking by other vehicles (see model law for bicyclist position on the highway on the following page, also the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances: Section 11-1205).
- A signal of intention to turn right or left when required shall be given continuously during not less than the last 100 feet traveled by the bicycle before turning, and shall be given while the bicycle is stopped waiting to turn. A signal by hand and arm need not be given continuously if the hand is needed in the control or operation of the bicycle. (UVC, 11-1208)
- A) Whenever a bicycle lane has been established on a roadway, any person operating a bicycle upon the roadway at a speed less than the normal speed of traffic moving in the same direction shall ride within the bicycle lane, except that such person may move out of the lane under any of the following situations:
 1. When overtaking and passing another bicycle, vehicle, or pedestrian within the lane or about to enter the lane if such overtaking and passing cannot be done safely within the lane.
 2. When preparing for a left turn at an intersection or into a private road or driveway.
 3. When reasonably necessary to leave the bicycle lane to avoid debris or other hazardous conditions.

**MODEL LAW FOR BICYCLIST POSITION
ON THE HIGHWAY**

§ 1 - Bicyclist position on roadway

(a) A person driving a bicycle shall comply with state law comparable to UVC § 11-301 requiring all drivers to be on the right half of the roadway and shall not drive on the left facing traffic coming from the opposite direction except when authorized by that law.

(b) Except as provided in subsection (c), any person driving a bicycle upon a roadway at less than the normal speed of traffic at the time and place and under the conditions then existing shall travel as closely as practicable to the right-hand curb or edge of the roadway, or as closely as practicable to either curb or edge of the roadway when on a one-way street.

(c) Any person driving a bicycle may move away from the positions described in subsection (b) as necessary under any of the following situations:

(1) When overtaking and passing another bicycle or (other) vehicle.

(2) When preparing for a turn.

(3) When reasonably necessary to avoid conditions including, but not limited to, fixed or moving objects, parked or moving vehicles, vehicle doors that are or may open, bicycles, pedestrians, animals, surface hazards, or substandard width lanes, that make it unsafe to remain near the curb or edge of the roadway. For purposes of this section, a "substandard width lane" is a lane that is too narrow for a bicycle and an overtaking vehicle to travel safely side by side within the lane.

(4) When necessary to comply with lane use restrictions.

§ 2 - Bicyclist on shoulders

(a) A person driving a bicycle may travel on any shoulder except as provided in subsection (d).

(b) A person driving a bicycle (on a controlled-access highway) (or a highway with a speed limit in excess of 35 miles per hour) shall travel on the shoulder when the shoulder is:

Model Law for Bicyclist Position on the Highway

National Highway Traffic Safety Administration
Report on Model Regulations (1981)

B) No person operating a bicycle shall leave a bicycle lane until the movement can be made with reasonable safety and then only after giving an appropriate signal in the event that any vehicle may be affected by the movement (California Vehicle Code, 21208).

11-313, 11-1202, 11-1205, 11-1205.1, 11-1209, 11-1210 of the Uniform Vehicle Code should be reviewed. Also see the Model Traffic Ordinance's Model Bicycle Registration Ordinance (1987).

- Bicyclists must ride single file on the roadway if motor vehicle traffic is approaching within 300 feet from the rear or if sight distance is limited within 300 feet in front of or behind the cyclist. (Colorado)
- Bicyclists must keep at least one hand on the handlebars at all times. Bicyclists are prohibited from carrying any package, bundle or other article that prevents him/her from keeping both hands on the handlebars. (Maryland)
- Bicyclists are prohibited from conducting or participating in a bicycle racing event on a public highway that has not been approved by State and/or local highway agencies. (Maryland).

Ordinances that clarify traffic laws that cyclists often ignore:

- Bicyclists must move to the right and stop for emergency vehicles. (Maryland)
- Bicyclists must stop for loading and unloading school buses when warning lights are flashing. (Maryland)
- Bicyclists must maintain sufficient spacing behind vehicles for emergency stopping. (Maryland)
- Bicyclists are prohibited from wearing a headset or ear plugs in or covering both ears while riding on a public highway (hearing aid devices are permitted). (Maryland)

Several other resources exist for preparing bicycle-related additions to the traffic code: the Uniform Vehicle Code includes sections on bicycles, as does the Model Traffic Ordinance, both of which are published by the National Committee on Uniform Traffic Laws and Ordinances. In preparing local ordinances, sections 1-158, 11-201,



Section 5:

Recommendations for Bicycle Law Enforcement

Greenways Incorporated has evaluated the current status of bicycle law enforcement in the region, and make the following recommendations:

- 1) In their present form, existing bicycle ordinances are incomplete. We recommend that the local jurisdictions within Durham and Orange counties develop a complete set of bicycle ordinances, as described in the preceding section of this report. The bicycle ordinance should be periodically updated, to reflect revisions of the Uniform Vehicle Code (National Committee on Uniform Traffic Laws and Ordinances).
- 2) We recommend that law enforcement agencies in this region, including local police departments and university public safety offices, begin to enforce bicycle laws. This effort should be based on a positive public relations approach, as outlined below:
 - a. Bicycle law enforcement should be gradually introduced into the community. Officers can make verbal warnings during the initial phase of the program (six months to one year). Officers can use the opportunity provided by a verbal warning to make sure that the cyclist understands the rules of the road.
 - b. After the initial phase, police departments should practice selective enforcement. Officers can target those offenses which are most blatant and dangerous, such as running stop lights, and wrong-way riding. Enforcement of these rules is needed especially in the university areas, where student cyclists are frequent violators.
 - c. We recommend that the local police department develop a citing procedure for cyclists who violate traffic laws. We suggest the following sequence: Verbal warning, warning ticket, full citation (with the

same fine that would be given to a motor vehicle, but with no points).

Note: In several communities across the United States, police officers have developed an innovative method of educating repeating violators of bicycle laws. In lieu of paying a fine for a citation, the violator is given the option of attending a bicycle safety seminar.

- 4) We recommend that local police departments conduct annual registration drives. Bicycle registration is increasingly important, not only as a theft deterrent, but also to record the number of offenses a cyclists may have. Younger cyclists do not have driver's licenses, therefore bicycle registration is an effective way to identify the cyclist. Bicycle registration should be mandatory in each local jurisdiction, and should be coordinated with local university registration programs.

Cranford, New Jersey offers a successful example of a bicycle registration program. Local police departments keep bicycle serial numbers and owner information are kept in readily accessible computer files.
- 5) We recommend that law enforcement agencies designate one "bicycle officer" who can serve as the department's liaison to the local planning department, city council, and other bicycle enforcement agencies within the region. Ideally, this officer would be a cyclist. He/she can serve to answer any questions that community residents or local officials may have about bicycle law enforcement, as well as coordinate the police department's bicycle law enforcement program.
- 6) We recommend that enforcement procedures be made explicit to all police officers through the development of an enforcement manual. We recommend that police departments ob

tain the Bicycle Law Enforcement Manual (1981, produced by the University of North Carolina Highway Safety Research Center) from the NCDOT Bicycle Program to serve as a guide in the development of an enforcement program. This manual provides several examples of bicycle law enforcement manuals from across the United States.

Many accomplishments have been made to develop bicycle education and enforcement programs in Durham and Orange counties. Bicycle education and enforcement are essential components of a comprehensive program. Cyclists must understand the rules before they will abide by them. Bicycle ordinances will not insure the safe and equitable flow of traffic, however, unless they are enforced.

Appendix A:

Community Contacts List



Community Contacts List

Regional Bicycle Plan for Durham and Orange Counties prepared by Greenways Incorporated

Statewide Education and Enforcement Contacts

Ms. Mary Meletiou, Assistant Bicycle Coordinator (919) 733-2804
NCDOT Office of Bicycle and Pedestrian Transportation
P.O. Box 25201
Raleigh, NC 26611-5201

Mr. Alec French, Health Educator 919-226-8465
Alamance County Schools
3158 Hollywood Drive
Burlington, NC 27217

Ms. Donna Scandlin (919) 733-0385
North Carolina DEHNR - Children and Youth Section
P.O. Box 27687
Raleigh, NC 27611-7687

Mr. Mark Fountain, Assistant Director (919) 733-3046
DMV - School Bus and Traffic Safety Section

Ed Maxa, Director (919) 515-3242
Agriculture Extension Service
4-H Youth Development
Box 7606
North Carolina State University
Raleigh, North Carolina 27695-7606

Jane Stutts (919) 962-8717
UNC Highway Safety Research Center

Orange County Education and Enforcement Contacts

James Colavato, Assistant Superintendent 732-8126
Orange County Schools

Linda Howell, Director of Instruction 732-8126
Orange County Schools

Donna Williams, Health Educator 732-6271 ext. 259
Orange County Schools
200 E. King Street
Hillsborough, NC 27278

Debra Kornegy (919) 732-5558
PTA Representative, Orange County Schools
2607 Buckboard Dr.
Hillsborough, NC 27278

Harvey Wensel (919) 732-2531
Transportation Coordinator
Orange County Schools
Box 231 Bus Garage Rd.
Hillsborough, NC 27278

Major Don Truelove (919) 967-9251
Orange County Sheriff's Department ext. 2911
144 East Margaret Lane
Hillsborough, NC 27278

Mary Ann Moore, Director (919) 967-9251
Orange County Department of Recreation and Parks ext. 2664
300 W. Tryon St.
Hillsborough, NC

James Davis 732-2331
Mopaco Motorcycles
Hillsborough, NC

Chapel Hill Education and Enforcement Contacts

Linda Haac, President 967-3626
Chapel Hill-Carrboro PTA Council
103 Kings Mountain Court
Chapel Hill, NC 27516

Susan Spalt, Coordinator of Health 967-8211 ext. 231
Chapel Hill-Carrboro City Schools
Lincoln Center, Merritt Mill Road
Chapel Hill, NC 27516

Stephanie Willis 967-8211 ext. 217
Chapel Hill-Carrboro City Schools
Lincoln Center, Merritt Mill Road
Chapel Hill, NC 27516

Mr. Wayne Pein, Chairman (919) 942-6051
Town of Chapel Hill Bicycle Advisory Committee
144 Hamilton Road
Chapel Hill, NC 27514

Ms. Louise Echols, Health Educator (919) 732-8181
Orange County Health Department ext. 2413
300 W. Tryon Street
Hillsborough, NC 27278

Officer Rex Gibson (919) 968-2760
Bicycle Patrol Officer

Everet Johnson (919) 968-2760
Community Relations Department
Chapel Hill Police Department

Raymond S. Magyar, Transportation Planner (919) 962-1501
Department of Transportation and Parking
University of North Carolina at Chapel Hill

Durham City and County Education and Enforcement Contacts

Karen Hall, Curriculum Coordinator 560-2060
Durham City Schools

Rebecca Hunt, Director of Instruction (919) 560-2076
Durham City Schools

Chief Lynch (919) 688-8886
North Carolina Central University

Dr. Martin Lachen (919) 660-5745
Duke University Bicycling

Ms. Wanda Woods, Health Educator (919) 560-7600
Durham County Health Department
414 E. Main Street
Durham, NC 27701

Sergeant Steve W. Chalmers (919) 560-4317
Community Relations Division
Durham Police Department
314 Mangum Street
Durham, NC 27701

Mr. James Miller (919) 560-0525
Durham County Cooperative Extension Service
4H Program
721 Foster St.
Durham, NC 27701

Mr. Dave Connelly (919) 544-6372
Durham Bicycle Committee
101 Barratt Place
Durham, NC 27713

Elton O'Neil (919) 560-3718
Health and PE Coordinator
Durham County Schools
P.O. Box 3823
Durham, NC 27702

Lt. Wesley Crabtree (919) 560-0857
Durham County Sheriff's Office
P.O. Box 170
Durham, NC 27702

Ms. Martis King, PTA Council President
P.O. Box 15623
Durham, NC 27704

Jim Drennan
PTA Representative, Durham County
2716 Old Sugar Road
Durham, NC 27707

Bicycle Clubs in Durham and Orange Counties

Kathy Trotter, President (919) 548-5747
North Carolina Bicycle Club

Beth Gregory, Bing Brogden (919) 493-0761
Carolina Tarwheels Bicycle Club
P.O. Box 111
Durham, NC 27702

Dale Roenigk (919) 490-5702
Carolina Tarwheels Bicycle Club

Dick Terry (919) 248-5303
Chapel Hill League for Safe Bicycling
633 Kensington Drive
Chapel Hill, NC 27514

Civic Club Contacts in Durham and Orange Counties

David Parker, President 732-6600
Hillsborough Kiwanis

Lewis Pifer 489-3863
Durham Kiwanis

Chris Gussow 493-1449
Durham Kiwanis

Durham Rotary Club:
Warren Pope 489-9251
Jean Turner 688-9361

Chapel Hill Kiwanis:
George Doak 942-4576
Anne Mautsby 929-4904
929-5727

Chapel Hill Rotary Club
Dr. Frick 929-7010

Bicycle Shops in Durham and Orange Counties

Life Cycle Sports
Eric Towne
Hillsborough St. store 493-4816
Woodcroft store 489-7952

Bull City Bikes 688-1164
Gaynor Colleston, owner
900 W. Main St.

Performance, Inc 933-9113
Tom Davis

Four Season's Fitness 929-5114
Evan

Tumbleweeds Cyclery 967-4874
Michael Gleason

Clean Machine 682-6305
Jim Rumpfelt

Bicycle Clubs in the US that have developed education programs:

Cascade Bicycle Club (206) 523-1952
Education Office
444 N.E. Ravenna Blvd., Suite #202
Seattle, Washington 98115

Hawaii Bicycling League (808) 735-5756
P.O. Box 4403
Honolulu, Hawaii

Tri-City Cyclists (517) 892-2100
P.O. Box 2156
Bay City, Michigan 48707

Quad Cities Bicycle Club (319) 355-4395
Box 3575
Davenport, Iowa 52808

Rochester Bicycling Club (716) 671-6732
P.O. Box 10100
Rochester, New York 14610

Cream City Cycle Club (414) 645-8583
P.O. Box 894
Milwaukee, Wisconsin 53201

Bicycle Education Contacts in the United States

Yvonne Morrison, Former Bicycle Instructor (602) 949-1517
Arizona State University (602) 998-2219
8238 East Rancho Vista
Scottsdale, AZ 85251

Susan Jones, Education Director (301) 539-3399
League of American Wheelmen
190 W. Osten Street, Suite 120
Baltimore, MD 21230

Mr. Forest Wilkins (213) 485-7782
Los Angeles Police Department



Appendix B:

*List of Educational Resources
Available from the NCDOT Bicycle Program*



North Carolina Department of Transportation Bicycle Program

BICYCLE SAFETY EDUCATION MATERIALS

The North Carolina Department of Transportation Bicycle Program can provide a variety of tools for your use in developing and conducting bicycle safety programs. Below is a list and brief description of the items which are available. All materials can be obtained, free of charge to North Carolina residents, by completing the enclosed order form or by calling (919) 733-2804 during regular business hours. If you are unsure of which items might be appropriate for your program, we can provide a sample packet of materials for your review. For large orders, please allow a minimum of three weeks for delivery.

FILM AND VIDEO LIBRARY - films and video cassettes on a variety of bicycle safety topics for riders of all ages, including adults. List which includes dates of production, length of film or video and intended audience is available.

PAMPHLETS AND HANDOUTS - available in multiple copies. (maximum of 500 of each item, except as otherwise noted)

- Bicycle Safety: What Every Parent Should Know** - points out erroneous concepts many parents have about how to bike safely. Outlines accident types common to younger riders and offers instructions for avoiding these hazardous situations.
- Do Your Kids Need a Bicycle Helmet?** - informative pamphlet encouraging parents to buy helmets for their children.
- Namron Learns the Rules of the Road** - for grades K-3. Coloring book/reader highlighting basic bicycle safety concepts. Quantities limited to 30 per request. For larger groups, use booklet as reader and worksheets listed below as supplementary handouts.
- Namron Says Be Safe on Your Bike** - Worksheets for grades K-3. Connect-the-dots and fill-in-the-blank worksheets covering helmet use, stop signs, watching for cars, signaling turns, and keeping both hands on the handlebars while riding.
- Roscoe's Bicycle Maintenance Tips** - for grades K-3. Outlines basic procedures for keeping a bicycle in good condition.
- Roscoe's Rules of the Road** - for grades K-3. Provides concise list of bicycle safety rules children should know.
- Sprocketman Talks Road Sense** - for grades 5 to 9. Promotes concept that "bicycles are vehicles" and should be ridden responsibly.
- Bicyclists' Rights and Responsibilities** - for grades 4 to adult. Outlines North Carolina vehicle laws which apply to the operation of a bicycle.
- Why Knock Yourself Out On Your Bicycle** - Eye-catching pamphlet for children, grades 4 to 9, encouraging them to wear a bicycle helmet.
- Bicycle Maintenance Checklist** - for grades 4 and up. Outlines procedures for testing bicycle parts for wear or improper adjustment.
- Bicycle Quick Check** - for grades 4 to adult. Outlines procedure for checking your bike for problems before each ride.
- Bicycle Inspection Form** - checklist of parts with place to note problems. Bicycle inspection is suggested as element of all bicycle rodeos.
- Certificate of Achievement** - to be awarded upon the successful completion of a Bicycle Rodeo course.

A Concise History of Bicycling -for grades 5 to adult. Traces the development of the bicycle from its earliest appearance around 1770. Industrial and social impacts of the bicycle are also outlined.

Keep Your Head In a Safe Place-Wear a Helmet - pamphlet for high school and adult cyclists stressing the need to wear a bicycle helmet.

Be Seen at Night - for high school and adult cyclists highlighting risks of biking at night and encouraging use of lights and reflective clothing to enhance visibility.

"Now You See Them..." - pamphlet for motorists explaining bicyclists rights and responsibilities on the road. Encourages cooperation and "sharing the road."

TESTS - available in multiple copies. (maximum of 500 of each)

What Do You Know About Bicycling? for grades 4 and up. Tests student's knowledge of basic bicycle rules and safe riding technique. Accompanying answer sheet thoroughly explains correct answers.

Find the 12 Hazards - for grades 4 and up. Cartoon illustration shows twelve accidents waiting to happen". Correct answers on back.

Parts of the Bicycle - for grades 4 and up. Tests students knowledge of basic bicycle parts. Correct answers on back.

MANUALS/GUIDEBOOKS /INFORMATION SHEETS - comprehensive information on a variety of topics, for use by instructors and event organizers. Maximum of three copies of each, except as noted.

Bicycle Events: A Community Guide - 32 page booklet outlining suggested bicycle events and promotions. Includes information on how to mobilize community resources and how to work with the media.

A Guide to Bicycle Rodeos - complete guidelines on planning and executing a community bicycle rodeo.

North Carolina Bicycle Helmet Campaign Guide - comprehensive manual on how to conduct local awareness campaign to increase bicycle helmet use. Includes case studies, sample budgets and references and contacts

The Basics of Bicycling - curriculum package complete with video component (instructor's module and student modules) for teaching bicycle safety to 4th and 5th grade students. Seven lesson format includes two in-class lessons and five on-bike lessons conducted in a simulated traffic environment. Complete teacher's manual with lesson plans and background information. **Loan only.**

Bicycle Law Enforcement Manual - tool for use by law enforcement agencies. Outlines need for enforcement programs, model programs, program elements, role of the bicycle officer and resources available for implementation.

Streetwise Cycling: A Guide to Safe Bicycling In North Carolina - informative 31 page booklet outlining laws which apply to bicycling, how to keep safe when riding in traffic, basic and advanced riding skills, how to deal with dogs, etc.

Conducting a Bicycle Repair Clinic - instructions on how to set up, staff, and implement a local bicycle repair clinic.

Organizing a Bicycle Field Trip for Children - instructions for taking a group of children on a long bicycle outing.

POSTERS - available in limited quantities for use as display items in classrooms, at bicycle events, etc.
(maximum of 25 each)

Share the Road - 18" x 24" four-color poster highlighting the need for bicyclists and motorists to share the road.

Namron Says Be Safe on Your Bike! - for grades K-3. 11" x 17" 2-color poster listing twelve important rules for keeping safe on your bike. Features coloring book characters (see listing on first page).

The Well Equipped Night-time Cyclist - 11" x 17" two-color poster provides tips on being seen at night.

Ride With Traffic - 11" x 17" two-color poster urging cyclists to ride on the right-hand side of the road, in the same direction as other traffic.

Wrong Way is the Wrong Way - 11" x 17" two-color poster stressing that bicyclists should ride with traffic.

Keep Your Head In a Safe Place - Wear a Helmet - 11" x 17" two-color poster for high school and adult bicyclists, stressing the need to wear a bicycle helmet.

Protection: You're Not Born With It - 17" x 27" two color poster promoting helmet use to parents and children.

Frankenstein Helmet Poster - 11" x 17" two-color poster for kids grades 4 and up. Features cartoon of Frankenstein monster, the "Noted Brain Expert", advising kids to "Keep your brains where they belong — in your head. Get a bicycle helmet today."

History of Bicycle Transportation - 11" x 17" two-color poster for grades 5 and up. Traces the development of the bicycle from its earliest appearance around 1770. Industrial and social impacts of the bicycle are also outlined.

Bicycle Rodeo - colorful 11" x 17" poster for use in announcing local bicycle rodeos. Provides space for date, time, place, etc. of event.

MISCELLANEOUS ITEMS

North Carolina Bicycle Accident Facts - Cites data from recent studies documenting the need to increase bicycle helmet use. (maximum of 250)

Sources of Low-Cost Bicycle Helmets - List of bicycle manufacturers who offer special discounts on helmets. Describes type of promotion, cost of helmet and provides name and phone number of contact person. Lists both bicycle shop based promotions and direct bulk purchase programs. (maximum of 10)

Sample Newsletter Article, "Studies Prove Bicycle Helmet Effectiveness" - Highlights findings of studies which show that use of helmets can reduce the risk of head injury by 85% and fatality by 75%. (maximum of 3)

Bicycle Helmet Hang Tags - Point-of-purchase promotional piece which states, "This Bike is Missing One Part - A Helmet". For use on floor model bicycles at all local bicycle retail outlets. (maximum of 300)

North Carolina Bicycle Shops - complete listing of all bicycle shops in the state. Personnel sometimes available to assist in local safety efforts.

North Carolina Bicycle Clubs and Organizations - listing of all local bicycle groups as well as state organizations. Members sometimes available to assist in local safety efforts.



North Carolina Bicycle Program Film Library

The Bicycle Program has an extensive library of films and video cassettes dealing with a variety of bicycle safety topics for bicyclists of all ages. These visual aids are available on loan, free of charge, to individuals and organizations in North Carolina. Films and video cassettes should be reserved in advance and must be returned within one week after use. All films returned via US Mail or UPS should be insured for \$400.00 apiece; videos for \$100.00. Borrowers are responsible for replacing lost or stolen films or video cassettes.

To obtain a film or video cassette, contact: The Bicycle Program, P. O. Box 25201, Raleigh, NC, 27611, (919) 733-2804. Visual aids will be mailed or you may pick them up during regular business hours. The Bicycle Program offices are located in downtown Raleigh, in the Highway Building, at the corner of Wilmington and Morgan Streets, Room 422. A reservation form is included for your use.

Films

Bicycle Safety	1986	14 mins.
Grades 5-8		

Three messages are stressed in this film – obeying traffic laws, maintaining control of the bicycle and riding defensively. Instruction in performing a pre-ride safety check, rules of the road, hazard recognition and safe riding techniques are highlighted. Slow-motion sequences which show unsafe bicycling practices are especially effective.

Bicycle Safety: Stop, Search, and Assess	1981	15 mins.
Upper Elementary through Adult		

The most common types of accidents occurring among elementary age through adult cyclists are outlined in this film. Errors which can cause these accidents and pointers on preventing them are discussed. The need to learn to scan the road ahead and to anticipate problems is also stressed.

Bicycles are Beautiful	1977	27 mins.
Grades 3-7		

Narrated by Bill Cosby, this film teaches that accidents can be prevented by learning to recognize hazards. The film presents an amusing history of bicycles and features a bicycle safety quiz. Correct answers are given after each section of questions. At the end, the viewer is asked to total up his or her score to find out how much they really know about bicycle safety.

Bicycling Safety On the Road	1980	25 mins.
High School to Adult		

This instructional film focuses on the cyclist as the operator of a vehicle, with the same rights and responsibilities as the operator of any other vehicle. The film shows the cyclist how to become a predictable part of the normal traffic flow. The development of good riding skills is stressed. Techniques for anticipating motorist errors, performing basic traffic maneuvers, approaching intersections, riding safely with cars and riding in a group are demonstrated.

Cycling: Under Your Own Power	1982	18 mins.
Jr. High to Adult		

Produced by the Columbus (OH) Council of American Youth Hostels, this inspirational film captures the essence of almost everything that can be done on a bicycle – touring, racing, commuting, shopping, camping, club and family cycling. Individual riders discuss why they like to bicycle and how they integrate riding into their varying life styles.

Everything About Bicycles
Grades 4-7

1976

15 mins.

A cartoon character who travels to prehistoric times when the wheel was first invented. Traces the development of the bicycle to the present day in this film. Amusing sequences are used to illustrate basic bicycle safety concepts.

It's Your Move
Grades 5-9

late 1970's

10 mins.

In this film, ten common potential bicycle-motor vehicle accident situations are simulated. Viewers are asked to choose one of three courses of action to take to avoid an accident. The "correct" choice is then explained. Accident avoidance techniques such as the panic stop, emergency turn and rock dodge are demonstrated.

Only One Road
High School to Adult

1980

26 mins.

Produced by AAA Foundation, this film stresses that greater understanding and cooperation are needed between bicyclists and motorists to safely share the roadway. Six case studies illustrate what bicyclists and motorists can do to make the bike-car traffic mix less hazardous.

On the Right Side
Jr. High to Adult

1980

16 mins.

Locally written and produced for the Greensboro Department of Traffic and Transportation, this film features Greensboro bicyclists demonstrating proper bicycling techniques. Five basic concepts for sharing the road safety with other vehicles are thoroughly explained. These include: ride on the right, be seen, be predictable, be alert and skillful.

Otto the Auto Bicycle Safety Series
Grades K-2

1981

4 mins. ea.

Three animated films, each covering one key topic, instruct children in those bicycle safety concepts most important for reducing accidents in this age group.

Bicycle Border Patrol: Otto teaches children on bicycles to avoid darting out into traffic by observing "borders" along sidewalks, driveways, alleys and streets to help them remember to ride only where it is safe.

Dream Bike: Otto instructs a young girl on how to properly choose a bicycle. Otto shows her how to see if the bike fits and what equipment she must check to make sure that she can safely ride the bike.

Bikes Go With the Flow: Riding on the wrong side of the road is a serious mistake made by young children on bikes. Otto, by use of a catchy song, "Go with the Flow", shows youngsters how to ride with traffic and tells them why they should ride on the right-hand side of the street.

Ride On By
Adult

undated

13 mins.

This film was produced for law enforcement agencies and community groups to demonstrate the importance of enforcing traffic laws for bicyclists. It shows scenes of accidents that could have been avoided if police had stopped young, law-breaking cyclists and explained to them the dangers of wrong-way riding, ignoring stop signs, etc. It makes the point that enforcement of bicycle laws is not harassment of cyclists but can save lives and reduce accidents.

Videos

"Heads You Win" 1990 10 mins.
Adults

Produced by the Pitt County Bicycle Helmet Promotion Project for use with adult groups such as PTA's, service clubs, community groups, etc. Provides information on bicycle accident trends, how helmets reduce injury severity, why parents should buy helmets for their children, helmet types, helmet standards, helmet fit, etc. Also available in slide/tape format.

I'm No Fool with a Bike 1988 15 mins.
Grades K-4

Features Disney characters Jiminy Cricket, Pinocchio and Gepetto. Live action sequences cover topics which include bicycle fit, use of helmets, riding on the sidewalk, riding in traffic, rules of the road and scanning for hazards.

Otto the Auto Bicycle Safety Series 1981 4 mins. ea.
Grades K-2

Three animated videos each covering one key topic, instruct children in those bicycle safety concepts most important for reducing accidents in this age group.

Bicycle Border Patrol: Otto teaches children on bicycles to avoid darting out into traffic by observing "borders" along sidewalks, driveways, alleys and streets to help them remember to ride only where it is safe.

Dream Bike: Otto instructs a young girl on how to properly choose a bicycle. Otto shows her how to see if the bike fits and what equipment she must check to make sure that she can safely ride the bike.

Bikes Go With the Flow: Riding on the wrong side of the road is a serious mistake made by young children on bikes. Otto, by use of a catchy song, "Go with the Flow", shows youngsters how to ride with traffic and tells them why they should ride on the right-hand side of the street.

Bicycle Safety Camp 1989 25 mins.
Grades 4 & 5

Sam Sprocket teaches kids all the important bicycle safety rules in a lively rap music format. Helmet use, signaling turns, looking both ways before entering the road, obeying traffic signs and signals, concentrating on what is ahead and much more is covered.

Be Safe on Your Bike 1988 13 mins.
Grades 6-9

Members of the US Cycling Team show how bicycling can be a thrilling, enjoyable yet safe experience. This video emphasizes helmet use, safe riding skills, and riding safely on the road. Upbeat and fast-moving.

Bicycle Repair 1985 60 mins
Jr. High to Adult

Complete step-by-step instruction on basic bicycle repair. Reviews bicycle parts, common road repairs and more extensive home repairs. Features Tom Cuthbertson, author of a popular bicycle repair manual. Can be shown as series.

Bicycle Tripping
Jr. High to Adult

1985

80 mins.

Covers everything you need to know to plan for all types of bicycle travel - errands, commuting, day-trips, and touring. Includes information on types of bicycles, transporting bikes, preparing for a ride, safety tips and on-road repairs. Features well-known author Tom Cuthbertson. Can be shown as series.

The Complete Cyclist
Jr. High to Adult

1987

75 mins.

Narrated by Olympic gold and bronze medalists Connie Carpenter Phinney and Davis Phinney. Covers the essentials of bicycling including: selection, positioning and fit, technique, types of riding, repair and maintenance, clothing, nutrition, and exercise and training.

Guide to Bicycle Touring
Adult

1985

80 mins.

Complete information on bicycle touring by author Dennis Coello. Offers in-depth instruction on bicycle selection and fit, trip planning and preparation, mechanical problems and roadside repairs and bicycle safety.

Additional bicycle safety films and videos are available from the Division of Motor Vehicles. To order, contact: School Bus and Traffic Safety Section, P. O. Box 25201, Raleigh, NC 27611, (919) 733-3046.

Appendix C:

*Sample Copy of
NC DEHNR Grant Application*



FUNDING FOR PREVENTION MINIPROJECTS

The Office for Prevention, Children and Youth Section, Division of Maternal and Child Health announces the availability of funds for miniprojects for prevention of disabilities. Public and private nonprofit agencies and organizations are eligible to apply. Project duration is 12 months (July 1, 1992 - June 30, 1993). Applications may be submitted for either of the following miniproject categories:

I. Prevention of Disabilities

The purpose of this initiative is to promote community planning and implementation for the prevention of spinal cord injuries, head injuries, secondary disabilities, or developmental disabilities. Proposals for locally-designed projects are being sought. Projects may include, but are not limited to: innovative community interventions; public, professional, or targeted consumer education; community training initiatives; or materials development, procurement or dissemination. Projects addressing prevention of developmental disabilities may focus on preconceptional issues, prenatal influences on development, or early childhood experiences. Projects designed to prevent parental substance abuse and/or child abuse and neglect are encouraged. A suggested reference is A Healthy Start: A Plan for the Prevention of Disabilities, available free from the Office for Prevention, (919) 733-0385. It is anticipated that eight to ten projects will be awarded funding for amounts of \$4,000 to \$7,000.

II. Community Bicycle Helmet Promotion

Three awards of up to \$4,000 will be made to proposals for intervention programs designed to increase bicycle helmet usage. A suggested reference is The North Carolina Bicycle Helmet Campaign Guide, available free from the North Carolina Department of Transportation Bicycle Program, (919) 733-2804.

The Review Committee will consider the following criteria when evaluating proposals:

- documentation of community need;
- probability of success;
- evidence of interagency cooperation;
- appropriateness of evaluation plan;
- creativity;
- potential for replication;
- cost-effective features and/or efficient service delivery; and
- development of plan for continuation of funding, when applicable.

Salary, rent, and major equipment purchases are **not** priorities for funding.

Proposals must be postmarked by **February 28, 1992**. Awards will be made no later than April 20, 1992. Six copies of proposals should be addressed to:

Luanne Gardner
Office for Prevention
Division of Maternal and Child
P.O. Box 27687
Raleigh, NC 27611-7687
(919) 733-0385

GUIDE FOR PREVENTION MINIPROJECT PROPOSALS

Please address the following sections in your proposal. The proposal is not to exceed four pages and must be submitted with the enclosed "Prevention Miniproject Applicant Information" form. Letters of support are encouraged but must be attached to the proposal when submitted.

I. Project Description and Plan

Describe the purpose and goals, target population, and counties served by the project. Include documentation of community need and the extent of interagency cooperation in the project. Develop a time-framed plan for your project which includes objectives, corresponding activities, and estimates of numbers to be served. The following table is a suggested format for your project plan:

Objective	Activities/Target Dates	Target Group/Estimated Number of Participants

II. Project Evaluation Plan

Describe the evaluation process to be used. Include each objective, the method of measurement for each objective (e.g., pre- and post-tests, observation, interviews, etc.), the source of data for evaluation (e.g., administrative files, pre/posttest responses, attendance records, medical records, etc.), the person responsible for data collection, and the target date for completion of evaluation. The following format is suggested for your evaluation plan:

Objective	Method of Measurement	Data Source	Person Responsible	Target Date

III. Project Continuation Plan

If applicable, describe plans for continuation of the project after Office for Prevention funding expires. Briefly describe the plan; organizations and/or agencies involved in the continuation plan; and potential and/or secured sources of funding for project continuation.

IV. Project Budget (sample format):

A. Itemized Expenditures:

	\$ _____
	\$ _____
	\$ _____
	\$ _____
	\$ _____
TOTAL	\$ _____

B. Revenue:

Funds requested from Office for Prevention:	\$ _____
Total other applicable funds:	\$ _____
Please indicate source and amount of funds that are secured for this project: _____	

TOTAL PROJECT FUNDS (must equal total expenditures): \$ _____

North Carolina Bicycle Safety and Helmet Promotion Projects

1988-1990:

- Pitt County Bicycle Helmet Promotion Project

1990-1991:

- New Hanover County Health Department - "Happy Helmets to You"
- Henderson County Health Department - "Henderson County Bicycle Safety and Helmet Promotion Project"
- Yadkin County Health Department - "Yadkin County Bicycle/Skateboard Helmet Promotion Project"
- The Pilot Club of Tarboro, Inc. - "Cycling Safely with Helmets"
- Catawba County Safe Kids Coalition
- Carolina's Medical Center Traffic Injury Prevention Program
- Thoms Rehabilitation Hospital - Asheville

1991-1992:

- New Hanover County Health Department - "Happy Helmets to You"
- Alamance County Schools - "Basics of Bicycling in Alamance County"
- Carteret County Health Department - "Carteret County Bicycle Helmet Campaign"
- Durham County Health Department - Community Bicycle Helmet Promotion Campaign"
- Eastern Band of Cherokee Indians Health Delivery System - "Cherokee P.R.I.D.E."
- Rocky Mount City Schools - "Rocky Mount Says YES to Helmets!"
- Yadkin County Health Department - "Yadkin County Bicycle Helmet Promotion Project"
- Pilot Club of Cary/Cary Police Department
- Wake County Health Department

1992-1993:

- Boone Police Department
- Burlington Police Department
- Clayton Police Department
- Durham Police Department
- Elkin Police Department
- Greensboro Police Department
- High Point Park Rangers
- Kitty Hawk Police Department
- Morehead City Police Department
- Onslow County Park Rangers
- Raleigh Park Rangers
- Wrightsville Beach Police Department/Recreation Department

The above list of bicycle safety and helmet promotion projects is not representative of all projects in the state. Other communities and/or community organizations may also be sponsoring similar projects. Please let us know if you are aware of bicycle safety and helmet promotion projects not included on this list.

If you are interested in learning more about bicycle safety and helmet promotion, contact one of the following agencies:

N.C. Department of Transportation Bicycle Program, (919) 733-2804
Injury Control Section, Division of Epidemiology, N.C. DEHNR, (919) 733-3732
Office for Prevention, Division of Maternal and Child Health, N.C. DEHNR, (919) 733-0385



Appendix D:

Description of the Effective Cycling Curriculum





LEAGUE OF AMERICAN WHEELMEN

190 W. OSTEND ST., SUITE 120, BALTIMORE, MD 21230-3731 (301) 539-3399

Effective Cycling Program

For many years, the League of American Wheelmen has recognized cycling education as an area where it should play an active role. The Effective Cycling Program, which began in 1976, forms the backbone of its current activity in education. It is a unique program in the world of bicycling. Its hallmarks are *on-the-road training* and an emphasis on learning to ride safely and effectively in *all* conditions of road and traffic. The program is also unusual in being a largely *volunteer* enterprise which has successfully evolved into a truly national, and even an international, effort.

The Effective Cycling Program is a *service* program of the League of American Wheelmen. Certified Effective Cycling Instructors offer courses through local bicycle clubs or dealers, or through educational institutions. Their principal rewards are the joy of sharing their love and knowledge of cycling with newcomers and the satisfaction of seeing the transformation their students experience. Timid, awkward, and out of shape initially, the students develop smooth, efficient cycling style, endurance, and the confidence to make full, effective use of the public roads within a few weeks. The students who complete an Effective Cycling course benefit immensely. Bicycle clubs who sponsor such courses ensure themselves of a steady stream of enthusiastic and skilled new members. And, of course, L.A.W. and the life sport of cycling benefit as well.

Instructors offer a variety of seminars and courses designed for different audiences. Brief seminars, such as those at rallies, are of greatest benefit to those who already have significant cycling experience. Short courses (up to 20 hours of class, usually less than one month's duration) can be tailored to either beginners or more advanced cyclists. After the advanced type of short course, most students can pass the National Effective Cyclist Examination and a Road Test, and thereby qualify for L.A.W.'s Effective Cyclist patch. This multiple-choice examination was developed by the Effective Cycling committee and serves to define key items of course content and a standardized scale of achievement nationwide. Testing is usually offered at L.A.W. rallies and sometimes made available at other major cycling events.

Effective Cycling Instructor certification is open to all L.A.W. members with sufficient cycling experience and a desire to teach and to continue learning. The application forms are designed to permit prospective instructors to evaluate their own preparedness for entering the program and to indicate any areas where they may need to gain more experience before proceeding. Once admitted to the Effective Cycling Program, Instructor Trainees complete the requirements for certification by passing written examinations and a road test and by getting sufficient experience teaching Effective Cycling courses. Assistance and advice are provided by volunteers on the Effective Cycling committee and the national network of E.C. Instructor Advisors. L.A.W. rallies serve as focal events where road tests can be completed and instructors share ideas and experiences.

If you are interested in taking an Effective Cycling course, contact one of the E.C.

instructors listed in the *BICYCLE USA Almanac* (but keep in mind that very few instructors offer more than one course per year). If no courses are being offered near where you live, there are other ways to learn effective cycling skills. The book *Effective Cycling* by John Forester, published by MIT Press, is the principal reference. The book is available in softcover form for \$18.00 prepaid for L.A.W. members or \$21.00 for nonmembers, which includes shipping and handling. Order from L.A.W at the address on this form. Reading, followed by systematic practice on the road can teach you much of what you need to know. Joining a bicycle club will put you in contact with many people who can help you (even if they haven't read the book). Many clubs own or occasionally borrow a copy of the film "Bicycling Safely of the Road" and show it periodically. It is also usually shown at L.A.W. rallies along with seminars on Effective Cycling. If you are successful in taking a course or in seeking out some of these sources of information, you will be well on your way to a lifetime of safe, enjoyable bicycling.

Appendix E:

*Syllabus for Bicycling Course at
Arizona State University*



BICYCLING
P.E. 110

Yvonne Morrison

H-949-1517
W-966-6896

REQUIRED BOOKS

Effective Cycling by Forester
Bicycle-Safety Education --Facts and Issues by Cross
Cycling by Burkett and Darst

GRADING

100 points to be divided as follows-

Quiz to be given before midterm	10 points
Midterm	30 points
Quiz to be given after midterm	10 points
Final	30 points
Notebook	10 points
Observation	<u>10 points</u>
	100 points

Note: There will be one or two times during the semester where extra credit will be offered with 5 points offered for completion of a special observation or assignment. This will be announced.

Grading Scale

100-90 = A
89-80 = B
79-70 = C
69-60 = D
Below 60 = F

NOTEBOOK

This will be handed in at the end of the semester. It should contain the following:

Class notes
Class handouts
Record of the numbers of miles you have ridden this semester.
Five articles from newspapers or magazines relation to bicycling.
(Note: The magazines can not be specific to bicycling.)

CLASS RIDES

We will be going on several class rides. Be sure your bicycle is safe before the ride. Any bike not safe will not be allowed on the rides. No headphones will be allowed. Shoes with closed upper tops are required.

Session 1-

- a. Class requirements
- b. History of bicycle development
- c. Types of bicycles

Session 2-

- a. Trends in bicycle sales
- b. Frequency of bicycle use
- c. Types of bicyclists
- d. Parts of bicycle

Session 3-

- a. Sizing bicycles
- b. Bicycle clothing
- c. Safety checking bicycles

Session 4-

- a. Bearings of bicycles
- b. Starting and stopping techniques
- c. Practice safety checking bicycles
- d. Basic traffic principles
- e. Basic ride-residential streets

Session 5-

- a. Bicycle racing
 - 1. Types
 - 2. Governing bodies and rules
- b. State Laws and Local Ordinances
 - 1. How to find
 - 2. How enforced-video *Ride On By*

Session 6-

- a. State and local accident statistics
- b. Guest speaker-police officer

Session 7-

- a. Accidents
 - 1. Types
 - 2. Location
 - 3. Rates by age, sex
- b. Types of falls

Session 8-

- a. Advantages of bicyclists
- b. Wrong way riding
- c. Road position
 - 1. Parked cars
 - 2. Intersections
 - 3. Turns
 - 4. Different roadway widths

Session 9-Class Ride-Collector Streets

- a. Correct mounting and dismounting techniques
- b. Correct hand signals
- c. Correct road positions at
 1. Intersections
 2. Turns
 3. Different roadway widths

Session 10-

- a. Film, *Bicycling Safely on the Road*
- b. Quiz

Session 11-

- a. Review quiz
- b. Avoiding straight road hazards

Session 12-

- a. Emergency maneuvers
- b. Gearing, theory and calculation

Session 13- Review for Mid Term

Session 14- Mid Term

Session 15-

- a. Review Mid Term
- b. Tube and tire repair
 1. Terms
 2. Techniques
- c. Wrong way cycling

Session 16-

- a. Organizing bike clubs
- b. Line pacing techniques

Session 17-Ride, techniques of pacing

Session 18-

- a. Bicycle touring
 1. Organizations
 2. Types
 3. Equipment
 4. Planning
- b. Functions of maps
- c. Transporting your bicycle

Session 19-

- a. Bicycle gearing
- b. Tire and tube repair
- c. Slides-bicycle touring

Session 20-Class Ride-Hilly

- a. Shifting techniques on hills
- b. Methods of ascending hills

Session 21-

- a. Guest speaker - planning a large bicycle ride

Session 22-

- a. Calculation target heart rate
- b. Increasing fitness through bicycling
- c. Racing events

Session 23-

- a. Quiz
- b. Safety education for children
 - 1. Differences between child and adult education
 - 2. Types of programs

Session 24-

- a. Cycling Education
 - 1. Objectives
 - 2. Constraints
- b. Accident chain
- c. Education for
 - 1. Motorists
 - 2. Parents
 - 3. Law enforcement

Session 25-

- a. Bicycle rodeos
 - 1. Content-objectives
 - 2. Organization
- b. Elementary curriculum
 - 1. State of Florida
 - 2. State of Arizona
 - 3. Complete Bicycle Education Program
 - 4. Implementation

Session 26-

- a. Intermediate cycling education
- b. Cycling education in other countries
- c. Adult cycling education
- d. Myths of cycling education

Session 27-

- a. Complete ASU evaluation form
- b. Complete Instructor's evaluation form
- c. Review for final exam

Session 28-Final Exam

Appendix F:

*Excerpt from Florida DOT's
K-2nd Grade Traffic Safety Curriculum*



WHEN YOU CAN'T SEE CLEARLY

Clear

FOCUS

6

In this lesson children model the proper procedure for crossing the street mid-block with visual barriers. The video illustrates visual barriers found on and off of the street. Learner outcomes are: stop at roadway edge and search, move to visual barrier edge and search again.

ACTIVITY: Visual Barriers

SHOW VIDEO TAPE VB#1 (1:00)
**CROSSING THE STREET MID-BLOCK
WITH VISUAL BARRIERS.**

STOP the video player when the screen goes black.

DISCUSS using these guide questions as an informal inventory and to help the children focus on the intent of the lesson.

What did you see take place?
Where do you think the little girl might be going?

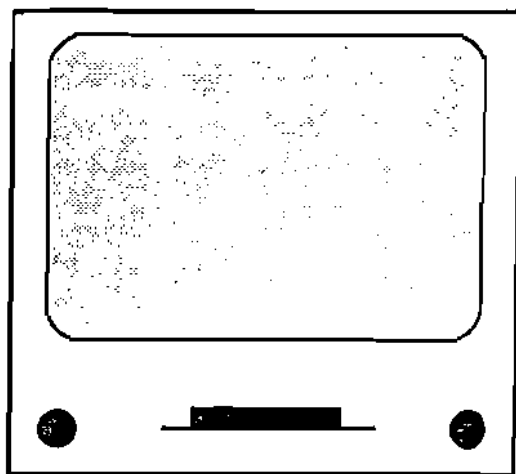
What did you see her do?
What was she looking for?

cars
Where did she stand to look?
edge of the roadway, moved to an open space, roadway edge, then search at the edge of the visual barrier, the car

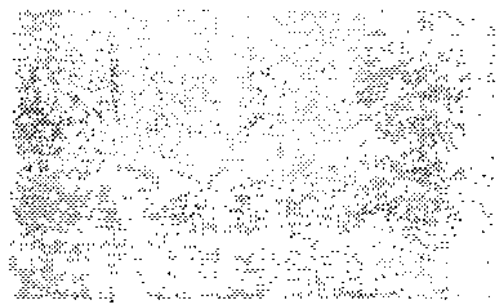
What blocked her view?
cars, visual barriers

Did she see any cars?
Cars and other things that move people are called vehicles.

Vehicles moving in the roadway are a part of



MATERIALS:
video tape and player



Draft

KINDERGARTEN

traffic.

Can you name visual barriers that are OFF the street?

fence, bushes, etc.

Can you name visual barriers that are ON the street?

parked cars, signs

Vehicles can be "moving" visual barriers on the street.

Can you name some moving visual barriers?

cars, trucks

If you are moving on the roadway, you are part of traffic.

What did the little girl, do before she became part of traffic?

looked left-right-left

Why do you think she looked left first?

closest lane of traffic

Why do you think she looked left once again before crossing, instead of just "looking both ways"?

Did you notice that she continued to search for traffic as she crossed the street?

Is a car parked on the side of the street, part of traffic?

No, however, parked vehicles have the potential to become part of traffic at any moment! Impress upon the children that the vehicle drivers have a difficult time seeing them.

RESUME PLAY

SHOW VIDEO TAPE VB#2 (1:30)

CROSSING THE STREET MID-BLOCK WITH VISUAL BARRIERS (key)

STOP the video tape player when the screen goes black.

The words "keyed in" on the screen may be read aloud to the class. Children may elect to read with you as they pick up the sequence.

DISCUSS the importance of stopping at the edge, moving to an area free of

visual barriers, stopping at the new edge (car) look left-right-left, and keep looking. Clarify the definitions of these terms, visual barrier, looking space, edge of visual barrier.

RESUME PLAY

SHOW VIDEO TAPE VB#3 (1:00)

CROSSING THE STREET MID-BLOCK

WITH VISUAL BARRIERS (school bus).

STOP the video tape player when the screen goes black.

DISCUSS using these guide questions to help the children focus on the intent of the lesson.

What did you see take place?

Where do you think the children might be going?

What did you see the children do?

What were they looking for?

cars

Where did they start to look?

first as they stepped off the bus, at the EDGE OF THE ROADWAY, then moved to an open space in front of the bus, a new looking edge, then searched at the EDGE OF THE VISUAL BARRIER, the bus

What blocked their view?

visual barriers, bus

How did they deal with traffic?

the bus stop sign stopped traffic

Cars and other things that move people are called vehicles.

Vehicles moving in the roadway are a part of traffic.

Can you name visual barriers that are OFF the street?

trees, shrubs,

Can you name visual barriers that are ON the street?

motor home

Vehicles can be "moving" visual barriers on the street.

Can you name some moving visual barriers?

bicycle riders

If you are moving on the roadway, you are part of traffic.

What did the children, do before they became part of traffic?

looked left-right-left

Why do you think the children looked left first?

The vehicle driver CAN NOT see you when you are near a visual barrier.

left

RESUME PLAY

SHOW VIDEO TAPE VB#4 (1:00)

CROSSING THE STREET MID-BLOCK WITH VISUAL BARRIERS (bus/key)

The words "keyed in" on the screen may be read aloud to the class. Children may elect to read with you as they pick up the sequence.

STOP the video tape player when the screen goes black.

DISCUSS the importance of stopping at the edge, moving ten (10) feet away and in front of the bus, stopping at the new edge in front of the bus, look left-right-left, wait for all traffic to stop, cross and keep looking.

RESUME PLAY

SHOW VIDEO TAPE VB#5 (1:00)

CROSSING THE STREET MID-BLOCK WITH VISUAL BARRIERS (parking)

STOP the video tape player when the screen goes black.

DISCUSS using these guide questions to help the children focus on the intent of the lesson.

What did you see take place?

Where do you think the children might be going?

What did you see them do?

each child looked for themselves

What were they looking for?

traffic

Where did they start to look?

first as they stepped off the curb, at the EDGE OF THE ROADWAY, then moved to an open space in front of the parked cars, a new looking edge, then they searched at the EDGE OF THE VISUAL BARRIER, the parked cars

What blocked their view?

parked cars, visual barriers

Why did the last two children wait?

car coming

How did they deal with the traffic?

wait for car to pass, search again

WRAP UP DISCUSSION. Review the importance of stopping at the edge, moving to an area free of visual barriers, stopping at the new edge, wait for traffic, look left-right-left, and keep looking as you cross. Clarify the definitions of these terms, visual barrier, looking space, edge of the visual barrier, looking for yourself.

Appendix G:

Order Forms for Bicycle Safety Materials



Bicycle Forum Emporium

Safety & Encouragement Products for the Bicycle Advocate

Guide to Bicycle Rodeos

Recently updated, the Guide will take you through design, publicity, layout and execution of a successful bicycle rodeo. Used by professionals and advocates all over the United States and Canada.

Includes masters for all forms, handouts and posters.
Cat. #EF-10 \$5.00 each

(for orders of more than five Rodeo Guides, contact Mike Caven at Outdoor Empire Publishing, 511 Eastlake Avenue, E., Seattle WA 98109 or call (206) 624-3845).



Sprocketman's Here!

"Sprocketman Talks Road Sense;" compact full-color brochure. Covers safety topics especially important for older kids and young adults.
BF-1001

100	500	1000
\$35.00	\$85.00	\$150.00

Custom versions*

Item:	Quantity:	Price:
BF-1002	5,000	\$675.00
BF-1003	10,000	1200.00
BF-1004	20,000	2200.00
BF-1005	40,000	3900.00

*Available on a special order basis. Includes your logo and credits in two places.

Bicycle Safety: What Every Parent Should Know

Written for non-cycling parents, this booklet discusses common childhood crashes and presents ideas for avoiding them.

BF-20	100	500	1000
	\$35.00	\$75.00	\$125.00



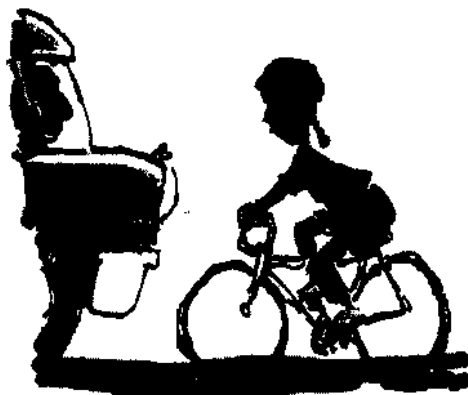
Artwork:	Quant.	Price:
BF-21	<20,000	\$125.00
BF-22	20-50,000	250.00
BF-23	>50,000	450.00



Do You Make These 8 Mistakes?

Advice for novices on wrong-way riding, sidewalk problems and more.

BF-30	100	500	1000
	\$30.00	\$65.00	\$110.00



Artwork:	Quant.	Price:
BF-21	<20,000	\$80.00
BF-22	20-50,000	160.00
BF-23	>50,000	300.00

What is the artwork option?

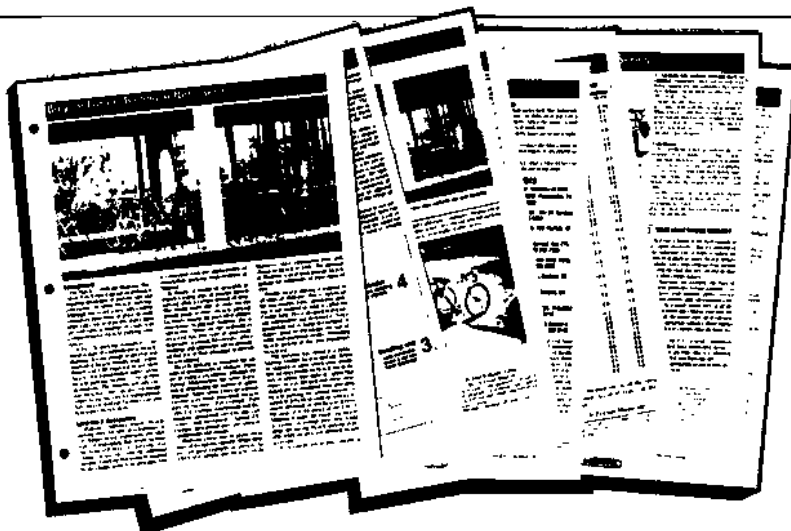
With set-up and camera-ready art of the parents and 6 mistakes, features the logo, credits, typeset and layout. If you have an agency for advertising or a printer, it's easy to place the order. Just ask for the parent's artwork and let us know what it is. We'll be glad to help!

Bicycle Forum Technical Notes

Brief, useful papers on bike advocacy topics

- S-1: Common Car-Bike Crashes
- S-2: Safety "Accessory" Myths
- S-3: Bike Safety Bibliography
- P-1: Bike Parking Location
- P-2: Choosing Parking Devices
- P-3: A Simple Bike Rack Design
- P-4: Bike Parking Ordinances
- F-1: Facility Design Liability (Interview)
- F-2: Bicycles & Traffic Signals

Tech Notes are \$1.00 each
Note kits (20 each of all eight): XS-100: \$40.00



Find the 12 Hazards Poster

Fun and inexpensive
11"x14" coloring poster
for kids.

EF-804

10 \$2.50
100 24.00
500 75.00

Share the Road

3"x7" Bumpersticker

EF-902 (Vinyl)

100: \$35.00

1000: \$175.00

Closeout: EF-902A Paper version

\$15.00/100 (Not as durable as vinyl)



Now...Bicycle touring brochures

Bikecentennial's informative bicycle touring and fitness brochures for adult riders are now available at low quantity prices. Check them out!

	100	500	1000
BP-402 Choosing a Bicycle for Touring	\$25.00	\$60.00	\$100.00
BP-403 Getting in Shape for Touring	25.00	60.00	100.00
BP-405 Transportation Tips	20.00	55.00	100.00

Forum Emporium Order Form

Method of Payment:

My payment of \$_____ is enclosed.

Charge: VISA MC AMEX

Account Number (all digits, please)

Exp. Date _____ Daytime phone (_____) _____

Signature _____

required for credit card orders only

Subscriber Status

- Subscription #F _____
 New subscriber
 I'm not interested at this time

Shipping Address

Name _____

Address _____

City _____

State _____ Zip _____

Day time phone _____

Quantity	Catalog #	Title or Description	Unit Price	Total
Shipping Charge (Please check box)			SUBTOTAL	
Subtotal	UPS in U.S.	Surface (Outside US)	Shipping	
Under \$20 <input type="checkbox"/> add 15%	<input type="checkbox"/> add 15%	<input type="checkbox"/> add 15%	Subscription	
\$20-50 <input type="checkbox"/> add 10%	<input type="checkbox"/> add 10%	<input type="checkbox"/> add 15%	TOTAL	
Over \$50 <input type="checkbox"/> add 5%	<input type="checkbox"/> add 5%	<input type="checkbox"/> add 15%		

Domestic shipments: Allow 3 to 4 weeks for shipping.

Bicycle Forum Subscriptions

Yes, I would like to subscribe to *Bicycle Forum*, Bikecentennial's quarterly journal for bicycling advocates and professionals!

I understand that if I am ever dissatisfied, I may cancel my subscription and receive a full refund for all undelivered issues.

New subscriber

Renewal #F _____

Check category	Individual	Agency
Domestic	<input type="checkbox"/> \$14.95	<input type="checkbox"/> \$19.95
Canada/Mex.	<input type="checkbox"/> 17.95	<input type="checkbox"/> 22.95
Overseas	<input type="checkbox"/> 20.95	<input type="checkbox"/> 25.95

All prices in U.S. funds

Bicycle Forum

Box 8308
Missoula MT 59807

Forwarding & return postage guaranteed

Non-Profit Org.
US POSTAGE
PAID
Missoula, MT
59801
Permit #315

Name _____

Street Address _____

City _____ St _____ Zip _____

RESOURCES

Many cities and states have their own SAFE KIDS™ coalitions. For information on a state or local coalition in your area working on SAFE KIDS™ projects, please contact the Coalition Director at the National SAFE KIDS™ Campaign, (202) 939-4993.

STATE COALITIONS

Alabama	Minnesota	New York
Alaska	Missouri	North Carolina
Colorado	Montana	North Dakota
Delaware	Nevada	Pennsylvania
Georgia	New Hampshire	Rhode Island
Maine	New Jersey	Virginia

LOCAL COALITIONS

Auburn/Opelika, AL	Greenwich, CT	DeKalb, GA
Birmingham, AL	Washington, DC	Savannah, GA
Mobile, AL	Broward County, FL	Chicago, IL
Montgomery, AL	Dade County, FL	Indianapolis, IN
Forrest City, AR	Gainesville, FL	South Bend, IN
Little Rock, AR	Pembroke Pines, FL	Wichita, KS
Flagstaff, AZ	Pensacola, FL	Ashland, KY
Phoenix, AZ	Sun Coast, FL	Louisville, KY
Prescott, AZ	West Palm Beach, FL	Baton Rouge, LA
Long Beach, CA	Augusta, GA	Lafayette, LA
San Diego, CA	Dalton, GA	Lake Charles, LA

LOCAL COALITIONS (continued)

Boston, MA	Charlotte, NC	Allentown, PA
Montgomery Co., MD	Moore Co., NC	Philadelphia, PA
Detroit, MI	San Juan Co., NM	Austin, TX
Kalamazoo, MI	Las Cruces, NM	Beaumont, TX
Columbia, MO	Northern NV	Dallas, TX
Kansas City, MO	Harlem, NY	Houston, TX
Springfield, MO	Schenectady, NY	Salt Lake City, UT
St. Louis, MO	Vaihalla, NY	Hampton Roads, VA
Billings, MT	Cleveland, OH	Roanoke, VA
Missoula, MT	Columbus, OH	Milwaukee, WI
Catawba Co., NC	Oklahoma City, OK	

ADDITIONAL INFORMATION ON BIKE SAFETY

• **"Be Safe On Your Bike":** a 13 minute entertaining and educational video/film emphasizes helmet use and safe riding skills. VHS Video—\$50.00/16 mm film —\$100.00. To order, send a check to Los Angeles Police Department, South Traffic Division, c/o Officer Forrest Wilkins, 4125 So. Crenshaw Blvd., Los Angeles, CA 90008.

• **Bike Education Program:** an on-bike/in-class program for 4th-6th grades on how to handle intersections and avoid accidents.

Write: Bicycle Federation of America, 1818 R St. NW, Washington, DC 20009.

• **Bicycle Helmet Safety Institute brochure:** "A Consumers Guide to Bicycle Helmets." Free. Send a self-addressed legal size stamped envelope to: Bicycle Helmet Safety Institute, 4649 2nd St. S, Arlington, VA 22204.

• **A Guide To Bicycle Rodeos:** a comprehensive guide for setting up your own bike rodeo programs. Send check or money order for \$5 plus 75¢ postage and handling to Bikecentennial, P.O. Box 8308, Missoula, MT 59807.

• **For additional information on coordinating a bike safety event at your school contact:**



National SAFE KIDS™ Campaign,
111 Michigan Ave. NW,
Washington, D.C. 20010
(202) 939-4993

A program of



Supported by

Johnson & Johnson

Special support for the bike helmet campaign by



NATIONAL SAFE KIDS™ CAMPAIGN ORDER FORM

Description	Item No.	
"Safe Kids™: A Magazine for Kids": 12-page, 4-color traffic and bike safety booklet for children. 30 per box. Freight charges: \$2.81 per box	002-30	Nonprofit: \$5.69 per box x _____ (# of boxes) + _____ (freight) _____ SUBTOTAL
Bike Helmet Brochure for Parents: 4X7, 12-panel brochure about head injury and bike helmets. 30 per box. Freight charges: \$2.81 per box	003-30	Nonprofit: \$3.59 per box x _____ (# of boxes) + _____ (freight) _____ SUBTOTAL
Bike Helmet Poster: 17x22 multi-color bike helmet poster. Use as a giveaway for kids, or to promote events (includes space for event details). 30 per box. Freight charges: \$2.81 per box	004-30	Nonprofit: \$10.19 per box x _____ (# of boxes) + _____ (freight) _____ SUBTOTAL

National SAFE KIDS™ Campaign

P.O. Box 4779
Monticello, MN 55365

Ship to: _____

Name _____

Title _____ Organization _____

Address _____ City _____

State _____ Zip _____ Phone () _____

Number of boxes ordered of each item: _____ 002-30 _____ 003-30 _____ 004-30

Signature: _____

Please allow four weeks for delivery. All orders must be prepaid.

MAKE CHECKS PAYABLE TO: Children's National Medical Center

Amount Enclosed: _____ or P.O. Number: _____

Prices subject to change without notice.



Bicycle Rodeo Kit

Available in a standard kit with enough materials for 100 participants or you can customize a kit for your community's needs.

This kit provides children with a fun-filled, hands-on opportunity to practice and perfect their bike riding skills. Materials in the basic kit contain publications written by two bicycle safety leaders in the country, John Williams and Dan Burden. *A Guide to Bicycle Rodeos*, written by Williams and Burden, is a complete manual offering the most inexperienced person helpful instruction in staging a rodeo. The workbook, *The Best Bicyclist On Earth* authored by Dan Burden, greatly reinforces those hands-on skills with key conceptual ones. In addition to the items in the refill kit below, the complete Rodeo Kit contains 27 plastic laminated Station Posters (22" x 15", to be used for the various bicycle rodeo stations), 15 Bicycle Reaction Test Rules (18" long, measures a person's brake reactions), and one *Guide to Bicycle Rodeos*.

The complete Bicycle Rodeo Kit\$150.00

Refill Kit

A special refill kit is available which replaces those items designed to be taken home by rodeo participants. The refill kit is \$100 and contains

- 100 Best Bicyclist On Earth workbooks
- 100 Certificate of Achievements
- 100 Bicycle Driver's Licenses
- 100 Get Into the Helmet Habit brochures
- 100 Bike Check Cards
- 100 10 Little Bike Riders brochures

Customize Your Own Bicycle Rodeo Kit!

All the components of the Bicycle Rodeo Kit can be purchased separately. You can put together your own kit of materials depending upon the size and scope of your rodeo. Select from the items below:

Best Bicyclist on Earth	100	.....	\$99
Certificates of Achievement	100	.....	\$14
Bicycle Driver's Licenses	100	.....	\$14
10 Little Bike Riders	100	.....	\$19
Get Into the Helmet Habit	100	.....	\$16
Bike Check Cards	100	.....	\$23
Station Poster	1 set	.....	\$40
Traffic Cones	12	.....	\$27
Bicycle Reaction Test Rulers	15	.....	\$7.50
A Guide to Bicycle Rodeos	1	.....	\$5

Other items that can be purchased separately:

	100	500	1,000
Bike Check Cards	@24 ¢	@22 ¢	@20 ¢
Bicycle Driver's Licenses	@15 ¢	@14 ¢	@11 ¢
Bicycle Test Rulers	@47 ¢	@45 ¢	@40 ¢
Certificates of Achievement	@15 ¢	@14 ¢	@11 ¢
A Guide to Bicycle Rodeos	@\$3 95	@\$3 75	\$3 50

Single copy \$5.50
5 — 10 copies \$4.95 each

BOOKS

	SINGLE	100+	200+	500+	1,000+
Captain Cycle Comic Book	\$2.50*	99 ¢*	95 ¢	85 ¢	80 ¢
Captain Cycle Coloring Book	\$2.50*	69 ¢*	57 ¢	54 ¢	51 ¢
Safe Feet Coloring Book	\$2.50*	69 ¢*	57 ¢	54 ¢	51 ¢
Bicyclist's Guide	\$2.50*	89 ¢*	77 ¢	74 ¢	67 ¢
Best Bicyclist on Earth	\$2.50*	99 ¢*	87 ¢	84 ¢	75 ¢
Bicycle Driver's Guide	\$2.50*	99 ¢*	87 ¢	84 ¢	75 ¢

Best Bicyclist Instructor Guide } Single copy FREE with order for 100 or
Bicycle Driver's Instructor Guide } more Student books.

Either Bicycle Instructor Guide 2 — 10 copies @ \$1.25 each
11 — 100 copies @ \$1 each
Individual copy @ \$2.60* each

BROCHURES

	SINGLE	100+	200+	500+	1,000+
Get Into the Helmet Habit	\$1.00*	18 ¢	15 ¢	13 ¢	11 ¢
Ten Little Bike Riders	\$1.00*	21 ¢	18 ¢	16 ¢	13 ¢
Ten Little Pedestrians	\$1.00*	18 ¢	16 ¢	16 ¢	13 ¢

VIDEOS

Bicycle Law Enforcement \$35.00* each.
Professional Driver and the Bicyclist \$35.00* each.

* Mailing included in quoted prices. All orders less than \$200 must be prepaid with a check, money order or bankcard.

** Call Mike Caven at (206) 624-3845 for Quantity Price Discounts on orders of 5,000 to 100,000 or more customized copies.

Purchase orders must be received before shipment. Phone orders accepted, but physical purchase order must arrive before shipment. Fax copies acceptable.

Orders without notation of freight charges (F.O.B., Seattle, Washington, prepay and add) will not be shipped until such authorization has been received.

All orders except customized, are usually shipped within one week of receipt.

Prices subject to change without notice.

For further information on customizing material, publishing, special orders or shipping charges please contact:

Publications Consultant
(206) 624-3845
FAX: (206) 340-9816
Outdoor Empire Publishing
P.O. Box C-19000
511 Eastlake Avenue East
Seattle, WA 98109

Over 30 years of serving outdoor recreationalists in education safety.

Members of National Safety Council, NAGHSR, NBDA, BIA, Bikecentennial, L.A.W., ADTSEA.

BICYCLE & PEDESTRIAN SAFETY EDUCATION MATERIALS

1991 — 1992 PRICES

BOOKS

A Guide to Bicycle Rodeos

Authoried by two of the top bicycle safety educators in the country, John Williams and Dan Burden, this manual provides all the information relative to planning, layout and operation of a bike rodeo. Easy-to-understand directions, plus innovative techniques based on solid government research make this book invaluable for any group that offers a bicycle rodeo in their community. Can be purchased



separately from the rodeo kit. Recommended by the National Safe Kids Campaign™, American Academy of Pediatrics and the American Automobile Association. Published under special arrangement with Bicentennial, 8 1/4" x 11", 48 pages, glossy cover.



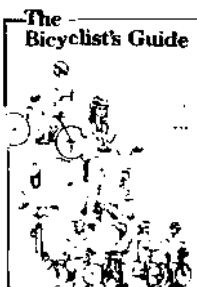
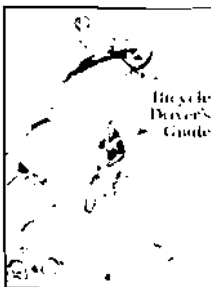
The Best Bicyclist On Earth

This fun, brightly illustrated book takes the 8-12 year old bike rider from his/her own driveway out into the neighborhood, helping with the skills: judgment, and confidence necessary for safe riding habits. Exciting activities, colorful graphics, and interactive projects capture the young rider's attention and encourage participation. This book is especially designed for comprehensive

school based programs for bicycle skills training. Can be purchased separately from the Bicycle Rodeo Kit. An instructor's guide is available. Both are written by Dan Burden. 8 1/2" x 11", 48 pages, Instructor's Guide, 8 pages.

Bicycle Driver's Guide

Topics covered in this comprehensive text for cyclists include emergency skills, accident types and causes, maintenance tips; children in traffic; parental responsibility; traffic, sign and signal recognition; clothing and basic bicycling techniques. An excellent middle school and upper elementary book. Student edition, 48 pages, full color, 8 1/4" x 11". Instructor's manual includes an extra 24 page insert.



Bicyclist's Guide

This popular book is a clear, well-written guide for the young, intermediate cyclist. The basics of cycling, choosing the right bike, hazard avoidance, traffic signals and markings, maintenance and touring are all covered. Reviews, skill tests, chapter objectives and reinforcement of on-bike training all enhance the basic bicycle safety information, 8 1/2" x 11", 32 pages, full color.

MORE BOOKS...

Captain Cycle and the Bike Rangers™

Bicycle Safety Coloring Book

Designed for pre-school to the 3rd grade, this coloring book features Captain Cycle™ teaching the Bike Rangers important bike safety tips such as helmet use, traffic sign recognition, driveway and intersection awareness, hazard avoidance, turn signals and the Bike Ranger Safety Code. Captain Cycle™ is with the National Traffic



Safety Institute's bicycle safety program (personal appearances are possible). The book is published under special license with NTSI. 16 pages, plus cover cover, 8 1/2" x 11".



Captain Cycle and the Bike Rangers™

Battle the Irresponsible Motorist

A colorful comic book for kids featuring Captain Cycle™. They will read about his adventures with the Bike Rangers as they travel to and from school. The irresponsible motorist almost runs down a child at an intersection as well as getting off a school bus. Captain Cycle™ offers safety tips for school bus loading/unloading, pedestrian, plus cycling to and from school. Published under special

license from the National Traffic Safety Institute. 8 1/2" X 11", 16 pages, full color, glossy cover.

VIDEOS

The Professional Driver and the Bicyclist

Both the professional driver (bus, van truck, police) and all types of cyclists will enjoy this video. Practical skills, cyclist behaviors, and important safety tips are explained and illustrated. 24 minutes, VHS, color.

Bicycle Law Enforcement

Basic safety concepts apply everywhere. This video shows successful examples of the pioneering bicycle law enforcement programs begun in Florida which can be implemented in your area. Both law enforcement personnel and bike safety people will find this video invaluable. 23 minutes, VHS, color.

CUSTOMIZATION

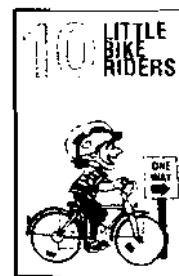
All publications can be customized with your logo, signage or other textual modifications. Minimum quantities are required: 5,000 copies for books and 20,000 copies for brochures. Delivery is usually within 45 days after receipt of purchase order, or approval of proofs, whichever comes later. Call Mike Caven at (206) 624-3845 for details.

BROCHURES

Get Into the Helmet Habit

This popular brochure illustrates the need for children to wear hard-shell helmets. In 1989, a Wayne State University study discovered that soft-shell helmets for children are not 100 percent safe. The Harborview Injury and Prevention Center's study (1989) states that almost 85 percent of all cyclist injuries are head related. This concise brochure explores the necessity for helmet use, providing facts on helmet construction and selection, along with other essential information. Additional bicycle safety tips are also included. Space is provided on back panel for personalized stamping or for a special customized printing. Letter fold, 3 1/2" x 8 1/2".

Get Into the Helmet Habit



Ten Little Safety Tips Series

Full color pamphlets utilizing the "Ten Little Indians" theme for a variety of safety messages. Currently available:

- 10 Little Bike Riders
- 10 Little Pedestrians
- Get into the Seat Belt Habit

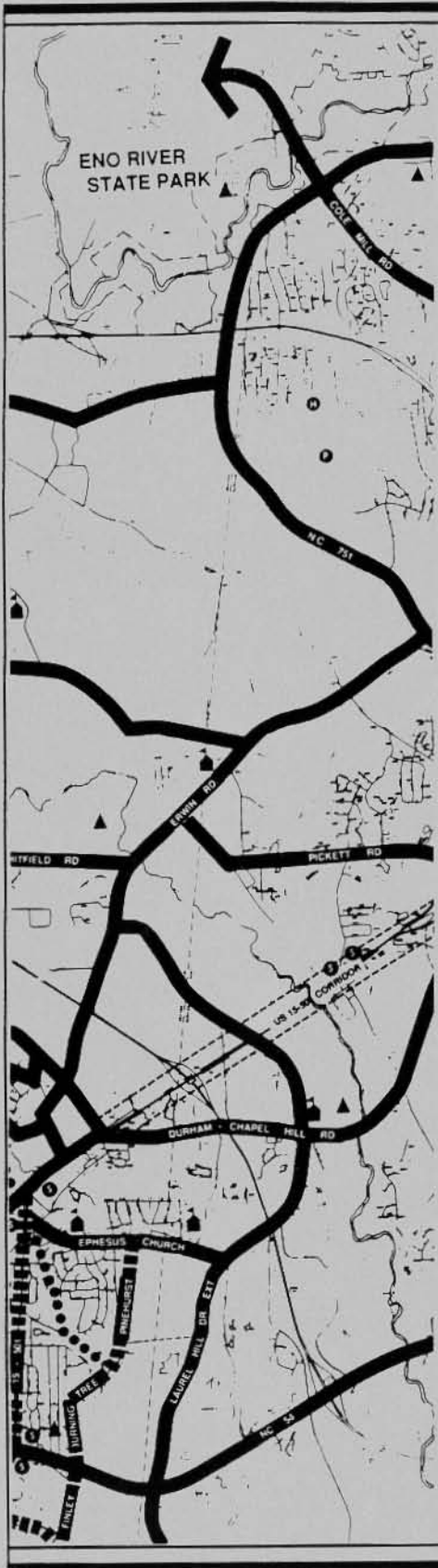
Accordion fold, each panel is colorfully illustrated and written with a safety rhyme and clear review of important information. Space available on back panel for customized information. 2 3/4" X 4 1/2".

NEW PEDESTRIAN SAFETY

Safe Feet Coloring Book

Designed for kids up to the 3rd grade, this innovative coloring book is based upon the National Safety Council and the National Highway Traffic Safety Administration's Walk Alert program, as well as Dr. Stina Sandel's work on Children and Traffic, as refined by experiential activities in the R.S.A. A safety message on each page, plus illustration for the child to color will reinforce safe walking concepts to and from school, as a pedestrian, combined with illustrations on bicycling and school bus riding. 8 1/2" X 11", 16 pages plus cover.

Note: All bicycle publications in this brochure illustrate hard-shell helmet use for children, plus incorporate the latest proven research in bicycle safety education.



Engineering Supplement

REGIONAL BICYCLE PLAN FOR DURHAM
AND ORANGE COUNTIES

prepared for:

**The Transportation Advisory
Committee for the Durham-
Chapel Hill-Carrboro Urban Area**

prepared by:

Greenways Incorporated

August, 1992

Acknowledgements

This Engineering Supplement to the Regional Bicycle Plan for Durham and Orange Counties was produced by Greenways Incorporated for the Transportation Advisory Committee of the Durham-Chapel Hill-Carrboro Urban Area. The Regional Bicycle Plan represents the collaborative efforts of four local jurisdictions: the Town of Chapel Hill, Orange County, the City of Durham and Durham County. This Supplement provides technical data for roadways designated for proposed bicycle facilities by the Urban and Rural Bicycle Route Plans. Also contained herein are bicycle signage engineering specifications.

A special thanks to RS&H of NC, Inc. for their assistance in transportation data collection, and to Mark Fiers and Wesley Parham for gathering technical information for this portion of the Regional Bicycle Plan.

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Orange County Commissioner

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Greenways Incorporated

Charles A. Flink, President

Jennifer L. Toole, Project Manager



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Section 3: Technical Evaluation of Proposed Chapel Hill Bicycle Routes

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Section 4: Bicycle Signage Engineering Specifications

From Arizona's Bicycle Facilities Planning & Design Guidelines



Section 1:
Technical Evaluation of Rural Routes
Durham and Orange County



Rural Bicycle Route Plan

Regional Bicycle Plan for
Durham and Orange
Counties

Legend

Bicycle Routes

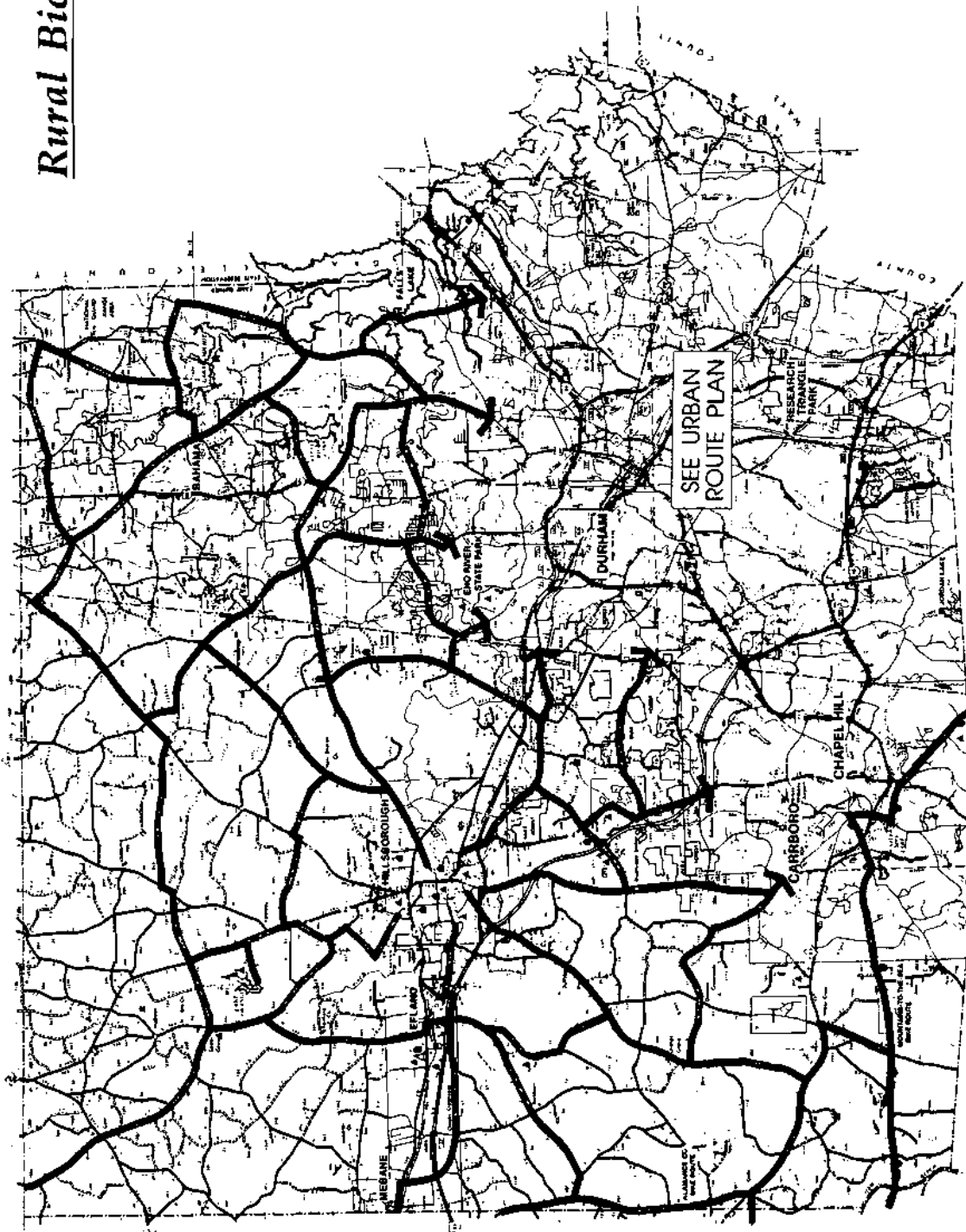
— Roadways designated for added
bicycle improvements

Destination Points

• Park

• School

August 1962



Prepared by
The Transportation Advisory
Committee for the Durham-Chapel
Hill-Carrboro Urban Area





Rural Roadway Evaluation (Durham County)

Roadway Name	Speed limit	ADT's	ROW width	Total Pmt. width	Lane widths	Roadway Class
Ellis Chapel Road (SR 1616)	55 mph	3,100	N.A.	18'	9'	Minor Thoroughfare
Cole Mill Road (SR 1569)	N.A.	9,700	60'	24'-44'	N.A.	Major Thoroughfare
Guess Rd. north of City (NC 157)	45, 55 mph	15,400	60'	20'	10'	Major Thoroughfare
Old Oxford Road (SR 1004)	35, 55 mph	7,700	60'	20'	10'	Major Thoroughfare
Orange Factory Road (SR 1628)	55 mph	2,400	N.A.	20'	10'	Minor Thoroughfare
Quail Roost Road (SR 1615)	55 mph	1,200	N.A.	18'	9'	Major Thoroughfare
Snow Hill Road (SR 1631)	45 mph	2,500	N.A.	22'	10'	Major Thoroughfare
Staggville Rd. (SR 1615)	55 mph	2,000	N.A.	18'	9'	Major Thoroughfare
St. Mary's/Mason Road (SR 1002)	55 mph	2,300	N.A.	20'	9'	Major Thoroughfare
Umstead Road (SR 1449)	N.A.	7,200	N.A.	N.A.	N.A.	Major Thoroughfare
Red Mountain Road (SR 1471)	35, 55 mph	N.A.	N.A.	18'	9'	Secondary Road
Cassam Tilley Road (SR 1622)	55 mph	N.A.	N.A.	20'	10'	Major Thoroughfare
Bahama Road (SR 1607)	35, 55 mph	N.A.	N.A.	20'	9'	Major Thoroughfare
Rocky Springs Road (SR 1532)	35, 55 mph	N.A.	N.A.	24'	10'	Secondary Road
Roxboro Road (US 501)	45, 55 mph	14,800	N.A.	2 x 32'	12'	Major Thoroughfare
Latta Road	45 mph	8,400	N.A.	23'	10'	Major Thoroughfare
Infinity Road	45 mph	1,600	N.A.	19'	9'	Major Thoroughfare



Rural Roadway Evaluation (Orange County)

Roadway Name	Speed Limit	ADT's	ROW width	Total Pmt. width	Lane widths	Rd-way class	Comments
Ben Johnston Rd. (SR 1144)	55 mph	150	60'	20'/5' unpaved shdr.	10'	Major thorough.	Hillsborough Plan
Borland Rd. (SR 1126)	55 mph	400	60'	20'/2'-4' unpaved shdr.	10'	Local (Major)	
Carr Store Rd. (SR 1352, 1004)	55 mph	500	60'	18'/5' unpaved shdr.	9'	Collector	
Chestnut Ridge Ch. Rd. (SR 1125)	55 mph	90	60'	18'	9'	Local (Major)	
Coleman L. P. (SR 1334)	55 mph	500	60'	20'/5' unpaved shdr.	10'	Local (Major)	Near Hillsborough
Dairyland Road	55 mph	900	100'	18'/4' unpaved shdr.	9'	Collector	
Djimmocks Mill Road (Hillsb)	55 mph	500	60'	20'/4' unpaved shdr.	10'	Major thorough.	Hillsborough Plan
Efland-Cedar Grove Rd. (SR 1004)	45/55 mph	1,100	60'	18'-20'/3' unpaved shdr.	9'-10'	Collector	
Faucette Mill Road (SR 1328)	35 mph	N.A.	N.A.	20'/4' unpaved shdr.	10'	Local	Hillsborough Plan
Frank Perry Road (SR 1379)	55 mph	130	60'	18'/2' unpaved shdr.	9'	Local	Hillsborough Plan
Highland Farm Rd. (SR 1332)	N.A.	400	60'	20'/4' unpaved shdr.	10'	Collector	
Guess Rd. from Caldwell (NC 157)	55 mph	1300	60'	20'/3' unpaved shdr.	10'	Minor Arterial	
Lake Orange Rd. (SR 1323)	45/55 mph	200	60'	18'/5' unpaved shdr.	9'	Minor Local	1.5 miles long - Dead end
Little River Church Rd. (SR 1543)	55 mph	200	60'	18'/4' unpaved shdr.	9'	Collector	
Old Greensboro Rd. (SR 1005)	55 mph	3,000	N.A.	20'/4' unpaved shdr.	10'	Minor Arterial	
Mt. Hermon Church Rd. (SR 1713)	N.A.	1,700	60'	N.A.	N.A.	Major thorough.	In DCHC Plan Area
NC 54 from White Cross to Oaks	55 mph	6,500	120'	24'/10' paved shdr.	12'	Principal Arterial	
NC 86 from 1334 to 1352	55 mph	5,500	100'	22'/5' unpaved shdr.	11'	Principal Arterial	



Rural Roadway Evaluation (Orange County, page 2)

Roadway Name	Speed Limit	ADT's	ROW width	Total Pmt. width	Lane widths	Rd-way class	Comments
New Hope Church Rd. (SR 1723)	55 mph	1,100	60'	20' / 4' unpaved shdr.	9 - 10'	Collector	
New Sharon Church Rd. (SR 1538)	55 mph	600	60'	20' / 5' unpaved shdr.	9 - 10'	Collector	Portion in DCHC Area
Old NC 10 (SR 1710)	45/35 mph	1,700	60'	20' / 4' unpaved shdr.	10'	Minor thorough.	Portion in DCHC Area
Orange Grove Rd. (SR1006)	55 mph	1,600	60'	20'	10'	Collector	Eno Rd intersect. high accident
Phelps Rd. (SR 1551)	55 mph	500	60'	20' / 5' unpaved shdr.	10'	Local (Major)	
Pleasant Green Road (SR 1567)	No data	1,500	60'	N.A.	N.A.	Major thorough.	DCHC Plan Area
St. Mary's Rd. (SR 1002)	55 mph	1400	60'	18' / 4' unpaved shdr.	8' - 9'	Collector	Portion in DCHC Area
Sawmill Rd. (SR 1545)	45/55 mph	800	60'	18' / 5' unpaved shdr.	9'	Collector	
Walker Rd. (SR 1553)	55 mph	250	60'	20' / 5' unpaved shdr.	10'	Local (Major)	
West Ten Road (SR 1144)	55 mph	500	60'	20' / 4' unpaved shdr.	10'	Collector	Intersections w/SR 1114 and Buckhorn Rd. are high accident
Mt. Sinia Church Rd. (SR 1718)		1,600					
NC 57	55 mph	1,800	100'	20' / 5' unpaved shdr.	N.A.	Arterial	NC 157 intersect. high accident
NC 86							
Old NC 86 (SR 1009)							
Union Grove Road (SR 1111)							
White Cross Rd (SR 1951/1952)	55 mph	350	60'	20' / 4' unpaved shdr.	N.A.	Collector	
Mebane-Oaks Road	55 mph	900	N.A.	18'-20' / 4' unpaved	N.A.	Collector	
Mt. Willing Road	55 mph	300	N.A.	20' / 4' unpaved shdr.	N.A.	Collector	



Section 2:
Technical Evaluation of Urban Routes
Town of Chapel Hill



Chapel Hill Route Listing

<u>Page #</u>	<u>Roadway Name</u>
1	Booker Creek Road/Old Oxford Road
2	Boundary Street
3	Burning Tree Drive/Pinehurst Drive
4	Cameron Avenue
5	Caswell/Curtis/Lake Shore/Honeysuckle/Sedgefield Drive
6	Culbreth Road
7	Elliot Road
8	Ephesus Church Road
9	Erwin Road
10	Estes Drive
11	Finley Golf Course Road/Mason Farm Road
12	Fordham Boulevard (U.S. 15-501 Bypass)
13	Franklin Street
14	Homestead Road
15	Manning Drive
16	Mason Farm Road
17	Merritt Mill Road
18	Mount Carmel Church Road
19	NC 86 (Airport Road)
20	Old Durham-Chapel Hill Road
21	Piney Mountain Road
22	Pittsboro Street
23	Rosemary Street
24	Seawell School Road
25	Smith Level Road
26	South Columbia Street
27	South Raleigh Road (NC 54)
28	Sunrise Drive
29	Umstead Drive
30	U.S. 15-501 Corridor (Chapel Hill-Durham Blvd)
31	U.S. 15-501 South
32	Weaver Diary Road
33	Bolin Creek Bikeway
34	Booker Creek Bikeway



Booker Creek Road/Old Oxford Road

Proposed bicycle route boundaries:

Traveling north to south, this route follows Booker Creek Road from Honeysuckle Road to Old Oxford Road, and Old Oxford Road to Erwin Road.

Transportational function of proposed bicycle facility:

Connector route that links the proposed Booker Creek Bikeway with the urban bicycle route system.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Residential area.

Description of currently scheduled bicycle improvements per NCDOT TIP:

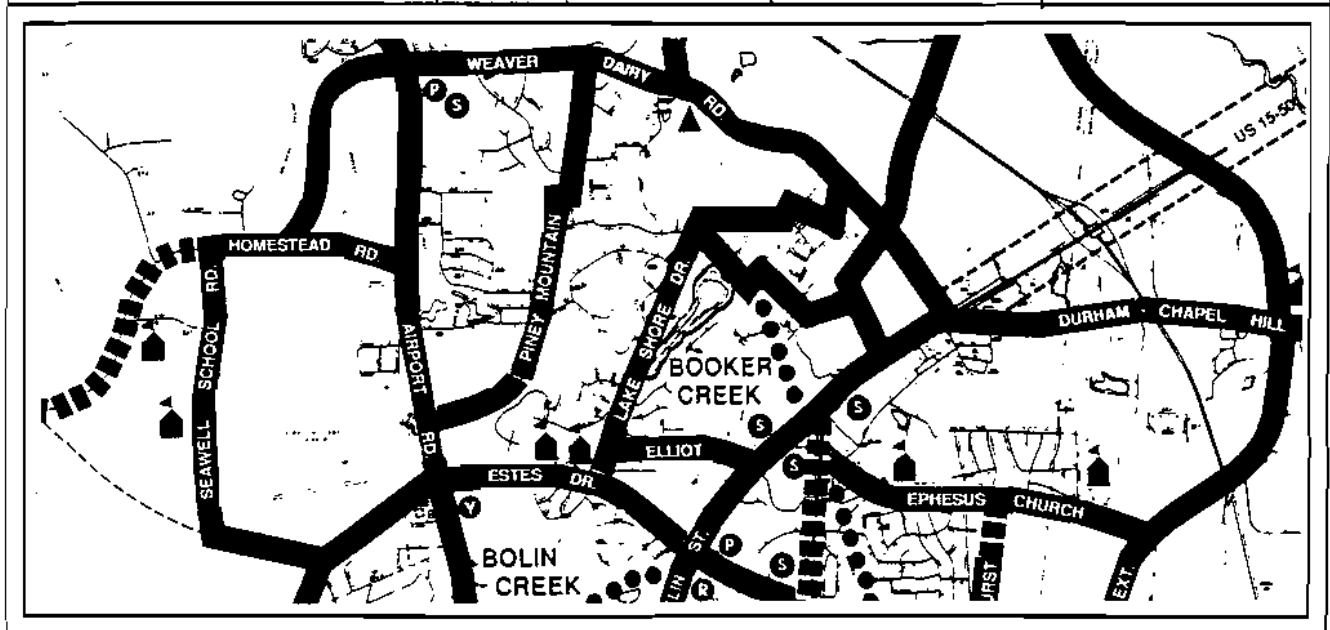
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Booker Creek/Old Oxford Rd.	N/A	Local A (both)	24'-33'	25 mph



Boundary Street

Proposed bicycle route boundaries:

Boundary Street from Country Club Road to Rosemary Street

Transportational function of proposed bicycle facility:

Connector route to Rosemary Street and Cameron Avenue - proposed bicycle routes that bypass Franklin Street through downtown Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, Battle Park, one library, residential area.

Description of currently scheduled bicycle improvements per NCDOT TIP:

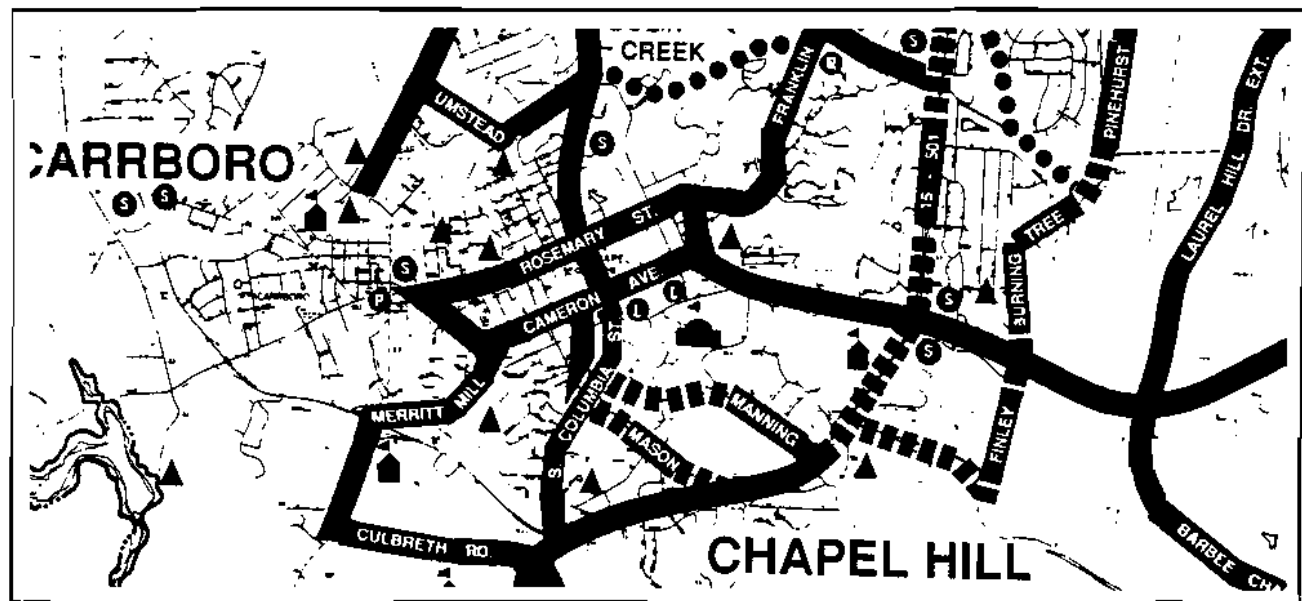
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Boundary Street	not available	Collector	variable: 18'-30'	25 mph



Burning Tree Drive/Pinehurst Drive

Proposed bicycle route boundaries:

Burning Tree Drive from NC 54 to Pinehurst Drive, and Pinehurst Drive to Ephesus Church Road.

Transportational function of proposed bicycle facility:

North-south commuter route option through Chapel Hill, to be considered if Fordham Boulevard proves unfeasible for bicycle facilities.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

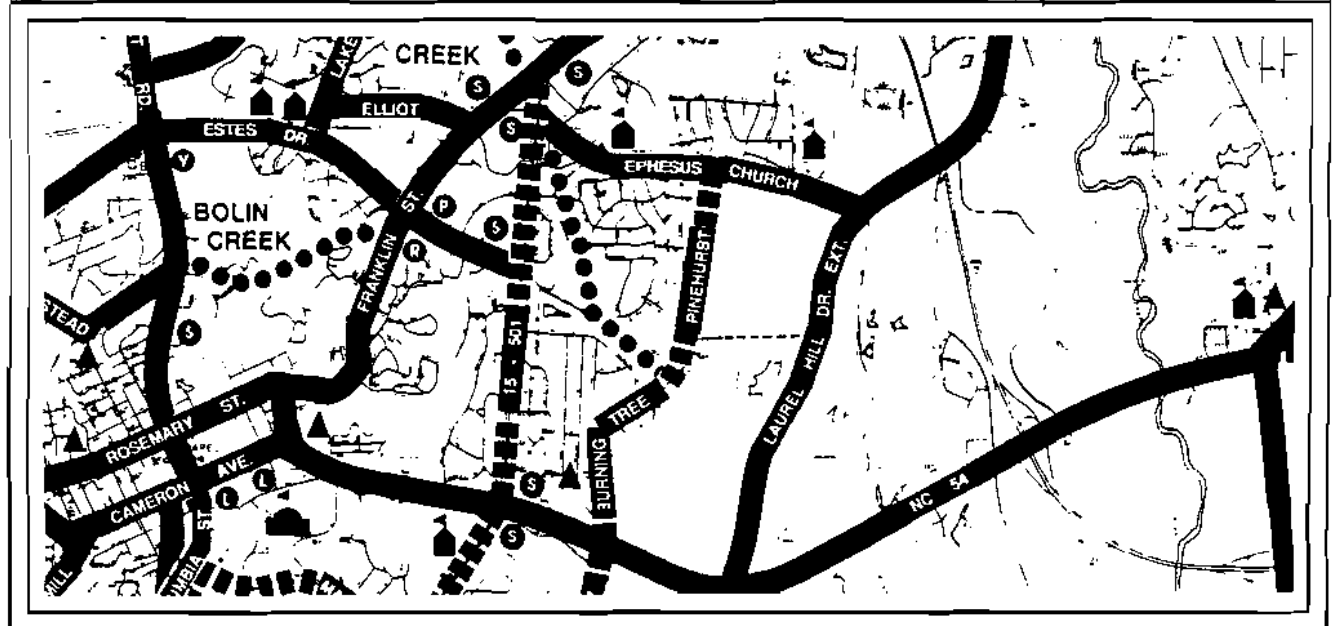
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Burning Tree Drive	2,000	Collector	36'	25 mph
Pinehurst Drive		Local C		



Cameron Avenue

Proposed bicycle route boundaries:

Cameron Avenue from Pittsboro Street to Raleigh Street

Transportational function of proposed bicycle facility:

East-west commuter route through central Chapel Hill, would serve a large number of cyclists at UNC-Chapel Hill. Also will connect with existing bicycle lanes on Cameron Avenue on western side of town, and with bicycle lanes on Country Club Boulevard.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, two libraries, one museum, one park, residential area.

Description of currently scheduled bicycle improvements per NCDOT TIP:

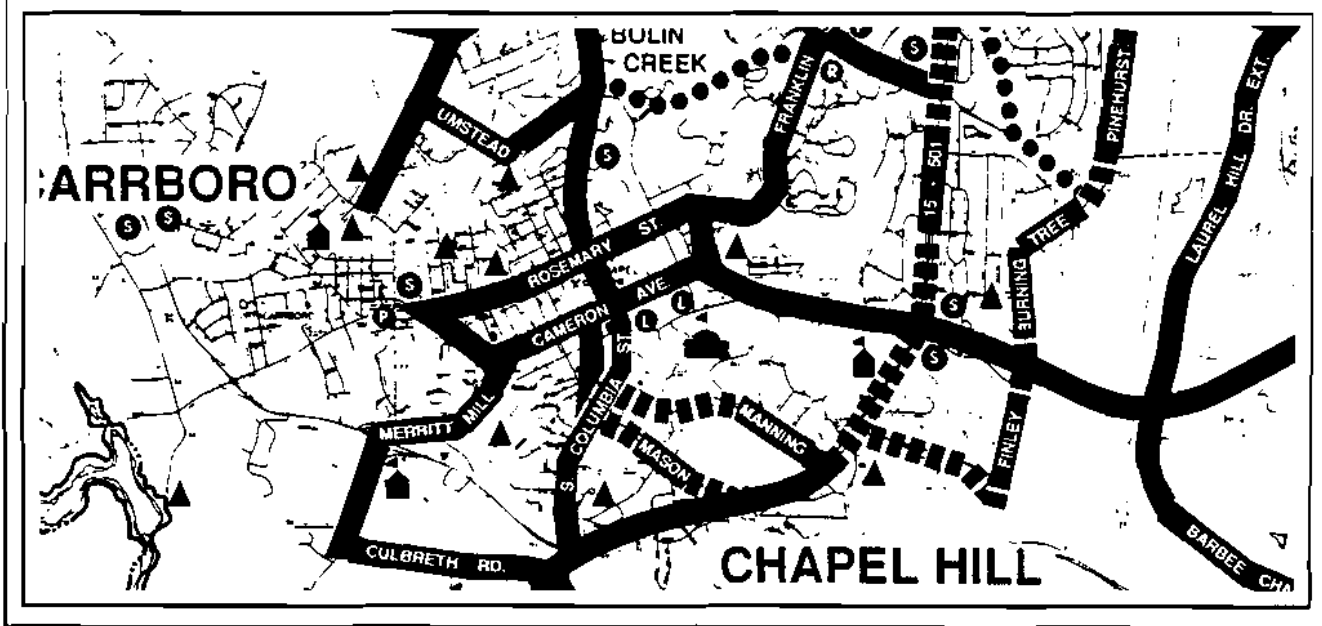
No bicycle improvements are currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Width constraints along Cameron Avenue through campus

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Cameron Avenue	13,500	Minor arterial	variable: 22'-45'	25 mph



Caswell Rd./Curtis Rd./Lake Shore Dr./Honeysuckle Rd./Sedgefield Dr. Connector Route

Proposed bicycle route boundaries:

Traveling from south to north, this route follows Caswell Road from Estes Drive to Curtis Road, Curtis Road to Lake Shore Drive, Lake Shore to Honeysuckle Road, and Honeysuckle to Sedgefield Drive, ending at Weaver Dairy Road.

Transportational function of proposed bicycle facility:

Neighborhood connector route from Estes Drive to Weaver Dairy Road and north east Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One elementary school, several residential areas.

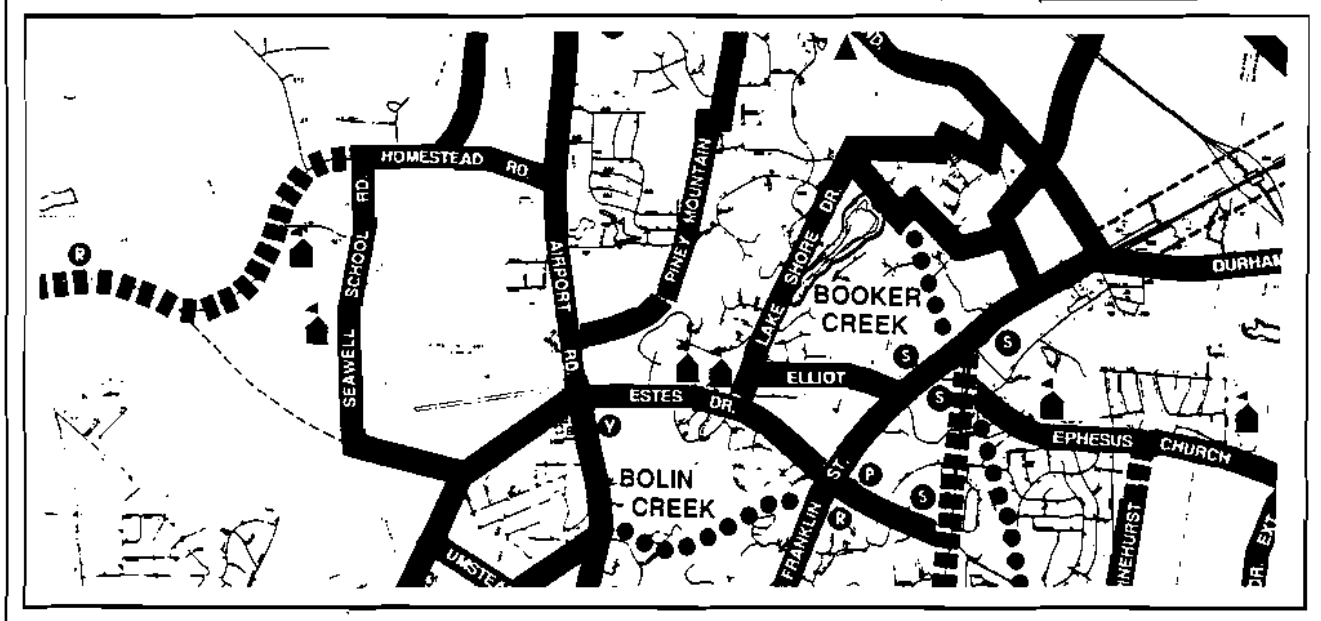
Description of currently scheduled bicycle improvements per NCDOT TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Lake Shore Connector	1,700 3,200	Collectors (all)	24'-33'	25 mph



Culbreth Road - SR 1994

Proposed route boundaries:

Culbreth Road from Smith Level Road to US 15-501 South

Transportational function of proposed facility:

East-west commuter route in southern Chapel Hill. The Mountains-to-the-Sea Bicycle Route 2 is currently routed along Culbreth Road.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One junior high school, residential area.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

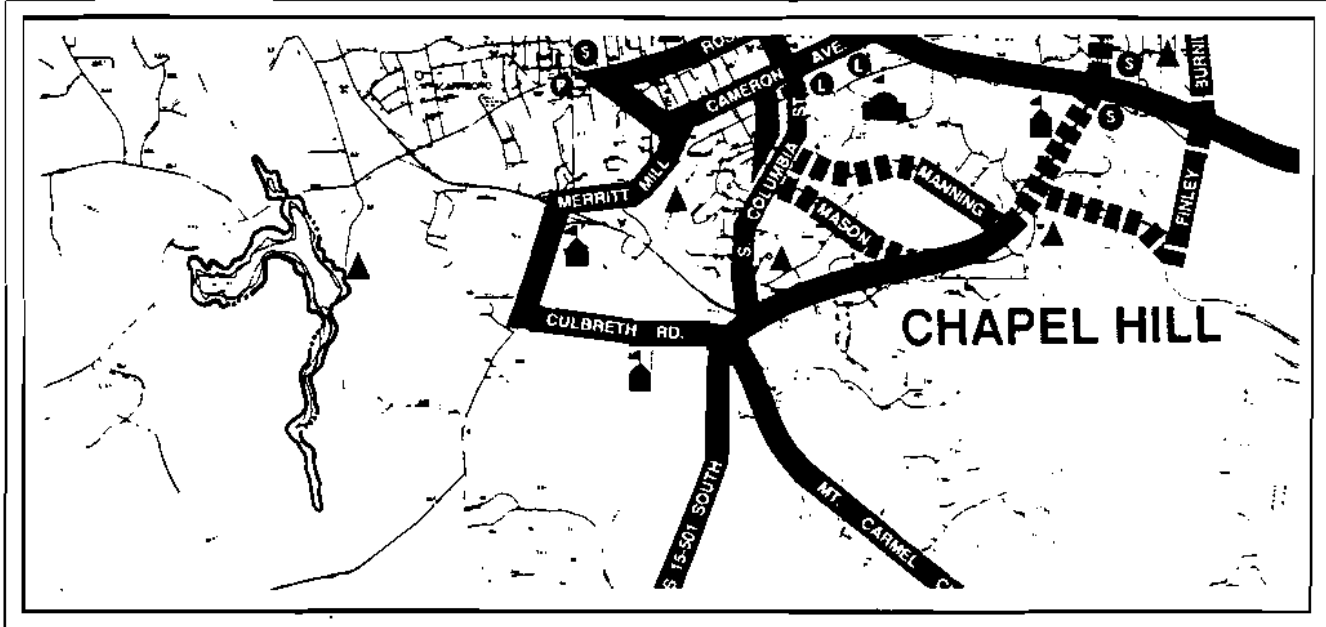
No bicycle improvements currently scheduled in the TIP, however, Culbreth Road is listed among the Town of Chapel Hill's independent bicycle projects. Planned improvements include 4' bikelanes along Culbreth Road from Smith Level Road to US 15-501 South.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width		Speed Limit
Culbreth Road - SR 1994	3300-4000	Collector (minor coll.)	20'	45 mph/west of Adams Way 20'-33'	35 mph/east of Adams Way



Elliot Road

Proposed bicycle route boundaries:

Elliot Road from Curtis Road to E. Franklin Street.

Transportational function of proposed bicycle facility:

Neighborhood connector route in central Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Residential area.

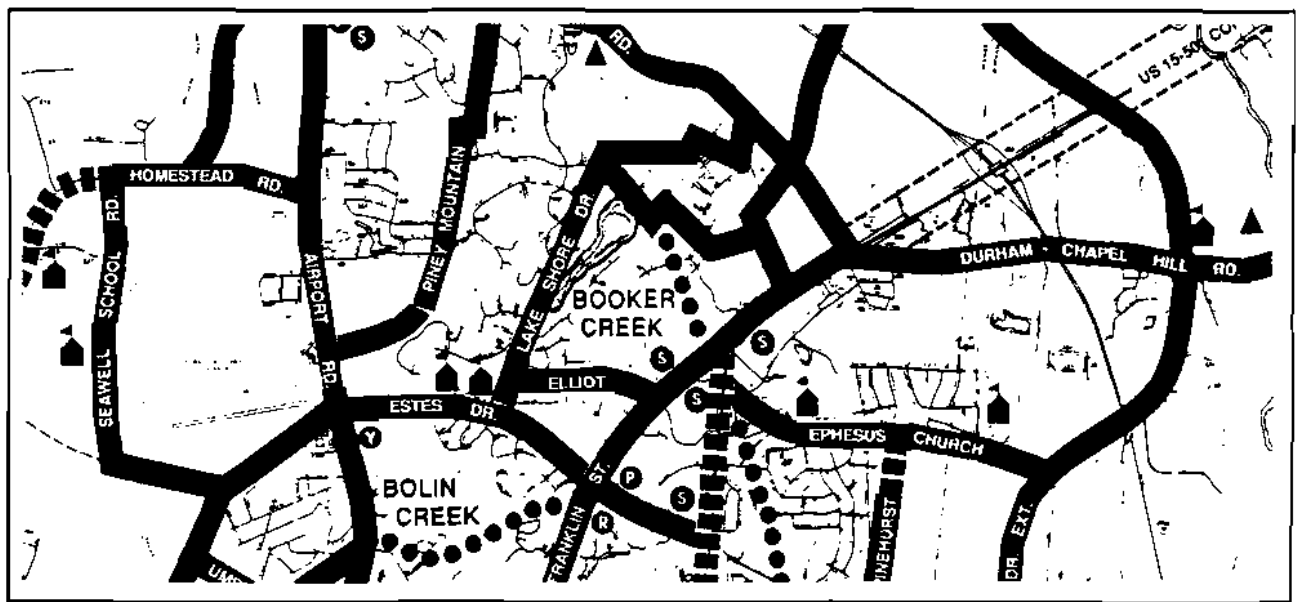
Description of currently scheduled bicycle improvements per NCDOT TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Constraint: the intersection of Elliot Road and Franklin Street is among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Elliot Road	4,100	Collector	33'	25 mph



Ephesus Church Road - SR 1742

Proposed bicycle route boundaries:

Ephesus Church Road from Fordham Boulevard to King Road

Transportational function of proposed bicycle facility:

Forms portion of a commuter route option to Durham. This route would enable cyclists to bypass the 15-501/Franklin Street interchange. This facility will also connect with the proposed Booker Creek off-road bikeway.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Two schools, one shopping center, several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

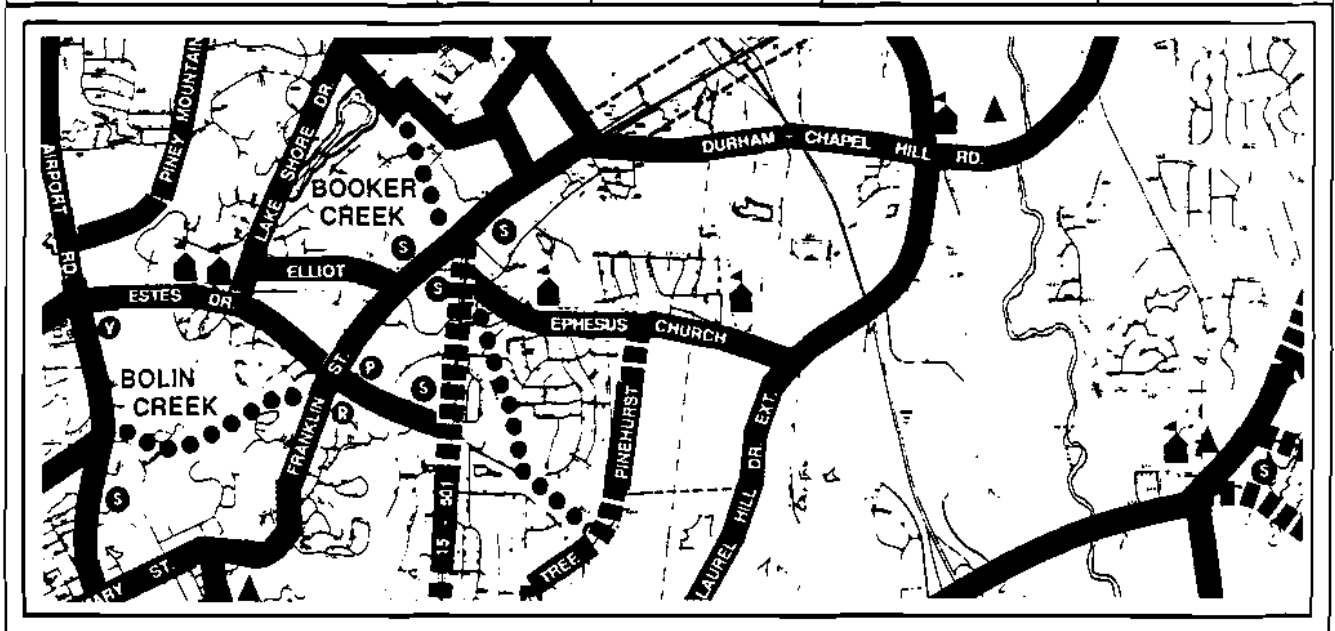
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Ephesus Church Rd. - SR 1742	7400-7800	Minor arterial	36' Orange Co. 22' Durham Co.	35 mph



Erwin Road - SR 1734

Proposed bicycle route boundaries:

Erwin Road from U.S. 15-501 to Durham county line

Transportational function of proposed bicycle facility:

Serves as a commuter route option from northern Chapel Hill to north/central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Route passes through Duke Forest, several residential areas, one school.

Description of currently scheduled bicycle improvements per NCDOT TIP:

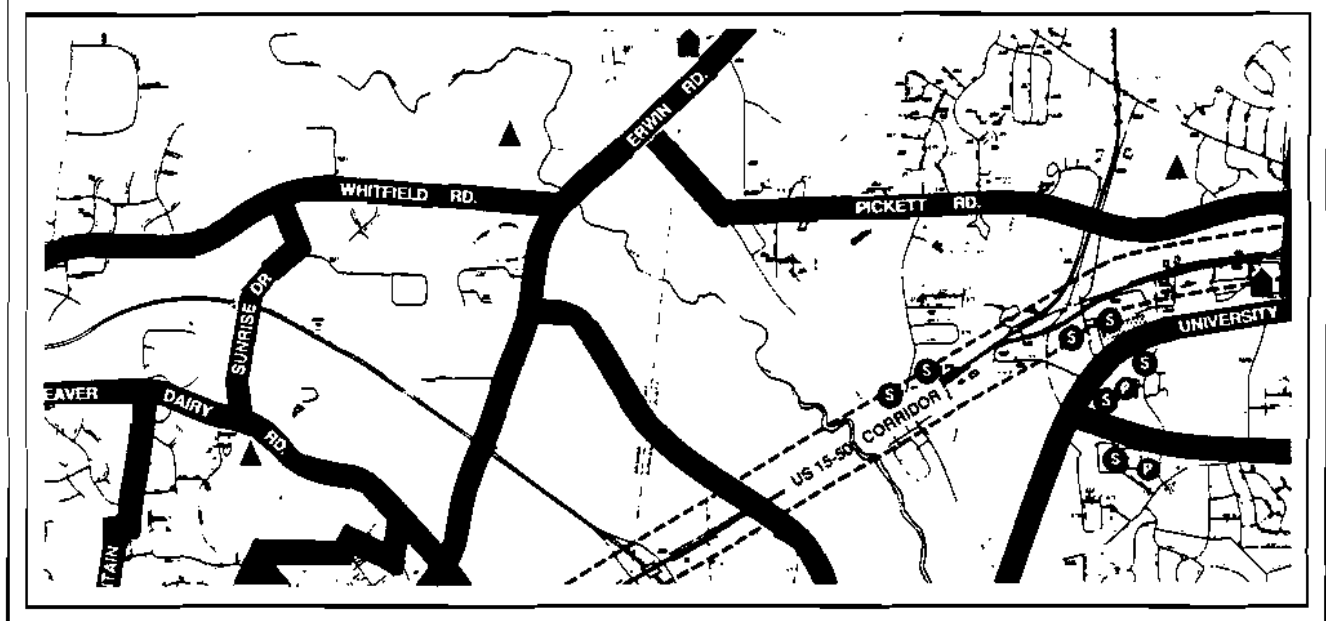
Erwin Road from Durham to Chapel Hill is scheduled for incidental bicycle improvements in the TIP (no length or date specified). Improvements will include wide paved shoulders.

Possible opportunities/constraints along proposed bicycle route:

I-40 crossing may be a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Erwin Road - SR 1734	10,000-14,600	Principal arterial	18'-22'	35 mph (in town) 45 mph (in Co.)



Estes Drive - SR 1780/1750

Proposed bicycle route boundaries:

Estes Drive from Carrboro city limits to 15-501 Bypass

Transportational function of proposed bicycle facility:

East-west commuter route in northern Chapel Hill, links residential areas and commercial areas, also provides link from west Chapel Hill to commuter route in Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

YMCA, Horace Williams Airport, one park, one recreation center, one post office, one junior high school, one elementary school, University Mall, several residential areas.

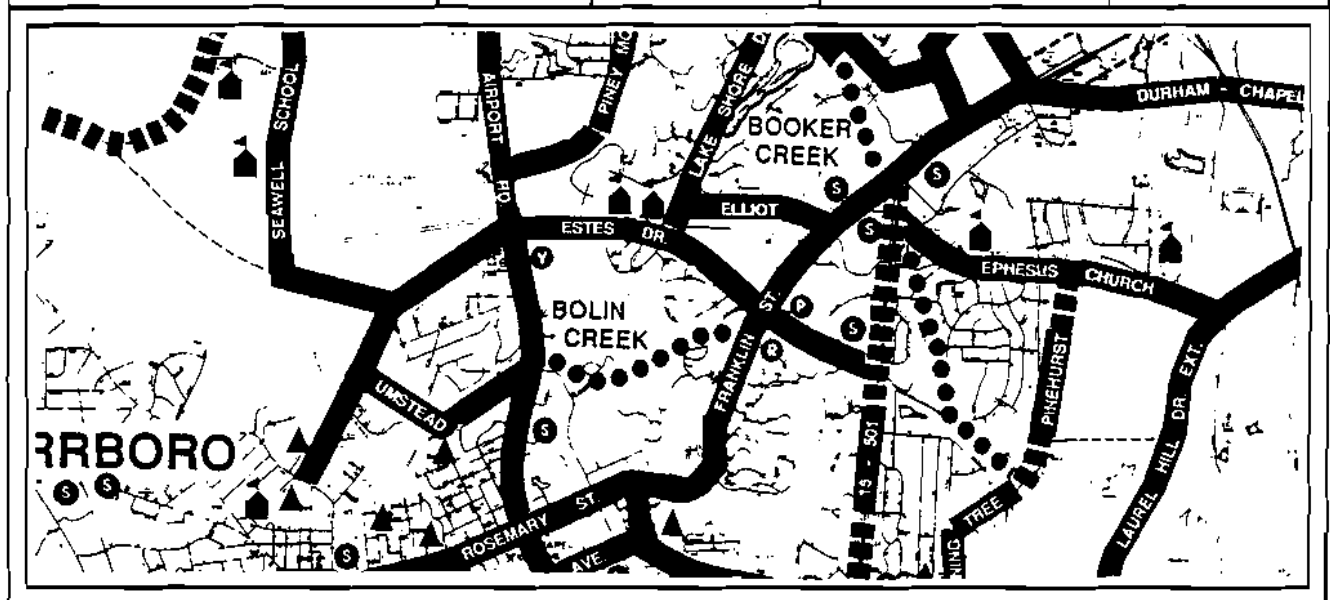
Description of currently scheduled bicycle improvements per NCDOT TIP:

The NCDOT Bicycle Program will examine Estes Drive from Airport Road to Caswell Road in a 1993 feasibility study. Estes Drive was previously funded in the 1988 TIP for \$141,000.00 for the 1.3 mile section from NC 86 to Carrboro town limits. This project was found to be unfeasible by the NCDOT Bicycle Program as an independent project. Estes Drive is now listed as an incidental project (no date specified).

Possible opportunities/constraints along proposed bicycle route:

The Orange Co. Thoroughfare Plan Study Report found the intersections of Estes Dr. with Airport Rd. and Franklin St. to be among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Estes Drive - NC 1780/1750	12,000-16,000	Principal arterial	20' west of NC 86 20'-33' to Franklin 22'-65' to 15-501	35 mph



Finley Golf Course Rd./Mason Farm Rd. Connector

Proposed bicycle route boundaries:

Traveling north to south, this route follows Finley Golf Course Road to Mason Farm Road, and Mason Farm Road to Fordham Boulevard.

Transportational function of proposed bicycle facility:

Connector route option through east Chapel Hill, to be considered if Fordham Boulevard is found unfeasible for bicycle facilities.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

North Carolina Botanical Garden

Description of currently scheduled bicycle improvements per NCDOT TIP:

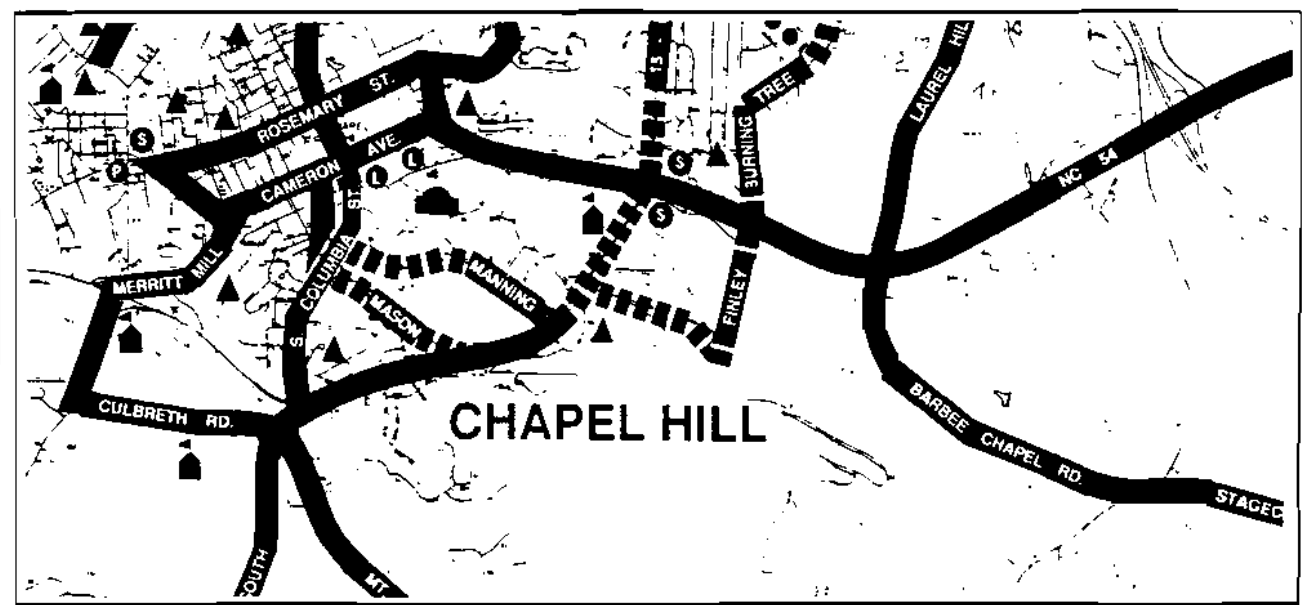
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Finley Golf Course Road	1,200	Local B	18'-22'	45 mph
Mason Rd.	900	Local B	18'-22'	25 mph



Fordham Boulevard (15-501 Bypass)

Proposed bicycle route boundaries:

15-501 Bypass from SR 1838 (Old Durham/Chapel Hill Road) to Culbreth Road

Transportational function of proposed bicycle facility:

Commuter route option from northern to southern Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Five shopping centers, residential areas, University Mall, two schools, the NC Botanical Garden, Dean Smith Athletic Center.

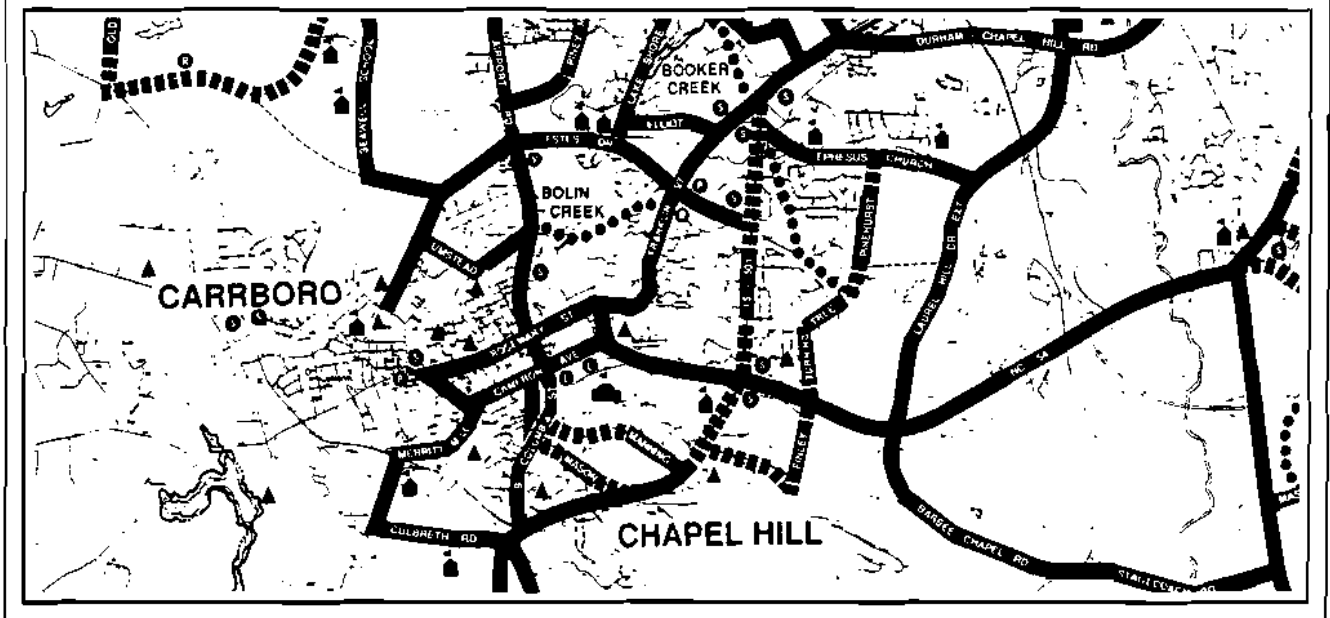
Description of currently scheduled bicycle improvements per NCDOT TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Opportunities: this roadway currently has 4' paved shoulders from Elliott Road to South Columbia Street. This route connects with the proposed Morgan Creek Greenway.
 Constraints: intersections with Elliot Road, Willow Drive, and Manning Drive are among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Fordham Blvd. (15-501 Bypass)	21,200-28,400	Principal arterial	divided hwy. 28' each side	45 mph



Franklin Street

Proposed bicycle route boundaries:

Franklin Street from Boundary Street to Durham-Chapel Hill Road

Transportational function of proposed bicycle facility:

Connector route from central Chapel Hill to Durham commuter routes

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Two parks, one library, one recreation center, two shopping centers, residential areas, Horace Williams House, downtown.

Description of currently scheduled bicycle improvements per NCDOT TIP:

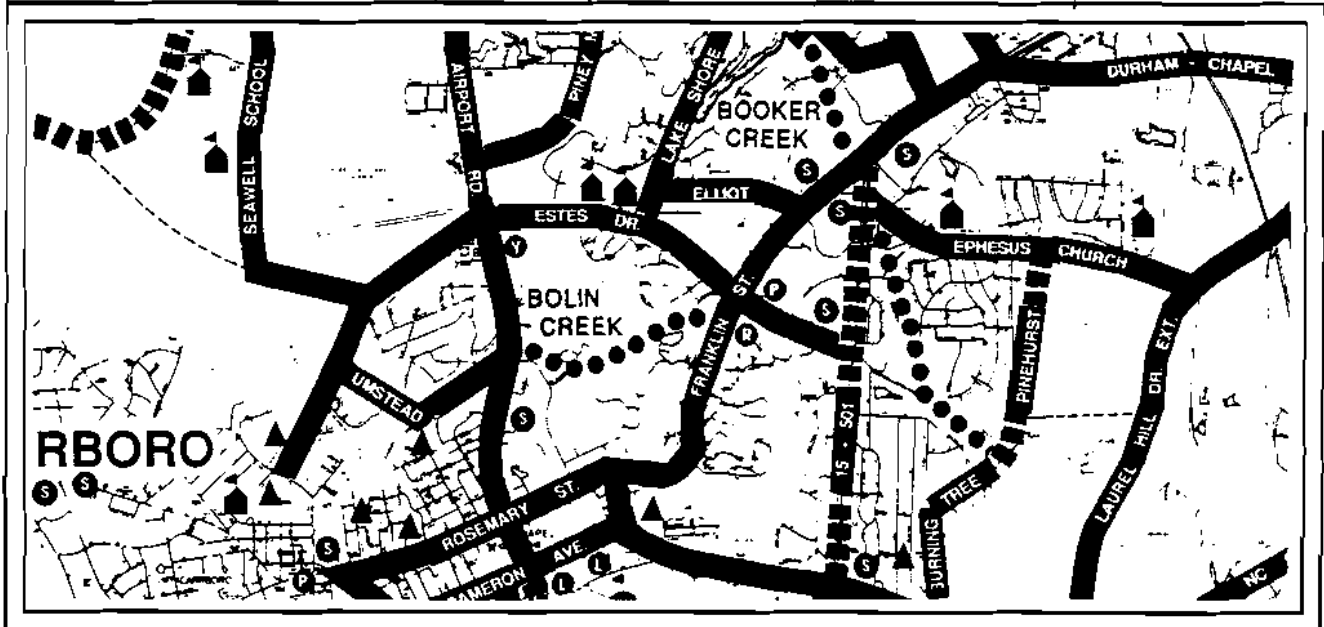
No bicycle improvements currently scheduled. Existing bicycle facilities along this route should be evaluated to determine whether they meet national standards for bicycle facilities, and modified appropriately if they are found to be substandard.

Possible opportunities/constraints along proposed bicycle route:

Opportunities: this facility will connect with the proposed Bolin Creek Greenway.

Constraints: Urban congestion; this section of Franklin has a sharp curve that must be taken into consideration. Intersections with Elliot Road, Estes Drive, and Henderson Street are among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Franklin Street	24,000-31,700	Principal arterial	variable: 50'-60'	20 mph/downtown 35 mph/east town



Homestead Road - SR 1117

Proposed bicycle route boundaries:

Homestead Road from Airport Road to Old NC 86

Transportational function of proposed bicycle facility:

Commuter route from areas north-east of town limits. This route also forms a portion of a commuter route option to Hillsborough.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Homestead Historic Site, one high school, residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

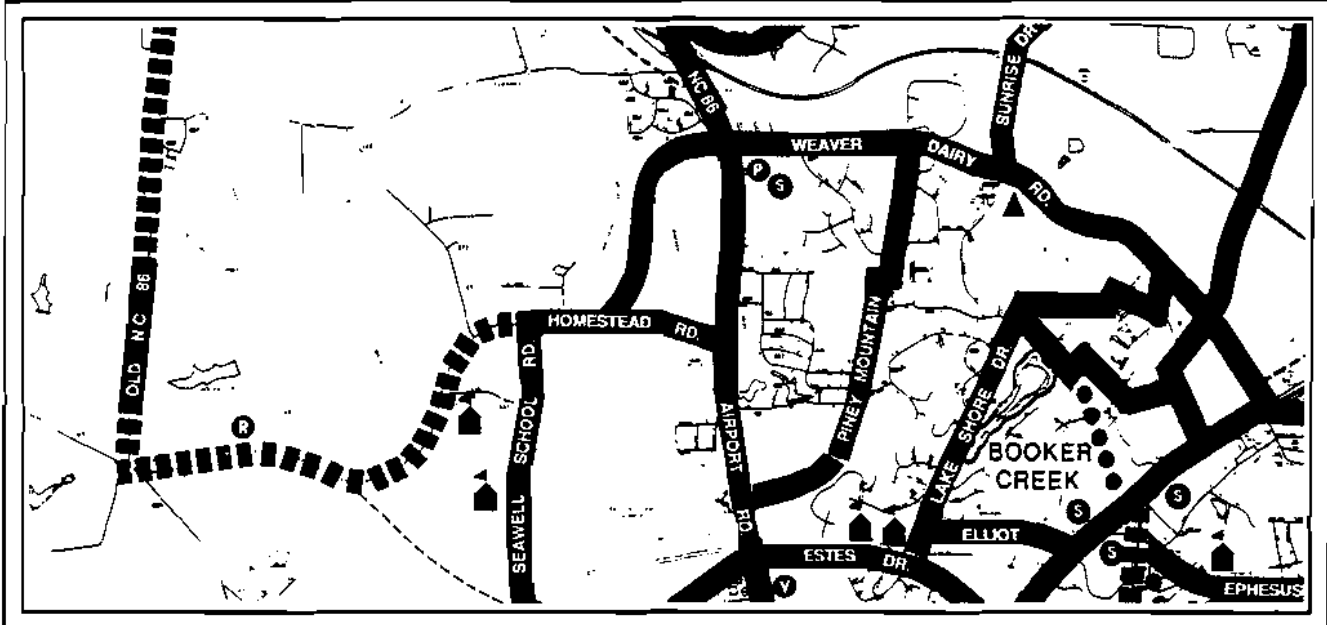
Homestead from High School Rd. to NC 86 to have 4' wide paved shoulders(incidental- no date).

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Homestead Road - SR 1117	2500	Minor thoroughfare	variable: 20'-36'	35 mph



Manning Drive

Proposed bicycle route boundaries:

Manning Drive from Fordham Boulevard to South Columbia Street

Transportational function of proposed bicycle facility:

Commuter route option connecting central Chapel Hill (and UNC Campus) to 15-501 Bypass and points east.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, Dean Smith Center, North Carolina Memorial Hospital, North Carolina Botanical Garden.

Description of currently scheduled bicycle improvements per NCDOT TIP:

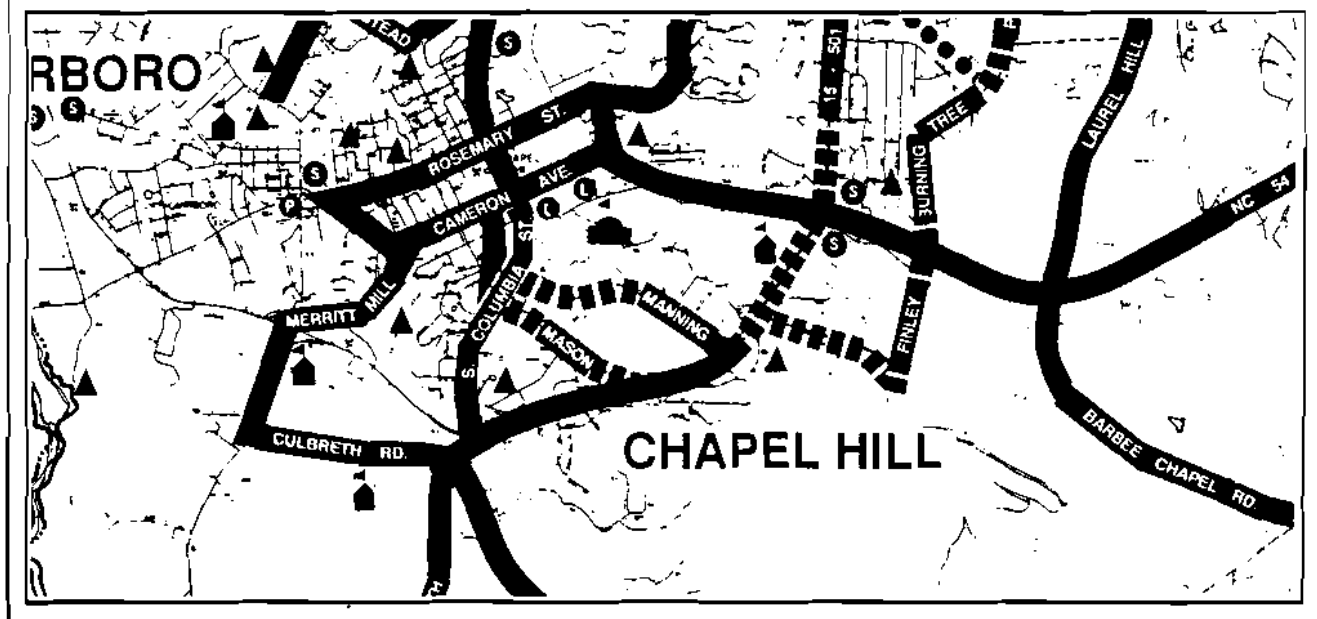
No bicycle improvements currently scheduled.

Possible opportunities /constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Manning Drive	8000-9000	Minor arterial	60'	25 mph



Mason Farm Road

Proposed bicycle route boundaries:

Mason Farm Road from Fordham Boulevard to South Columbia Street

Transportational function of proposed bicycle facility:

Commuter route option connecting central Chapel Hill (and UNC Campus) to 15-501 Bypass and points east.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, Dean Smith Athletic Center, North Carolina Memorial Hospital.

Description of currently scheduled bicycle improvements per NCDOT TIP:

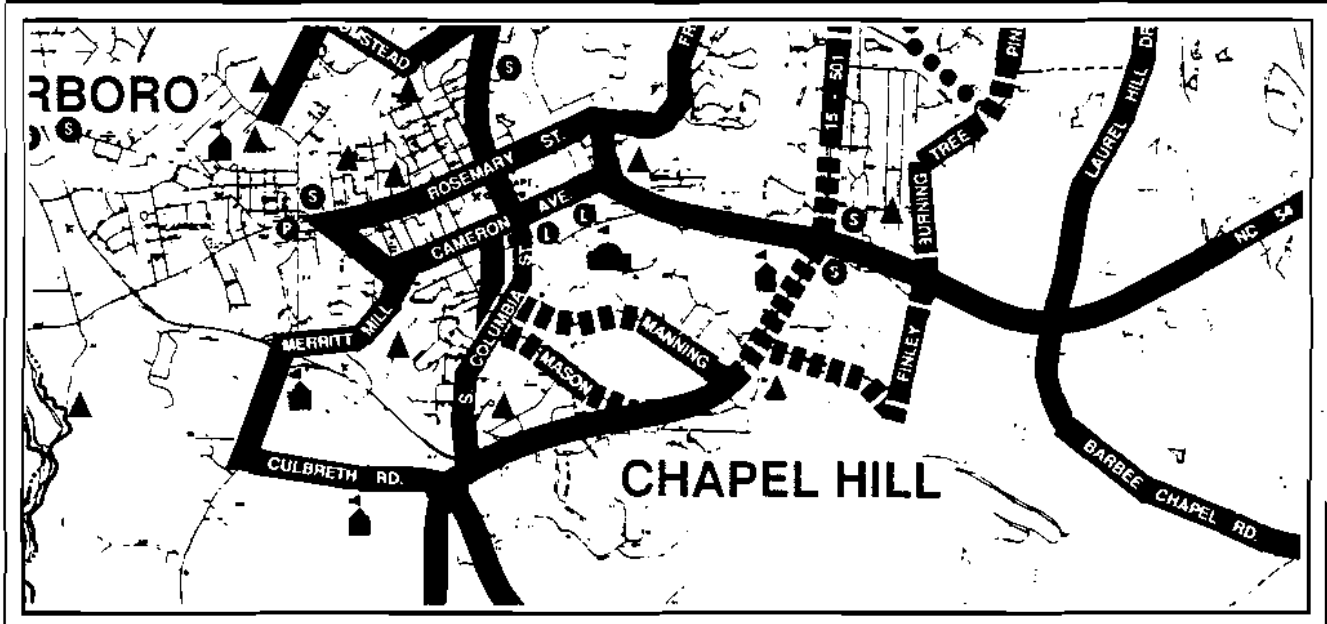
No bicycle improvements currently scheduled.

Possible opportunities / constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Mason Farm Road	6000	Collector	18'-22'	25 mph



Merritt Mill Road

Proposed bicycle route boundaries:

Merritt Mill Road from Cameron Avenue to the NC 54 Bypass.

Transportational function of proposed bicycle facility:

Connector route to southern regional bicycle routes.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One elementary school, several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

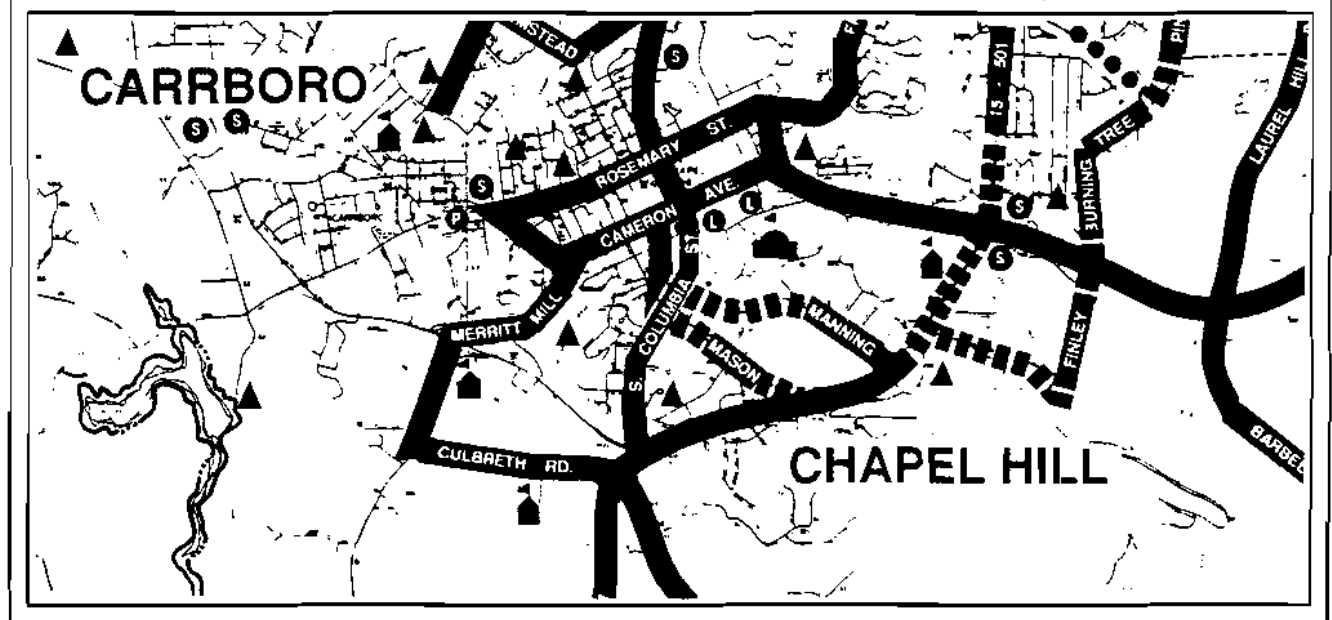
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvm. Width	Speed Limit
Merritt Mill Road	6,200	Minor arterial	36'	25 mph



Mount Carmel Church Road - SR 1008

Proposed bicycle route boundaries:

Mount Carmel Church Road from U.S. 15-501 South to the Chatham county line.

Transportational function of proposed bicycle facility:

Commuter route linking southern residential areas and Chatham County with Chapel Hill. The Mountains-to-the-Sea Bicycle Route 2 is routed along Mount Carmel Church Road.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas, developing areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

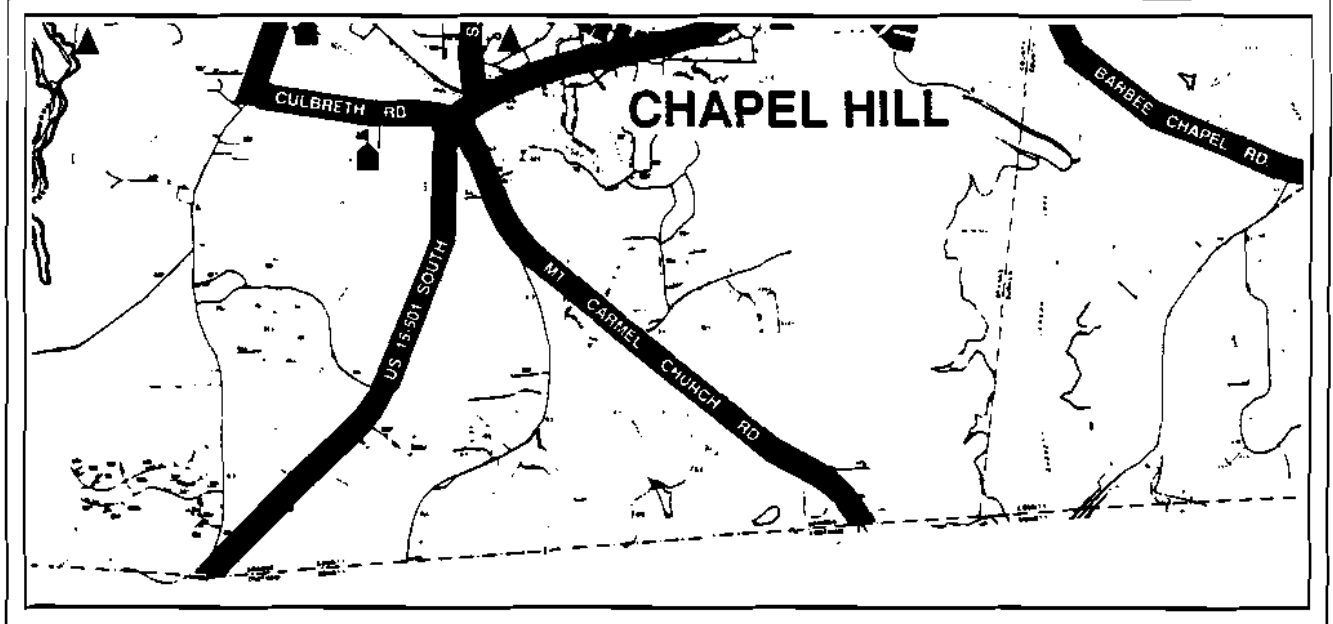
Mount Carmel Church Road from US 15-501 to the Chatham County line is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide paved shoulders.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Mount Carmel Church Road	6200-4200	Major thoroughfare	20'-22'	35-45 mph



Airport Road - NC 86

Proposed bicycle route boundaries:

NC 86 north from Columbia Street to Whitfield Road. Possibility of improvements to NC 86 from Whitfield Road to Hillsborough should also be examined.

Transportational function of proposed bicycle facility:

North-south commuter route to central Chapel Hill. Also serves as a portion of a commuter route option to Hillsborough.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Two shopping centers, a YMCA, one post office; several residential, commercial and business areas.

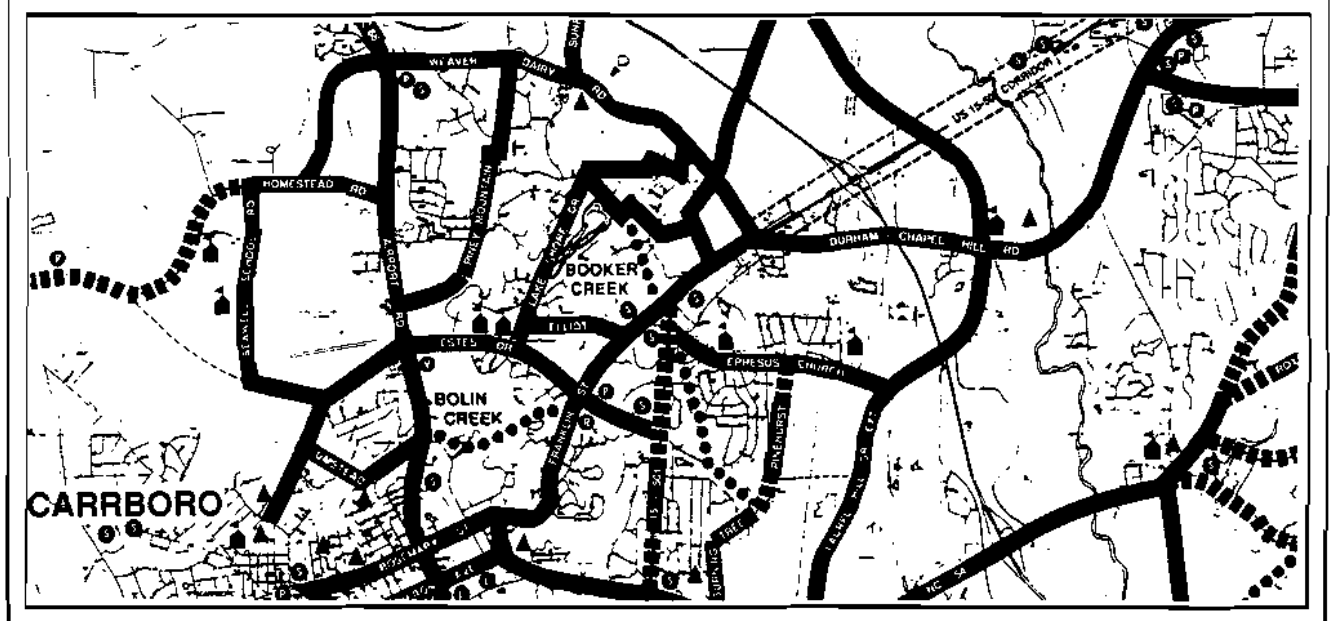
Description of currently scheduled bicycle improvements per NCDOT TIP:

NC 86 from SR 1777 to I-40 is scheduled for bicycle improvements in the TIP. Wide curb lanes will be constructed along this segment in 1997. Existing bicycle facilities along this route should be evaluated to determine whether they meet national standards for bicycle facilities, and modified appropriately if they are found to be substandard.

Possible opportunities/constraints along proposed bicycle route:

Constraints: I-40 interchange, intersection of Airport Road and Estes Drive is among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
NC 86 - Airport Road	23,800-20,000	Principal arterial	18' north of Homestead	35 mph



Old Durham-Chapel Hill Road - SR 1838

Proposed bicycle route boundaries:

Old Durham-Chapel Hill Road from U.S. 15-501 to Durham County line

Transportational function of proposed bicycle facility:

Commuter route option from Chapel Hill to Durham. This route forms a linkage to south-central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Residential area

Description of currently scheduled bicycle improvements per NCDOT TIP:

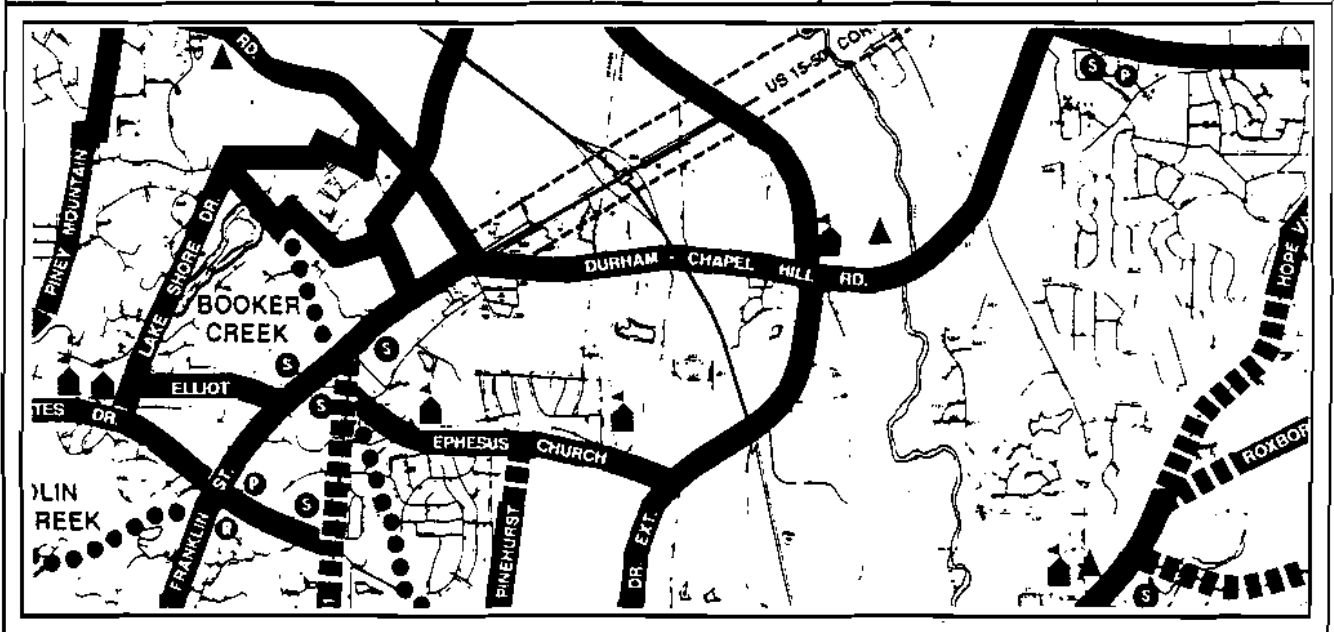
No bicycle improvements currently scheduled in the TIP for Orange County, however, Old Durham-Chapel Hill Road is listed among the Town of Chapel Hill's independent bicycle projects. Planned improvements include travel lane widening and 4' bikelanes along Old Durham-Chapel Hill Road from Scarlette Drive to Pope Road.

Possible opportunities/constraints along proposed bicycle route:

Intersection with U.S. 15-501 may prove a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Old Durham-Chapel Hill Road	not available	Major thoroughfare	28' /501-Standish 18'/to I-40	35 mph



Piney Mountain Road

Proposed bicycle route boundaries:

Piney Mountain Road from Airport Road to Weaver Dairy Road via Cedar Hills Circle

Transportational function of proposed bicycle facility:

Commuter route option from central Chapel Hill to Weaver Dairy Road and areas north-east of town.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas, Cedar Falls Park.

Description of currently scheduled bicycle improvements per NCDOT TIP:

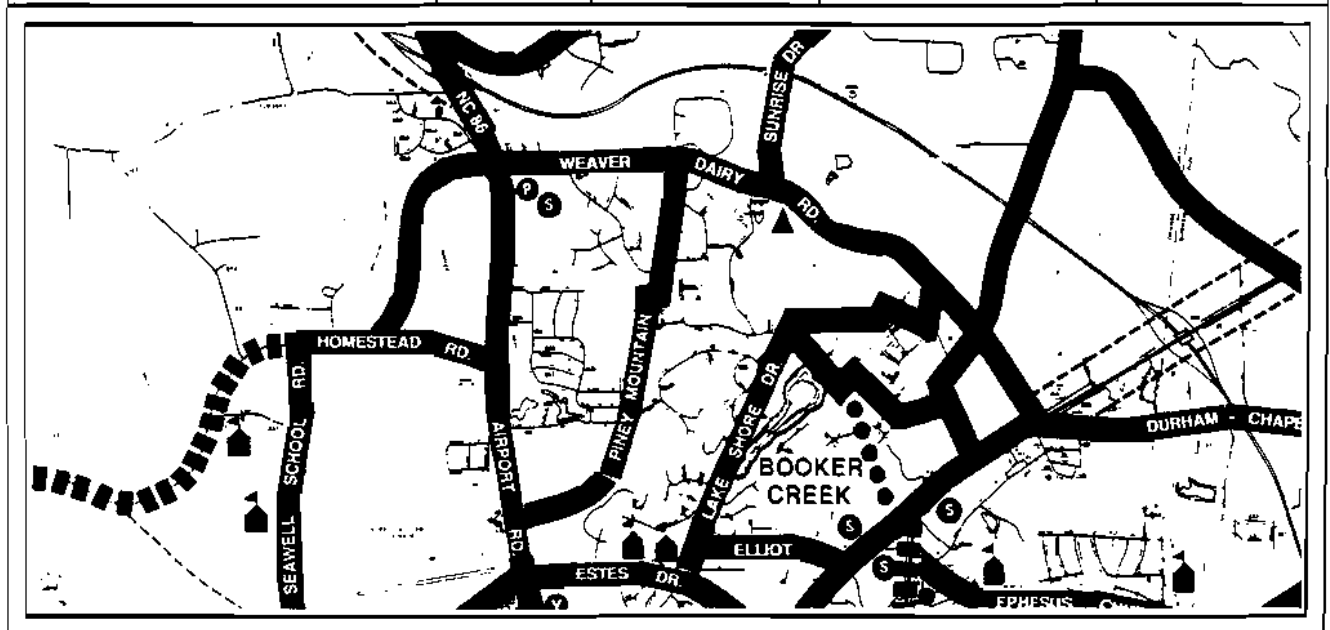
No bicycle improvements currently scheduled in the TIP, however, Piney Mountain Road is listed among the Town of Chapel Hill's independent bicycle projects. Planned improvements include travel lane widening and 4' bikelanes along Piney Mountain Road from NC 86 to Riggsbee Road.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Piney Mountain Road	4500	Collector	variable: 24'-36'	35 mph
Cedar Hills Circle	N.A.		18'	35 mph



Pittsboro Street

Proposed bicycle route boundaries:

Pittsboro Street from Cameron Avenue to South Columbia Street.

Transportational function of proposed bicycle facility:

Commuter route through town, along a one-way street.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

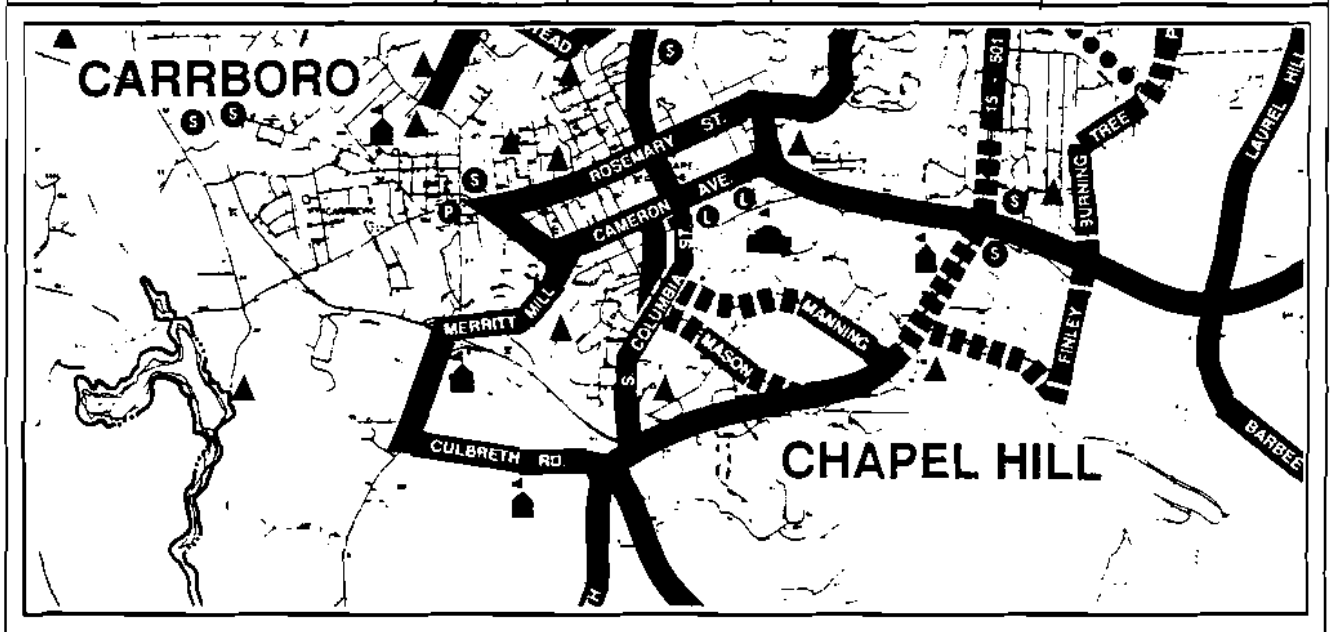
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Pittsboro Street	10,600	Collector	24'-30'	25 mph



Rosemary Street

Proposed bicycle route boundaries:

Rosemary Street from Boundary Street to Carrboro city limits

Transportational function of proposed bicycle facility:

East-west commuter route through downtown Chapel Hill. This route bypasses congestion along Franklin Street.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One library, one post office, UNC-Chapel Hill campus, downtown Carrboro and Chapel Hill; commercial, business and residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

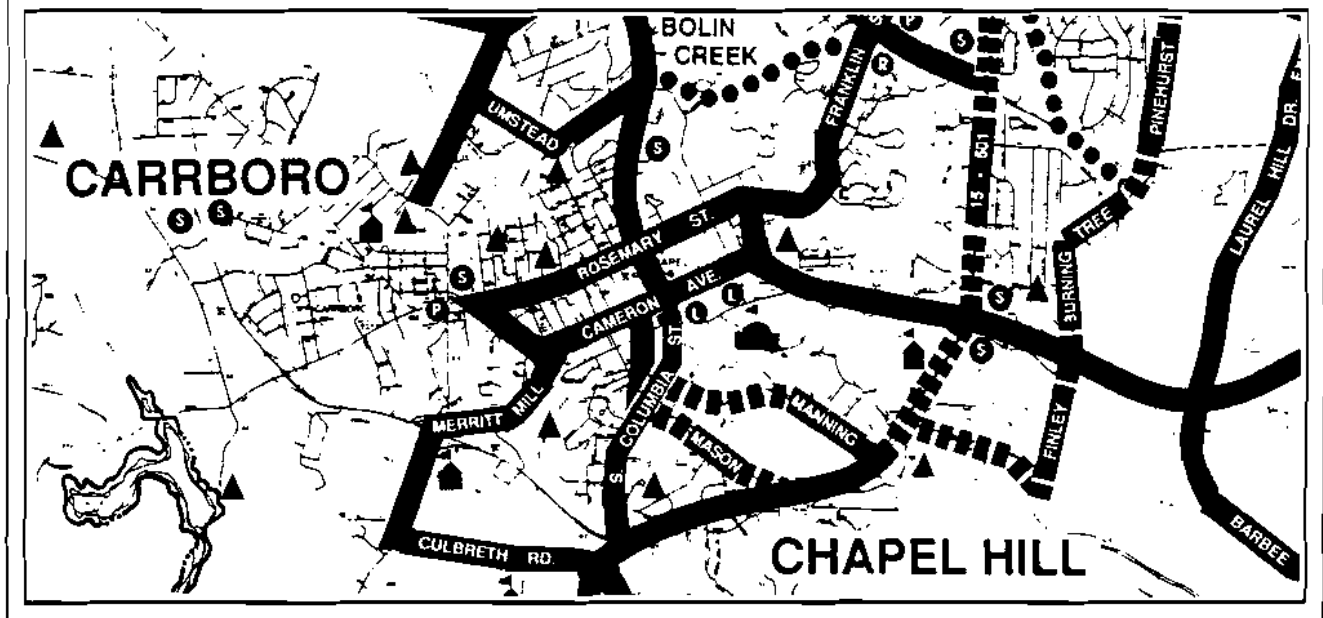
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Constraints: narrow street, intersection with Columbia Street is among the highest accident intersections in Chapel Hill.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Rosemary Street	11,500	Collector	40' Main to Henderson 24' Henderson to Hillsb.	25 mph



Seawell School Road - SR 1843

Proposed bicycle route boundaries:

Seawell School Road from Homestead Road to the Estes Drive Extension.

Transportational function of proposed bicycle facility:

Connector route through north-west Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One high school, one elementary school.

Description of currently scheduled bicycle improvements per NCDOT TIP:

No bicycle improvements currently scheduled in the TIP, however, this segment of Seawell School Road is listed among the Town of Chapel Hill's independent bicycle projects.

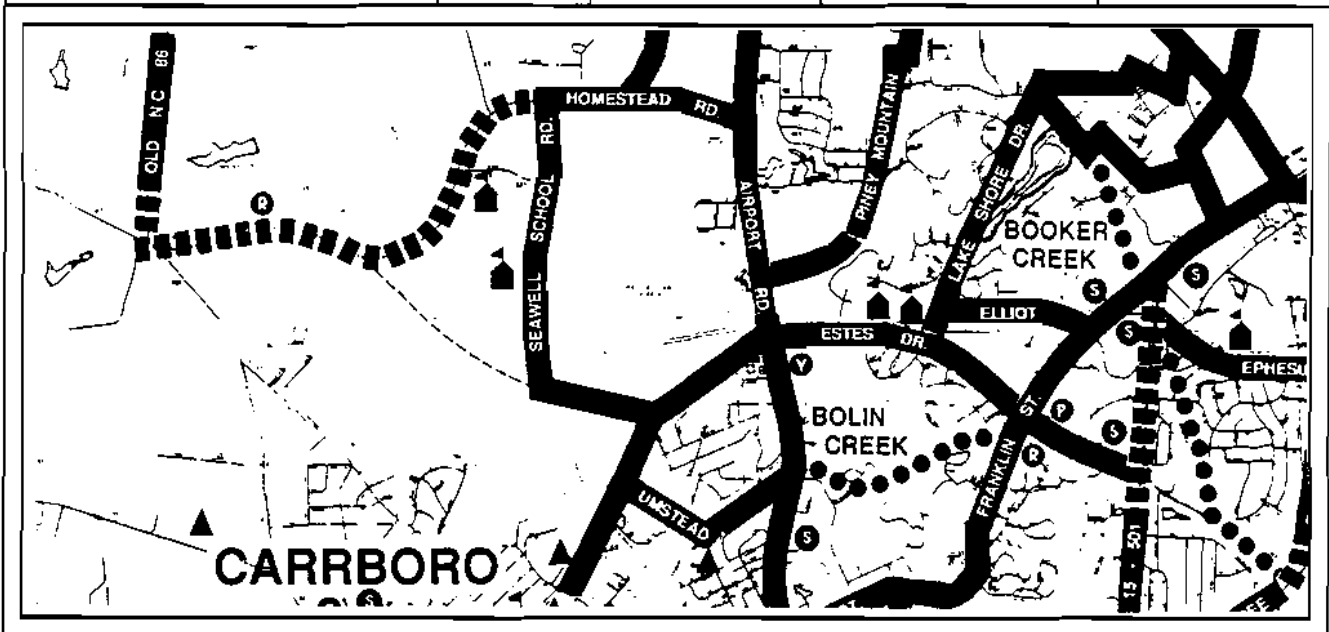
Planned improvements include 4' wide bikelanes.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Seawell School Road	1700-2300	Collector	22'	35 mph



Smith Level Road - SR 1919

Proposed bicycle route boundaries:

Smith Level Road from NC 54 Bypass to Culbreth Road

Transportational function of proposed bicycle facility:

Commuter route for residential areas south of Chapel Hill, linking them to the town and to proposed regional bicycle routes. Also, serves as a portion of the Mountains-to-the-Sea Bicycle Route #2 through Orange County.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Residential areas, one elementary school

Description of currently scheduled bicycle improvements per NCDOT TIP:

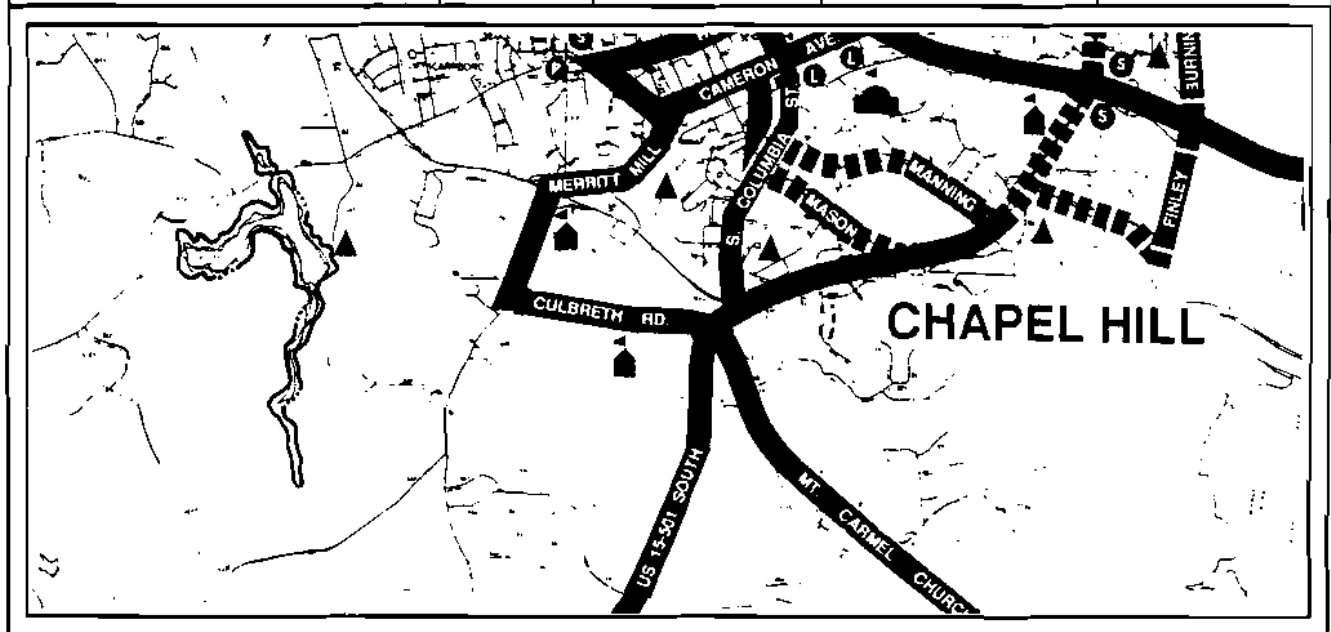
Smith Level Road from NC 54 to Rock Haven Road is scheduled for bicycle improvements in the TIP. Improvements include wide paved shoulders (no date specified) and bicycle safety improvements at the bridge crossing over Morgan Creek.

Possible opportunities/constraints along proposed bicycle route:

Opportunity: this facility will connect with the proposed Morgan Creek Greenway.

Constraint: Smith Level Road and NC 54 interchange will need special consideration.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Smith Level Road SR 1919	12,000	Major thoroughfare	18'-22'	not available



South Columbia Street - NC 86

Proposed bicycle route boundaries:

South Columbia Street from Airport Road to US 15-501 Bypass

Transportational function of proposed bicycle facility:

North-south commuter route through Chapel Hill, linking regional routes that pass through town.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, Kenan Stadium, Ackland Art Museum, Charles Jones Park, one library, one post office, several residential areas and Franklin Street commercial areas.

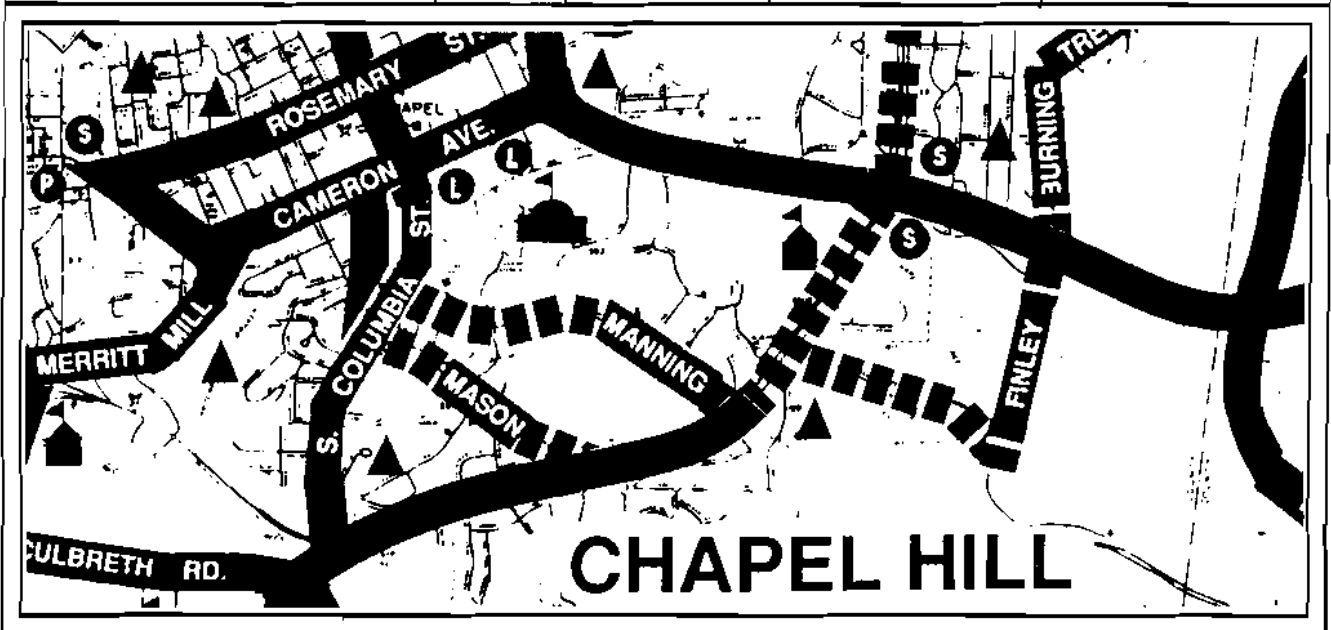
Description of currently scheduled bicycle improvements per NCDOT TIP:

South Columbia Street from Manning Drive to US 15-501 is scheduled for incidental improvements in the TIP, to include wide curb lanes (no date specified).

Possible opportunities/constraints along proposed bicycle route:

Constraints: US 15-501 interchange, congested areas through UNC-Chapel Hill. Intersections with Rosemary Street and Franklin Street are among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pmnt. Width	Speed Limit
South Columbia Street	17,500-19,400	Principal arterial	24'-38' to Cameron 51'-64' to Airport	25mph/Mason-Airp. 35mph/Mason-501



South Raleigh Road - NC 54

Proposed bicycle route boundaries:

NC 54 from Country Club Road to the Durham County line

Transportational function of proposed bicycle facility:

Commuter route option from Chapel Hill to Research Triangle Park and south Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

UNC-Chapel Hill campus, Battle Park, a Park and Ride facility, two schools, two shopping centers, and one park.

Description of currently scheduled bicycle improvements per NCDOT TIP:

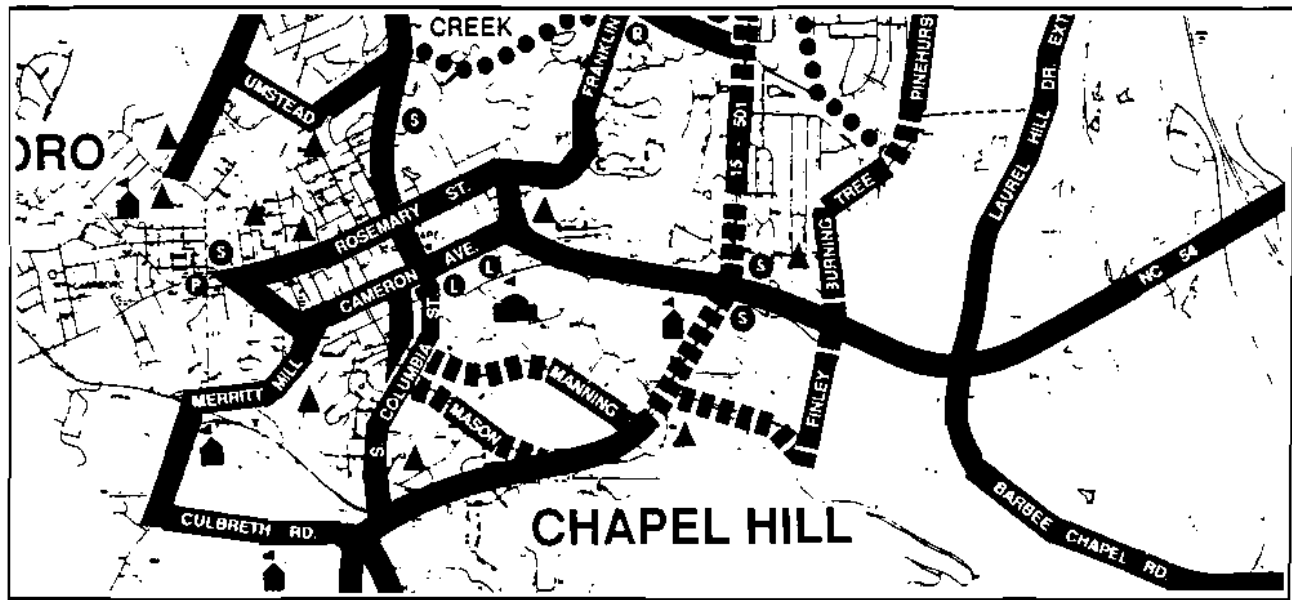
No bicycle improvements currently scheduled along this portion of NC 54.

Possible opportunities/constraints along proposed bicycle route:

Constraints: U.S. 15-501 Interchange, strip development.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
South Raleigh Road (NC 54)	16,400-30,400	Principal arterial	48'-72'	35 mph/west 45 mph/east



Sunrise Drive

Proposed bicycle route boundaries:

Sunrise Drive from Whitfield Road to Weaver Dairy Road

Transportational function of proposed bicycle facility:

North-south connector route between proposed regional bicycle routes.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Residential area, Cedar Falls park.

Description of currently scheduled bicycle improvements per NCDOT TIP:

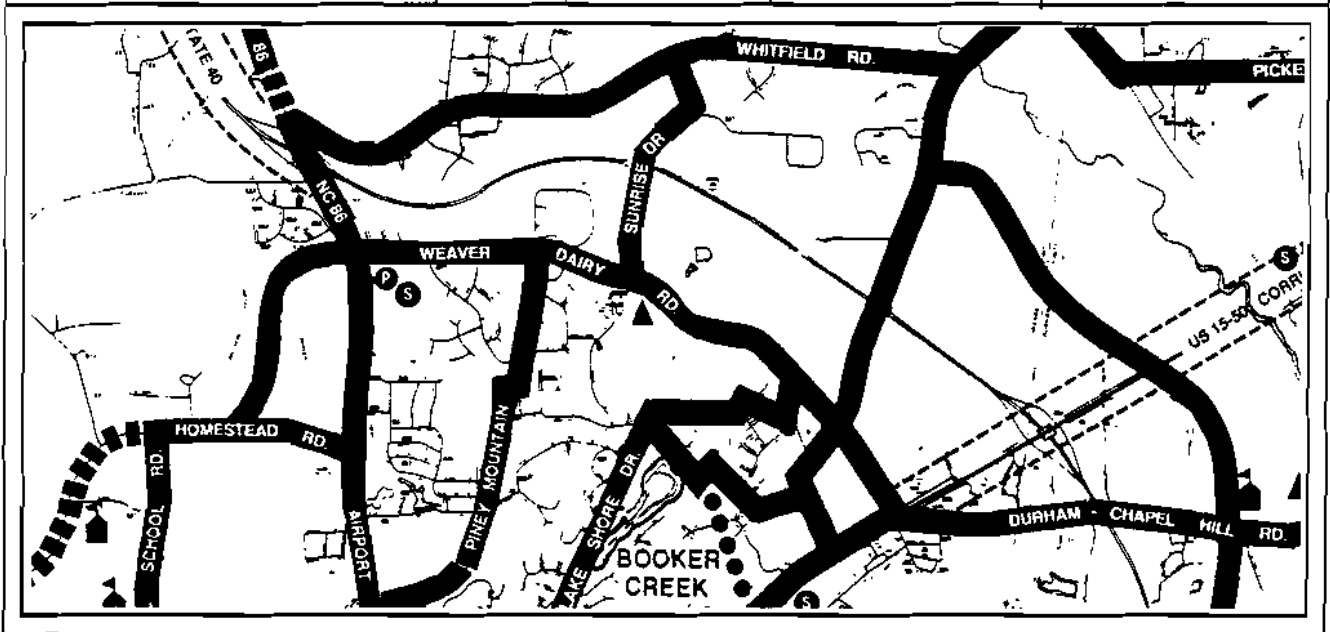
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Sunrise Drive	N/A	Local	variable: 20'-33' (mostly 20'-24')	35 mph



Umstead Drive

Proposed bicycle route boundaries:

Umstead Drive from the Estes Drive Extension to Airport Road (NC 86).

Transportational function of proposed bicycle facility:

East-west commuter route.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One park, several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

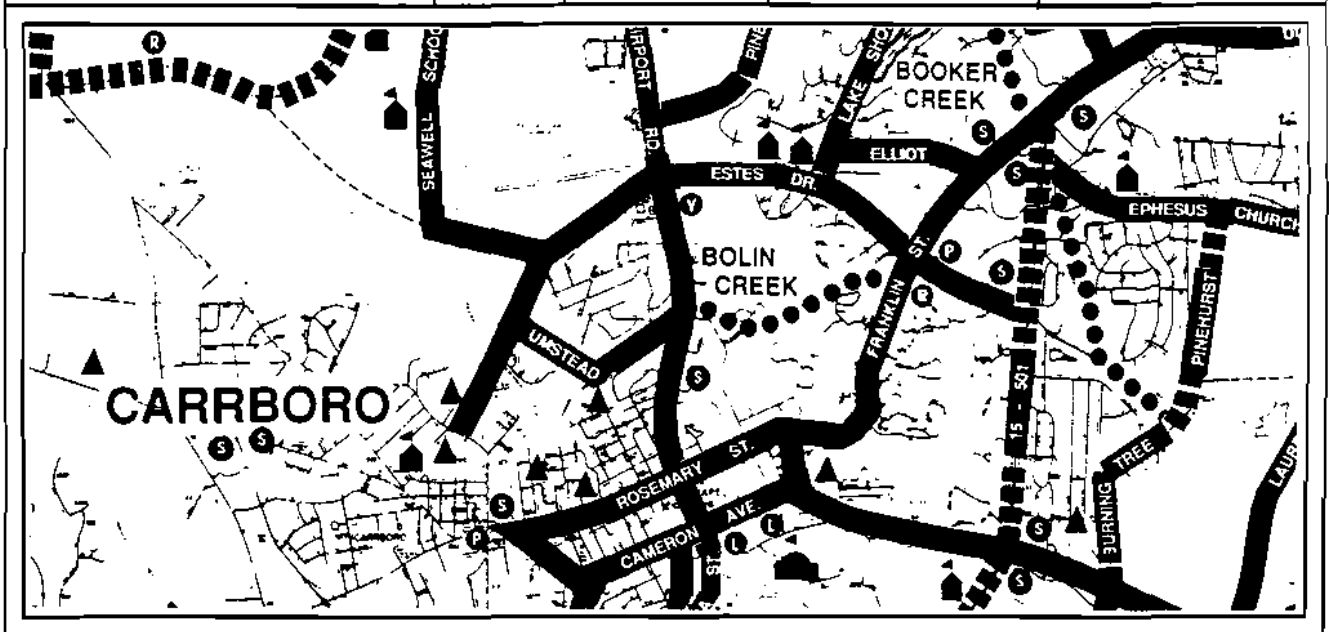
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

This facility will connect with the proposed Bolin Creek Bikeway.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt. Width	Speed Limit
Umstead Drive	1,900	Collector	20'-30'	25 mph



U.S. 15-501 Corridor (Chapel Hill-Durham Boulevard)

Proposed bicycle route boundaries:

U.S. 15-501 Corridor (Chapel Hill-Durham Boulevard) from Old Durham-Chapel Hill Road to Academy Road (NC 751) in Durham.

Transportational function of proposed bicycle facility:

Most direct commuter route option connecting Durham and Chapel Hill. Current conditions not suitable to bicycle transportation. Future corridor improvement should consider bicycle transportation.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas, three shopping centers, one mall, commercial and business centers along this developing corridor.

Description of currently scheduled bicycle improvements per NCDOT TIP:

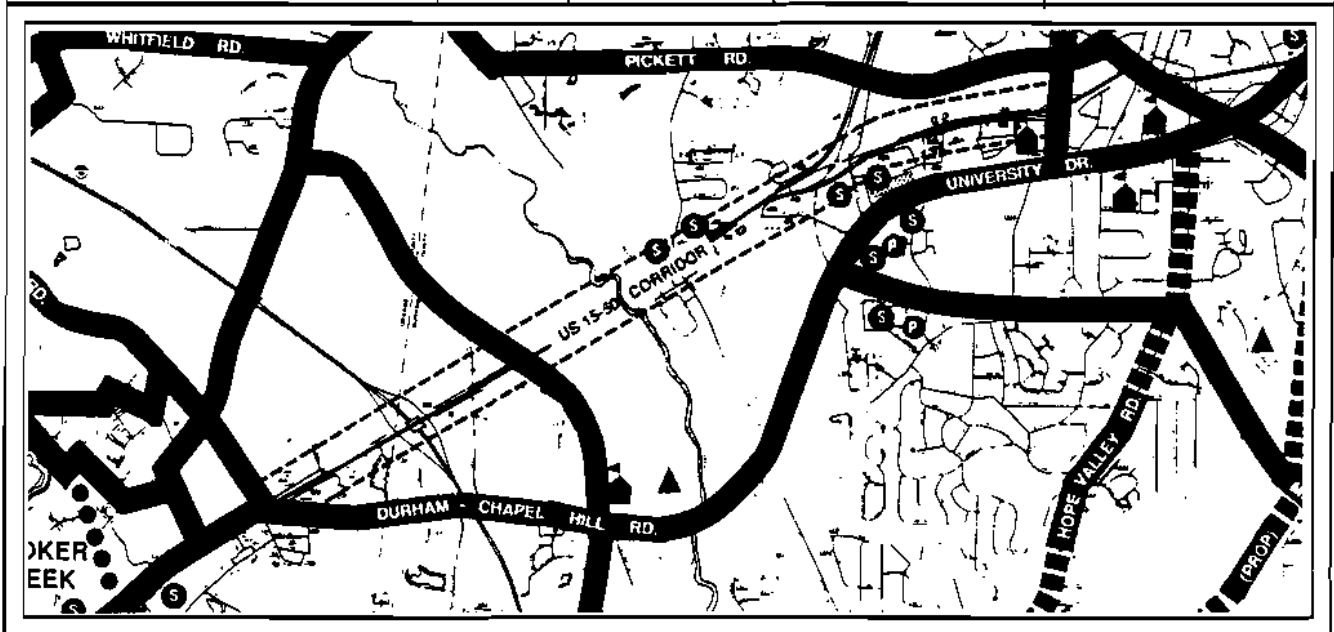
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Opportunities: this corridor could connect with the proposed New Hope Corridor greenway system.

Constraints: Urban congestion, high-speed traffic, strip development. Intersection with Eastown Road is among the highest accident intersections in Chapel Hill.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
US 15-501 Corridor	42,100-45,900	Principal Arterial	30'-54'	45-55 mph



U.S. 15-501 South

Proposed bicycle route boundaries:

US 15-501 from the 54 Bypass to the Chatham County line

Transportational function of proposed bicycle facility:

Connector route links residential areas and other points south of Chapel Hill to the town and to proposed regional bicycle routes.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas, proposed Town of Chapel Hill Southern Park (near Dogwood Acres Drive), proposed Park and Ride facility.

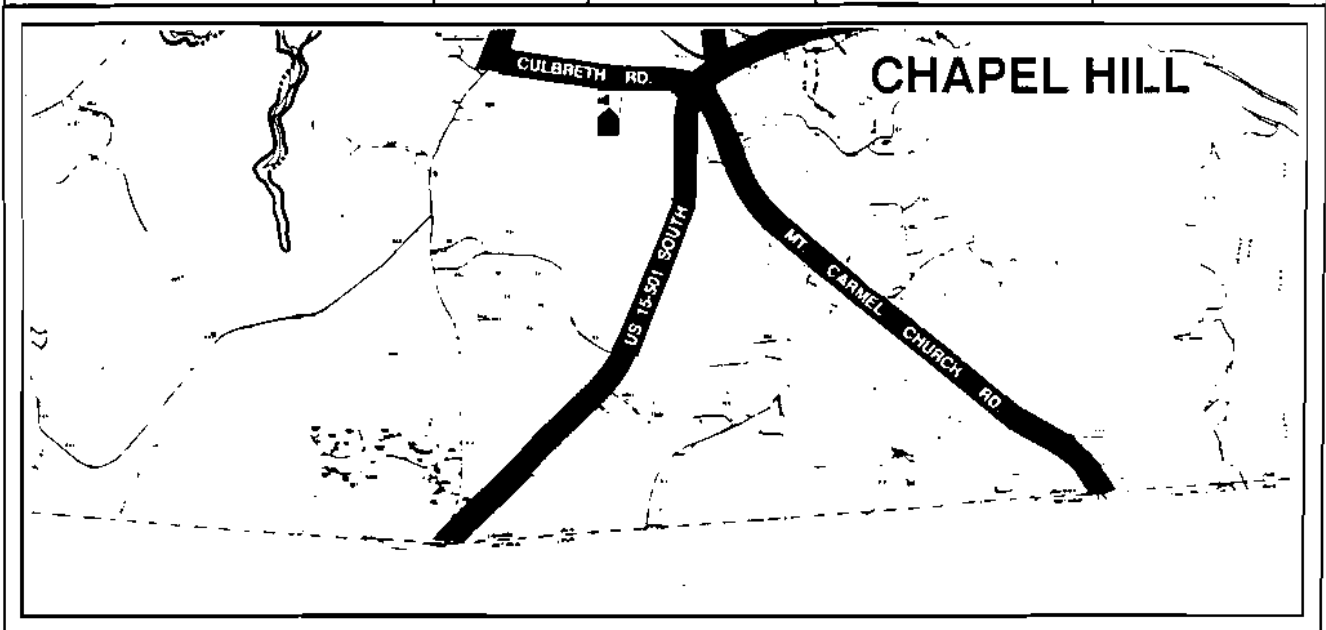
Description of currently scheduled bicycle improvements per NCDOT TIP:

US 15-501 South is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements include "bicycle provisions" from Fordham Boulevard to Chatham County line. Type of facility requested in Town of Chapel Hill's incidental list: bikelanes.

Possible opportunities/constraints along proposed bicycle route:

Opportunities: planned Community Park, Park and Ride facility
 Constraints: US 15-501 interchange.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
US 15-501 South	8700-11,000	Major thoroughfare	20'-22'	35-55 mph



Weaver Dairy Road - SR 1733

Proposed bicycle route boundaries:

Weaver Dairy Road from NC 86 to Erwin Road

Transportational function of proposed bicycle facility:

East-west commuter route through northern Chapel Hill, linking residential areas with commuter routes to Durham, and commercial areas.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One shopping center, one post office, one park, several residential areas.

Description of currently scheduled bicycle improvements per NCDOT TIP:

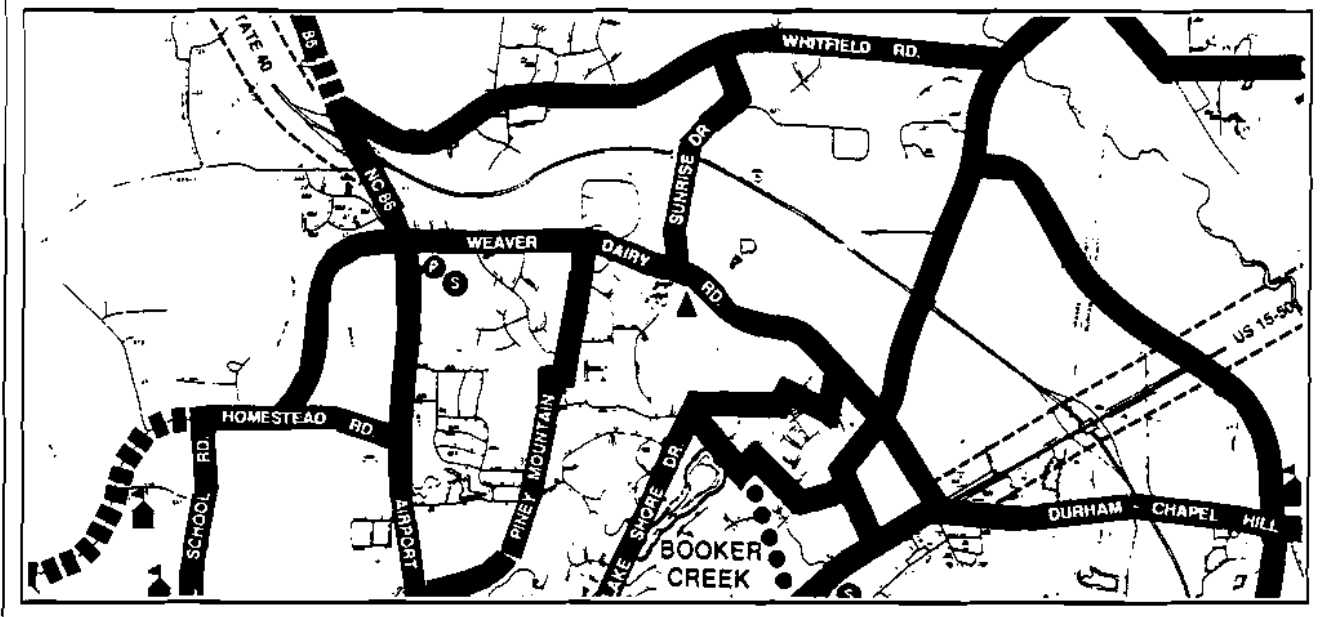
Currently, Weaver Dairy Road bicycle improvements are funded in the 1992 TIP under independent improvements, to include the addition of paved shoulders from NC 86 to Erwin Rd- approximately 2.3 miles. (Estimated TIP cost: \$250,000)

Possible opportunities/constraints along proposed bicycle route:

Right-of-way constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
Weaver Dairy Road	8100-7500	Principal arterial	20' (some areas 28'-33')	35mph/86-Sunrise 45mph/Sun.-Erwin



Bolin Creek Bikeway

Proposed bicycle route boundaries:

This proposed off-road trail extends from the Chapel Hill Police Department on NC 86 along Bolin Creek, passes under East Franklin Street, and terminates at the Estes Drive community center.

Transportational function of proposed bicycle facility:

East/west connector route in central Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

University Mall, shopping centers and commercial areas, several residential areas, one recreation center.

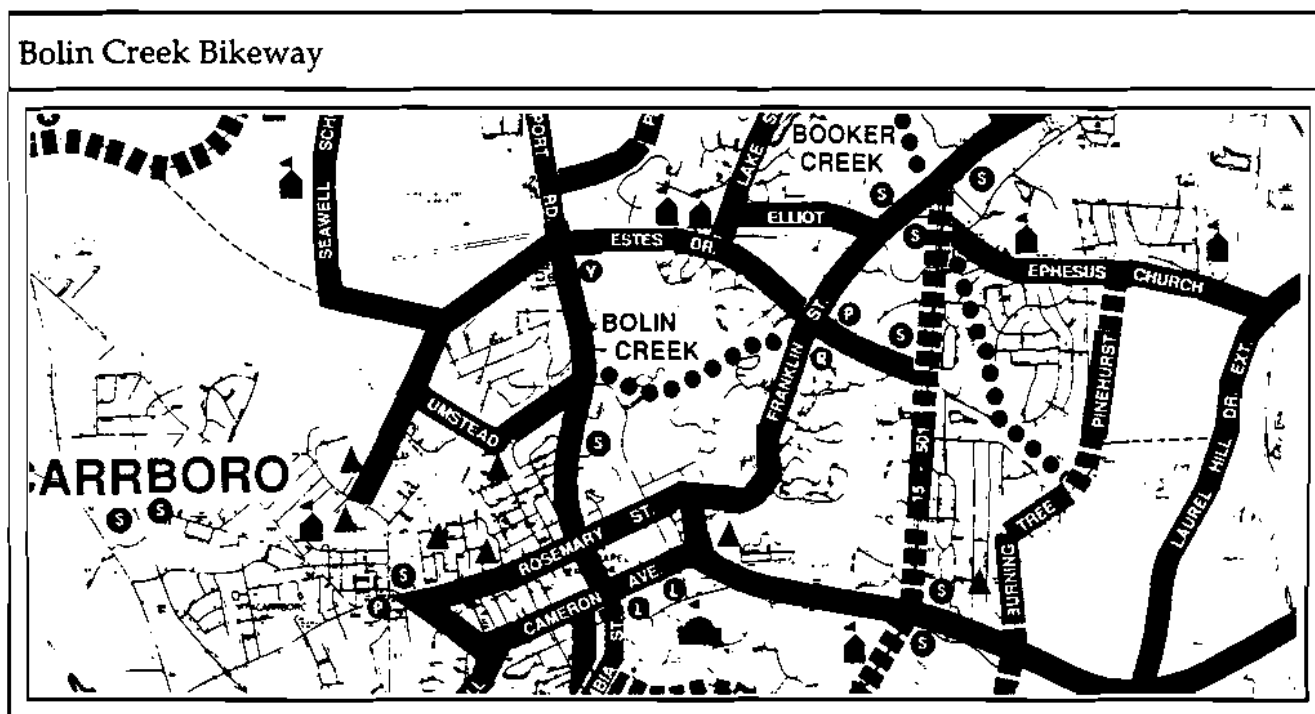
Description of currently scheduled bicycle improvements per NCDOT TIP:

The Bolin Creek Bikeway is scheduled for independant improvements in the TIP for 1994. Bolin Creek Phase II path (.8 miles) has been funded for \$240,000.00.

Possible opportunities/constraints along proposed bicycle route:

East-west alternative to Estes Drive: provides a short cut from residential areas to University Mall commercial area.

Project specifics:



Booker Creek Bikeway

Proposed bicycle route boundaries:

This proposed off-road trail extends from Lakeshore Lane in the north to Pinehurst Drive in the south.

Transportational function of proposed bicycle facility:

North/south connector route in Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Three shopping centers, several residential areas, one park.

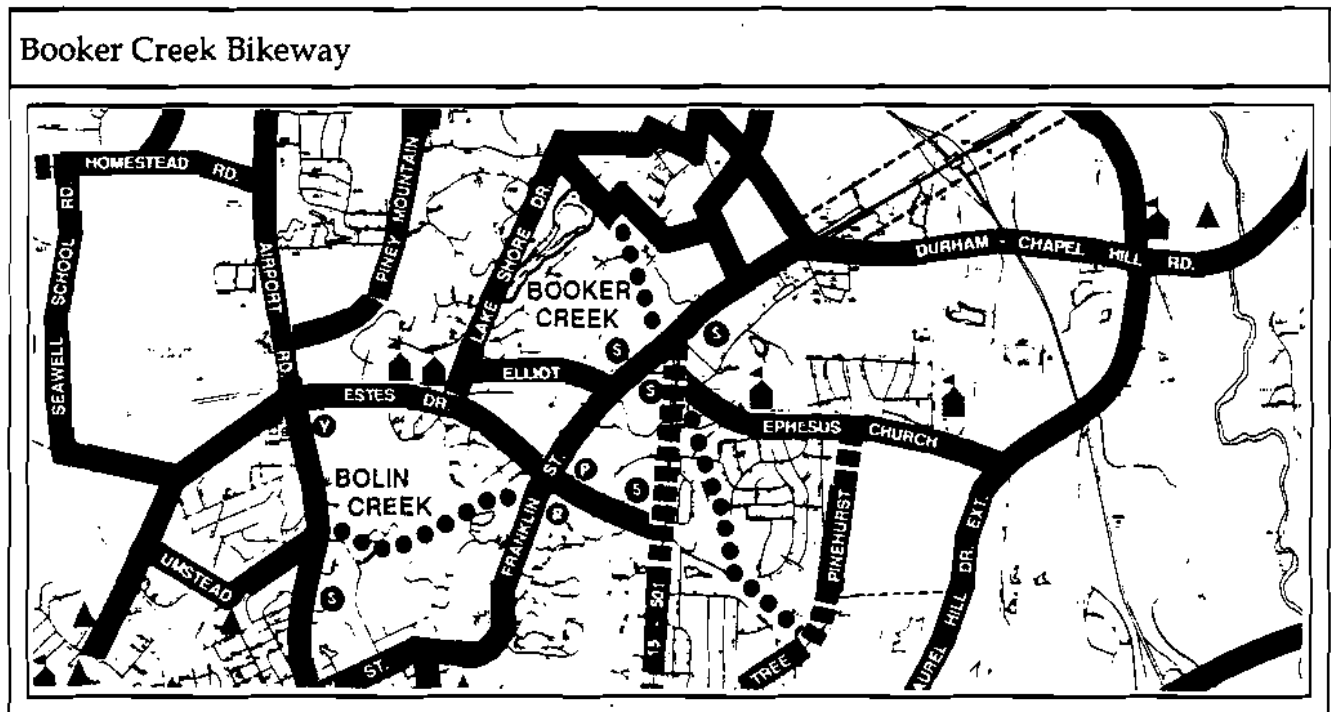
Description of currently scheduled bicycle improvements per NCDOT TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:



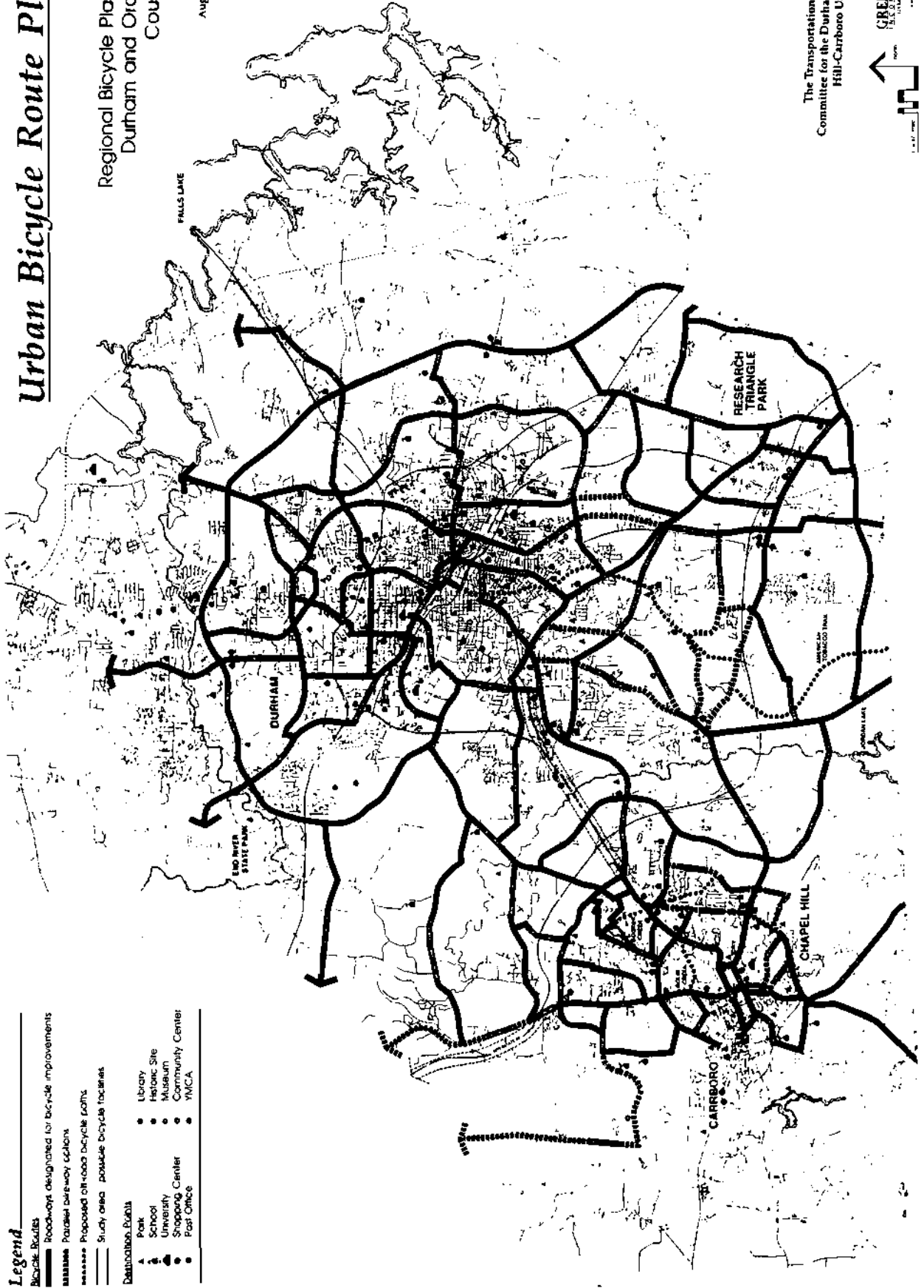
Section 3:
Technical Evaluation of Urban Routes
City of Durham



Urban Bicycle Route Plan

Regional Bicycle Plan for
Durham and Orange
Counties

August 1992



- Legend**
- Bicycle Routes
 - Roadways designated for bicycle improvements
 - Parallel on-street bicycle lanes
 - Proposed off-road bicycle paths
 - Study area - possible bicycle facilities
- Destination, Facility**
- Park
 - School
 - University
 - Shopping Center
 - Post Office
 - Library
 - Historic Site
 - Museum
 - Community Center
 - YMCA

Prepared for
The Transportation Advisory
Committee for the Durham-Chapel
Hill-Carrboro Urban Area





Durham Route Listing

Page #	Roadway Name	Page #	Roadway Name
1	Alexander Drive	40	Stadium Drive/Olympic Avenue
2	Alston Avenue	41	Stagecoach Road
3	American Tobacco Trail	42	So-Hi/Ellis/NE Creek Pkwy
4	Angier Avenue	43	South Miami Boulevard
5	Barbee Chapel Road	44	South Roxboro Street Extension
6	Broad/Sunset/Maryland Avenue	45	Umstead/Enterprise/Forest Hills
7	Campus Drive	46	Univ. Dr/Durham-Chapel Hill Rd.
8	Carver Street	47	Woodcroft Parkway
9	Club Blvd/E. Geer/Ferrell Road	48	U.S. 15-501 Corridor
10	Cole Mill Road	49	Blackwell Street
11	Cornwallis Road		
12	Davis Drive		
13	Downtown Durham Routes		
14	Downtown Route to East Durham		
15	Durham Inner Loop (proposed)		
16	Eno Drive (proposed)		
17	Erwin Road - to Chapel Hill		
18	Erwin Road - Duke campus segment		
19	Fayetteville Street		
20	Fulton Street/Hillandale Road		
21	Guess Road		
22	Guthrie Avenue/Briggs Avenue		
23	Hillsborough Road		
24	Hopson Road		
25	Latta Road		
26	Laurel Hill Drive/Farrington Road		
27	Martin Luther King, Jr. Parkway (proposed)		
28	Lumley Road		
29	Massey Chapel Road/Barbee Road		
30	Mineral Springs Road/Sherron Road		
31	Morris Street/Washington Street/Leon Street		
32	Ninth Street (BUS U.S. 70)		
33	NC 54		
34	NC 751: U.S. 70 to University Drive		
35	NC 751: Hope Valley Road		
36	NC 751: NC 54 to Chatham County Line		
37	Old Oxford Highway		
38	Pickett Road		
39	Roxboro Road (U.S. 501)		



Alexander Drive - SR 2028

Proposed route boundaries:

T.W. Alexander Drive from NC 54 to South Miami Boulevard.

Transportational function of proposed facility:

Commuter route within Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Research Triangle Park corporations.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

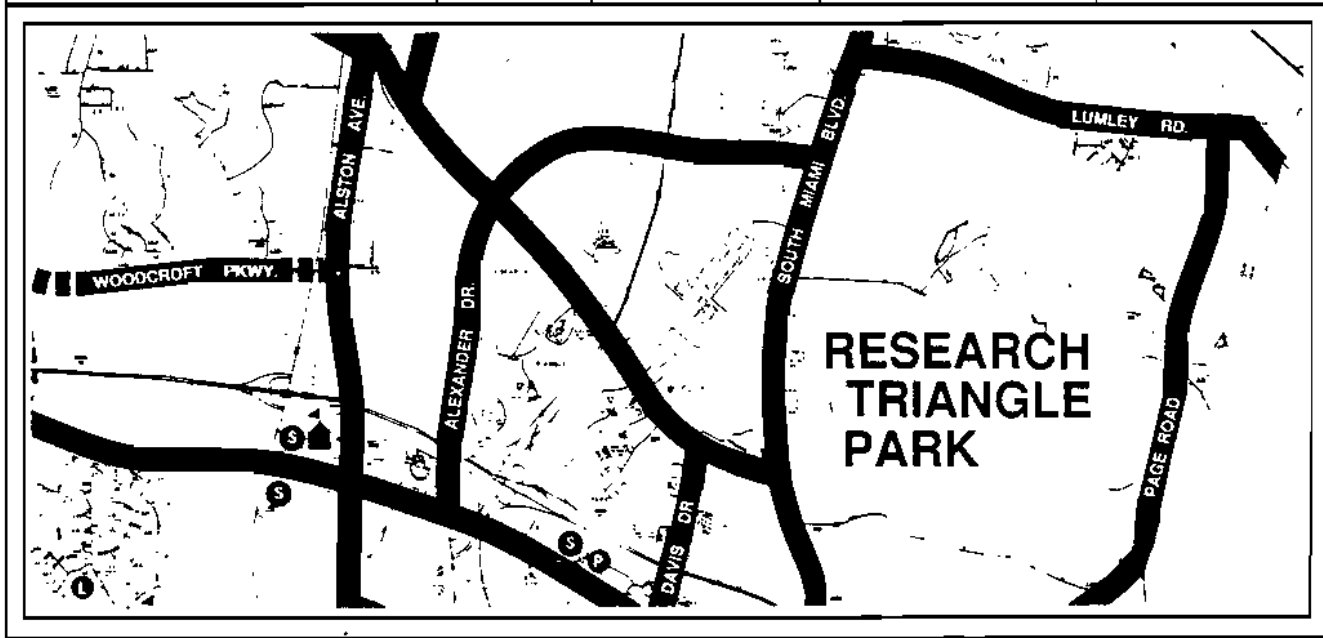
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this route will parallel existing internal pedestrian trail system for Research Triangle Park (trail is not designed for bicycles).

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Alexander Dr. - SR 2028	9,300	Major thoroughfare	26'	150'



Alston Avenue

Proposed route boundaries:

Includes the proposed Alston Ave. Extension from Holloway St. to Roxboro Rd. and Old Oxford Highway, and existing Alston Ave. from Holloway St. to the Durham County line.

Transportational function of proposed facility:

Commuter route option from northern Durham to North Carolina Central University and Research Triangle Park. Also serves as a bicycle connection to Wake County.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Research Triangle Park, North Carolina Central University, several residential areas, two libraries, one recreation center, five parks, four schools, and two shopping centers.

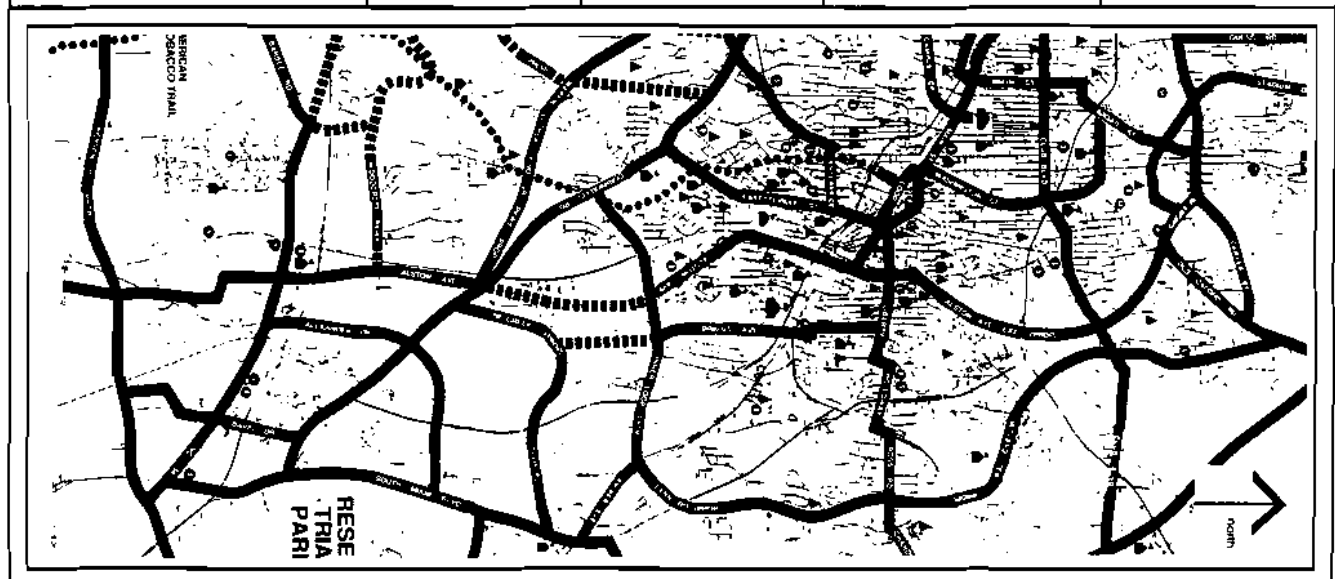
Description of currently scheduled improvements per NCDOT Bicycle TIP:

Section of Alston Ave. from NC 147 to Holloway St. is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide curb lanes and bicycle-safe drainage grates. The proposed Alston Ave. Extension is scheduled to include wide outside lanes (no date specified). Alston Ave./NC 55 is scheduled in 1992 independent projects for unsafe drainage grate replacement. Intersection of Lawson St. and Alston Ave. is scheduled for wide outside lanes and bicycle-safe drainage grates in 1992.

Possible opportunities/constraints along proposed route:

Route crosses NC 147 and passes through urban downtown area.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Alston Avenue (urban)	16,700-20,000	Min./Maj. thor.	18'-32'	60'
Alston Avenue Extension	proposed	Maj. thorough.	N/A	100'



American Tobacco Trail

Proposed route boundaries:

The American Tobacco Trail is a proposed off-road bicycle trail that will be constructed along the abandoned Norfolk Southern railroad corridor from its terminus in downtown Durham (at the proposed new Durham Bulls Ballpark) to the Chatham County line.

Transportational function of proposed facility:

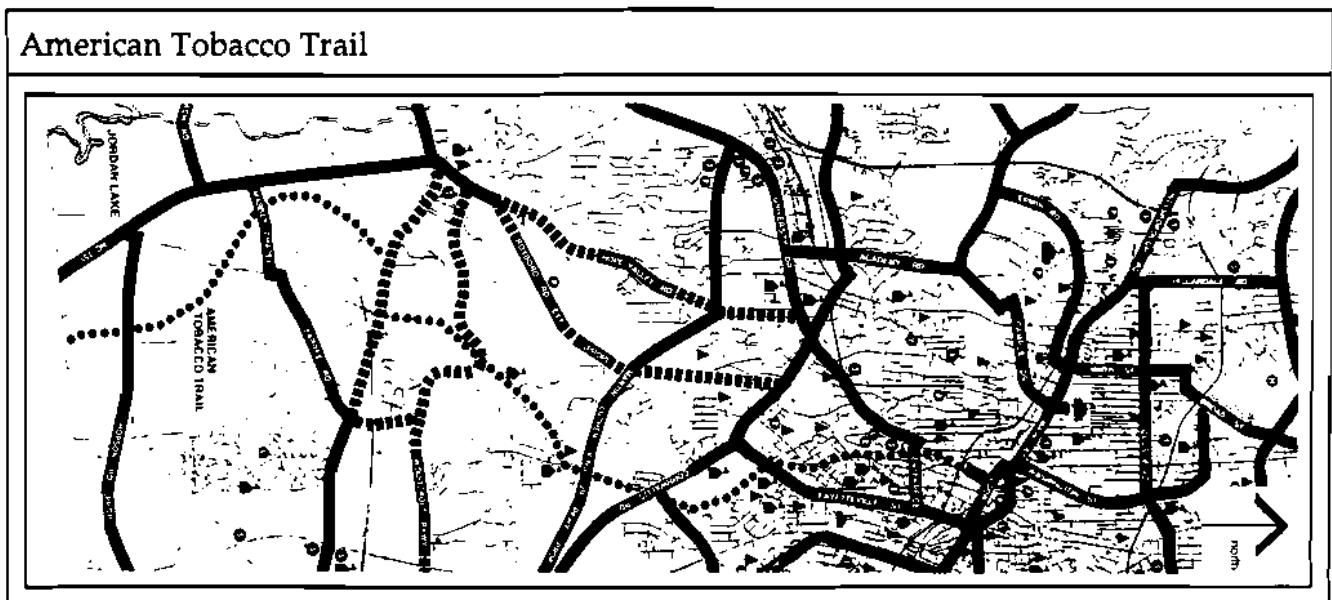
Forms a portion of a commuter route from downtown Durham, also links Durham to Jordan Lake and other southern destinations in Chatham and Wake Counties. Access points to this bicycle facility should be retained from all intersecting roadways designated to include bicycle or pedestrian facilities in the future. New roadway construction and roadway widening projects should not block access along this corridor.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Downtown Durham, the proposed Durham Bulls Ballpark, three parks, one shopping center, several residential areas, one library and one community center.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

Phase I of the American Tobacco Trail is scheduled in the TIP for funding in FY 1994: \$295,000 has been allotted. This trail segment will extend from Willard Street to Otis Street (1.4 miles). Phase II - from Otis Street to Cornwallis Road (1.8 miles) - is scheduled for a feasibility study in FY 1995. Both Phases are also listed in the Enhancement and Passenger Rail Program of the State TIP. Funds have also been appropriated for right-of-way acquisition through this program in FY 93: \$1,820,000 for the segment from I-40 to the CSX Apex Line.



Angier Avenue - SR 1926

Proposed route boundaries:

Angier Avenue from Lynn Road Extension to South Miami Boulevard

Transportational function of proposed facility:

Portion of a commuter route to Research Triangle Park from east Durham. This route will connect with the new Lynn Road Extension, thereby avoiding traffic congestion on US 70 and connecting with the Inner Loop.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Residential area.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

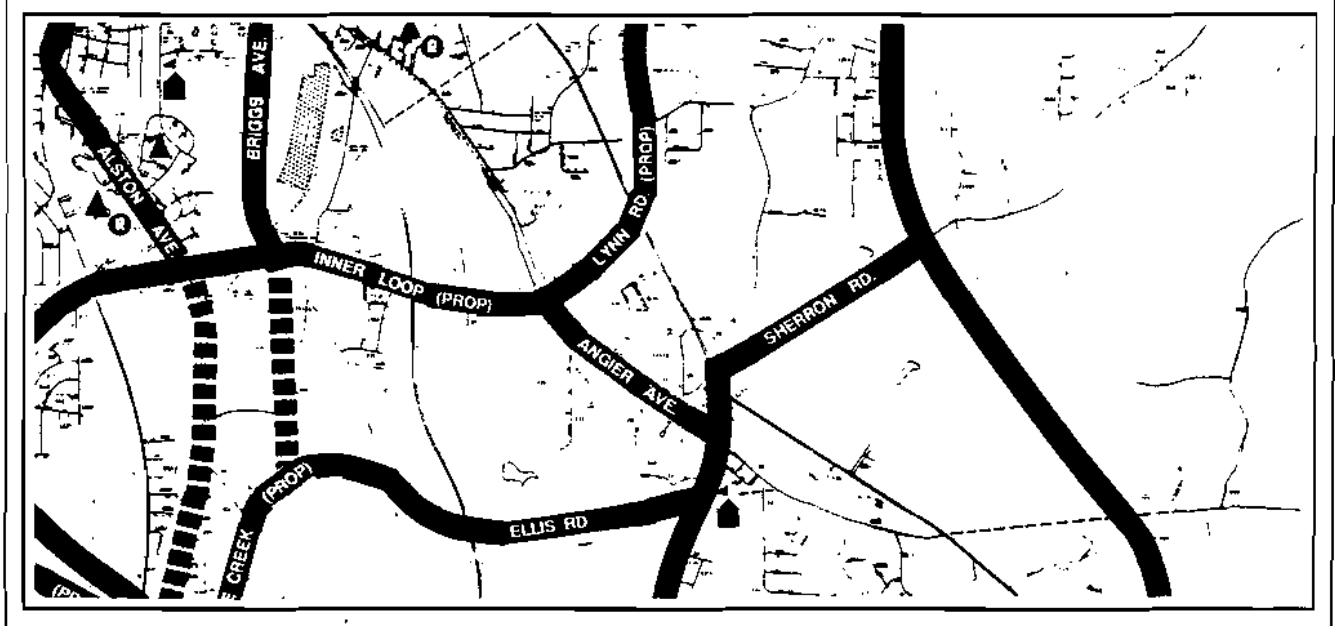
No bicycle improvements currently scheduled.

Possible opportunities / constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Angier Avenue - SR 1926	3800	Major thoroughfare	30'-35'	not available



Barbee Chapel Road - SR 1110

Proposed route boundaries:

Barbee Chapel Road from NC 54 to Stagecoach Road

Transportational function of proposed facility:

Portion of a commuter route option from south Chapel Hill to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One residential area.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

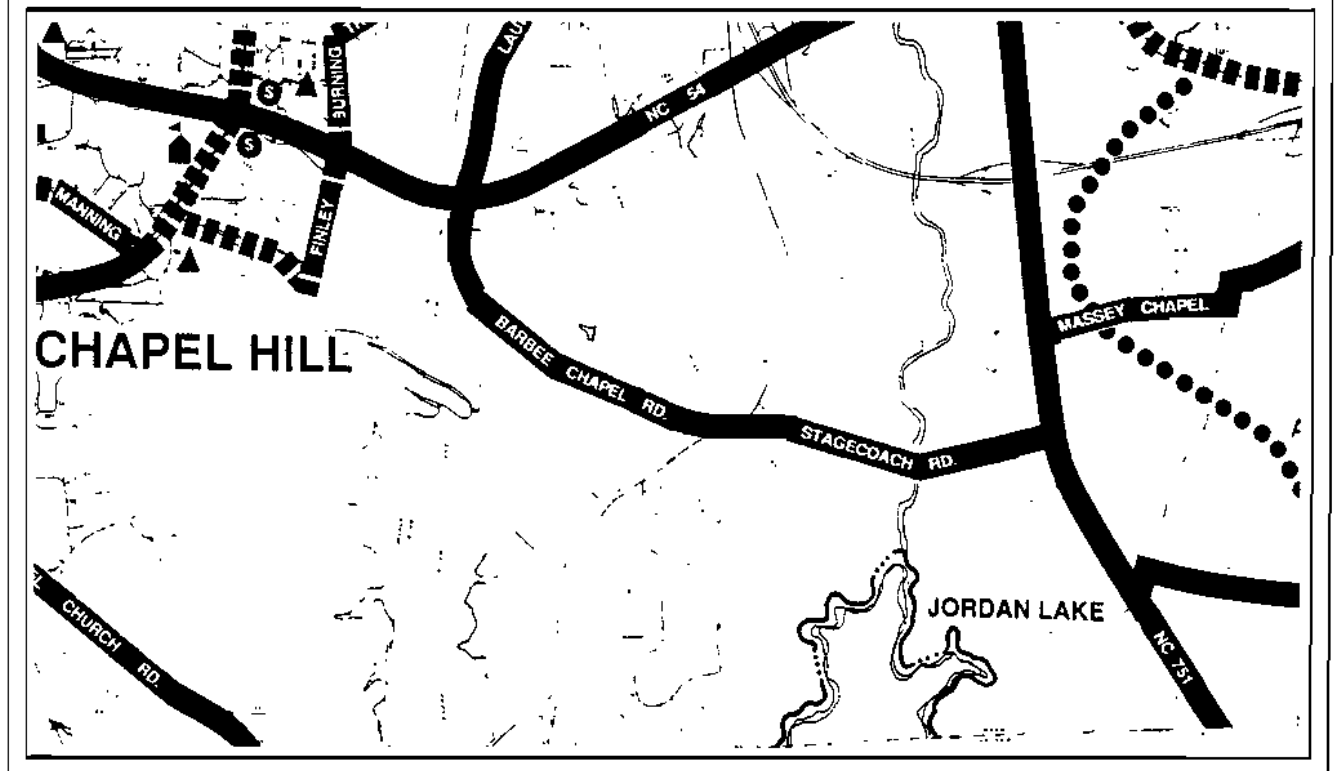
No scheduled improvements.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Barbee Chapel Road - SR 1110	2400	Maj. & min. thoroughfare	18'	60'



Broad St./Sunset Avenue/Maryland Avenue

Proposed route boundaries:

Broad Street from Carver Street, connecting with Sunset Avenue near Guess Road intersection, connecting to Club Blvd. via Maryland Avenue

Transportational function of proposed facility:

Connector route from central Durham to north Durham destinations.

Trip generators within 1/4 mile or 2 block radius of proposed route:

North Carolina School of Science and Math, one elementary school, one park, and several residential areas.

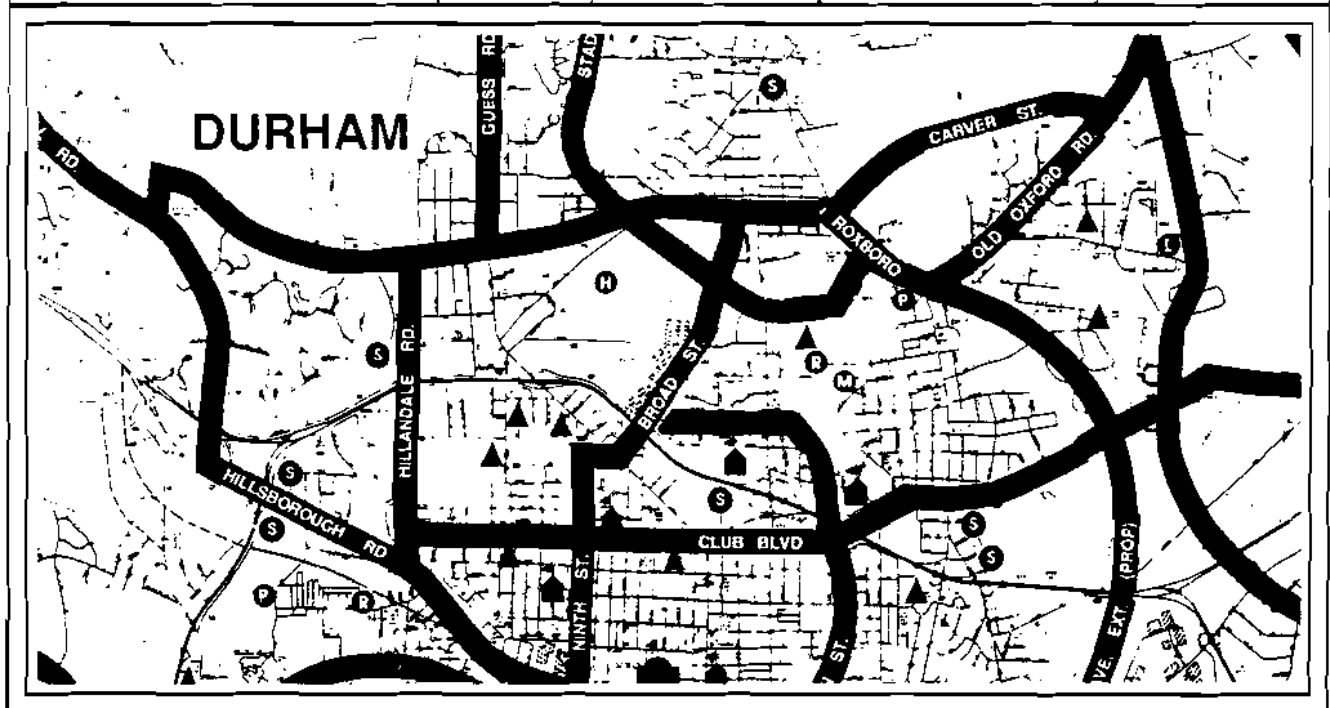
Description of currently scheduled improvements per NCDOT Bicycle TIP:

Broad Street (SR 1322) scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide curb lanes.

Possible opportunities/constraints along proposed route:

Broad Street/I 85 crossing may be a constraint. This facility will cross the proposed Durham North/South Greenway.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Broad Street/Sunset/Maryland	4500-12,000	Maj. and min. thoroughfare	20'-40'	60'-80'



Campus Drive

Proposed route boundaries:

Campus Drive from Academy Road to Duke University East Campus

Transportational function of proposed facility:

Connector route East Campus and West Campus of Duke University, also may serve as a portion of a commuter route between central Durham and north Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Duke campuses

Description of currently scheduled improvements per NCDOT Bicycle TIP:

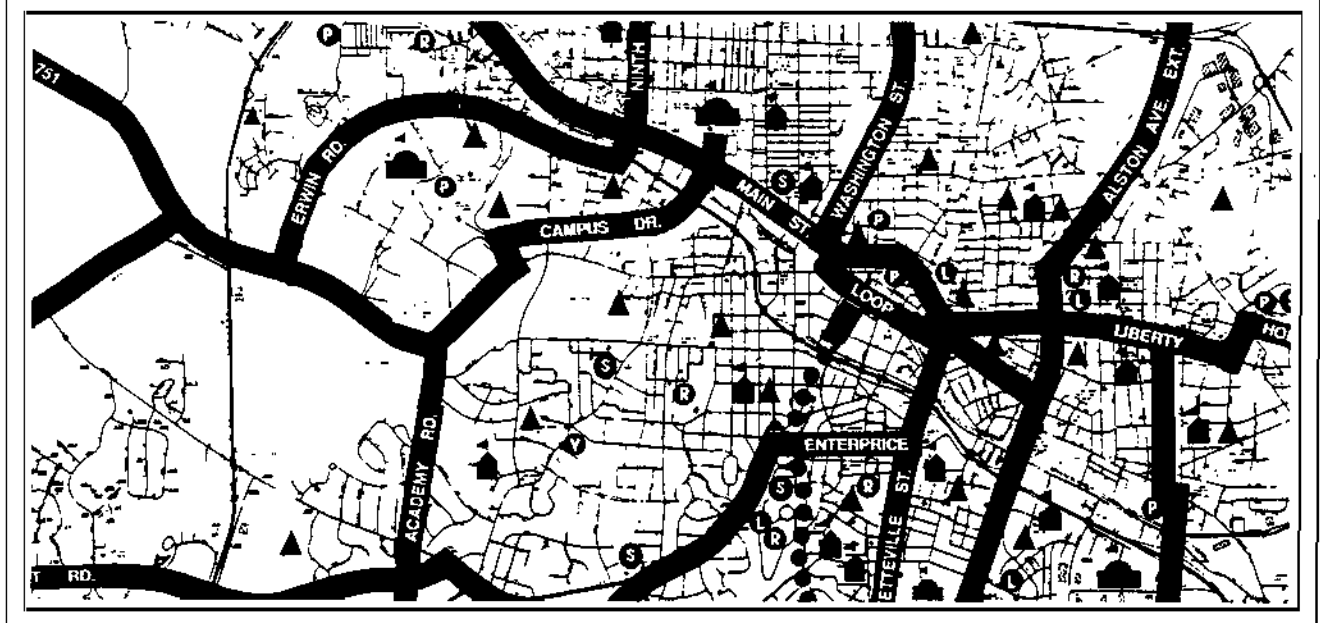
No scheduled bicycle improvements in Bicycle TIP. Duke University completed a feasibility study in 1992 to develop a two-directional bicycle path along the south side of Campus Drive, and a pedestrian path on the north side. Currently no funds have been appropriated by the University to fund the route.

Possible opportunities/constraints along proposed route:

NC 147/Campus Drive crossing may be a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Campus Drive (private street)	not available	local	not available	not available



Carver Street - SR 1407

Proposed route boundaries:

Carver Street from Cole Mill Road and Rose of Sharon Road to Old Oxford Road. This route should include bicycle improvements to short segment of Rose of Sharon Road linking Carver Street and Cole Mill Road.

Transportational function of proposed facility:

East-west connector route in north Durham.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Independence Park business centers, Duke Homestead, Durham Regional Hospital, several residential areas and Oxford Commons shopping center.

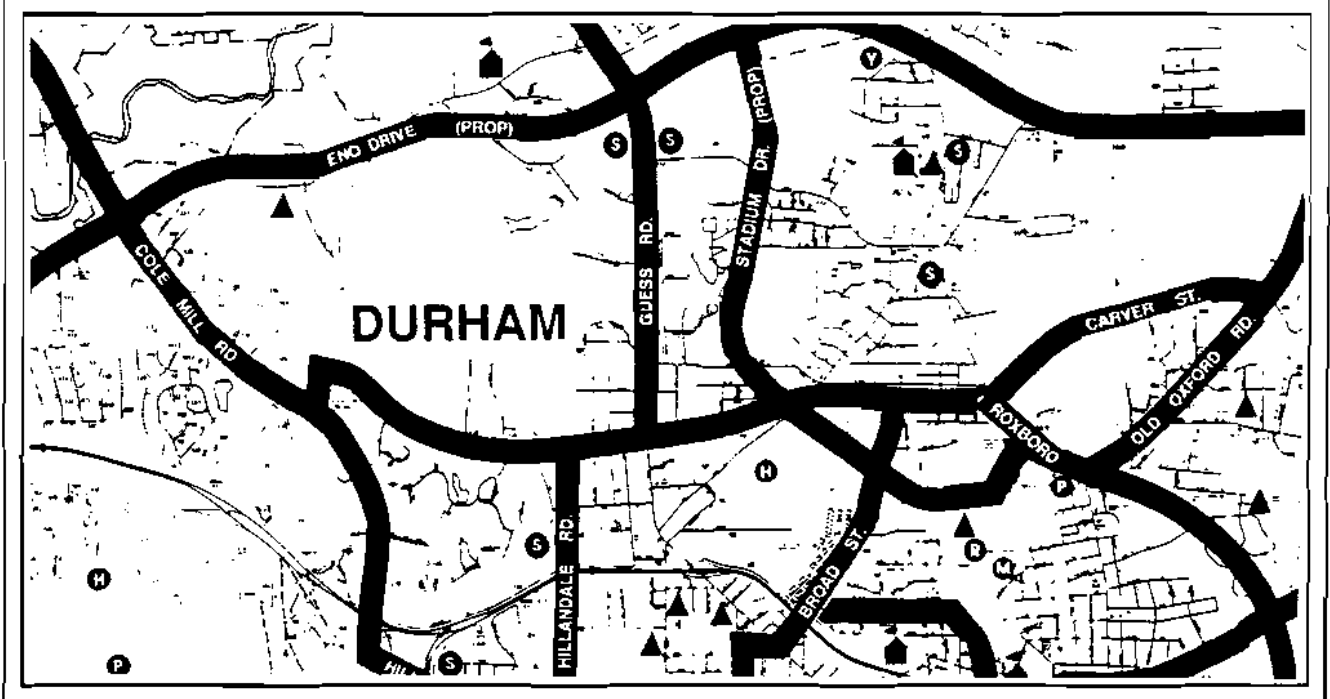
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No scheduled bicycle improvements. Intersection of Roxboro Road to receive wide outside lanes and bicycle-safe drainage grates(incidental-no date).

Possible opportunities/constraints along proposed route:

Intersection of Carver Street and Roxboro Road was recently cited as among the highest accident intersections in Durham. This area will require special consideration.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Carver Street	6100-8400	Major thoroughfare	variable	variable



Club Boulevard/Geer Street/Ferrell Road

Proposed route boundaries:

Traveling west to east, this route will follow Club Boulevard from Hillandale Road to East Geer Street, Ferrell Road connection back to East Geer Street, and then travel on East Geer Street ending at Red Mill Road (connection to county bicycle route).

Transportational function of proposed facility:

Connector route from central Durham to north-west Durham destinations and county bicycle routes.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Northgate Mall, one shopping center, several residential areas, one elementary school, three parks, and the North Carolina School of Science and Math.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

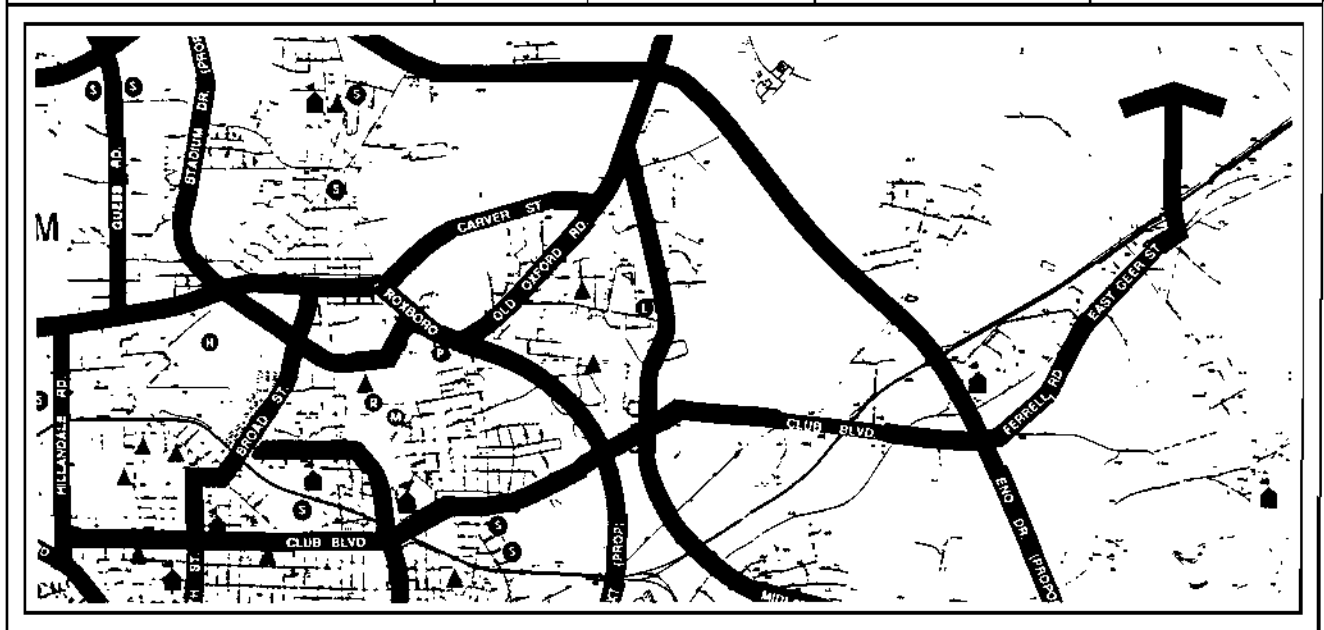
Club Boulevard is scheduled for incidental bicycle improvements in the TIP (no length or date specified). Improvements will include wide curb lanes/bicycle-safe drainage grates.

Possible opportunities/constraints along proposed route:

Opportunity: this facility will cross the proposed Durham North/South Greenway.

Constraint: Club Boulevard/I 85 crossing.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Club Boulevard - SR 1669	6900-16,400	Maj. and min. thoroughfare	23'-46'	60'-70'



Cole Mill Road - SR 1401

Proposed route boundaries:

Cole Mill Road from the Eno River State Park to Hillsborough Road (BUS U.S. 70).

Transportational function of proposed facility:

Connector route from Durham to the Eno River State Park and Orange County destinations.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Several residential areas and Eno River State Park.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

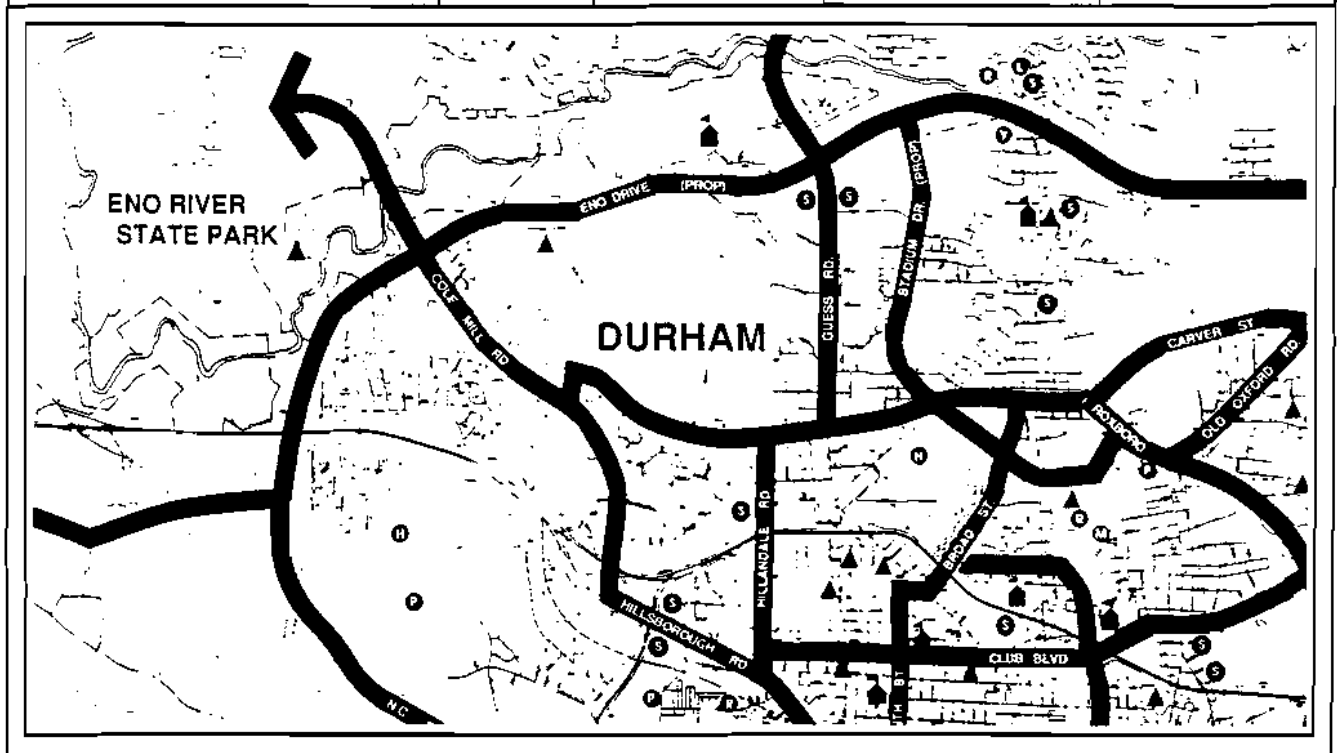
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Cole Mill Road/I 85 crossing may be a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Cole Mill Road - SR 1401	2000-9600	Major thoroughfare	24'-44'	60'



Cornwallis Road - SR 1121

Proposed route boundaries:

Cornwallis Road from Pickett Road to South Miami Boulevard in Research Triangle Park.

Transportational function of proposed facility:

Commuter route from central Durham to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Research Triangle Park, two schools, one recreation center, one park, and several residential areas.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

A 1.6 mile section of Cornwallis Road (from Fayetteville Road to NC 55) is scheduled for independent bicycle improvements in 1993 (a feasibility study is scheduled for 1992). The project has been funded for FY 1993 at \$242,000, and will include additional pavement.

Possible opportunities/constraints along proposed route:

Opportunities: this facility will cross the proposed Durham North/South Greenway, as well as the proposed American Tobacco Trail - bicycle access should be accommodated between on-road and off-road facilities.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pymt.	ROW Width
Cornwallis Road - SR 1121	1,600 16,000	Min. & Maj. thoroughfare	18'-64'	variable



Davis Drive - SR 1999

Proposed route boundaries:

Davis Drive from Cornwallis Road to Hopson Road.

Transportational function of proposed facility:

Commuter route within Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Research Triangle Park corporations, one post office.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

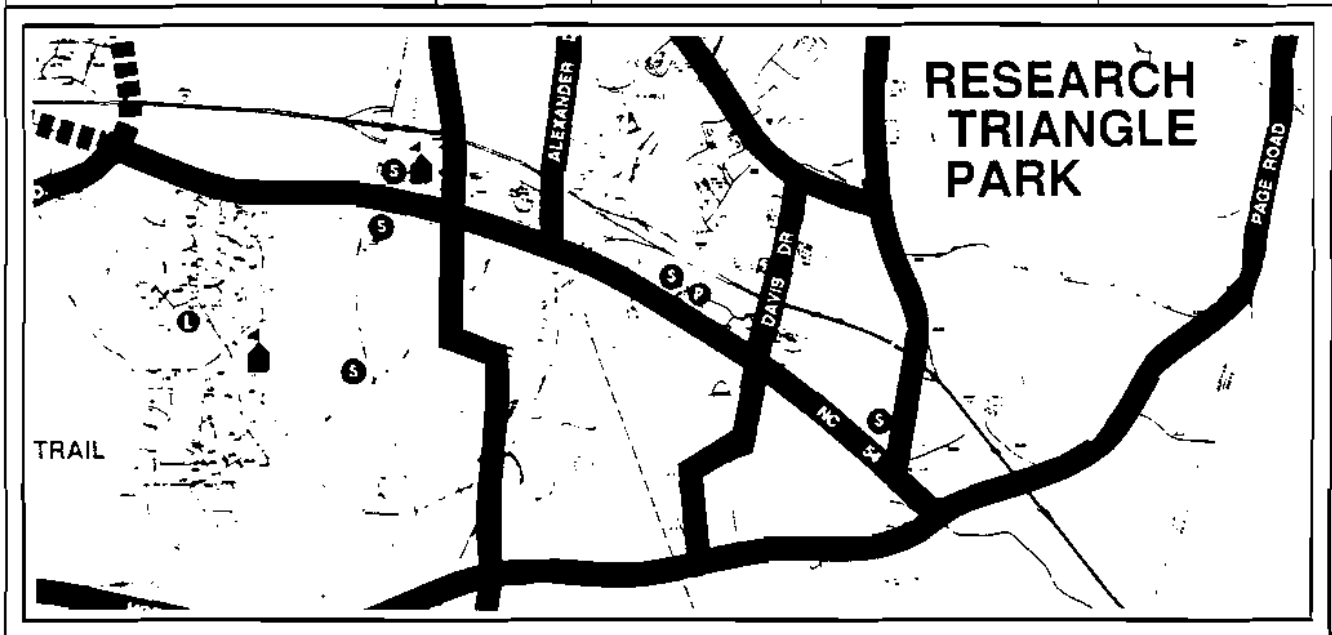
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this route will parallel existing internal pedestrian trail system for Research Triangle Park (trail is not designed for bicycles).

Project specifics

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Davis Drive - SR 1999	9,000	Major thoroughfare	2 x 26' 20'	150'



Downtown Durham Routes

Proposed bicycle route boundaries:

W. Main Street from Hillsborough Road to the Downtown Loop, the Downtown Loop in its entirety, and E. Main Street from the Downtown Loop to Alston Avenue.

Transportational function of proposed bicycle facility:

Cross-town commuter route through downtown Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Amtrak Station, the Durham Public Transit Station, Greyhound Trailways Station, the proposed Durham Ballpark, the American Tobacco Trail, three shopping centers, Duke University, one school, one library, downtown area, one park.

Description of currently scheduled bicycle improvements per NCDOT TIP:

Main Street is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide curb lanes.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Main Street	3,300-12,100	Major thoroughfare	30'-40'	50'-60'



Downtown Route to East Durham

Proposed route boundaries:

Traveling west to east, this route will follow Liberty St. from the Downtown Loop to Herbert St., Herbert St. from Liberty St. to Holloway St., Holloway St. to Junction Rd., Junction Rd. to Ross Rd., from Ross Rd. to Chandler Rd., north on Clayton Rd. to Freeman Road, ending at Eno Drive. (On-road improvements are **not recommended** for non-thoroughfare residential streets along this route.)

Transportational function of proposed facility:

Connector route from downtown Durham to east Durham destinations, including the Oak Grove community, bypassing congested NC 98.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Five parks, two schools, two libraries, several residential areas.

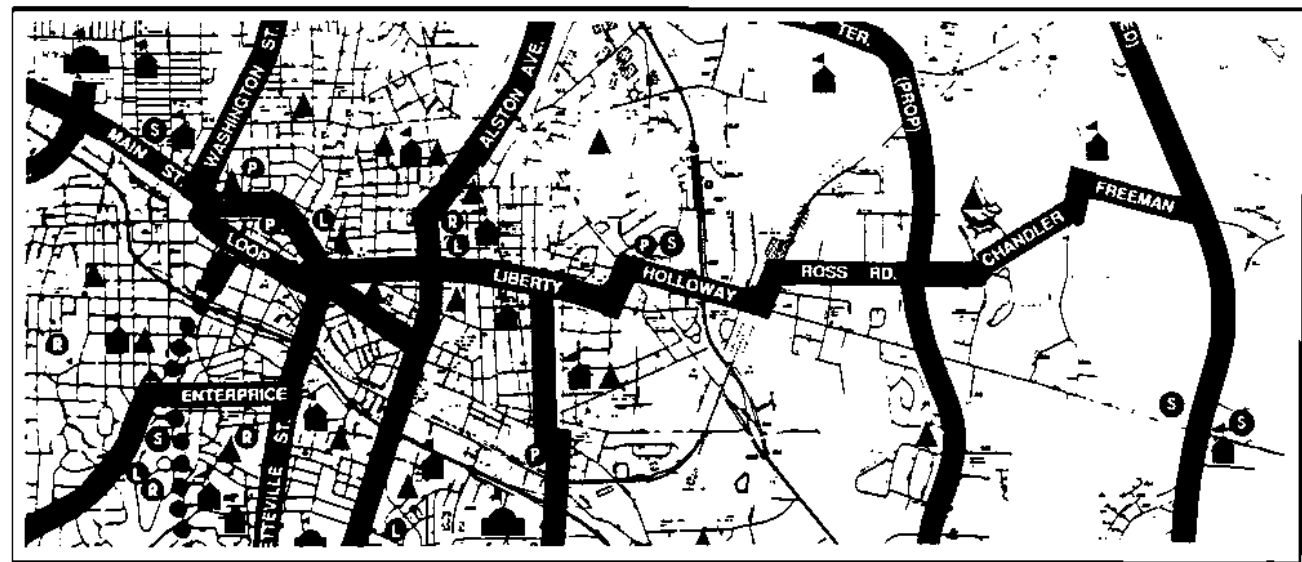
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

The intersection of Holloway Street and US 70 is among the highest accident intersections in Durham. This area will need special consideration.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Liberty Street	4,000-6,000	Maj. thor.	36'-48'	variable
Holloway Street	15,400-23,500	Maj. thor.	44'	60'
Junction Road	7,400	un-designated	19'	60'



Durham Inner Loop (proposed)

Proposed route boundaries:

Includes Cornwallis Road-Riddle Road Connector (proposed), Riddle Road, Glover Road, Lynn Road Connector (proposed), Lynn Road, Midland Terrace and Midland Terrace Extension (proposed).

Transportational function of proposed facility:

East-west connector route in south and east Durham, forms regional linkage with developing areas.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Two parks, one shopping center, many residential areas, and the Expressway Commerce Center.

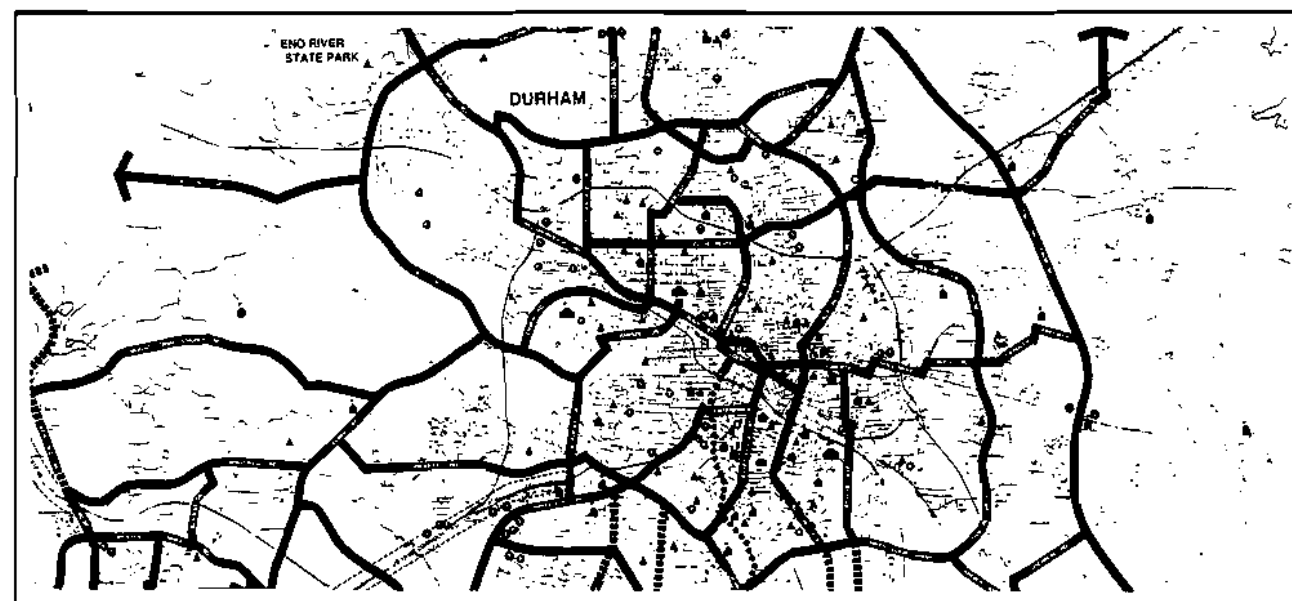
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: the proposed Riddle Rd. Connector will intersect with the American Tobacco Trail - bicycle access should be accommodated between on-road and off-road facility. Also, bicycle improvements can be combined with planned roadway improvements for this route.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Inner Loop	2,600 - 6,100	Major thoroughfare	variable	84'-100'



Eno Drive (proposed)

Proposed route boundaries:

Eno Drive from US 70 Business (west Durham) to US 70 at the Wake County line (east Durham)

Transportational function of proposed facility:

Regional linkage connecting north and west Durham with east Durham and Wake County bicycle routes (per Raleigh Bicycle Plan).

Trip generators within 1/4 mile or 2 block radius of proposed route:

Eno River State Park, West Point on the Eno, Eno Industrial Park, two parks, many residential areas, five shopping centers, and three schools.

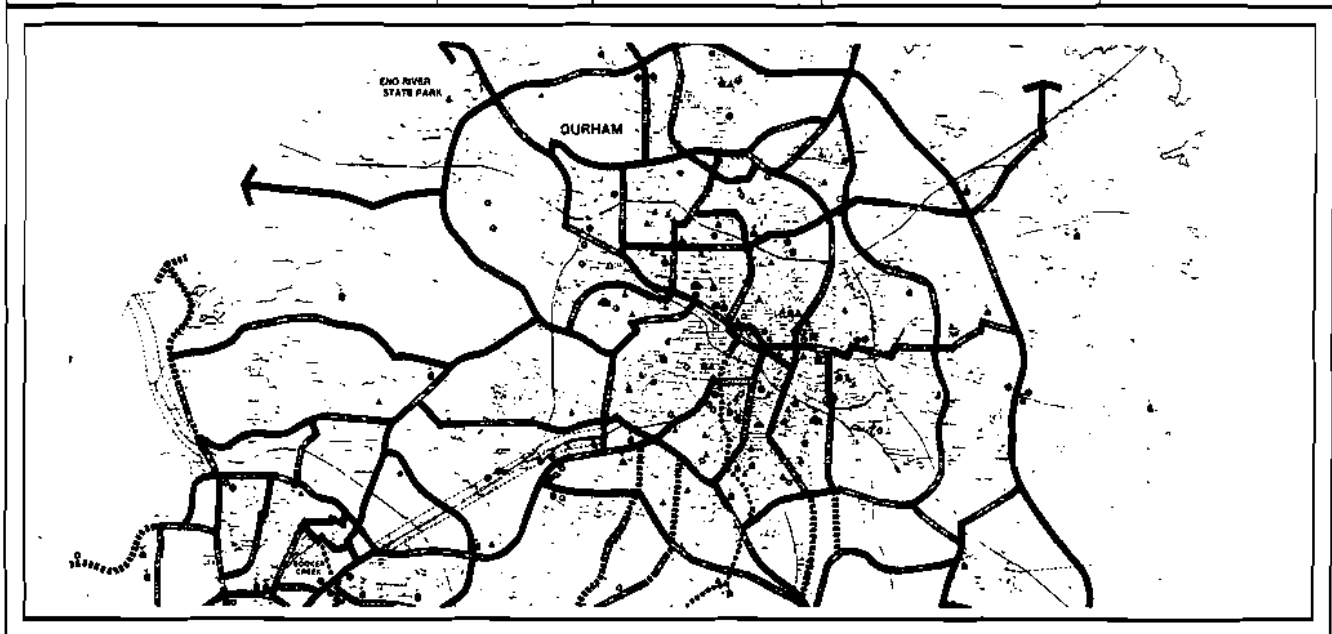
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: northern Eno Drive will intersect with the Durham North-South Greenway - bicycle access should be accommodated between on-road and off-road facility. Also, bicycle improvements can be combined with planned roadway construction on this route.

Road name	ADT's	Rd-way Class	Prop. Total Pvmt.	ROW Width
Eno Drive (proposed)	(proposed)	Major thoroughfare	68' (2 x 26')	100'-150'



Erwin Road (SR 1306) - to Chapel Hill

Proposed route boundaries:

Erwin Road from NC 751 to the Orange County line.

Transportational function of proposed facility:

Commuter route option from Durham to northern Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One school, residential areas, passes through portions of Duke Forest.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

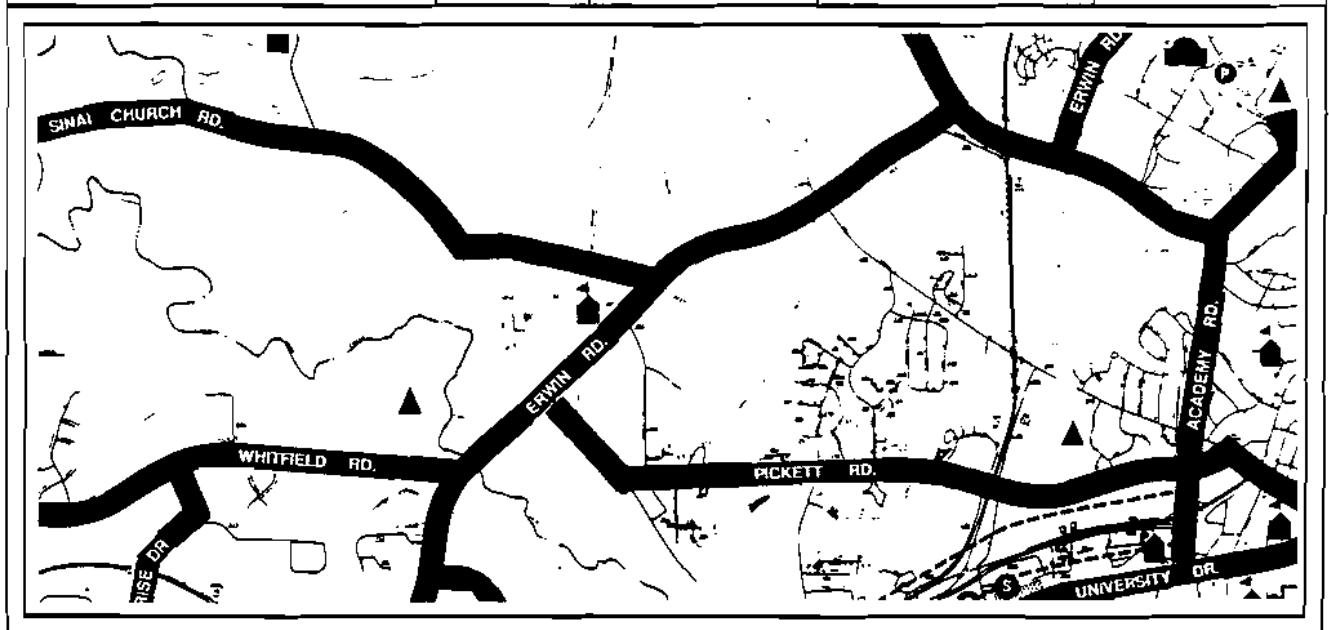
Erwin Road from Durham to Chapel Hill is scheduled for incidental bicycle improvements in the TIP (no length or no date specified). Improvements will include wide paved shoulders.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Erwin Road - SR 1306	9500-19,500	Major thoroughfare	20'-30'	50', 60', 100'



Erwin Road (SR 1320) - Duke campus segment

Proposed route boundaries:

Erwin Road from Ninth Street to NC 751 (Cameron Boulevard)

Transportational function of proposed facility:

Local connector route between East Campus and West Campus of Duke University, also serves as a segment of west Durham commuter routes.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Duke University campuses, Duke Hospital, VA Hospital, residential areas, and Duke Cross Country Trail.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

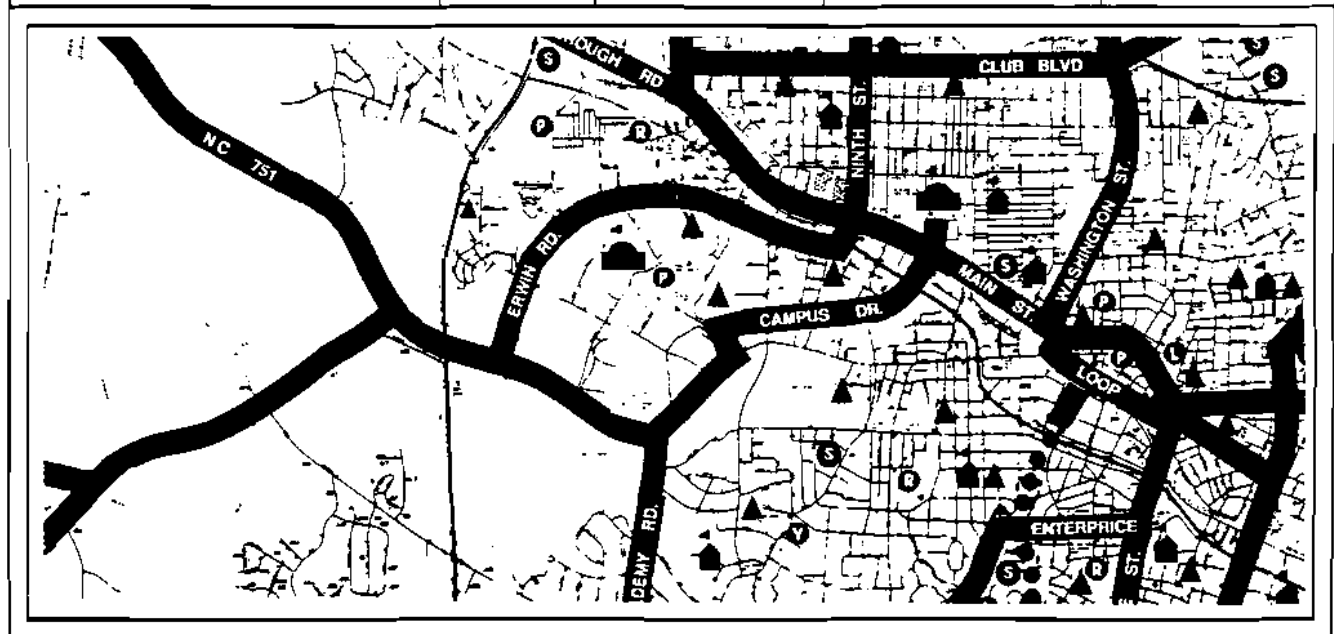
Erwin Road (SR 1320) from NC 751 to Ninth Street is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include restriping for wide outside lanes. Scheduled under independent projects in 1995 TIP for bicycle-safe drainage grates.

Possible opportunities/constraints along proposed route:

NC 147 crossing may be a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pmnt.	ROW Width
Erwin Road - SR 1320	19,000	Major thoroughfare	55'	100'-90'-80'



Fayetteville Street - SR 1118

Proposed route boundaries:

Fayetteville Street from Cornwallis Road to Main Street

Transportational function of proposed facility:

Commuter route through central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed route:

North Carolina Central University, one library, one post office, two elementary schools, one high school, three parks, and one recreation center.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

Fayetteville Street from Umstead Street to Nelson Street is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide outside lanes and bicycle-safe drainage grates. Scheduled under independent projects for 1995- Bicycle-safe drainage grates.

Possible opportunities/constraints along proposed route:

Opportunity: this facility will cross the proposed American Tobacco Trail - bicycle access should be accommodated between on-road and off-road facility.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
SR 1118 Fayetteville Street	11,800-14,700	Major thoroughfare	18'-64'	50'+



Fulton Street/Hillandale Road (SR 1321)

Proposed route boundaries:

Hillandale Road from Carver Street to Hillsborough Road, Fulton Street from Hillsborough Road to Erwin Road.

Transportational function of proposed facility:

North-south commuter route through central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Duke University - West Campus, Duke and VA Hospitals, residential areas, one shopping center, one recreation center, one park.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

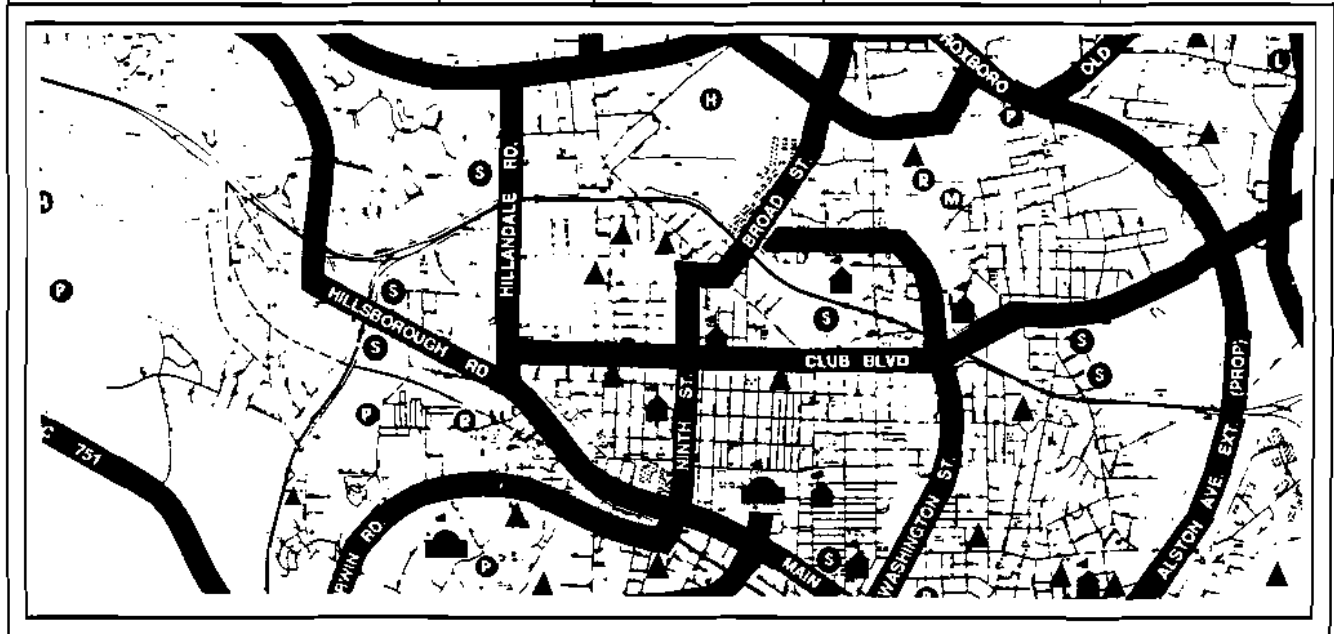
Hillandale Road from I 85 to Club Boulevard is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide outside lanes.

Possible opportunities/constraints along proposed route:

I-85 crossing may prove a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Hillandale Road - SR 1321	8500-12,000	Major thoroughfare	20'-44'	60'



Guess Road - NC 147

Proposed route boundaries:

Guess Road from Latta Road to Carver Street.

Transportational function of proposed facility:

North-south commuter route through north Durham, also links to proposed rural Durham County bicycle route system.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Two shopping centers, one school, several residential areas.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

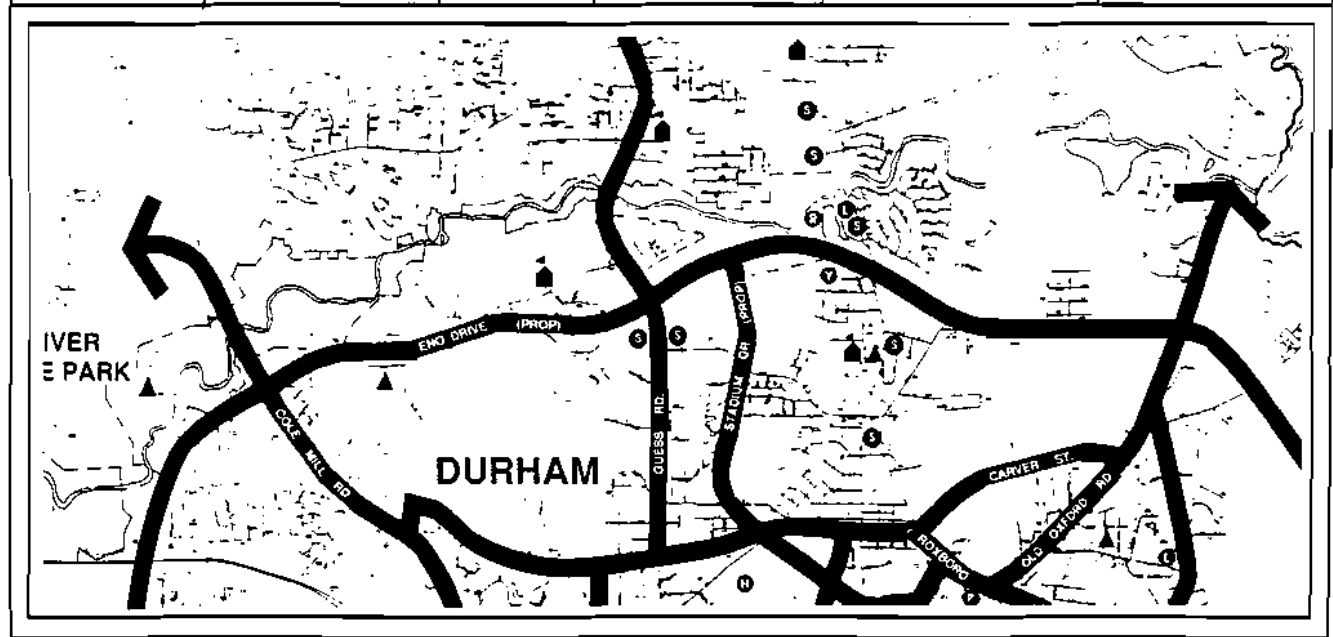
Guess Road is scheduled for incidental bicycle improvements in the TIP for 1992. Improvements will include wide curb lanes and bicycle-safe drainage grates from Carver Street to Umstead Road, and extra roadway width for bicycle safety from Umstead Road to Latta Road.

Possible opportunities/constraints along proposed route:

The Eno River bridge may prove a constraint to facility development.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Guess Road - NC 147	20,000-35,000	Major thoroughfare	24'-50'	60'



Guthrie Avenue/Briggs Avenue Connector

Proposed route boundaries:

Guthrie Avenue from Liberty Street to Angier Avenue, and Briggs Avenue from Angier Avenue to So-Hi Drive (joins Ed Cook Road alignment). This connector route should include bicycle improvements to a short route segment on Angier Avenue between Guthrie Avenue and Briggs Avenue.

Transportational function of proposed facility:

Commuter route option from west-central Durham and Durham Technical Community College to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Expressway Commerce Center, Durham Tech. Community College, and one post office.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

No scheduled bicycle improvements.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Briggs Avenue	8000	Major thoroughfare	26'-40'	not available



Hillsborough Road (U.S. 70 Business)

Proposed bicycle route boundaries:

Hillsborough Road from Cole Mill Road to W. Main Street.

Transportational function of proposed bicycle facility:

Portion of a cross-town commuter route through central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Two shopping centers, one school.

Description of currently scheduled bicycle improvements per NCDOT TIP:

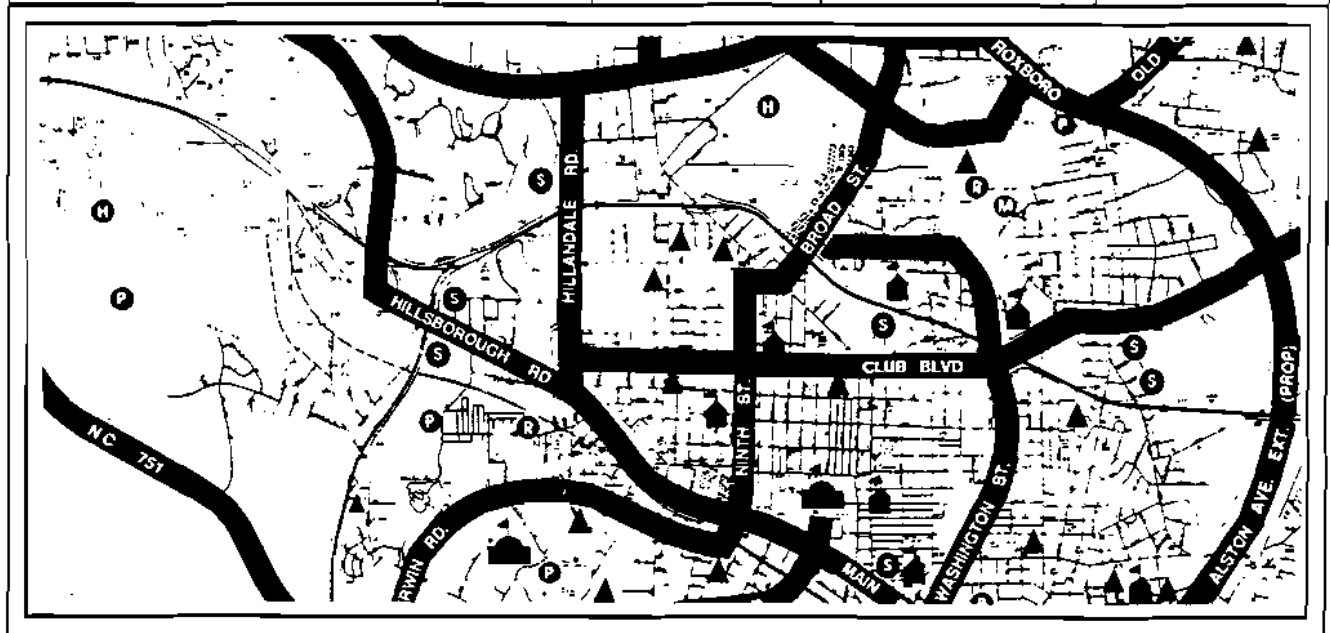
Hillsborough Road from 15-501 Bypass to Hillandale Road is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide outside lanes and bicycle-safe drainage grates.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Hillsborough Road	3,300-12,100	Major thoroughfare	30'-40'	50'-60'



Hopson Road - SR 1119

Proposed route boundaries:

Hopson Road from NC751 to NC 54 (includes proposed extensions of Hopson Road).

Transportational function of proposed facility:

Commuter route from south Durham County and Chapel Hill to southern Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Research Triangle Park.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

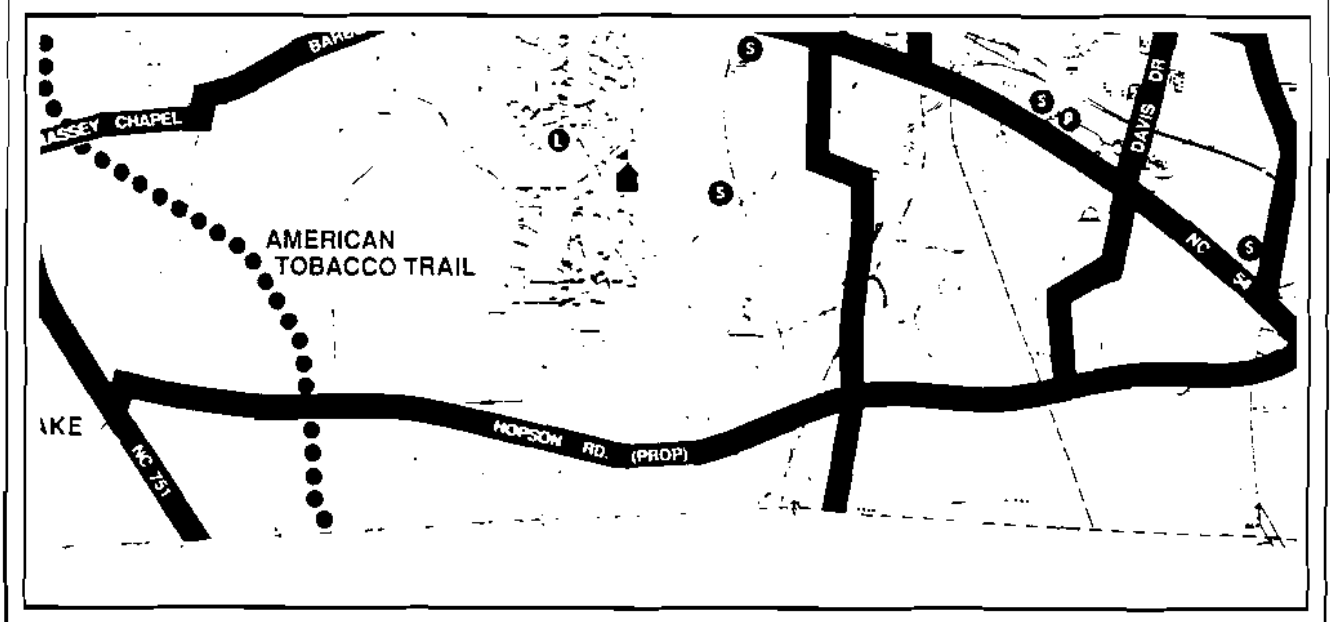
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: bicycle improvements can be combined with planned roadway improvements for this route.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Hopson Road - SR 1119	2,000	Major thoroughfare	n/a	n/a



Latta Road - SR 1448

Proposed bicycle route boundaries:

Latta Road from Guess Road to Roxboro Road

Transportational function of proposed bicycle facility:

Connector route to Roxboro Road destinations, also serves as a connection to proposed rural Durham County bicycle route system via Infinity Road.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One school, two shopping centers, and a residential area.

Description of currently scheduled bicycle improvements per NCDOT TIP:

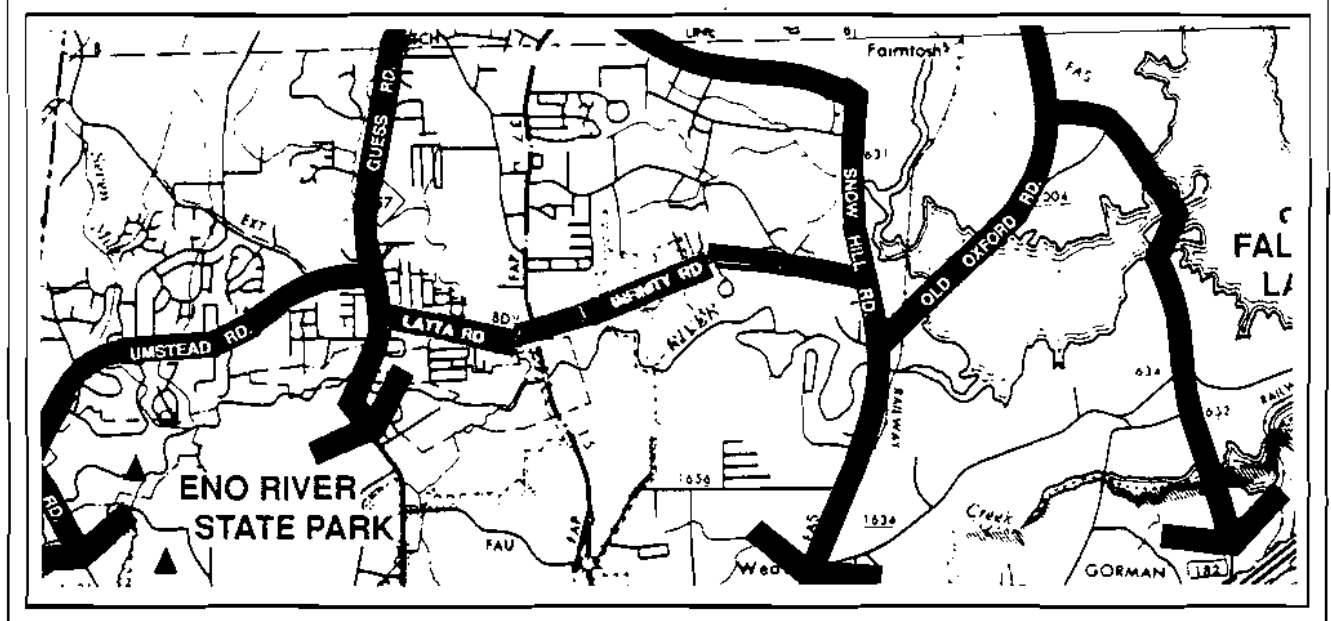
No bicycle improvements are currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Latta Road - SR 1448	8400	Major thoroughfare	23'	variable



Laurel Hill Drive (proposed)/Farrington Road

Proposed route boundaries:

Proposed Laurel Hill Drive from NC 54 to Farrington Road, and Farrington Road to Durham-Chapel Hill Road.

Transportational function of proposed facility:

Regional connector route in urbanizing area between Durham and Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One school, residential areas.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

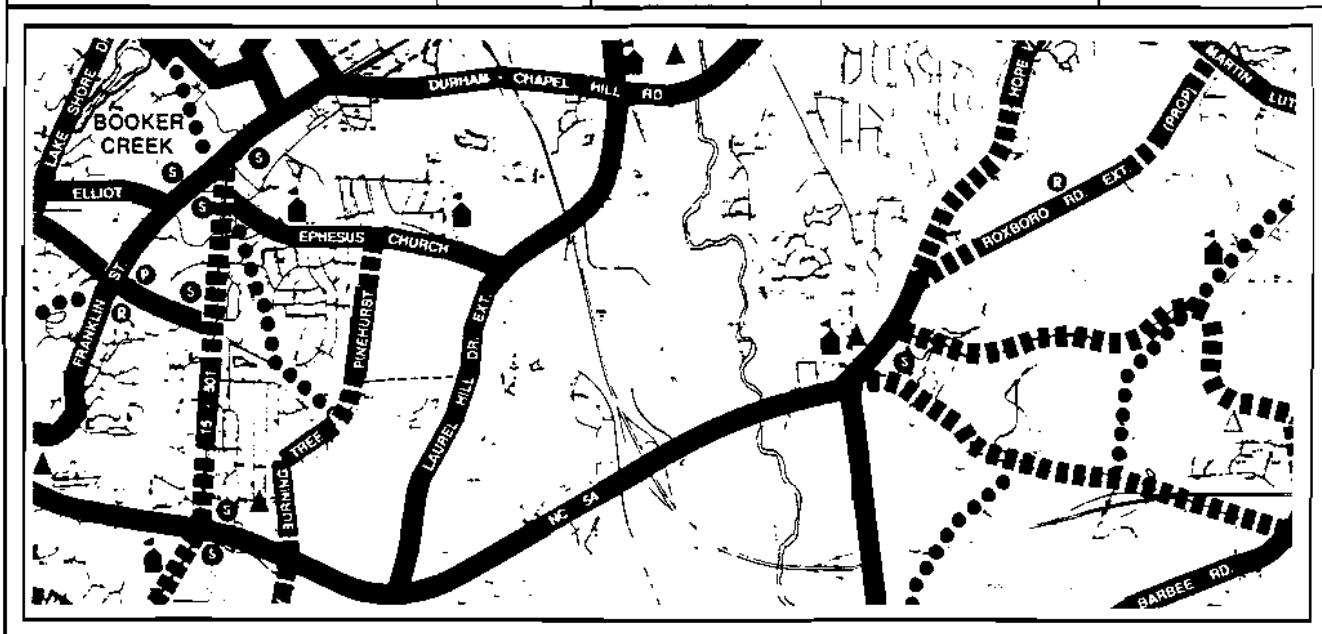
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: bicycle improvements can be combined with planned roadway construction.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Laurel Hill Dr./Farrington Rd.	2,800-4,100	Minor thoroughfare	28'-68' proposed	110' proposed



Lumley Road - SR 1966

Proposed route boundaries:

Lumley Road from South Miami Boulevard to the Wake County line.

Transportational function of proposed facility:

Connector from south Durham and Research Triangle Park to Wake County destinations - forms connection to Page Rd. bicycle route proposed in the Raleigh Bicycle Plan.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Residential area.

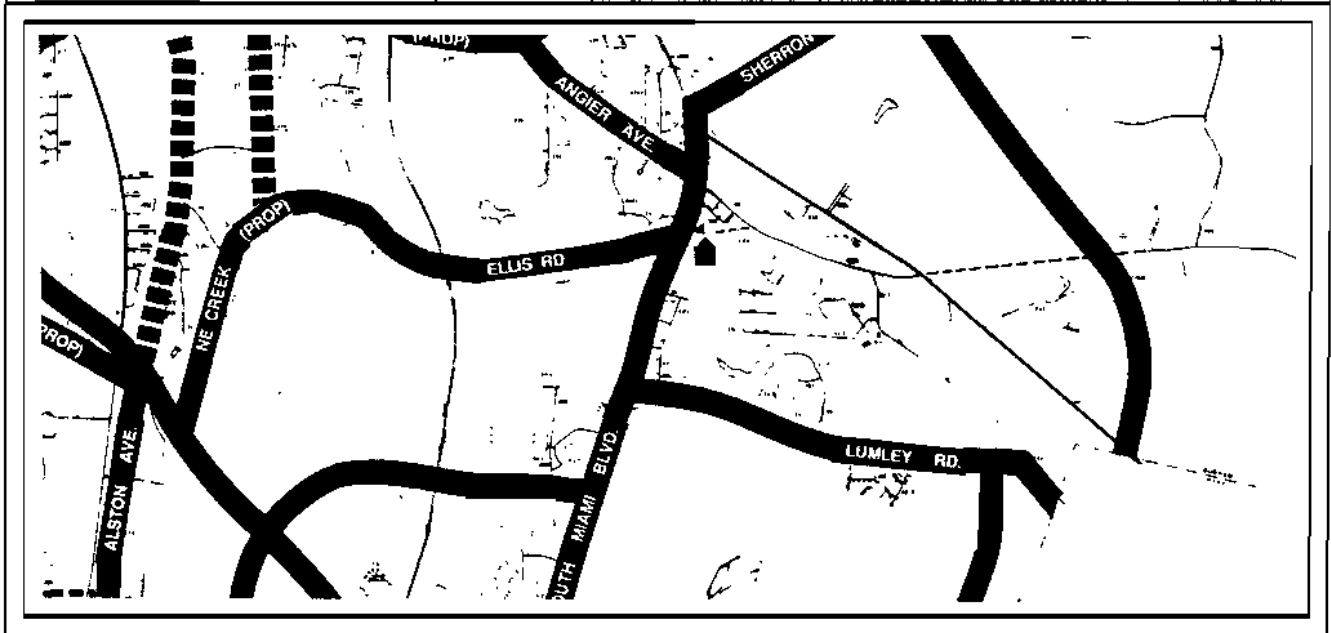
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Lumley Road - SR 1966	2,000	Secondary road	n/a	n/a



Martin Luther King, Jr. Parkway (proposed)

Proposed route boundaries:

Proposed Martin Luther King, Jr. Parkway from University Drive to Cornwallis Road

Transportational function of proposed facility:

Commuter route from west-central Durham to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Two shopping centers, one mall, 5 residential developments, one post office, one park.

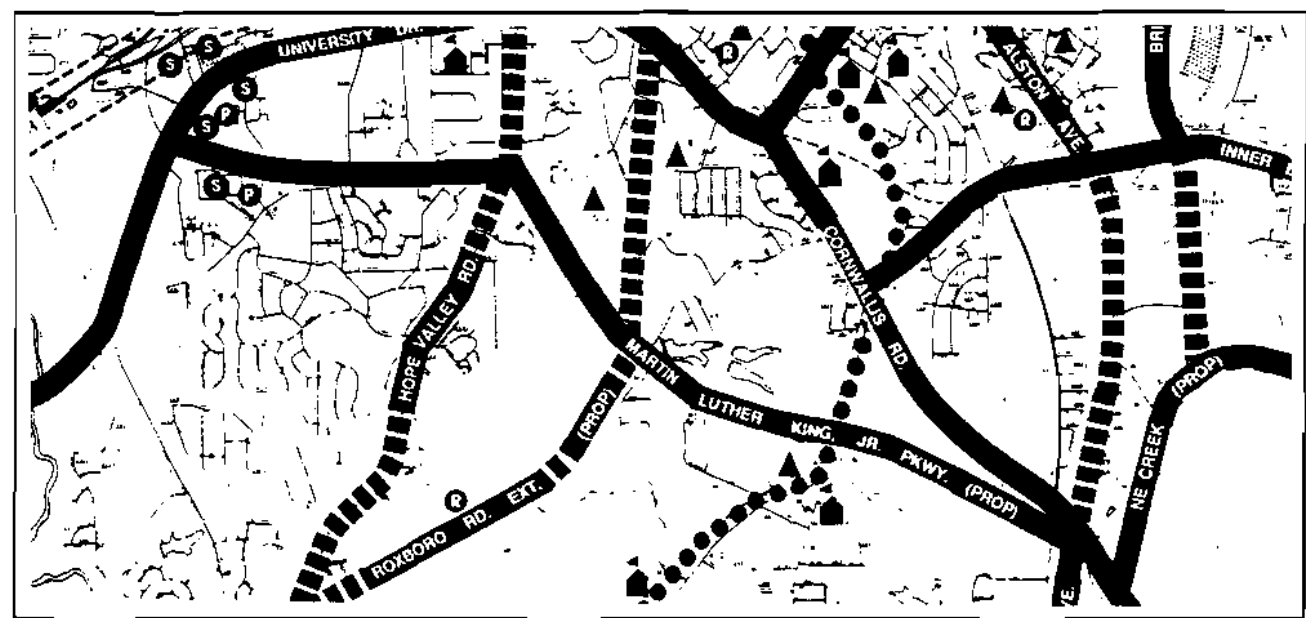
Description of currently scheduled improvements per NCDOT Bicycle TIP:

Martin Luther King, Jr. Parkway is scheduled for incidental bicycle improvements in the TIP (1992). Improvements will include safe bicycle access at interchanges. Portions of Martin Luther King, Jr. Parkway funded by the City of Durham will include bicycle facilities (construction beginning in 1993), including Shannon Road to Hope Valley Road and Cook Road to NC 55.

Possible opportunities/constraints along proposed route:

This facility will cross two planned trail systems: the Durham North/South Greenway and the American Tobacco Trail - bicycle access should be accommodated between on-road and off-road facilities.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Martin Luther King, Jr. Pkwy	not avail.	Major thoroughfare	26'-64'	variable



Massey Chapel Road (SR 1192)/Barbee Road

Proposed route boundaries:

Massey Chapel Road from NC 751 to Fayetteville Road, and Barbee Road from Fayetteville Road to Woodcroft Parkway.

Transportational function of proposed facility:

Serves as a portion of a commuter route option from Chapel Hill/south Durham to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Residential areas

Description of currently scheduled improvements per NCDOT Bicycle TIP:

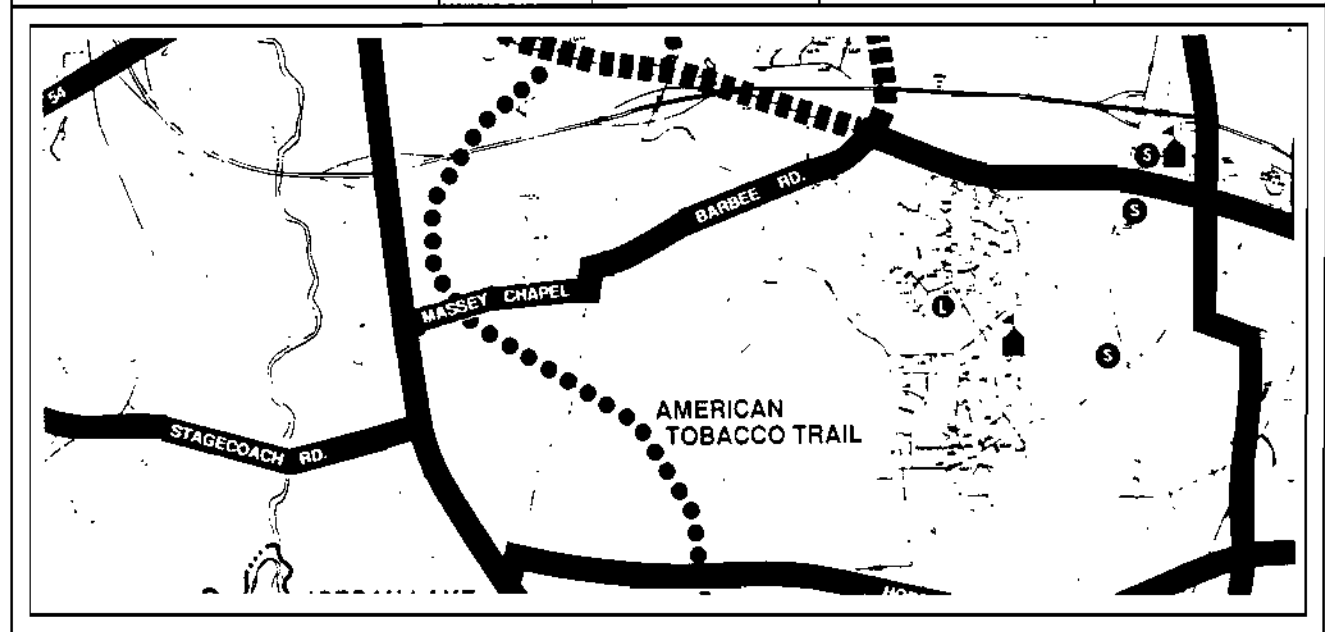
No bicycle improvements are currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunity: this facility will cross the proposed American Tobacco Trail.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Massey Chapel Rd./Barbee Rd.	500	Minor thoroughfare	18'	not available



Mineral Springs Rd. (SR 1917)/Sherron Rd. (SR 1811)

Proposed route boundaries:

Mineral Springs Road from Miami Boulevard to Sherron Road, and Sherron Road from Mineral Springs Road to Eno Drive.

Transportational function of proposed facility:

Connector route from Eno Drive to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Residential areas.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

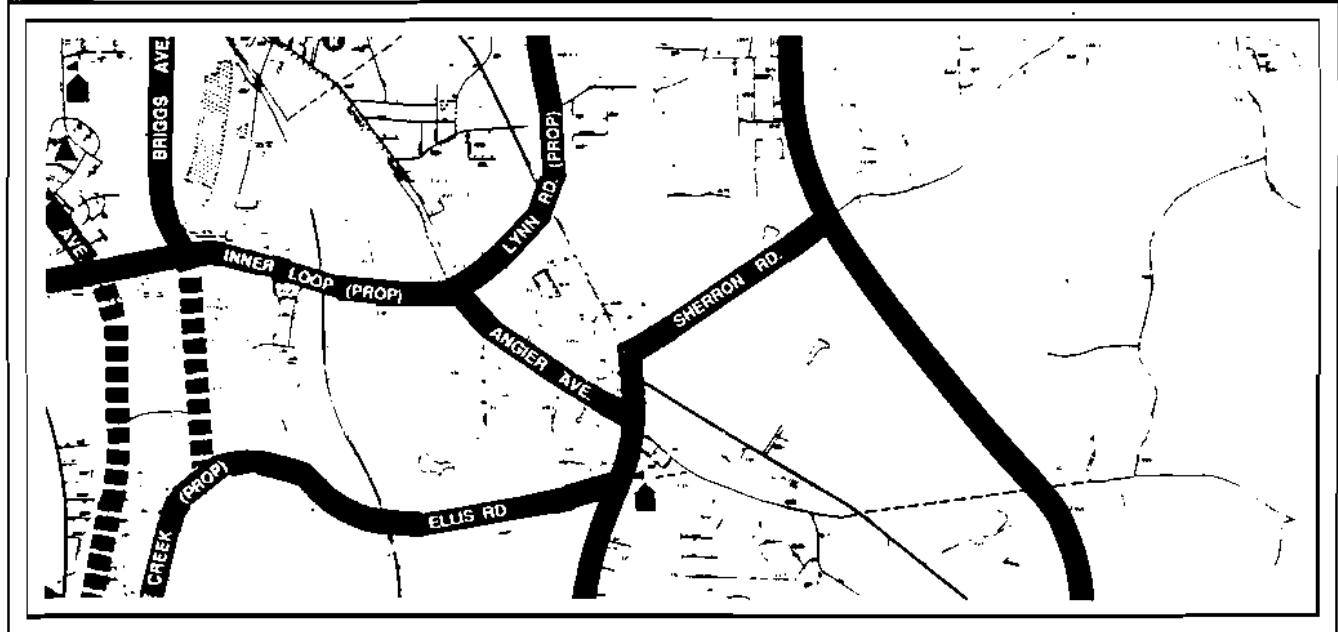
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Bicycle improvements can be combined with general roadway improvements scheduled for the area.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Sherron Road - SR 1811	3000	Major thoroughfare	18'	60'



Morris Street/Washington Street/Leon Street

Proposed route boundaries:

The route includes Morris Street from the Downtown Loop to Washington Street, following Washington Street to Leon Avenue, following Leon Avenue to Broad Street.

Transportational function of proposed facility:

Provides a downtown linkage to north Durham bicycle routes.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Downtown, Durham Athletic Park, one post office, one park and one school.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

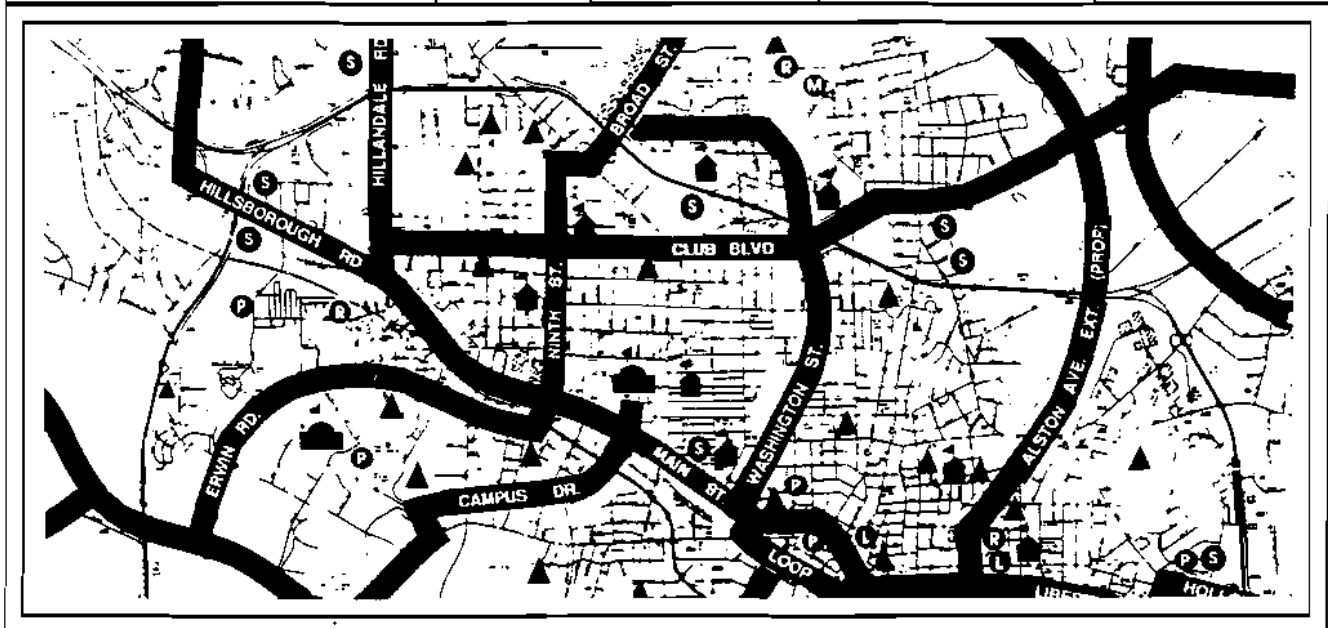
No bicycle improvements currently scheduled.

Possible opportunities /constraints along proposed route:

Opportunities: this route intersects with the proposed Durham North-South Greenway - bicycle access should be accommodated between on-road and off-road facility.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Morris/Washington/Leon	6,300	Minor thoroughfare	30'-42'	variable



Ninth Street (BUS US 70)

Proposed route boundaries:

Ninth Street from Club Boulevard to Main Street.

Transportational function of proposed facility:

Local connector to commercial areas, north-south urban route.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Commercial area frequently used by Duke University students, NC School of Science and Math.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

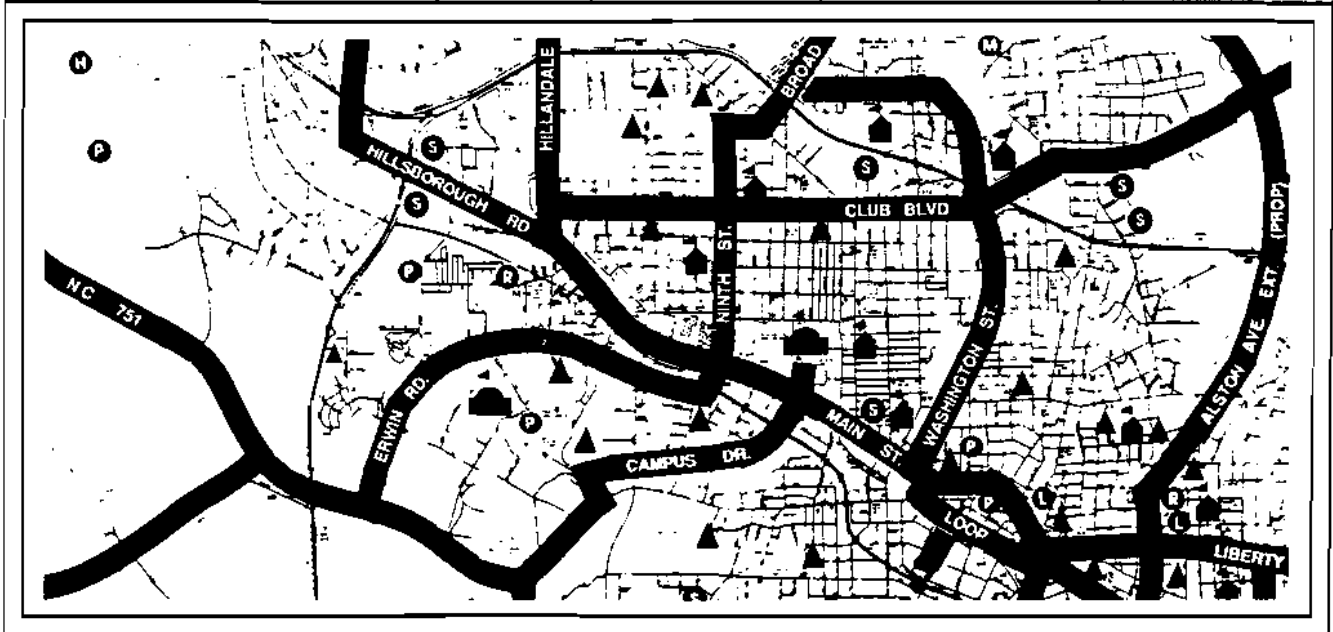
Ninth St. is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide curb lanes.

Possible opportunities/constraints along proposed route:

Urban congestion, on-street parking.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Ninth Street (BUS US 70)	8100	Minor thoroughfare	36'-43'	variable



NC 54

Proposed route boundaries:

NC 54 from Greenwood Road in Chapel Hill to Page Road interchange (east of Research Triangle Park).

Transportational function of proposed facility:

Commuter route option from Chapel Hill/south Durham to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Along section under construction: three shopping centers, one school, one post office, and Research Triangle Park business centers.

Along remainder of project: four shopping centers, one "park and ride" facility, two schools, and one park, several residential areas.

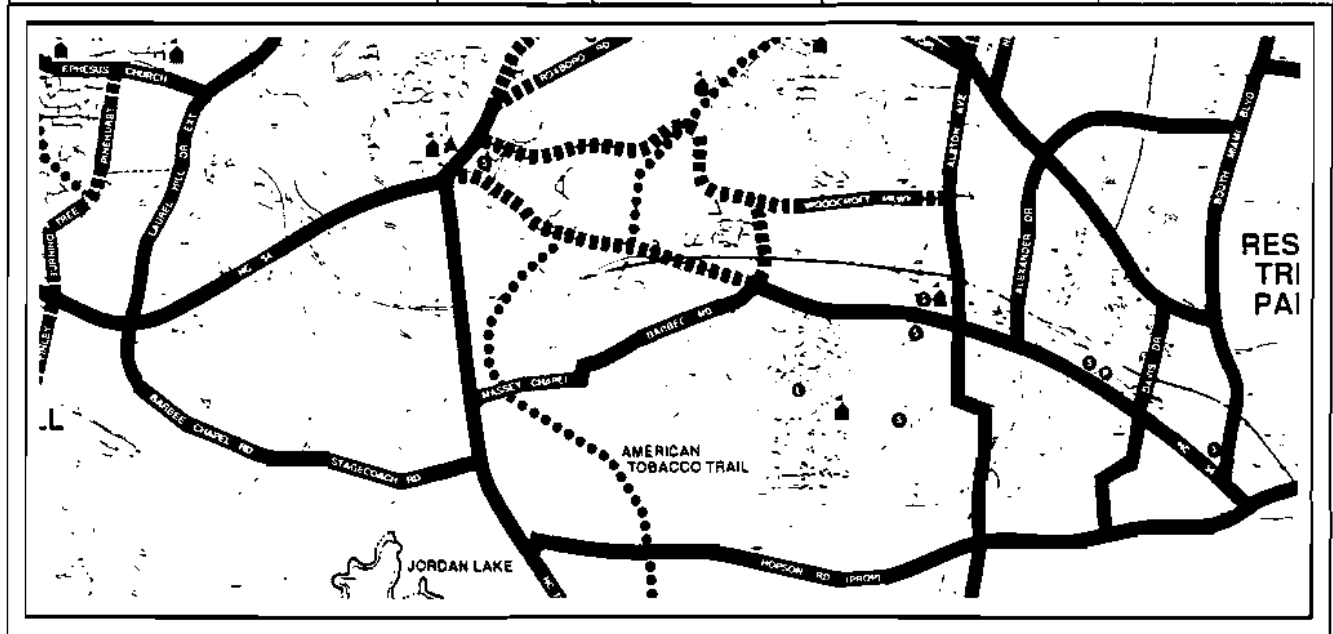
Description of currently scheduled improvements per NCDOT Bicycle TIP:

NC 54 from NC 55 to Davis Drive is scheduled for incidental bicycle improvements in 1992 (widened curb lanes).

Possible opportunities/constraints along proposed route:

I-40 crossings may be constraints.

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
NC 54	21,500-25,600	Major thoroughfare	variable	60'-100'



NC 751: US 70 to University Drive

Proposed bicycle route boundaries:

NC 751 from US 70 (Hillsborough Road) to University Drive. Includes Cameron Boulevard and Academy Road.

Transportational function of proposed facility:

Commuter route from north-west to central Durham, serves as portion of commuter route from Hillsborough, North Carolina. NC 751 is designated as a US Bicycling Highway.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Eno River SP, Duke Univ., Duke Cross Country Trail, several residential areas, one school.

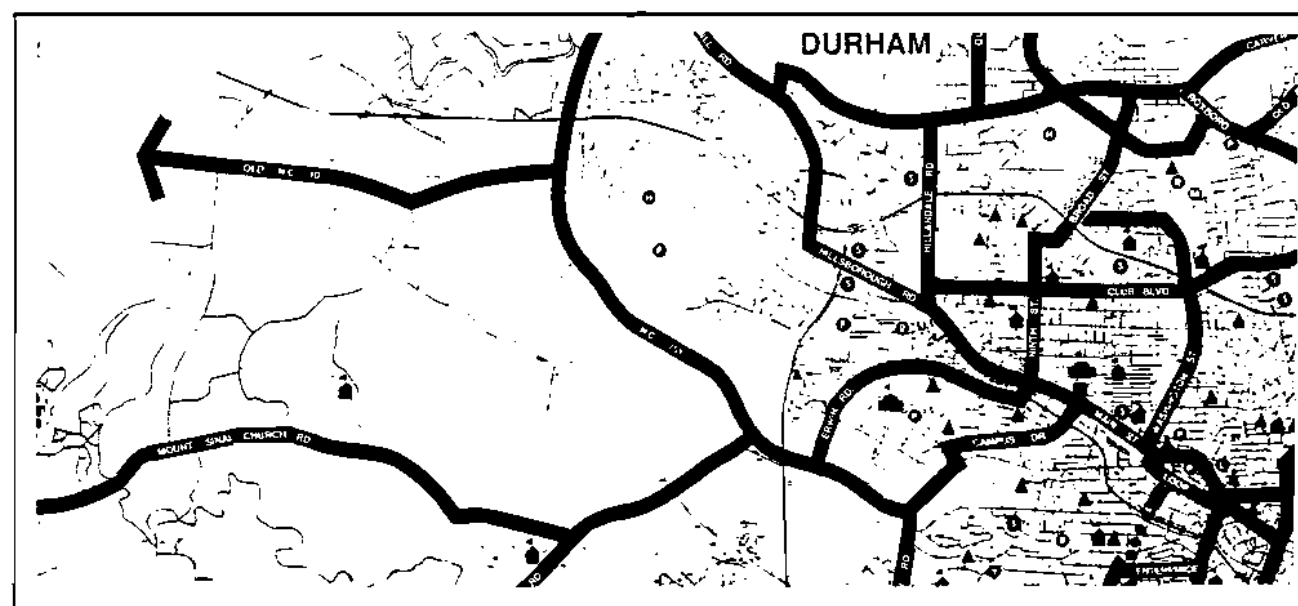
Description of currently scheduled improvements per NCDOT Bicycle TIP:

NC 751 from University Dr. to US 70 is scheduled for incidental bicycle improvements in the TIP (type of improvements and date are unspecified). The bridge over Southern Railroad on NC 751 is also scheduled for incidental bicycle improvements: "provide for bicycle safety" (no date specified). Academy Rd. is scheduled for independent bicycle improvements in 1995, to include bicycle-safe drainage grates.

Possible opportunities/constraints along proposed route:

Opportunity: a portion of the route from Erwin Road to US 70 is included in the New Hope Corridor Plan to include a bicycle/pedestrian sidepath.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
NC 751: US 70 to Univ. Dr.	14,500-15,200	Major thoroughfare	18'-48'	60'



NC 751: Hope Valley Road

Proposed bicycle route boundaries:

Hope Valley Road from University Drive to NC 54.

Transportational function of proposed facility:

Commuter route option from central Durham to Woodcroft, Chapel Hill, and points south. NC 751 is designated as a US Bicycling Highway, part of a national system of bike routes.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Woodcroft community, two schools, one park, and one shopping center.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

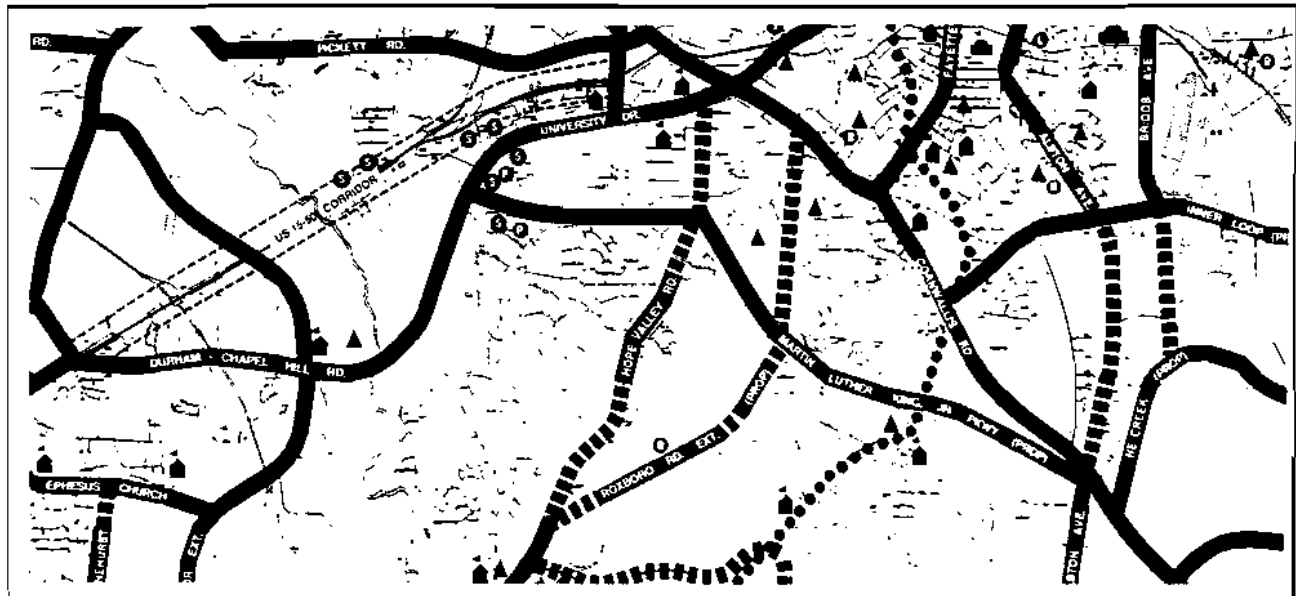
NC 751 from Durham to Old US 1 (Chatham County) is scheduled for incidental bicycle improvements in the TIP (no date specified). The improvements will include wide paved shoulders.

Possible opportunities/constraints along proposed route:

I-40 crossing may prove a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
NC 751: Hope Valley Road	9,900	Minor thoroughfare	19'-28'	variable



NC 751: NC 54 to Chatham County Line

Proposed route boundaries:

NC 751 from NC 54 to Chatham County line.

Transportational function of proposed facility:

Portion of a commuter route between Chapel Hill and south Durham/Research Triangle Park. NC 751 is a US Bicycling Highway, therefore the proposed facility will link with a nationwide system of routes.

Trip generators within 1/4 mile or 2 block radius of proposed route:

None

Description of currently scheduled improvements per NCDOT Bicycle TIP:

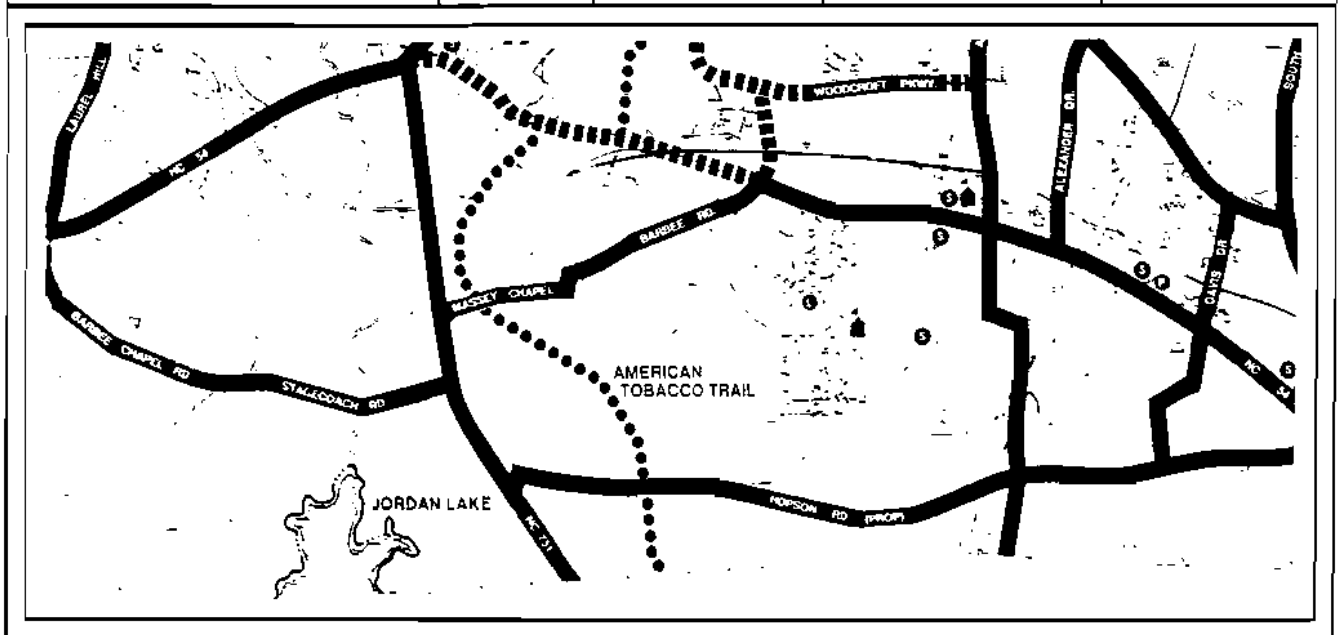
NC 751 from Durham to Old US 1 (in Chatham County) is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide paved shoulders.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
NC 751: NC 54 to county line	6900-16,400	Major thoroughfare	20'	60'-70'



Old Oxford Highway - SR 1004

Proposed route boundaries:

Old Oxford Highway from Roxboro Street to Eno Drive.

Transportational function of proposed facility:

Connector route to northern Durham County destinations, also links to proposed rural Durham County bicycle route system.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Oxford Commons Shopping Center, one park and one school.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

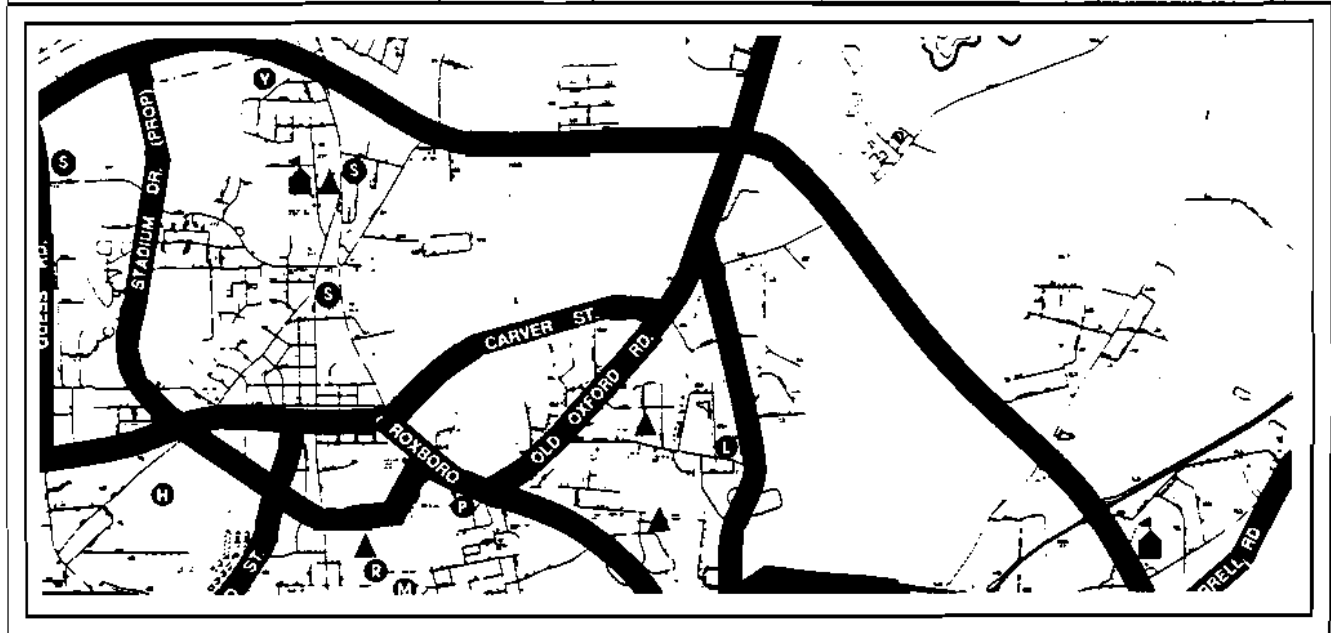
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Old Oxford Highway	13,400	Major thoroughfare	24'-44'	60'-100'



Pickett Road - SR 1303

Proposed bicycle route boundaries:
 Pickett Road from Erwin Road to Cornwallis Drive.

Transportational function of proposed facility:
 Commuter route from north-west to central Durham, serves as portion of commuter route from Hillsborough, North Carolina.

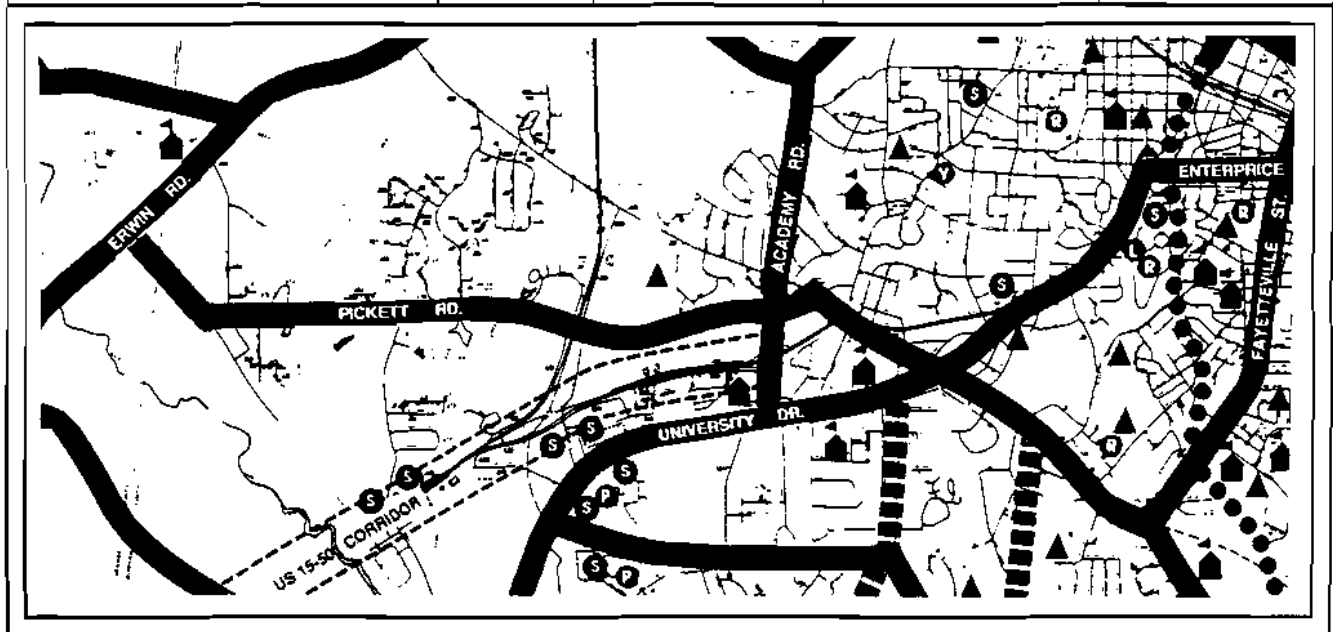
Trip generators within 1/4 mile or 2 block radius of proposed route:
 One park, several residential areas.

Description of currently scheduled improvements per NCDOT Bicycle TIP:
 No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:
 U.S. 15-501 crossing may be a constraint.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pmnt.	ROW Width
Pickett Road - SR 1303	4100-2500	Minor thoroughfare	18'	60'



Roxboro Road (US 501)

Proposed bicycle route boundaries:

Short segment of Roxboro Road from Old Oxford Road to Carver Street.

Transportational function of proposed bicycle facility:

Vital connector route linking areas northeast of Durham to inter-urban bicycle route system.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

One post office, Oxford Commons Shopping Center, Independence Park Business Center, Durham Regional Hospital,

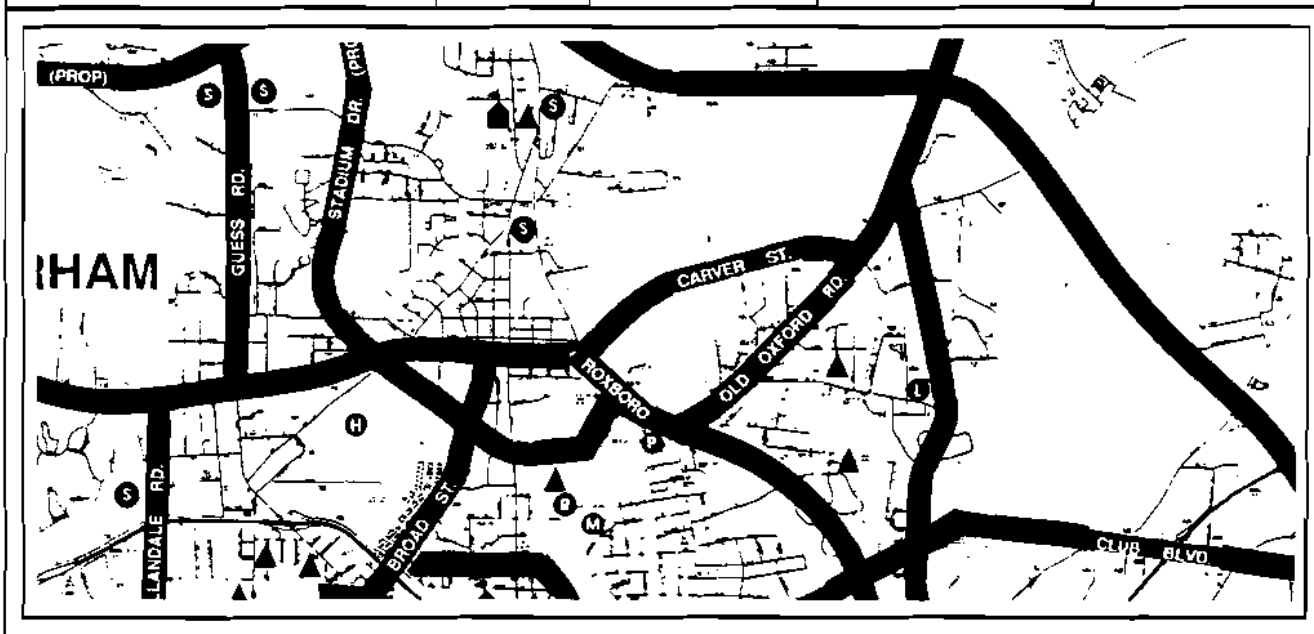
Description of currently scheduled improvements per NCDOT Bicycle TIP:

Roxboro Road is scheduled for incidental bicycle improvements in the TIP (no date specified). The improvements will include wide outside lanes and "Share the Road" signs (no length specified).

Possible opportunities/constraints along proposed route:

Intersections of Roxboro Street at Old Oxford Road and at Olympic Avenue were recently cited as among the highest accident intersections in Durham. These areas will require special consideration.

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Roxboro Road	20,700	Major thoroughfare	44'	60'



Stadium Drive/Olympic Avenue

Proposed route boundaries:

Stadium Drive from Eno Drive to Olympic Avenue, and Olympic Avenue to Roxboro Street.

Transportational function of proposed facility:

Local connector route to North Durham and Roxboro Road destinations.

Trip generators within 1/4 mile or 2 block radius of proposed route:

County Stadium, Durham Regional Hospital, Oxford Commons Shopping Center, several residential areas, two parks, and one recreation center, and the Durham North-South Greenway.

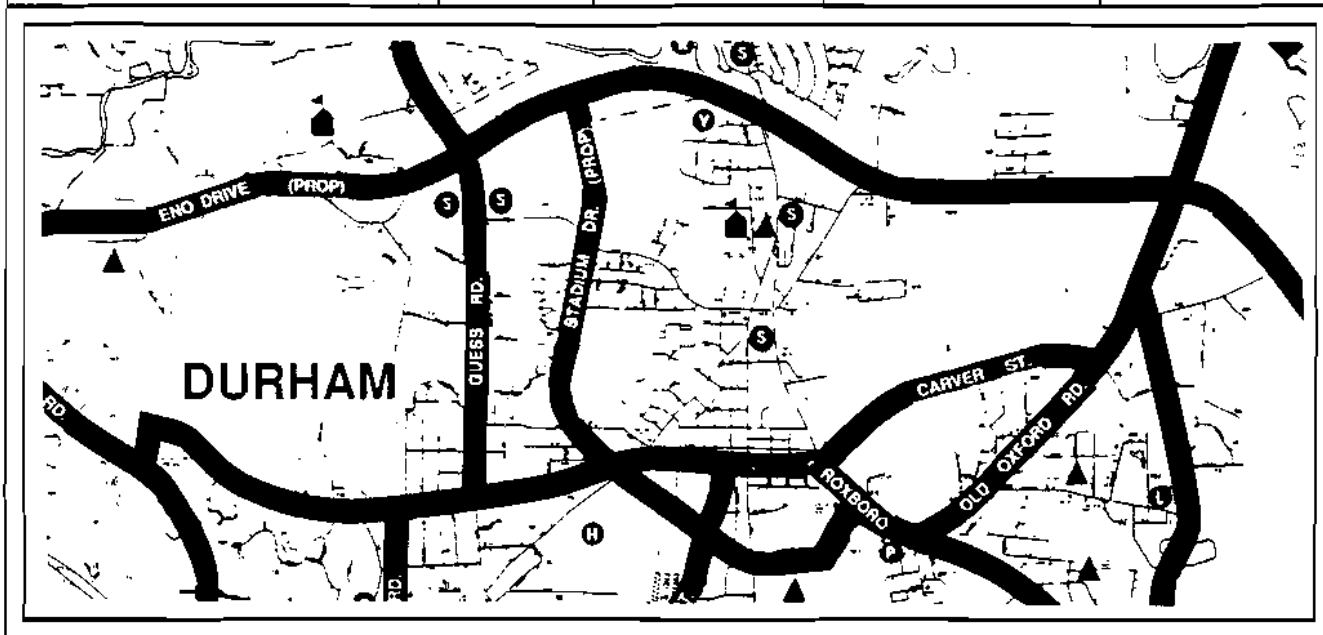
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this facility will cross the Durham North-South Greenway twice - bicycle access should be accommodated between on-road and off-road facility. Also, Bicycle improvements can be combined with general roadway improvements scheduled for the area.

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Stadium Drive	6000	Minor thoroughfare	40'	60'



Stagecoach Road - SR 1107

Proposed route boundaries:

Stagecoach Road from Farrington Road to NC 751

Transportational function of proposed facility:

Forms a portion of the southern commuter route option from Chapel Hill to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

None

Description of currently scheduled improvements per NCDOT Bicycle TIP:

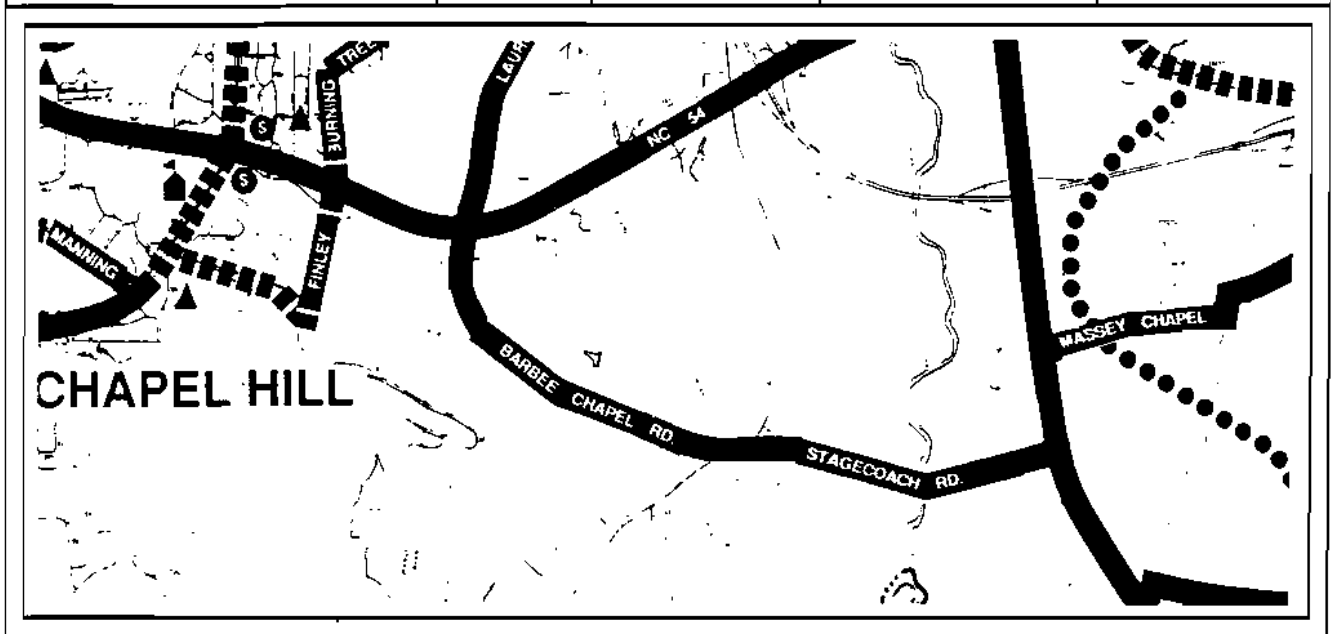
Section of Stagecoach Road from Farrington Road to NC 751 is scheduled under Orange County incidental bicycle improvements (this could be an error in the TIP). Improvements will include 1.6 miles of wide paved shoulders (no date specified).

Possible opportunities/constraints along proposed route:

This route is currently unpaved, however is identified by the Durham-Chapel Hill-Carrboro Urban Area Thoroughfare Plan to become a major thoroughfare.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Stagecoach Road	not available	Major thoroughfare	unpaved	not available



So-Hi Dr./Ellis Rd./Proposed North-East Creek Pkwy.

Proposed route boundaries:

Traveling east to west, this route will follow Ellis Road from South Miami Boulevard to So-Hi Drive, then follow So-Hi Drive to the proposed North-East Creek Parkway, and follow N-East Creek Parkway to Cornwallis Road.

Transportational function of proposed bicycle facility:

East-west connector route in southeast Durham, this route also serves as a commuter route option to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One school.

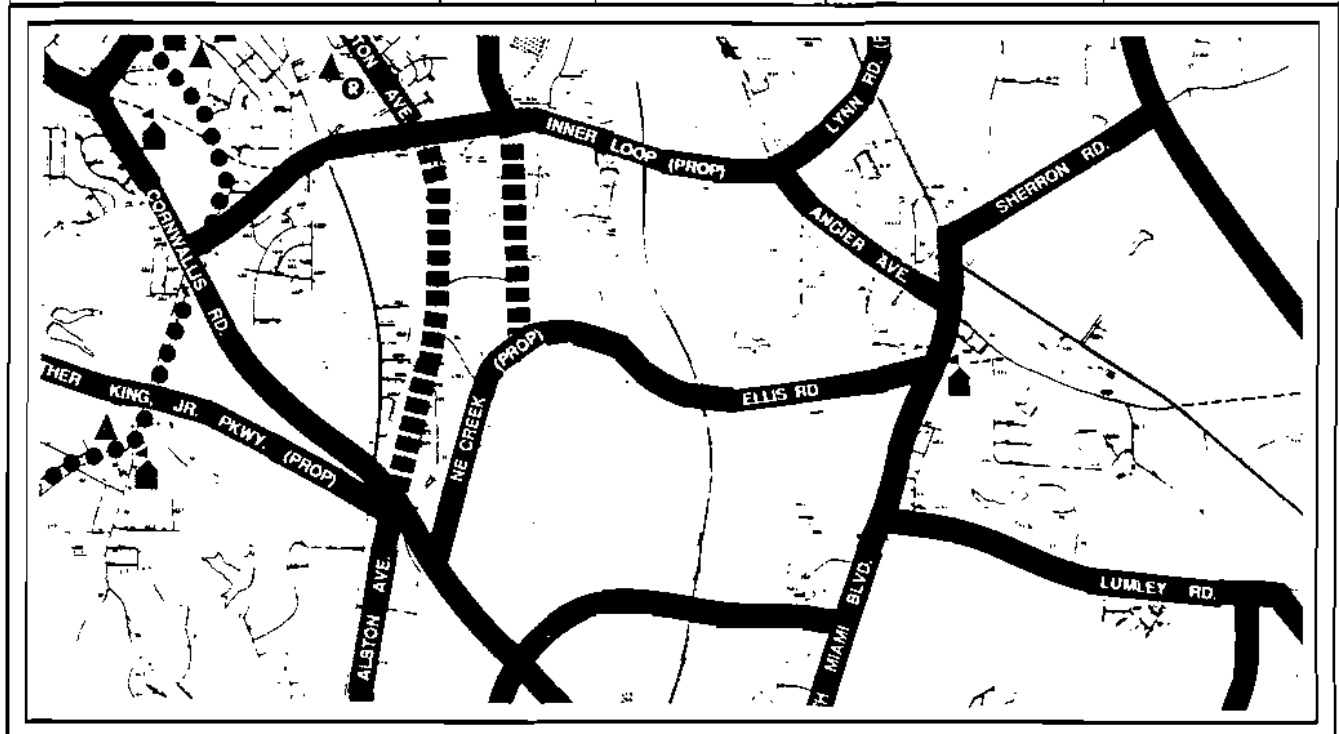
Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Bicycle improvements can be combined with general roadway improvements planned for this area.

Road name	ADT's	Rd-way Class	Total Pymt.	ROW Width
Ellis Road - SR 1954	900-3600	Major thoroughfare	variable	not available



South Miami Boulevard - SR 1959

Proposed route boundaries:

South Miami Boulevard from US 70 to NC 54

Transportational function of proposed facility:

East Durham commuter route to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One elementary school, Research Triangle Park, and the Imperial Center.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

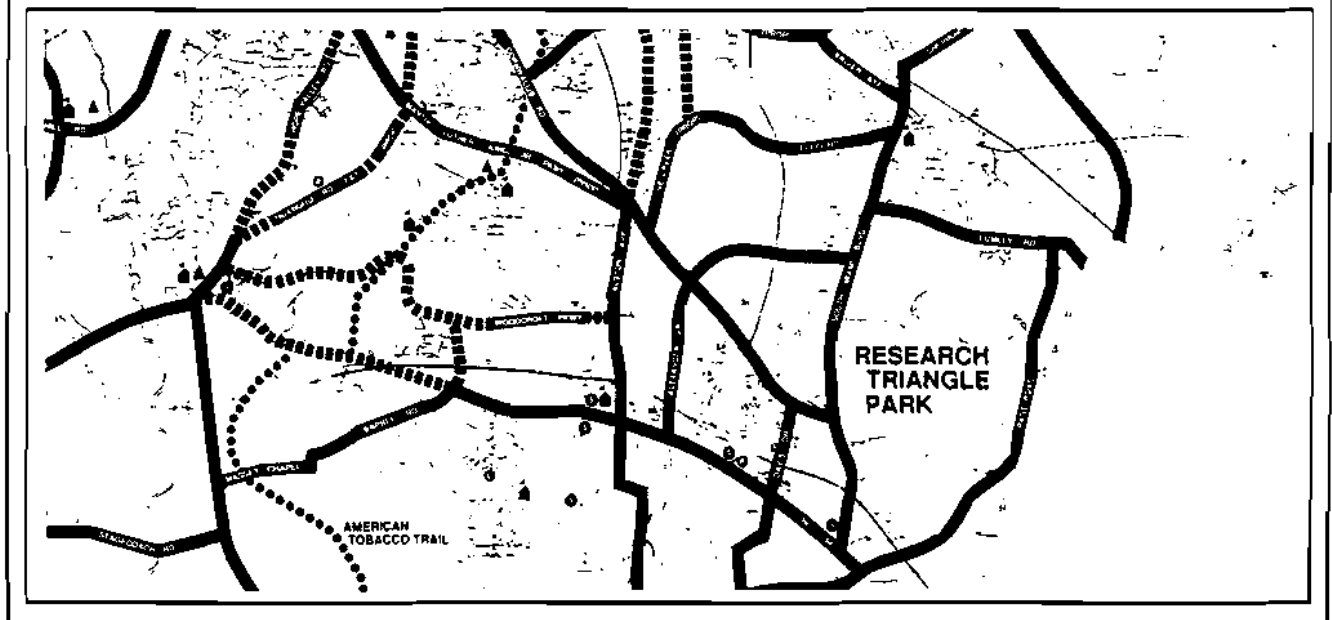
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

This route is relatively flat and therefore well-suited for cyclists.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
South Miami Blvd. - SR 1959	n/a	Major thoroughfare	48'-64'	variable



South Roxboro Street Extension

Proposed route boundaries:

South Roxboro Street Extension from Cornwallis Road to Hope Valley Road.

Transportational function of proposed facility:

Serves as a portion of a commuter route option from Durham to Chapel Hill.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Two parks, residential areas, and the Research TriCenter.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

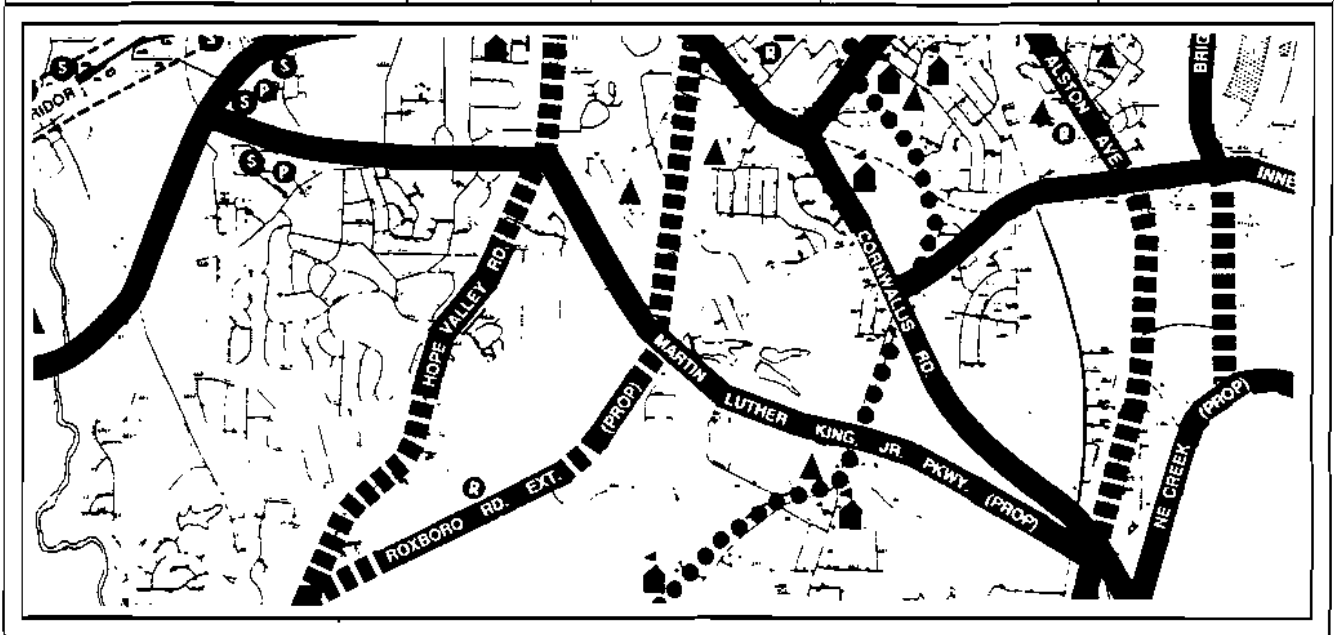
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this route intersects with the proposed Durham North-South Greenway - bicycle access should be accommodated between on-road and off-road facility.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
S. Roxboro Road Extension	under construction	Thoroughfare	2 x 24' 2 x 28'	90'-110'



Umstead Street/Enterprise Street/Forest Hills Blvd.

Proposed route boundaries:

Follows Umstead Street from Fayetteville Street to Enterprise Street, Enterprise Street to Forest Hills Boulevard, and Forest Hills Boulevard to University Drive.

Transportational function of proposed facility:

Connector route between proposed improved bicycle routes, providing access to proposed American Tobacco Trail.

Trip generators within 1/4 mile or 2 block radius of proposed route:

One recreation center, one park, one shopping center, and one library.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

No bicycle improvements currently scheduled.

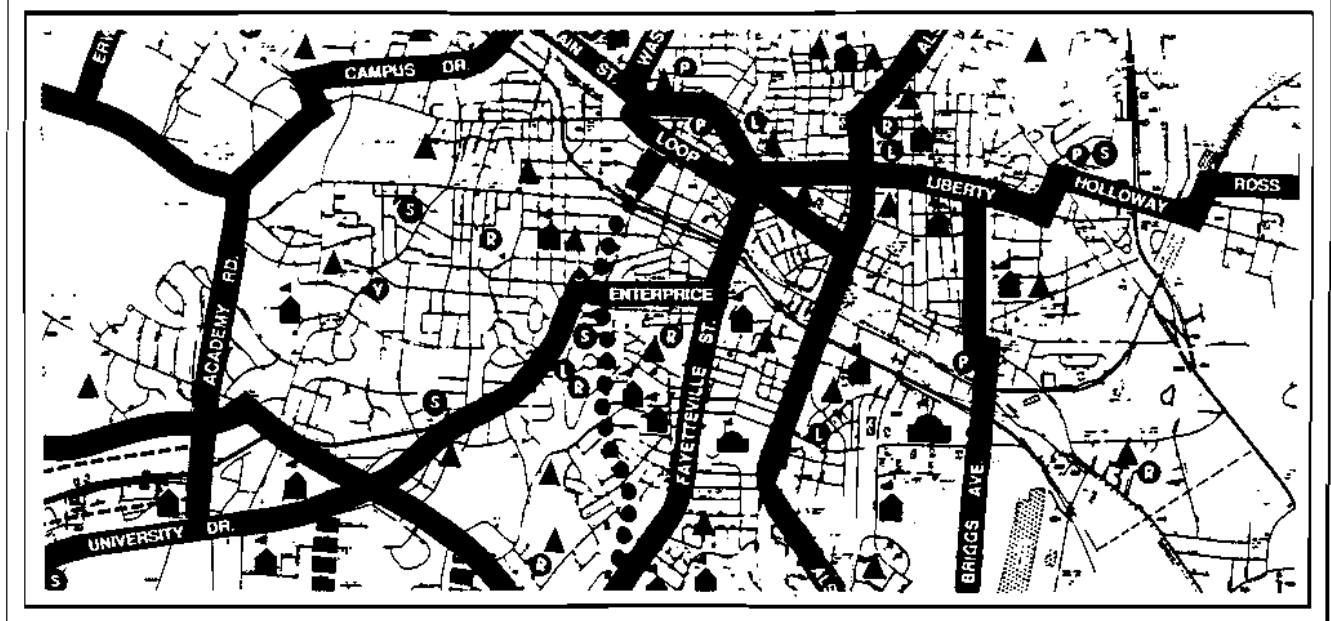
Possible opportunities/constraints along proposed route:

No known opportunities or constraints.

Project specifics:

No on-road improvements recommended along this (non-thoroughfare) connector route. Should be designated as a bicycle route upon completion of bicycle facility construction on Fayetteville Street and University Drive.

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Enterprice Connector	not available	not designated	28'-38'	not available



University Dr./Old Durham-Chapel Hill Rd. (SR 2220)

Route Boundaries:

Lakewood Road/University Drive from Blackwell Street to Garrett Road, and Old Durham-Chapel Hill Road from Garrett Road to U.S. 15-501 (in Chapel Hill).

Transportational function of proposed facility:

A commuter route option from Durham to Chapel Hill, also serves as a local connector route through central Durham.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Five shopping centers, one mall, 9+ residential developments, one library, one post office, one community center, three parks and three schools.

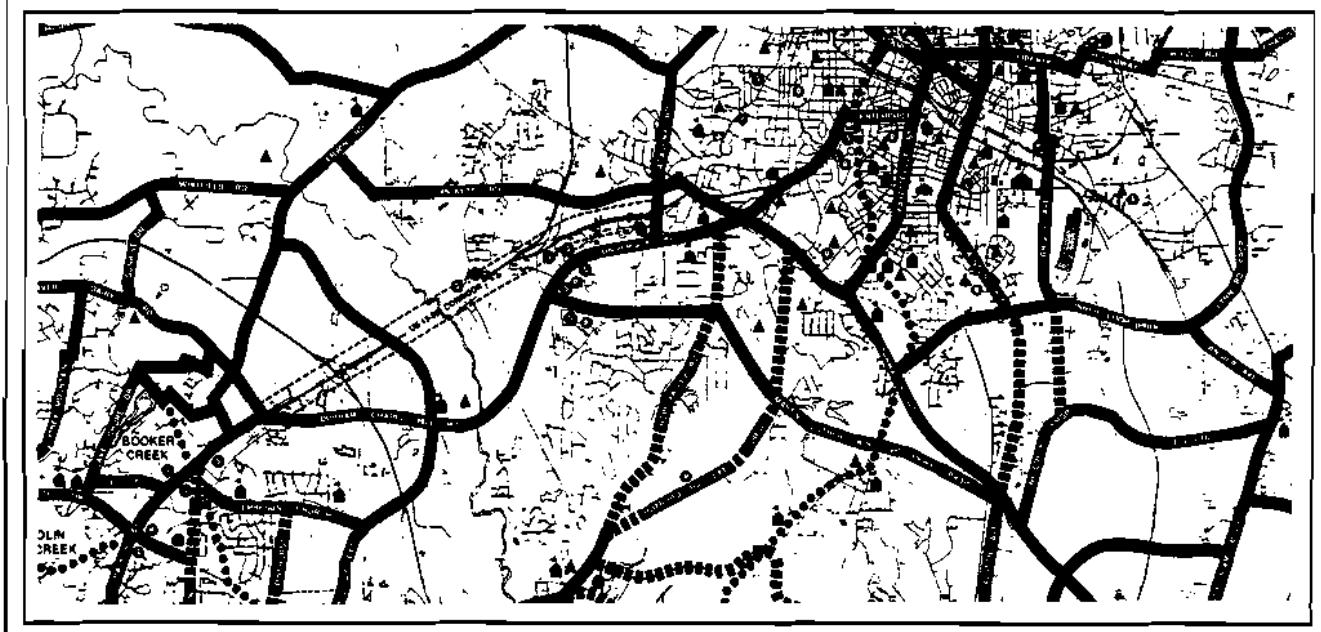
Description of currently scheduled improvements per NCDOT Bicycle TIP:

Section of University Drive from Academy Road (NC 751) to Dixon Road is scheduled for incidental bicycle improvements in the TIP (no date specified). Improvements will include wide outside lanes and bicycle-safe drainage grates.

Possible opportunities/constraints along proposed route:

Intersection of Academy Road and University Drive was recently cited as among the highest accident intersections in Durham. This area will require special consideration.

Road name	ADT's	Rd-way Class	Total Pvmnt.	Lane Width
University Drive	8,100-16,900	Maj. thorough.	24'-36'-64'	60+
Durham-Chapel Hill Road	5,800-9,200	Maj. thorough.	variable	N/A



Woodcroft Parkway

Proposed route boundaries:

Woodcroft Parkway from Hope Valley Road to Alston Avenue

Transportational function of proposed facility:

Portion of a commuter route option from southwest Durham and Chapel Hill to Research Triangle Park.

Trip generators within 1/4 mile or 2 block radius of proposed route:

Woodcroft (high density residential area), one shopping center, one park.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

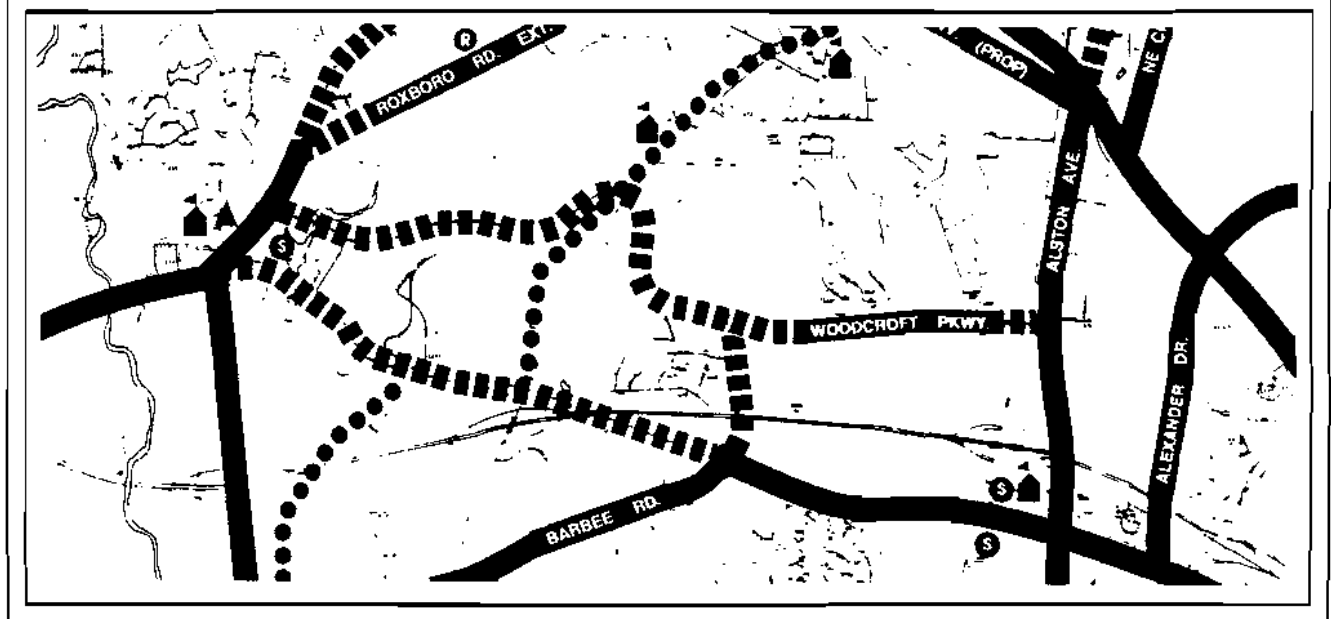
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this route will cross the proposed American Tobacco Trail and the Durham North-South Greenway - bicycle access should be accommodated between on-road and off-road facilities.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmnt.	ROW Width
Woodcroft Parkway	6900-9200	Minor thoroughfare	24'	variable



U.S. 15-501 Corridor (Chapel Hill-Durham Boulevard)

Proposed bicycle route boundaries:

U.S. 15-501 Corridor (Chapel Hill-Durham Boulevard) from Old Durham-Chapel Hill Road to Academy Road (NC 751) in Durham.

Transportational function of proposed bicycle facility:

Most direct commuter route option connecting Durham and Chapel Hill. Current conditions not suitable to bicycle transportation. Future corridor improvement should consider bicycle transportation as a separate parallel facility.

Trip generators within 1/4 mile or 2 block radius of proposed bicycle route:

Several residential areas, three shopping centers, one mall, commercial and business centers along this developing corridor.

Description of currently scheduled bicycle improvements per NCDOT TIP:

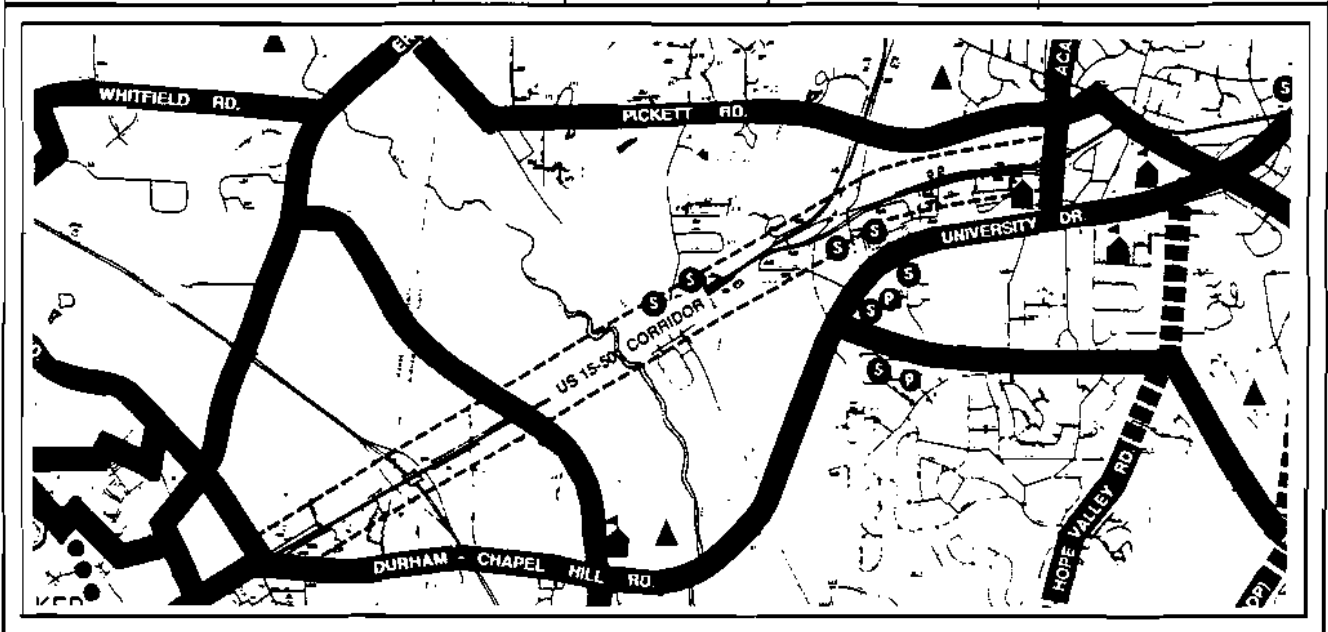
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed bicycle route:

Opportunities: this corridor could connect with the proposed New Hope Corridor greenway system.

Constraints: Urban congestion, high-speed traffic, strip development, controlled access freeway.

Road name	ADT's	Rd-way Class	Total Pvmnt. Width	Speed Limit
US 15-501 Corridor	42,100-45,900	Major thoroughfare	2 x 36'	45-55 mph



Blackwell Street

Proposed route boundaries:

Blackwell Street from Lakewood Drive to the Downtown Loop.

Transportational function of proposed facility:

Connector route through Durham downtown.

Trip generators within 1/4 mile or 2 block radius of proposed route:

American Tobacco Trail, proposed multi-modal transit station, proposed Durham Bulls Ballpark, Durham downtown.

Description of currently scheduled improvements per NCDOT Bicycle TIP:

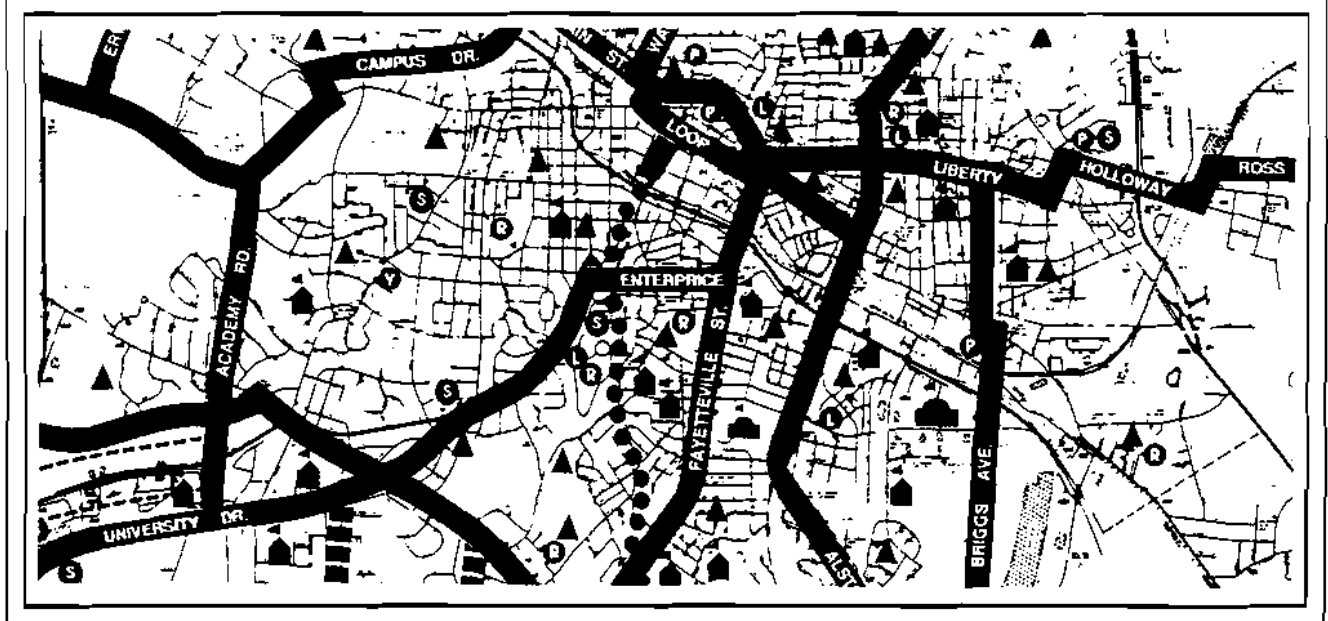
No bicycle improvements currently scheduled.

Possible opportunities/constraints along proposed route:

Opportunities: this facility will connect the terminus of the American Tobacco Trail with Durham's downtown.

Project specifics:

Road name	ADT's	Rd-way Class	Total Pvmt.	ROW Width
Blackwell Street	5,200	Minor thorough.	variable 36'-52'	variable to 70'



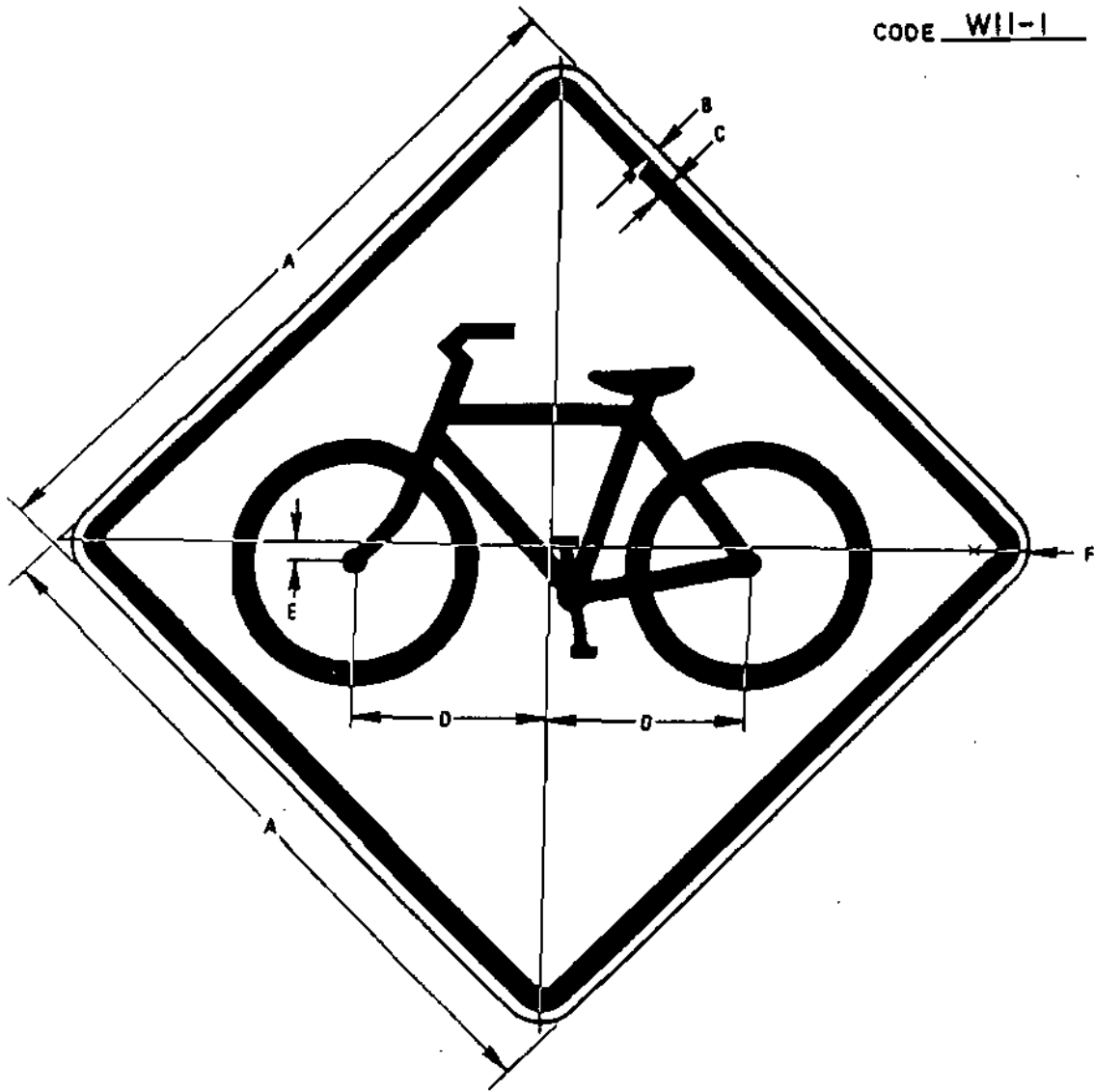


Section 4:

*Bicycle Signage Engineering
Specifications*



CODE W11-1



SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN	24	3/8	5/8	6 1/16	13/16	1 1/2										
STD	30	1/2	3/4	8 1/2	1	1 7/8										
EXPWY.	36	5/8	7/8	10	1 3/16	2 1/4										
FWY.																
SPECIAL	48	3/4	1 1/4	13 3/8	1 5/8	3										

COLORS

LEGEND -BLACK (NON-REFL)
 BACKGROUND-YELLOW (REFL)

ALL DIMENSIONS ARE NOMINAL

REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
DRAWN	RGT	DATE MAR 1984
APPROVED		

CODE W5-4



* REDUCE SPACING 50%

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
BIKE	18	1 1/2	3/8	5/8	3C	1	5/8	6 1/2	7 1/8	6 3/4	7 1/2						
MIN.																	
STD.																	
EXPWY.																	
FWY.																	
SPECIAL																	

COLORS
 LEGEND BLACK (NON REFL)
 BACKGROUND YELLOW (REFL)

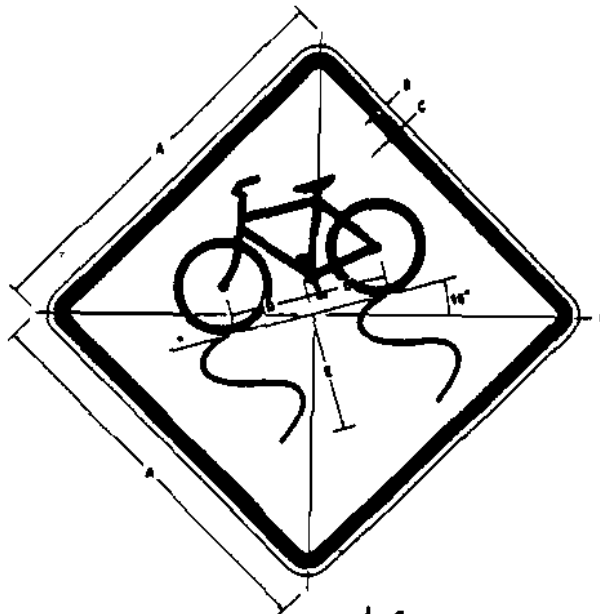
ALL DIMENSIONS ARE NOMINAL

REV. ARIZONA DEPARTMENT OF TRANSPORTATION
 TRAFFIC DESIGN SERVICES

DRAWN JJH DATE MAR 1984

APPROVED
[Signature]

CODE W8-10




W8-10 S

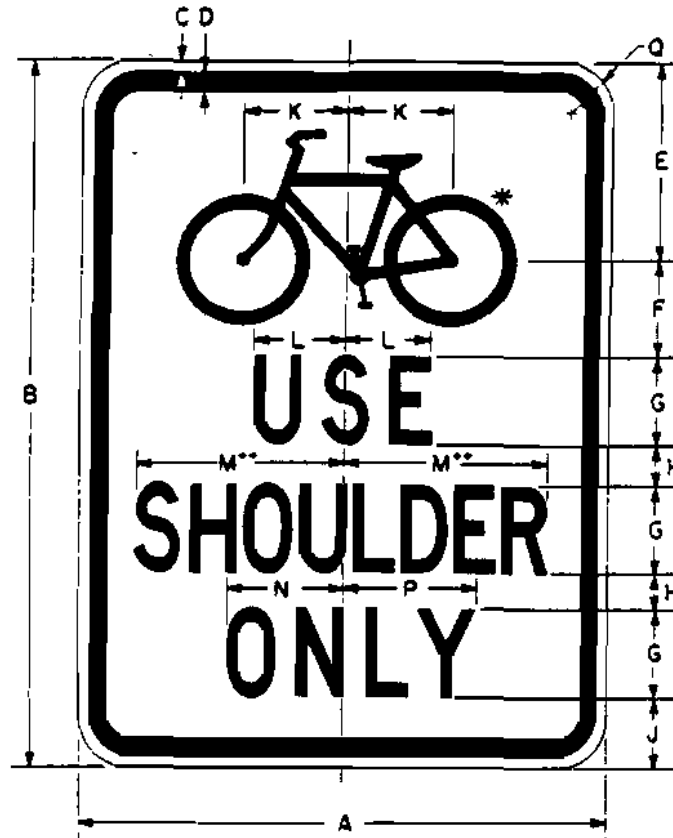
*REDUCE SPACING 25%

*See W8-5 & W11-1 for symbol design

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE	18	$3/8$	$5/8$	$3 5/8$	$5 3/4$	$1 1/2$	12	9	$3/8$	$3/8$	2	2C	$1 1/2$	$1 1/2$ C	5	$5 1/4$
MIN.	30	$1/2$	$3/4$	6	$9 5/8$	$1 7/8$	24	18	$3/8$	$5/8$	4	4C	3	3C	10	$10 3/8$
	S	T	U	V	W	X	Y	Z								
BIKE	$4 5/8$	$4 1/4$	$1 1/2$													
MIN.	9	$8 5/8$	$1 1/2$													

<p style="text-align: center;">COLORS</p> <p>LEGEND, SYMBOL, BORDER-BLACK(NON-REFL)</p> <p>BACKGROUND-YELLOW(REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	RGT	DATE MAR 1984
	APPROVED		

CODE R9-8



*See W11-1 For Symbol Design
 **Reduce Spacing 75%

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.																
STD.																
EXPWY.																
FWY.	18	24	3/8	5/8	6 3/4	3 1/4	3C	1 1/4	2 1/2	3 1/2	3	7	3 15/16	4 1/4	1 1/2	
SPECIAL																

<p>COLORS</p> <p>LEGEND -BLACK (NON-REFL) BACKGROUND-WHITE (REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	RGT	DATE
	APPROVED		10/23

CODE R9-7

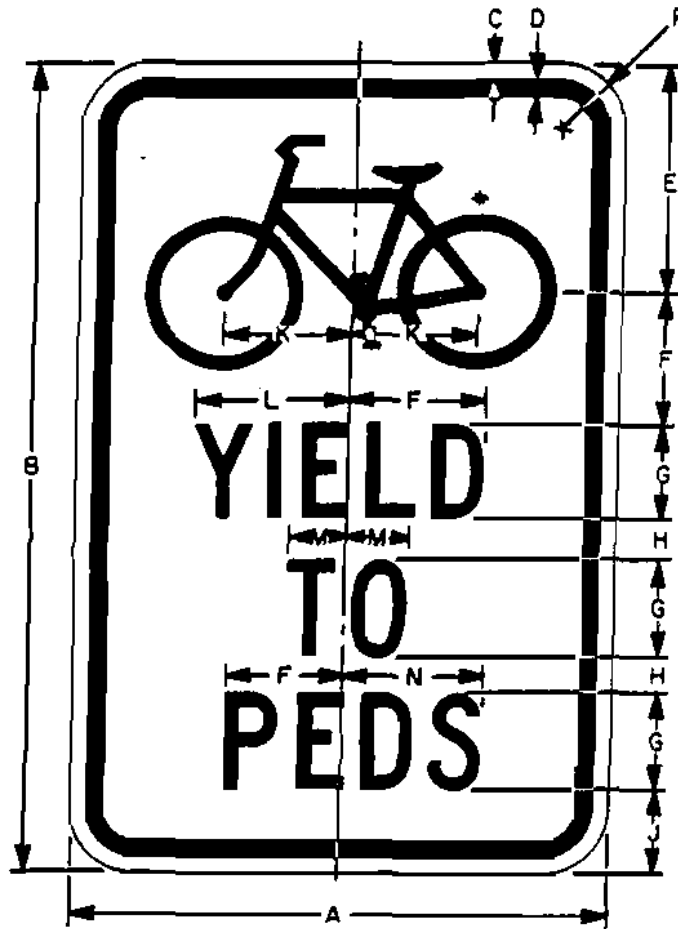


*Reduce spacing 50%.
 **See W11-2 for symbol design
 ***See W11-1 for symbol design

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.																
STD.	12	18	3/8	3/8	2	4B	1 1/2	2B	4 1/2	4	4 3/8	4 5/8	3/8	3 1/4	2 3/4	1 1/2
EXPWY.																
FWY.																
SPECIAL																

<p>COLORS</p> <p>LEGEND - BLACK (NON-REFL)</p> <p>BACKGROUND - WHITE (REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	RGT	DATE
	APPROVED		AUG 1993

CODE R9-6

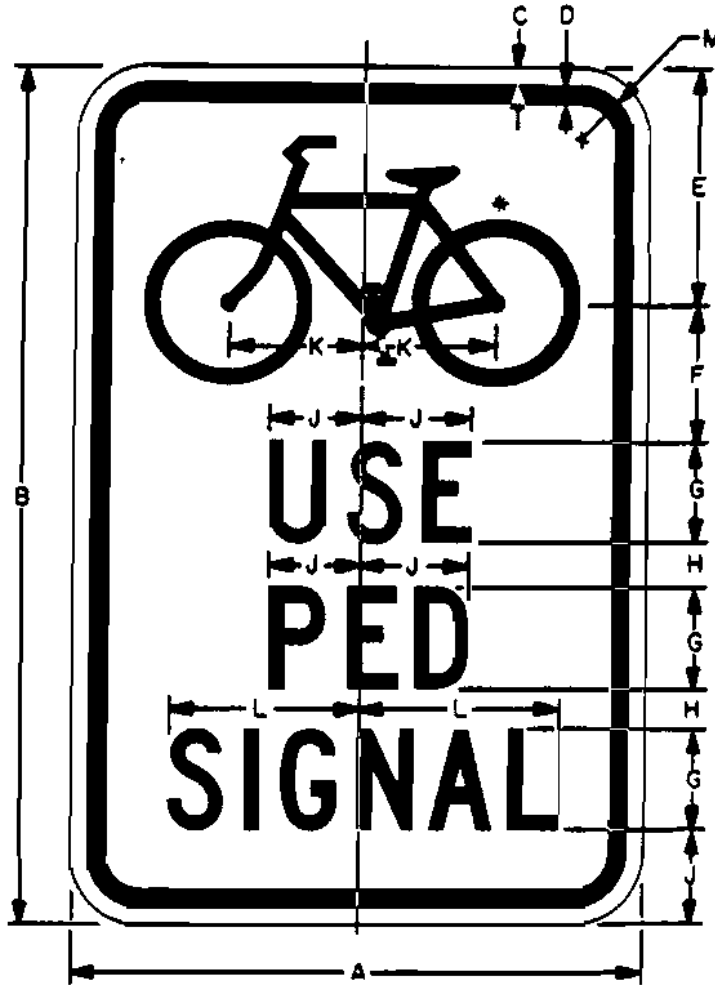


* See W11-1 for symbol design

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.																
STD.	12	18	3/8	3/8	5	3	2C	1	2	2 3/4	3 1/4	1 1/4	3 1/2	1 1/2		
EXPWY.																
FWY.																
SPECIAL																

<p>COLORS</p> <p>LEGEND - BLACK (NON-REFL)</p> <p>BACKGROUND - WHITE (REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES
	DRAWN RGT	DATE AUG 1983
	APPROVED	

CODE R9-5

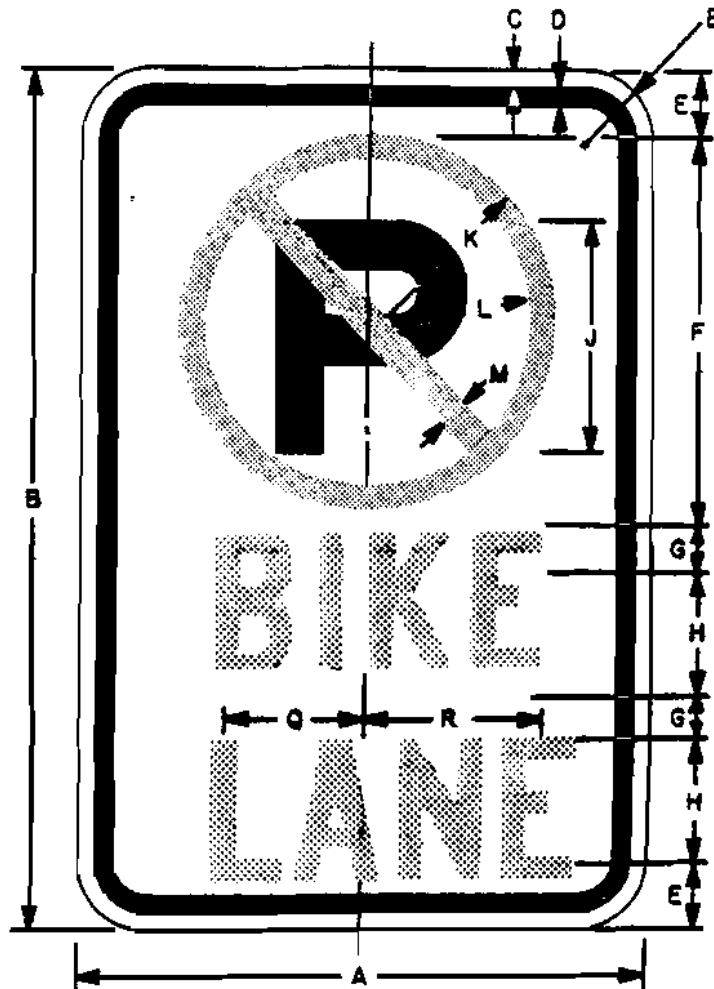


* See W11-1 for symbol design.

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
BIKE																	
MIN.																	
STD.	12	18	3/8	3/8	5	3	20	1	2	2 3/4	4	1 1/2					
EXPWY.																	
FWY.																	
SPECIAL																	

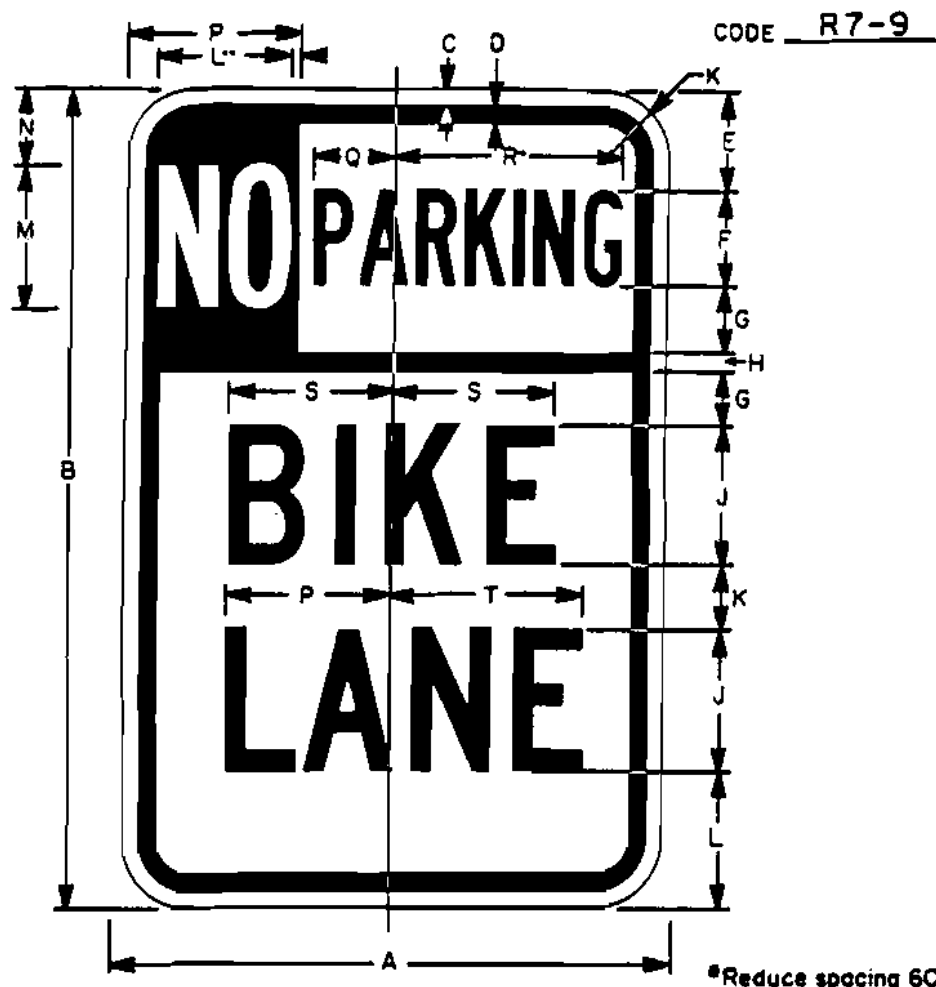
<p>COLORS</p> <p>LEGEND -BLACK (NON-REFL)</p> <p>BACKGROUND -WHITE (REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES
	DRAWN RGT	DATE AUG 1988
	APPROVED <i>[Signature]</i>	

CODE R7-90



SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
BIKE																	
MIN.																	
STD.	12	18	3/8	3/8	1 1/2	8	1	2 1/2	5/8	4	3 3/8	5/8	2 3/4	3 1/4	3	3 5/8	
EXPWY.																	
FWY.																	
SPECIAL																	

<p>COLORS</p> <p>LEGEND, CIRCLE, DIAGONAL - RED</p> <p>BACKGROUND - WHITE</p> <p>LETTER P, BORDER - BLACK</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	RGT	DATE
	APPROVED	<i>[Signature]</i>	AUG 1983

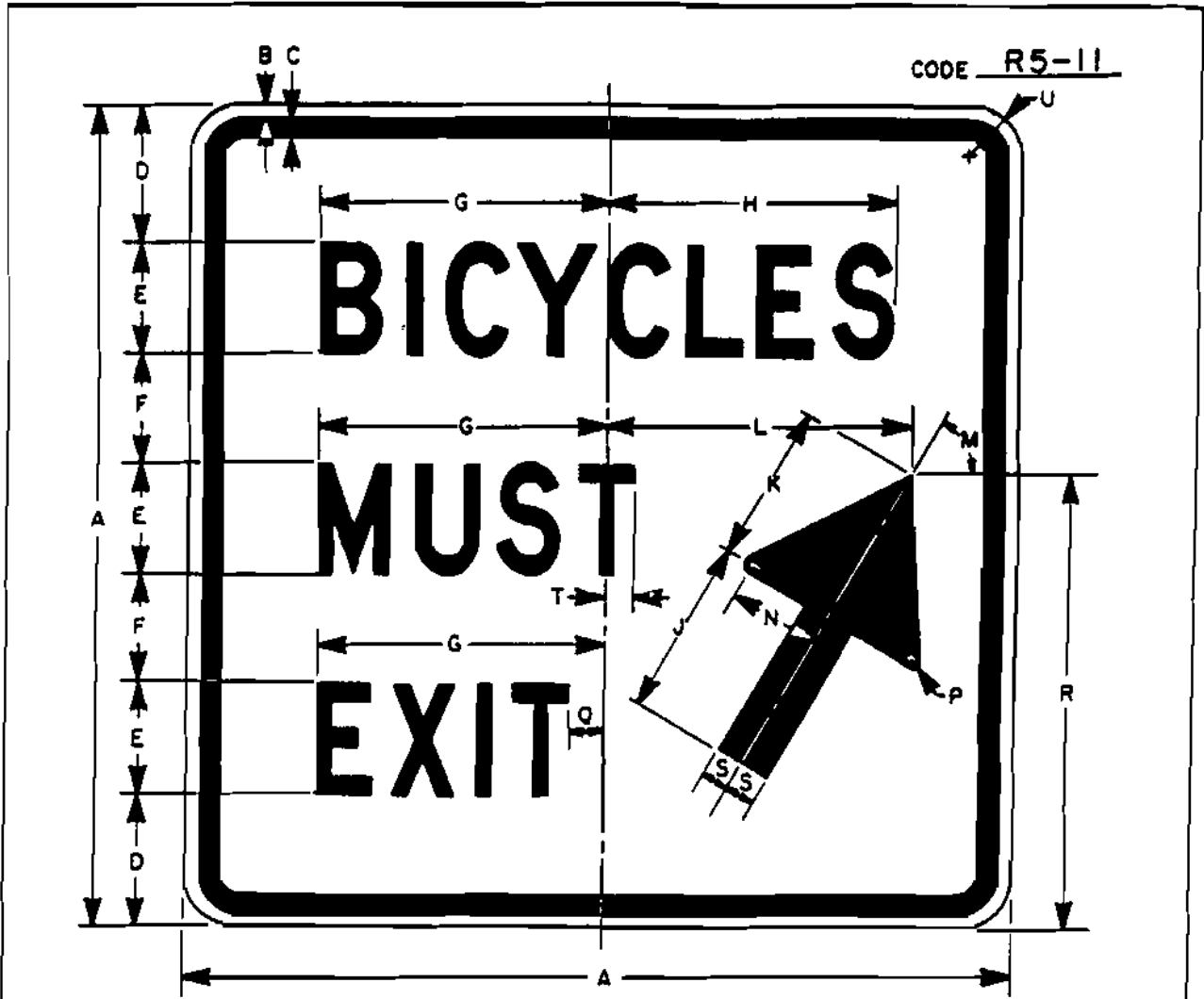


CODE R7-9

*Reduce spacing 60%
**Reduce spacing 50%

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
STD.	12	18	3/8	3/8	2 3/8	2 1/8	1 3/8	3/8	3 C	1 1/2	3	3 1/8	1 3/4	3 3/4	1 7/8	5	

COLORS			REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
TOP LEFT	TOP RIGHT & BOTTOM			DRAWN	DATE
LEGEND - WHITE	LEGEND - RED			RGT	AUG 1983
BACKGROUND - RED	BACKGROUND - WHITE			APPROVED	
ALL DIMENSIONS ARE NOMINAL				<i>John P. ...</i>	



SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
STD.	30	1/2	3/4	5	4C	4	10 5/16	10 3/16	6 3/8	5 5/8	11 1/8	60°	3 3/8	3/8	1 3/8	16 1/2
	S	T	U	V	W	X	Y	Z								
STD.	1	1	1 7/8													

COLORS

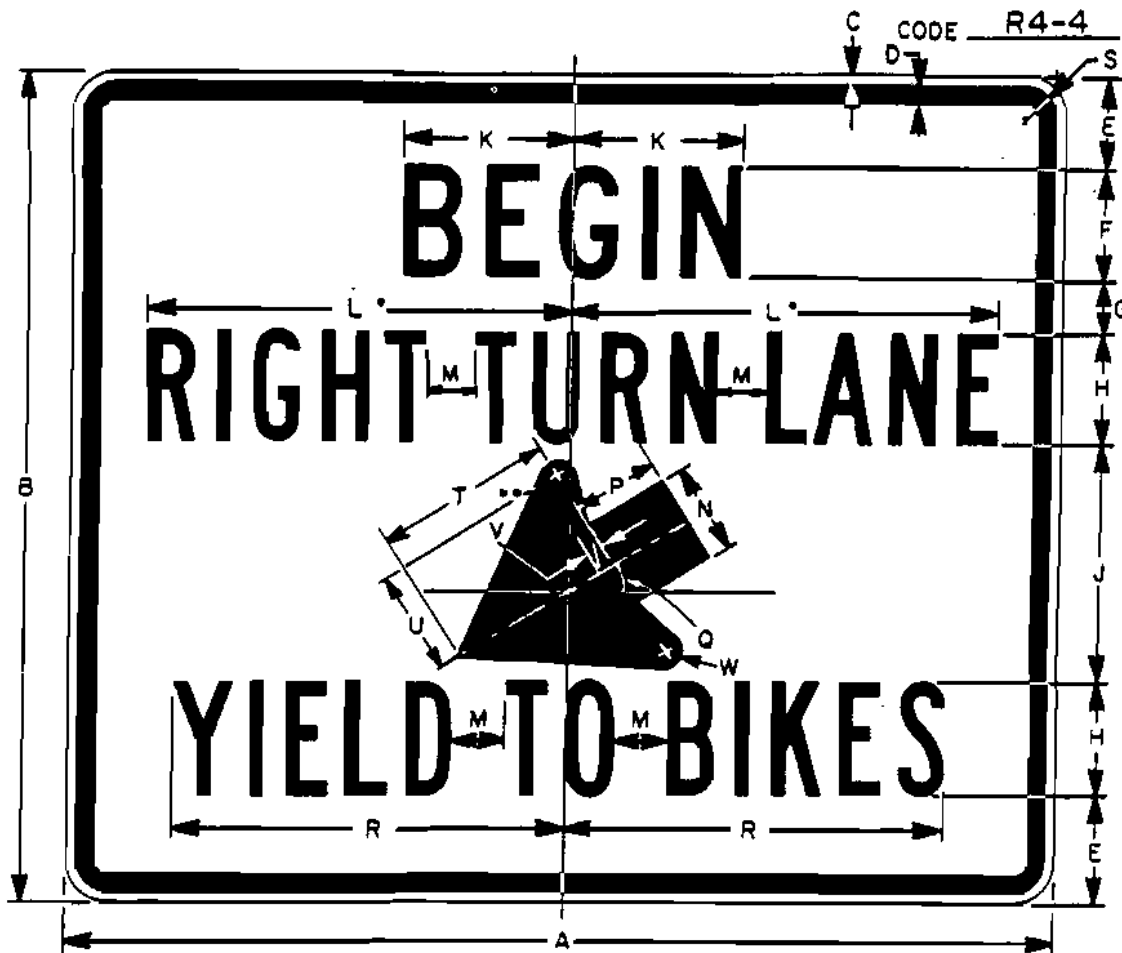
LEGEND - BLACK (NON-REFL)

BACKGROUND - WHITE (REFL)

ALL DIMENSIONS ARE NOMINAL

REV. ARIZONA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN SERVICES

DRAWN RGT	DATE AUG 1968
APPROVED <i>[Signature]</i>	



* Reduce spacing 20%
 ** Optically locate arrow

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
STD.	36	30	1/2	3/4	3 1/2	4C	2	4B	9	6 1/4	15 1/2	2 3/8	3 1/4	3 1/2	30°	14 1/4
	S	T	U	V	W	X	Y	Z								
STD.	1 7/8	6 1/2	3 5/8	1/2	5/8											

COLORS

LEGEND & ARROW - BLACK (NON-REFL)
 BACKGROUND - WHITE (REFL)

ALL DIMENSIONS ARE NOMINAL

REV. ARIZONA DEPARTMENT OF TRANSPORTATION
 TRAFFIC DESIGN SERVICES

DRAWN RGT DATE AUG 1983

APPROVED *[Signature]*

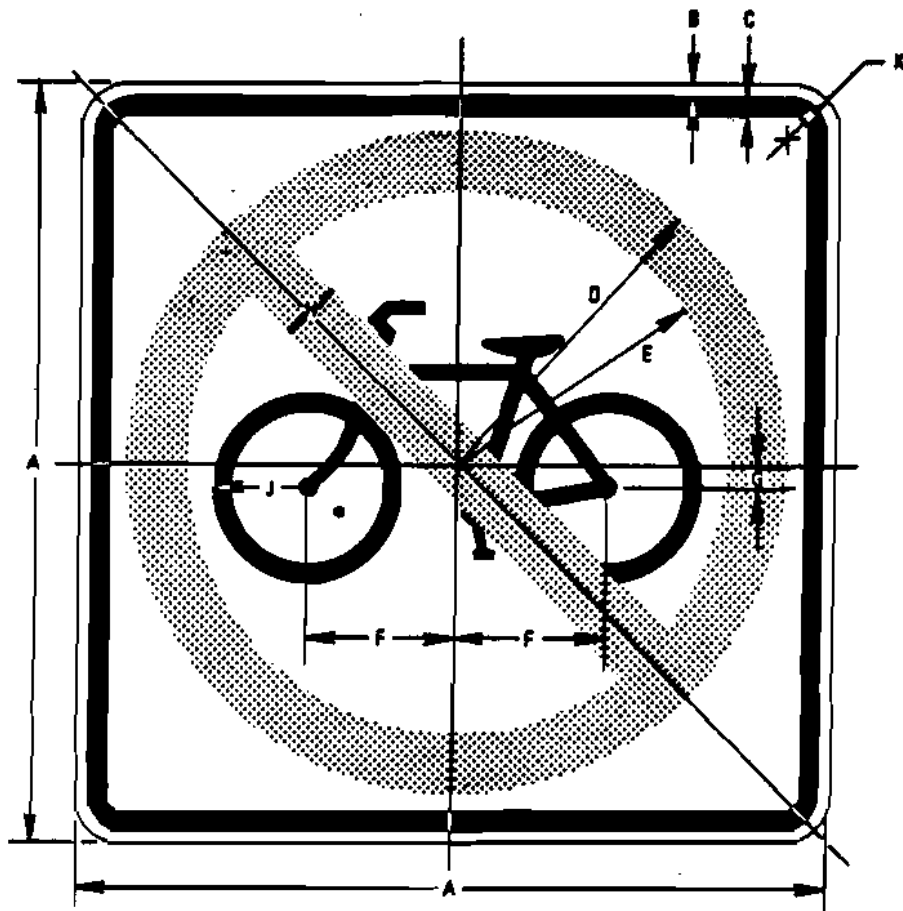
CODE R5-10b



SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.																
STD.	30	18	3/8	5/8	3	3C	1 1/2	11	11 3/16	12 1/2	12	3 1/2	9 1/4	9 3/4		
EXPWY.																
FWY.																
SPECIAL																

COLORS		REV. ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES
LEGEND	- BLACK (NON-REFL)	
	BACKGROUND - WHITE (REFL)	
ALL DIMENSIONS ARE NOMINAL		DRAWN RGT DATE AUG 1983 APPROVED <i>[Signature]</i>

CODE R5-6

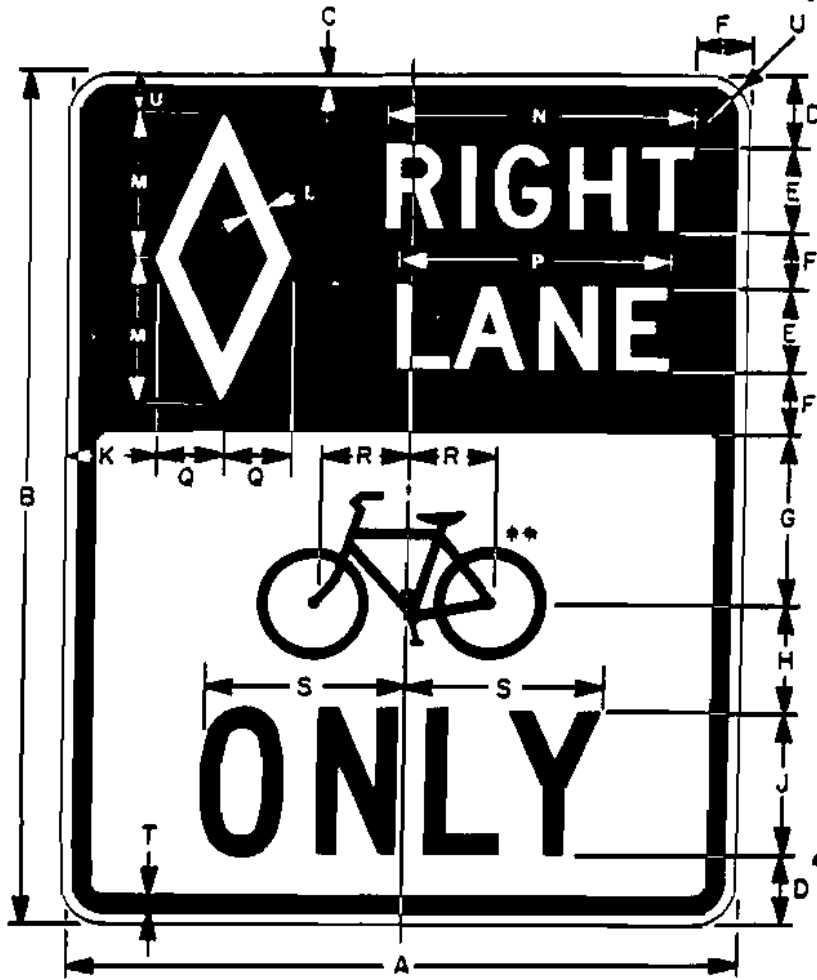


*See W11-1 for symbol design

SIGN	DIMENSIONS (INCHES)																
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
BIKE																	
MIN.	24	3/8	5/8	10 1/2	8 1/2	4 3/4	3/4	2	3	1 1/2							
STD.	24	3/8	5/8	10 1/2	8 1/2	4 3/4	3/4	2	3	1 1/2							
SPECIAL	30	1/2	3/4	13 1/8	10 5/8	5 7/8	7/8	2 1/2	3 3/4	1 7/8							
SPECIAL	36	5/8	7/8	15 3/4	12 3/4	7 1/8	1 1/8	3	4 1/2	2 1/4							
SPECIAL	48	3/4	1 1/4	21	17	9 1/2	1 1/2	4	6	3							

<p style="text-align: center;">COLORS</p> <p>CIRCLE & DIAGONAL - RED (REFL)</p> <p>SYMBOL & BORDER - BLACK (NON-REFL)</p> <p>BACKGROUND - WHITE (REFL)</p> <p>ALL DIMENSIONS ARE NOMINAL</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	RGT	DATE
	APPROVED	<i>[Signature]</i>	1973

CODE R3-17



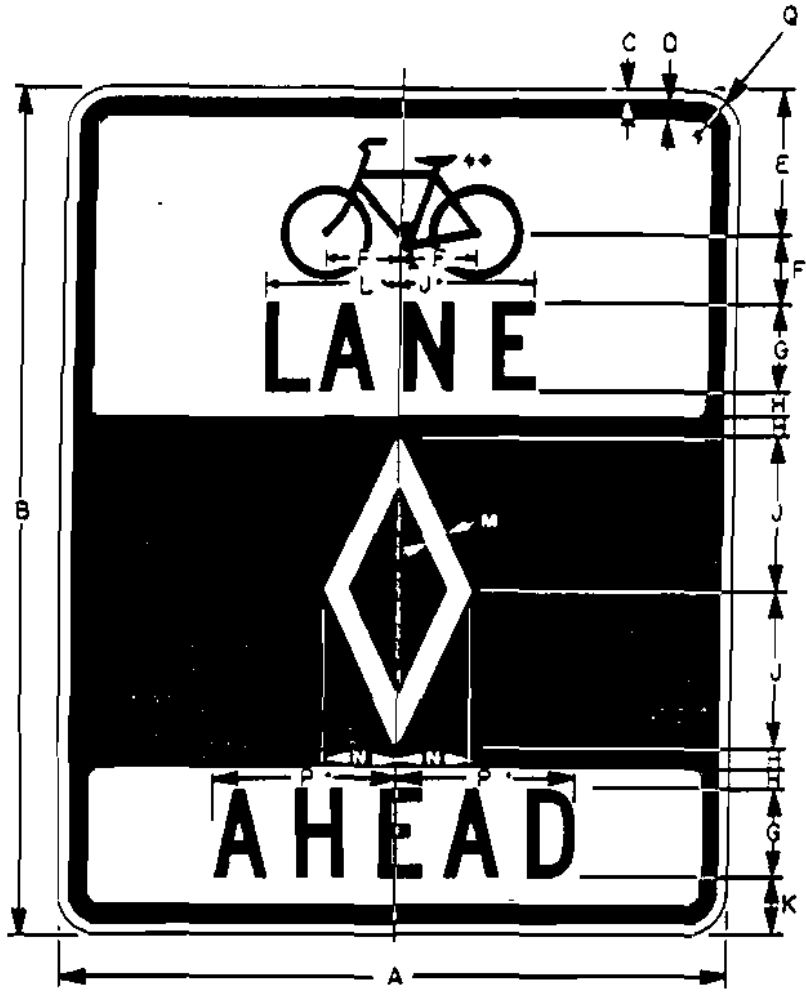
**See W11-1 for symbol design.

*Optically locate symbol and top legend.

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
STD.	24	30	3/8	2 1/2	3D	2	6	4	5C	3	3/4	5	11 1/4	10	2 3/8	3 1/4
	S	T	U	V	W	X	Y	Z								
STD.	7	5/8	1 1/2													

COLORS		REV. ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES DRAWN RGT DATE AUG 1983 APPROVED <i>[Signature]</i>
TOP	BOTTOM	
SYMBOL & LEGEND-WHITE (REFL) / LEGEND-BLACK (NON-REFL) BACKGROUND-BLACK (NON-REFL) / BACKGROUND-WHITE (REFL)		
ALL DIMENSIONS ARE NOMINAL		

CODE R3-16

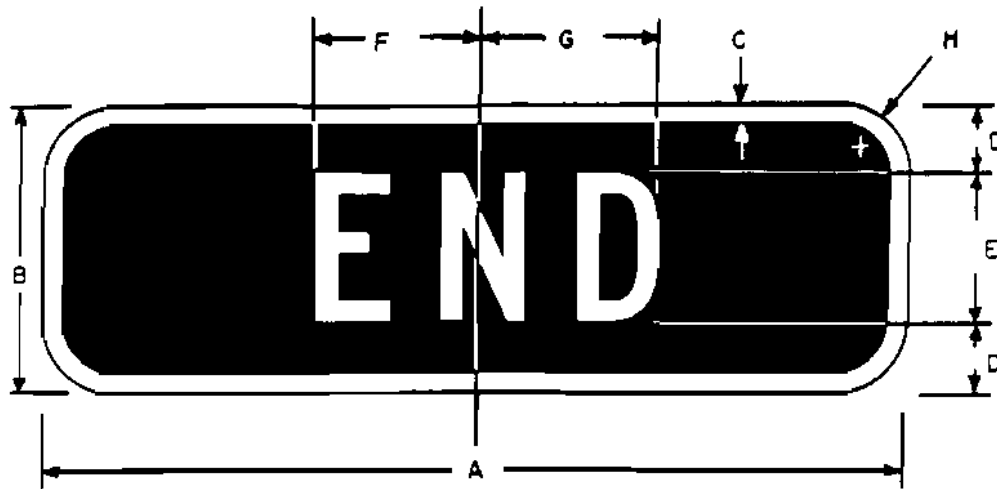


♦ See W11-1 for symbol design
 ♦ Increase spacing 100%

SIGN	DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.																
STD.	24	30	3/8	5/8	5 3/8	2 5/8	3 0	1	5	2	4 5/8	3/4	2 3/8	6 3/8	1 1/2	
EXPWY.																
FWY.																
SPECIAL																

LEGEND BACKGROUND — WHITE (REFL) SYMBOL (MIDDLE) — REFL. WHITE ON BLACK ALL DIMENSIONS ARE NOMINAL	COLORS — BLACK (NON-REFL) — WHITE (REFL)	
	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES
	DRAWN RGT	DATE AUG 1983
APPROVED <i>[Signature]</i>		

CODE M4-12



Increase Spacing 100%

SIGN	NOMINAL DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.	12	4	1/4	1	2C	2 1/4	2 1/2	1								
STD.	24	6	1/2	1	4C	4 3/8	4 7/8	1 1/2								
EXPWY.																
FWY.																
SPECIAL																

COLORS		REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
LEGEND - WHITE (REFL.)			DRAWN	DATE
BACKGROUND - GREEN (REFL.)			J	JUN 86
LEGEND - BLACK (NON-REFL.)			APPROVED	
BACKGROUND - ORANGE (REFL.)			<i>[Signature]</i>	

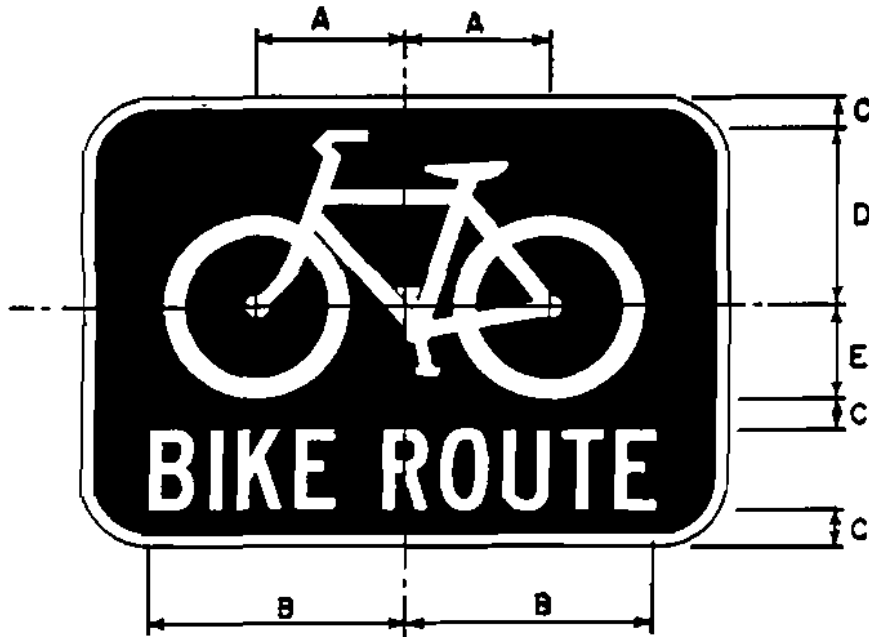
CODE M 4 - 11



SIGN	NOMINAL DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN.	12	4	3	1/4	1	2C	1									
STD.	24	6	6 1/4	1/2	1	4C	1 1/2									
EXPWY.																
FWY.																
SPECIAL																

<p align="center">COLORS</p> <p>LEGEND - WHITE (REFL.) BACKGROUND - GREEN (REFL.) LEGEND - BLACK (NON-REFL.) BACKGROUND - ORANGE (REFL.)</p>	REV.	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN	J	DATE JUN 6
	APPROVED	[Signature]	

CODE D11-1



ALL DIMENSIONS ARE IN INCHES

SIZE	BORDER WIDTH	MARGIN WIDTH	LETTER SIZE, SERIES & STROKE WIDTH					CORNER RADIUS
			LINE 1	LINE 2	LINE 3	LINE 4	LINE 5	
24x18		1/2		3C				1 1/2
30x24		1/2		4C				1 1/2

SIZE	DIMENSIONS															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
24x18	5 1/2	9 1/2	1 1/2	7	3 1/2											
30x24	6 7/8	12 1/2	1 7/8	8 3/4	4 3/8											

Green BACKGROUND WITH White BORDER AND LEGEND

REMARKS: Opaque Background / Reflectorized Legend

ALL DIMENSIONS ARE NOMINAL

REV	ARIZONA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN SERVICES	
	DRAWN C. A. B.	DATE 4/97
	APPROVED <i>[Signature]</i>	

CODE MI-8



* SEE W11-1 FOR SYMBOL DESIGN

SIGN	NOMINAL DIMENSIONS (INCHES)															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
BIKE																
MIN																
STD.	12	18	1	5 1/4	4	50	1 3/4	2 3/8	3	1 1/2						
EXPWY.																
FWY.																
SPECIAL																

COLORS
 LEGEND 8 SYMBOL - WHITE (REFL)
 INNER BACKGROUND - GREEN (REFL)
 OUTER BACKGROUND - WHITE (REFL)

REV: ARIZONA DEPARTMENT OF TRANSPORTATION
 TRAFFIC DESIGN SERVICES

DRAWN JDH	DATE JUN 1964
APPROVED <i>[Signature]</i>	