

North Carolina's Bicycling Highways

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The bicycle program of the North Carolina Department of Transportation has initiated a unique project called "bicycling highways" to develop a statewide bicycle route system on existing roads of the state's primary and secondary highway system. The purpose of the project is to provide some measure of safety for cyclists. Although no roadway where automobile and bicycle mix will ever be totally safe, many highways, unknown to the majority of people, are relatively safe for bicycling due to their low traffic volume and good roadway conditions. By linking these roads throughout the state and providing detailed route information, a safer environment is expected for all. This paper describes the methodology undertaken in the selection of highways, survey techniques, information gathering procedures, map drafting, and reproduction. The resulting maps and narrative provide a very usable and informative product, which requires only small amounts of money and resources.

The bicycle program of the North Carolina Department of Transportation initiated a unique project 3 years ago: the development of a statewide bicycle route system on existing roads of the extensive primary and secondary highway system. The idea for "bicycling highways," as the project is being called, evolved from three changes in the bicycle environment:

1. An increasing number of people, particularly adults, are bicycling. There are no bicycle traffic counts nor other sources to determine specific increases; however, evidence of this greater involvement has been observed at all levels of government. Requests to local and state agencies from across the state and nation ask the question, "Where can I safely ride my bicycle?" People are venturing out for 1- or 2-d bicycle trips, others are traveling much greater distances by bicycle, and still others wish to combine automobile-bicycle trips in the areas to which they travel.

2. The growth of the bicycling population has brought parallel increases in safety problems. Total transportation accidents and deaths in North Carolina are on the decline, but bicycle accidents and deaths are climbing. Moreover, the average age of those involved in accidents has increased significantly. There are many reasons for these accidents—unsafe bicycles, improper operation, or lack of respect from motorists, but a great many are due to the bicyclist's lack of knowledge of the safest roads on which to ride. Where traffic volumes are high and trucks are numerous, the potential for accidents is great unless special high-quality bikeway facilities are provided. In North Carolina, such facilities exist, on a limited basis, only in urban areas and are thus available to just a small segment of the population.

3. The seriousness of the safety problem has precipitated demands to improve the existing situation for both the bicyclist and the motorist. In 1974, the North Carolina Bicycle and Bikeway Act was passed, which mandated to the department of transportation the responsibility for developing a statewide bicycle network. The initial reaction was to provide extensive bikeways; however, such provisions are both impractical and impossible. To provide statewide bikeways for the needs and desires of North Carolina's bicyclists would require millions of dollars, amounts far beyond the most cost/beneficial expenditures required to provide a safe bicycling environment. The more feasible approach is to utilize what is already available to the

bicyclist—the 120 700 km (75 000 miles) of primary and secondary highways existing in the state. By selecting the roads determined to be safer for bicycling and providing the public with bicyclist-oriented maps and information, knowledge of alternatives to the high-volume roads presently being used by bicyclists would then be available.

The overall goal of the bicycling highways project is to locate those roads across the state that are safest for bicycling and link them into a network of routes to make a statewide bikeway system. This system will include four or five major routes and a series of regional loop routes, which will serve as local connectors to the major routes. Each route developed will be described in a route guide, which will include maps and narrative offering all information pertinent to the cyclist's safety and comfort. On completion, the bicyclist in North Carolina will have the most thorough bicycle-oriented road data available in any state.

North Carolina has much to offer the bicyclist. In the west lie the Great Smoky and Blue Ridge mountain ranges with 49 peaks over 1828 m (6000 ft)—a challenge to even the best riders. Weather conditions permit bicycling from May through October; fall is an especially spectacular season. This is a rugged and somewhat isolated region where recreation areas and scenic vistas abound. The region has several important historic sites and many points of interest.

Traveling east through the Piedmont area, the terrain changes to rolling countryside. Here, one occasionally encounters the remains of an ancient mountain. The climate is more temperate than in the mountains; bicycling weather is good from mid-March through mid-November. Spring and fall offer particularly pleasant warm days and cool evenings. Winter weather is often suitable for bicycling but is unpredictable; temperatures can vary from freezing to the upper sixties. The Piedmont is the most populated and industrialized area of North Carolina, and most of the major cities of the state are located here.

Stretching the final 161 km (100 miles) to the ocean, the Coastal Plain offers virtually flat land for easy pedaling. The days here are usually warmer than those in other sections of the state throughout the year. Spring and fall are generally the best times for riding because summer days are hot and humid. The Coastal Plain was the first section of North Carolina to be settled, thus the feeling of history is strong. Many historic sites and old plantation homes can be found throughout the area. Along the coast and on North Carolina's unique Outer Banks, a series of barrier islands off the coast, there are numerous recreation areas.

The bicycle program has completed the development of its first major long-distance bicycle route, the mountains-to-sea bicycle route, which traverses these three regions. This route runs from Murphy, deep within the Appalachian Mountains, to Manteo, on the Outer Banks—a total distance of 1146 km (712 miles). A route guide, which offers 16 segment maps and accompanying narrative, has been produced and is being distributed, free of charge, on request. Several thousand copies have been distributed since the guide first became available a year ago. Requests are still

received every day from around the nation as bicycle touring grows in popularity.

Demand for such long-distance bicycle routes and bicycle-oriented road data is overwhelming; guidelines for development are virtually nonexistent. Therefore, step-by-step procedures used by the bicycle program in developing their system are offered below as a guide to the development of bicycling highways in other parts of the country.

Evolution of Project

1. Develop concept study,
2. Develop road selection criteria,
3. Conduct corridor study and selection,
4. Investigate information sources,
5. Select draft route,
6. Conduct field survey,
7. Design pamphlet format,
8. Produce pamphlet, and
9. Promote finished product.

CONCEPT

Prior to working out the details of actually developing the project, the general ideas had to be conceptualized. When firmly developed, a presentation of the concept was made to proper state officials, who offered their input and support for the project. Bicycling highways then had the important support it would need throughout its many phases.

Road Selection Criteria

To select a bicycle route from all the roads in a state would be an overwhelming task, unless some limiting factors were imposed. Therefore, a set of road selection criteria were developed to reflect what the ideal bicycling highway might offer. These include the following:

1. Traffic—The greatest hazard to the bicyclist is other traffic, particularly trucks. The most desirable road from this standpoint is, therefore, the one with the lowest volume of traffic. In terms of average daily traffic (ADT) counts, a road with a count of 1200 or less is most desirable. This means that at the peak travel hour, when it is estimated that 20 percent of the day's total traffic is on the road, 2 automobiles/min will pass in each direction. Traffic during the nonpeak hour would be significantly less frequent. A route with more than 25 percent commercial traffic is considered unsuitable.
2. Air pollution—A consequence of high volumes of traffic is a high level of air pollution. In such a situation, the bicyclist is forced to breathe air that contains excessive amounts of noxious gases; thus riding efficiency and alertness are directly affected.
3. Road surface—The road itself is an important consideration. The surface should be smoothly paved, preferably with high bituminous (plant mix) treatment. Some high-quality low bituminous (surface treatment) pavement is acceptable, however. Rough pavement increases the road resistance to the tire, thus increasing the effort a bicyclist must expend to propel himself or herself forward. Road shock cannot be absorbed by the bicycle on this type of surface and is transmitted to the cyclist. After a few hours of riding, the cyclist's hands become numb and other parts of the body feel great discomfort. Unpaved or gravel roads are unacceptable and should be avoided.
4. Roadway condition—The road selected should be

in good repair, free from potholes, and have even, unbroken edges that are level with the shoulders. In the presence of potholes the cyclist is often required to swerve suddenly to avoid contact, thus endangering himself in the traffic flow. Uneven and broken road edges make it difficult for a cyclist to ride to the right to allow faster moving vehicles to pass. When the shoulders are low, a bicyclist who runs off the road might lose control and be thrown from the bicycle. Return to the road surface is also hazardous under such circumstances. These problems are not visible from the motorist's vantage point. The driver often cannot comprehend why a cyclist will not move to the right to allow a motor vehicle to pass. He or she may believe that the cyclist is stubbornly asserting a right to the road and thus become annoyed.

5. Roadway width—Wide lanes [over 3.66 m (12 ft)] and paved shoulders can sometimes compensate for otherwise undesirable features of a road. A somewhat higher volume of traffic, up to 2400/d, might be tolerated under these circumstances.

6. Grade and curvature—Steep grades should be avoided whenever possible, for obvious reasons. A 2 to 3 percent grade is the ideal maximum. Roads with many curves, where sight distances are short, should also be avoided.

7. Other—Other minor hazards should be avoided whenever possible. Railroad tracks that are not perpendicular to the road may catch a bicycle wheel and throw the rider. Narrow, one-lane bridges cause bicycle-motor vehicle conflicts. Roads that collect a lot of debris, whether natural or manmade, reduce riding efficiency and can cause bicycle maintenance problems, particularly flat tires. Strip development in cities and towns where there will be much entrance-exit activity on the road creates a prime accident area.

Corridor Study and Selection

To further limit the road selection process, it was determined that corridors 48 km (30 miles) in width would be defined; a 16-km (10-mile) leeway would be allowed on either side to compensate for the possibility that suitable roads might not be found within the primary corridor. The actual bicycle routes would be designated on roads within these corridors. Several factors were taken into consideration—existing corridors of bicycle travel, extent of present bicycling, state border points of frequent exit-entry, and frequent trip origin-destination points within the state. To determine the first three factors, information was solicited from individual bicyclists and bicycle clubs within the state. Correspondence with the bicycle program by both in-state and out-of-state cyclists requesting bicycle route information was reviewed for additional information. Maps detailing this information were prepared. To determine the fourth factor, maps were prepared showing population densities throughout the state; major points of interest, such as local, state, and national parks and recreation areas; historic sites; scenic areas; and places of cultural or educational significance. In order for any route to be useful, it must begin where cyclists are and end where they want to go.

Comparison and analysis of these maps and information defined several corridors within the state. It was found that one major east-west corridor, and three north-south corridors (one along the Blue Ridge Parkway, one along US-1, and one along the coast) were in regular use. It was further determined that the first route should be developed within the east-west corridor to serve as a backbone for the remainder of the system. Thus the mountains-to-sea bicycle route was initiated.

Information Resources

Once the corridor was selected an investigation of potential route information resources was undertaken. Much valuable data were collected from many state government agencies as well as from outside sources. This made the task of a route selection much easier. A thorough check was made of all maps available within the department of transportation and information was obtained on ADT counts, roadway widths, grades, and surfaces. Film footage of all primary highways made by the division of highways on the road provided an opportunity to make a preliminary review of some possible portions of the route before the actual field survey was conducted. The most important resource, however, was the experience and expertise of various central office and field personnel of the U.S. Department of Transportation.

Data on roads and road use were also solicited from local bicycle clubs, individual cyclists, and local and regional government contacts. A letter, which described the project and requested public input, was prepared and mailed to 250 individuals. Only 25 cyclists responded.

The reasons for this poor showing are unclear, but several speculations were made. Bicycling is a rather individual sport—perhaps the participants would rather bicycle than answer letters or attend meetings. Bicycling is a rather new sport—perhaps many cyclists do not feel qualified to respond. The bicycle program was, at that time, a new program—maybe it did not have sufficient contacts. It has since been learned by talking to many cyclists that all of these specifications were valid. Should we take this approach again today, the results would be more encouraging. Bicycling has continued to grow, and there are several good clubs in the state whose many experienced riders are willing to share their knowledge of safer roads.

Despite this poor showing, meetings were scheduled in eight cities across the state. At least 8 to 10 people attended each meeting. The success of these meetings varied. In one very urbanized area of the state, no useful route information was gained; in other areas, suitable 80-km (50-mile) segments were developed. The personal contact in all cases was extremely beneficial and served to develop a great deal of enthusiasm and support for the project.

Information was also collected on services and points of interest within the corridor. Some of this was accomplished during the preliminary field survey of the selected route, but as these attractions have a bearing on the actual route selected, some initial research was necessary. Within state government this information was obtained from the state parks and recreation division, the department of archives and history (including the state library, historic sites section, preservation section, and the state archaeologist), and from state travel and promotion, which handles all tourist information and has a wealth of pamphlets and brochures on points of interest throughout the state.

Additional information was gathered from local historical societies, newspapers and magazines, private foundations that have preserved various historic sites, and local chambers of commerce. National and regional government sources including the Blue Ridge Parkway administration of the U.S. Department of the Interior, the superintendent of national forests in North Carolina, and the Cape Hatteras national seashore administration were also contacted.

Selection of Draft Route

After this information was collected, corridor boundaries, road data, and preliminary information on services and points of interest were pinpointed on county highway maps [scale 2.54 cm = 3.2 km (1 in = 2 miles)], which show ADT counts for all state-maintained roads. In addition to this information, several other factors were taken into consideration in selection of the draft route.

Steps in Selecting Draft Route

1. Determine corridor,
2. Fix corridor boundaries on county maps,
3. Pinpoint known services and points of interest within corridor,
4. Select roads with low ADT counts,
5. Connect in linear fashion avoiding circuitous routing,
6. Provide access to cities and points of interest,
7. Keep any high-volume connector roads under 0.8 km (0.5 mile), and
8. Incorporate routes recommended by knowledgeable local cyclists.

Since the bicyclist's safety is the single most important consideration, a careful study was made of the low-volume (under 1200 ADT) roads within the corridor and an attempt was made to link these in a linear east-west fashion. Since a bicyclist will not follow a circuitous route, which will add an unreasonable distance to the overall trip, it became necessary, in some places, to route along short stretches of more heavily traveled roads to connect the desirable low-volume roads in a direct line. Generally, the distance of this connector was kept under 0.8 km. Where longer, it was designated as a hazardous area to be detailed in the final information offered to the bicyclist. Routes through large cities where traffic congestion would be high were avoided. The route should, however, come close enough to these centers of population to be useful to the cyclists living there and also to be a source of supplies and services for other cyclists using the route. In general, any area with a population over 5000 was skirted. Major points of interest such as state or national parks or important historic sites generate cyclist travel. Where safety considerations were equal, roads that provided closest access to these areas were selected. Wherever possible, the routes recommended by local cyclists were incorporated into the draft route.

FIELD SURVEY

When selection of the draft route was completed, a field survey was conducted. Although research of the route by bicycle would have been the ideal method, an automobile was used for the preliminary check since over 1609 km (1000 miles) of roadway had to be surveyed and the territory could be covered more quickly in this manner. Significant portions were covered by bicycle as a final check, however. Navigation and collection of data while driving presented the most serious problem in field survey data collection. Whenever possible, a driver was used while a second person navigated and took notes. A pocket cassette tape recorder recorded information. Freed from taking notes, it was possible to be constantly alert to road and terrain characteristics and to the exact location of all services. Numbers of the state secondary roads intersecting the route were used as reference for pinpointing all such information. The entire distance of the route was traveled in both

directions. A turn that was easy to locate in one direction was sometimes confusing when traveling the other way and had to be noted for clarification on the final maps. Road signs were, on occasion, found to be incorrect or nonexistent; these locations were pinpointed for correction at a later date. Map portions that were confusing or difficult to follow were noted, to be clarified by enlargements on the final maps.

During the field survey, road selection criteria were applied to determine the suitability of the roads on the route and to locate areas where routing changes should be made. Notes were made about traffic conditions, type of terrain traversed, general description of the area (i.e., wooded, remote, or populated), and characteristics and conditions of the roadway and shoulder. Hazardous areas caused by heavy traffic, railroad tracks (those that cross roadway at an angle and would catch bicycle tires), bridges on blind curves, narrow bridges, poorly maintained roadways, broken roadway edges, and low shoulders were pinpointed. The method used to conduct the field survey is given below.

Conducting the Field Survey

1. Mark route on county road maps showing all state-maintained roads,
2. Use automobile to cover distance more quickly,
3. Have backup survey done by cyclists,
4. Use two surveyors (one to drive, one to navigate and take notes),
5. Use pocket cassette tape recorder to note information,
6. Use intersecting road numbers to reference information,
7. Travel entire route in both directions,
8. Check road signs carefully for errors,
9. Note any mistakes or confusing areas on base maps,
10. Note condition of roadway and shoulder,
11. Note traffic conditions,
12. Note type of terrain,
13. Note general character of area,
14. Note hazardous areas,
15. Note availability of services, and
16. Investigate points of interest.

Besides road data, availability of services essential to the cyclist were noted. All places directly on the route offering the basic services of food, water, and restrooms were pinpointed. No attempt was made to locate any such services away from the route, except in places where there was a scarcity of these basic service facilities directly on the route and no suitable alternative route was available. Those areas where the distance between basic service facilities exceeded 16 km (10 miles) were noted as remote areas. All cities and towns shown on each segment that offer full services including large grocery stores, motels, restaurants, hospitals, banks, laundromats, and drug stores were located. Bicycle shops where parts and service may be obtained were also located. Camping facilities on or within reasonable bicycling distance of the route were investigated and noted. All points of interest including recreation areas, historic sites, places of cultural or educational interest, and scenic areas were pinpointed and investigated to obtain firsthand information on what facilities each offers the bicyclist.

After the field survey was completed, the information was reviewed, with special attention given to the areas that did not meet the criteria. Once these were analyzed, alternative routes in those areas were selected and researched in the same manner as the draft route.

It is understood that with a long distance route it will be virtually impossible for all parts to meet the established criteria. About 85 percent of the mountains-to-sea route meets the ideal conditions outlined by these criteria. Since the remaining 15 percent is detailed to make the cyclist aware of all problems, these portions can, with caution, be navigated safely.

When the route was finalized, county maps marking the route were sent to the appropriate agencies and individuals for review. These included the department of transportation traffic engineering section, which conducted its own field survey; the trails coordinator of the parks and recreation section of the department of natural and economic resources; and selected avid cyclists who rode the route to give a cyclist's-eye view of any problems. This cyclist input is extremely important as some critical features of a road can only be detected on a bicycle. Those suggestions deemed appropriate to the goal of the project were incorporated into the final route.

DEVELOPMENT OF GUIDE DESIGN AND FORMAT

The few bicycle route brochures available from other parts of the country were studied for ideas on the best way to offer the information gathered. In-house production capabilities were investigated to determine what limitations would be imposed on the availability of supplies and machinery. Within these confines, the idea of offering a series of separate individual map segments evolved. Ironically, an almost identical format was being developed simultaneously by the East Coast Bicycle Congress for their East Coast bicycle trail, a route from Boston to Richmond.

Using this system of separate segments rather than a bound pamphlet, a bicyclist could lift out one or two segments for a short ride or use the entire packet for an extended ride. In the future when additional routes would be developed, it would be possible to combine segments of different routes in endless combinations to allow the cyclist to go almost anywhere in the state.

As the guide developed, each segment was named according to a geographic or historic feature found in the area. The segments were also numbered consecutively from west to east—the primary route from Murphy to Manteo—A-1 through A-16, and future routes would be numbered B, C, and D.

It was determined that the size of the package should be such that the map could fit into the map pocket of a handlebar pack. This 21.6 × 10.2-cm (8.5 × 4-in) size would also be convenient for a shirt or back pocket. The county road maps with a scale of 2.54 cm = 3.2 km were used as a base and reduced to 45 percent; each segment shows approximately 72 km (45 miles) of the route. This represents a day of riding for a novice bicycle tourist; more advanced cyclists might cover two or three segments in a day.

The package folder containing the maps offered general information pertinent to any route that might be developed. This information includes (a) laws pertaining to the operation of a bicycle in North Carolina, (b) helpful safety tips, (c) a brief sketch of the physiographic characteristics of the state, (d) instructions on using the maps, (e) average seasonal temperatures for the state's three regions, (f) direction of prevailing winds, (g) contacts for further information, (h) location of public transportation services, and (i) a disclaimer of responsibility for the safety of the route. The disclaimer was prepared by the department's legal staff and reads:

This guide is published by the Department of Transportation as an aid to bicyclists. The Department of Transportation in no manner warrants the safety of the highways indicated on these maps for use by bicyclists. The connecting routes and roads indicated on these maps are suggested only as more suitable than others for use by bicyclists as connecting routes. All roads suggested are regular roads of the highway system, used by automobiles and trucks, with no special lane provided for bicycles. As no separate lanes are provided for bicycles and therefore are dangerous for use by bicyclists, the bicyclist assumes the risk of his own safety when using the route indicated on the map.

To orient the cyclist, a foldout map included in the pamphlet package shows the major cities of the state, the routes, and the position and number of each map segment. This map also serves as a reference for selecting the map segments needed for a particular trip.

The segment map and narrative each cover half of a 21.6 x 20.3-cm (8.5 x 8-in) piece of paper, which is folded with one facing the other. The outside front of each piece shows the name and number of the segment, distance covered by the segment in miles and kilometers,

and a highlight of the location of that segment in relation to the state. The outside back of each piece provides a complete legend (Figure 1), copyright information, and a space for notes.

The maps showing the route are the most important feature of the package. Since the route is not signed, accuracy of the information shown on the map is extremely important.

There are several reasons why these routes are not specially signed. First, with the length of roadway to sign, costs would be prohibitive. Second, the only available bicycle route sign that is currently permitted on the highway system is urban in orientation and, therefore, not suitable for the type of bicycle routes being developed in this project. The federal government is now studying the possible adoption of additional signs pertaining to bicycling. Finally, the scope of the project is such that three or four different routes might intersect in places. Using the one available sign would not clearly show the different routes and would greatly confuse the bicyclist.

It is important to include enough information on the maps so that the cyclist will be aware of his or her location at all times, without cluttering the maps with so much information that they are unreadable. This delicate balance was obtained by experimenting with degrees of information shown, varying from showing everything on the base county maps to showing only the route and the intersecting roads (Figure 2). However, since not all origins and destinations are directly on the route, adequate access information is needed so cyclists can reach any city or point of interest located in the segment. In this way, the maps can be useful to a greater number of people. Base information includes a network of major and minor roads pertinent to the route, the numbers of those roads, important creeks and rivers and their names, the name and location of major mountain ranges, cities and towns, railroad networks, airports, and county names.

Information necessary for the safety and comfort of the cyclist was then added to this base. The most important items are highlighted with a color overlay. These items include: the actual routes; an asterisk pinpointing hazardous areas; a star designating full-service cities or towns; a triangle pinpointing basic service locations; dots locating points of interest, restaurants, and campgrounds; the location and

Figure 1. Legend.

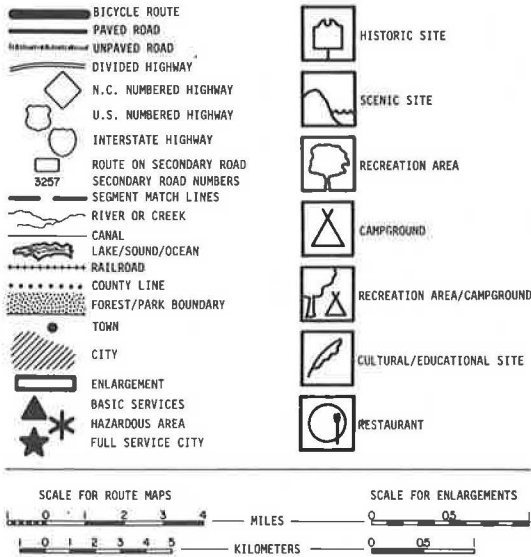
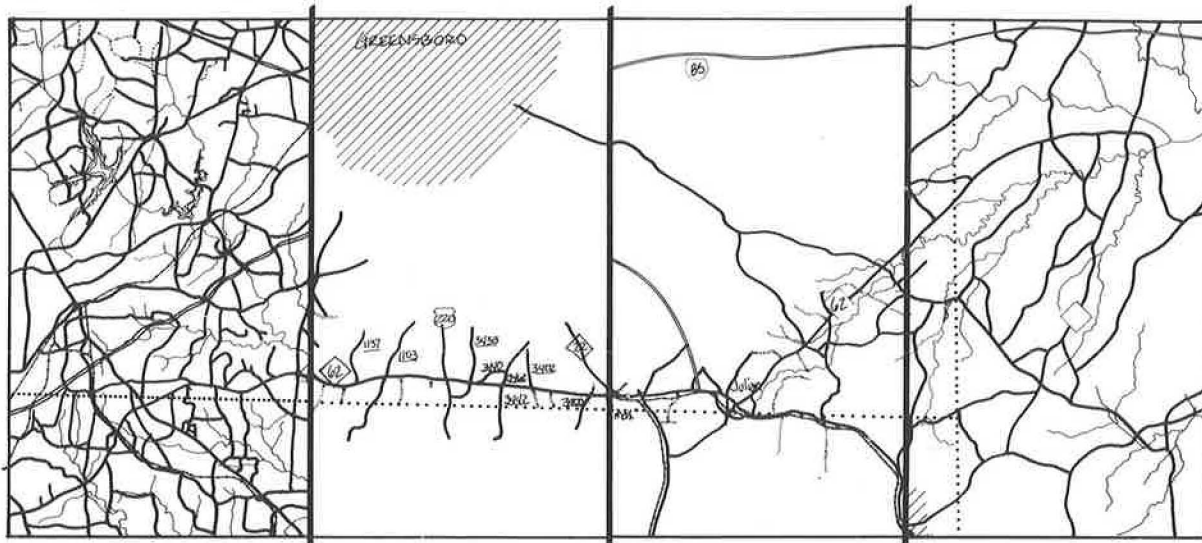


Figure 2. Evolution of map detail.



boundaries of the enlarged insets of confusing areas; and match lines. Care was taken not to overdo the use of color and thus destroy its highlighting effect.

Other additions to the face of the maps include enlarged insets of confusing areas; symbols denoting points of interest as recreational, historical, scenic, cultural, or educational; campground symbols; restaurant symbols; and a north directional arrow. The road number of all secondary roads that are a part of the route are enclosed in a rectangle to facilitate map reading.

Information offered in the narrative explains or expands the information symbolized on the face of the map. A general description of the physical features of the segment is given along with distance covered in miles and kilometers. Roadway conditions throughout the segment are briefly described with special regard to any areas that deviate from the established criteria. Hazardous areas are pinpointed and described completely, including an approximate duration of the problem. A discussion of available services includes information on the frequency of basic services (food, water, and restrooms) throughout the segment; the names of cities offering full services; the location of all bicycle shops in or near the segment; and the location of all overnight facilities, both indoor and outdoor. Finally, a description with background information on each point of interest is offered.

The entire package is copyrighted, primarily to protect the maps against reproduction for profit. The package is offered free of charge; the only requirement for obtaining a copyright is that a legal entity, in this case the department of transportation, must submit application for such.

A mockup pamphlet cover, foldout map, and map segment with accompanying narrative were prepared and sent out for review to several state and federal government agencies as well as to leading cyclists around the country. Suggested changes were incorporated in the final design.

Production

Actual production of the route guide pamphlet was time consuming, in part because no guidelines for development existed. Numerous decisions and minor details slowed the progress of the pamphlet. A general schedule can be offered, however. Preliminary research, including concept study, bicyclists' meetings, and selection of the draft route took 2 months. For the field survey, only 160 km/d (100 miles/d) could be covered thoroughly (allowing leeway for getting lost), and thus it required 2 weeks. Revisions in the draft route consumed another 2 weeks. Design decisions and production of a mockup pamphlet required a month. Individual map segments with color overlay required approximately 2.5 d apiece, or a total of 3 months of drafting time. Research and writing of the narrative accompanying each map segment and the text of the pamphlet cover took 2 months. Supervision of the reproduction of 1500 copies of the finished product, including shooting of photonegatives, 2-color offset printing, and folding and colating of the individual segments and the pamphlet cover, required another month.

Promotion

The promotion of the project and the final document began early in the planning process. With any project of this nature, especially those that involve new concepts, publicity is of ultimate importance. The idea must be sold to the public in order for the public to

realize its value and accept the change from their normal methods of action—in this case, unplanned travel by bicycle; use of bad or unrelated information in bicycle trip planning; or simply not bicycling due to a lack of knowledge of existing roads.

To be able to determine the user, and his or her interests and needs, the bicycle program staff undertook the statewide campaign of information exchange. This exchange initiated the first publicity. Also, during this time the concept of bicycling highways was being transferred by word of mouth and through the regular channels of correspondence to bicyclists' inquiries.

After the basic data had been collected and the completion date was in sight, the major publicity was undertaken. The scope was state and national. A major news release was sent to all newspapers, radio stations, and television stations in the state. Details of the final product along with a location map of the total route were provided. Also, information on how to obtain copies of the maps was given. Special mailings with this same information went out to all bicycle clubs and other special interest groups (Sierra Clubs and local bicycle committees).

To ensure the proper national coverage, the major bicycle magazines were contacted along with major bicycle groups. These contacts resulted in a series of newsletter articles, magazine reports, and discussions at national conventions.

From the initial state and national publicity, secondary news sources were generated. Local or regional bicycle groups and related-interest publications picked up on the project and carried their own stories of the effort.

This publicity generated hundreds of letters of request and many inquiries on the methodology undertaken in the project. These letters came from throughout the state and nation, proving that the data we were offering were, as hoped, exactly what the bicycling public wanted and needed.

The only change suggested for the promotional effort would be to develop a coordinated publicity package with ads, slogans, and suggested distribution. This would cost more than the bicycle program had available but may have improved the salability to non-bicycle-related news resources. Nevertheless, the methods undertaken, even though more time consuming, did spread the word quite well.

A file was maintained of all requests. At completion, the first major mailing was to these requests. Bicycle shops and interested bicycle clubs were provided with copies. A supply was also given to the state travel agency for distribution to bicycling tourists as they inquire to that office for travel information.

A supply of maps will be readily available for all future inquiries to the bicycle program. Future routes will become a part of the package. The distribution of the mountain-to-sea route package included a mail-return request allowing the recipient to review the existing maps and material and notify the program of their desire for future mailings. Eventually the distribution process will be totally computerized for ease in the mailing of future route maps.

CONCLUSION

The bicycle program is now working on the selection of other major routes and the collection of information on roads, which will become regional loop routes. As expected, interest is being generated throughout the state. Local areas are developing their own shorter bicycling highways, which will be integrated into the statewide bicycle route system.

Much was learned in the development of the first route, which will make completion of future segments easier and more efficient. When the North Carolina bicycling highways project is finished, a bicycle trip of 8 to 8047 km (5 to 5000 miles), can be taken throughout all regions and reaching into all corners of the state. Most importantly, however, as bicycle-oriented maps

and information become available, these trips may be accomplished with a degree of safety never before possible.

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