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CAPITAL CITY GREENWAY

RALEIGH

A REPORT TO THE CITY COUNCIL ON THE BENEFITS, POTENTIAL, AND METHODOLOGY OF ESTABLISHING A GREENWAY SYSTEM IN RALEIGH

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PREFACE

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RALEIGH'S EXPANSION

1792 1972 1980

Since 1792 when Raleigh was established, the city has been expanding almost continuously. Over the first one-hundred-eighty years the planned urban area grew from approximately 1,000 acres to 30,000 acres. In the next ten years the city is expected to expand 20,000 additional acres.

The original city plan prepared by William Christmas located the State Capitol on an east-west oriented ridgeline, with New Bern Avenue and Hillsboro Street following this high area. As time passed, the city expanded away from the ridgeline, growing ever closer to the valley floors where Crabtree and Walnut Creeks existed in their natural states. Due to their flooding conditions and the expense of trying to modify these conditions, the early developers of the city did not encroach upon the creeks or their tributaries. This practice led to the conservation of some of the city's most pleasant residential open spaces (Beaver Dam Park, Claremont Park, Edna Wells Park, Fallon Park, Fairall Drive Park, Forest Drive Park, Hyde Park, Lake Drive Park, Marshall Street Park, Park Drive Park, and Rothgeb Park).

During the early 1950's, Raleigh's private developers found that, through the use of large, modern earth-moving equipment, they could economically undertake development within the stream valleys. That ability has led to a disregard for the forces of nature and principles within which nature sustains all life; and to the locating of residential, industrial, and commercial land uses within the flood plains of the city's natural streams and, thus, within the reach of their floodwaters.

The City of Raleigh has had comprehensive land use plans since 1792 and has exercised zoning regulations for the past fifty years, yet these have neither protected the flood plains from the introduction of development nor have they protected the introduced development from the periodic hazards of flooding.

The inadequacies of zoning are not just a local problem. Traditionally, the zoning process has sought equity through allowing individual property owners to seek zoning changes on their property. In this manner, large-scale change can occur as a series of seemingly unrelated increments which, taken singularly, do not appear to be in conflict with the common good of the city. When taken in their cumulative form, however, the increments may produce an "end-state" condition

for which no one would have opted in a single decision.

Another inadequacy of zoning is its weakness in integrating the natural carrying capacity of specific sites with the characteristics of a proposed urban land use. Although the Planning Department has sought to protect the environment, in an informal manner, for many years, Raleigh's zoning has only recently begun to include considerations for natural characteristics of the land.

Due to the combined effect of the aforementioned conditions over the past twenty years, development has crept into Raleigh's flood plains with increasing frequency. Unless the city takes some basic positive steps to check this misuse of flood prone lands, there will be public expense generated periodically for flood damage relief and/or possible flood control projects.

There is no single solution to this condition, but part of a solution has been presented sporadically since 1951. At that time it was found within the city's Land Development Plan as "public corridors" along the city's streams. The 1969 report: "Raleigh, the park with a city in it", was the latest conceptual step in conserving these areas for "public greenway" use. This report is an extension and expansion of those previous concepts.

The purpose of the present report is multifaceted. First, it will introduce the greenway concept with reference to the governmental functions it could serve and show the benefits to be gained or foregone. Next, it will explain a method by which the greenway could be established. Then it will discuss how this project could be financed, and what actions each of the various participants should take to stimulate the success of a Capital City Greenway Program.

Although the primary purpose of this report is to inform and educate the reader about the potential for the proposed Capital City Greenway, it must be remembered that the greenway is only part of a solution to the problems confronting the city and its flood prone lands. To this end, this report will occasionally allude to various actions which are needed, either separately or in combination with the Capital City Greenway, to foster a complete and lasting solution to the flooding problems in Raleigh's urbanizing area; as well as produce a more livable environment for Raleigh's urban population.

INTRODUCTION TO

GREENWAY BENEFITS

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OBJECTIVES OF THE GREENWAY

1. Promote the strategic use of flood prone lands for an open-space corridor system.
2. Establish a linear park network, left primarily in its natural state.
3. Compliment the existing and future park system through the introduction of a linear park network which will accommodate public recreation desires which are now unmet.
4. Enhance private development by giving a common structural system to the elements of urban amenity.
5. Introduce a trail system which connects compatible land uses.
6. Buffer conflicting land uses.
7. Give alternative to the automobile for short commuter trips by developing a safe passageway for bicycles and pedestrians.
8. Retain natural ecological functions in the urban environment.
9. Allow more effective planning for future urban growth.
10. Elevate the livability of the urban environment.
11. Stimulate the more beneficial expenditure of public funds through the multiple use of public property.

Introduction to Public Need

Within an urbanizing area, open space in the form of undeveloped land is a valuable commodity, both economically and intrinsically. To suggest that specific parcels of land should remain undeveloped is a recommendation which requires a great deal of justification. In order to do this it must be shown that these specific parcels are serving and can continue to serve a public purpose over and above that of an expanded tax base. Indeed, that by allowing these areas to serve their natural as well as introduced public purposes as a greenway, the public will ultimately benefit economically.

The greenway would be capable of serving five recognized public functions (parks, recreation, planning, sewers, and transportation) as well as one emerging function (environmental control). These functions should prove sufficient to allow the City Council to legally proclaim a public need for the greenway corridor. This action would secure a minimum degree of protection for the proposed corridor and assure a chance of negotiation prior to encroachment by private development. The Council proclamation could be made in the form of an adopted greenway right-of-way plan, which would be similar in function to the City's thoroughfare plan, and this action should be followed by the adoption of greenway zoning.

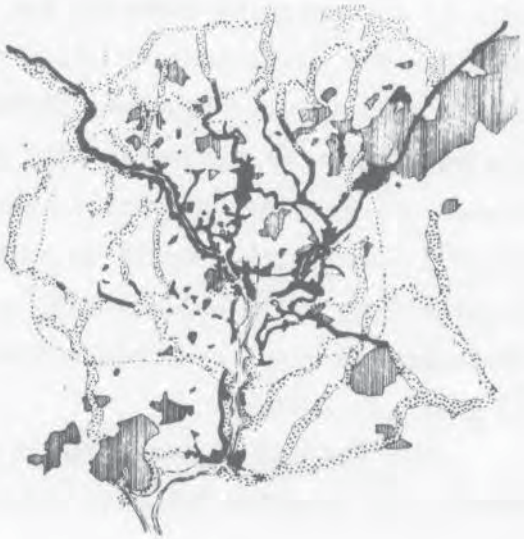
THIS CHAPTER IS DESIGNED TO REINTRODUCE THE GREENWAY CONCEPT AND TO REVIEW THE NUMEROUS BENEFITS SUCH A SYSTEM COULD BRING TO THE CITY OF RALEIGH.

Greenway Concept - Historically

The greenway concept proposed for Raleigh is a variation of a style of city-regional design which dates back at least as far as the Thirteenth Century, B.C., with the Biblical description for the Levitical Cities of Palestine (Numbers 35:1-4). This original concept has reappeared from time to time in various places around the world, with different names and modified shapes, but the basic concepts have always been the same: to give the urban population space in which to live, rather than just exist.

Since World War I the concept has had a revival. In England it was adapted for numerous new towns, known as Green-Belt Cities or Garden Cities. In the United States it was also found to be a desirable concept for new towns, appearing in Radburn, New Jersey, and Greenbelt, Maryland, and more recently in Reston, Virginia and Columbia, Maryland. Even though the greenway concept can be incorporated into a new town more easily than it can be adapted to an existing urban area, the latter has occurred in a large number of cases. Some of the urban areas which have undertaken the development of this concept are: Chicago; Kansas City; Boulder, Colorado; Los Angeles; San Antonio; Miami; Hartford, Connecticut; Cleveland; Boston; Washington, D. C.; and Toronto, Canada.

CLEVELAND, OHIO;
CLASSIC GREENBELT
THE "EMERALD NECKLACE" CONSISTS OF A PARK ROAD STRING JOINING "BEADS" OF REGIONAL RESERVATIONS, IN PART WILD AND IN PART DEVELOPED FOR RECREATION. RIVER VALLEYS ARE INCORPORATED INTO THE "GREENBELT" AND RECENT EMPHASIS HAS BEEN ON RECLAMATION OF THE LAKE ERIE SHORE AS A SCENIC AND RECREATIONAL ASSET.



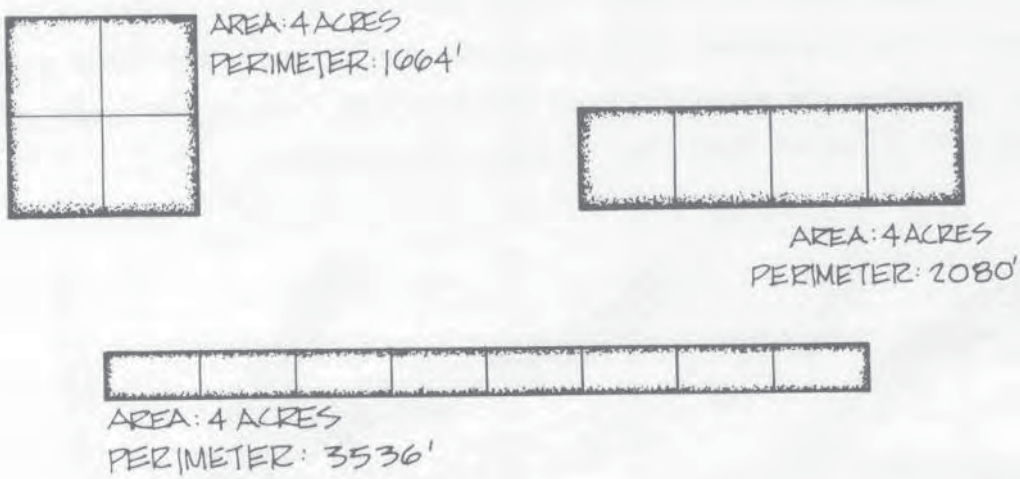
WASHINGTON, D.C.;
STREAM VALLEYS AND AREAS WITH PARKWAY CORRIDORS:
AN EXTENSIVE SYSTEM OF OPEN SPACE, INCORPORATING STREAM VALLEYS, PARKWAYS, AND LARGE INSTITUTIONAL USES, MOSTLY FEDERAL.

* MAPS ORIGINALLY SHOWN IN MAN-MADE AMERICA: CHAOS OR CONTROL?, TUNNARD and PUSHKAREV, YALE UNIVERSITY PRESS, 1963.

Parks and Recreation

The greenway concept proposed for implementation in Raleigh, stated in its simplest terms is: the strategic use of part of the city's flood plains for an open-space corridor system between various adjoining land uses. Described in more detail, with emphasis on the parks and recreation aspects, the same concept would read: the greenway is a linear park network left primarily in its natural state, except for the introduction of a connector system of trails for use by pedestrians and bicyclists between different land use areas. To best evaluate the various park and recreation functions inherent in this concept, it is necessary to look at the two separately.

Park Functions. First, it is necessary to examine the notion of linear parks in contrast to the traditional consolidated method of locating parks. The great advantage of linear parks lies in the fact that in two identical acreages, one linear and one traditional, the linear park will have the greater amount of perimeter.

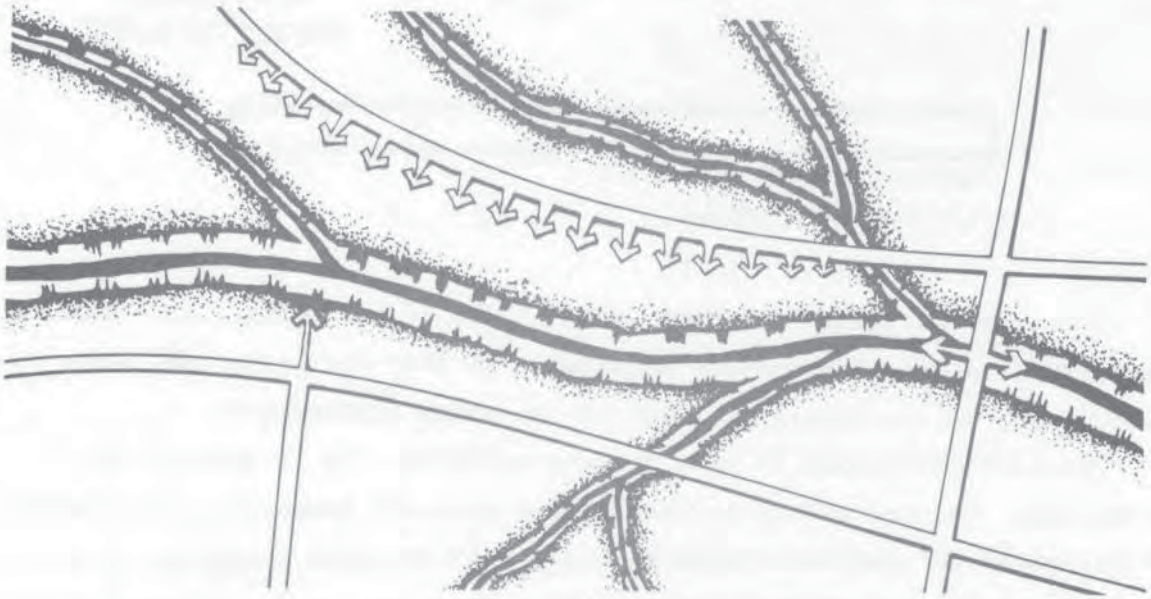


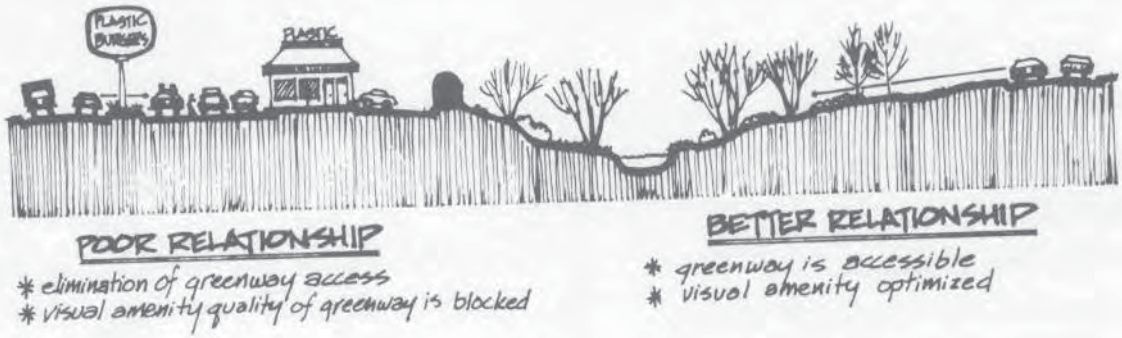
Increased perimeter does not appear to be of great importance until one recognizes two of the basic attributes of this advantage and their relationship to the impact of parks on the urban environment.

The first attribute is that of accessibility. It is logical to assume that the greater the perimeter of a piece of property, the greater the potential for gaining access to that property; this advantage is at the heart of the linear park notion. With reference to the greenway this

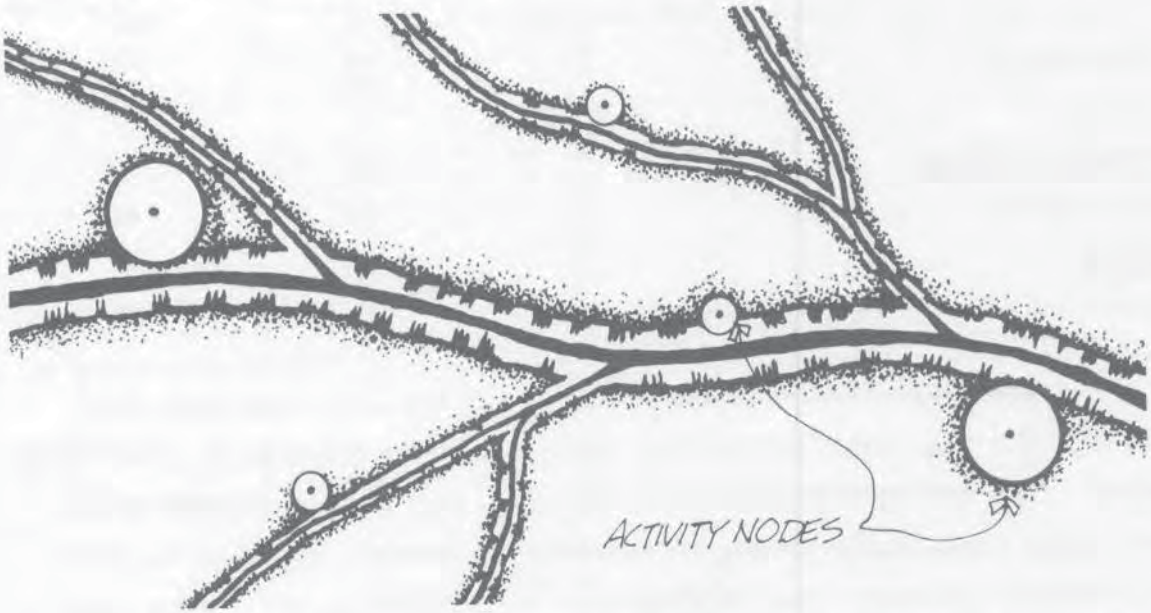
means that the creeks and tributaries within Raleigh, themselves, a linear system could be utilized to create a linear park system which would circumscribe and penetrate into all areas of the city. By virtue of the greater perimeter advantage of the linear corridor, a greater number of citizens would own property, nearby or adjacent to the system, thus bringing the benefits of the city's park system to the greatest number of people.

The second attribute of linear parks is visibility, and this also relates to the greater perimeter advantage previously mentioned. Again, it is logical to assume that the greater the perimeter of a piece of property, the greater its potential for having a visual impact on the community. There are three basic ways of viewing park perimeter: by dead-ending perpendicular to it, by crossing perpendicularly through it, and by moving parallel to it. This fact could be used by the City Planning Department in guiding development in such a manner as to gain the most visual impact from the open spaces within the city. With reference to the greenway, this characteristic would allow a linear park system to contribute the maximum visual amenity (that is, contrast to the usual urban landscape) as possible to the citizenry and their guests; and to establish the possibility of creating for Raleigh, an image which is much more pleasant than that of other urban areas.





Recreation Functions. Just as the proposed greenway would bring certain advantages to the city's park system, it would also bring certain advantages to the city's recreation program.

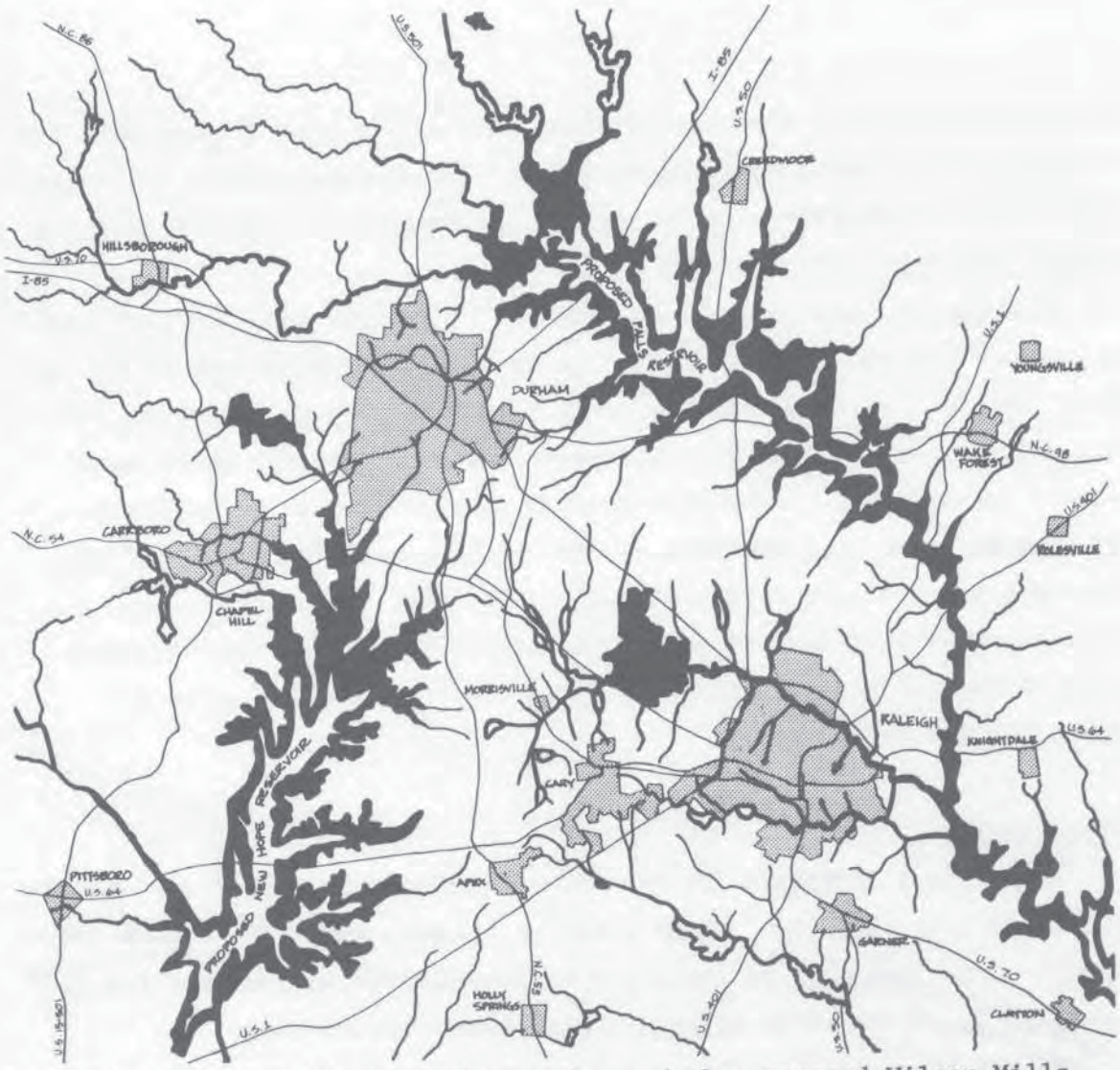


Even though the proposed greenway is conceived as a linear connector system which would contain no formalized activity areas per se, it could still accommodate many recreation activities which do not lend themselves to organized programming. In 1965 the United States Department of Interior's Bureau of Outdoor Recreation conducted a survey of citizen participation in the sixteen major summertime outdoor recreation activities. The following table ranks the results of that survey as indicated by the recorded participation. If the proposed greenway is evaluated with respect to its ability to satisfy public demand for a place to engage in the activities; then it will be found that the greenway could directly accommodate seven of the sixteen on 44 percent of the activities.

Activity	Rank	Millions of Occasions
Walking for Pleasure	1	1,030
Swimming	2	970
Driving for Pleasure	3	940
Playing Outdoor Games or Sports	4	929
Bicycling	5	467
Sightseeing	6	457
Picnicing	7	451
Fishing	8	322
Attending Outdoor Sports Events	9	246
Boating (other than canoeing and sailing)	10	220
Nature Walks	11	117
Camping	12	97
Horseback Riding	13	77
Water Skiing	14	56
Hiking	15	50
Attending Outdoor Concerts and Plays	16	47

Further evaluation of these seven activities will show that they are, for the most part, activities which cannot be effectively programmed. Indeed, they are usually excluded from urban recreation programs since most small urban parks cannot effectively accommodate these activities. The proposed greenway could accommodate the activities and in the case of walking for pleasure, or bicycling, would give a reasonable alternative to the streets and sidewalks. Yet two other activities which would be better accommodated by the greenway than by most other existing facilities are jogging and canoeing.

Two other potentials of the proposed greenway should also be recognized. First is the potential for the Capital City Greenway to be a vital link in a regional system. Such a system could be accomplished within the Research Triangle area if the citizens supported such a move; and if governments of the communities and counties, along with the Corps of Engineers, would work together toward that end. This system (see next page) could connect Raleigh, Durham, and Chapel Hill; the New Hope



Reservoir, Falls of the Neuse Reservoir, and the proposed Wilson Mills Reservoir; William B. Umstead State Park, and the proposed Falls of the Neuse State Park and Recreation Areas; and the Eno River, the Neuse River, and the greenway on Crabtree, Walnut and Swift Creeks. The second potential, which could be reached when the proposed greenway is implemented, is that of gaining National Recreation Trail designation, as authorized by Public Law 90-543, October 2, 1968 (See Appendix.)

NATIONWIDE SYSTEM OF TRAILS

The proposed greenway when established could easily meet the criteria for designation as a National Recreation Trail and thereby deserve the title given to it in the 1969 plan "Raleigh - the Park with a City in It", the Capital City Greenway.

Pulling together the various park and recreation benefits mentioned in the previous evaluation of the greenway, the following summary can be made. The Capital City Greenway would compliment the present park and recreation system by introducing a park network to Raleigh which would be more accessible to the population and make activities available to them which are now not available or are inconvenient to undertake, due to inadequate space in less accessible locations. The Capital City Greenway could also be responsible for retaining much of the intrinsic value of Raleigh's landscape while being a vital link in a potential regional trail system.

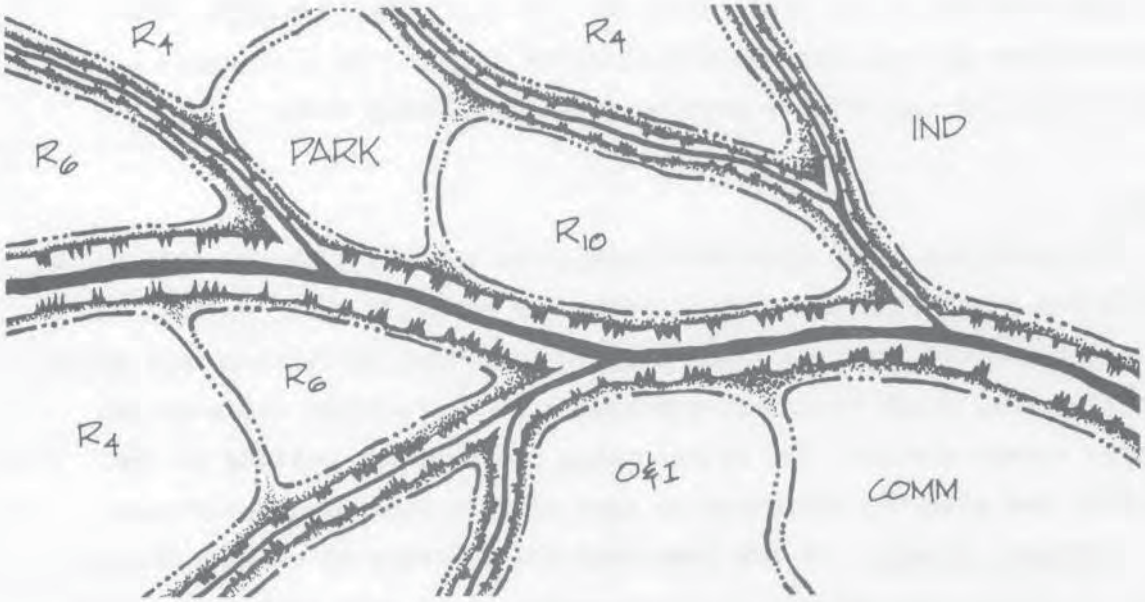
City Planning

The greenway proposed for Raleigh would have a number of distinctive effects on city planning. These would be slightly different within the present urban area than in the areas of future urban expansion. For this reason it is necessary to discuss these effects separately.

Within the existing urban area, development patterns are already established. For the most part, the only undeveloped land is that which traditionally has been thought of as being of marginal value for development purposes. This category of land includes the city's flood plains. As urbanization pressures build and land prices increase, a point will be reached at which it will seem to be economically feasible to modify these lands so they will be developable. At that point the city will stand on the threshold of losing the majority of its remaining undeveloped open space.

To the city planner, these open spaces represent the common denominator which keeps the city's density rates from rising; density being one of the major factors that distinguish the bearable urban environment from the unbearable. The effect of the Capital City Greenway will be to conserve some of the last remaining open space within the Raleigh urban area, thus stabilizing the density and maintaining the liveability of the city.

There will be slightly different effects on those areas which will urbanize after the greenway concept is adopted. In those areas, the city will be able to seek the optimum with reference to the greenway, rather than just "picking up the scraps" left after urbanization. This means that the city will have an even greater potential for buffering the conflicts which occur during urbanization. In this manner the Capital City Greenway could be used to separate competing land uses, thus reducing the undesirable impact one has upon the other.



At the same time, the greenway would serve to connect the various compatible land uses along its perimeter. The greenway, through these two city planning principles, would give structure and function to the city's future expansion.

Yet another phenomenon could result from the Capital City Greenway's impact upon city planning. In 1966, the Urban Land Institute published a study entitled "Open Space Communities in the Market Place". For this report, twenty-eight residential, open-space communities were studied. The basic questions this investigation set out to answer were: Are open-space communities successful and do open space, cluster planning, parks, a good street plan, and community features such as recreation help the sale of new homes and apartments?

The overall answer was found to be yes. The study recorded that: "Proof that developers who tried open space and better planning believe

in them is that in their next developments they have gone even farther to provide more open space, more recreation, and better community facilities."

There is a high probability that this phenomenon would occur in Raleigh with the implementation of the greenway. After a reasonable transition period, the evolving park/open-space network will begin to influence the direction of urban growth patterns.

This will occur as the City's private developers realize the enhancement which can be gained through a structured urban amenity system, and they seek to locate their developments along the greenway. The actualization of the phenomenon will allow the city to plan more effectively for the orderly growth of its urbanizing area.

Sewers

The greenway could also have beneficial effects with relation to the city's two sewer systems -- these being the sanitary sewer system, which transports wastes from the urban area to treatment facilities, and storm sewer systems, which transport stormwater from developed areas to the natural stream system. The relationship of these two systems to the greenway are slightly different so they will be discussed separately.

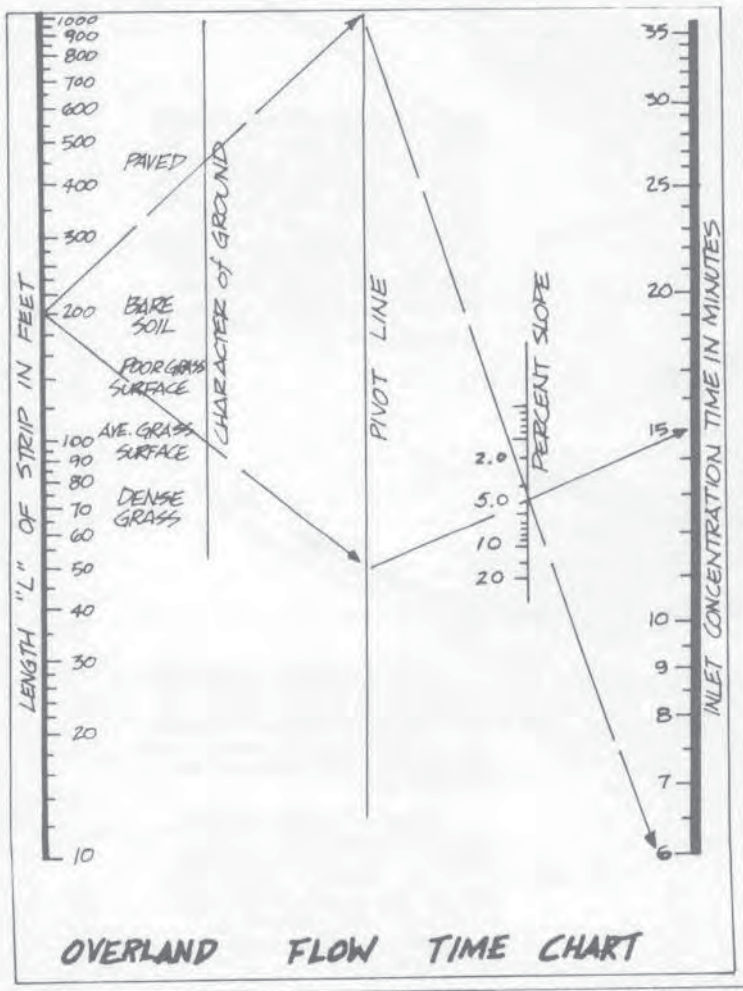
Sanitary Sewers. It has long been the practice of utility departments to follow the natural drainage system of an area with their sewer lines since natural drainage constitutes a gravity-flow system. This is an economic decision related to the fact that it is less expensive to operate a gravity-flow sewer system than to pump sewage under pressure; and this less expensive practice is used in Raleigh.

It can be seen that the relationship between the greenway and the sanitary sewer lines could be an important factor since both will occupy roughly the same area contiguous to the city's streams. The possibility is good for the Capital City Greenway to accommodate this public facility without damage to its other functions, thereby allowing the city to overlap these two rights-of-way. In this manner, both systems could be established at less expense than providing for the functions of both, separately.

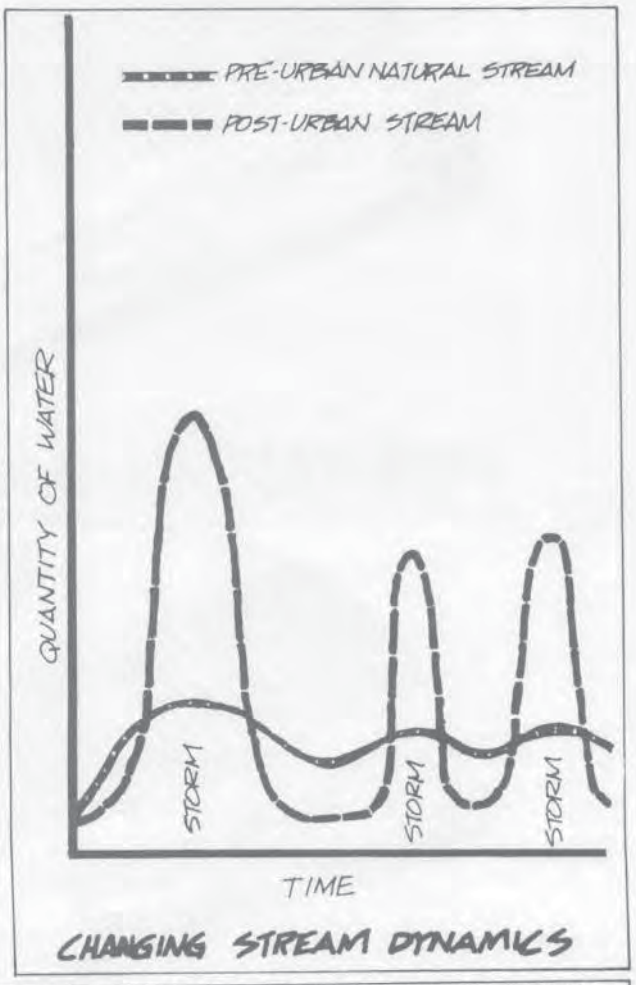
Storm Sewers. In the urbanization process man builds structures, roads, and parking lots, all of which represent impervious surfaces.

These man-made features do not absorb water; therfore, a greater quantity of runoff results and is directed into the storm sewer system. Through these, the water reaches the natural stream system which is supposed to carry it away from the urban area.

In the development process man not only increases the quantity of water which flows off the land but also increases the speed with which it reaches the city's streams. Since the quantity and concentration time of runoff are changed by development, the flow dynamics of the city's streams are changed, and flooding problems are created. This problem is compounded by the fact that many urban governing bodies have not protected their stream systems as natural extensions of the urban storm sewer system. They have allowed development to clog the floodways of this system, thus, reducing stream flow and raising flood levels upstream, increasing economic losses from flooding, and expanding the potential for loss-of-life during flood stage runoff.



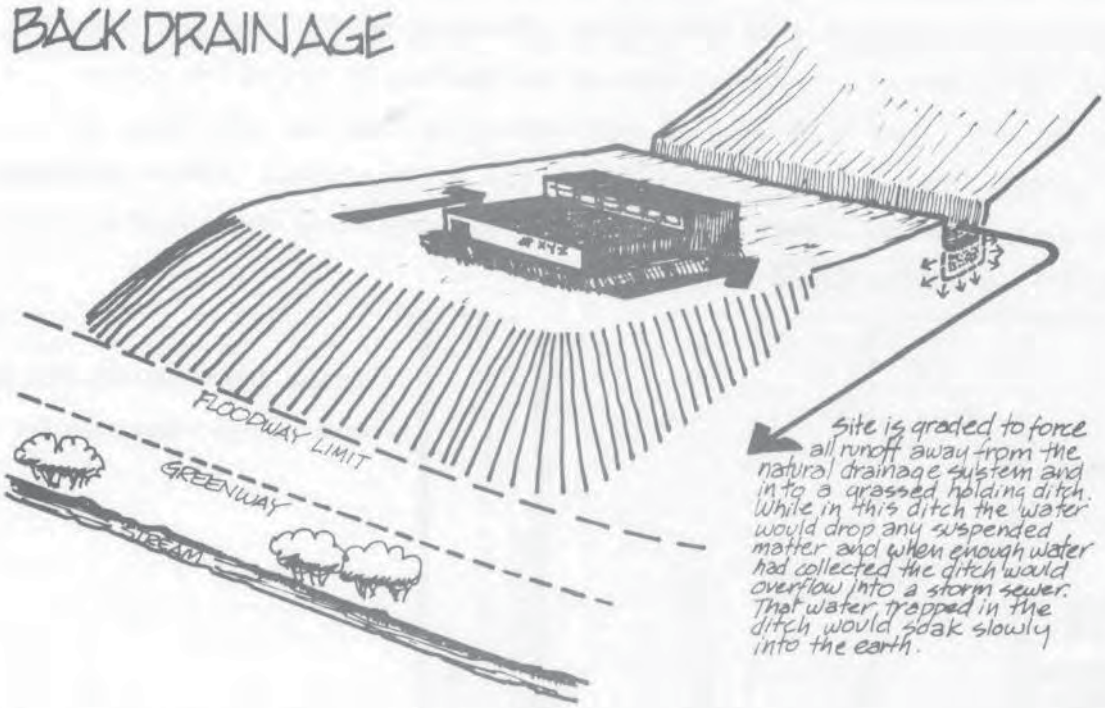
OVERLAND FLOW TIME CHART

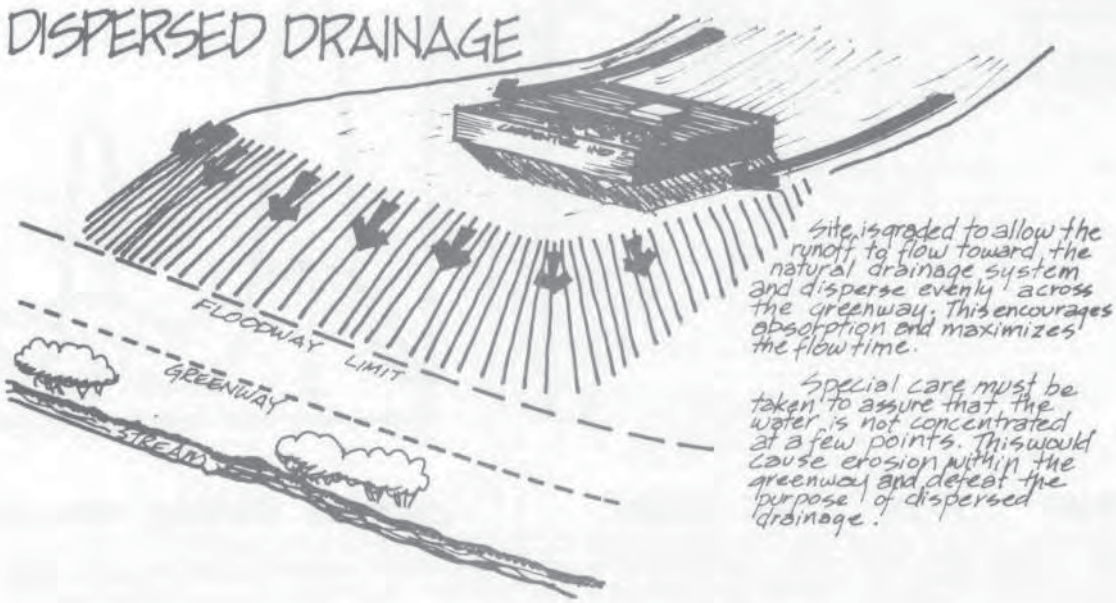


CHANGING STREAM DYNAMICS

THE FIGURE AT THE LEFT INDICATES THE EFFECTS OF IMPERVIOUS URBAN DEVELOPMENT UPON THE SPEED OF RUN-OFF, WHILE THE FIGURE ON THE RIGHT INDICATES THE RESULTING EFFECTS UPON THE FLOW DYNAMICS OF URBANIZING STREAMS.

If the Raleigh governing body was to accept their stream systems as a natural extension of the urban storm sewer system, then the greenway could play a large role in protecting the public interest. The Capital City Greenway could give minimum protection from moderate flooding due to its proximity and width along urban streams. If included in a comprehensive program with floodway and flood plain regulations, then flood damage prevention would be accomplished at its highest practical degree; and the urban sewers would be part of a total system.





Transportation

The greenway would also influence transportation patterns in Raleigh, since it could function as a reasonable alternative to the streets for short commuter trips, by offering a safe passageway for bicycles and pedestrians. This has always been a major part of the greenway concept and a strong selling point in new towns and open space communities which have adopted it.

Referring again to the Urban Land Institute report, "Open Space Communities in the Market Place", the following observations were made about the alternative transportation modes of bicycling and walking.

"Bicycle riding is very popular and in most places very dangerous. In many communities there are no sidewalks, and even when there are, children ride in the streets. It is clear that planners and developers have given little thought to the cyclist. The few bicycle paths that have been built are much used and become a big sales feature.

Walking, practically obsolete in this country, becomes a valuable sales feature when it is provided for. Among the 630 families interviewed (in the ULI study), 41.5 percent said they walked more, in their present (open-space) community, 72 percent said they felt it was safer to walk there, and 26 percent said that walking was a motivating factor in their purchase."

With the advent of the automobile, bicycling and walking began to lose their importance as modes of transportation. Today however, both are regaining popularity as recreational activities as well as means of commuting short distances within urban areas. Considering the observations of the Urban Land Institute Report, it should be assumed that the accommodation of these alternatives to automobile transportation would be of benefit to the entire community.

As previously mentioned, the Capital City Greenway would serve as a connector system between the various land uses which adjoin its perimeter. The greenway would serve as an alternative to streets for commuting between these various areas: homes, schools, parks, offices, commercial areas. It could be assumed that, given a reasonable transition period while the park/open-space network was evolving, that the housing preference patterns of individuals within Raleigh would change to reflect the desirable alternatives of living adjacent to the Capital City Greenway. Once this has happened, there could be some influence upon the city's congested

traffic situation. Whereas there would probably be no overall reduction in congestion, there could be a slight decrease in the rate of increase of congestion, and marked decreases in the congestion of specific localized areas.

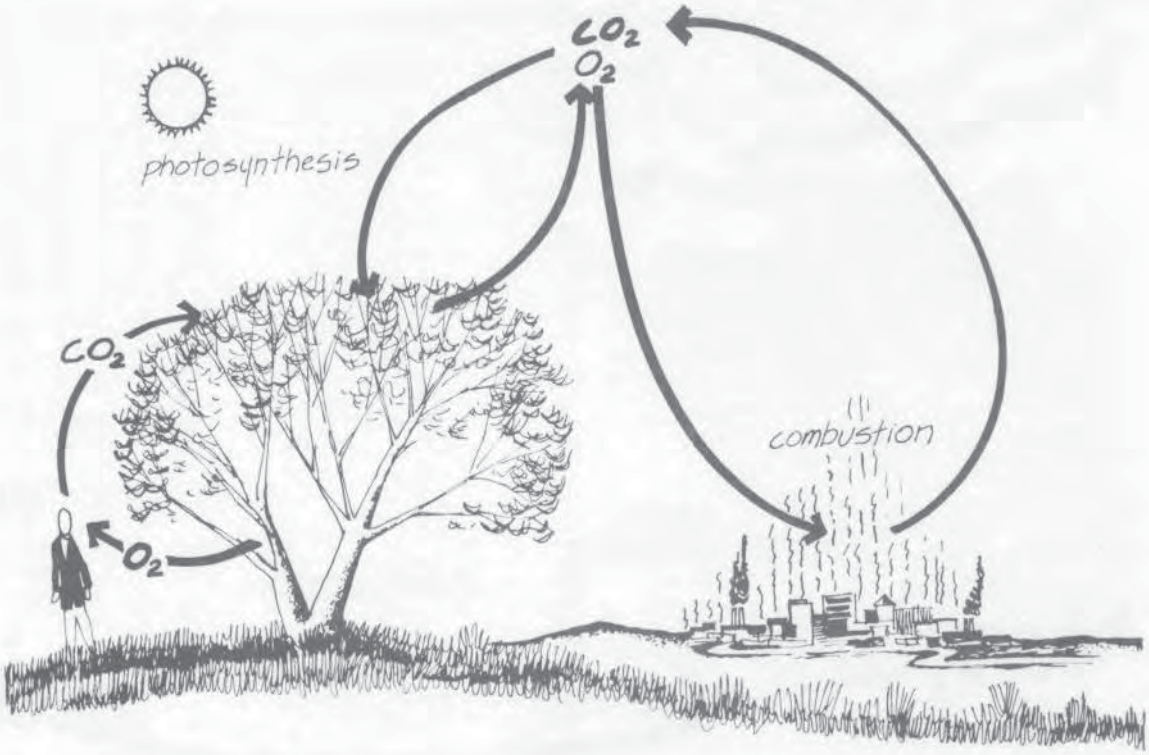
Environmental Maintenance

Thus far the discussion of the potential benefits of the greenway revolved around the governmental functions of parks, recreation, planning, sewers, and transportation. This section will discuss the greenway in terms of two of its environmental functions and the benefits they bring to the city.

There are individuals who believe that man, due to his superior intelligence, is a highly adaptive animal that can adjust himself to new conditions and create his own environment, and that the man-made environment is in many ways superior to what nature provided. These individuals fail to realize that man is not and cannot be a totally independent and mechanized creature, but must depend upon his natural environment to supply air to breathe and water to drink; and that these elements are involved in natural cycles which man upsets with his ever-increasing development of the natural landscape. Just how much natural landscape must be conserved in order to maintain the optimum livability of the urban environment is not known, but the general advantages of natural open space can be cited in this respect.

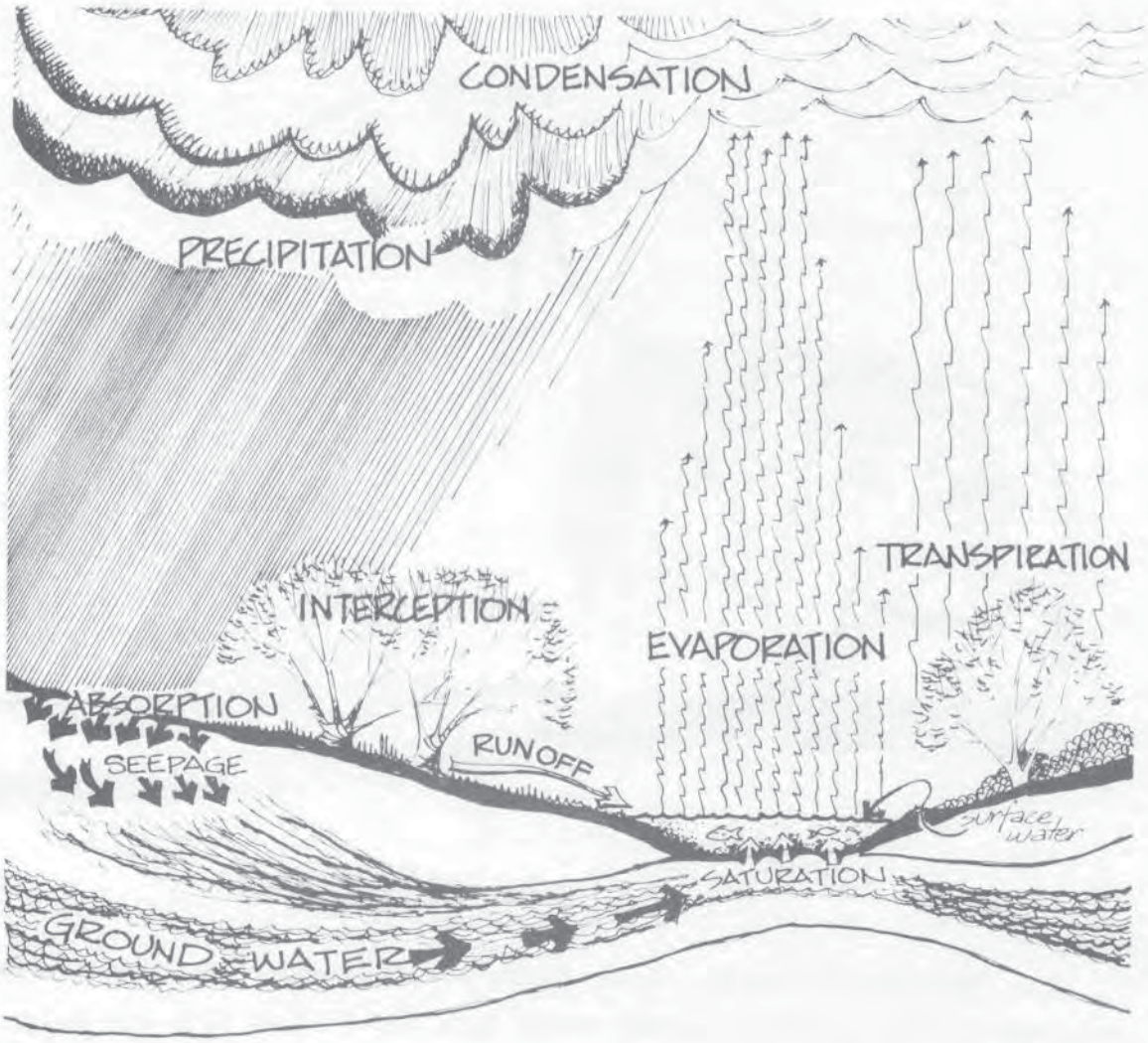
Two basic ecological cycles will be mentioned here for background purposes.

The Carbon Cycle. Carbon dioxide makes up only 0.003 percent of atmosphere. As Paul Sears points out in The Living Landscape, an excess of 0.05 in the air is decidedly bad for animal life, even though carbon dioxide is an inevitable by-product of activity in animal organisms. That the atmosphere retains a balance suitable for maintaining life in both plants and animals is the result of photosynthetic activity within green plants during daylight hours, when they produce and release more oxygen than they can use. One of the few areas where carbon dioxide builds up above normal conditions, Sears says, is in urban areas. The delicacy of this chemical balance between atmosphere and life is an ecological fact and must be given a position of importance in the urban planning process.



The Hydrological Cycle. Water falls upon the earth in various forms of precipitation, where it either sinks into the soil or runs off the surface into streams and eventually to the sea. Soil or ground water may be emitted through springs back into the stream system or it may be taken from the soil by the roots of plants. Water moves up through plants and is evaporated (transpired) into the atmosphere through the leaves. Also, water is evaporated directly from the surface of the land and bodies of water.

Vegetation plays a second important role in the hydrological cycle in that it intercepts precipitation before it reaches the ground. In doing this it reduces the impact of the precipitation on the ground thus reducing the potential for erosion by allowing the water to be absorbed gradually into the soil. The efficiency and productivity of vegetation and natural open space in urban areas are critical factors in determining how much of this kind of space should be retained. By conserving these resources, surface water runoff can be reduced, water supplies protected, flood damage lessened, and critical ground water recharge areas safeguarded.



The misuse and depletion of these natural resources will present man with silted waters, flooding, water shortages, and decreasing fish and wildlife populations.

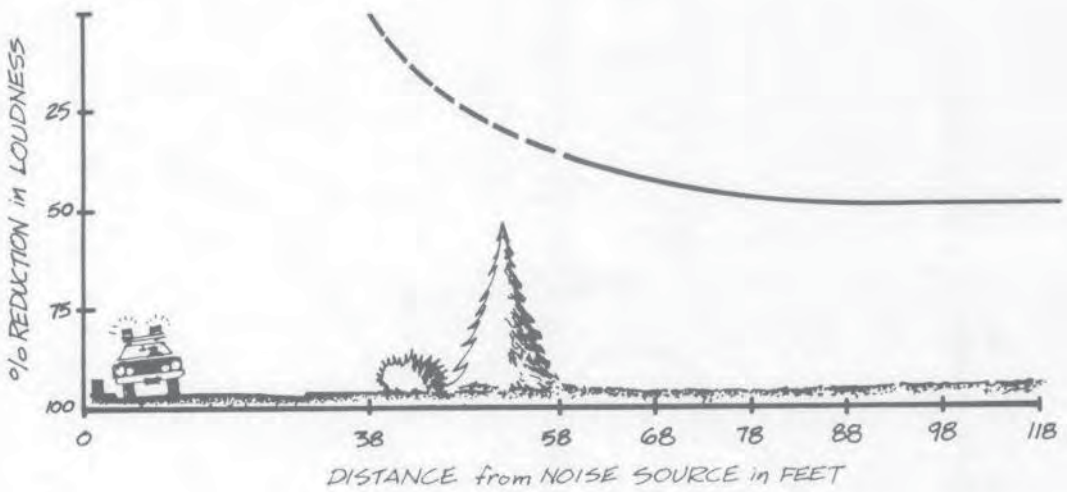
The carbon and hydrological cycles and their relationship with vegetation tell part of the vitally important ecological story. They highlight the fact that there is an economy of nature and interrelationship of living things, including man, and that the two are inseparable.

The greenway proposed for Raleigh calls, in part, for a flood plain oriented linear park network, left primarily in its natural state. Inherent to this concept is the notion that the city's flood plains will receive some minimum protection through the implementation of the greenway, and that these areas will retain their vegetative canopy. The inclusive natural elements of trees and water play a major role in this concept and in determining whether man's physical environment will be an oasis or a desert. Somewhere between these two extremes is the role of the greenway in Raleigh's urban environment.

Environmental Benefits

With reference to the aforementioned ecological cycles, the following are some of the benefits the Capital City Greenway could bring to the physical environment of Raleigh; due primarily to the retention of natural vegetation in critical areas.

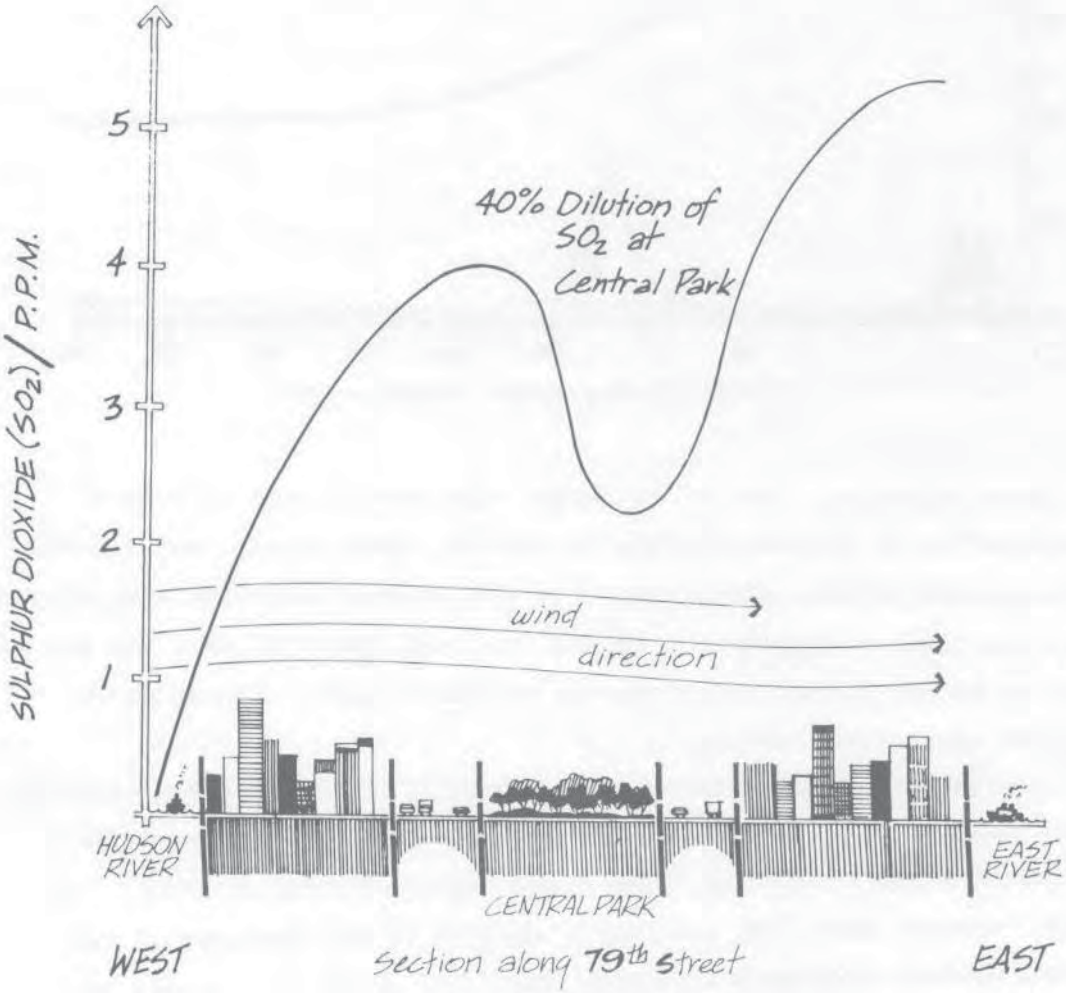
Noise Reduction. Urban areas are characterized by increasing noise levels. There is little question about the value of trees, buffer strips, shelter belt plantings, and the like in decreasing noise. The U. S. Bureau of Public Roads and the U. S. Soil Conservation Service have long advocated the use of natural greenery for noise reduction. The following graph was assembled from information in "Trees and Shrubs for Noise Abatement" by David I. Cook, and illustrates another benefit of retaining natural open/space in strategic locations.



Smog Reduction. One of the major elements in smog is sulphur dioxide which is produced by the burning of fuels, i.e., coal and oil, which contain sulphur impurities. It will attack susceptible vegetation, is an irritant to respiratory tissue, and will further react and mix with water to become either sulphurous or sulphuric acid. It can erode minerals and corrode metals.

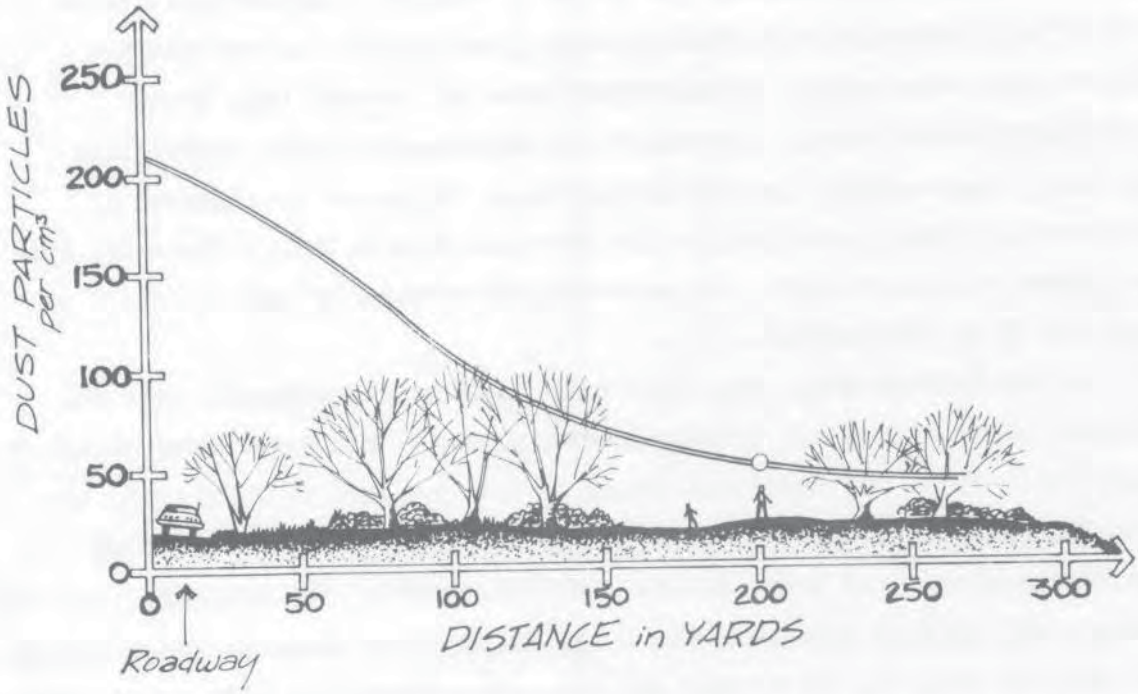
A study of sulphur dioxide concentration in New York was conducted by Dr. Ben Davidson, and the results were later reported by Roland C. Clement in a paper entitled "Open Space and the Breath of Life". Mr. Clement reports that "the pollutants emitted by the chimneys of two square miles of residential housing equal the pollutants spewed forth

by a large power plant. The power plant's emissions are focused, therefore obvious; the pollution contributed by dense housing is less obvious . . . Dr. Davidson studied the atmosphere concentration of sulphur dioxide (SO_2) in mid-Manhattan, going from the Hudson River to the East River along 79th Street downwind. The significant feature of this study is the dramatic drop in the SO_2 level created by the presence of Central Park in mid-Manhattan. There are no belching stacks in the park, so being pollution free itself, it provides an important, perhaps indispensable, dilution of the rest of the community's air pollution load. This is a contribution of every open space, and confirms the earlier conclusions based on good taste and more abstruse evidence, that every community must retain or recreate open space so that it will not suffocate in its own wastes."



Dust Reduction. Natural open spaces are also important in urban areas because they influence the movement of air, and filter dust which, as well as being a nuisance, affects health.

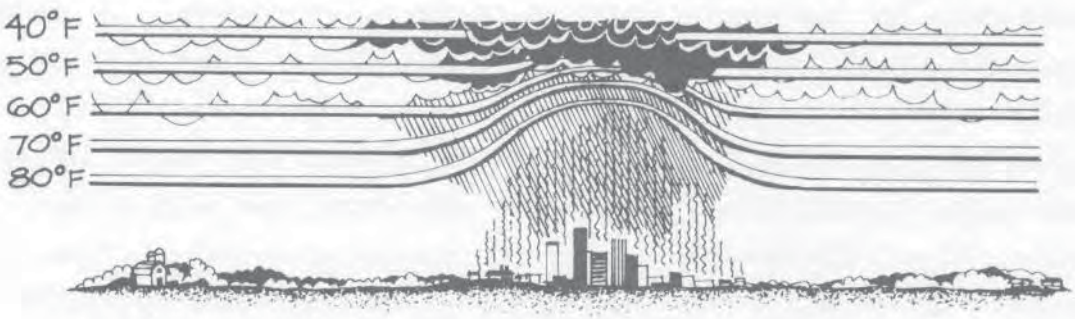
In an article entitled "Planning the City's Climate", Eric Kuhn discussed a study conducted in Leipzig. At a point near where the wind emitted from a narrow street, 210 dust particles per cubic centimeter were measured; while at the end of an open space two hundred yards long, the count was down to 50. This function would be performed on a community wide basis by the Greenway.



Heat Reduction. The effect of vegetation on temperature is well established, and has great meaning in the urban environment. In "People, Cities and Trees" the U. S. Department of Agriculture reports: "City streets and buildings store heat during the day (Heat Island Effect). At dusk when the sun goes down the heat is released (and keeps) temperatures high. Transpiration by trees can counteract some of this heat energy. Along with evaporation from the ground, tree transpiration cools the air, like a gigantic air conditioner". Indeed, it has been proven that a large healthy tree has a cooling effect of almost 40,000 BTU's and under optimum conditions it actually does cool the air beneath its branches as much as 20 degrees, and this effect will mean a great deal in terms of Raleigh's future livability.

Rain Reduction. One of the most dramatic physical changes which occur due to urbanization is the change in weather, specifically rainfall. The previously mentioned heating (Heat Island) effect plays a role in this phenomenon. Since urban areas are hotter than their surrounding rural areas, incoming cloud masses are forced upward over the city; thus causing them to precipitate. Research in a number of large urban areas, according to the American Meteorological Society, has shown that this phenomenon can cause an increase in average rainfall as great as 31 to 246 percent.

In the Raleigh area, Mr. Alan Gustafson, a meteorologist with the National Weather Service, Raleigh-Durham Airport, has been doing research since early 1971. Although his study is not complete at this time, his data indicates that urban Raleigh does receive greater rainfall than the surrounding rural area, due to this phenomenon. The greenway, through its twofold ability to effect the urban temperature increase (Heat Island) and provide space to accomodate moderate urban flooding, will justifiably serve the public for many generations.



In summary, this section has discussed the benefits to the physical environment which would be provided by the implementation of the Capital City Greenway. The Greenway would improve the physical environment of

Raleigh by stabilizing the elements of oxygen, carbon dioxide, and sulphur dioxide by reducing dust, noise, and heat and by stabilizing rainfall increases. Thereby helping the urban environment retain its livability as it expands.

Economics

Traditionally, one of the greatest hurdles an open-space program, such as the Capital City Greenway proposal, has to clear is the question of loss of tax revenues due to public ownership. This question was squarely faced in the report "Economic Impact of a Regional Open Space Program" prepared by Development Research Associates of Los Angeles, Economic Consultants. Their conclusion was: "A major open space program will not result in a net loss of assessed values on a regional basis. Removing a large amount of land from the supply available will increase the values of other built-up and raw land, thus quickly restoring any temporary reductions in the tax base resulting from use restrictions or public ownership. The result would be a transfer of values within the overall region".

Assuming the validity of this conclusion, it can be assumed that the proposed greenway will not signficantly effect property tax revenues. The only other question to be raised refers to the cost of servicing this open space land. In his report, "Challenge of the Land", Charles E. Little, Executive Director of the Open Space Institute, points out: "Open space produces municipal income negatively - by costing less to service. It produces it positively by adding value to adjacent properties. It can (in special cases) produce income directly through user fees, or because a desirable open space use is also taxable.

The purpose of acquiring or encouraging the preservation of open space may not be a financial one, but acquisition is nearly always susceptible to financial justification. Indeed, there is so much evidence that open space pays off handsomely for the typical suburban community that the objectors should be saddled with the burden of proof rather than the proponents. They are the ones caught with their tax rolls down."

Conclusion

This chapter has been addressed to the benefits the Capital City

Greenway can bring to the Raleigh urban area. Once established, the greenway would compliment the existing and future park system by connecting many of its parks with trails, as well as offering a linear space compatible with many activities which are now only marginally attainable in the Raleigh area. It would also give a degree of structure through which the City could grow in a more organized and economically sound manner: this structure being the multiple public use of flood prone land. The greenway would also serve the public by retaining environmentally important areas and conditions which are needed to maintain the livability of the urban environment.

GREENWAY OBJECTIVES / INVOLVED GOVERNMENTAL FUNCTIONS	PARKS	RECREATION	PLANNING	SEWERS		TRANSPORTATION
				SANITARY	STORM	
1. Promote the strategic use of flood prone lands for an open-space corridor system.	●	○	●	●	●	○
2. Establish a linear park network, left primarily in its natural state.	●	●	●	●	●	●
3. Compliment the existing & future park system through the introduction of a linear park network which will accommodate public recreation desires which are now unmet	●	●	●	○	○	○
4. Enhance private development by giving a common structural system to the elements of urban amenity.	●	●	●	○	○	○
5. Introduce a trail system which connects compatible land uses.	●	●	●	○	○	○
6. Buffer conflicting land uses.	●	○	●	●	●	○
7. Give alternative to automobile for short commuter trips by developing a safe passageway for bicycles and pedestrians.	●	●	●	○	●	●
8. Retain natural ecological functions in the urban environment.	●	○	●	●	○	●
9. Allow more effective planning for future urban growth.	○	○	●	○	○	○
10. Elevate the livability of the urban environment.	●	●	●	○	○	○
11. Stimulate the more beneficial expenditure of public funds through multiple use of public property.	●	●	●	●	●	●

● Directly involved ○ Indirectly involved

GREENWAY

CRITERIA PROPOSAL

CCG

3

OBJECTIVES OF THE CRITERIA

TO ESTABLISH GREENWAY CRITERIA WHICH WILL BE RESPONSIVE TO:

(A) the hierarchial nature of stream systems;

(B) the natural physiographical conditions associated with stream systems; and

(C) the urban land use contiguous to the stream system.

TO ESTABLISH GREENWAY CRITERIA SUFFICIENT TO ACCOMMODATE:

(A) an intra-city trail system;

(B) moderate flooding;

(C) increased rate of runoff from urbanization;

(D) sanitary sewer lines;

(E) the continuance of environmental systems; and

(F) use-density associated with various land uses.

It has been established that the areas needed for creation of the proposed greenway are presently serving public purposes as open space and that these benefits could be lost if the areas were allowed to be developed. It was also shown that these public purposes could be retained and expanded if a greenway plan were implemented. The Capital City Greenway plan must be a comprehensive plan through which the city can direct its growth to the most beneficial public end.

THIS CHAPTER WILL INTRODUCE A METHOD BY WHICH THE CITY CAN UNDERTAKE THIS PROJECT AND DISCUSS HOW THE METHOD WOULD WORK IN PRODUCING THE CAPITAL CITY GREENWAY FOR RALEIGH.

Methodology

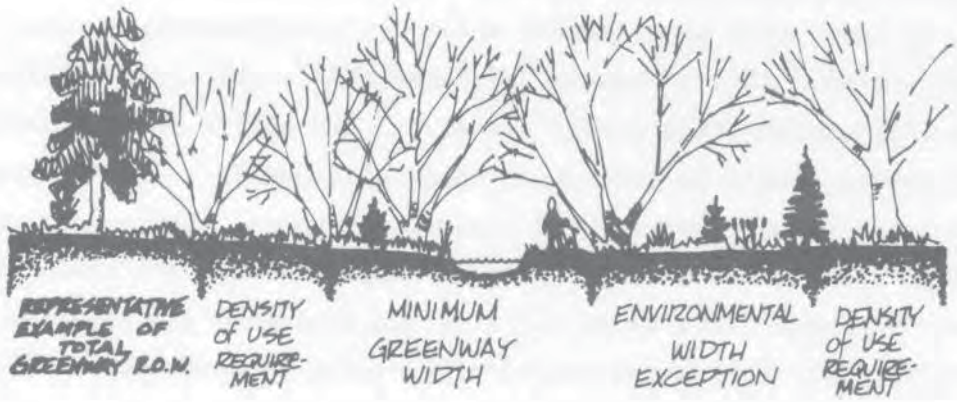
The greenway concept proposed for Raleigh stated, in part, that the greenway would be a corridor system. In order for the city to establish this system, they must be able to produce a Greenway Right-of-Way (ROW) plan for the urban area. The first requirement of such a plan would be to designate those areas where the city intended to seek greenway corridors. The second requirement would be to establish a system by which the city could put discrete limits on greenway ROW, as dictated by the various environmental and land use conditions throughout the urban area. The following explains how these two requirements could be fulfilled.

Location of Corridors. The greenway concept described earlier stated, in part, that the greenway would be, predominantly, a flood plain oriented system. This statement indicates that a practical relationship would exist between the greenway system and the city's stream systems, and two points should be made about this relationship. First, streams are a naturally inter-locking and connected physical system over which man builds his cities, thus the streams penetrate into all areas of the urban environment. This would allow for an equitable distribution of greenway corridor throughout the city, yielding a potential for connectedness equivalent to that of the stream system.

Secondly, the flood plains adjacent to these streams are usually the last land to be developed in an urban area. Thus, the potential for establishing the greenway system is still relatively good. Since these areas are expensive to develop, subject to the dangers of flooding, and costly to the extent of requiring deficit budgeting of public funds to

protect and maintain services to development in these areas; it has been long recognized as prudent to put these lands under public controls. Whereas the presently proposed regulations over flood prone lands will protect areas along Crabtree and Walnut Creeks, it will not give protection along the numerous, smaller streams in the Raleigh area. The proposed greenway could give some protection from moderate flooding along these otherwise forgotten streams. IT WOULD THEREFORE SEEM ENTIRELY REASONABLE TO CONSIDER ALL STREAMS, REGARDLESS OF WHETHER THEY ARE PRESENTLY WITHIN THE CITY'S PLANNING LIMITS, AS POTENTIAL ADDITIONS TO THE CAPITAL CITY GREENWAY.

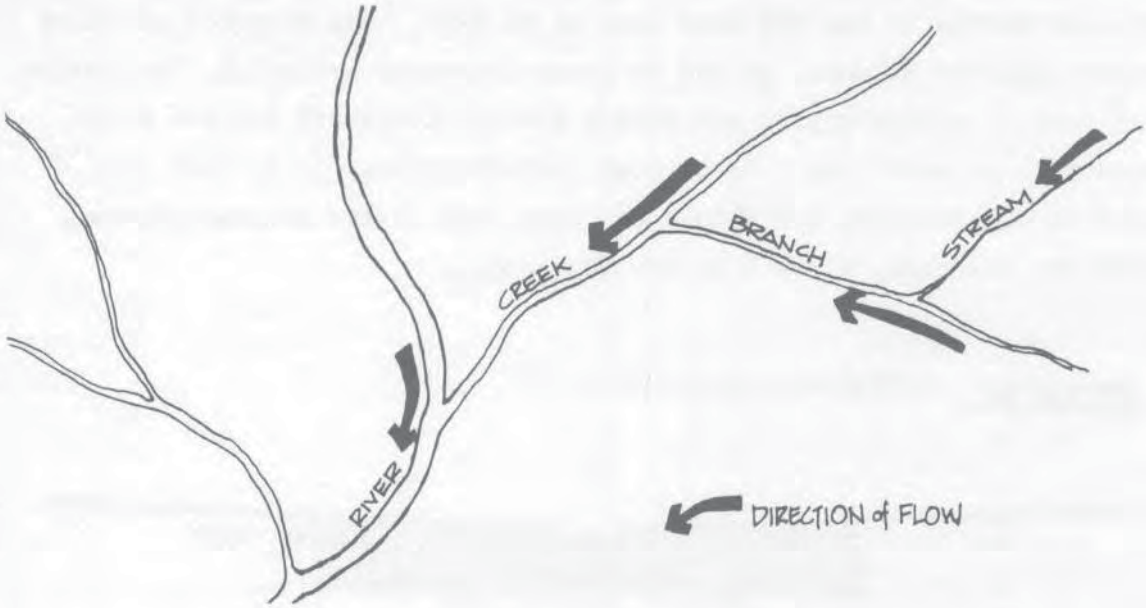
Greenway ROW Limits. In order for the proposed greenway to fulfill the previously mentioned public functions, its method of establishment must be responsive to a number of different criteria. These would include not only the size of the natural water course being followed, and the specific contiguous environmental and land use conditions, but also the nondamaging multiple public use of this corridor. The remainder of this chapter will discuss the integration of such responsiveness into the Capital City Greenway, and how discrete limits can be derived for any given section of the greenway by computing the total of the following three greenway segments.



Minimum Greenway Width

The first item to which the greenway must be responsive is the natural hierarchy of stream systems. In simplest terms, this is to say that small streams flow into larger streams, which flow into larger streams, and that the greenway should reflect this principle. In the

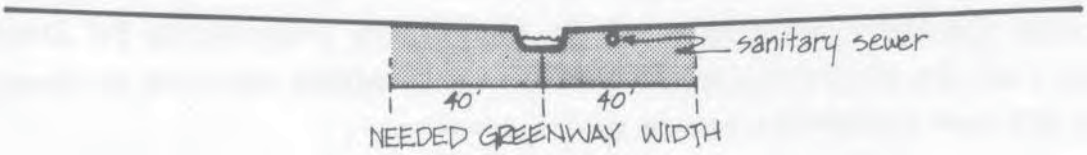
Raleigh area this would mean that: streams (mostly unnamed) flow into branches (Oxford Branch, Big Branch, Beaver Dam Branch, Garner Branch, Lead Mine Branch, etc.) which flow into creeks (Crabtree Creek, Walnut Creek, and Swift Creek) which flow into rivers (Neuse River).



Thus, once this system is recognized an attempt can be made to relate the size of the greenway to the size of the natural water course it is following.

At this time, the City Planning Department informally attempts to gain an 80 foot public easement along all natural water courses in newly developing areas. Although this figure is somewhat arbitrary, it can be justified when considered with reference to sanitary sewer easements which follow these same water courses and require 40 foot minimum easements. With this in mind, it is felt that the 80 foot ROW is valid and should be formalized as the minimum greenway width for streams, Class 4 of the hierarchy.

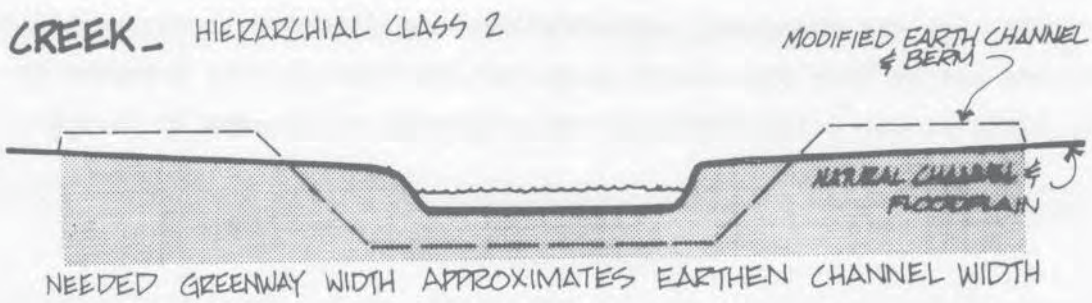
STREAM_ HIERARCHIAL CLASS 4



The next highest Hierarchial Stream Classification is Class 3 - Branches. The previously suggested 80 foot ROW would not be sufficient with relation to the larger branches. This is due in part to the fact that the branches are fed by a number of streams, therefore its natural channel is wider and this additional width would reduce the adjoining greenway widths if the ROW were kept at 80 feet. The branches are also longer than the streams, so due to their increased perimeter, they would have greater accessibility and thus a greater potential for use which would require more land. Upon these considerations, it is felt that a 140 foot ROW is valid and should be formalized as the minimum greenway width for Branches, Class 3 of the Hierarchy.

BRANCH_ HIERARCHIAL CLASS 3

The next highest Hierarchial Stream Classification is Class 2 - Creeks - which would initially include Crabtree and Walnut Creeks. Both of these areas are undergoing intensive development within their flood plains, and the City will either have to adopt strict land use controls for them or absorb the expense of channelization projects to give flood damage protection to these ill-placed private developments. It is felt that the approximate width required for the construction of an earth channel would also be adequate for the greenway ROW assuming a continuous channel was <u>not</u> built. Therefore, using the "Total Permanent Right-of-Way" figures established by the Soil Conservation Service in 1966 for Crabtree Creek and by the Corps of Engineers in 1971 for Walnut Creek, the following variable ROW table has been compiled. These minimum greenway ROW figures are roughly equivalent to earth channel ROW widths. The city therefore could only gain by formalizing these widths for Creeks, Class 2 of the hierarchy, since whichever alternative solution is chosen, this ROW must ultimately become public property.



VARIABLE CREEK ROW TABLE	MINIMUM GREENWAY ROW
Crabtree Creek	
Neuse River to U.S. 64	400'
U.S. 64 to U.S. 1	360'
U.S. 1 to Wake Forest Road	340'
Wake Forest Road to Anderson Drive	320'
Anderson Drive to Beltline	300'
Beltline to N.C. 50 - Edwards Mill Road	280'
N.C. 50 - Edwards Mill Road Ext. to Duraleigh Road	260'
Duraleigh Road to Umstead Park	240'
Umstead Park to N.C. 54 at Morrisville	200'
N.C. 54 at Morrisville to headwaters	140'
Walnut Creek	
Neuse River to Sunnybrook Road	300'
Sunnybrook Road to Lake Wheeler Road	250'
Lake Wheeler Road to Lake Johnson	200'
Lake Johnson to Buck Jones Road	170'
Buck Jones Road to headwaters	140'

The next and largest Hierarchial Stream Classification is Class 1 - River - which would include only the Neuse River. The City's zoning limits will soon reach to the Neuse River at which time a 1500 foot ROW should be considered as the formalized, minimum greenway width for Rivers, Class 1, of the hierarchy.

Through the foregoing considerations and justifications, specific minimum widths have been established for the Capital City Greenway on the basis of the relationship to the hierarchy of streams it follows.

MINIMUM ROW TABLE

Hierarchial Stream Classification System	Minimum Width of Contiguous Greenway
(1) River	1500 feet
(2) Creek	Variable (note table)
(3) Branch	140 feet
(4) Stream	80 feet

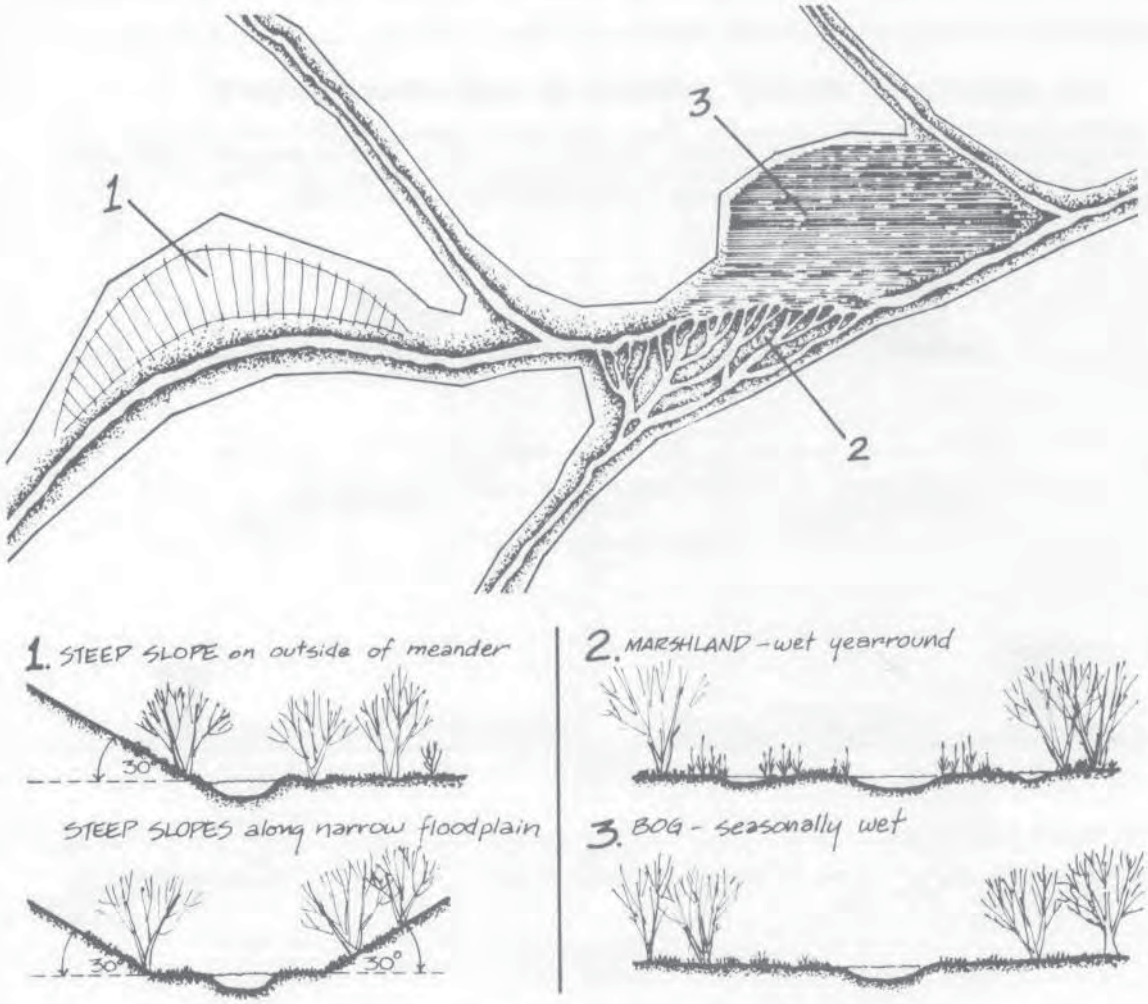
Environmental Width Exception

A second criteria to which the greenway's establishment method should be responsive is the various critical environmental conditions scattered throughout the city which should not be disturbed by development. These areas could be classified as "width exceptions", which would allow them to be included within the greenway ROW, if they are not already included in the minimum greenway width.

Swamps and Bottomland Bogs. These areas which are considered marginal for habitation by man, are some of the most important to man in terms of maintaining his environmental stability. This fact is so well documented that this report will not reiterate the studies, but one point must be made about the compatibility of these areas with the urban environment. When man confronts a swamp or bog he must decide whether to avoid it or change it. If he chooses to avoid it, he has lost only that acreage and retains the environmental benefits. If he chooses to alter it, he absorbs the economic cost of alteration, loses the environmental value and gains only the acreage. Often this made-land will still be marginal for human habitation and have hidden public costs for services. It appears reasonable to suggest that these lands should be conserved from development to protect their environmental public-value while at the same time

protecting the public from their marginal characteristics.

Steep Slopes. These areas are characteristic of the flood plain perimeter. They are a primary reason for the slow pace of flood plain development, as they are usually impassible for roads and unbuildable with traditional construction techniques. These areas are also highly erodable if their vegetative cover is removed, thus adding to the silt load of adjoining streams and reducing their carrying capacity. It is suggested that these flood plain perimeter slopes of 30 degrees or greater should be recognized, by regulation, as unbuildable and thus retained in their natural conditions as greenway open space.



Through the use of these two width exceptions and any others for which a need may arise, the Capital City Greenway can be made responsive to specific environmental conditions, which must be respected in the urban growth process if the quality of urban livability is to be retained.

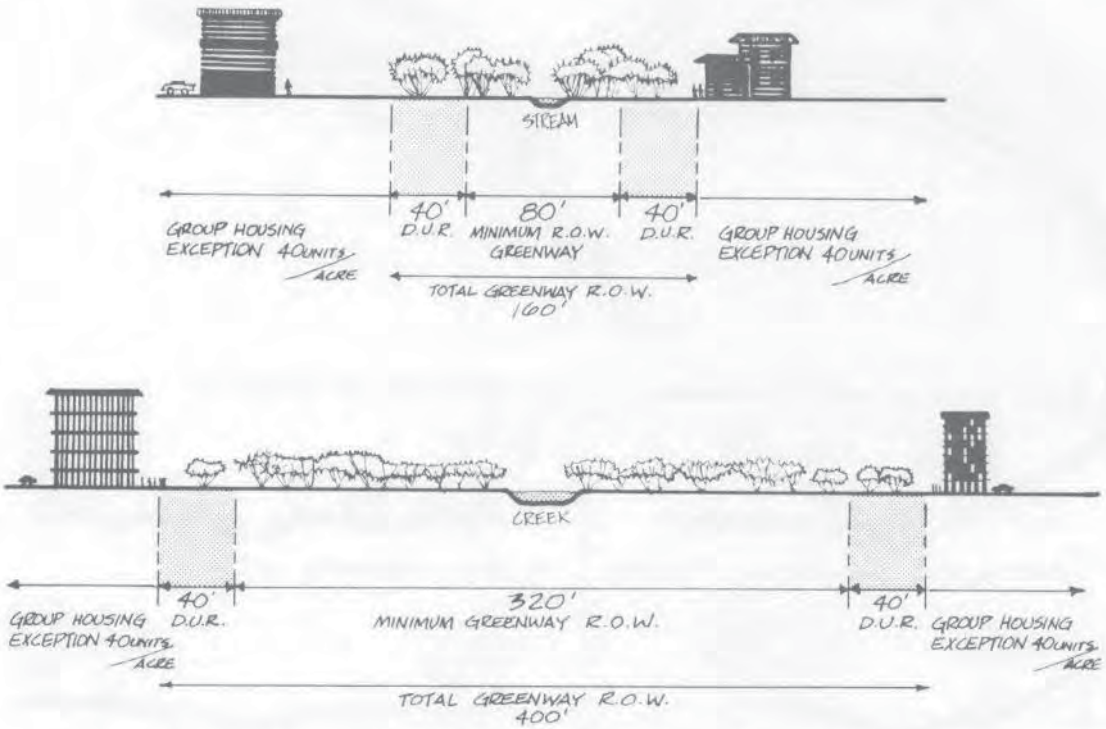
Density of Use Width

A third criteria to which the greenway's establishment method must be responsive is the projected density of use. Rather than relating the greenway to the stream system, this criteria would relate the greenway to the potential impact of the adjacent land uses. This is to say that different land uses will place different demands upon the proposed greenway.

The greatest impact on this public facility should occur in residential areas since it will be used both as a transportation space by pedestrians and bicyclists and as an unstructured recreation space by children and adults. Therefore the density of use requirement should be responsive to the population density within a given residential area.

THE IMPORTANCE OF THE DENSITY OF USE REQUIREMENT

In the top example, the impact of the adjoining dense residential use could destroy the greenway if it were only 80' wide. The D.U.R. in this case doubles the total greenway R.O.W., thereby allowing it to survive the projected heavy use. The lower example shows the D.U.R. along a wider area where it will serve primarily as a buffer.



Business and commercial areas would also receive a degree of pedestrian and bicycle traffic which would require a response within the greenway establishment method. Industrial, office and institutional uses could generate some use of the greenway, but this could probably be absorbed by the minimum greenway width previously discussed. With

the foregoing projectable observations in mind, the following table was established to accommodate the density of use requirement necessary to make the Capital City Greenway responsive to the City's accepted land uses; thereby protecting the greenway from deterioration from over-use.

DENSITY OF USE TABLE

Density of Use Requirement	Addition to ROW on the Contiguous Side
Residential Uses	
R-4	10 feet
R-6	15 feet
Mobile Home	25 feet
R-10	25 feet
R-20	30 feet
R-30	35 feet
Group Housing	35 feet
Zoning Exceptions	40 feet
Office and Institutional	
O & I - 1	0
O & II - 11	0
Buffer Commercial	10 feet
Shopping Center	20 feet
Neighborhood Business	10 feet
Business District	10 feet
Industrial	
Ind. - 1	0
Ind. - 11	0

Conclusion

This section has dealt with a methology for establishing the Capital City Greenway. It has shown how this method could be responsive to the stream system it follows, specific environmental conditions along its path, and the land use adjacent to it. If these various criteria are brought together they will produce a system by which a City Planner could compute the total ROW needed at any given point along the greenway.

Hierarchial Stream Classification System	Minimum Width of Contiguous Greenway	Width Exception with Buffer			Density of Use Requirement (Note Table)	TOTAL GREENWAY RIGHT-OF-WAY
		Swamps & Bogs	Steep Slopes	Other		
(1) River 1500'						
(2) Creek (Variable, Note Table)						
(3) Branch 140'						
(4) Stream 80'						

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Zoning Exceptions	40 feet
Office and Institutional	
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O & II - 11	0
Buffer Commercial	10 feet
Shopping Center	20 feet
Neighborhood Business	10 feet
Business District	10 feet
Industrial	
Ind. - 1	0
Ind. - 11	0

RIGHT-OF-WAY

COMPUTATION

PROCESS

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4

When the city planner begins the computation process to find the Total Greenway ROW needed at specific locations, he will find that he can follow the same series of steps in each case.

THIS CHAPTER WILL DISCUSS THE FOUR STEPS OF THE COMPUTATION PROCEDURE AND OTHER COMMONALITIES WITHIN THE GREENWAY IMPLEMENTATION PROCESS.

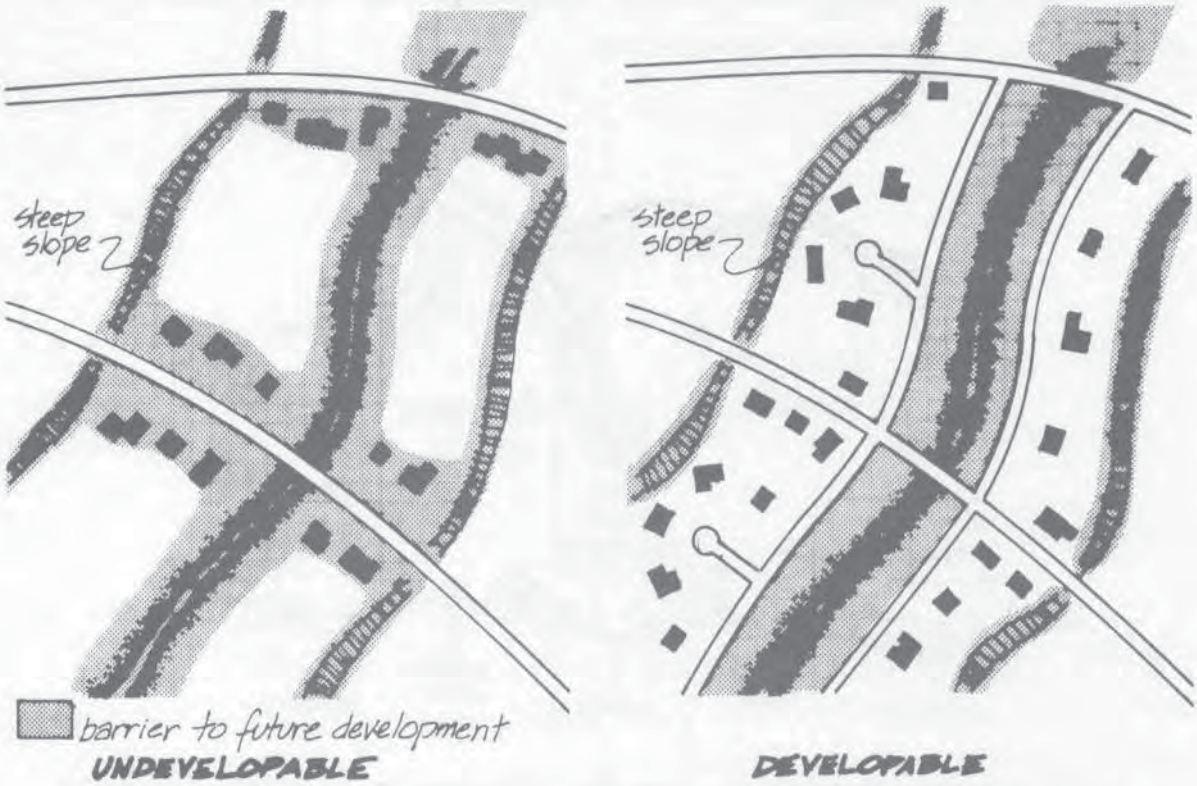
STEP ONE: Determine the minimum greenway ROW width according to the hierarchial classification of the natural water course being followed. These widths should have been established by the City Council through the adoption of a Greenway ROW Plan based upon the public functions which can occur within the corridor. After the adoption of such a plan the city should establish a greenway zone along all of the city's natural watercourses equivalent to the appropriate minimum greenway ROW.

STEP TWO: Designate any ROW exceptions which may exist in the specific area. These exceptions would be determined through a site analysis, and the specific boundaries would include all of that area needed to protect that particular environmental condition and buffer it from the impact of urban development.

STEP THREE: Establish the density of use requirements as dictated by the adjoining land uses. If the adjoining land is undeveloped, then this step can be held in abeyance until such development is proposed.

STEP FOUR: Evaluate the results of the previous steps, which will yield one of three possible actions: (a) If the first three steps have yielded one continuous greenway width, then this will constitute the Total Greenway ROW and the computation process is completed. (b) If part of the adjoining land is undeveloped and step three has been deterred, then the planner would hold this step in abeyance until such time that step three is completed. (c) If the first three steps are completed but do not yield a continuous width, then the fourth step will be to determine the developability of the extraneous acreage. If the accessibility to the area in question has been effectively severed by existing man-made or natural features, then, after informative discussions with the property owner, the area could be considered undevelopable and classified as a greenway width exception. If the area is found to be accessible and of sufficient size and shape to be developed, then after informative discussions with the property owner, the area would be

considered as developable; until such time that it was developed or until the aforementioned variables had changed.



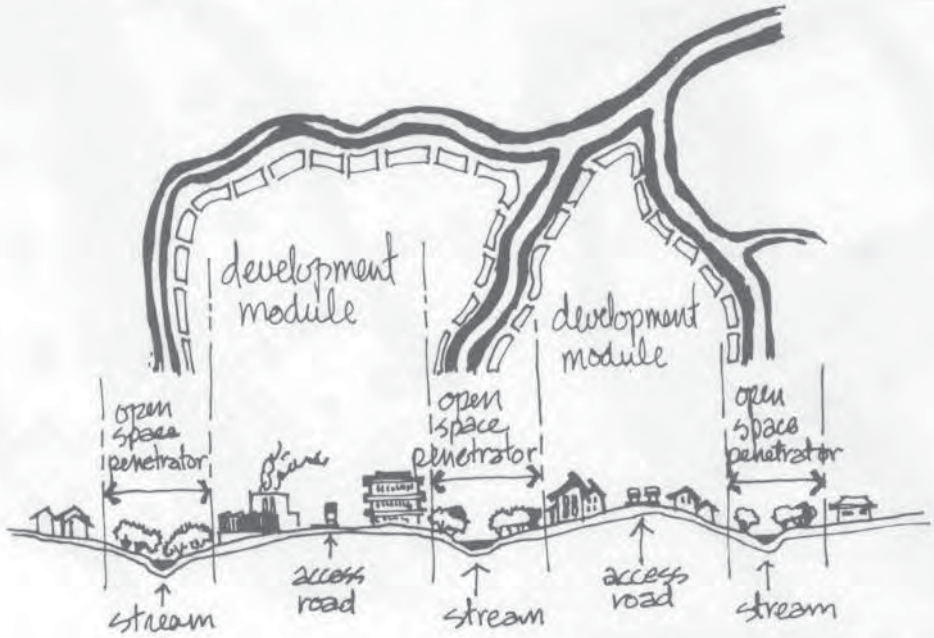
It is possible for the steep slopes of the flood plain perimeter to remain separated from the continuous width of the greenway by an area of development. In these cases the steep slopes (30°+) would cease to be part of the greenway, although they should continue to be protected by the city as open space, for reasons already discussed in this report.

Relationship to Development

As has already been mentioned, in the computation process the city planner will be dealing with two basically different situations, i.e., undeveloped land and previously developed land. In each of these situations the city's implementation procedure will be determined by the existence, degree, and location of development.

Undeveloped Land. Although there would be a considerable amount of undeveloped land within the city's flood plains, the bulk of this land lies beyond the city limits where it awaits urbanization. When this time comes, the city's Planning Department should be in a position to formally negotiate with the developer for public rights to the needed greenway

acreage. The existence of an adopted Capital City Greenway Plan and methodology will allow the city's natural water courses to be set first through greenway zoning thus leaving developable modules of land between the greenway's open space penetrators.



This procedure would not, however, place an undue burden for establishing the greenway upon the private development sector. Even though the developer would lose the use of a small portion of his property for development, per se, he could be allowed a density trade-off. That is, he would be able to use the greenway acreage in figuring his total unit density, and then be allowed to construct that many units on the remaining land, excluding the greenway. The result would be a type of cluster development.

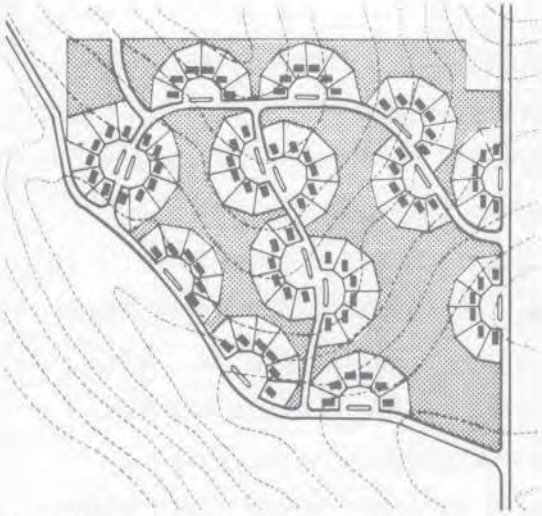
It has long been known that cluster developments can save a developer up to 50 percent on utility and street installation costs. In addition, residential developments which are required to retain certain amounts of open space by the city's zoning regulations, could use the greenway for that purpose. Also, if the developer wished to dedicate the greenway acreage to the city, he could benefit through a tax deduction, plus saving capital gains tax on that acreage.

It can be seen that, to benefit the public the most, the Total Greenway ROW should be implemented prior to or simultaneously with the urbanization process. In such case, the city would be in the favorable position of seeking the optimum allowable ROW for the benefit of the

THE ADVANTAGES OF CLUSTER DEVELOPMENT

RECTANGULAR PLAN, 94 LOTS, 12,000' OF STREETS AND UTILITIES.

CURVILINEAR PLAN, 94 LOTS, 11,600' OF STREETS AND UTILITIES.



CLUSTER PLAN, 94 LOTS, 6,000' OF STREETS AND UTILITIES.

LOT SIZE IN THE FIRST TWO CASES IS 50,000 SQ.FT.; IN THE THIRD CASE THE LOT SIZE IS REDUCED TO 30,000 SQ.FT. WITH SOME 44 ACRES LEFT OPEN.
DESIGNED BY MYRON X. FELD, PLANNING ENGINEER; FROM "THE AMERICAN CITY."

present and future generations, and the private developer would be in the most advantageous position with reference to negotiating with the city in his own interest. Also, all parties would benefit since the resulting open space community would be beneficial to the public and be highly marketable for the developers, as was indicated in the introduction.

Developed Land. When the property adjacent to the stream the greenway is following has already been developed, the city planner will have to react in a different manner. Rather than requiring development

to conform with the proposed greenway, as was previously described with reference to undeveloped land, the planner will have to make the greenway conform to the existing development. First the planner will determine whether the minimum greenway ROW width could be established in order to guarantee continuity within the system. This area is the most important therefore the city should seek continuity even if they must compromise on width. If the additional widths for the density of use requirement and/or the width exceptions are available, the city should secure them. Otherwise they should attempt to gain only minimum control over those areas through the use of conservation easements. In this manner, the city could assure at the least possible expense, the minimum benefits of the Capital City Greenway to the public, even in areas which have been previously developed.

Sequential Growth

Once the process of implementing the greenway is begun, it will be found that the city's interest in the various widths which make up the Total Greenway ROW could be handled differently, due to their varying use requirements. The following will discuss these widths and their various requirements as to the degree of legal interest needed.

Minimum Greenway Width. This area is the heart of the Total Greenway ROW. Its purposes include supplying a width sufficient to: give minimum protection from damage from moderate flooding, allow for the establishment of an inter-city pedestrial and bicycle trail system, accommodate the location and construction of sanitary sewer lines without damaging the values of the other purposes, and retain a livable urban environment by maintaining natural environmental systems.

In order to perform these functions the city must have great control over this width. First, there should be regulation in the form of greenway zoning, adopted for the purpose of protecting this width from development. By approving the appropriate hierarchial classification for all natural water courses in the city, the Council would have a long-range plan which functioned as does the city's thoroughfare plan. At such time as the city decided that it needed to activate the specific public right-to-use of one of these areas, then it would have to gain either full title to this land or a public use easement which specifies

exactly what uses would be allowed upon the land. Considering the degree of control and use the city will require in this case, it is likely that these rights will have to be gained through fee simple purchase. Although, there is always the possibility of "dedication" in the negotiation process prior to development.

Environmental Width Exceptions. This width is included in the Total Greenway ROW in order to gain a minimum degree of protection for areas of environmental importance which are endangered by the urbanization process. In order for these areas to perform their environmental functions they must be protected by the city. This could be done by conservation easements, full title ownership, or by regulation. Thus, these areas could be gained through purchase or dedication.

Density of Use Requirement. This area is included in the Total Greenway ROW in order to make the greenway width sufficient to withstand (buffer) the impact of adjoining land uses, as well as being an extension of the purposes of the minimum greenway width. This area could perform its functions without a great deal of city control, thus a great deal of money should not be required to establish this additional width. The city should attempt to gain interest in this width through conservation easements and/or direct dedication. The developer of a residential area could turn this area over to a homeowners association, with a restrictive deed, and the same purposes could be met.

Conclusion

It has been shown that the various widths of the greenway could be implemented in various ways and that the Total Greenway ROW need not be purchased in all cases. The ultimate cost of the greenway cannot be estimated here. That cost will vary according to the city administration's ability to gain appropriate regulations and dedications of property in the public interest.

It must be restated that the threading of the greenway through developed areas is a marginally desirable method of establishing such a system and it will prove more expensive, acre per acre, than working in undeveloped areas. Therefore, the sooner the establishment of the system is begun, the fewer developed areas it will have to pass through, and the less expensive it will be for the public.

FISCAL

IMPLEMENTATION

CCG

5

Thus far the report has focused on the potential benefits of the Capital City Greenway to an urban area, and on a method by which such a system could be given discrete widths to fit varying situations. Even though the introduction alluded to the economics of establishing such a system when it referenced the fact that the tax base would not be damaged, there are other economic questions remaining to be answered.

THIS CHAPTER WILL DISCUSS THE VARIOUS WAYS AND MEANS AVAILABLE FOR GAINING LEGAL INTEREST IN LAND FOR THE GREENWAY. THERE WILL ALSO BE A BRIEF OVERVIEW OF THE POTENTIAL SOURCES OF FISCAL AID TO SUCH A PROJECT.

Ways

In order for the city to undertake a project of the magnitude of the Capital City Greenway, it must be ready to use all ways of gaining legal interest in property. The three basic ways to be used in establishing the greenway will be full title interest, partial title interest, and regulation.

Full Title. This is the most common type of property ownership. In this type, the owner transfers all of the rights to the use of a parcel of property to the purchaser.

Partial Title. A land owner does not actually own his land; he owns certain rights to the use of the property, as long as he pays taxes. Therefore he can transfer any of these rights while retaining the others; these transferred rights are called easements.

The most common type of easement is the conservation easement, which William H. Whyte once described in this manner: "Basically the idea behind the conservation easement is to preserve open land by buying away the land owner's right to louse it up." The landowner who gives or sells an easement retains the right to use his property in any manner consistent with the terms of the easement. He also retains title to the property, and thus the privileges of ownership; including the right to sell or lease his land, in which case the terms of the easement will be binding on the new owner.

Regulation. This does not constitute ownership in property, but does acknowledge specific controls over certain areas and uses. Restraints to use can be adopted by governing bodies, in the public interest. It is through these police powers that floodway and flood plain regulations can

be instituted, and through which greenway zoning regulations could be established.

Such regulations are valuable and needed to protect the existing and potential public purposes which can be served by flood prone lands in an urban area; yet, regulation can only hold these lands for a future public use. Before any of these purposes can be implemented and realized, the public must gain full or partial title ownership.

Means

In order for the city to be able to use full title and partial title property rights ownership, they must be prepared to use all available means of gaining these interests in property.

Fee Simple. This is the most common method of acquisition. It is, in simplest terms, the outright purchase of property.

Dedication. This is the gift of property, usually undertaken for personal or economic reasons. There are considerable tax advantages for the donor of property for park and open space purposes, and these should always be thoroughly investigated and used in the best interest of the philanthropist and the public.

Combination Purchase/Dedication. Between the previous two extremes, there are a number of variations which can be used to best fit the specific situations encountered:

(1) Reserved Life Estate is when property is donated to the city but a life estate is reserved. This allows the owner to continue using the property as long as he lives, while benefiting from a tax deduction due to his gift.

(2) Bargain Sale is when an owner sells his property to the city at its original cost to him, and he then takes the capital gains as a deduction.

(3) Purchase and Leaseback is when the city buys property, in advance of need, and then leases all or part of it for the previous and/or other specified purposes; until such time that the city needs all of the property for its park and open space program.

TOTAL GREENWAY R.O.W. SEGMENTS	DENSITY of USE REQUIREMENT	MINIMUM GREENWAY WIDTH	ENVIRONMENTAL WIDTH EXCEPTION	DENSITY of USE REQUIREMENT
USES & FUNCTIONS	1) accomodate density of use associated with various land uses	1) inter-city trail system 2) minimum protection from flooding 3) accomodate sanitary sewer r.o.w. 4) accept increased urban 5) maintain environmental systems	1) retain areas needed for environmental maintenance 2) accomodate undevelopable land	1) accomodate density of use associated with various landuses
CHARACTER of SEGMENT	natural-urban	natural, except for introduction of trail system	natural	natural-urban
CHARACTER of USE	quasi-public	public	public	quasi-public
SEQUENTIAL GROWTH	1) prior to development	1) protected by regulation 2) developed as required	1) prior to development	1) prior to development
LEGAL INSTRUMENT FOR GAINING INTEREST (PRIORITIES)	1) conservation esmt. 2) full title transfer	1) full title transfer 2) conservation & access easement	1) conservation & access esmt. 2) full title transfer	1) conservation esmt. 2) full title transfer
METHODS of GAINING INTEREST in LAND (PRIORITIES)	1) dedication 2) combination ~~purchase~~ ~~dedication~~ 3) purchase	1) purchase 2) combination ~~purchase~~ ~~dedication~~ 3) dedication	1) dedication 2) combination ~~purchase~~ ~~dedication~~ 3) purchase	1) dedication 2) combination ~~purchase~~ ~~dedication~~ 3) purchase

Fiscal Resources

Capital Improvement Inventory. At this time there are no funds visibly available for use in implementing the Capital City Greenway. The city's "Capital Improvement Inventory 1971-1975" does show a Greenway Reserve of $100,000 annually for each of the five years, but the revenue has not been available to make this an active priority item. If funds can be found to activate the greenway reserve, then there are sources of funds available for matching purposes.

BOR. These monies from the Land and Water Conservation Fund as administered by the Bureau of Outdoor Recreation can be used for the purchase of land and construction of facilities. The funds are divided among the states and each state's share is divided equally between the state and local governments. During fiscal year 1971 North Carolina received $2,079,968 for distribution. For 1972 the apportionment has been increased to $4,790,175, of which the state will be unable to match all of its share, therefore leaving much of it for the local governments.

This situation presents a good opportunity for Raleigh to gain 50 percent matching funds for any part of the greenway implementation program, as well as for recreation activity nodes along the greenway.

HUD. The monies from the open space, urban beautification and historic preservation programs of the Department of Housing and Urban Development are being consolidated into a new program; Legacy of Parks-Urban Shapers Program. This program is designed to give special funding rates to any planned program which would direct urban growth patterns. Due to inadequate funding, this program will probably continue to match at the previous 50 percent level for a short time. When funds become available this program will provide 75 percent federal for 25 percent local financing.

The major advantage to this program is the fact that it will not be single purposed. That is, that through one bulk grant a city would be able to expend funds for open space preservation, construction of recreation facilities, sewer line ROW, and future road locations if these were all part of a coordinated plan to shape urban growth and improve the urban living environment. THIS IS EXACTLY WHAT HAS BEEN PRESENTED IN THIS REPORT AND IS A POSSIBILITY WHICH SHOULD BE PURSUED BY THE CITY.

HEW. Through the Elementary and Secondary School Act of 1965, monies are made available to local school districts for the purchase of property and its development for special types of projects. This offers the Raleigh school system 100 percent federal funds for establishing a series of outdoor, natural science and conservation laboratories near schools which are in the vicinity of natural stream systems; while at the same time, helping the city to complete the Capital City Greenway.

There is also a possibility of changes in the next few years to bring about new sources of funds.

North Carolina Office of Transportation. In 1934 the federal, Hayden-Cartwright Act was passed limiting the use of highway tax revenues. The State of North Carolina has recognized this legislation and respected it through strict fiscal policy.

For several years the Federal Highway Administration has been funding, to the same percentage as their road projects, the extra ROW needed for and the construction cost of trails for pedestrians and bicyclists. A growing number of states are changing their policies to take advantage of these monies; some are going so far as to use highway funds for trails in any location, since they are alternate transportation routes, but North Carolina has made no change from its strict fiscal policy. In the fall of 1971 the Federal Highway Administration went so far as to issue a directive to its Field Offices to give consideration to including bicycling and hiking trails in highway rights-of-way (See Appendix). Such a policy change for North Carolina should be encouraged and supported by the City of Raleigh considering the policy's potential impact on the Capital City Greenway.

Constitutional Change. During 1970 the citizens of North Carolina approved the notion of rewriting the state constitution. When this is done, if parks and recreation are moved from their present designation, as a governmental function to that of a governmental necessity, the resources of the total city budget will be opened to parks and recreation programs.

One Cent Sales Tax. In lieu of constitutional change, the city could request a vote of the people in order to approve the expenditure of part of the revenue from the one cent local sales tax for the

purpose of establishing the Capital City Greenway.

Conclusion

It has been shown where funds are available if the city will take advantage of them. To do this the greenway must be recognized in its fiscal budget. If the city can activate the $100,000 Greenway Reserve Figure from the Capital Improvement Inventory, then, with the aid of the 75 and 50 percent matching grants available, the first phase of the Capital City Greenway could be a reality in three to five years. If the less expensive regulatory and negotiative powers are used to the best advantage, then the Greenway can be established with the least possible expense to the public which will benefit most from its existence.

SOURCES OF SEED MONEY	POTENTIAL	REALIZED
ONE CENT SALES TAX	●	
PARKS-CAPITAL IMPROVEMENT FUND		●
ADVALOREM TAX through Constitutional change	●	
DONATION		●

USE / SOURCES OF MATCHING FUNDS	LEGACY OF PARKS-URBAN SHAPERS 75%	BUREAU OF OUTDOOR RECREATION 50%	ELEMENTARY & SECONDARY SCHOOL ACT OF 1965 100%	DEPARTMENT OF TRANSPORTATION
LAND ACQUISITION FOR GREENWAY	●	●	●	
LAND ACQUISITION FOR RECREATION ACTIVITY NODES	●	●		
DEVELOPMENT	●	●	●	
COMPATIBILITY & ENHANCEMENT				●

ACTION

CCG

6

The Capital City Greenway is an ambitious plan, but one that must be ambitious and far sighted if Raleigh is to remain a desirable place to live; something more than an economic center where many people are jammed together expediently. For this plan to be implemented there must be a concerted effort from all parties who have the ability, influence, or authority to effect the end product of such an effort.

THIS CHAPTER WILL DISCUSS THE POTENTIAL ROLES OF A NUMBER OF ACTORS IN THE CAPITAL CITY GREENWAY IMPLEMENTATION PROCESS.

The City of Raleigh - City Council

The City Council, as Raleigh's governing body, is the only group capable of setting goals and appropriating funds. Therefore it is important for the Council to carefully weigh the greenway concepts presented in this report and to act promptly upon the future recommendations of the cognizant city departments.

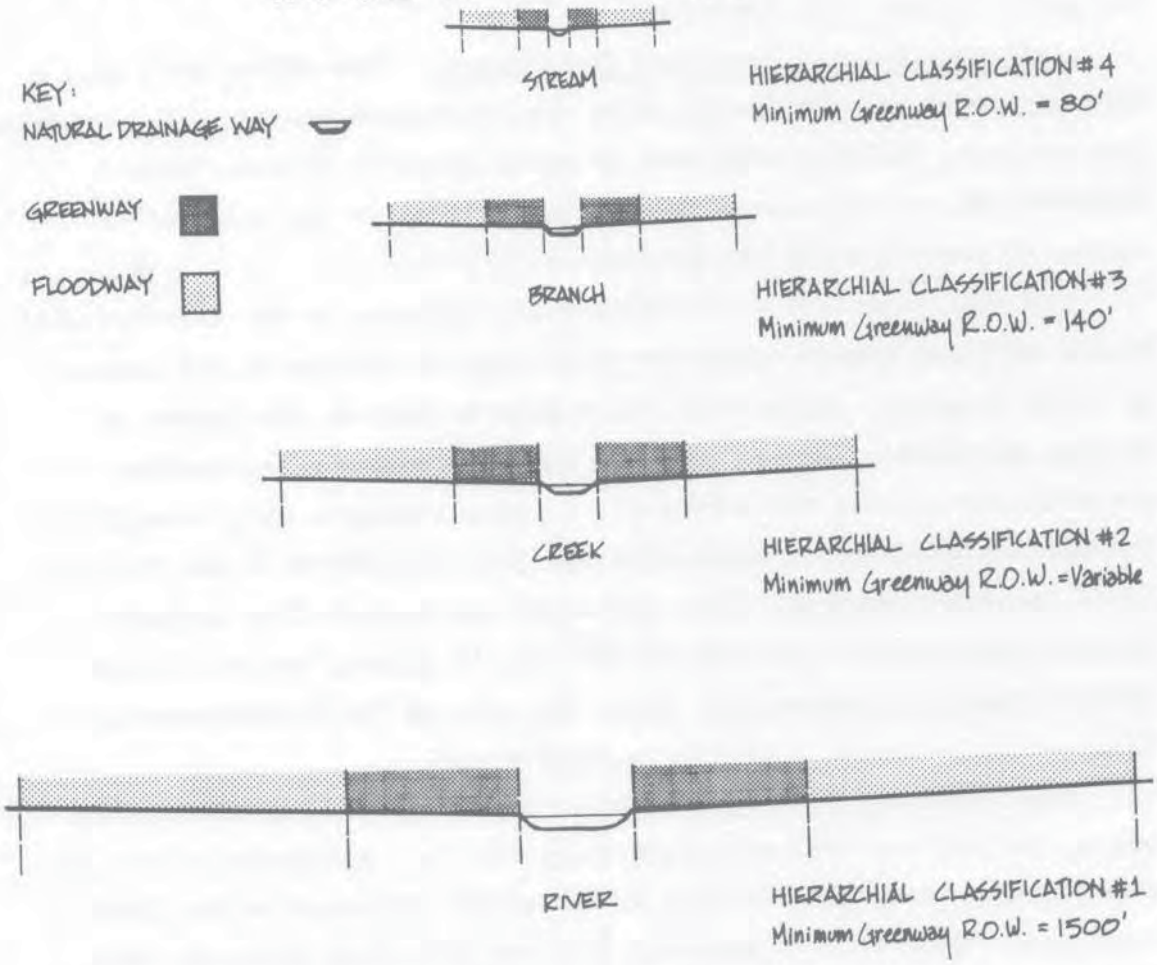
The City of Raleigh - Administration

The people in this sector have the ability to effect the greenway plan, due to the authority vested in their professional positions. Through their daily decision-making process, they can decide the degree of benefits this concept can bring to the city, as well as the magnitude of the total project.

City Planning Department. This Department is the single most important professional body when it comes to implementing the greenway. Not only will it be responsible for designating the location and determining the widths of the greenway corridor, but it should also have other authority over the potential disruptions of the greenway's value. First and foremost, the city must have an adopted and legal floodway regulation. This would establish as a floodway that portion of the stream channel and flood plain needed to provide passage for a 100 year flood, without increasing the elevation of that flood at any point by more than one foot, and would limit the permissible uses of that area. These regulations would be in accordance with the North Carolina Floodway Statutes passed by the 1971 General Assembly (see Appendix), and also give an additional degree of protection to the areas of future greenway location.

Another land use control method, which is needed in order to expedite the greenway establishment process, is greenway zoning. There are two major types of zoning: development and natural resources, and greenway zoning has purposes and justifications which overlap into both of these areas. This has been used in other municipalities and will be an essential element in creating the Capital City Greenway. The Planning Department should work closely with the City Attorney in order to establish these two as well as other regulations to create and protect the greenway.

APPROXIMATE RELATIONSHIP BETWEEN GREENWAY ZONE AND THE FLOODWAY ZONE



Additional regulative authorities rank almost equally as the next most needed planning tools. First is control over erosion and the resulting sediment which clogs stream channels and reduces their carrying capacity, as well as damaging fish and wildlife populations and being unsightly. The 1971 General Assembly passed enabling legislation to

allow the city to enact sediment control ordinances; these should be enacted in order to protect the potential values of the greenway and the flood carrying capacity of the streams. Another needed control measure is flood plain management regulations. These would take over where floodway regulations leave off; allowing industrial, commercial, and multi-story residential use of land above specific elevations, under the conditions that special structural standards, floor elevations, use, and occupancy requirements are met in order to minimize damages and protect human life during periodic flooding. The third control would be to revise the city's present zoning and subdivision regulations allowing them to reflect the existence of the greenway with its public values (see Appendix).

Intergovernmental Relations Coordinator. This office will play a very important role in the greenway implementation process. To complete this project, the city will have to participate in several federal programs, whose application preparation will be in the hands of the Intergovernmental Relations Coordinator's Office.

The most important application with reference to the greenway will be for matching grants under the Urban Shapers section of the Legacy of Parks Program. Application could also be made to the Bureau of Outdoor Recreation for the purchase and development of recreation activity nodes along the greenway. A federal program which should be pursued and which would complement the greenway system is the National Flood Insurance Program. The success of the Capital City Greenway Project lies with the success of the city in gaining matching funds through federal programs and, thus, the role of the Intergovernmental Relations Coordinator's Office is established.

Parks and Recreation Department. The major role of this agency during the initial implementation stage will be to support and aid the other groups which are directly or indirectly responsible for implementation. Once various greenway sections have been obtained, this department's job will reach its full potential. At that time it will become responsible for the design, construction, and maintenance of the included trail systems, where applicable. They will also be the major monitors of encroachment and environmental deterioration.

Ultimately, the Parks and Recreation Department will be responsible for establishing specialty trails at appropriate locations along the

greenway, for purposes of interpretive education and active recreation (see design chapter). The most important role this department can serve will be to maintain and perpetuate the greenway system for the benefit of present and future generations.

Public Utilities Department. A major role in the cooperative implementation of the greenway can be played by the Utility Department. As was mentioned in the introduction, sanitary sewer lines usually follow stream systems, which means they would be contiguous to the greenway.

Currently, the city gains the right to place a sewer line across private property through the use of utility easements. These have been acquired at a cost per square foot equivalent to $5,000 per acre, in some cases, and allow only one public purpose. If greenway zoning were adopted, thus establishing a minimum greenway width, then the areas needed for sewer lines would not be developed and the exorbitant aforementioned expense would be reduced, if not avoided.

In areas where a sewer line must run parallel to the stream system, yet distant from it, the city should not overlook the possibility of purchasing all of the land between the stream and the sewer line, and then lease it back to the previous owner. This would maintain the previous land use, e.g., crop farming, dairy farming, stables, etc., while generating revenue in lieu of property tax, until such time that this land is needed for urban park and recreation use.

In the above manner (regulation, fee simple and multi-use planning) the city through the Utility Department, could aid in the implementation of the greenway. In order to guarantee the highest level of benefits within the greenway, future sewer line construction should be oriented to the perimeter of the Total Greenway ROW, where feasible. This would minimize the potential for environmental damage to the greenway and its included stream.

Engineering and Traffic Engineering Departments. These two agencies will have a major role in the greenway implementation process. At this time, they are responsible for the detailed planning on city sewer and street projects. They also act as advisors on county and state projects, in these same fields, which involve the Raleigh urban area.

The role of these two agencies will be to advocate and initiate environmentally sound development practices with reference to city sewer

and street projects. In this manner they can protect proposed greenway corridors from disruption or distruction due to future thoroughfare projects, and protect the quality of the greenway environment from degradation due to excessive clearing and erosion from future sewer extensions.

Housing Authority. This agency is in the development and redevelopment business, which means that it would affect and be effected by the greenway. At this time, the Housing Authority administers two areas in the vicinity of the proposed greenway: Chavis Heights along Garner Branch which runs through Chavis Park, and Apollo Heights along Gatling Branch and Walnut Creek. In both areas the streams are thought of as a neutral or negative landscape element, but this need not be true. The greenway could make these streams a valuable and beneficial part of the urban environment.

The Housing Authority could also affect the greenway in two other areas. In the Southside Redevelopment Area the agency has the ability to maintain, as a greenway, the stream systems which feed Rocky Branch, or to eliminate the potential for a greenway through this area. In the Kent Road housing project, the treatment of the included stream system will decide whether it is an amenity or a detriment to the community. Thus, in several isolated areas the Housing Authority could influence the future of the Capital City Greenway through their acceptance or rejection of the concept as applied to their own projects.

The City of Raleigh - Public Schools

Due to the proximity of existing school sites to the proposed greenway and the availability of fiscal resources which are not open to the municipal government, the Raleigh public school system could play an important role in establishing the greenway. The Elementary and Secondary School Act of 1965 provides for federal grants to local school districts for special types of projects. These 100 percent federal grants could be used for the purchase of portions of the greenway for educational (laboratory) purposes associated with natural science and conservation courses.

Wake County - Commissioners

The Capital City Greenway is a massive undertaking and one which

does not recognize jurisdictional boundaries. The city and county have found this to be true in other areas and have begun the process of correcting existing deficiencies. When the city-county zoning study is begun, it should consider the possibility of establishing greenway zoning on a county-wide basis, and the County Commissioners should give acceptance to any forthcoming recommendation to that effect.

The Corps of Engineers

As was mentioned earlier, this federal agency is presently involved in two flood damage prevention studies in the Raleigh area. They should complete a study of Walnut Creek in 1972, while at the same time begin a study on Crabtree Creek. In the past the major emphasis of the Corps has been on channelization; a method of environmental alteration which would eliminate the majority of the benefits and values of the greenway, as conceived in this report.

Since Crabtree and Walnut Creeks constitute the backbone of the proposed greenway system, it is of utmost importance that they not be diminished by extensive channelization. While this report cannot honestly support an anti-channelization argument, it can and will support a stand against total, continuous channel projects. These two extremes represent actions which could not be in the best interest of the public, either economically or environmentally. What is needed is a method which will balance the local public investment against the public and private benefits derived from this investment. If this is done, the result should be a project which combines the removal of natural obstructions, the demolition of artificial obstructions and their reconstruction in a non-damaging manner, the limited and isolated use of channelization, and the introduction of floodway and flood plain regulations in order to gain the most public benefit from the least local public investment.

In seeking such a combined approach to the urban flooding problems, the city could protect or evacuate residences located in the flood plains, open a reasonable amount of now marginal land to development, retain the environmental values of the streams, and maintain the potential benefits of the Capital City Greenway. At the same time they would be protecting against the possibility of deficit budgeting public funds to subsidize private development; since the least public expenditure and a reasonable

private repayment, through increased tax revenues from areas benefited, would be equally balanced considerations.

The Private Development Sector

This is undoubtedly the strongest non-government group with an ability to effect the establishment of the greenway. Their strong role comes from the fact that most of the undeveloped land in the urban area is owned by real estate or development firms. On the following page is a map which generally indicates the undeveloped areas controlled by the private development sector, in relation to Crabtree and Walnut Creeks. As can be seen from the map, the private development sector will have great influence over the establishment of the greenway.

If the city's private developers accept the greenway concept, then, due to their property ownership and ability to create urban environments, these individuals will be able to participate in the process of establishing and benefiting from the greenway. The example on the following page illustrates the alternatives to the private developer and how each benefits his business and the city.

The acceptance or rejection of the greenway concept by these individuals will determine whether or not the project will be prohibitively expensive. If they accept the potentials discussed in the introduction and are willing to negotiate for a reasonable balance of public and private benefit, then the Capital City Greenway can become a reality. This would make Raleigh the most outstanding and desirable urban area in the state, thereby perpetuating the function of the private development sector and generating long-term economic benefits.

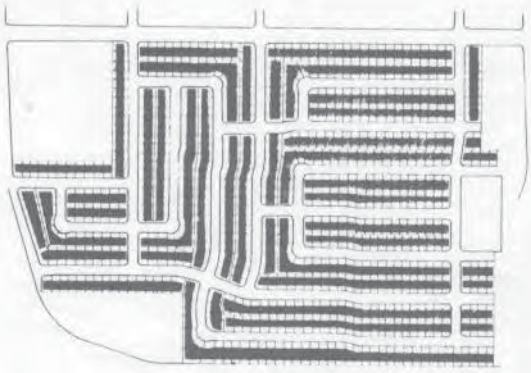
Private Citizen Groups

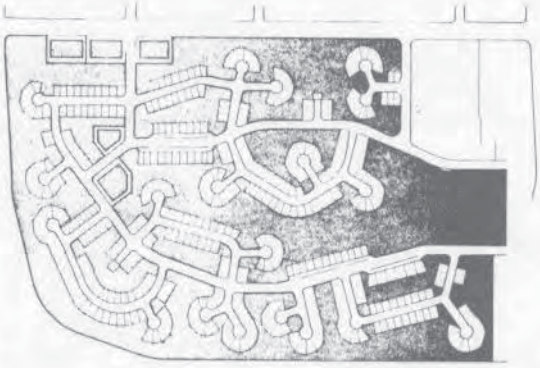
Even though the responsibility for adopting and establishing the Capital City Greenway lies with the governmental sector, there is a great deal the public can do to expedite the process. The first thing the public can do is to get involved, for little will happen without citizen support and direction.

Once approval of the greenway plan is gained, the public sector can aid in the implementation, construction, and maintenance of specific sections of the system. Interested neighborhood groups should contact city administrators and take part in the development of action plans

UNDEVELOPED AREAS

CONVENTIONAL SUBDIVISION		CLUSTER SUBDIVISION
32	Acres in streets	24
22,500	Linear feet of street	16,055
29	Percent of site in streets	19
80	Acres in building sites	41
590	Dwelling units	604
0	Acres of usable open space	51





DEVELOPER'S BENEFITS

- NONE

DEVELOPER'S BENEFITS

- DENSITY TRADE OFF WHICH YIELDS:
  - LESS COST FOR ROADS
  - LESS COST FOR UTILITIES
- TAX ADVANTAGES FROM GIFT OF LAND

PUBLIC BENEFITS

- NONE

PUBLIC BENEFITS

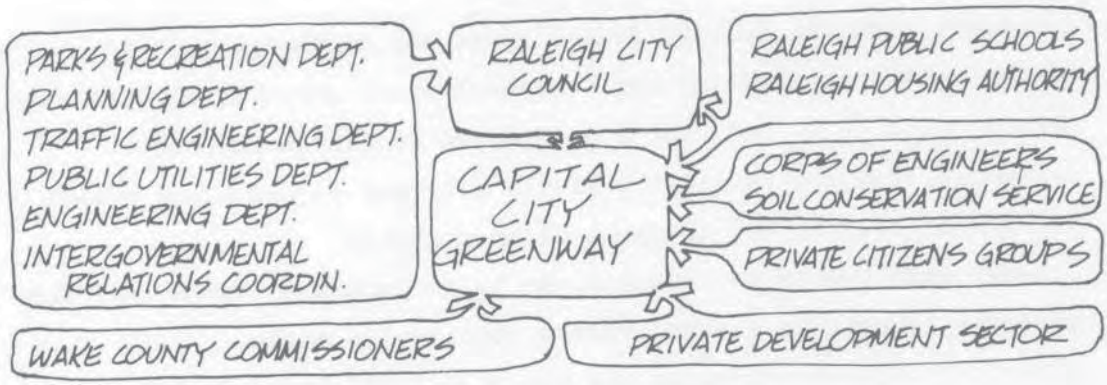
- DEVELOPMENT OF A COMMUNITY OPEN SPACE SYSTEM
- VALUE OF DONATED LAND CAN BE USED AS THE LOCAL SHARE OF FEDERAL MATCHING GRANTS.

and drawings for priority areas of the greenway. A Greenway Trail Council of special interest groups, i.e., Southeastern U. S. Masters Track and Field Club, North Carolina State Bicycle Club, North Carolina State Adult Fitness Club, could be formed to advocate and raise funds to aid in the construction of trails. Other groups which could aid in the construction and maintenance of trails, under the supervision of the Parks and Recreation Department, are Boy and Girl Scout Troops, Ecology Clubs, and Garden Clubs. There are a large number of civic project organizations and special interest groups not mentioned here, who could expedite the implementation, construction, and maintenance processes by supporting

specific projects and areas of interest with reference to the Capital City Greenway by consulting and working with the previously mentioned actors.

Conclusion

This chapter has discussed three basic groups which have the ability to influence the future of the Capital City Greenway Plan: those who have power through their professional position, those who have power through land ownership, and those who have power through enthusiasm and numbers. In order for this greenway plan to become a reality there must be active interaction and understanding between these groups. Their cooperation and dedication can breathe life into the Capital City Greenway and the Raleigh urban area.



RECOMMENDED ACTION

1. Pass a flood protection package which includes: floodway regulations, flood plain regulations, greenway regulations establishing corridors equivalent to proposed minimum greenway ROW, and application for National Flood Insurance.
2. Incorporate Environmental Width Exceptions and Density of Use Requirements into the city's zoning regulations and subdivision regulations.
3. Approve an application for the Legacy of Parks - Urban Shapers Program which requests funding of "Stage One" of the Capital City Greenway project (see design chapter).
4. Support policy of gaining full title rights to all utility ROW.
5. Issue directive requiring all public construction to be undertaken in an environmentally sound manner.
6. Cooperate with the Raleigh School Board and encourage them to assist in the acquisition and conservation of greenway acreage near school sites to be used for conservation education purposes.
7. Recommend that the continuity of the greenway be respected within all public housing and transportation projects.
8. Consult with County representatives to encourage acceptance of the greenway concept on a standardized county-wide basis.
9. Adopt a policy discouraging the use of deficit budgeting practices* to support channelization, and supporting the use of channelization only to protect human life.
10. Work through North Carolina State University, the Chamber of Commerce, and the Home Builders Association of Raleigh and Wake County to organize seminars and distribute information explaining the greenway and its benefits to the private development sector.
11. Develop a system for including individuals and groups in the planning process related to greenway implementation.

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*See Glossary.

DESIGN

CCG 7

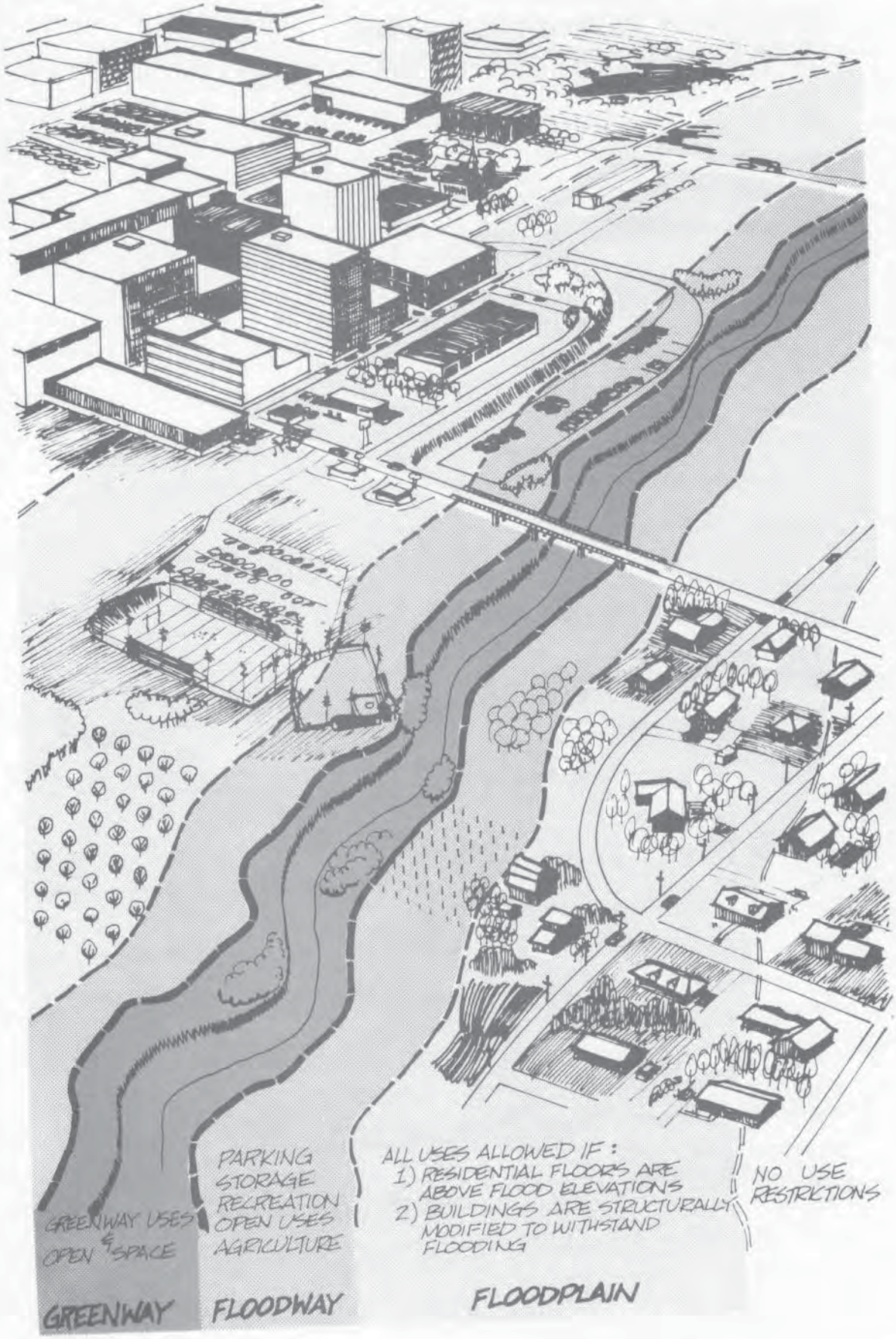
Thus far the report has dealt with the question of why have a greenway, by presenting the benefits it would bring to the Raleigh area; as well as the question of what to do, by presenting a method for its establishment and discussion of how it could be made to work. In order for the incremental inputs of the various actors to produce a congruent final product, there must be a common framework upon which all participants can focus. This framework must be reasonable in scale and economic feasibility, therefore making it attainable through the incremental yet coherent actions of these various participants.

THIS CHAPTER WILL PRESENT A MACRO-SCALE VIEW OF THE PLANNING AND DESIGN CONCEPTS WHICH ARE PERTINENT TO THE INITIAL IMPLEMENTATION OF THE CAPITAL CITY GREENWAY PLAN.

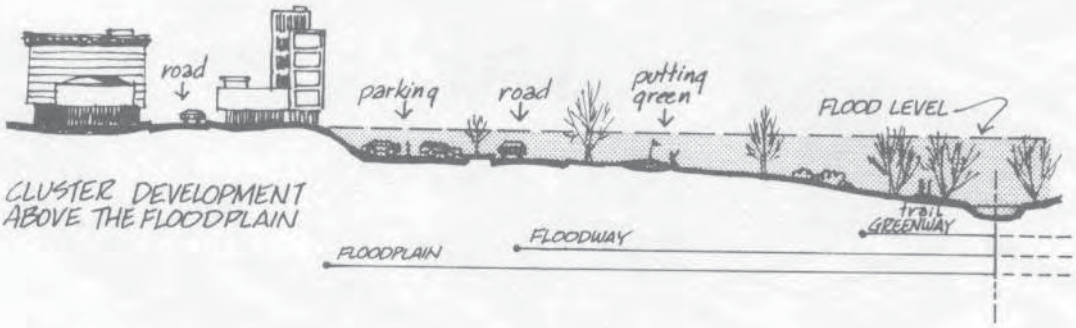
The Greenway and Future Land Use

This section will illustrate the relationship between the greenway and urban land uses. The report previously suggested that the greenway should be part of a flood damage prevention package. The following page shows how this could be accomplished by balancing the damagability of specific urban land uses against the potential for flooding in specific flood prone areas. The second page illustrates three methods (from most preferred to least preferred) of developing land adjoining urban streams, within the context of the flood damage prevention package. Thus development can occur and a profit be made, while guarding against flood damage and initiating a greenway system.

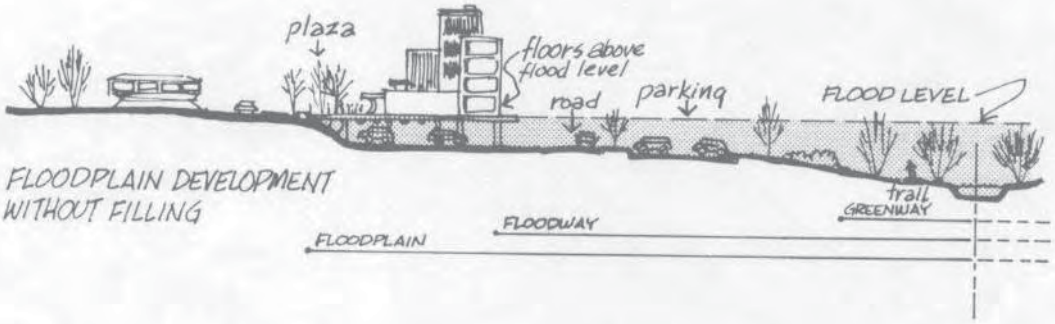
LAND USE AND THE FLOOD DAMAGE PREVENTION PACKAGE



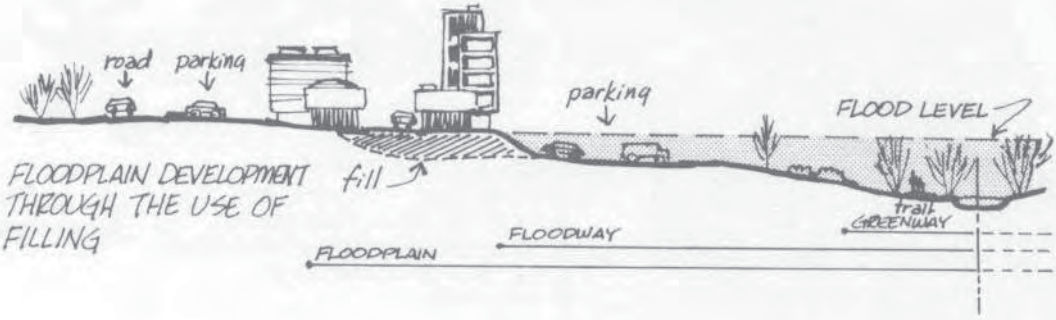
METHODS OF DEVELOPMENT UNDER FLOODPLAIN & FLOODWAY REGULATIONS



CLUSTER DEVELOPMENT ABOVE THE FLOODPLAIN



FLOODPLAIN DEVELOPMENT WITHOUT FILLING



FLOODPLAIN DEVELOPMENT THROUGH THE USE OF FILLING

The Greenway Design Elements

This section will describe the elements to be used in designing the Capital City Greenway.

(1) Loops will be found in two sizes: Major and Minor. The first map illustrates the location of major loops. These will consist of parts of Crabtree and Walnut Creeks and the connectors between these thus forming a loop. Minor loops will be discussed in the Section on Recreational Patterns. The purpose of the loop design within the greenway is to offer a continuous, circumventual system within which recreational activities can occur.

Trail use within the major loops will be of community-wide character, since the trail will circumscribe the city. It should be assumed that this trail will receive heavy use by pedestrians and bicyclists and should, for that reason, be planned to accommodate this use at all times.

(2) Penetrators will be the other element used in designing the greenway. The second map illustrates the location of these penetrators. They will consist of the tributaries to Crabtree and Walnut Creeks. The purpose of the penetrators is to reach into all parts of the urban area, thus equalizing the benefits of the greenway among the total population.

Trail use within the penetrator will be of neighborhood character, since the trail will serve only as a local connector to the major loops.

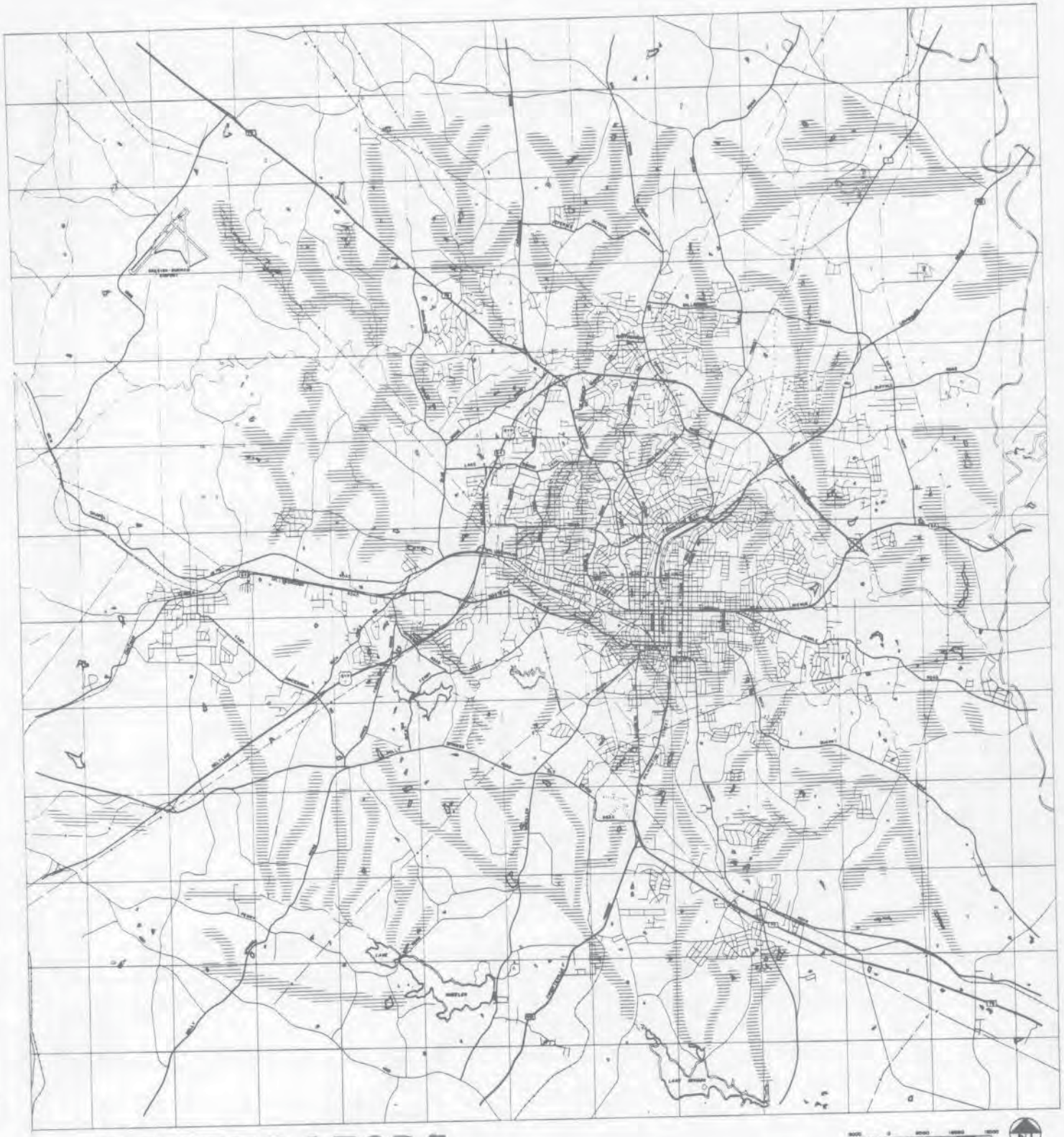
Through these two elements, with their complimentary functions, a greenway can be designed for Raleigh which will make it the most outstanding and desirable urban area within North Carolina; illustrated on the final map, at approximate scale.

MAJOR LOOPS

Major Loop A - 25 miles ±

Major Loop B - 40 miles ±

Major Loop C - 75 miles ±



PENETRATORS

CAPITAL CITY GREENWAY

The Greenway Phasing Program

This section will present a program for phasing the accumulation of needed greenway acreage. The Capital City Greenway is a landmark project within the southeast, and a project which will not be completed in a couple of short years. Indeed, it is a self perpetuating project which will continue to grow as long as the city continues to grow.

With any project of this type, the major problems and expense lie within the initial transition period; that time during which people have to change from the traditional way of doing things, to a new way which accomplishes a better end product. During the initial transition period the city would develop the regulations, policies and procedures which will allow the greenway to be self perpetuating in the future. Once the initial period is past, it will be found that there will be fewer problems and less expense involved in establishing the Capital City Greenway.

PHASE I: It is projected that this phase will take about five years to complete. The purpose of this phase is to catch-up with one-hundred-eighty years of growth in the Raleigh area. When completed this phase will have created a greenway within those areas that were within the city limits in 1970.

Due to its extent and duration, this phase has been broken down into three stages:

Stages I. a & b consist of those areas which are in the most immediate danger of development or other form of destruction; and those areas owned by the State of North Carolina, to which the city should seek a greenway/conservation easement, in lieu of taxes, from the 1973 General Assembly.

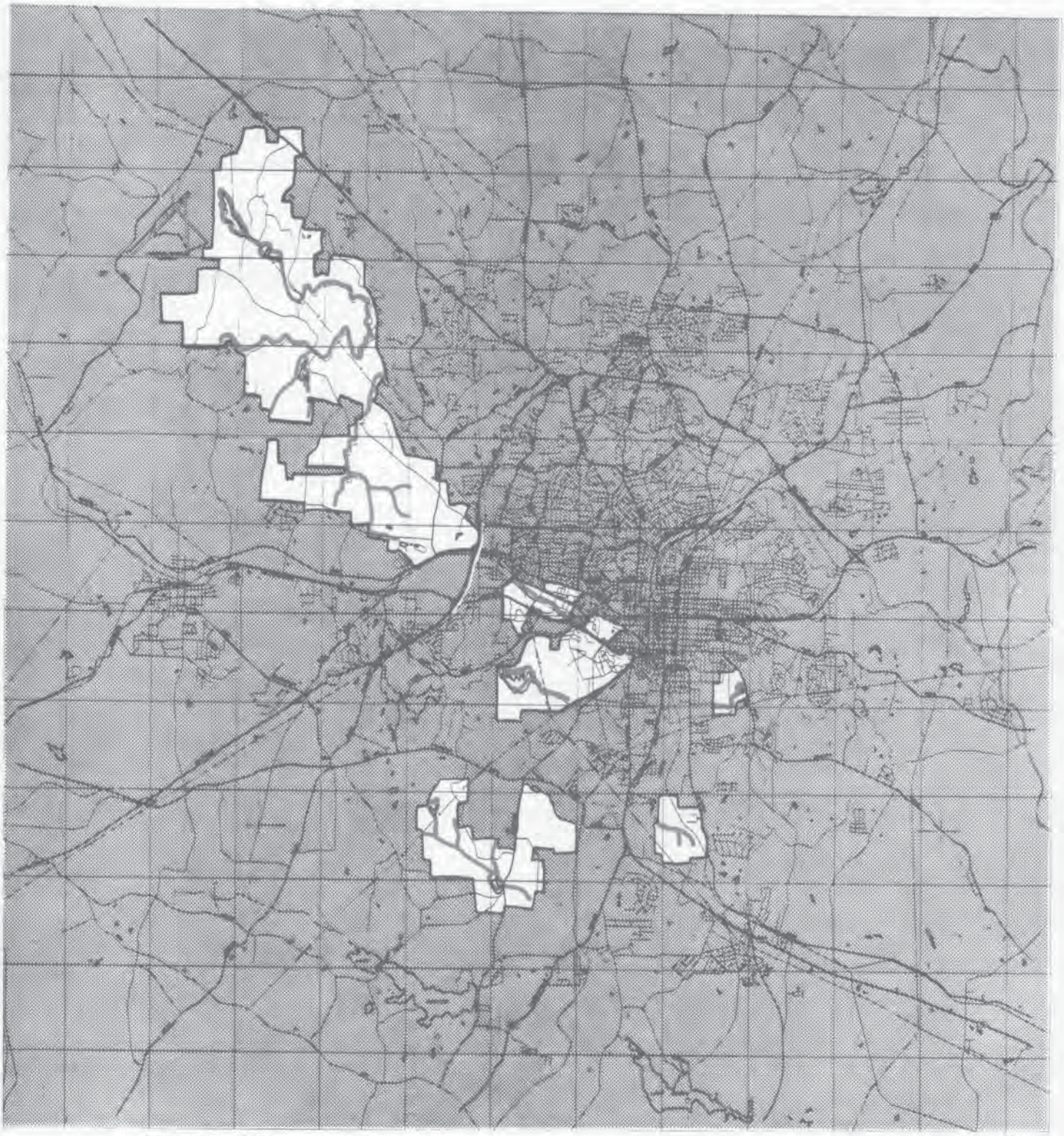
Stage II consists of those areas which are in danger of being substantially altered within the next five years.

Stage III consists of those remaining areas which will be needed to complete the greenway within the existing city limits, and complete major loop A.

PHASE I - STAGE Ia

PHASE I - STAGE Ia

	Natural Water Course		Length & Minimum Width	Acreage ±
LOOP A	Crabtree Creek	- Edwards Mill Rd. ext. to Noble Rd.	22,000' @ 280'-320'	138
		- US 1-401 N to US 64 E	17,000' @ 360'	136
	Walnut Creek	- Buck Jones Rd. to Lake Johnson	5,000' @ 170'	17
		- Wilmington St. to Rock Quarry Rd.	9,000' @ 250'	49
CONNECTORS	House Creek	- Crabtree Creek to Beltline	3,000' @ 140'	9
PENETRATORS	Lead Mine Creek	- Crabtree Creek to Shelly Rd.	8,000' @ 140'	24
	Marsh Creek	- Crabtree Creek to US 1-401 N	10,000' @ 140'	31
	Beaver Dam (SW prong)	- US 70 W to Brooks Avenue	3,500' @ 140'	11
	Bridges Branch	- Crabtree Creek to Glascock St.	5,000' @ 140'	15
	Rocky Branch	- Walnut Creek to S. Saunders St.	6,000' @ 140'	19
	Garner Branch	- Walnut Creek to Chavis Park	5,000' @ 140'	15
	Gatling Branch	- Walnut Creek to Poole Road	6,000' @ 140'	19
	Wildcat Branch	- Walnut Creek to Blind School	6,000' @ 140'	19
	Watsons Branch	- S. Gate Park to Kingwood Park	5,000' @ 140'	15
	TOTAL ACREAGE of PHASE I - STAGE Ia			508



STAGE Ib

PHASE I - STAGE Ib

	Natural Water Course	Length and Minimum Width	Acreage ±
STATE LAND	Crabtree Creek - through Umstead Park	21,000' @ 240'	114
	Sycamore Creek - through Umstead Park	19,000' @ 140'	60
	Reedy Creek - through Umstead Park	7,000' @ 140'	22
	Richland Creek - through University Farms & Forest	6,000' @ 140'	19
	Walnut Creek - through Dix Hospital Farms	11,000' @ 200'	26
	Wildcat Branch - through Blind School property	6,000' @ 140'	19
	Walnut Creek (swamp) - through Woman's Prison property	4,000' @ 250'	22
	Rocky Branch - through NCSU Campus	6,000' @ 140'	19
	Yates Mill Branch - through University Farms	16,000' @ 80'	29
CONNECTORS	Along Highway ROW - House Creek to Bushy Branch East side of Beltline	11,000' @ 80'	20
	EQUIVALENT ACREAGE OF PHASE I - STAGE Ib		350

STAGE II

PHASE I - STAGE II

	Natural Water Course		Length & Minimum Width	Acreage ±
LOOP A	Crabtree Creek	- Noble Rd. to US 1-401 N	7,500' @ 320'-340'	56
	Walnut Creek	- Lake Wheeler Rd. to Wilmington St.	9,000' @ 250'	49
CONNECTORS	Unnamed Branches	- Crabtree Creek to Walnut Creek	10,500' @ 140'	33
	Bushy Branch	- Walnut Creek to Beltline	6,000' @ 140'	19
PENETRATORS	Lead Mine Creek	- Shelly Rd. to Jeffreys School Rd.	7,500' @ 140'	23
	Big Branch (North)	- Crabtree Creek to Hardimont Rd.	7,000' @ 140'	22
	Marsh Creek	- US 1-401 N to headwaters	18,000' @ 140'	57
	Unnamed branch between Blue Ridge Road and Edwards Mill Road	- Crabtree Creek to headwaters	9,000' @ 140'	28
	Beaver Dam Branch	- Crabtree Creek to Scotland St.	2,000' @ 140'	6
	(SW prong)	- Wade Ave. to headwaters	3,500' @ 140'	11
	(SE prong)	- JayCee Park to Mayview Rd.	1,000' @ 80'	2
	Pigeon House Branch	- Crabtree Creek to Fenton St.	5,000' @ 140'	15
	Simmons Branch	- Walnut Creek to Beltline	6,000' @ 140'	19
	Rocky Branch	- S. Saunders St. to Pullen Park	9,000' @ 140'	28
	Watsons Branch	- Walnut Creek to S. Gate Park	2,500' @ 140'	7
	TOTAL ACREAGE OF PHASE I - STAGE II			375

STAGE III

PHASE I - STAGE III

	Natural Water Course		Length & Minimum Width	Acreage ±
LOOP A	Crabtree Creek	- US 64 E to connector	7,000' @ 400'	63
	Walnut Creek	- Lake Johnson to Trailwood Rd.	6,000' @ 200'	27
		- Rock Quarry Rd. to connector	14,000' @ 250'-300'	87
PENETRATORS	House Creek	- Beltline to Wade Avenue	14,000' @ 140'	41
	Beaver Dam Creek (SE prong)	- Scotland St. to US 70 W	4,000' @ 140'	12
		- US 70 W to Wade Avenue	6,000' @ 80'	10
	Unnamed branch (from Lake Drive Park)	- Crabtree Creek to Lake Dr. Park	1,500' @ 140'	5
	Oxford Branch	- Crabtree Creek to Fallon Park	1,000' @ 140'	3
	Simmons Branch	- Beltline to headwaters	4,000' @ 140'	12
	Unnamed branch from Carolina Pines	- Walnut Creek to headwaters	5,000' @ 140'	15
	Watsons Branch	- Kingwood Park to headwaters	3,000' @ 80'	9
	Swift Creek	- Lake Wheeler to Lake Benson	18,500' @ 300'	125
	TOTAL ACREAGE OF PHASE I - STAGE III			409
	TOTAL ACREAGE OF PHASE I - STAGES Ia, II, and III			1,292

PHASE II: Although this phase would be informally started at the same time as phase one, it would not receive the city's total commitment until phase one was completed. During the initial five years the city's only involvement would be to require the conservation of greenway space in areas where development was occurring, thereby protecting the public need for these corridor spaces. For the final three years until 1980, the city would be involved in completing major loop B and extending the greenway into areas which are, at that time, undergoing urbanization. Greenway implementation costs should be very small by this time, since the greenway will have been planned for, from the beginning of development projects, rather than initiated in the middle of such projects.

PHASE II

	Natural Water Course		Length & Minimum Width	Acreage ±
LOOP B				
	Crabtree Creek	- Umstead Park to Duraleigh Road	5,000' @ 240'	26
		- Duraleigh Rd. to Heir Snipe Ck.	9,000' @ 260'	52
		- Heir Snipe Ck. to Edwards Mill Rd.	2,500' @ 260'	15
		- Connector to Neuse River	15,000' @ 400'	135
	Walnut Creek	- headwaters to Buck Jones Road	13,000' @ 140'	40
		- Connector to Neuse River	17,500' @ 300'	118
CONNECTORS				
	Neuse River	- Crabtree Ck. To Walnut Ck.	6,000' @ ½ 1500'	100
	cross country	- Richland Ck. to Walnut Ck.	7,000' @ 140'	22
PENETRATORS				
	Turkey Creek	- Crabtree to Fork	6,000' @ 140'	19
		- West branch	13,000' @ 80'	22
		- East branch	14,500' @ 80'	26
	Heir Snipe Ck.	- Crabtree Ck. to headwaters	20,000' @ 140'	63
	Lead Mine Creek	- Jeffreys School Rd. to headwaters:		
		- West branch	16,000' @ 80'	29
		- Middle branch	8,000' @ 80'	15
		- East branch	12,000' @ 80'	22
	Unnamed branch	- Southeast of US 64 E		
		- Crabtree creek to headwaters	6,000' @ 140'	19
		- Tributary stream	1,000' @ 80'	2
	Unnamed branch	- South of US 64 E		
		- Crabtree Ck. to headwaters	3,500' @ 140'	11
	Unnamed branch	- North & South of US 64 E		
		- Crabtree Ck. to headwaters	13,000' @ 140'	40
	Reedy Creek	- Umstead Park to headwaters	9,000' @ 140'	28
		- tributary streams	6,000' @ 80'	10
	Richland Creek	- Crabtree Ck. to Stateland	8,000' @ 140	24
		- tributary streams	14,000' @ 80'	24

(continued)

PHASE II

Unnamed branch	- East of Duraleigh Rd.		
	- Crabtree to headwaters	7,000' @ 140'	22
Unnamed branch	- Laurel Hills Dr. to Crabtree Ck.	2,000' @ 140'	6
Unnamed branch	- North of Poole Road		
	- Crabtree Ck. to Fork	4,000' @ 140'	12
	- headwater streams	5,000' @ 80'	8
Unnamed branches	- West of Jones Franklin Road		
	- Walnut Ck. to headwaters North	4,000' @ 140'	12
	- Walnut Ck. to headwaters South	5,000' @ 140'	15
Unnamed branches	- between Lakes Johnson & Raleigh		
	- Walnut Ck. to headwaters West	4,000' @ 140'	12
	- Walnut Ck. to headwaters Middle	5,000' @ 140'	15
	- tributary streams	3,000' @ 80'	5
	- Walnut Ck. to headwaters East	2,500' @ 140'	7
Big Branch (S)	- Walnut Ck. to headwaters	22,000' @ 140'	70
	- tributary streams	60,000' @ 80'	109
Unnamed branches	- South of Poole Road		
	- Walnut Ck. to headwaters West	4,000' @ 140'	12
	- Walnut Ck. to headwaters East	6,000' @ 140'	19
Swift Creek	- Lk. Wheeler to Holly Springs Rd.	10,000' @ 250'	59
	- Holly Springs Rd. to US 1 South	17,000' @ 200'	76
TOTAL ACREAGE OF PHASE II			1331

PHASE III: This phase would also begin at the same time as phase one, but its intensive implementation would not occur until after 1980. If the county protects the proposed corridors in these outlying areas until the city has some regulator control over them, then the greenway implementation process, by this time, should be self-perpetuating and require little time or money. When this phase is completed, major loop C would be in existence and the greater Raleigh urban area will be on its way to a regional greenway system.

PHASE III

Throughout this report the Capital City Greenway has been discussed as a multipurpose public corridor. The following chart shows the relationship between these various public purposes and how the total greenway acreage is distributed between them. Also shown is the relationship between the national standard ratio of park acreage to population and the additional park acreage within the greenway.

Phase	Duration of Phase	Greenway Acreage Distribution				Total Acreage of Phase
		Sanitary Sewers	Alternative Trans. Route	Urban Livability	Park & Open Space	
I Stage Ia	1972-74	125	50	150	183	508
I Stage Ib	1973					350
I Stage II	1972-76	90	40	110	135	375
I Stage III	1972-77	100	40	120	149	409
II	1972-80	335	130	400	466	1331
III	1972-8+					

Even though the greenway park acreage will bring the city into alignment with the national standard, it must be remembered that the greenway is primarily passive rather than active open space. Therefore, it will not substitute for recreation activity areas needed at this time and in the future. Also, it should be noted that the park acreage figures are somewhat misleading, since all of the public purposes served by the greenway do not lend themselves to this type of distributive analysis, e.g., flood damage protection, and could further reduce the acreage assigned to fulfilling recreation functions.

Phase	Duration of Phase	Projected Population	National Standard Park Acreage/ Population	(Greenway) Park Acreage In Addition To the City's Present 900 Acres
I Stage Ia	1972-74	146,000	1,460	183
I Stage Ib	1973	139,000		
I Stage II	1972-76	161,000	1,610	318
I Stage III	1972-77	168,000	1,680	467
II	1972-80	190,000	1,900	933
III	1972-8+			

The Greenway Recreation Pattern

This section will focus on the impact the greenway will have upon recreational patterns in the Raleigh area. At this time, most leisure-time activities undertaken in the city's park system are of short duration. In order to undertake day long activities, most citizens are forced to travel to areas outside the city to find appropriate facilities. This would not necessarily be true once the first major loop of the greenway was completed.

As the introduction presented, the greenway would offer space for recreational activities which are now difficult to undertake in the Raleigh area. The individual who wished to participate in long or short duration bicycling could do so within the greenway. The same is true for hiking, jogging, and canoeing. With the development of specific recreational activity areas in appropriate locations adjoining the greenway, such activities as camping, picnicing, and horseback riding could be facilitated.

The first of the following maps indicates the location of existing parking lots adjacent to the proposed greenway. With the completion of the first phase of greenway development, there should be a continuous increase in the frequency of groups and individuals taking loop trips, as well as trips from a departure point to a destination point. The availability and location of parking lots is very important to the success of this type of leisure-time activity, since the greenway user would be using these areas as drop-off and pick-up stations.

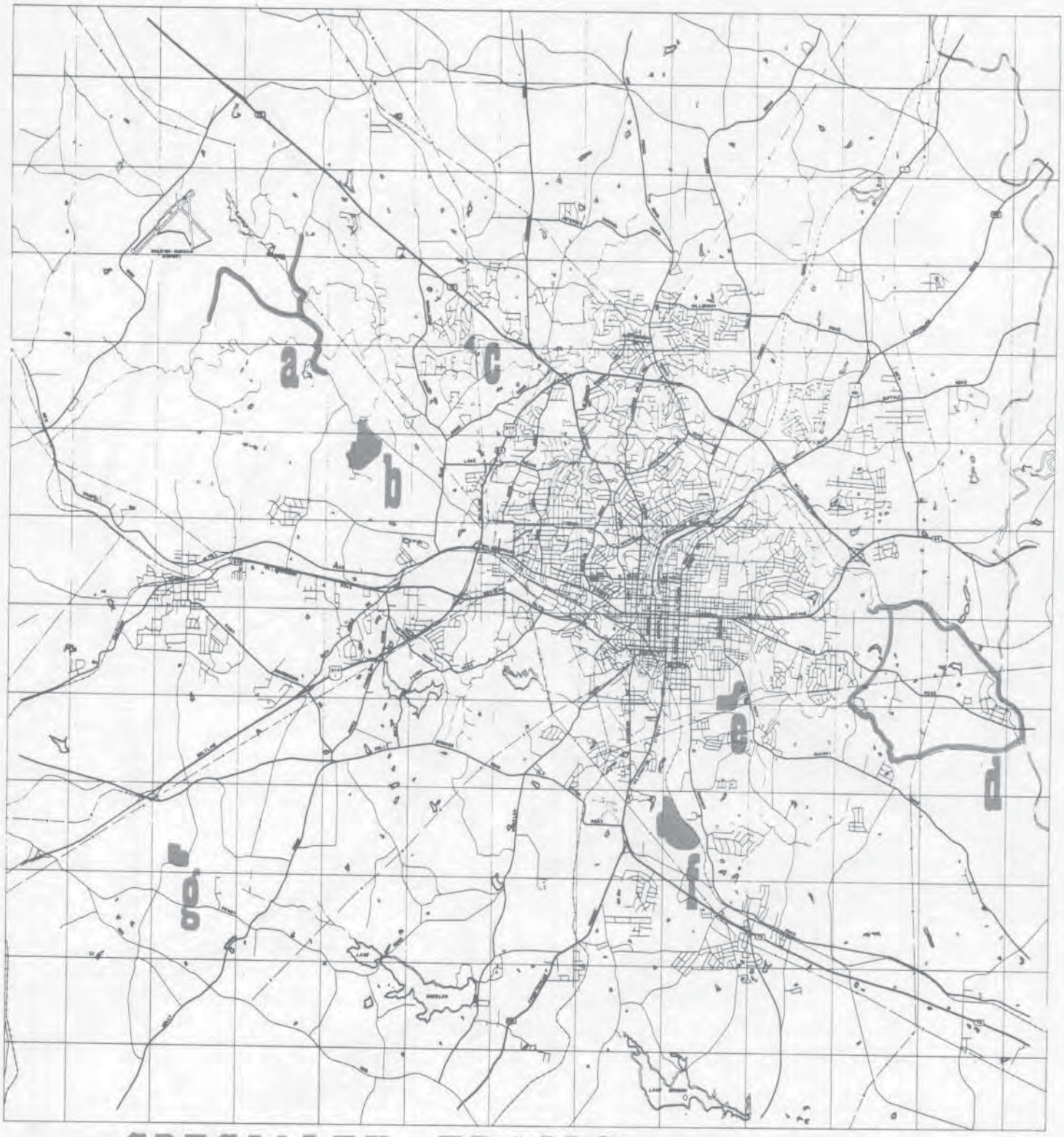
The next map indicates the location of cross country power lines. These locations, especially those outside the existing urban area, are of importance due to their potential for being used to create minor loops within the greenway system. The rights-of-way beneath these transmission lines are suitable for use as connectors between various streams and/or branches, and this possibility should be investigated whenever such a minor loop would stimulate use and benefit the public in that specific area.

The third map indicates the potential for directly or indirectly developing a series of special use of specialty trails which adjoin the Capital City Greenway.

PARKING

MINOR LOOPS

..... Cross Country Power Lines



SPECIALTY TRAILS

a Biking and Equestrian Trail - This is being planned for Umstead Park on the present location of parts of Reedy Creek Road and Ebenezer Church Road. It will be in addition to existing equestrian trails, and could be linked to the greenway.

b Forestry Interpretive Trail - This trail could be developed jointly between the city and NCSU on the present site of Schenck Forest. The self-guided trail would be advantageous in interpreting the benefits of Forestry management and research to an urban population; while offering the Forestry student an opportunity to experience the problems of planning, developing, and maintaining such an educational/recreational facility.

c Laurel Hills Nature Park - This area, which is presently a girl scout camp, has important flora and other ecological features. This site could be gained by the city if it offered to trade the Girl Scout Council adequate acreage in a better location. Such a site exists at this time, as a severed section of Umstead Park, on the north side of Ebenezer Church (Old Coach) Road. The Division of State Parks is willing to negotiate for the sale or trade of this land. Such a three step process would: allow the Division of State Parks to round out their park boundaries; give the Girl Scout Council a new camping area away from urban encroachment and adjacent to Umstead Park; and produce, for the Raleigh Parks and Recreation Department, a nature park and picnic area along Crabtree Creek.

d Equestrian Trail - The areas included in this location are the sewer line extensions along Crabtree and Walnut Creeks. These sewer line rights-of-way are ideal for equestrian trails and should be developed as such, since horses must be accomodated separately from paved bicycle paths and pedestrian trails.

e Fresh Water Marsh Interpretive Trail - This site is presently part of the Women's Prison property, and would be gained by the city through PHASE I, Stage Ib of the greenway implementation process. The planning and development of this self-guided interpretive trail system could be undertaken jointly among the city, the public school system, and the university. Each group would benefit from the existence of such an interpretive area, due to its value for educational, research and recreational purposes.

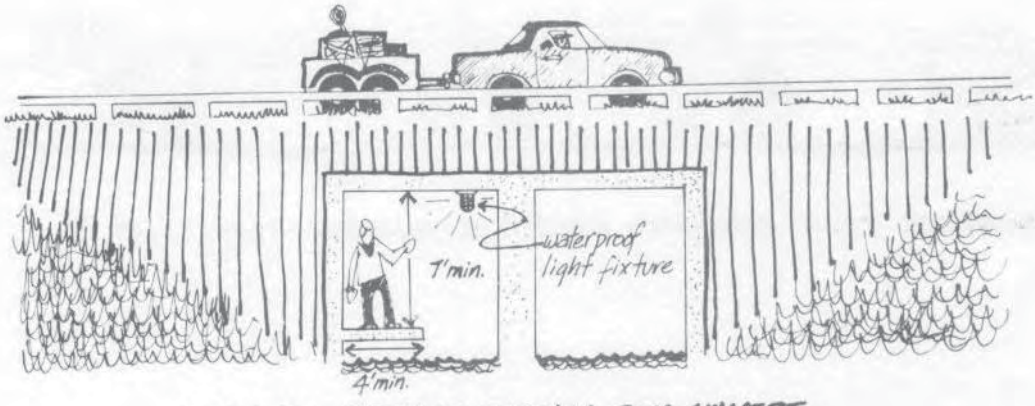
f Interpretive Nature Trail For The Handicapped - This site, which is presently part of the Governor Morehead School property, would also be gained through PHASE I, State IB of the greenway implementation process. The planning for this specialized trail could be undertaken jointly by the city, the Morehead School, and NCSU; while the development could be handled cooperatively between the city and (state) Morehead School. The development of such a facility would make educational resources available to the handicapped individual who is presently deprived of such experiences.

g Hemlock Bluffs State National Area - A campaign is underway at this time to secure this valuable ecological area for the State. When this is done and the site is opened as a natural area, it will be an important addition to the potential, regional greenway system which would include Swift Creek.

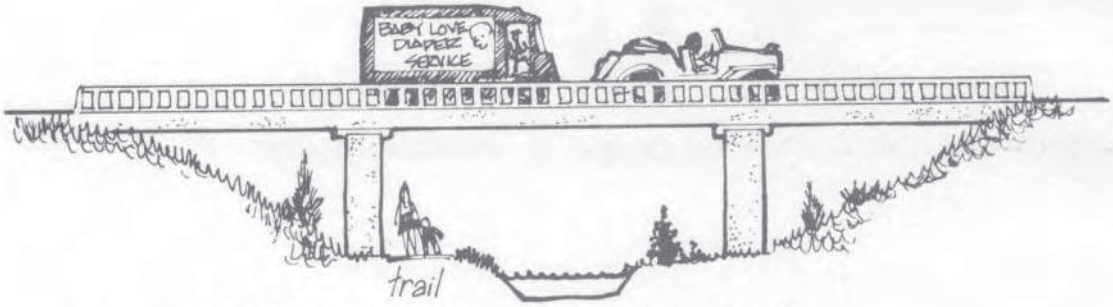
The Greenway Trail System

This section will present an insight into methods of evading the primary disruptors of the Capital City Greenway's trail system, as well as look at development details for trails of various uses and trails through different physiographic areas. The following illustrations show how the continuousness of the greenway can be preserved by avoiding on-grade confrontation with automobile traffic. The use of box culverts relates to existing situations only; the box culvert is marginal at best and should be discouraged in all future road projects which cross the greenway.

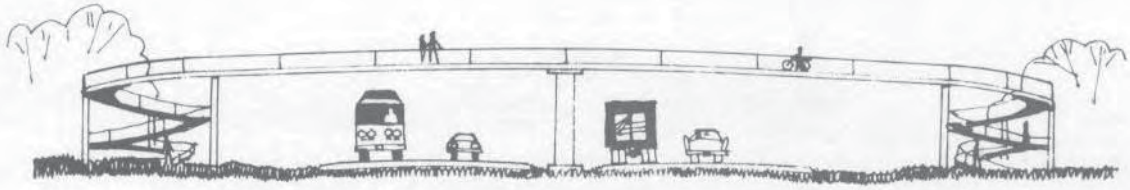
The illustrations on the following page indicate how the continuousness of the greenway can be preserved along "connector trails" which do not follow the stream system. The map on the next page locates the areas where the aforementioned greenway structual elements either exist or will be needed in the future. The next page shows two potential areas which can be adopted for use as greenway connectors, and a third area which can be easily adopted for use as a specialty trail. The final two pages give development details for the placement of major and minor trails through various physiographic areas.



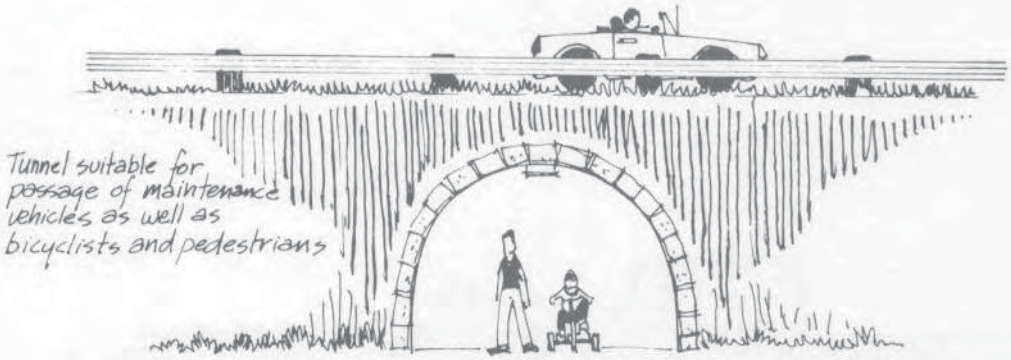
GREENWAY PASSAGE THROUGH BOX CULVERT



GREENWAY PASSAGE UNDER BRIDGE



CONNECTOR TRAIL CROSSING OVER THOROUGHFARE - WITHOUT STAIRS *



CONNECTOR TRAIL PASSING BENEATH THOROUGHFARE. *

* THESE METHODS OF CROSSING MAJOR TRAFFIC ARTERIES CAN BE FINANCED AT THE SAME PER CENTAGE DISTRIBUTION AS THE EXISTING HIGHWAY PROJECT.

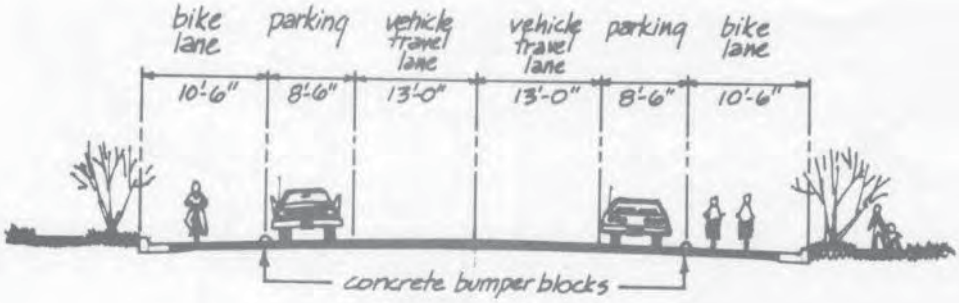
COMPLEMENTARY STRUCTURES

Existing Bridge

Cross Over Needed

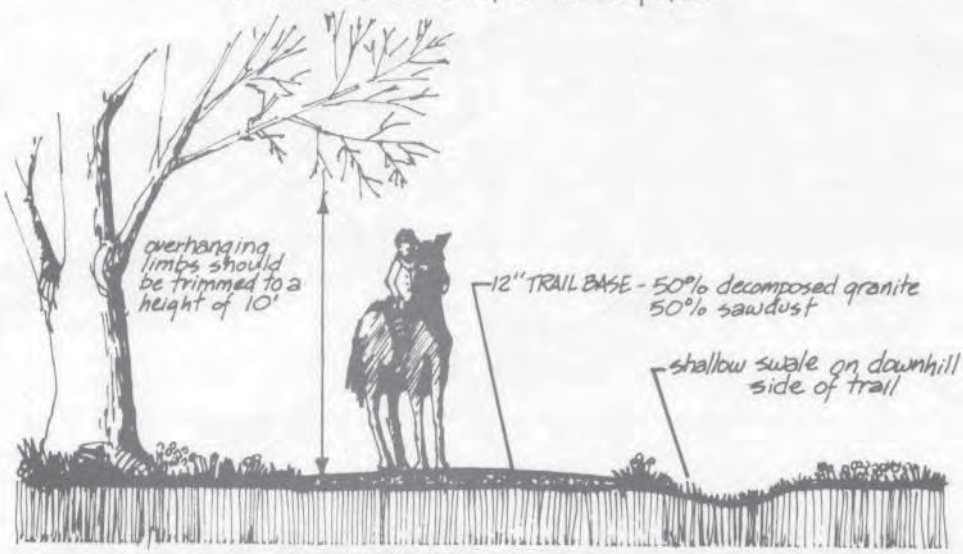
Tunnel Needed

Box Culvert Modification Needed



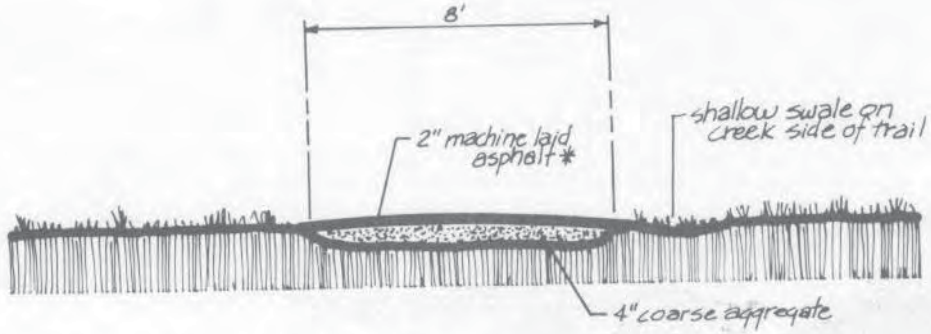
TRAFFIC R.O.W. CAN BE USED AS SUITABLE GREENWAY CONNECTOR WHEN ADAPTED FOR BICYCLE AS WELL AS PEDESTRIAN TRAFFIC. (AS PROPOSED BY THE B.O.R.)

CROSS COUNTRY POWER LINE R.O.W. IS SUITABLE FOR USE AS A GREENWAY CONNECTOR.

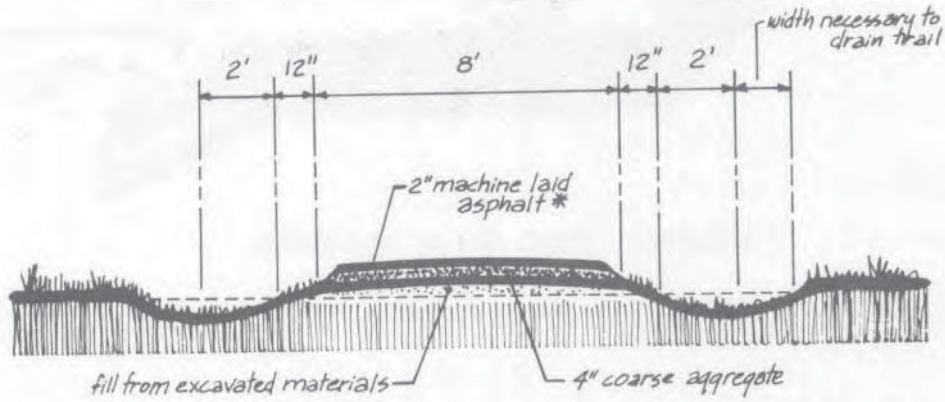


EQUESTRIAN TRAIL

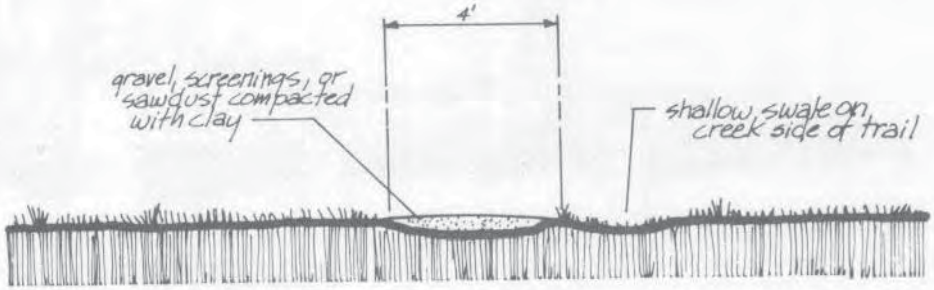
The most logical location for equestrian trails is in conjunction with major sewer outfalls such as those being constructed along Crabtree & Walnut creeks at this time. This construction requires the building of a substantial gravel road to allow access for machinery and materials. This road-bed could be converted easily and inexpensively into an equestrian trail after the sewer outfall is completed.



MAJOR & HEAVY USE TRAILS THROUGH DRY AREAS

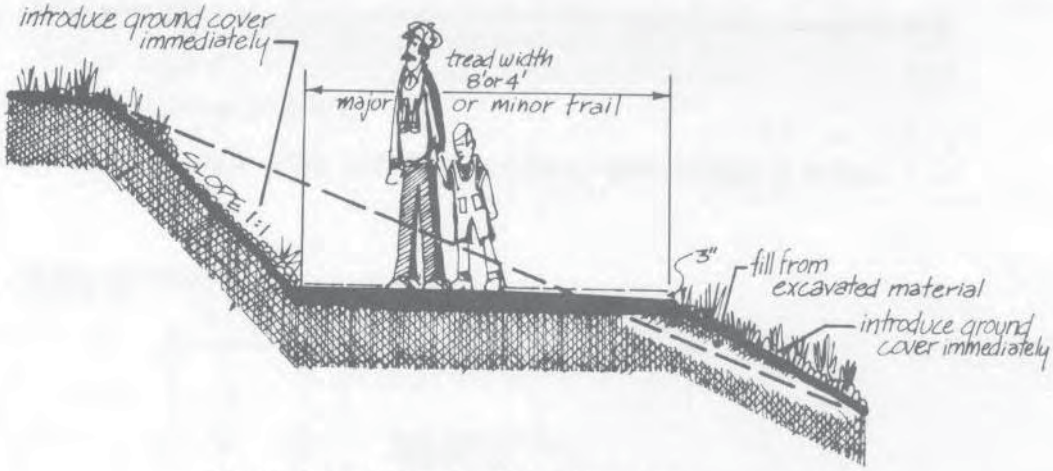


MAJOR & HEAVY USE TRAILS THROUGH SEASONALLY WET AREA (BOG)

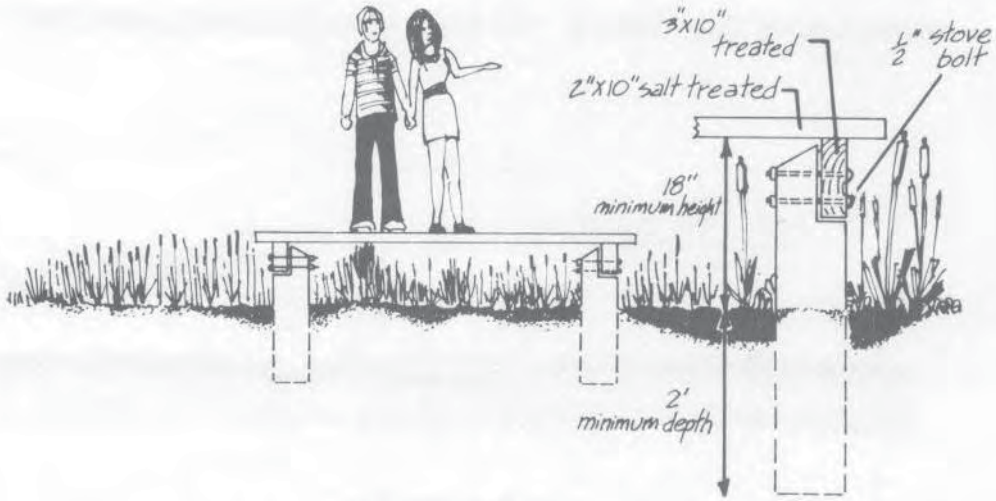


MINOR TRAILS

* APPROXIMATE COST ESTIMATE FOR CONSTRUCTION OF 8' ASPHALT TRAIL: $2.10/linear ft.
THIS TYPE TRAIL WOULD BE BEST FOR BICYCLIST AND INDIVIDUALS CONFINED TO WHEELCHAIRS. THEY COULD ALSO SUPPORT MAINTENANCE VEHICLES WHICH WOULD BE AN INVALUABLE ASSET IN THE REMOVAL OF DEBRIS FROM THE ADJOINING CREEKS, AS WELL AS ALONG THE GREENWAY ITSELF.



BUILDING TRAIL ON A HILLSIDE



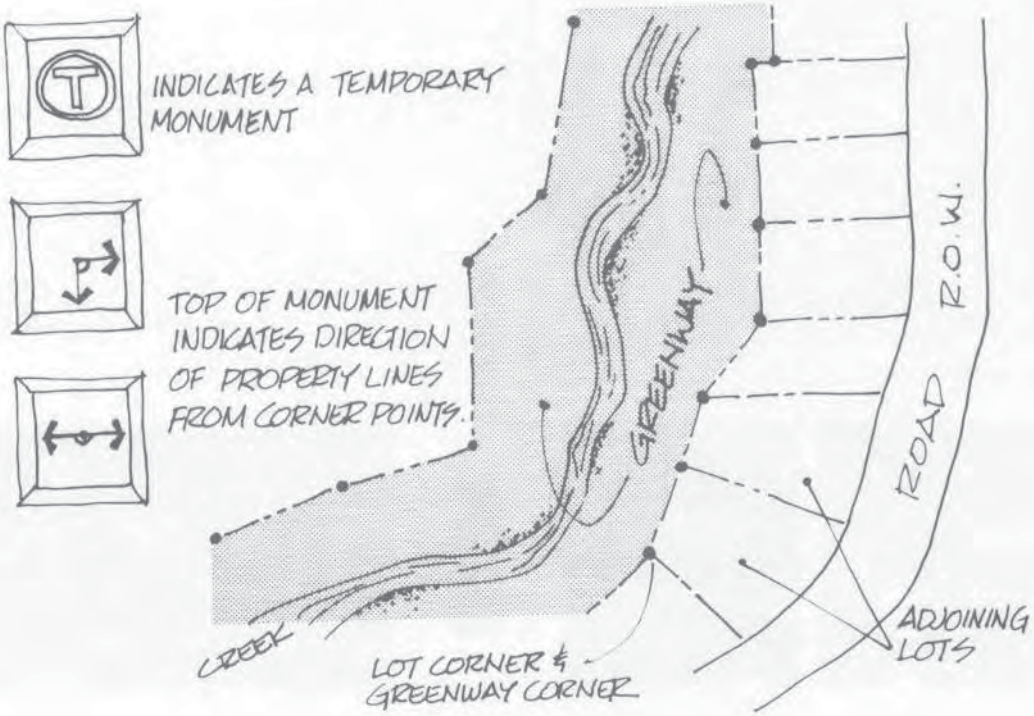
BUILDING TRAIL ON MARSHLAND

MINI-BIKES & CYCLES

THE ILLEGAL OPERATION OF THESE VEHICLES WITHIN THE GREENWAY COULD DESTROY THE GREENWAY EXPERIENCE FOR THE MAJORITY OF THE PEOPLE.
THE CITY CODE SHOULD BE AMENDED TO ALLOW THE CITY TO CONFISCATE SUCH ILLEGALLY OPERATED VEHICLES; TO BE SOLD LATER AT PUBLIC AUCTION.

CONCRETE MONUMENTS

SHOULD BE PLACED AT ALL CORNERS.



APPENDIX

8

Glossary

Cluster Development - A method of development where structural units are grouped on lots smaller than commonly required by older zoning ordinances, with the excess land set aside as open space for the benefit of the public. Cluster development does not allow a greater density of units per development; rather it groups the units closer together thus allowing for the conservation of open space elsewhere.

Conservation - The protection, improvement and use of natural resources according to principles that will assure their greatest socio-economic benefits.

Conservation Easements - Legal promises about land use which a land owner voluntarily imposes upon himself and his heirs, in order to assure that his property is not used for a purpose he would not desire or not in the public interest. If a landowner attaches a conservation easement to his property, he does not give up any of his rights to sell or lease his land, and he can receive income, estate and property tax benefits.

Deficit Budgeting - The expenditure of a greater amount of public funds, for a public project, than can be recouped from that project in a reasonable length of time, through normal taxing practices or public use. For the purpose of this report, the term refers to the enhancement of privately owned flood prone lands through channelization, at a public expense greater than the amount returned through increased property taxes on these lands. To guard against deficit budgeting, the governing body must assume the position of "banker" for the public; they should not "invest" in public projects which require deficit budgeting while yielding no visible public gain.

Public Law 90-543
90th Congress, S. 827
October 2, 1968

National Trail System Act

An Act

82 STAT. 919

To establish a national trails system, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

National Trails System Act.

SHORT TITLE

SECTION 1. This Act may be cited as the "National Trails System Act".

STATEMENT OF POLICY

SEC. 2. (a) In order to provide for the ever-increasing outdoor recreation needs of an expanding population and in order to promote public access to, travel within, and enjoyment and appreciation of the open-air, outdoor areas of the Nation, trails should be established (i) primarily, near the urban areas of the Nation, and (ii) secondarily, within established scenic areas more remotely located.

(b) the purpose of this Act is to provide the means for attaining these objectives by instituting a national system of recreation and scenic trails, by designating the Appalachian Trail and the Pacific Crest Trail as the initial components of that system, and by prescribing the methods by which, and standards according to which, additional components may be added to the system.

NATIONAL TRAILS SYSTEM

SEC. 3. The national system of trails shall be composed of—

(a) National recreation trails, established as provided in section 4 of this Act, which will provide a variety of outdoor recreation uses in or reasonably accessible to urban areas.

(b) National scenic trails, established as provided in section 5 of this Act, which will be extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass.

(c) Connecting or side trails, established as provided in section 6 of this Act, which will provide additional points of public access to national recreation or national scenic trails or which will provide connections between such trails.

The Secretary of the Interior and the Secretary of Agriculture, in consultation with appropriate governmental agencies and public and private organizations, shall establish a uniform marker for the national trails system.

NATIONAL RECREATION TRAILS

SEC. 4. (a) The Secretary of the Interior, or the Secretary of Agriculture where lands administered by him are involved, may establish and designate national recreation trails, with the consent of the Federal agency, State, or political subdivision having jurisdiction over the lands involved, upon finding that—

(i) such trails are reasonably accessible to urban areas, and, or

(ii) such trails meet the criteria established in this Act and such supplementary criteria as he may prescribe.

(b) As provided in this section, trails within park, forest, and other recreation areas administered by the Secretary of the Interior or the Secretary of Agriculture or in other federally administered areas may be established and designated as "National Recreation Trails" by the appropriate Secretary and, when no Federal land acquisition is involved—

(i) trails in or reasonably accessible to urban areas may be designated as "National Recreation Trails" by the Secretary of the Interior with the consent of the States, their political subdivisions, or other appropriate administering agencies, and

(ii) trails within park, forest, and other recreation areas owned or administered by States may be designated as "National Recreation Trails" by the Secretary of the Interior with the consent of the State.

NATIONAL SCENIC TRAILS

SEC. 5. (a) National scenic trails shall be authorized and designated only by Act of Congress. There are hereby established as the initial National Scenic Trails:

(1) The Appalachian Trail, a trail of approximately two thousand miles extending generally along the Appalachian Mountains from Mount Katahdin, Maine, to Springer Mountain, Georgia. Insofar as practicable, the right-of-way for such trail shall comprise the trail depicted on the maps identified as "Nationwide System of Trails, Proposed Appalachian Trail, NST-AT-101-May 1967", which shall be on file and available for public inspection in the office of the Director of the National Park Service. Where practicable, such rights-of-way shall include lands protected for it under agreements in effect as of the date of enactment of this Act, to which Federal agencies and States were parties. The Appalachian Trail shall be administered primarily as a footpath by the Secretary of the Interior, in consultation with the Secretary of Agriculture.

Rights-of-way.

(2) The Pacific Crest Trail, a trail of approximately two thousand three hundred fifty miles, extending from the Mexican-California border northward generally along the mountain ranges of the west coast States to the Canadian-Washington border near Lake Ross, following the route as generally depicted on the map, identified as "Nationwide System of Trails, Proposed Pacific Crest Trail, NST-PC-103-May 1967" which shall be on file and available for public inspection in the office of the Chief of the Forest Service. The Pacific Crest Trail shall be administered by the Secretary of Agriculture, in consultation with the Secretary of the Interior.

Administration.

Advisory councils.

(3) The Secretary of the Interior shall establish an advisory council for the Appalachian National Scenic Trail, and the Secretary of Agriculture shall establish an advisory council for the Pacific Crest National Scenic Trail. The appropriate Secretary shall consult with such council from time to time with respect to matters relating to the trail, including the selection of rights-of-way, standards of the erection and maintenance of markers along the trail, and the administration of the trail. The members of each advisory council, which shall not exceed thirty-five in number, shall serve without compensation or expense to the Federal Government for a term of five years and shall be appointed by the appropriate Secretary as follows:

Members; term of office.

(i) A member appointed to represent each Federal department or independent agency administering lands through which the trail route passes and each appointee shall be the person designated by the head of such department or agency;

(ii) A member appointed to represent each State through which the trail passes and such appointments shall be made from recommendations of the Governors of such States;

(iii) One or more members appointed to represent private organizations, including landowners and land users, that, in the opinion of the Secretary, have an established and recognized interest in the trail and such appointments shall be made from recommendations

of the heads of such organizations: *Provided*, That the Appalachian Trail Conference shall be represented by a sufficient number of persons to represent the various sections of the country through which the Appalachian Trail passes; and

(iv) The Secretary shall designate one member to be chairman and shall fill vacancies in the same manner as the original appointment.

Additional studies.

(b) The Secretary of the Interior, and the Secretary of Agriculture where lands administered by him are involved, shall make such additional studies as are herein or may hereafter be authorized by the Congress for the purpose of determining the feasibility and desirability of designating other trails as national scenic trails. Such studies shall be made in consultation with the heads of other Federal agencies administering lands through which such additional proposed trails would pass and in cooperation with interested interstate, State, and local governmental agencies, public and private organizations, and landowners and land users concerned. When completed, such studies shall be the basis of appropriate proposals for additional national scenic trails which shall be submitted from time to time to the President and to the Congress. Such proposals shall be accompanied by a report, which shall be printed as a House or Senate document, showing among other things—

Report to President and Congress.

(1) the proposed route of such trail (including maps and illustrations);

(2) the areas adjacent to such trails, to be utilized for scenic, historic, natural, cultural, or developmental, purposes;

(3) the characteristics which, in the judgment of the appropriate Secretary, make the proposed trail worthy of designation as a national scenic trail;

(4) the current status of land ownership and current and potential use along the designated route;

(5) the estimated cost of acquisition of lands or interest in lands, if any;

(6) the plans for developing and maintaining the trail and the cost thereof;

(7) the proposed Federal administering agency (which, in the case of a national scenic trail wholly or substantially within a national forest, shall be the Department of Agriculture);

(8) the extent to which a State or its political subdivisions and public and private organizations might reasonably be expected to participate in acquiring the necessary lands and in the administration thereof; and

(9) the relative uses of the lands involved, including: the number of anticipated visitor-days for the entire length of, as well as for segments of, such trail; the number of months which such trail, or segments thereof, will be open for recreation purposes; the economic and social benefits which might accrue from alternate land uses; and the estimated man-years of civilian employment and expenditures expected for the purposes of maintenance, supervision, and regulation of such trail.

(c) The following routes shall be studied in accordance with the objectives outlined in subsection (b) of this section:

(1) Continental Divide Trail, a three-thousand-one-hundred-mile trail extending from near the Mexican border in southwestern New Mexico northward generally along the Continental Divide to the Canadian border in Glacier National Park.

(2) Potomac Heritage Trail, an eight-hundred-and-twenty-five-mile trail extending generally from the mouth of the Potomac River to its sources in Pennsylvania and West Virginia, including the one-hundred-and-seventy-mile Chesapeake and Ohio Canal towpath.

(3) Old Cattle Trails of the Southwest from the vicinity of San Antonio, Texas, approximately eight hundred miles through Oklahoma via Baxter Springs and Chetopa, Kansas, to Fort Scott, Kansas, including the Chisholm Trail, from the vicinity of San Antonio or Cuero, Texas, approximately eight hundred miles north through Oklahoma to Abilene, Kansas.

(4) Lewis and Clark Trail, from Wood River, Illinois, to the Pacific Ocean in Oregon, following both the outbound and inbound routes of the Lewis and Clark Expedition.

(5) Natchez Trace, from Nashville, Tennessee, approximately six hundred miles to Natchez, Mississippi.

(6) North Country Trail, from the Appalachian Trail in Vermont, approximately three thousand two hundred miles through the States of New York, Pennsylvania, Ohio, Michigan, Wisconsin, and Minnesota, to the Lewis and Clark Trail in North Dakota.

(7) Kittanning Trail from Shirleysburg in Huntingdon County to Kittanning, Armstrong County, Pennsylvania.

(8) Oregon Trail, from Independence, Missouri, approximately two thousand miles to near Fort Vancouver, Washington.

(9) Santa Fe Trail, from Independence, Missouri, approximately eight hundred miles to Sante Fe, New Mexico.

(10) Long Trail, extending two hundred and fifty-five miles from the Massachusetts border northward through Vermont to the Canadian border.

(11) Mormon Trail, extending from Nauvoo, Illinois, to Salt Lake City, Utah, through the States of Iowa, Nebraska, and Wyoming.

(12) Gold Rush Trails in Alaska.

(13) Mormon Battalion Trail, extending two thousand miles from Mount Pisgah, Iowa, through Kansas, Colorado, New Mexico, and Arizona to Los Angeles, California.

(14) El Camino Real from St. Augustine to San Mateo, Florida, approximately 20 miles along the southern boundary of the St. Johns River from Fort Caroline National Memorial to the St. Augustine National Park Monument.

CONNECTING AND SIDE TRAILS

SEC. 6. Connecting or side trails within park, forest, and other recreation areas administered by the Secretary of the Interior or Secretary of Agriculture may be established, designated, and marked as components of a national recreation or national scenic trail. When no Federal land acquisition is involved, connecting or side trails may be located across lands administered by interstate, State, or local governmental agencies with their consent: *Provided*, That such trails provide additional points of public access to national recreation or scenic trails.

ADMINISTRATION AND DEVELOPMENT

Publication in Federal Register.

SEC. 7. (a) Pursuant to section 5(a), the appropriate Secretary shall select the rights-of-way for National Scenic Trails and shall publish notice thereof in the Federal Register, together with appropriate maps and descriptions: *Provided*, That in selecting the rights-of-way full consideration shall be given to minimizing the adverse effects upon the adjacent landowner or user and his operation. Development and management of each segment of the National Trails System shall be designed to harmonize with and complement any established multiple-use plans for that specific area in order to insure continued maximum benefits from the land. The location and width of such rights-of-way across Federal lands under the jurisdiction of another Federal agency shall be by agreement between the head of that agency and the appro-

priate Secretary. In selecting rights-of-way for trail purposes, the Secretary shall obtain the advice and assistance of the States, local governments, private organizations, and landowners and land users concerned.

Relocation of right-of-way, determination.

(b) After publication of notice in the Federal Register, together with appropriate maps and descriptions, the Secretary charged with the administration of a national scenic trail may relocate segments of a national scenic trail right-of-way, with the concurrence of the head of the Federal agency having jurisdiction over the lands involved, upon a determination that: (i) such a relocation is necessary to preserve the purposes for which the trail was established, or (ii) the relocation is necessary to promote a sound land management program in accordance with established multiple-use principles: *Provided*, That a substantial relocation of the rights-of-way for such trail shall be by Act of Congress.

Facilities on trails.

(c) National scenic trails may contain campsites, shelters, and related-public-use facilities. Other uses along the trail, which will not substantially interfere with the nature and purposes of the trail, may be permitted by the Secretary charged with the administration of the trail. Reasonable efforts shall be made to provide sufficient access opportunities to such trails and, to the extent practicable, efforts shall be made to avoid activities incompatible with the purposes for which such trails were established.

Motorized vehicles, prohibition, exceptions.

The use of motorized vehicles by the general public along any national scenic trail shall be prohibited and nothing in this Act shall be construed as authorizing the use of motorized vehicles within the natural and historical areas of the national park system, the national wildlife refuge system, the national wilderness preservation system where they are presently prohibited or on other Federal lands where trails are designated as being closed to such use by the appropriate Secretary: *Provided*, That the Secretary charged with the administration of such trail shall establish regulations which shall authorize the use of motorized vehicles when, in his judgment, such vehicles are necessary to meet emergencies or to enable adjacent landowners or land users to have reasonable access to their lands or timber rights: *Provided further*, That private lands included in the national recreation or scenic trails by cooperative agreement of a landowner shall not preclude such owner from using motorized vehicles on or across such trails or adjacent lands from time to time in accordance with regulations to be established by the appropriate Secretary.

Uniform markers.

The Secretary of the Interior and the Secretary of Agriculture, in consultation with appropriate governmental agencies and public and private organizations, shall establish a uniform marker, including thereon an appropriate and distinctive symbol for each national recreation and scenic trail. Where the trails cross lands administered by Federal agencies such markers shall be erected at appropriate points along the trails and maintained by the Federal agency administering the trail in accordance with standards established by the appropriate Secretary and where the trails cross non-Federal lands, in accordance with written cooperative agreements, the appropriate Secretary shall provide such uniform markers to cooperating agencies and shall require such agencies to erect and maintain them in accordance with the standards established.

Use, acquisition of lands.

(d) Within the exterior boundaries of areas under their administration that are included in the right-of-way selected for a national recreation or scenic trail, the heads of Federal agencies may use lands for trail purposes and may acquire lands or interests in lands by written cooperative agreement, donation, purchase with donated or appropriated funds or exchange: *Provided*, That not more than twenty-five acres in any one mile may be acquired without the consent of the owner.

Acreage limitation.

Right-of-way lands outside exterior boundries.

(e) Where the lands included in a national scenic trail right-of-way are outside of the exterior boundaries of federally administered areas, the Secretary charged with the administration of such trail shall encourage the States or local governments involved (1) to enter into written cooperative agreements with landowners, private organizations, and individuals to provide the necessary trail right-of-way, or (2) to acquire such lands or interests therein to be utilized as segments of the national scenic trail: *Provided*, That if the State or local governments fail to enter into such written cooperative agreements or to acquire such lands or interests therein within two years after notice of the selection of the right-of-way is published, the appropriate Secretary may (i) enter into such agreements with landowners, States, local governments, private organizations, and individuals for the use of lands for trail purposes, or (ii) acquire private lands or interests therein by donation, purchase with donated or appropriated funds or exchange in accordance with the provisions of subsection (g) of this section. The lands involved in such rights-of-way should be acquired in fee, if other methods of public control are not sufficient to assure their use for the purpose for which they are acquired: *Provided*, That if the Secretary charged with the administration of such trail permanently relocates the right-of-way and disposes of all title or interest in the land, the original owner, or his heirs or assigns, shall be offered, by notice given at the former owner's last known address, the right of first refusal at the fair market price.

Property suitable for exchange.

(f) The Secretary of the Interior, in the exercise of his exchange authority, may accept title to any non-Federal property within the right-of-way and in exchange therefor he may convey to the grantor of such property any federally owned property under his jurisdiction which is located in the State wherein such property is located and which he classifies as suitable for exchange or other disposal. The values of the properties so exchanged either shall be approximately equal, or if they are not approximately equal the values shall be equalized by the payment of cash to the grantor or to the Secretary as the circumstances require. The Secretary of Agriculture, in the exercise of his exchange authority, may utilize authorities and procedures available to him in connection with exchanges of national forest lands.

Use of condemnation proceedings to acquire private lands.

(g) The appropriate Secretary may utilize condemnation proceedings without the consent of the owner to acquire private lands or interests therein pursuant to this section only in cases where, in his judgment, all reasonable efforts to acquire such lands or interests therein by negotiation have failed, and in such cases he shall acquire only such title as, in his judgment, is reasonably necessary to provide passage across such lands: *Provided*, That condemnation proceedings may not be utilized to acquire fee title or lesser interests to more than twenty-five acres in any one mile and when used such authority shall be limited to the most direct or practicable connecting trail right-of-way: *Provided further*. That condemnation is prohibited with respect to all acquisition of lands or interest in lands for the purposes of the Pacific Crest Trail. Money appropriated for Federal purposes from the land and water conservation fund shall, without prejudice to appropriations from other sources, be available to Federal departments for the acquisition of lands or interests in lands for the purposes of this Act.

Limitation.

Pacific Crest Trail.

Lands within federally administered areas.

(h) The Secretary charged with the administration of a national recreation or scenic trail shall provide for the development and maintenance of such trails within federally administered areas and shall cooperate with and encourage the States to operate, develop, and maintain portions of such trails which are located outside the boundaries of federally administered areas. When deemed to be in the public interest, such Secretary may enter written cooperative agreements with the States or their political subdivisions, landowners, private organi-

zations, or individuals to operate, develop, and maintain any portion of a national scenic trail either within or outside a federally administered area.

Right-of-way reservation.

Whenever the Secretary of the Interior makes any conveyance of land under any of the public land laws, he may reserve a right-of-way for trails to the extent he deems necessary to carry out the purposes of this Act.

Regulations.

(i) The appropriate Secretary, with the concurrence of the heads of any other Federal agencies administering lands through which a national recreation or scenic trail passes, and after consultation with the States, local governments, and organizations concerned, may issue regulations, which may be revised from time to time, governing the use, protection, management, development, and administration of trails of the national trails system. In order to maintain good conduct on and along the trails located within federally administered areas and to provide for the proper government and protection of such trails, the Secretary of the Interior and the Secretary of Agriculture shall prescribe and publish such uniform regulations as they deem necessary and any person who violates such regulations shall be guilty of a misdemeanor, and may be punished by a fine of not more than $500, or by imprisonment not exceeding six months, or by both such fine and imprisonment.

Publication.

Penalty.

STATE AND METROPOLITAN AREA TRAILS

SEC. 8. (a) The Secretary of the Interior is directed to encourage States to consider, in their comprehensive statewide outdoor recreation plans and proposals for financial assistance for State and local projects submitted pursuant to the Land and Water Conservation Fund Act, needs and opportunities for establishing park, forest, and other recreation trails on lands owned or administered by States, and recreation trails on lands in or near urban areas. He is further directed, in accordance with the authority contained in the Act of May 28, 1963 (77 Stat. 49), to encourage States, political subdivisions, and private interests, including nonprofit organizations, to establish such trails.

78 Stat. 897. 16 USC 460l-4 note.

16 USC 460l-460l-3.

(b) The Secretary of Housing and Urban Development is directed, in administering the program of comprehensive urban planning and assistance under section 701 of the Housing Act of 1954, to encourage the planning of recreation trails in connection with the recreation and transportation planning for metropolitan and other urban areas. He is further directed, in administering the urban open-space program under title VII of the Housing Act of 1961, to encourage such recreation trails.

73 Stat. 678; 78 Stat. 792; 81 Stat. 262. 40 USC 461.

75 Stat. 183. 42 USC 1500 et seq.

(c) The Secretary of Agriculture is directed, in accordance with authority vested in him, to encourage States and local agencies and private interests to establish such trails.

(d) Such trails may be designated and suitably marked as parts of the nationwide system of trails by the States, their political subdivisions, or other appropriate administering agencies with the approval of the Secretary of the Interior.

Suitable markings.

RIGHTS-OF-WAY AND OTHER PROPERTIES

SEC. 9. (a) The Secretary of the Interior or the Secretary of Agriculture as the case may be, may grant easements and rights-of-way upon, over, under, across, or along any component of the national trails system in accordance with the laws applicable to the national park system and the national forest system, respectively: *Provided*, That any conditions contained in such easements and rights-of-way shall be related to the policy and purposes of this Act.

Easements and rights-of-way.

Cooperation of Federal agencies.

(b) The Department of Defense, the Department of Transportation, the Interstate Commerce Commission, the Federal Communications Commission, the Federal Power Commission, and other Federal agencies having jurisdiction or control over or information concerning the use, abandonment, or disposition of roadways, utility rights-of-way, or other properties which may be suitable for the purpose of improving or expanding the national trails system shall cooperate with the Secretary of the Interior and the Secretary of Agriculture in order to assure, to the extent practicable, that any such properties having values suitable for trail purposes may be made available for such use.

AUTHORIZATION OF APPROPRIATIONS

SEC. 10. There are hereby authorized to be appropriated for the acquisition of lands or interests in lands not more than $5,000,000 for the Appalachian National Scenic Trail and not more than $500,000 for the Pacific Crest National Scenic Trail.

Approved October 2, 1968.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 1631 accompanying H. R. 4865 (Comm. on Interior & Insular Affairs) and No. 1891 (Comm. of Conference).
SENATE REPORT No. 1233 (Comm. on Interior & Insular Affairs).
CONGRESSIONAL RECORD, Vol. 114 (1968):
July 1: Considered and passed Senate.
July 15: Considered and passed House, amended, in lieu of H. R. 4865.
Sept. 18: House agreed to conference report.
Sept. 19: Senate agreed to conference report.

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

SUBJECT	Trails in Highway Rights-of-Way	FHWA NOTICE

August 12, 1971
EV-1

There is a growing interest in providing walking and bicycle trails for people living in urban and adjacent suburban areas. This is brought out in a 1966 report by the Bureau of Outdoor Recreation entitled, "Trails for America,"[1/] and currently in public utterances by Secretary Volpe.

There are times when in the planning of a highway it is possible to include in the highway right-of-way a walking or bicycle trail that would be of significant benefit to the community. This would be especially true when the trail along the highway serves as a connecting link between a larger system of trails running through the community.

In view of the above, trails proposed within highway rights-of-way should be given favorable consideration where an important public need will be served and where conditions are appropriate. This policy is in accord with recent statements by Secretary Volpe and myself urging the development of trails for hiking, bicycling, and equestrian use.

Plans for trails must of course give due consideration to safety and amenity. Along a major artery there obviously should be some degree of physical separation and in some cases a protective fence may be needed. Crossings between streets and trails must be carefully handled. While the acquisition of additional land solely for the purpose of providing trails may be permitted under some circumstances, there should be many instances in which sufficient land already will be available, particularly if full use is made of the provisions of Paragraph 5q in PPM 80-1. Land acquired under the scenic enhancement provisions of Section 319(b) can provide additional opportunities.

In all cases where we have the 3-C planning operations in progress, consideration should be given to including trails as part of the areawide transportation plan. We are seeking all possible ways to utilize those transportation modes or mixtures of several modes which will provide the most efficient and acceptable service. These searches are also to consider ways to eliminate the need for trips altogether by any mode.

F. C. Turner
Federal Highway Administrator

1/ Copies available from the Government Printing Office at $3 per copy.

N. C. Floodway Act

§ **143-215.51. Preamble.**—The purpose of this Part is to specify a means for regulation of artificial obstructions in floodways by responsible local governments with guidance, coordination and assistance from State government, consonant with the State policy of vesting primary responsibility for flood plain management with local levels of government. It is hereby declared that the channel and a portion of the flood plain of all of the State's streams will be designated as a floodway, in which artificial obstructions may not be placed except with the permission of the responsible local government. The purpose of designating these areas as a floodway is to help control and minimize the extent of floods by preventing obstructions which inhibit water flow and increase flood height and damage, and thereby to prevent or minimize loss of life, injuries, property damage and other losses (both public and private) in flood hazard areas, and to promote the public health, safety and welfare of citizens of North Carolina in flood hazard areas. (1971, c. 1167, s. 3.)

Editor's Note. — Session Laws 1971, c. 1167, s. 12, makes the act effective July 1, 1971. Session Laws 1971, c. 1167, s. 11, contains a severability clause.

§ **143-215.52. Definitions.**—As used in this Part, unless the context otherwise requires:

(1) "Artificial obstruction" means any obstruction which is not a natural obstruction, including any which, while not a significant obstruction in itself, is capable of accumulating debris and thereby reducing the flood-carrying capacity of the stream.

(2) "Floodway" means that portion of the channel and flood plain of a stream designated to provide passage for the 100-year flood, without increasing the elevation of that flood at any point by more than one foot.

(3) "Local government" means any county or municipal corporation.

(4) "Natural obstruction" includes any rock, tree, gravel, or analogous natural matter that is an obstruction and has been located within the floodway by a nonhuman cause.

(5) "Stream" means a water course that collects surface runoff from an area of one square mile or greater. This does not include flooding due to tidal or storm surge on estuarine or ocean waters. (1971, c. 1167, s. 3.)

§ **143-215.53. Artificial obstruction prohibited.**—The placement of any artificial obstruction in the floodway of any stream after the floodway has been delineated pursuant to G.S. 143-215.56 is hereby prohibited, except as set forth in G.S. 143-215.54, unless a permit has been obtained for such artificial obstruction from the responsible local government. No damageable portion of a structure located outside the floodway may be below the elevation that would be attained by the 100-year flood if the stream were contained within the floodway. (1971, c. 1167, s. 3.)

§ **143-215.54. Floodway uses.**—(a) Local governments are empowered to grant permits for the use of the floodways consistent with the purposes of this Part.

(b) The following uses may be made of floodways as a matter of right without a permit issued under this Part:

(1) General farming, pasture, outdoor plant nurseries, horticulture, forestry, wildlife sanctuary, game farm, and other similar agricultural, wildlife and related uses.

(2) Loading areas, parking areas, rotary aircraft ports, and other similar industrial-commercial uses.

(3) Lawns, gardens, parking, play areas, and other similar uses.

(4) Golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, parks, swimming pools, hiking or horseback-riding trails, open space and other similar private and public recreational uses.

(5) Streets, bridges, overhead utility lines, creek and storm drainage facilities, sewage or waste treatment plant outlets, water supply intake structures, and other similar public, community or utility uses.

(6) Temporary facilities (for a specified number of days), such as displays, circuses, carnivals, or similar transient amusement enterprises.

(7) Boat docks, ramps, piers, or similar structures.

(8) Dams. (1971, c. 1167, s. 3.)

§ **143-215.55. Existing artificial obstructions.**—Artificial obstructions existing in a floodway on July 1, 1971 shall not be considered to be in violation of this Part. However, they may not be enlarged or replaced in part or in whole, without a permit, as provided by this Part in the case of a proposed artificial obstruction. Local governments are empowered to acquire, by purchase, exchange, or condemnation such existing artificial obstructions if deemed necessary by the responsible local government for the purpose of avoiding flood damages. The procedure in all condemnation proceedings pursuant to this section shall conform as nearly as possible to the procedure provided in G.S. Chapter 40, Article 2, and all acts amendatory thereof. (1971, c. 1167, s. 3.)

§ **143-215.56. Delineation of floodway; powers of Board of Water and Air Resources; powers of local governments.**—(a) For the purpose of delineating the floodway and evaluating the possibility of flood damages, responsible local governments are empowered to:

(1) Request technical assistance from the competent federal agencies, including the Army Corps of Engineers, the Soil Conservation Service, the Tennessee Valley Authority, and the U.S. Geological Survey, or successor agencies, and

(2) Utilize the reports and data supplied by federal and State agencies as the basis for the exercise by local ordinance or resolution of the powers and responsibilities conferred on responsible local governments by this Part.

(b) The Board of Water and Air Resources shall be empowered to render advice and assistance to any local government having responsibilities under this Part. In exercising this function it shall specifically be authorized to furnish manuals, suggested standards, plans, and other technical data; to conduct training programs; and to give advice and assistance with respect to handling of particular applications; but it shall not be limited to such activities. In the exercise of its powers to adopt rules and regulations interpreting and applying the provisions of this Part, the Board may adopt (but is not limited to adopting) regulations interpreting any of the terms used in this Part including regulations supplementing the definitions provided in this Part. A copy of every regulation adopted by the Board interpreting or applying the provisions of this Part, shall be filed by the Board with the chairman of the governing body of each county and municipality

within the State, as well as with the Secretary of State as required by G.S. 143-195.

(c) The local governing body may delineate any floodway subject to its regulation by showing it on a map or drawing, by a written description, or any combination thereof, to be designated appropriately and filed permanently with the clerk of superior court and with the register of deeds in the county where the land lies and with the Director of Water and Air Resources. Alterations in these lines shall be indicated by appropriate entries upon or additions to such map or description. Such entries or additions shall be made by or under the direction of the clerk of superior court. Photographic, typed or other copies of such map or description, certified by the clerk of superior court, shall be admitted in evidence in all courts and shall have the same force and effect as would the original map or description. The local governing body may provide for the redrawing of any such map. A redrawn map shall supersede for all purposes the earlier map or maps which it is designated to replace upon the filing thereof at those places designated above. (1971, c. 1167, s. 3.)

§ **143-215.57. Procedures in issuing permits.**—(a) Responsible local governments are empowered to establish application forms and require such maps, plans, and other information as necessary for the issuance of permits in a manner consonant with the objectives of this Part. They shall consider the effects of a proposed artificial obstruction in a floodway in creating danger to life and property

(1) By water which may be backed up or diverted by such obstruction;
(2) By the danger that the obstruction will be swept downstream to the injury of others; and
(3) By the injury or damage at the site of the obstruction itself.

For this purpose they may take into account anticipated development in the foreseeable future which may be adversely affected by the obstruction, as well as existing development.

(b) In prescribing standards and requirements for the issuance of permits under this Part, and in issuing such permits, responsible local governments shall proceed as in the case of an ordinance for the better government of the county or municipality, as the case may be. A municipality may exercise the powers granted in this Part not only within its corporate boundaries but also within the area of its extra-territorial zoning jurisdiction. A county may exercise the powers granted in this Part at any place within the county outside the zoning jurisdiction of any municipalities in the county. The county may regulate territory within the zoning jurisdiction of any municipality whose governing body, by resolution, agrees to such regulation; provided, however, that any such municipal governing body may, upon one year's written notice, withdraw its approval of the county regulations, and those regulations shall have no further effect within the municipality's jurisdiction.

(c) The local governing body is hereby empowered to adopt such regulations as it may deem necessary concerning the form, time, and manner of submission of applications for permits under this Part. Such regulations may provide for the issuance of permits under this Part by the local governing body or by such agency as may be designated by said body, as prescribed by the governing body. Every final decision granting or denying a permit under this Part shall be subject to review by the superior court of the county, with the right of jury trial at the election of the party seeking review. The time and manner of election of a jury trial shall be governed by G.S. 1A-1, Rule 38(b) of the Rules of Civil Procedure. Pending the final disposition of any such appeal, no action shall be taken which would be unlawful in the absence of a permit issued under this Part. (1971, c. 1167, s. 3.)

§ **143-215.58. Violations and penalties.** — (a) Any violation of this Part or of any ordinance adopted (or of the provisions of any permit issued) under the authority of this Part shall constitute a misdemeanor.

(b) Failure to remove any artificial obstruction or enlargement or replacement thereof, that violates this Part or any ordinance adopted (or the provision of any permit issued) under the authority of this Part, shall constitute a separate violation of this Part for each 10 days that such failure continues after written notice from the county or municipal governing body

(c) In addition to or in lieu of other remedies, the county or municipal governing body may institute any appropriate action or proceeding to restrain or prevent any violation of this Part or of any ordinance adopted (or of the provisions of any permit issued) under the authority of this Part, or to require any person, firm or corporation which has committed any such violation to remove a violating obstruction or restore the conditions existing before the placement of the obstruction. (1971, c. 1167, s. 3.)

§ **143-215.59. Other approvals required.**—(a) The granting of a permit under the provisions of this Part shall in no way affect any other type of approval required by any other statute or ordinance of the State or any political subdivision of the State, or of the United States, but shall be construed as an added requirement

(b) No permit for the construction of any structure to be located within a floodway shall be granted by a political subdivision unless the applicant has first obtained the permit required by this Part. (1971, c. 1167, s. 3.)

§ **143-215.60 Liability for damages.**—No action for damages sustained because of injury caused by an obstruction for which a permit has been granted under this Part shall be brought against the State or any political subdivision of the State, or the employees or agents. (1971, c. 1167, s. 3.)

§ **143-215.61 Flood plain management.**—The provisions of this Part shall not preclude the composition by responsible local governments of land use controls and other regulations in the interest of flood plain management for the flood plain or the floodway (1971, c. 1167, s. 3.)

Suggested Zoning Changes

Zoning Regulations:

Section 24-2(33) the term "Greenway" should be defined.

Section 24-4(g) greenway should be added to the list of considerations as a public facility.

(j) flooding should be added to the list of considerations as a hazard.

(o)(17) a Greenway District should be established conforming with the proposed "minimum greenway right-of-way".

Section 24-8.2(6) these three land uses which

Section 24-13.2(7) require site plan approval

Section 24-26(d) should require that the greenway be shown upon the plan as a site feature.

Section 24-42.1(3)(d) the existence of elements of the greenway or connectors to the greenway should be a consideration of the council when granting special exceptions for density.

Section 24-49(c)(9) the greenway should also be a consideration when granting front, side, and rear yard exceptions.

In addition to these specific changes, there should be a general change made to require site plan approval for all land use types. This procedure should require a site analysis which would consider: soil types, slope, vegetation, and natural drainage patterns as well as those factors already required of site plans, and the relationship of all of these factors should be analyzed.

Suggested Subdivision Changes

Subdivision Regulations:

Section 20-2(q) the term "Greenway" should be defined.

(r) the term "open space" should be defined.

(s) the term "common area" should be defined.

Section 20-4.3(B) the site plan required for townhouse developments should show proposed and existing greenways.

Section 20-25(d) should be changed to read: The subdivider or developer shall pipe or completely enclose all open ditches, drains, and natural water courses which carry only rain and runoff waters within the subdivision.

Section 20-26(b) should be changed to read: The city will accept no responsibility to maintain any storm drainage structures or easements except those lying within street and greenway rights-of-way.

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ACKNOWLEDGEMENTS

graphics by: James B. Carpenter

MY SINCERE APPRECIATION TO THE NUMEROUS INDIVIDUALS WITHIN THE FOLLOWING AGENCIES AND OFFICES, WHOSE HELP AND EXPERTISE HAVE GUIDED THIS REPORT TO A LEVEL OF ATTAINABILITY FOR THE CITIZENS OF RALEIGH:

CITY OF RALEIGH

City Attorney's Office

City Manager's Office

Parks and Recreation Department

Planning Department

Public Utilities Department

NORTH CAROLINA STATE UNIVERSITY

Center for Urban Affairs and Community Services

Department of Landscape Architecture

Department of Recreation Resources Administration

THIS REPORT WAS FUNDED THROUGH A GRANT FROM THE RALEIGH CITY COUNCIL.

DATE DUE

23 JAN			

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