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SUGAR CREEK BASIN NORTH CAROLINA & SOUTH CAROLINA FLOOD CONTROL ALTERNATI. (U) CORPS OF ENGINEERS CHARLESTON SC CHARLESTON DISTRICT 18 APR 79

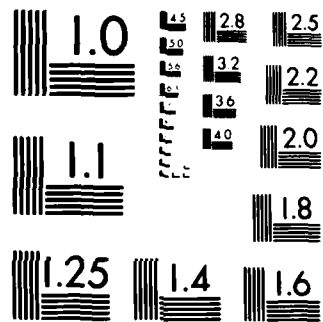
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# SUGAR CREEK BASIN

## NORTH CAROLINA & SOUTH CAROLINA

(7)

### AREA I

### FLOOD

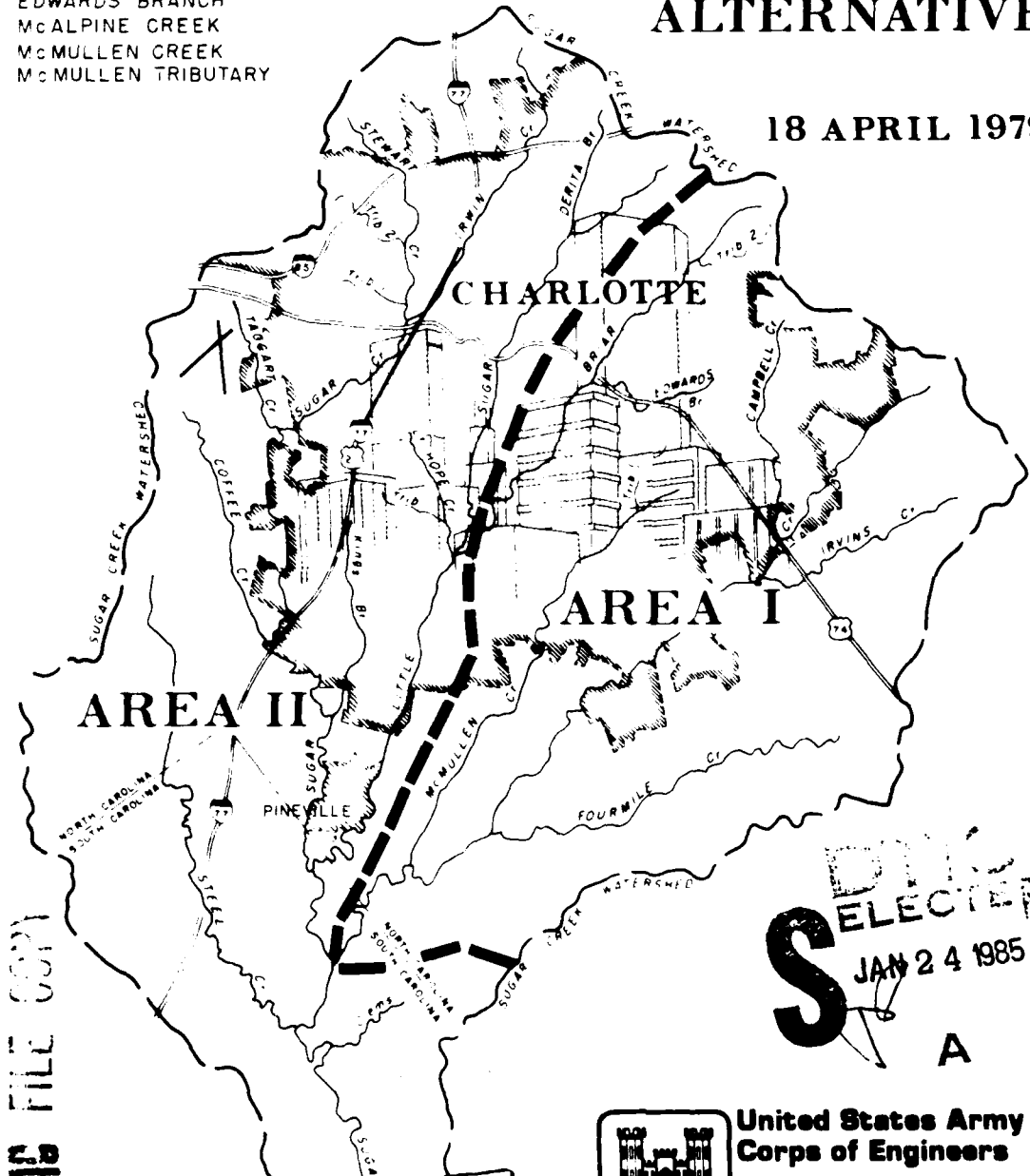
### CONTROL

### ALTERNATIVES

- BRIAR CREEK
- BRIAR TRIBUTARY II
- CAMPBELL CREEK
- EDWARDS BRANCH
- McALPINE CREEK
- McMULLEN CREEK
- McMULLEN TRIBUTARY

18 APRIL 1979

AD-A149 789



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Corps of Engineers**  
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**Charleston District**

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**PLAN FORMULATION PUBLIC MEETING**

SUGAR CREEK BASIN  
FLOOD CONTROL ALTERNATIVES  
AREA 1

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SUGAR CREEK BASIN  
FLOOD CONTROL ALTERNATIVES  
AREA 1

INTRODUCTION

This brochure presents information on alternative plans which have been formulated as potential solutions for the reduction of flood damages experienced in the eastern half of Sugar Creek Basin, North Carolina and South Carolina. Alternative solutions for the following streams are discussed in this brochure:

- \*BRIAR CREEK
- \*BRIAR TRIBUTARY #2
- \*CAMPBELL CREEK
- \*EDWARDS BRANCH
- \*McALPINE CREEK
- \*McMULLEN CREEK
- \*McMULLEN TRIBUTARY

Alternative plans for the remaining portion of Sugar Creek Basin are presented in a similar brochure which will be made available upon request. These plans will be presented and discussed at the plan formulation public meeting scheduled for 19 April 1979 in the Charlotte Civic Center. Alternative solutions for the following streams will be presented and discussed at the 19 April 1979 public meeting:

- \*DERITA BRANCH
- \*KINGS CREEK
- \*LITTLE HOPE CREEK
- \*LITTLE HOPE TRIBUTARY
- \*LITTLE SUGAR CREEK
- \*STEWART CREEK
- \*STEWART TRIBUTARIES 1 & 2
- \*SUGAR-IRWIN CREEKS
- \*TAGGART CREEK

Potential flood control alternatives for the Town of Pineville, North Carolina will also be presented at the 19 April 1979 public meeting.

This brochure is intended to help you understand the flood problems of the Sugar Creek Basin and to present potential alternatives to alleviate flood damages. You are encouraged to make full use of this brochure to assess potential effects of the flood control alternatives and the desirability of implementing the various alternatives. Everyone will be given the opportunity to participate by expressing views and furnishing data on any aspect of the study. You are encouraged to freely, fully and publicly express your views by:

. Writing to:

District Engineer  
U. S. Army Corps of Engineers - Charleston  
P. O. Box 919  
Charleston, S. C. 29402

. Calling:

Corps representatives will be available locally at the Cameron-Brown Building (Phone 374-2291) from 8:00 a.m. - 4:00 p.m. on Thursday, 19 April (Area I) and 8:00 a.m. - 11:30 a.m. on Friday, 20 April, (Area II). Calls may also be made to the Corps office in Charleston, S. C., after the 23rd of April (Area Code 803-724-4247 or 724-4254).

. Participation in:

Plan Formulation Public Meetings  
18 & 19 April 1979 at 7:30 p.m.  
Charlotte Civic Center  
101 South College Street  
Charlotte, N. C.

All comments should be received by 15 May 1979 to assure full consideration in the selection of various recommended plans of improvement. A late stage public meeting will be held later this year to present study recommendations. The date, time and place will be announced later.

#### STUDY AUTHORITY

Because of the almost yearly flooding experienced in the urban areas of the Sugar Creek Basin, particularly in the highly developed area of Charlotte, North Carolina, the committee on Public Works of the United States Senate, at the request of local interests made through their representatives in Congress, adopted a resolution requesting a study in the interest of flood control and allied purposes. The resolution adopted on 4 November 1971 is quoted as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers for Rivers and Harbors, created under the Provisions of Section 3 of the Rivers and Harbors Act approved June 13, 1902, be, and is hereby, requested to review the report of the Chief of Engineers on the Santee River System, North Carolina and South Carolina, Published as Senate Document Number 189, Seventy-eighth Congress, and other Pertinent reports with a view to determining whether any modifications of the recommendations contained therein are advisable at this time, with particular reference to providing improvements in the Sugar Creek Basin, North Carolina and South Carolina, in the interest of flood control and allied purposes."



## STUDY STATUS

The Sugar Creek Basin Study has progressed to the point of identifying existing and anticipated future flooding problems and formulating potential structural and nonstructural alternatives for the reduction of flood damages within the Sugar Creek Basin. All alternatives investigated to date for the eastern portion of the basin are discussed in this brochure. A similar brochure for the remainder of the basin is also available. Two public plan formulation meetings are being held on 18 and 19 April 1979. All plans formulated for the entire basin will be presented during these meetings and public input is solicited to assist in the selection of a recommended plan of improvement. A draft report of the study findings and recommendations is scheduled for completion in September of this year.

## PLAN FORMULATION PROCESS

In order to formulate alternative plans of improvement, high damage areas were identified based on existing and projected future flood stages. Structural alternatives were formulated for each high damage reach. These alternatives consist of a variety of flood control measures including channel modifications, bridge alterations, paved channels, covered floodways, levees, floodwalls and reservoir storage. Nonstructural alternatives, which generally consist of the evacuation of flood plain structures from the flood plain, have also been formulated for all damage areas within the basin. Plans which emphasize

contributions to the improvement of environmental quality of the area and the National Economic Development will also be identified during the process of selecting a recommended plan of improvement. The general basin map (page 6) identifies the location and description of each structural alternative within the entire basin considered to date. A summary of each plan in the eastern portion of the basin (Area 1) is subsequently discussed according to sub-basin location.

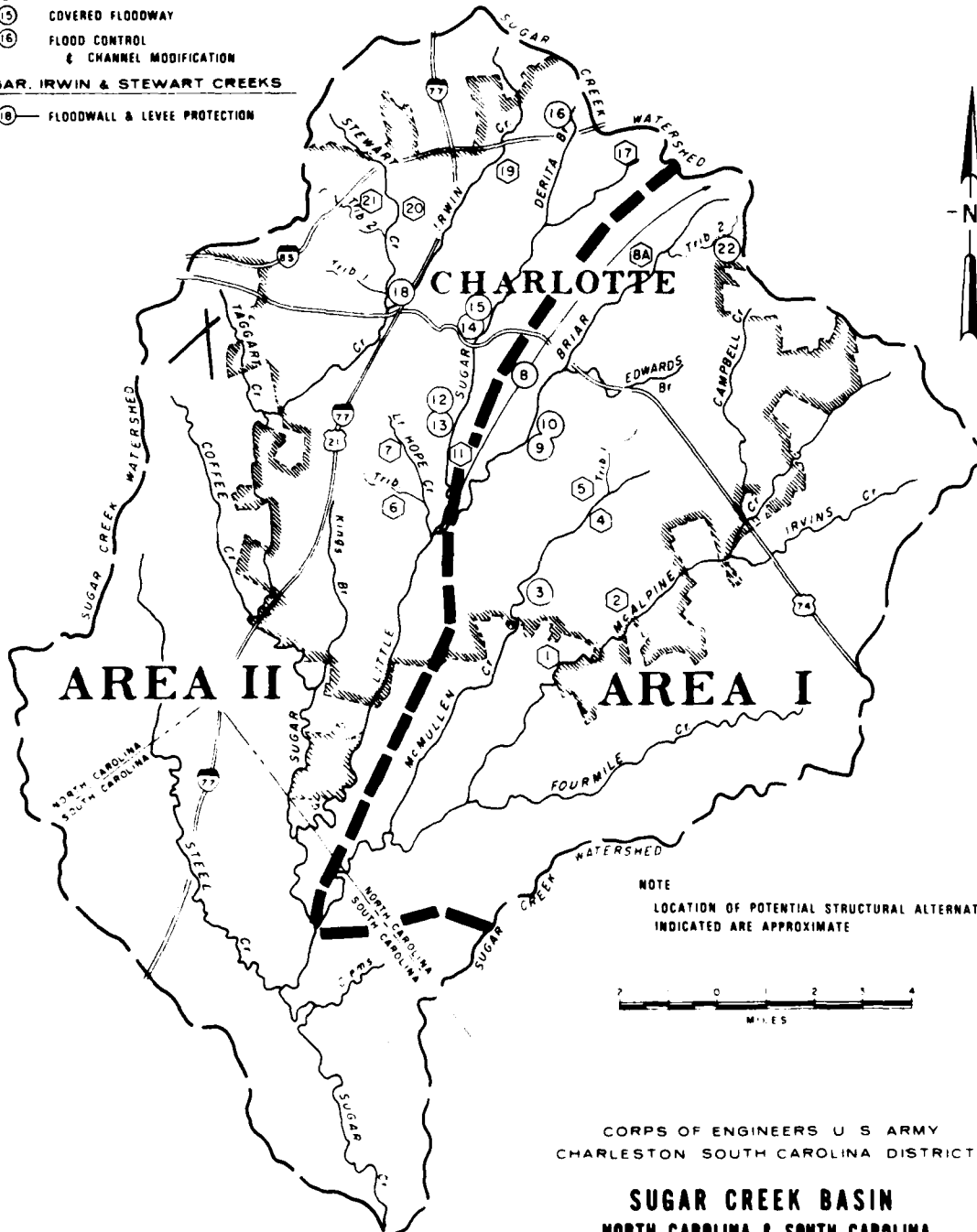
For purposes of clarity, sub-basins are discussed in a counter-clockwise manner beginning with McAlpine Creek and proceeding through Briar Creek. Structural alternatives are discussed first in each section followed by a brief discussion of potential nonstructural alternatives.

**ECONOMICALLY JUSTIFIED**

- McMULLEN CREEK**
- ③ — LEVEE PROTECTION
- BRIAR CREEK**
- ⑨⑩ — LEVEE PROTECTION
- ⑧ — CHANNEL MODIFICATION
- BRIAR CREEK TRIB 2**
- ⑫ — CHANNEL MODIFICATION
- LITTLE SUGAR CREEK**
- DERITA BRANCH**
- ⑫⑬ — CHANNEL MODIFICATION
- ④ — CHANNEL MODIFICATION
- ⑤ — COVERED FLOODWAY
- ⑬ — FLOOD CONTROL & CHANNEL MODIFICATION
- SUGAR, IRWIN & STEWART CREEKS**
- ⑮ — FLOODWALL & LEVEE PROTECTION

**ECONOMICALLY UNJUSTIFIED**

- McALPINE CREEK**
- ① — CHANNEL MODIFICATION
- ② — LEVEE PROTECTION
- McMULLEN CREEK**
- ④ — LEVEE PROTECTION
- McMULLEN TRIB**
- ⑦ — CHANNEL MODIFICATION
- LITTLE HOPE & TRIB**
- ⑥ — CHANNEL MODIFICATION
- ⑦ — CHANNEL MODIFICATION
- LITTLE SUGAR CREEK**
- ⑪ — CHANNEL MODIFICATION
- ⑰ — FLOOD CONTROL RESERVOIR
- IRWIN CREEK**
- ⑲ — LEVEE PROTECTION
- STEWART CREEK & TRIB**
- ⑳ — CHANNEL MODIFICATION
- ㉑ — CHANNEL MODIFICATION
- BRIAR CREEK**
- ⑧A — CHANNEL MODIFICATION



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CHARLESTON SOUTH CAROLINA DISTRICT

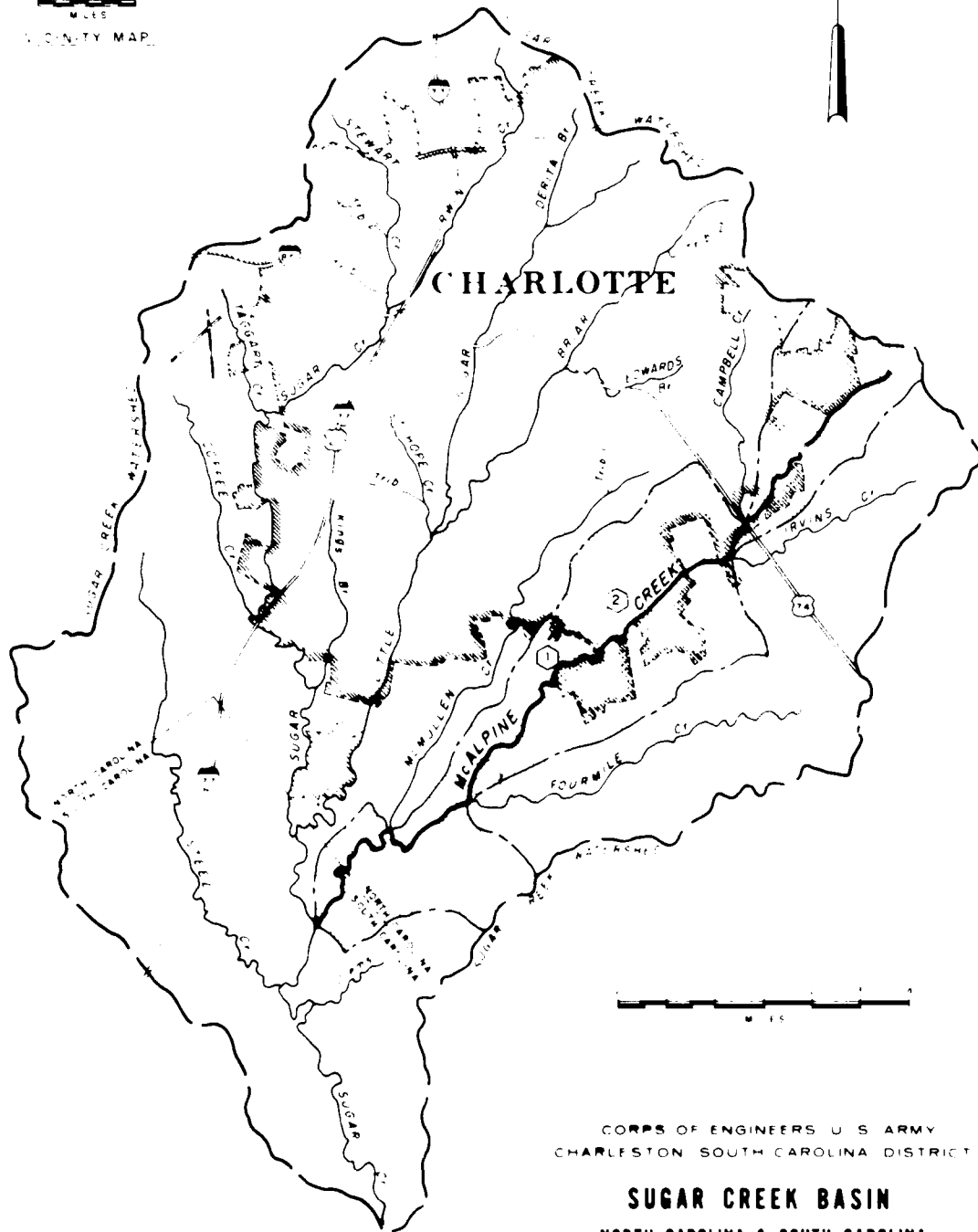
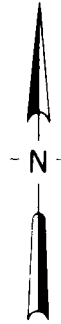
**SUGAR CREEK BASIN  
NORTH CAROLINA & SOUTH CAROLINA  
GENERAL MAP  
STRUCTURAL ALTERNATIVES**

**McALPINE CREEK**



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LOC. MAP



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CHARLESTON SOUTH CAROLINA DISTRICT

**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**  
**McALPINE CREEK WATERSHED**

## STRUCTURAL ALTERNATIVES - MCAI PINE CREEK

### Alternative 1, Channel Modification

The proposals for Alternative 1 consisted of channel modification on McAlpine Creek from Rea Branch confluence to Old Providence Road, a total distance of 3.2 miles, channel bottom widths varied from 70 feet to 50 feet with channel side slopes of 2 horizontal to 1 vertical. No bridge modifications would be required. Total channel excavation yardage for this alternative were estimated to be 89,400 cubic yards. The estimated first cost of Alternative 1 is \$2,020,400 which yields an annual cost of \$144,100 based on the prevailing Federal interest rate of 6-7/8% and a fifty year project life expectancy. (Annual operation and maintenance cost are not included). Annual project benefits of \$51,900 when compared to annual cost yields a benefit to cost ratio of 0.36. Further evaluation of structural alternatives for this reach of McAlpine Creek have been terminated due to the lack of economic justification.

### Alternative 2, Levee Protection

Proposals for Alternative 2 consisted of providing levee protection to an apartment complex located upstream from Providence Road. The proposals would utilize existing ponding areas to store interior runoff and would require construction of a levee approximately 1300 feet in length. Estimated first cost of the levee alternative was \$221,000 which yielded an annual cost of \$15,300. Annual project benefits of \$2,000 when compared to annual cost yields a benefit to cost ratio of 0.12. Further evaluation of this alternative has been terminated due to the lack of economic justification.

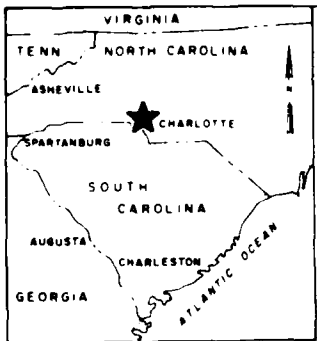
## NONSTRUCTURAL ALTERNATIVES - MCALPINE CREEK

Nonstructural measures for flood control generally modify flood damage susceptibility and do not reduce or eliminate flooding. Several such measures have already been implemented by the City of Charlotte including floodway zoning, flood insurance, and open space development of flood plain areas for recreational facilities. Other nonstructural measures being considered for McAlpine Creek include the evacuation of damageable properties from the floodplain by either physically relocating floodplain structures or by demolishing affected structures. Reclaimed floodplain lands would then be restored to natural conditions or developed in a manner compatible with floodplain use such as parks, playgrounds, golf courses or environmental corridors.

Alternatives being considered as part of this basin study include evacuation of structures from the 10-year, 15-year, and/or 100-year floodplains based on projected 2010 conditions. Economic analysis of nonstructural alternatives indicate a marginal feasibility of evacuating all structures within the 10 and 15-year floodplains, including 18 single-family residential structures; 12 apartment units and 5 commercial and/or public establishments. Evacuation of the 100-year floodplain is economically unjustified. Incremental feasibility of the evacuation of floodplain structures in various damage areas of McAlpine Creek will be discussed in workshop type groups during the course of this meeting.

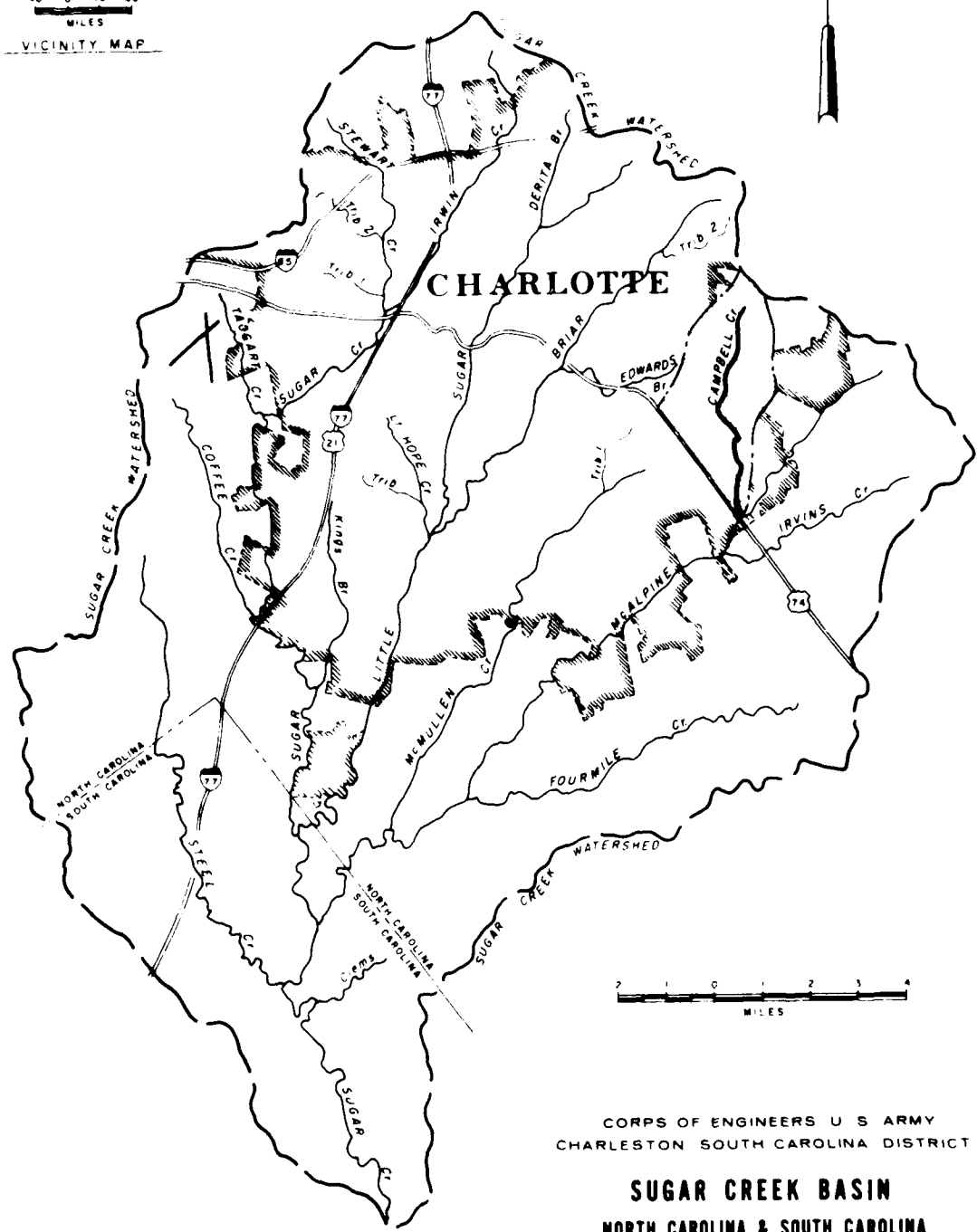
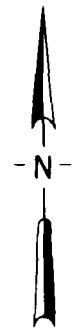
CAMPBELL CREEK





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VICINITY MAP



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**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**  
**CAMPBELL CREEK WATERSHED**

#### STRUCTURAL ALTERNATIVES - CAMPBELL CREEK

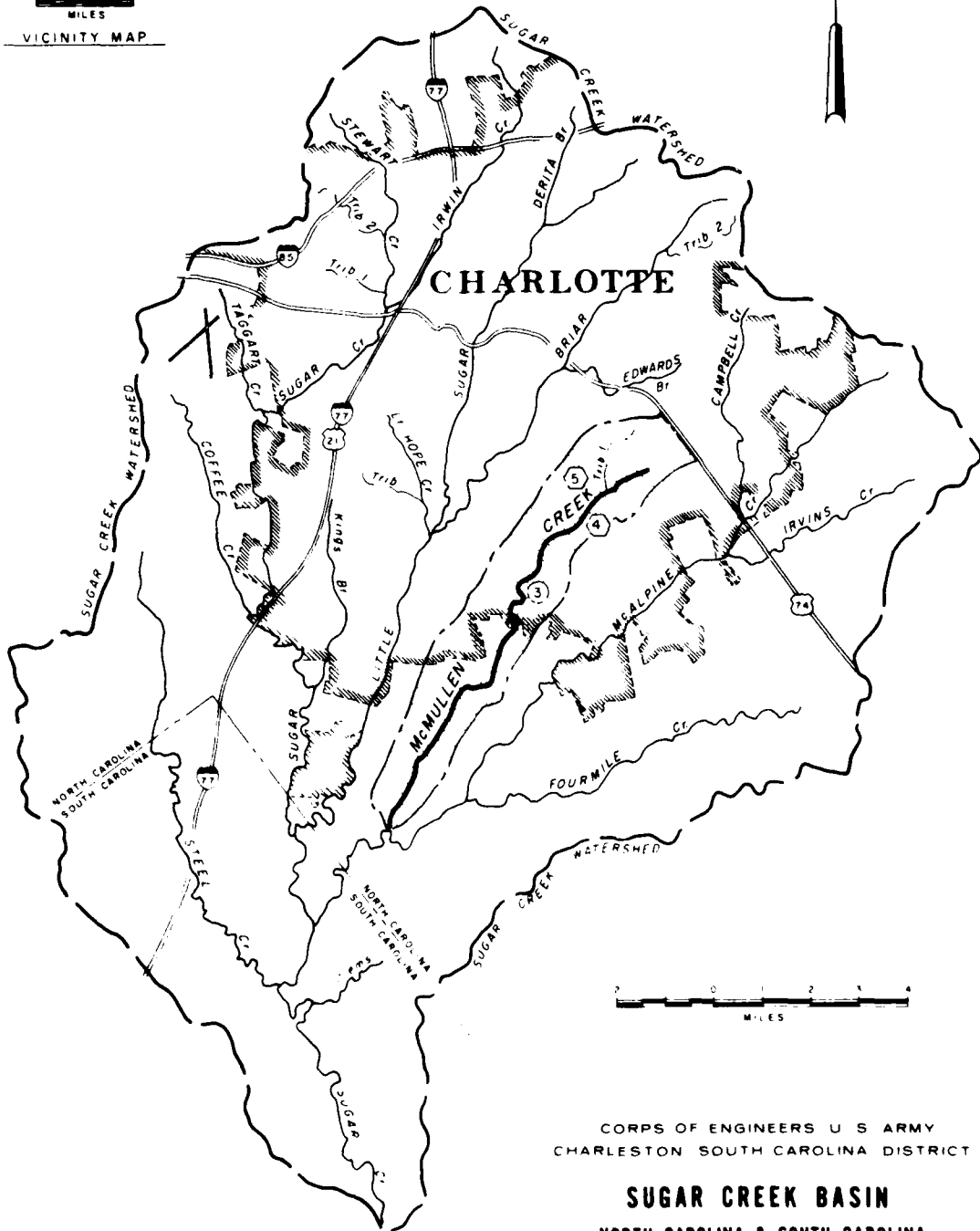
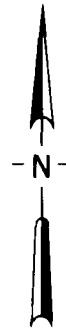
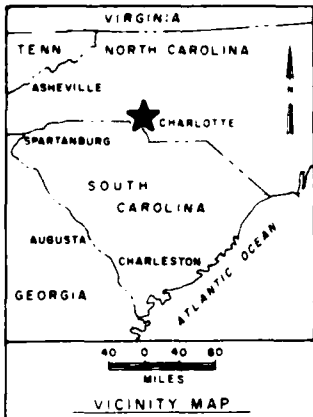
Due to the relatively low monetary damages experienced on Campbell Creek during flood conditions, structural alternatives were deemed unfeasible. Nonstructural alternatives, however, were formulated and are discussed in the following paragraphs:

#### NONSTRUCTURAL ALTERNATIVES - CAMPBELL CREEK

Nonstructural measures for flood control generally modify flood damage susceptibility and do not reduce or eliminate flooding. Several such measures have already been implemented by the City of Charlotte including floodway zoning, flood insurance, and open space development of floodplain areas for recreational facilities. Other nonstructural measures being considered for Campbell Creek include the evacuation of damageable properties from the floodplain by either physically relocating floodplain structures or by demolishing affected structures. Reclaimed floodplain lands would then be restored to natural conditions or developed in a manner compatible with floodplain use such as parks, playgrounds, golf courses or environmental corridors.

Alternatives being considered as part of this basin study include evacuation of structures from the 10-year, 15-year, and/or 100-year floodplain based on projected 2010 conditions. Economic analysis of non-structural alternatives indicates a marginal feasibility of evacuating all structures within the 10 and 15-year floodplains consisting of 2 single-family residential structures. The feasibility of evacuating these structures will be discussed in workshop type groups during the course of this meeting.

**McMULLEN CREEK & TRIBUTARY**



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**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**  
**McMULLEN CREEK WATERSHED**

## STRUCTURAL ALTERNATIVES - MCMULLEN CREEK

### Alternative 3, Levee Protection

The proposals for Alternative 3 consisted of providing localized levee protection to approximately seven homes located in the flood plain of McMullen Creek on Johnny Cake Lane (See Map-Alternative 3). Length of levee required is approximately 650 feet. Preliminary levee design consisted of an average height of 10.0 feet, top width of 10.0 feet and side slopes of 2 horizontal to 1 vertical. Estimated first cost of this alternative is \$72,850. Annual cost of \$5,200 when compared with annual benefits of \$18,000 yields a benefit to cost ratio of 3.26. Additional investigation for solving interior drainage problems will be required.

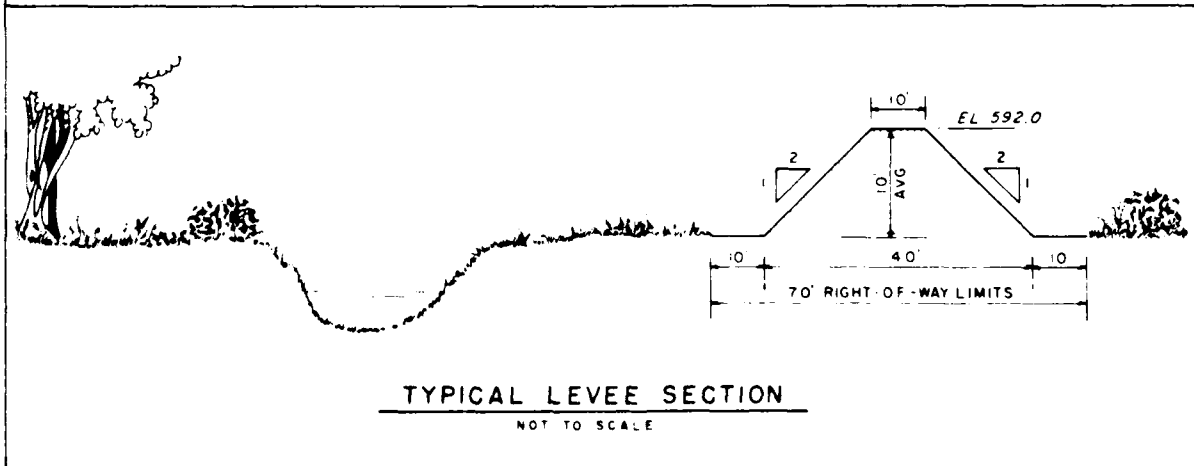
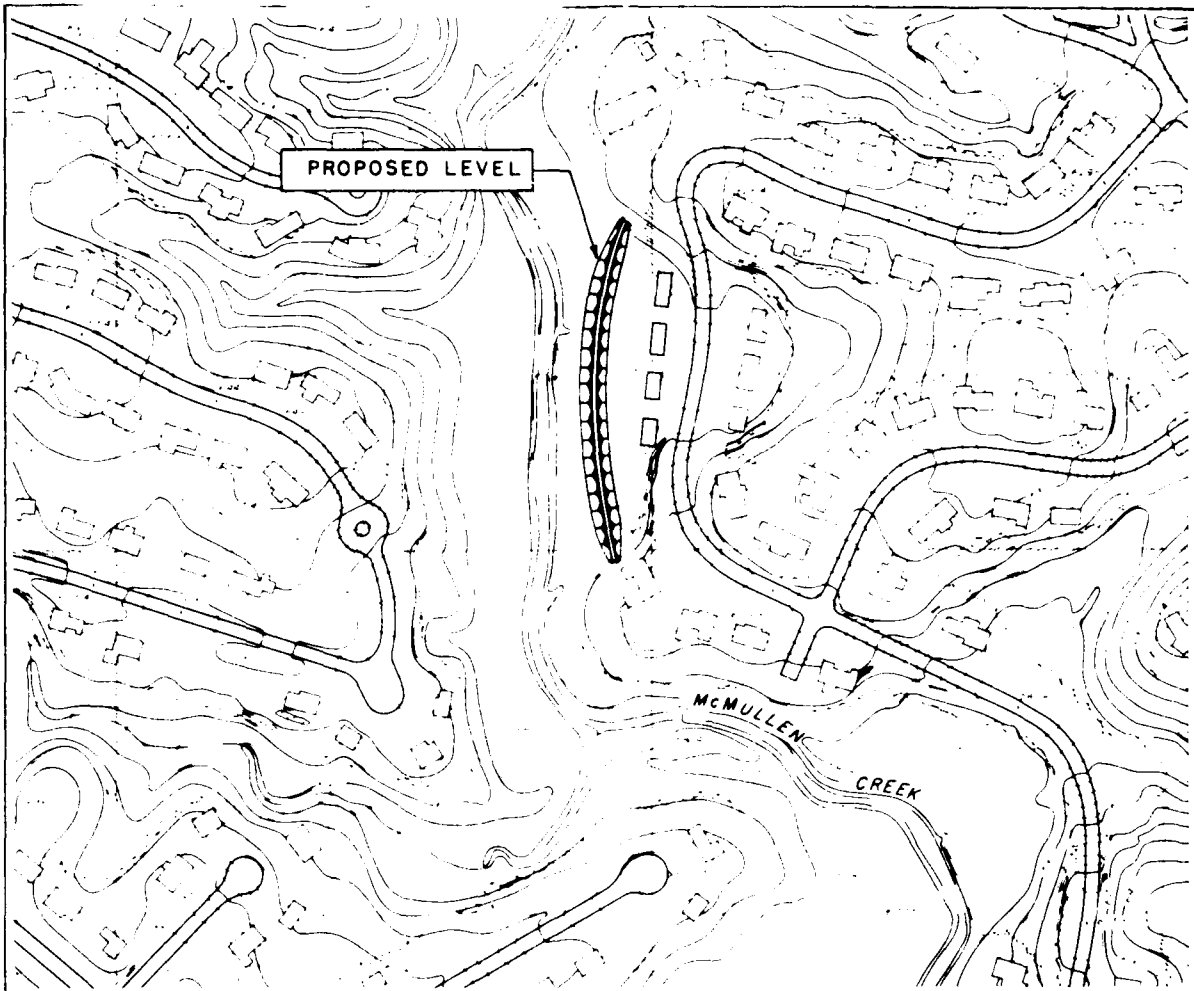
### Alternative 4, Levee Protection

Preliminary analysis of this alternative for providing levee protection to homes in the vicinity of Willhaven Drive indicated that structural solutions for this area were not feasible and that the problem could be addressed more efficiently during the formulation of non-structural solutions.

### McMullen Tributary

### Alternative 5, Channel Modification

Proposed modifications for McMullen Tributary consist of 3,550 feet of channel enlargement beginning at the confluence with McMullen Creek and extending upstream to Sharon Amity Road. Channel bottom



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CHARLESTON, SOUTH CAROLINA, DISTRICT

**SUGAR CREEK BASIN**  
NORTH CAROLINA & SOUTH CAROLINA

**McMULLEN CREEK WATERSHED**

**LEVEE PROTECTION**  
**ALTERNATIVE No. 3**

widths would vary from 15 to 10 feet with channel side slopes of 2 horizontal to one vertical. Modification of road crossings at Addison Drive and Sharon Amity Road would also be required as part of the project proposals. Channel excavation yardage is estimated to be 10,400 cubic yards. Estimated first cost of this alternative is \$450,000 which yields an annual project cost of \$41,000 including annual maintenance cost. Annual benefits of \$14,750 when compared to annual project cost yields a benefit to cost ratio of 0.36. Due to the lack of economic justification, no further investigation of this alternative will be made.

#### NONSTRUCTURAL ALTERNATIVES - MCMULLEN CREEK

Nonstructural measures for flood control generally modify flood damage susceptibility and do not reduce or eliminate flooding. Several such measures have already been implemented by the City of Charlotte including floodway zoning, flood insurance, and open space development of flood plain areas for recreational facilities. Other nonstructural measures being considered for McMullen Creek include the evacuation of damageable properties from the floodplain by either physically relocating floodplain structures or by demolishing affected structures. Reclaimed floodplain lands would then be restored to natural conditions or developed in a manner compatible with floodplain use such as parks, playgrounds, golf courses or environmental corridors.

Alternatives being considered as part of this basin study include evacuation of structures from the 10-year, 15-year, and/or 100-year floodplains based on projected 2010 conditions. Economic analysis of nonstructural alternatives indicate a marginal feasibility of evacuating all structures within the 100-year floodplain, which consists of approximately 35 single-family residential structures. Incremental feasibility of the evacuation of floodplain structures within various damage areas of McMullen Creek will be discussed in workshop groups during the course of this meeting.

#### NONSTRUCTURAL ALTERNATIVES - MCMULLEN TRIBUTARY

Economic analysis of nonstructural alternatives for McMullen Tributary also indicates a marginal feasibility of evacuating all structures

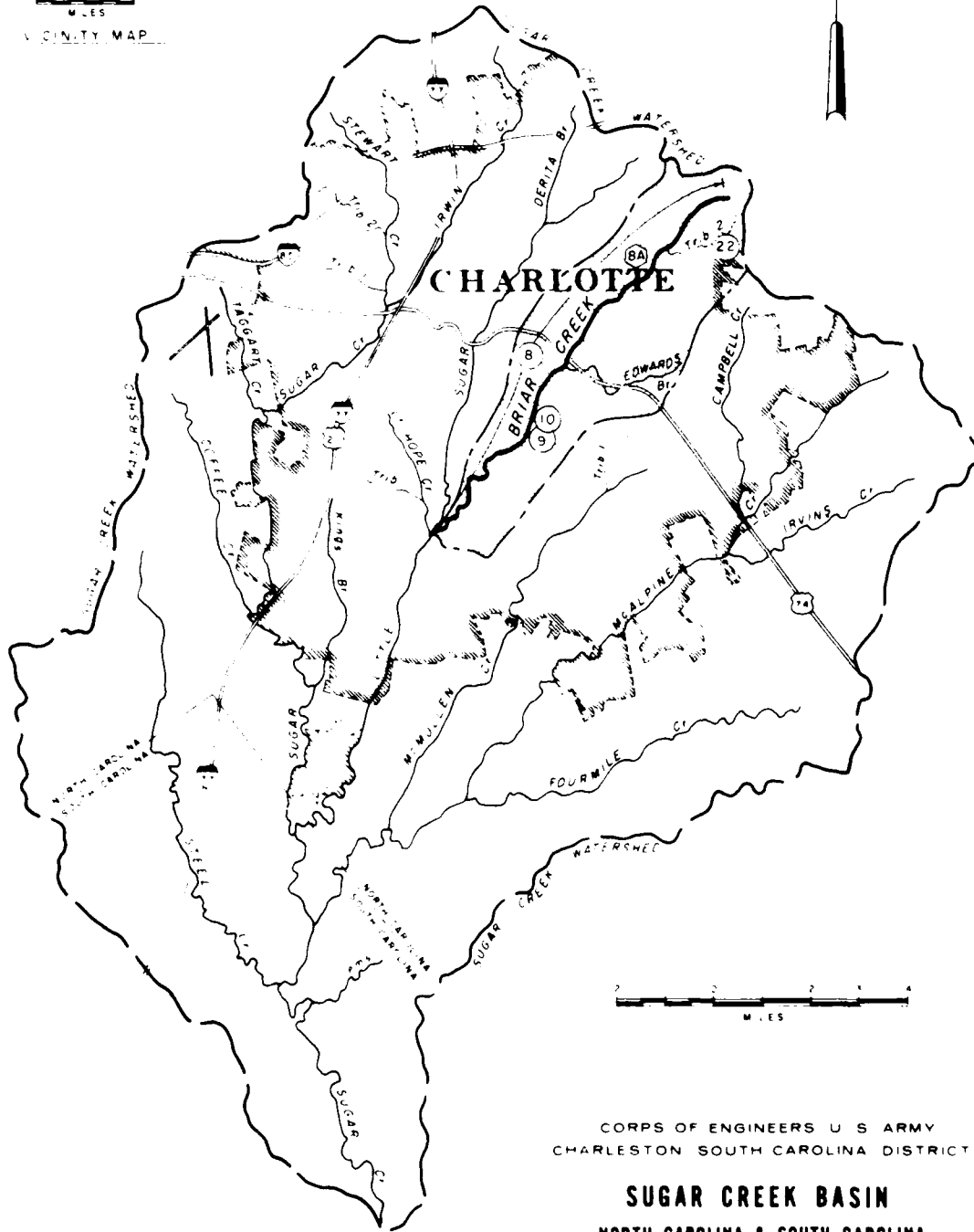
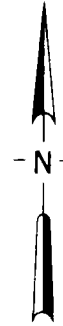


within the 100-year floodplain which consists of approximately 13 residential structures. Incremental feasibility of the evacuation of floodplain structures within the various damage areas of McMullen Tributary will be discussed in workshop groups during the course of this meeting.

**BRIAR CREEK & TRIBUTARIES**



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VICINITY MAP



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CHARLESTON SOUTH CAROLINA DISTRICT

**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**  
**BRIAR CREEK WATERSHED**

## STRUCTURAL ALTERNATIVE - BRIAR CREEK

### Alternative 8 - Channel Modification

Alternative 8 consists of a comprehensive channel enlargement alternative beginning approximately 1,240 feet downstream from Coloney Road and extending upstream to Plaza Road, a total distance of approximately 8.0 miles (See map, Alternative 8), Bottom widths vary from 60 feet to 20 feet with channel side slopes of 2 horizontal to 1 vertical. Thirteen bridge modifications would be required as shown on the attached map. Total channel excavation yardage is estimated to be 705,000 cubic yards.

Estimated first cost of this alternative is estimated to be \$13,130,000 consisting of \$7,810,000 construction cost; \$1,720,000 for bridge modification; and \$3,600,000 for lands, easements and rights-of-way. Average annual cost of \$936,400 when compared to annual benefits of \$1,372,000 yields a benefit to cost ratio of 1.47.

### Alternative 8A - Channel Modification

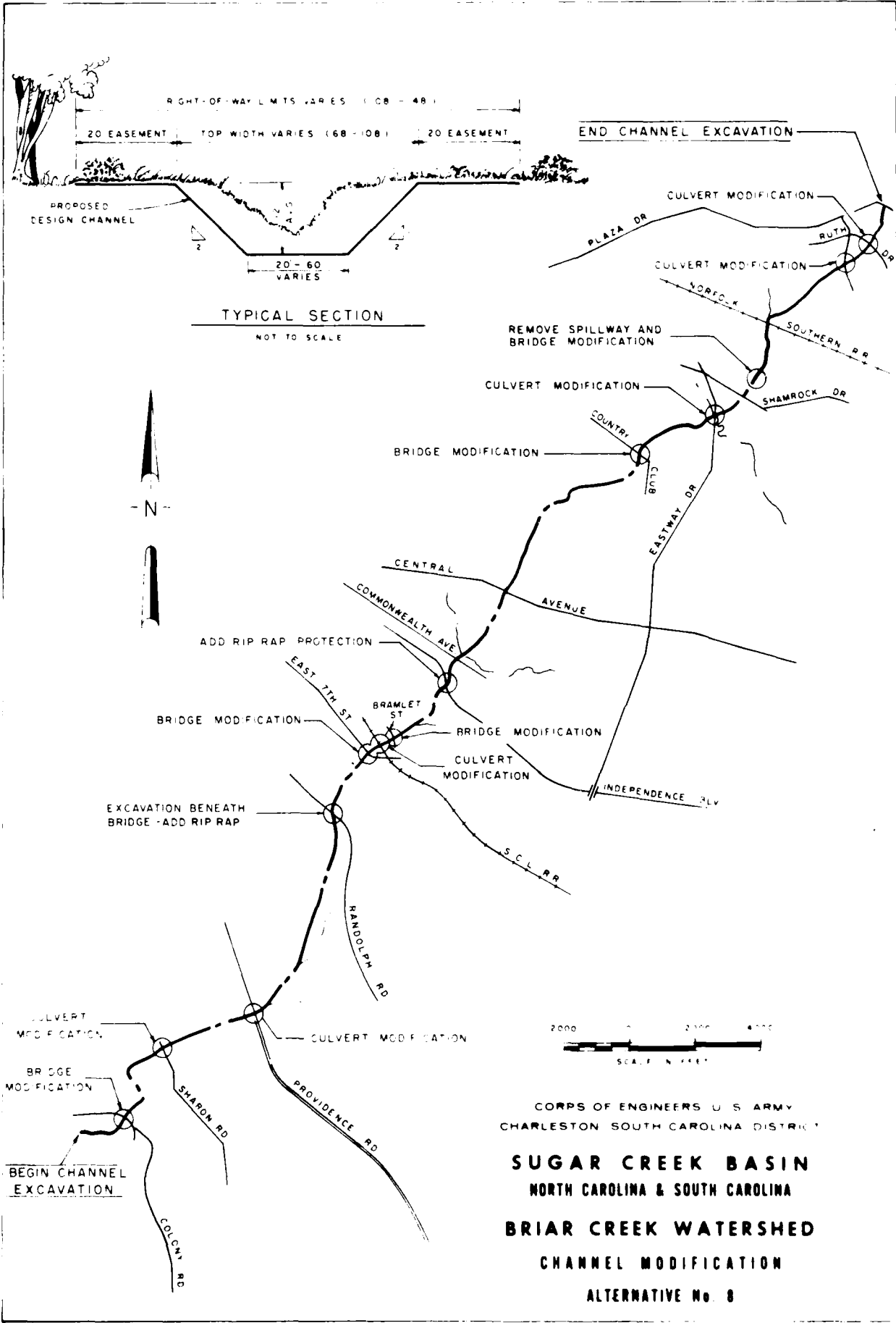
At the request of city officials, a channel modification alternative was formulated to provide flood protection to homes located in the vicinity of the Shannonhouse and Ruth crossings on Briar Creek. This alternative consists of 1.2 miles of channel modification with bottom widths varying from 30 feet to 20 feet and channel side slopes of 2 horizontal to 1 vertical. Total excavation yardage for this reach was estimated to be 22,100 cubic yards. Estimated first cost of Alternative 8A is \$783,800 which yields an annual

project cost of \$55,900. Annual benefits of \$20,400 when compared to annual project cost yields a benefit to cost ratio of 0.36. Further evaluation of this alternative has been terminated due to the lack of economic justification.

#### Alternatives 9 & 10 - Levee Protection

Alternatives 9 & 10 were originally analyzed as separate levee alternatives but were later combined into one system due to their close proximity. The levee system would provide protection to structures located on Hanson Drive and Scotland Avenue in the vicinity of the Providence Road crossing on Briar Creek (See Map, Alternatives 9 & 10). Total length of the proposed levee project is 4,640 feet. Average levee height is approximately 10.5 feet. Interior drainage would be collected and stored in a ponding area until flood stages subsided sufficiently to allow for natural drainage through a gated pipe outlet.

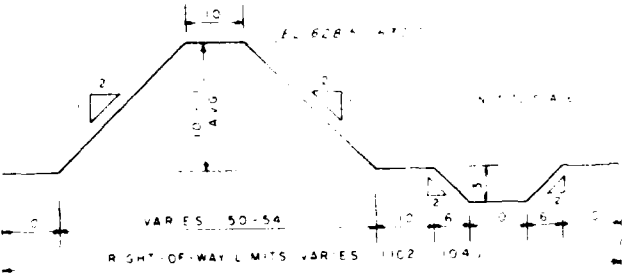
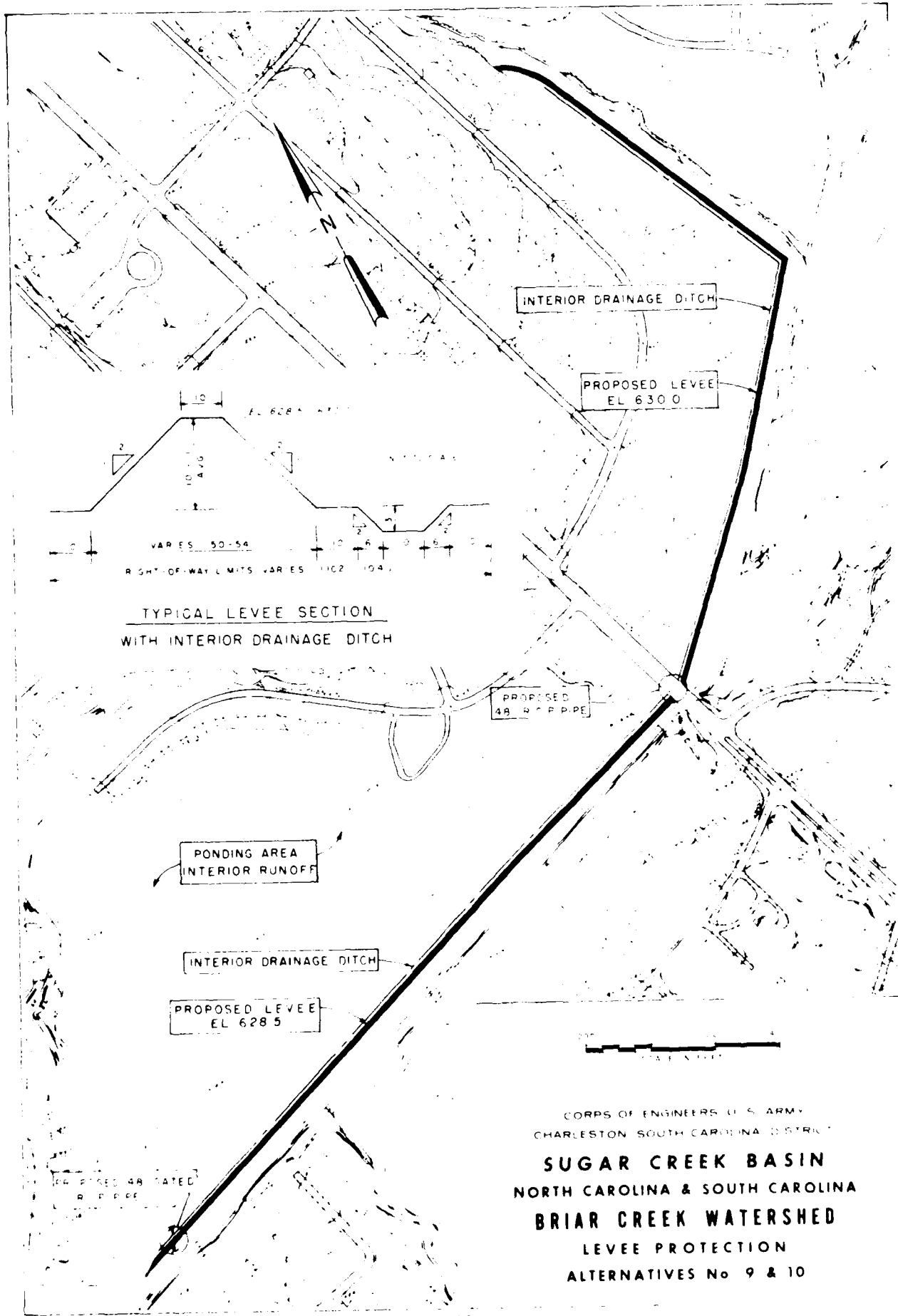
Estimated first cost of this alternative is \$870,000 consisting of \$380,000 construction cost and \$490,000 for lands, easements and rights-of-way. Average annual cost of \$68,000, including \$6,000 for annual maintenance, when compared to annual benefits of \$112,250 yields a benefit to cost ratio of 1.65.



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 CHARLESTON SOUTH CAROLINA DISTRICT

**SUGAR CREEK BASIN**  
 NORTH CAROLINA & SOUTH CAROLINA

**BRIAR CREEK WATERSHED**  
 CHANNEL MODIFICATION  
 ALTERNATIVE No. 8



TYPICAL LEVEE SECTION  
WITH INTERIOR DRAINAGE DITCH

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CHARLESTON SOUTH CAROLINA DISTRICT

**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**  
**BRIAR CREEK WATERSHED**  
LEVEE PROTECTION  
ALTERNATIVES No 9 & 10

PROPOSED 48\"/>

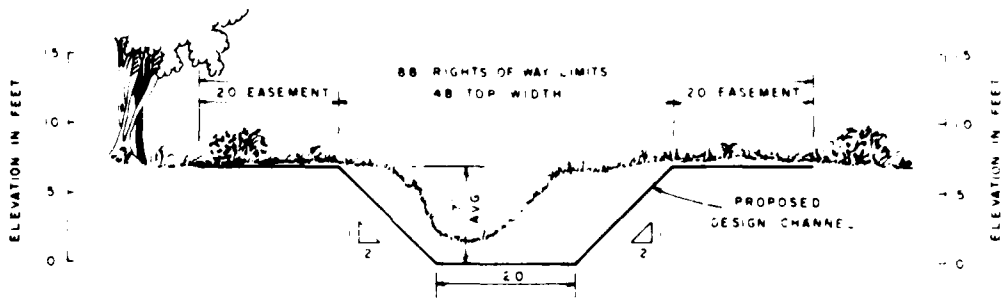
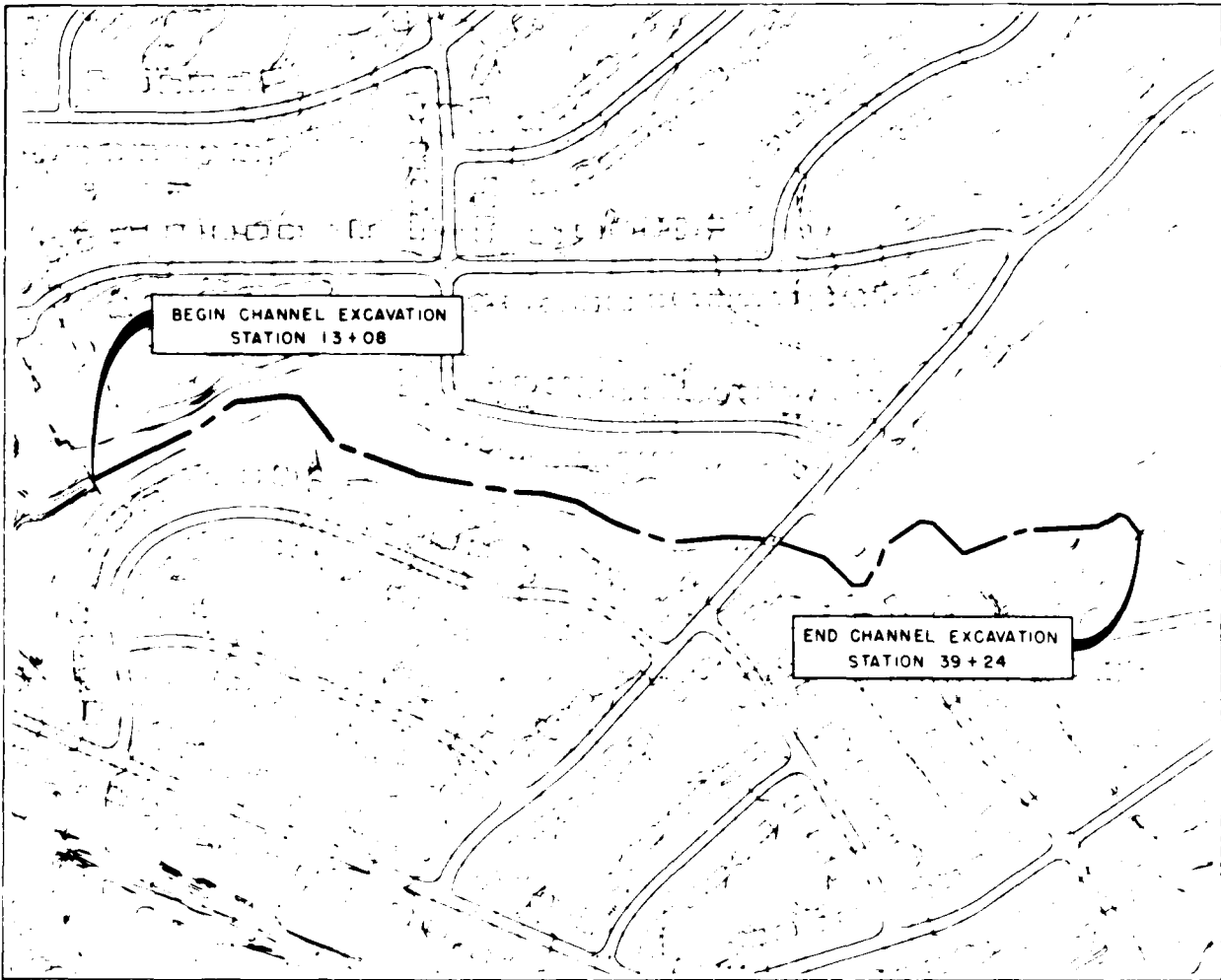
STRUCTURAL ALTERNATIVE - BRIAR TRIBUTARY #2

Alternative 22 - Channel Modification

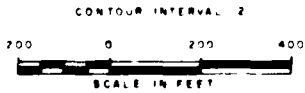
Proposed modification for Briar Tributary 2 consists of channel excavation for flood control beginning approximately 1,300 feet upstream from the confluence with Briar Creek and extending 0.6 miles further upstream. The improved channel was designed with a bottom width of 20.0 feet and channel side slopes of 2 horizontal to 1 vertical. Total excavation yardage is estimated to be 9,900 cubic yards. No bridge modifications would be required. (See Map, Alternative 22).

Estimated first cost of this alternative is \$413,000 consisting of \$243,000 for construction and \$170,000 for lands, easements, and rights-of-way. Annual cost of \$29,500 when compared to annual benefits of \$40,300 yields a benefit to cost ratio of 1.36.





**TYPICAL SECTION**  
NOT TO SCALE



CORPS OF ENGINEERS U S ARMY  
CHARLESTON SOUTH CAROLINA DISTRICT

**SUGAR CREEK BASIN**  
**NORTH CAROLINA & SOUTH CAROLINA**

**BRIAR CREEK WATERSHED**

**CHANNEL MODIFICATION**  
**ALTERNATIVE No. 22**

## NONSTRUCTURAL ALTERNATIVES - BRIAR CREEK

Nonstructural measures for flood control generally modify flood damage susceptibility and do not reduce or eliminate flooding. Several such measures have already been implemented by the City of Charlotte including floodway zoning, flood insurance, and open space development of floodplain areas for recreational facilities. Other nonstructural measures being considered for Briar Creek include the evacuation of damageable properties from the floodplain by either physically relocating floodplain structures or by demolishing affected structures. Reclaimed floodplain lands would then be restored to natural conditions or developed in a manner compatible with floodplain use such as parks, playgrounds, golf courses or environmental corridors.

Alternatives being considered as part of this basin study include evacuation of structures from the 10-year, 15-year, and/or 100-year floodplains based on projected 2010 conditions. Economic analysis of nonstructural alternatives indicates a marginal feasibility of evacuating all structures within the 100-year floodplain including approximately 250 single-family residential structures; 42 apartment buildings and 19 commercial and/or public establishments. Incremental feasibility of the evacuation of floodplain structures from various damage areas of Briar Creek will be discussed in workshop groups during the course of this meeting.

NONSTRUCTURAL ALTERNATIVES - EDWARDS BRANCH

Economic analysis of nonstructural alternatives for Edwards Branch indicates a marginal feasibility for the evacuation of 10 single family residential structures within the 15-year floodplain. Evacuation of commercial and public establishments is not economically justified. Incremental feasibility of the evacuation of floodplain structures from various damage areas of Edwards Branch will be discussed in workshop groups during the course of this meeting.

NONSTRUCTURAL ALTERNATIVES - BRIAR TRIBUTARY #2

Economic analysis of nonstructural alternatives for Briar Tributary #2 indicates an economically feasible alternative of evacuating all structures within the 100-year floodplain which consists of 14 single-family residential structures. Incremental feasibility of the evacuation of floodplain structures from various damage areas of Briar Tributary #2 will also be discussed in workshop groups during the course of this meeting.

**END**

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