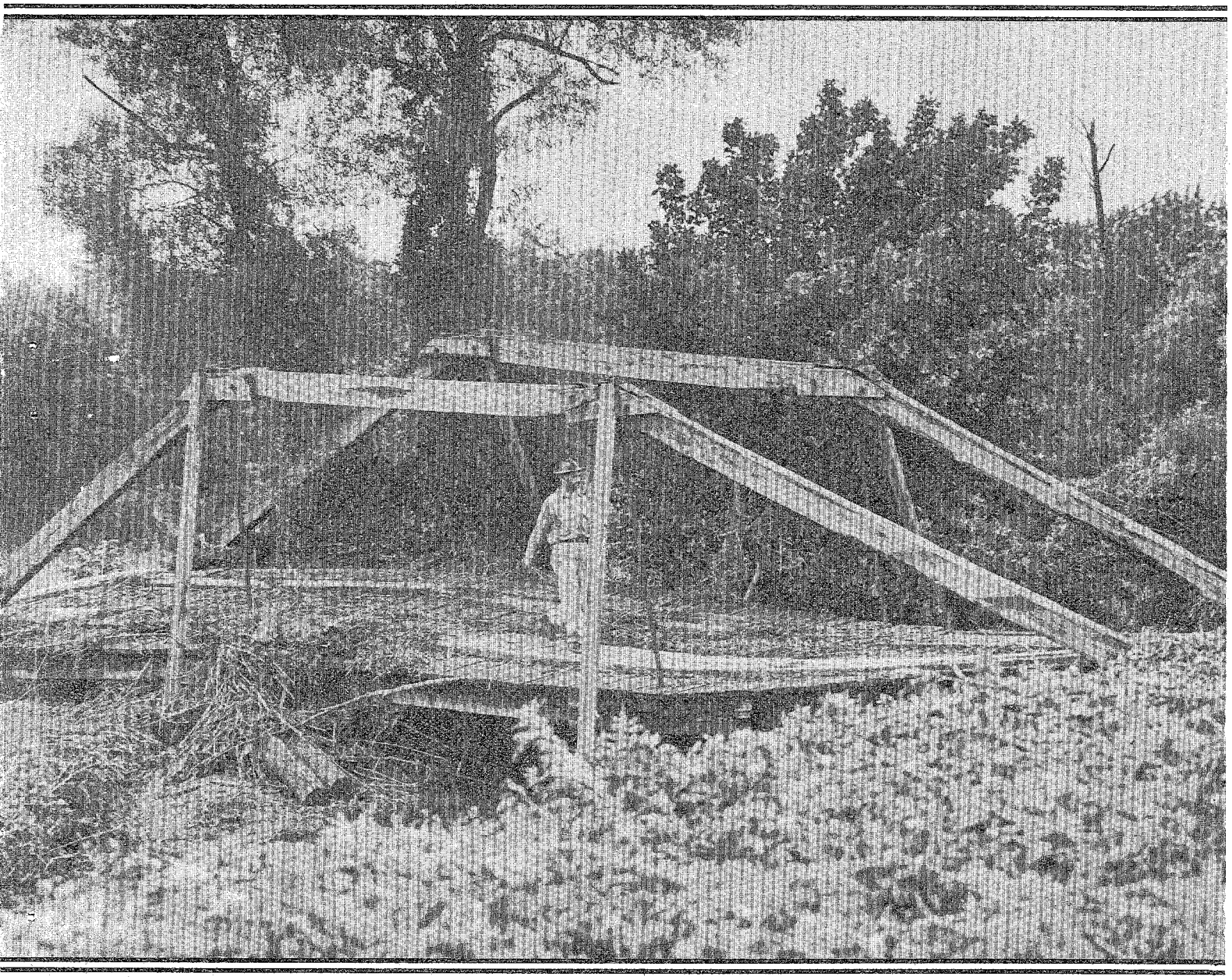
DAVIS

FLOOD PLAIN INFORMATION
MORGANTON, NORTH CAROLINA
VOLUME I

HUNTING CREEK & TRIBUTARIES



PREPARED BY THE CORPS OF ENGINEERS, U. S. ARMY

CHARLESTON, SOUTH CAROLINA, DISTRICT JULY 1969

FOR THE CITY OF MORGANTON, NORTH CAROLINA

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INTRODUCTION

This flood plain information report is based on a detailed investigation of the flood characteristics of Hunting Creek and its tributaries in Burke County, North Carolina. The major objectives of this report are: (a) to compile information on floods and flood hazards; (b) to provide state and local agencies with a factual basis for reducing future flood damages through well-planned use of the flood plain; (c) to publicize information available to private citizens and private interests on the hazards associated with flood plain use; and (d) to reduce future expenditures arising from flood problems caused by improper use of the flood plain. The findings of this report serve only to indicate the relationship between various flood profiles and the degree of risk associated with them. The degree of risk to be allowed in flood plain development must be determined by local interests.

This report contains maps, profiles, and cross sections which should prove helpful in planning the best flood plain uses. They show areas and depths of probable flooding from Intermediate Regional and Standard Project Floods. With this information, measures may be taken to minimize flood hazards. One such measure would be to plan floor levels for buildings high enough to avoid flood damage.

This report provides the basis for further study and planning by the local government in solving flood problems. Possible solutions may include local planning programs to guide developments by controlling flood plain uses through zoning and subdivision regulations and the construction of flood protection works.

The information in this report is presented for use by the State of North Carolina, Burke County, the City of Morganton, and other local interests in planning the use and regulation of flood plains in the study area. The report is not intended to extend Federal authority over zoning or other regulation of flood plain use.

The Charleston District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State, and local agencies in the interpretation and use of the information contained in this report and will provide other related flood data, if available.

SUMMARY OF FLOOD SITUATION

Hunting Creek and its tributaries, East Prong, Fiddlers Run, and Sandy Run, are located on the east side of Morganton. Most of the study area is within the city limits and much of it is yet undeveloped. Encroachment into the flood plain has begun, however, and continued growth and development of the Morganton area without sufficient flood plain development regulation will result in serious flooding in the future.

The need for regulations to control flood plain occupancy in the Hunting Creek Basin is acute, if the prevention of flood damages to future developments is to be accomplished. Flood plain regulations should be enacted ahead of expected development and enforced during the development.

Hunting Creek and its tributaries are subject to flooding from widespread rainfall over their drainage basins. In addition, floods on the Catawba River will cause water to backflow over about 3.0 miles along the lower end of Hunting Creek.

The local flood situation has been developed from information on past floods and the possible heights of future floods. The following paragraphs summarize the significant findings which are discussed in more detail in succeeding sections of this report.

GREAT FLOODS. The Catawba River Flood of record occurred in 1916. Other great floods occurred in the vicinity of Morganton in 1901 and 1940.

STANDARD PROJECT FLOOD. The Standard Project Flood overflows five roadways in the Hunting Creek Basin study area; City Dump Road, Am-

herst Road, Bethel Road, and State Hospital Road on Hunting Creek, and New Laurel Road on East Prong. Overflow depth varies from about 1.0 foot to about 3.5 feet. The overflow depth is about 5.0 feet at New Laurel Road.

Standard Project Flood determinations indicate that floods could occur along the streams in Burke County that would reach heights exceeding those of known past floods.

INTERMEDIATE REGIONAL FLOODS

The elevation of the Intermediate Regional Flood will be useful in city and county planning. On the studied area of Hunting Creek, the Intermediate Regional Flood, beyond the influence of the river, averaged about 4.0 feet less in elevation than the Standard Project Flood. On Sandy Run it varied from about 1.0 foot to about 3.0 feet less, on East Prong it varied from about 1.0 foot to 6.0 feet less, and on Fiddlers Run it averaged about 2.0 feet less than the Standard Project Flood.

FLOOD DAMAGES that would result from recurrence of major known floods would be substantial; however, even more extensive damages would be caused by the Intermediate Regional Flood and Standard Project Flood because of their wider extent, greater depths, and higher velocities.

MAIN FLOOD SEASON for North Carolina is in the summer or fall. From rainfall records, it is apparent that heavy or flood-causing storms are most likely to occur during the hurricane season which includes the period July through October.

WATER VELOCITIES for floods of comparable magnitude are slightly less on Hunting Creek than on its tributaries. During major floods, channel velocities would reach about 15.2 feet per second on Hunting Creek, 17.0

feet per second on Sandy Run, 13.8 feet per second on East Prong, and about 14.0 feet per second on Fiddlers Run. Overbank velocities for major floods would reach about 9.5 feet per second on Hunting Creek, 4.5 feet per second on Sandy Run, 13.2 feet per second on East Prong, and about 12.6 feet per second on Fiddlers Run. Although velocities as great as these would not be found throughout the study reaches, the velocities found would frequently be greater than 3.0 feet per second. Velocities greater than 3.0 feet per second combined with depths of 3.0 feet or greater are considered hazardous.

FLOOD DURATIONS would depend on the position, intensity, and duration of the flood-producing storm. Stage hydrograph determinations indicate that major floods would reach maximum stages on Hunting Creek about 29 hours after runoff begins. Major floods would remain above bankfull stage for about 16 hours. Stage-duration relationships for Hunting Creek are graphically illustrated by stage hydrograph on Plate 2.

FLOOD CONTROL PROJECTS. Presently there are no flood control projects in the Hunting Creek Basin. Some flood height reduction could be accomplished by removing brush and debris along certain reaches. Channel enlargement or diking would also reduce flood heights.

EXISTING REGULATIONS. There are neither city nor county flood plain zoning regulations for the study area.

The findings in this report can be used by planners in establishing limits to flood hazard areas.

FUTURE FLOOD HEIGHTS that would be reached by the Intermediate Regional Flood and the Standard Project Flood are illustrated in tables, plates,

and figures of this report. Stream Profiles, Plates 4 and 5, show the computed flood elevation profiles for the entire study. Flood heights are pictorially illustrated in Figure 18.

FLOODS IN MORGANTON

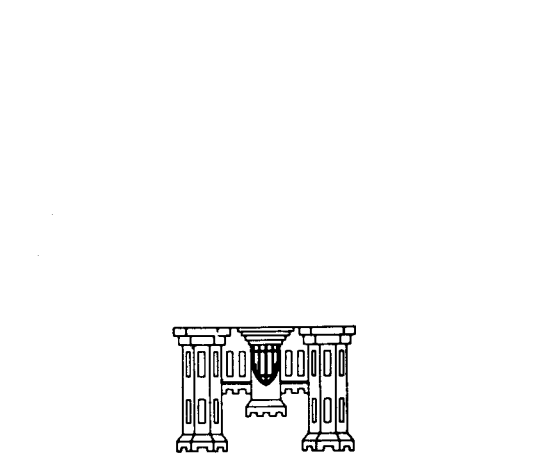
Burke County has experienced several major floods since 1900. Each of these floods caused considerable amounts of damage. However, as future floods occur, even greater destruction will result due to flood plain development which has taken place in recent years. Presently, only a few structures have been built where flooding could occur. However as city growth continues, encroachment into the flood plain may be expected to continue unless precautionary measures are taken. Significant damages by those floods could be prevented by imposing sufficient flood plain regulations.

This damage need not occur. The information needed to establish definite flood plain limits is now available for some potential flood hazard areas. To guide in local flood plain management, a report has been prepared by the Corps of Engineers which discusses the flood situation along Hunting Creek and its tributaries in the Morganton vicinity. The report defines flood hazard areas and shows expected flood elevations along the streams. Data from the report will be invaluable to the Morganton Planning and Zoning Board in proper flood plain planning.

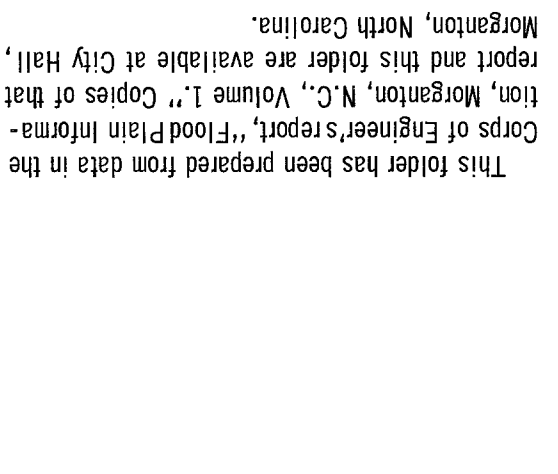
PAST FLOODS

The largest known flood recorded on the Catawba River occurred in July 1916, and the second largest in August 1940. Little information is available for floods on Hunting Creek and its tributaries; however, U.S.G.S. records indicate the largest flood of record on Hunting Creek occurred in August 1940.

Flooding in the Morganton area is most likely to occur during the summer or fall as a result of hurricane rainfall. However, intensive storms in the upper portion of the watersheds may cause flooding anytime during the year.



1940 Flood damage to U.S. Highway 70 bridge on Hunting Creek.

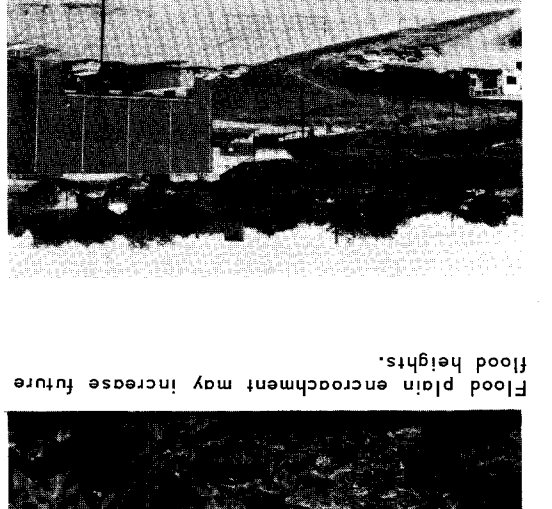


1940 Flood damage to N.C. Highway 18 bridge on Hunting Creek.

FUTURE FLOODS

An analysis of rainfall and runoff characteristics in the general region provided data used to compute flood heights that might be expected to occur in the future. Two floods were computed for each of the studied streams.

Only in rare instances has a specific stream experienced the largest flood that is ever likely to occur. Severe as the maximum known flood may have been on any given stream, it is commonly accepted that eventually a larger flood may occur. The Standard Project Flood is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. The purpose of the Standard Project Flood determination is to establish the flood plain limits. Beyond the Standard Project Flood limits, it is practical to assume that no flood hazard exists. The occurrence of a larger flood is not impossible, but is highly unlikely. The Standard Project Flood has no assigned frequency of occurrence.



Arrows show approximate heights that would be reached by the Standard Project and Intermediate Regional Floods at an industrial building upstream from Bethel Road.

POSSIBLE SOLUTIONS

To begin a realistic program of flood damage reduction in Burke County, it must be realized that greater floods than those of the past can occur. The elevation of the greatest probable flood, designated as the Standard Project Flood, has been determined. The occurrence of such a flood could cause great damage to structures in the flood plain.

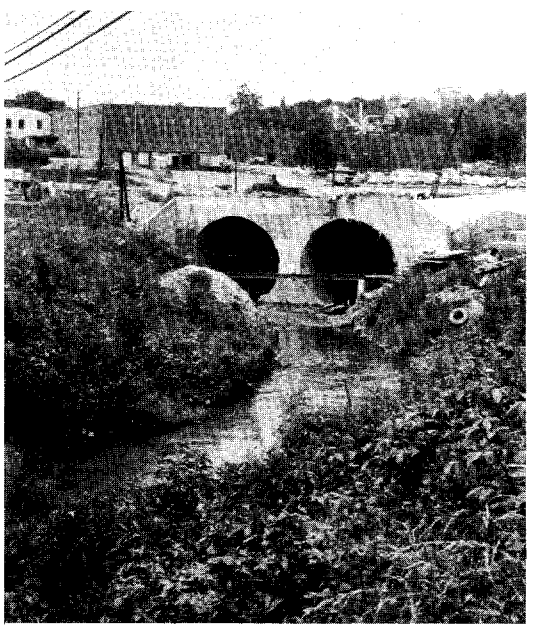
Haphazard development of the flood plain can be expected to continue, unless properly regulated. As time passes and business and industrial developments increase there will be greater demands for building sites in the flood plain due to its availability and ease of construction. A further danger is that new developments in the flood plain, if unregulated, could be so constructed as to restrict the flow of water and thus increase flood heights and damages upstream.

Flood data and reasonable regulations can be used to guide and control developments in flood hazard areas and to prevent an increase in flood damage. Such controls have been adopted by many other areas and have become accepted as a practical approach to safe development and prevention of flood disasters. The adoption of flood plain regulations would not prevent the use of the area for parks and other open-type facilities that would be less vulnerable to flood damage.

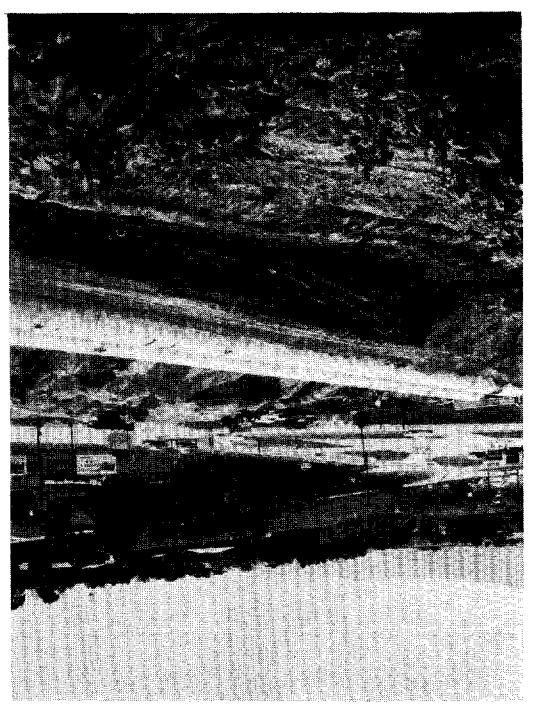
Corrective measures may include flood proofing to make existing and proposed structures less vulnerable. This involves such changes as permanently closing lower openings, using flap valves on sewer openings, waterproofing walls and floors, and installing removable bulkheads over entrances.

Flood proofing is not a cure for all flood problems. Rather, it should be considered as one device among an array of available flood damage reduction measures, including land use regulations, flood control projects, flood fighting, flood relief, and flood insurance. A comprehensive flood plain management program would probably involve the use of several or all of these techniques.

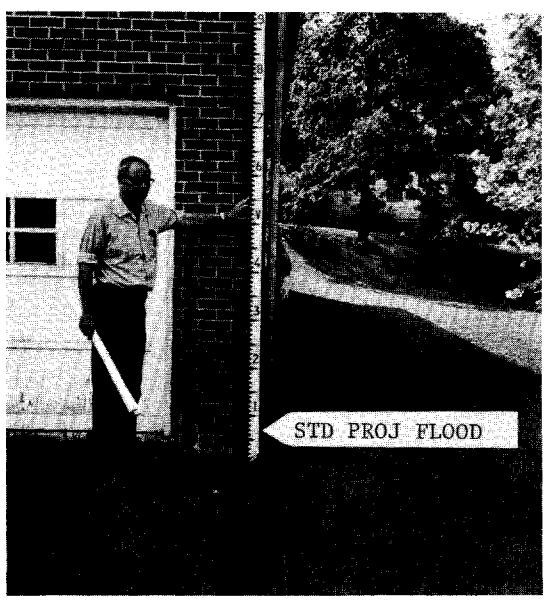
Early flood prevention measures were exercised as illustrated by this water system, designed and installed in 1920 by H.L. Millner of Morganton, using the diving bell concept.



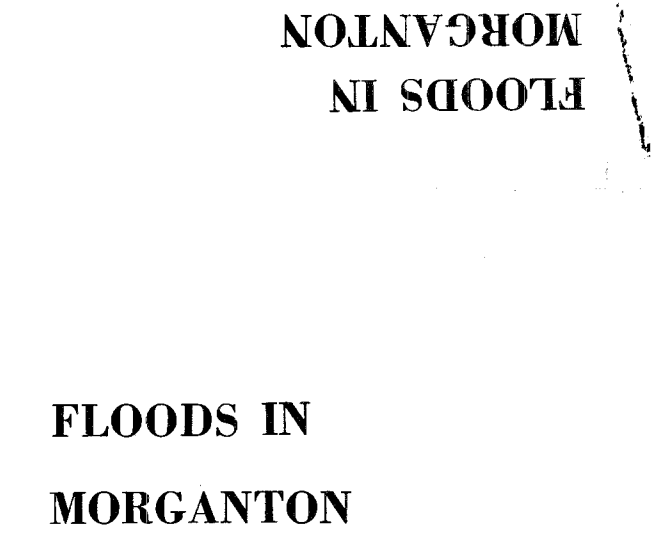
Flood plain encroachment.



Flood plain encroachment may increase future flood heights.



Arrow shows approximate height that would be reached by the Standard Project Flood at a home on Bethel Road.



This folder has been prepared from data in the Corps of Engineer's report, "Flood Plain Information, Morganton, N.C., Volume 1." Copies of that report and this folder are available at City Hall, Morganton, North Carolina.

JULY 1969

Structures in the flood plain should be of sufficient design so as not to reduce the natural flow area and consequently cause increased flood heights.

FLOODS IN MORGANTON, NORTH CAROLINA

VOLUME 1

HUNTING CREEK AND TRIBUTARIES

--How to Avoid Damage

CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT

FLOODED AREAS

HUNTING CREEK & TRIBUTARIES
VICINITY OF MORGANTON, N.C.

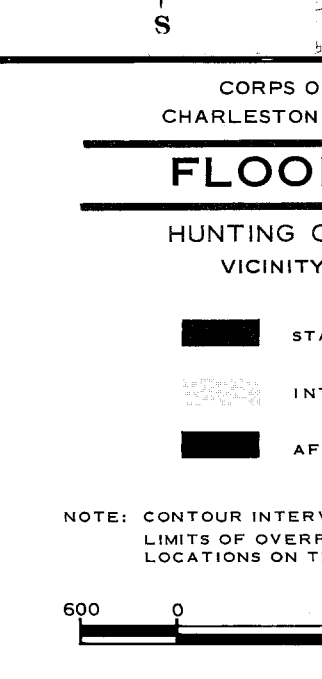
STANDARD PROJECT FLOOD

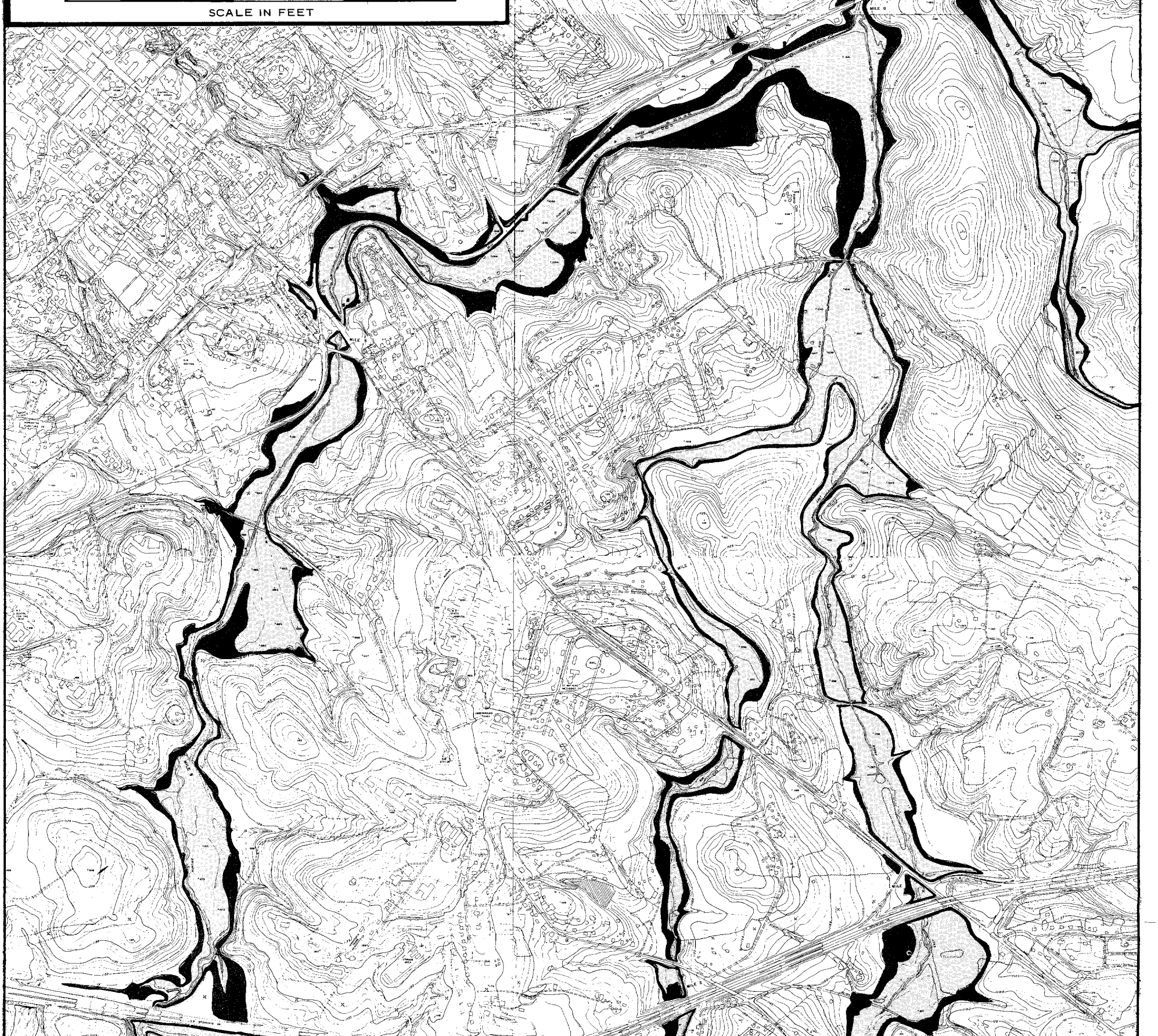
INTERMEDIATE REGIONAL FLOOD

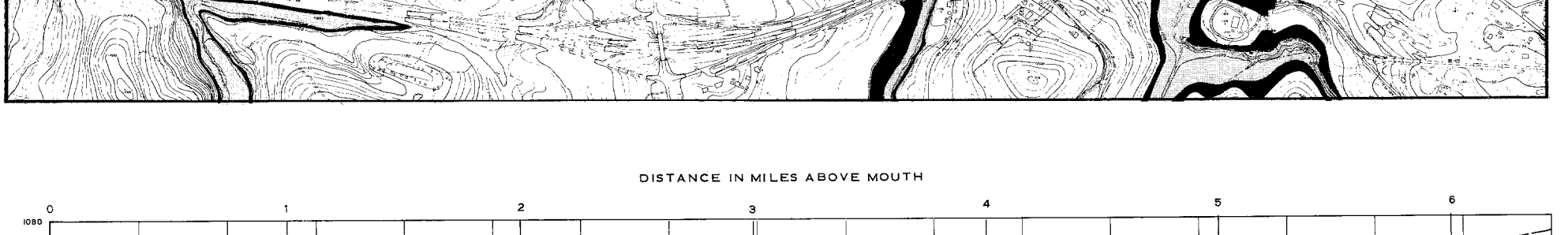
AFFECTED PROPERTY

NOTE: CONTOUR INTERVAL 5 FEET
LIMITS OF OVERFLOW INDICATED MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AS EXPLAINED IN THE REPORT.

600 0 1200 2400 3600
SCALE IN FEET







PROFILES OF STREAM STUDIED

Figure 1 FLOOD PLAIN ENCROACHMENT
Obstruction to flow increases future flood heights.

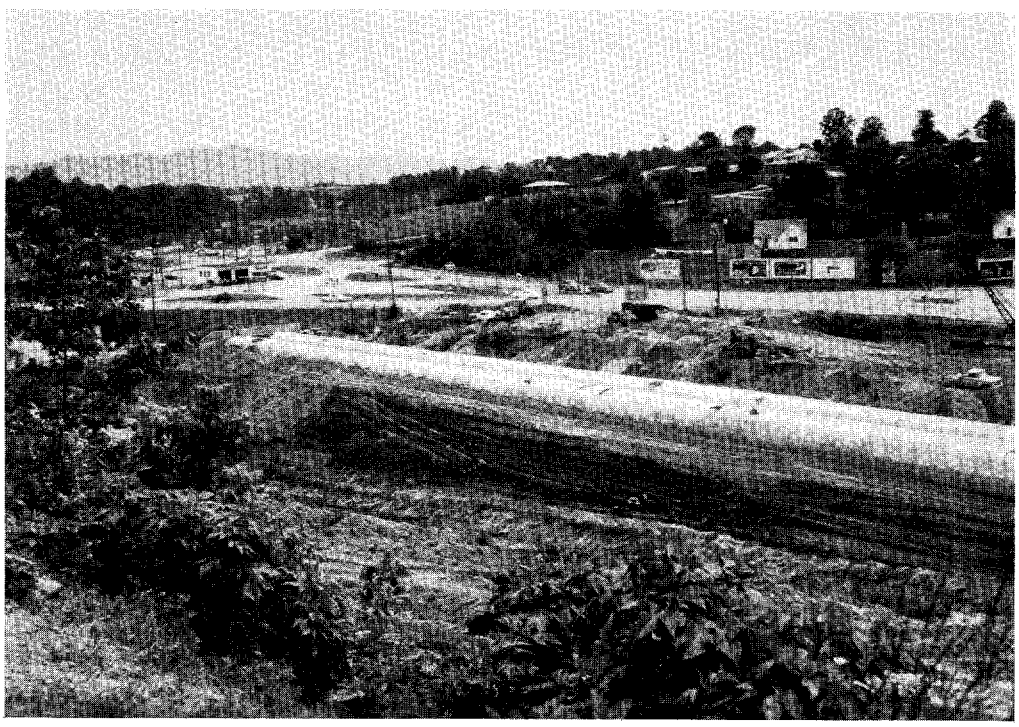
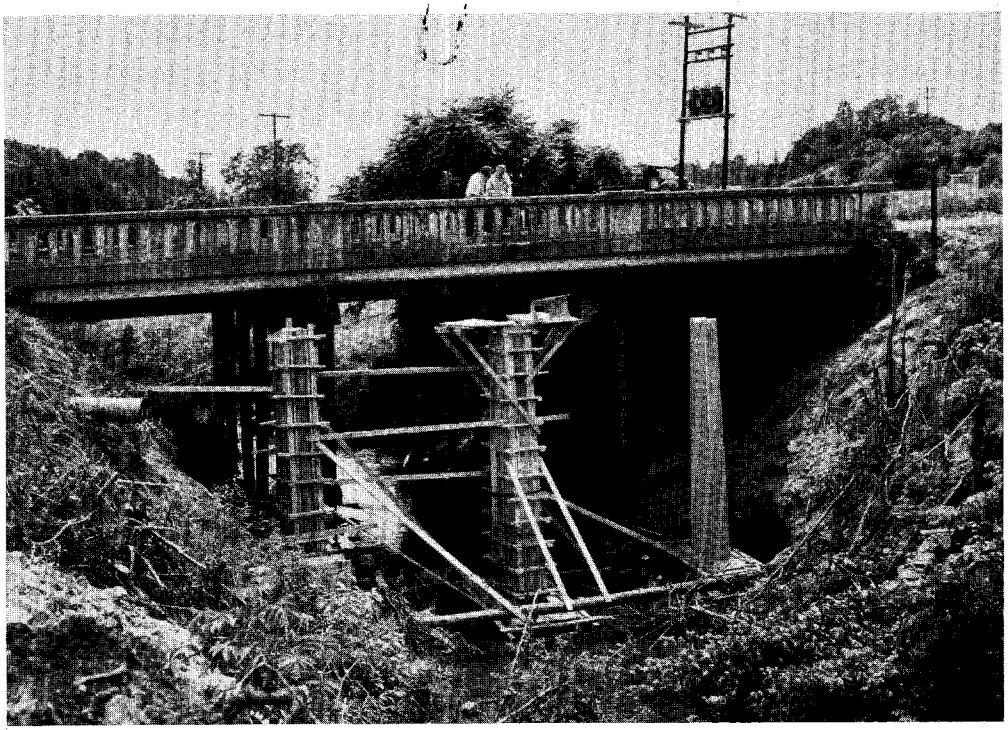


Figure 2 FILL IN THE FLOOD PLAIN
Fill in the flood plain reduces the natural flow area and may increase future flood heights.



Man-made obstructions which may affect future flood heights.

Natural obstructions which increase flood heights.

Figure 3 OBSTRUCTIONS TO FLOW

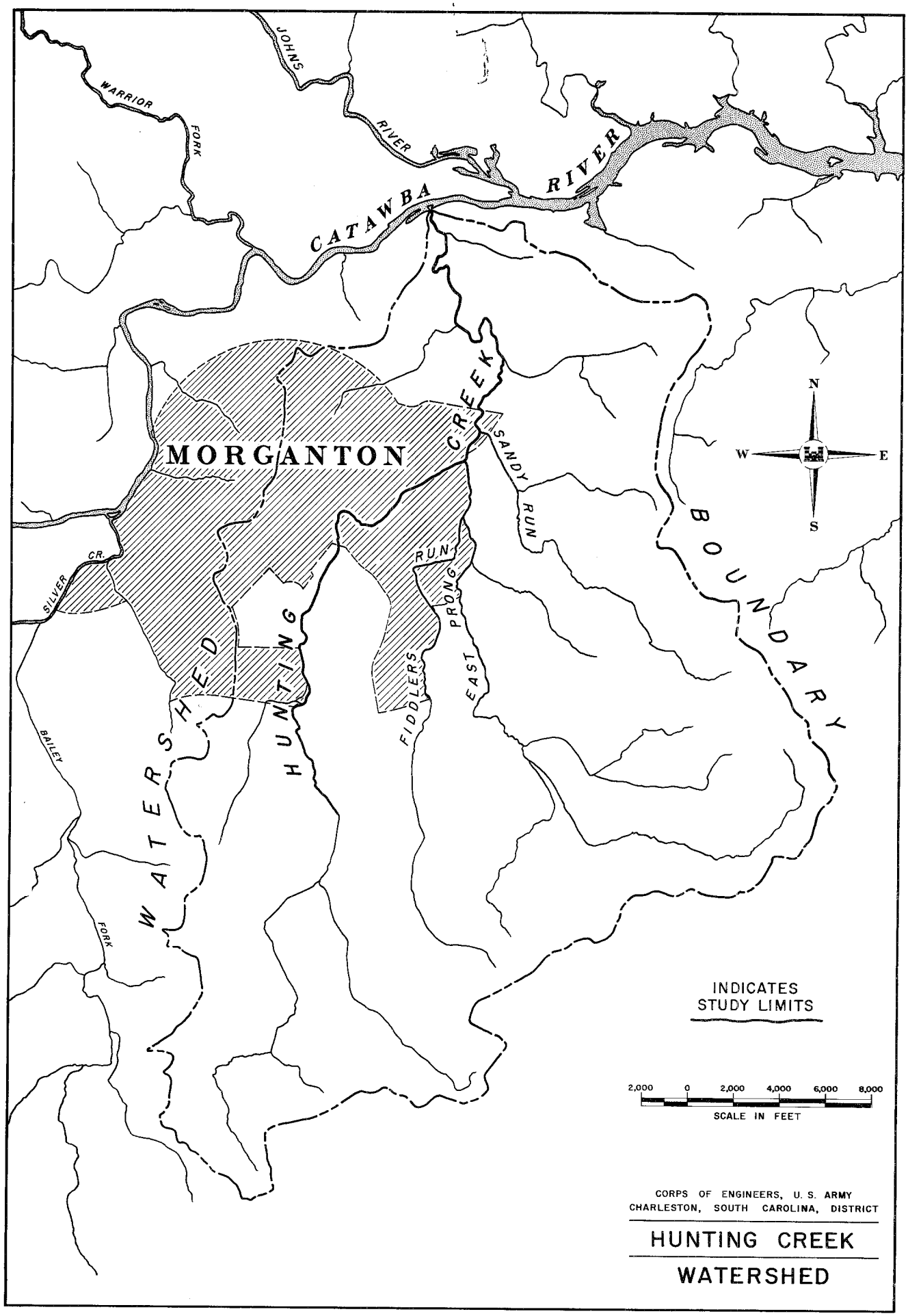

WARRIOR FORK
JOHNS RIVER
CATAWBA RIVER
MORGANTON
CREEK
SANDY RUN
BOUNDARY
N
W
E
S
SILVER CR.
RUN
PRONG
FIDDLERS
EAST
HUNTING
WATERSHED
BAILEY
FORK
INDICATES
STUDY LIMITS
2,000 0 2,000 4,000 6,000 8,000
SCALE IN FEET
CORPS OF ENGINEERS, U. S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
HUNTING CREEK
WATERSHED

PLATE 1

GENERAL CONDITIONS AND PAST FLOODS

The citizens of Morganton and Burke County are aware of the problems that stem from urbanization of a flood plain. Many have seen, first hand, the devastation caused by floods occurring in improperly developed flood hazard areas. Although there is little encroachment presently in the flood plains of the study area, continued development in the Morganton area will result in more and more flood plain encroachment unless regulations are imposed to prevent it.

The basic data contained in this report can be used by planners to establish building regulation flood lines along the studied reaches of Hunting Creek and its tributaries.

Settlement

Morganton, North Carolina, the county seat of Burke County, with a population of 10,000 is located in the foothills of the Blue Ridge Mountains. Morganton is situated 70 miles northwest of Charlotte, and 60 miles east of Asheville. It was founded and chartered in 1784 and incorporated in 1885. It was named for General Daniel Morgan of Revolutionary fame. Its past is colorful and interesting; its history replete with tales of Daniel Boone, Andrew Jackson, John Sevier, Bishop Hagenberg and his trading with the Indians in redolent Quaker Meadows, a rendezvous for the "Men of Holstein" who fought at King's Mountain.

In 1771, over one hundred inhabitants on the upper Catawba and its tributaries petitioned Josiah Martin, the colonial governor, that a new county be formed from western Rowan of which they were a part at the time. Other stimuli may have been applied but this petition certainly pointed up the need for a county farther west. So Burke was established in 1777.

Seven years later, the legislature appointed a commission to locate a courthouse and county seat. This body proceeded to purchase from James Greenlee, a large-scale land speculator of the area, 230 acres "at a place called the Alder Springs." Thus was begun a real estate operation in the course of which the property was fashioned into lots and streets, with the preservation of the courthouse square near the center. Subsequent sale of town lots, over a period of the next 30-40 years, enabled the county to construct a log courthouse, prison and stocks, and to carry out such other capital expenditures as were necessary to the courthouse grounds and other county buildings. But by the time the present stone courthouse was begun in 1833, it was necessary to levy a special tax to finance the work. Until 1839, when Morganton was incorporated, town affairs continued to be managed by a commission appointed annually by the legislature. Among these early commissioners were Alexander Erwin and Charles McDowell, John H. Stevelie, Adolphus L. Erwin, Thomas Walton, John Caldwell, Thomas Bouchelle, David Tate, William W. Erwin and Isaac T. Avery, some of whom, strangely enough, lived well outside of the town. After incorporation, town commissioners, five in number, were chosen by popular vote. The 1800 census listed 130 inhabitants, 50 of whom were slaves. By 1840, there had been an increase to 403 inhabitants of which number 257 were slaves.

A local post office was officially established in January, 1795, with William Walton, Jr., as postmaster. Stage coach lines operated through Morganton as early as 1830 and much before this time, hard-bitten waggoners like Christian Bortles or Zadock Smith made the long hauls to Charleston or Columbia and cursed the muddy thoroughfares to this red-dirt town. By 1820, plans were underway to build a church and an academy. Several years later a branch of the State Bank was opened at Morganton and a short-lived economic boom developed around 1830, spurred on by the Brindletown Gold Rush which brought in wealthy slaveholders from northeastern North Carolina and bordering Virginia.

Summer sessions of the State Supreme Court were held here during the late ante bellum period and gave a boost to the socio-cultural life of the community. Taverns and inns abounded from the very first, McEntire's and Tate's being among the earliest. John Caldwell and Thomas Walton were the most substantial of the early merchants. Morganton had more than its share of professional people during the early days, the Bouchelles, Sluyter and Thomas, being the earliest doctors and Burgess S. Gaither, W. W. Avery and T. R. Caldwell being among the most prominent of the ante bellum lawyers. The railroad did not reach Morganton until after the Civil War, and one must peer over into the twentieth century to learn of the town's industrial development and heavy population growth.

Morganton is primarily an industrial city. Nationally known products are manufactured here, including furniture, textiles and chemicals. Morganton is noted for other diversified industries. Grain, farming, dairying, poultry raising and forestry are the chief agricultural interests.

FLOOD DESCRIPTIONS

The largest known flood recorded on the Catawba River occurred in July 1916, and the second largest in August 1940. Little information is available for floods on Hunting Creek and its tributaries; however, U.S.G.S. records indicate the largest flood of record on Hunting Creek occurred in August 1940.

This section contains an excerpt from a paper written by Mr. Cliff Avery of Morganton on the 1916 Flood and excerpts from The News Herald describing several floods which occurred in the vicinity of Morganton. They illustrate the destruction and hardships caused by floods, and emphasize the need for proper flood plain management.

Excerpt From Paper Written By Mr. C. K. Avery of Morganton, N. C.

Early in the morning of July 5 a tropical cyclone or hurricane swept up out of the Gulf of Mexico, striking the mainland near Mobile, Alabama. This disturbance was preceded by high winds and pushed along with it a heavy downpour of rain. Moving slowly north by east the cyclone crossed the entire State of Alabama, leaving all streams in heavy flood stage and putting all railroad lines south and west of Birmingham out of service. The cyclone continued to blow itself out, crossing northwest Georgia and hovering over the mountains of western North Carolina. Rainfall started south of Asheville Saturday the 8th and by Sunday the 9th all western North Carolina was getting what turned out to be a three day soaking rain. The cyclone seemed to spend its last strength on the Continental divide around Altapass, for north and east of that point the rain gauges were lighter. In the three days ending on Monday, July 10, Altapass had 8 inches of rain. It rained a day longer in Marion which had seven inches of rain. By evening of July 9th the French Broad at Asheville had gone above flood stage and remained at or above flood stage for the next ten days. Monday evening and Tuesday morning (the tenth and eleventh of July) Catawba River in Burke County rose 16 feet and destroyed much of the work done on the new bridge at

Glen Alpine. Johns River rose 12 feet and flooded all low-lying land, with Tuesday morning, July 11, bringing the highest water to Burke County since 1901[5]. By Wednesday, the 12th, the streams were falling rapidly. Thursday, July 13th, was free of rain in Morganton, Marion and Altapass. Burke County streams returned to their banks. The French Broad at Asheville continued to run bank full at flood stage.

On the evening of Thursday, July 13, another tropical cyclone or hurricane moved westward out of the Atlantic, striking the coast near Charleston on Friday, the fourteenth. This Atlantic cyclone moved faster than the Gulf cyclone had moved, travelling rapidly across the State of South Carolina pushing high winds and rain ahead. High winds and heavy rain reached Charlotte, North Carolina, on Friday night, July 14, and 5 inches of rain fell there in the 24 hours ending Saturday night. Along a front of 75 to 100 miles wide it moved North by West its center passing Southwest of Charlotte, and striking the mountains in full fury in Wilkes, Caldwell, Burke and McDowell Counties. Beginning late Friday, July 14th, and continuing for more than 48 hours, record amounts of water fell on the foot of the Appalachians, with this Atlantic cyclone breaking against the Southeast side of the Continental divide almost directly on the opposite side of the same range when the Gulf cyclone had blown itself out four days earlier. This Atlantic cyclone dumped more than 23 inches of rain on the gauge located in the apple orchard at Altapass, more than 22 inches of which fell between Saturday at 2:00 P.M. and Sunday at 2:00 P.M., July 16. This was the greatest one day's rainfall recorded in the United States to that date and it fell on the same gauge which had registered eight inches of rain five days earlier as result of the Gulf cyclone. In nine days Altapass received more than 32 inches of rainfall. During the 48 hours ending Sunday, July 16, while Altapass was recording 23 inches of rainfall, Banner Elk had 16 inches, Marion had 11-1/2 inches, and Morganton had 9-1/2 inches. Northern areas of Burke, Caldwell and Wilkes Counties all received in excess of 15 inches while the city of Asheville received less than 3 inches. The area southeast of Asheville along the headwaters of the French Broad River also received 15 inches or more of rainfall. But only 20 miles directly west of Altapass the rainfall dwindled to a bare 3 inches in three days.

Since the Gulf cyclone had thoroughly saturated the earth only a few days earlier the runoff following the Atlantic cyclone was estimated to be near ninety per cent of the precipitation. The heaviest rain fell against the sides of the mountains, and the preceding 20 years had seen the wasteful removal of much of the virgin timber from these same mountains. When one remembers that much of the worst storm area had mountains with a high incidence of flake mica in the soil it is understandable that the flood runoff in the mountain valleys was accompanied by many landslides which left scars hundreds of feet long as vertical marks on the sides of the mountains. As the torrents of water came down on the narrow valleys of the mountains they demolished everything in their pathway and carried every movable thing with them, including roads, railroads and bridges. The valley of the North Fork of the Catawba in McDowell County called the North Cove felt the hand of the storm most harshly for it runs along the foot of the mountain below Altapass. Wilsons Creek in North Caldwell was also hit most harshly.

In Asheville the French Broad was at bankfull on the morning of July 15. By 8:00 A.M. on Sunday, July 16, it had come up 9-1/2 feet. One hour later it had crept to 14-1/2 and at 10:00 o'clock the gauge itself was washed away. It was later determined that the water at Asheville reached 21 feet above normal flow. The water was six feet deep in the Asheville railroad station and up almost to the roof on the passenger track umbrella sheds.

In Burke County the Catawba commenced to rise rapidly on Saturday afternoon, July 15. Prudent people who lived in the lowlands commenced to make normal preparation for a summer freshet. C. A. Edmondson, a beloved Burke County native whose home stood at a low level near the point where Upper Creek flows into the Catawba, later told how his apprehension grew on that afternoon until he and his wife commenced to check the rise of the water hourly[6]. The water crept up steadily and late in the afternoon the couple started moving furniture and belongings from their dwelling house to other buildings higher up on the hill. At eleven that night the rate of rise had slowed and since the water was still some ten feet below the level of their floor, they quit moving things from the house, but kept a close vigil. From eleven until three in the morning the water rose very little and they felt that the worst danger was past, although it was still raining. Then at three o'clock Sunday morning the water commenced to rise so rapidly that its progress could be seen from moment to moment as it crept up and over marking sticks and weeds and fence posts. From three o'clock until daylight the Edmondsons raced the river, emptying their house of its furnishings, transporting them to higher ground. Later

in that morning they moved everything yet higher, and again a third time. After noon on Sunday, July 16, the flood reached its crest and stood 9 feet deep in Mr. Edmondson's house. It stopped raining Sunday afternoon. That same day W. E. Walton of Morganton recorded the rise on the Catawba at the foot of North Green Street as 41 feet above normal, or 17 feet above the highest water heretofore recorded in 1901. The rise at the lower bridge on the Lenoir Road was 44 feet.

The News Herald
18 July 1916

BRIDGES AND BUILDINGS SWEPT AWAY BY THE FLOOD

Water Highest in History of County, and Reports Which Have Come from Outside Show that Even Greater Damage Has Been Done Further Down the Catawba--Railroad Bridges Gone--No Mails--No Telegraphic Connections--Situation Alarming

In the terrific rainstorms which visited this section Friday, Saturday, and Sunday and which by Sunday morning had caused the rivers and smaller streams to flood the surrounding territory as it had never been flooded before, and to sweep before their mighty current almost everything that was within their path, Burke county has experienced the greatest calamity in her history. It is impossible to estimate in dollars and cents the financial loss. So far there has been no report of loss of human life in the county, but at this writing it is impossible to get into communication with any but a small section immediately surrounding Morganton, and it is possible that there has been loss of life. Telephone connection with Hickory was never cut off but that was the only nearby town with which any communication at all could be had.

The seven steel bridges over the Catawba River in Burke county were swept away Saturday night. This isolates large portions of the county and makes it difficult to get food supplies to Morganton, the situation all the more serious because there are no trains running.

Late Saturday afternoon it was seen that the loss of the bridges was inevitable, as the waters were rising very rapidly. Watchers say that the two near Morganton, known as the upper and lower bridges, went very early Sunday morning, the latter going first. It is said that the creaking and groaning of the steel as it broke from the supports sounded almost like some animal in great despair.

When these bridges were built after the freshet of 1901 they were placed over 10 feet above what was then thought to be the record breaking water mark. Judging from high water we have had in the past, it was thought to be improbable that these splendid steel structures would ever be swept away.

The railroad bridge over the Catawba near Catawba station suffered the same fate as other bridges and this cuts off the whole western section of the state from railway connection with the outside world. It is not known when it will be possible for trains to run. Guesses vary from four or five days to a month or six weeks, the first based upon the belief that the Southern will probably arrange for a transfer by boat or ferry of at least of mail and passengers. Likely it will be more than a month before shipments of freight can reach us.

The News Herald
10 August 1916

THE ESTIMATED LOSS

A Summing Up of the Damage Brought by Flood Brings Estimated Loss Near $300,000

It has been hard to arrive at what might be considered a conservative estimate of the loss Burke county sustained during the flood of July 15-16. In order to make a government report Postmaster Hamilton Erwin obtained a number of estimates from those whom he thought best able to calculate the loss, but he found such a wide divergence in them that it was difficult to strike an average. Finally basing his figures largely upon a survey taken by Civil Engineer W. E. Walton he sent in the following, which is believed to be a conservatively low estimate of the country's loss:

River bridges	$ 40,000
Buildings and factories	100,000
Highways	25,000
Crops (small grain and hay)	28,000
Crops (prospective corn, acreage 12,800)	100,000
Live stock	500
Total	$293,500

So great was the loss of corn, the bottom land corn being almost a complete loss, farmers are much concerned over the upkeed of their stock during the winter. As it has been raining almost every day it has been impossible for them to get pasturage crops planted. However the last day or two of clear weather promises relief from that situation. Many farmers have disposed of stock at a sacrifice. One man sold a number of nice pigs at $1 each, because he said, he had nothing to feed them.

Several farmers not only lost all their crops, including wheat stacks that had not been threshed, but had been getting flour at the mills for several months, looking to the time when they would have new wheat.

As gloomy as is the immediate prospect there is one view of the situation that may bring hope to the hearts of the majority of the farmers if they can be made to look ahead a year and see more than the ruin of their crops this year. There's hardly a farm in the county but that has been enriched, in many cases to the extent of several thousand dollars, by the rich sediment that was deposited as the rivers receded. In some places it is as deep as three feet. If the season is good next year there will be such a bumper crop raised as the county has never known. Even the most pessimistic will agree that the damage done the soil in the way of washouts and white sand deposits has been at least balanced by the rich deposits.

The News Herald
20 July 1916

FLOOD DETAILS SHOW GREAT LOSS

Western Part of State Suffered Most Heavily--Asheville Losses Great in Both Life and Property

---

Reported Tragedy at Belmont Confirmed--Ten Workmen Missing at Belmont--Six Saved by Two Negro Boatmen--Southern Power Company Escapes Very Great Losses--Reports from Other Sections of Burke County

Through the courtesy of the Hickory Daily Record, The News-Herald was able to obtain late yesterday afternoon the following Associated Press dispatch:

As reports continue to filter through from points of Western North Carolina which has been isolated by the recent floods the death list grows. The list now stands 40, and 6 are missing.

Eleven persons were drowned at Bat Cave and Chimney Rock. Two unidentified bodies were found today near Belmont while one was found near Greenville, S. C.

While flood waters were receding in North Carolina and Virginia today the Wateree in South Carolina was rising and on the Atlantic Coast Line two bridges were overflowed.

Conditions around Asheville, and in Western North Carolina were much improved.

The material damage in the four states will probably never be estimated, though it is now placed at $15,000,000.

At Ronda, Wilkes county, two houses were found washed ashore the Yadkin, one in which 7 bodies were found, 3 women, 2 men, 2 children. This brings the known list to 37. Counting the known dead west of Hickory the number will all probability reach 50.

The News Herald
28 July 1916

DANGERS WHICH THREATEN AS AFTER-EFFECTS OF THE FLOOD

In considering the material loss that we have suffered on account of the recent flood, we are likely to overlook an important social problem--an epidemic of some contagious disease, which so often confronts a community, town, or city after a big freshet such as we have had.

The economic loss to our county has been great, but so far as I have been able to learn there has been no loss of life. It is very important that we further conserve the life of our people by observing every sanitary precaution possible and guarding against all kinds of preventable diseases.

The rains and swollen streams have flooded many of our springs and wells. The importance of pure water is something which many do not appreciate; for they do not understand the nature of germ diseases or know that water is a good culture medium for all kinds of minute organic life. Because water is clear is no indication that it is pure. The surface water that has found its way to your spring, well or source of supply has, perhaps, run over polluted soil, thus making your supply impure. Do you know that the source of your water supply is pure.

The county has provided free vaccination against typhoid to make us secure from that scourge. Remember it is important that we do not miss a dose if we desire effective immunity.

The health of our people is more important than our farms and crops. Of what value would there be to endless acres of land and thousands of bushels of grain if our people were not sane, virile and healthy? Let us cooperate with our county health officer in every measure that he puts forward for the promotion of health and happiness among all.

Although the above newspaper account relates conditions following the 1916 Flood, the same hazardous conditions would follow other great floods. The photographs in Figure 4 show breaks in a major water line caused by the 1940 Flood.

1940 FLOOD DAMAGE TO MORGANTON'S MAIN WATER LINE

Figure 4

The News Herald
16 August 1940

FLOOD DAMAGE SOARS IN BURKE

Deluge Sweeps Down After Heavy Rains; County Is Hard Hit

Morganton, Breaking Through Temporary Isolation, Now Gets Reports of Widespread Damage

---

Surging floodwaters sweeping down from the mountains and augmented by heavy rains here overran Burke county Tuesday night and Wednesday morning, destroying farm crops, devastating railway lines, and ripping gaps in the area's highway and bridge system.

Rivalling in severity the 1916 flood except in the vulnerable Catawba river valley, the deluge temporarily isolated Morganton and cut the county into a waterbound patchwork.

The subsiding flood yesterday brought to light new reports of damage, and nothing resembling an estimate was placed on the loss in hundreds of thousands of dollars.

A heavy rain fall of cloudburst proportions fell Tuesday afternoon to send streams, swollen by earlier rainfall, out of their banks to cut a wide path of destruction.

Official U. S. weather records kept at State hospital by E. R. Moran show total rainfall of nearly 12 inches for the week, over half of which fell within a few hours time Tuesday night. Beginning with a light drizzle Saturday, the rain for the 24-hour period to 5:30 p.m. Sunday night amounted to .68 inches; to Monday afternoon, 1.78 inches; Tuesday afternoon to 5:30 o'clock, 2.96 inches; and in the next 24-hour period, 6.10 inches, most of which fell by midnight Tuesday, or an average of almost one inch each hour.

Records kept for the Duke Power company by W. J. Wortman show that for a different twnety-four period--from 8 a.m. Tuesday to 8 p.m. Wednesday--the rainfall was 8.68 inches. By coincidence, the combined rainfall for the past four months--April, May, June and July--totalled 8.68, exactly the amount falling here in one days' time.

Communication systems were damaged if not entirely disrupted. The Duke Power company's main line shut off current in its territory for only 12 minutes, although from 20 to 25 of its poles were under water ranging from eight to 22 feet and three were swept away early. Telephone lines were down but service was continued with little impairment. The city's facilities suffered some damage, chief of which to get public attention was the washouts on the line which brings Morganton's water supply from the South Mountains.

The rapid rate of the water is shown by the filling of Lake James, the Duke Power company's huge reservoir. Even up to 2 p.m. Tuesday, the lake waterline was four feet below the full mark. When the peak was reached some time after midnight, water was flowing at a height of 6.1 feet over the spillway--a gain of 10 feet or almost one foot an hour. Nothing resembling a threat to the safety of the huge dam was heard.

Railway service was suspended Tuesday, first by washouts and landslides in the Asheville area where the flood stage was reached earlier than in this section. As the waters rushed eastward, the flood took heavy toll along the Southern railway lines, washing out four dirt embankments within a radius of a few miles and leaving tracks and ties suspended in mid-air. Westernmost washout occurred at McGalliard creek just west of Valdese when the rampant waters dug out the high fill. At the underpass at Icard, water surging through two culverts ate away the railway fill, causing tons of dirt of cave in to be swept away by the flood. An even wider gap was cut in the railway line east of Icard with still another washout between it and the Hildebran station. Railway crews are busy at work on the huge task of repairing the four major washouts in eastern Burke.

Train service between Morganton and Asheville was restored Wednesday afternoon, the local station serving as the eastern terminus. The last train to pass here was No. 15 early Tuesday morning. With the restoration of the service Wednesday, Train No. 22 arrived at 3:20 p.m. about two hours behind schedule time, and then headed back to Asheville as Train No. 11.

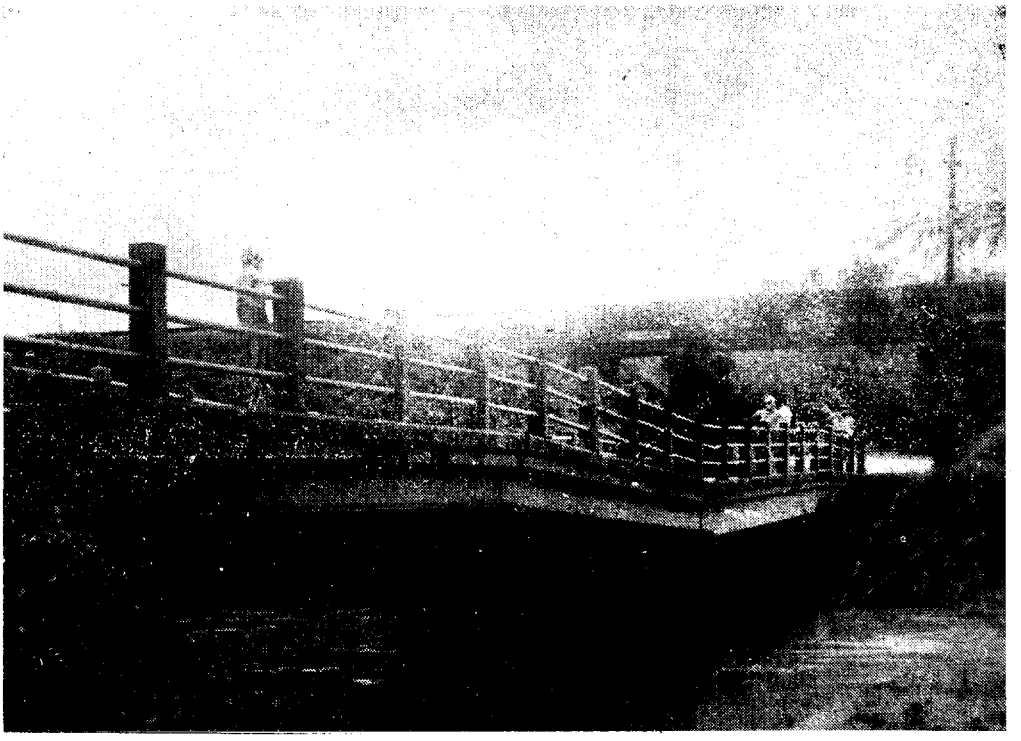
Minor slides and several points where tracks were flooded constituted the only damage suffered by the railroad company in this county west of Morganton.

Damage to highways and bridges in Burke county may equal a quarter-million dollars. It was estimated that between 50 and 75 bridges were swept away or weakened. A thirty-foot section of Highway No. 18 toward Lenoir was swept away at the eastern entrance to John's river bridge, and the roadbed was weakened by the water's force.

N, C. Hwy. 18 Bridge at Johns River

Figure 5

FLOOD OF 1940



U. S. Hwy. 70 Bridge over Hunting Creek

N. C. Hwy. 18 Bridge over Hunting Creek

Figure 6 1940 FLOOD DAMAGE TO BRIDGES ON HUNTING CREEK

The Hunting Creek bridge a mile east of Morganton on Highway No. 70, already ordered replaced, was undermined by the flood, and two supports gave way, cracking the concrete span and causing traffic to be detoured by way of the Asbury place and out to the highway again on Drum's straight. The bridge over Hunting creek on No. 18 highway, near State Hospital, was also closed after water swept away the fill approaching the span.

Hunting Creek carried away other bridges, including a steel span used only for light traffic near the Drexel Furniture company here. The misshapen bridge was lodged against a willow tree and still supports a sign "Bridge UnSafe for Trucks."

Highway traffic was continued east and west along U. S. Route 70 with the use of detours. The western route was never closed, although Silver Creek at its peak ran two inches over the bridge just to the west of town.

Traffic was closed to Route 18 to Lenoir and south to Shelby, Route 181 north was closed by the water's overflow on the highway west of the Catawba river bridge and by washouts and bridge weakness in the Clearwater Beach section. While not closed, new Highway No. 181 south to Rutherfordton was damaged and users were asked to drive with caution.

The Linville river bridge at the head of Lake James became impassable, as did the bridge over Linville river near Henry Franklin's at Linville Falls.

Clearwater Beach, long a resort center at the convergence of two mountain streams, Steele's creek and Upper Creek, was virtually "wiped off the map." J. F. Burns reported yesterday upon returning from the beach that the pavilion had been swept away, along with the resort's cabins, and that the stream bed where swimmers are accustomed to play had been carved to about twice its former width.

Similar reports were received from Brown Mountain beach where a number of vacationists from Morganton were marooned.

With the rapid rise of water Tuesday night, highway crews worked desperately to find washouts and other damaged points to protect motorists. Detour signs, warning lamps and other emergency equipment, however,

could not be reached at State highway prison camp because a swollen branch crossing Highway No. 18 near "Hell's Island" completely shut off traffic. Not for more than 24 hours could the camp be reached, but highway employees bought up all available red lanterns to use as warning signals.

Sheriff Paul M. Dale and his staff of officers spent the night in patrolling danger zones and in guarding motorists from traffic hazards.

The county's chief farm crop, corn, suffered chiefly from the flood which overran many broad river bottoms where the crop had reached the roastingear stage. In such a stage of growth, the water and mud, it is believed, has soured or will sour the grain and greatly reduce the crop yields.

Persons who have a vivid recollection of the disastrous flood of 1916 seem to be in agreement that with the exception of the Catawba river, Burke's chief stream, the area's creeks and rivers rose higher this week than they did 24 years ago. The Catawba, many say, lacked ten, 12 or perhaps 15 feet from reaching the 1916 height, and this meant the difference between that flood and this. But for Lake James, which served to impound a large volume of water that otherwise would have been added to the flood stream, the deluge would have equalled if not surpassed the 1916 disaster, since the lesser streams in some instances reached higher stages.

Countless are the reports trickling into Morganton about crops being wiped out, livestock being swept away, and river bottoms being filled with sand and mud.

Several summer cottages around the lake, particularly in the Linville river area at the lake headquarters, were swept away and others were damaged, twisted on foundations and flooded with mud and muck. The Linville river bridge was swept away, and John Moore's store was "cleaned out."

Accumulated mail, like a flood, deluged the Morganton postoffice yesterday as postal employees sought by devious means to continue as near normal as possible the regular postal service.

Postmaster M. B. Kibler, Assistant Postmaster F. T. Clarke, and the mail collector drove in cars to Hickory Wednesday to dispatch outgoing mail and to receive in-

coming mail. They reported that west-bound Train No. 11 had been able to get as far as Hickory, leaving the Hickory-Morganton link as the only gap in train service. All mail dispatched yesterday was sent west by train to Asheville.

Rural carriers are covering their routes in spots which they can reach, and indications are that most of the territory can be served by tomorrow. The carrier on Route 3, for example, has thus far not been able to get over the John's river, leaving that area without any mail service. Mail volume has been light, but the arrival yesterday of a large amount of mail accumulating during the flood's delay is giving postal employees a sizable job.

Train crews are working on the two outside washouts of the four in eastern Burke, and postoffice officials are not expecting normal train service on mail before Saturday, if by that time.

FLOOD PROTECTION

Perhaps no opinion regarding the Flood of 1940 is as generally held as the belief that Lake James prevented a repetition of the disaster of 1916.

Almost every discussion of the havoc wrought by the floodwaters which swept over Western North Carolina this week, has included some mention of what *might have happened* if the Duke Power company's huge man-made reservoir had not caught some of the water rushing down out of the mountains toward us.

An early survey of Burke county reveals untold damage, despite that measure of protection. When the mire and the muck of the receding flood can be brushed aside to permit an accurate inventory and when the way is open for travel and an easy exchange of reports, the known toll will reach surprising heights. If transplanted into dollars and cents, the damage in Burke county alone would reach a sum that would be staggering even to persons who have inspected bridges ruined, highways washed out, and gaps cut in railway lines by the almost irresistible force of uncontrolled water.

Here and there, smaller streams are said by some people to have risen beyond the point reached in 1916. But the Catawba, to which Burke's other major rivers are tributary, is estimated to have fallen short by ten or 15 feet or more of the damaging peak reached 24 years ago. That margin makes a wide difference in the flood loss here and down through the Catawba river valley.

Lake James, completed since 1916 as the power company's Bridgewater unit, was constructed for the production of hydroelectric power and, chiefly, as a reservoir for water storage to regulate the flow to affiliated power plants down the Catawba.

A large volume of water was impounded there this week following the heavy rains, but at 2 o'clock Tuesday afternoon the lake was still four feet short of being full. Some time after midnight, the rising waters reached their peak, flowing at a height of 6.8 feet over the spillways--a rise of over 10 feet or almost one foot an hour! It would be interesting to know the number of gallons represented by each twelve-inch rise in the waterline of the huge lake--the largest in Western North Carolina and the largest reservoir in the entire State. Even if measurable, the water retained within the dams at such a time cannot be regarded as *"just so much water."* This is one exception to the rule that two and two make four, in terms of damaging force, for twice the volume of uncontrolled floodwater will do more than twice the destruction.

Under such unusual conditions, Lake James filled its purpose as an impounding basin, met safely the greatest test in its existence, and, most important of all to us, prevented a far greater flood toll in the valley below.

Dams on the Catawba River above and below Morganton, N.C., are shown in Figures 7 and 8. The photos were taken during the 1940 Flood. The Lake James Dam experienced a 10-foot overflow.

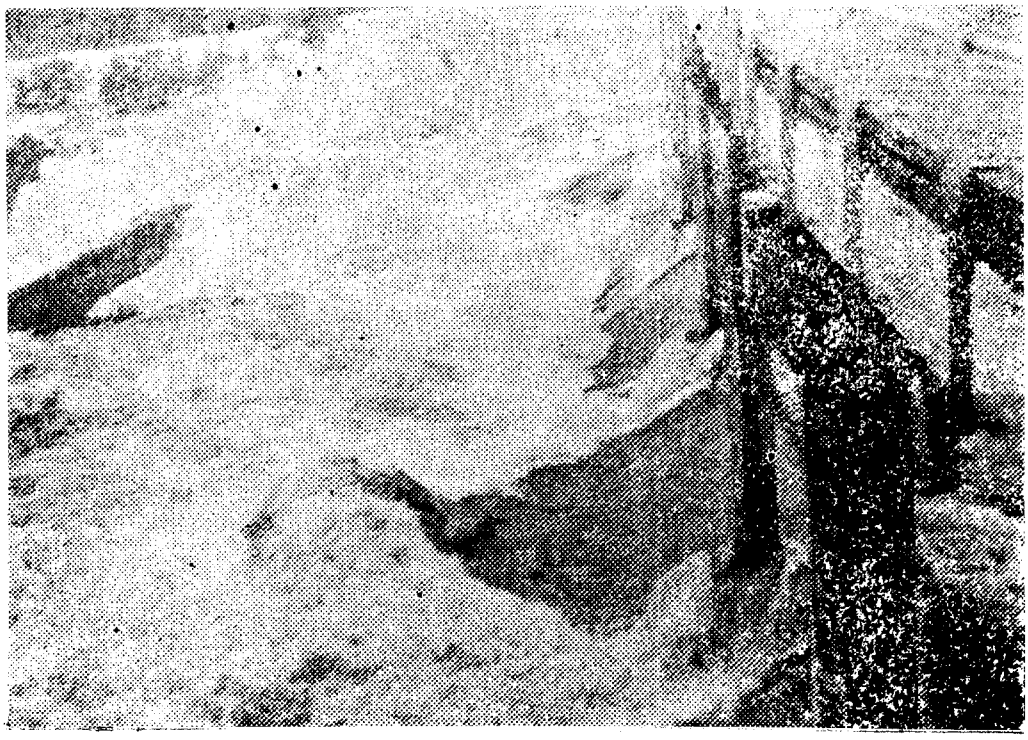


Figure 7 LAKE JAMES DAM DURING 1940 FLOOD

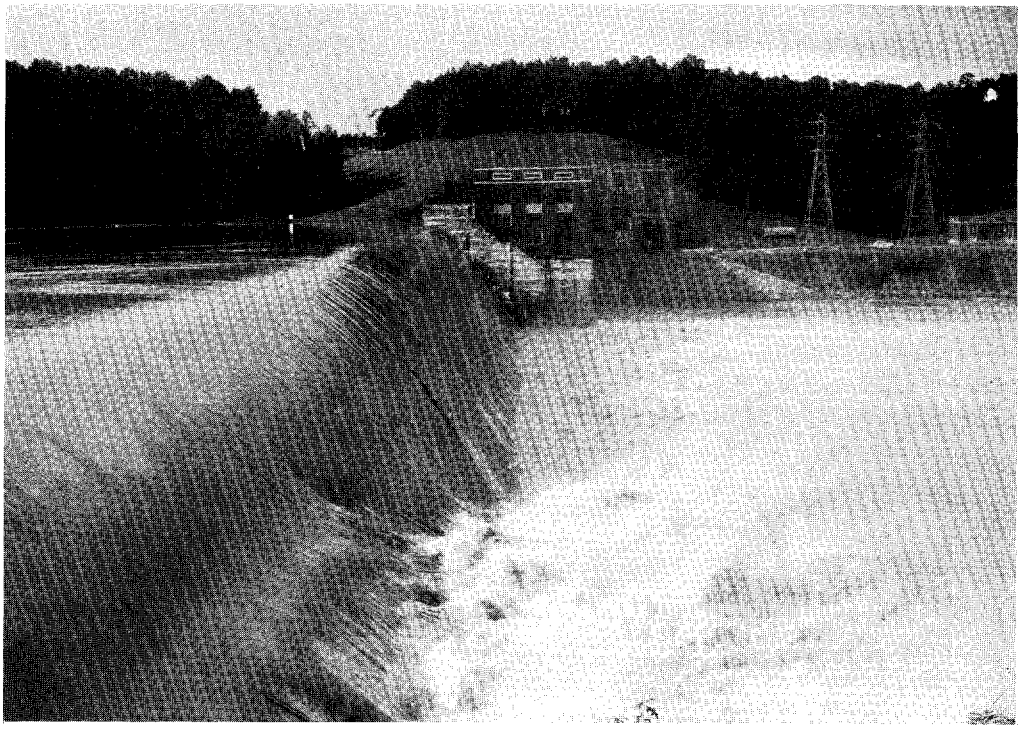
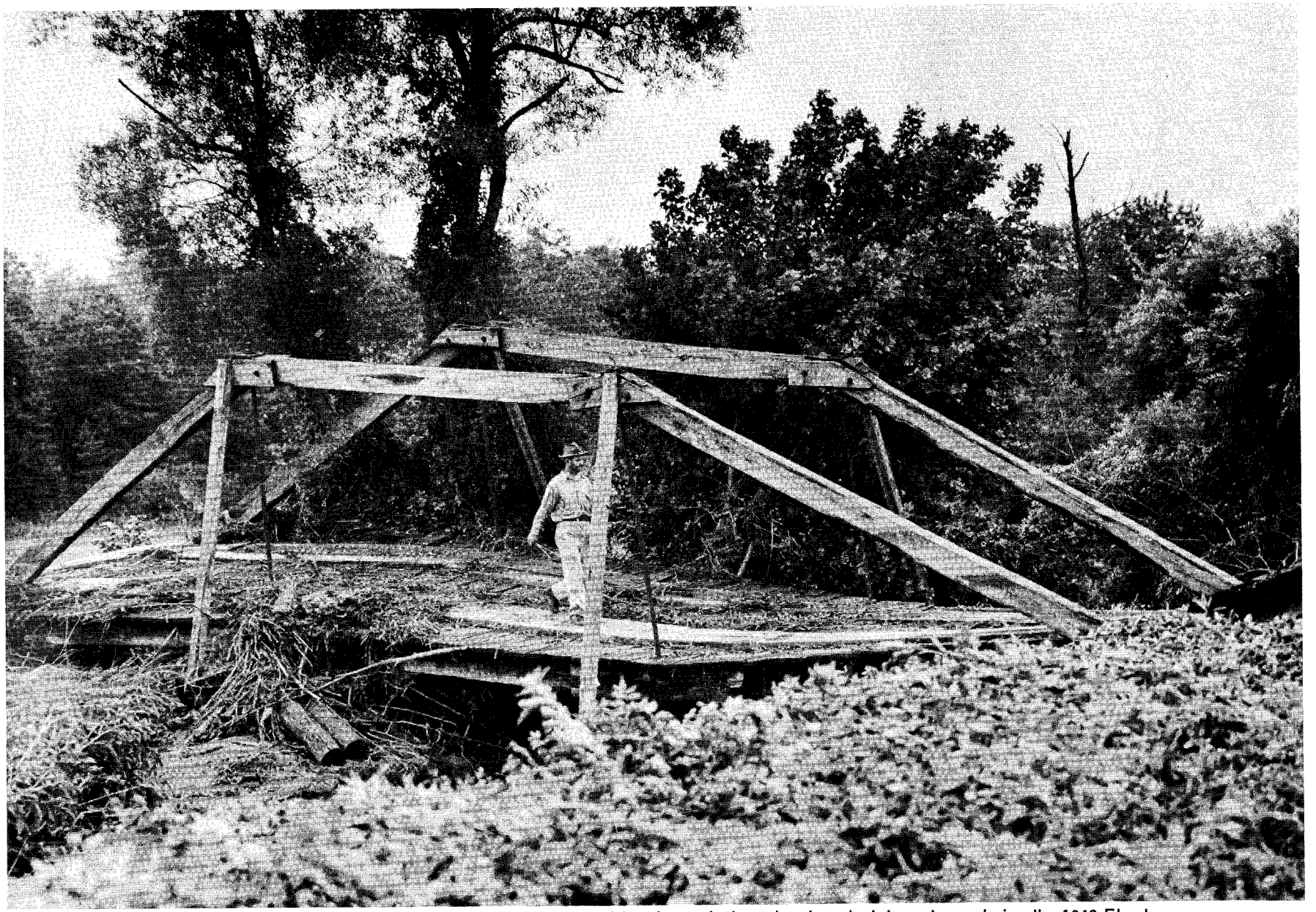


Figure 8 LAKE RHODHISS DAM DURING 1940 FLOOD



Hunting Creek Bridge Near Drexel Furniture Co. and Bethel Road was destroyed and washed downstream during the 1940 Flood.

Figure 9

FLOOD OF 1940

HUNTING CREEK

The Stream and Its Valley

Hunting Creek flows northeastward through Morganton to the Catawba River from its headwaters south and southeast of the city.

The study area consists of 13.9 miles of stream all within Burke County. It extends 7.8 miles up Hunting Creek from the Catawba River to Salem Road, 2.7 miles up East Prong from Hunting Creek to New Laurel Road, 2.3 miles up Fiddlers Run from East Prong to I-40, and 1.1 mile up Sandy Run from Hunting Creek. The drainage area at the lower end of the study is 25.69 square miles.

The stream channels are well defined with generally wide and open flood plains. Hunting Creek has an average width of 50 feet, an average depth of 7.5 feet and an average slope of 12.1 feet per mile. Fiddlers Run has an average width of 20 feet, an average depth of 4.5 feet, and an average slope of 23.4 feet per mile. East Prong has an average width of 30 feet, an average depth of 4 feet, and an average slope of 15.5 feet per mile. Sandy Run has an average width of 15 feet, an average depth of 4.5 feet, and an average slope of 26.6 feet per mile.

Developments in the Flood Plain

Plates 6 through 11 show areas subject to flooding within the study area. Structures affected by the Standard Project Flood are shown in black. There is little residential development in the flood plains, but commercial development has begun and with the present rate of population growth, residential as well as commercial development will move into the flood hazard area unless flood plain regulations are imposed. Figure 18 shows structures located in flood hazard areas and expected future flood heights along Hunting Creek and its tributaries in the vicinity of Morganton.

Bridges Across the Streams

There are 18 bridges within the study area; 10 on Hunting Creek, 2 on Fiddlers Run, 5 on East Prong, and 1 on Sandy Run. Tables 5 through 8 list pertinent data for these structures and show their relationship to computed flood elevations. Some of these bridges are shown in Figures 10 through 16.

TABLE 1

DRAINAGE AREAS IN WATERSHED
OF HUNTING CREEK

Location	Miles above Mouth	Drainage Area (Sq.Mi.)
Lower Limit of Study Area	0.0	25.7
Amherst Road	2.3	22.7
Southern Railroad	3.1	21.5
Bethel Road	4.1	9.3
College Street (U.S.G.S. Gage)	5.0	8.9
Interstate Hwy. 40	6.7	6.5
Upper Limit of Study Area	7.6	4.9

TABLE 2

DRAINAGE AREAS IN WATERSHED
OF SANDY RUN

Location	Miles above Mouth	Drainage Area (Sq.Mi.)
Mouth of Sandy Run	0.0	2.8
Upper Limit of Study Area	0.6	1.6

TABLE 3

DRAINAGE AREAS IN WATERSHED
OF EAST PRONG

Location	Miles above Mouth	Drainage Area (Sq.Mi.)
Mouth of East Prong	0.0	9.1
Bethel Road	0.5	6.6
N. C. Hwy. 18	2.0	5.4
Upper Limit of Study Area	2.3	5.1

TABLE 4

DRAINAGE AREAS IN WATERSHED
OF FIDDLERS RUN

Location	Miles above Mouth	Drainage Area (Sq.Mi.)
Mouth of Fiddlers Run	0.0	2.3
N. C. Hwy. 18	1.4	1.8
Upper Limit of Study Area	2.0	1.5

TABLE 5

HUNTING CREEK
BRIDGE AND CULVERT DATA

Miles above Mouth	Identification	Stream Bed Elevation (ft. msl)	Low Cord Elevation (ft. msl)	Roadway Elevation (ft. msl)	Intermediate Regional Flood Elevation (ft. msl)	Standard Project Flood Elevation (ft. msl)
1.1	City Dump Road Bridge	997.2	1017.0	1020.2	1015.9	1021.9
2.3	Amherst Road Bridge	1013.2	1030.9	1033.0	1029.6	1035.0
2.9	East Union Street and U.S. 64 and 70 Bridge	1019.6	1039.2	1042.7	1033.5	1037.1
3.1	Southern RR Bridge	1022.8	1054.5	1059.8	1036.5	1039.9
3.4	Fleming Drive and U.S. 64 and 70 Bypass Bridge	1027.2	1043.0	1046.6	1040.6	1046.0
4.1	Bethel Road Bridge	1036.1	1043.0	1048.5	1046.3	1049.6
4.9	N. C. Highway 18 and and Sterling Street Culvert	1049.4	1062.8	1066.8	1059.6	1062.4
5.0	S. College Street Bridge	1048.3	1066.8	1070.8	1060.0	1063.1
5.4	State Hosp. Road Bridge	1051.7	1063.5	1064.4	1066.4	1067.8
6.7	Interstate Hwy. 40 Culvert	1069.7	1079.6	1096.3	1087.2	1088.3

TABLE 6

SANDY RUN
CULVERT DATA

Miles above Mouth	Identification	Stream Bed Elevation (ft. msl)	Low Cord Elevation (ft. msl)	Roadway Elevation (ft. msl)	Intermediate Regional Flood Elevation (ft. msl)	Standard Project Flood Elevation (ft. msl)
3.4	U.S. Hwy. 64 & 70 Bypass and Fleming Drive Culvert	1026.0	1035.7	1041.2	1034.2	1037.1

TABLE 7

EAST PRONG
BRIDGE AND CULVERT DATA

Miles above Mouth	Identification	Stream Bed Elevation (ft. msl)	Low Cord Elevation (ft. msl)	Roadway Elevation (ft. msl)	Intermediate Regional Flood Elevation (ft. msl)	Standard Project Flood Elevation (ft. msl)
0.5	Bethel Street Bridge	1034.8	1046.1	1048.6	1043.7	1045.9
1.6	Bethel Road Bridge	1049.7	1057.4	1061.8	1058.9	1059.7
2.0	N.C. Highway 18 Culvert	1057.5	1070.3	1074.2	1064.9	1067.7
2.1	Interstate Hwy. 40 Culvert	1058.8	1069.7	1096.6	1069.6	1077.7
2.3	New Laurel Road Bridge	1063.1	1071.8	1074.0	1071.3	1079.2

TABLE 8

FIDDLERS RUN
CULVERT DATA

Miles above Mouth	Identification	Stream Bed Elevation (ft. msl)	Low Cord Elevation (ft. msl)	Roadway Elevation (ft. msl)	Intermediate Regional Flood Elevation (ft. msl)	Standard Project Flood Elevation (ft. msl)
1.4	N. C. Highway 18 Culvert	1070.1	1074.5	1109.0	1078.6	1087.7
1.9	Old N. C. Highway 18 Culvert	1086.9	1095.7	1101.4	1092.5	1094.0

Bridges or culverts usually affect flood problems. Openings too small to freely pass flood discharges will impede flow, causing increased flood heights immediately upstream. This effect is known as "head loss" and its influence on upstream water surface elevations, a "stepped" effect, is shown in the flood profiles on Plates 4 and 5.

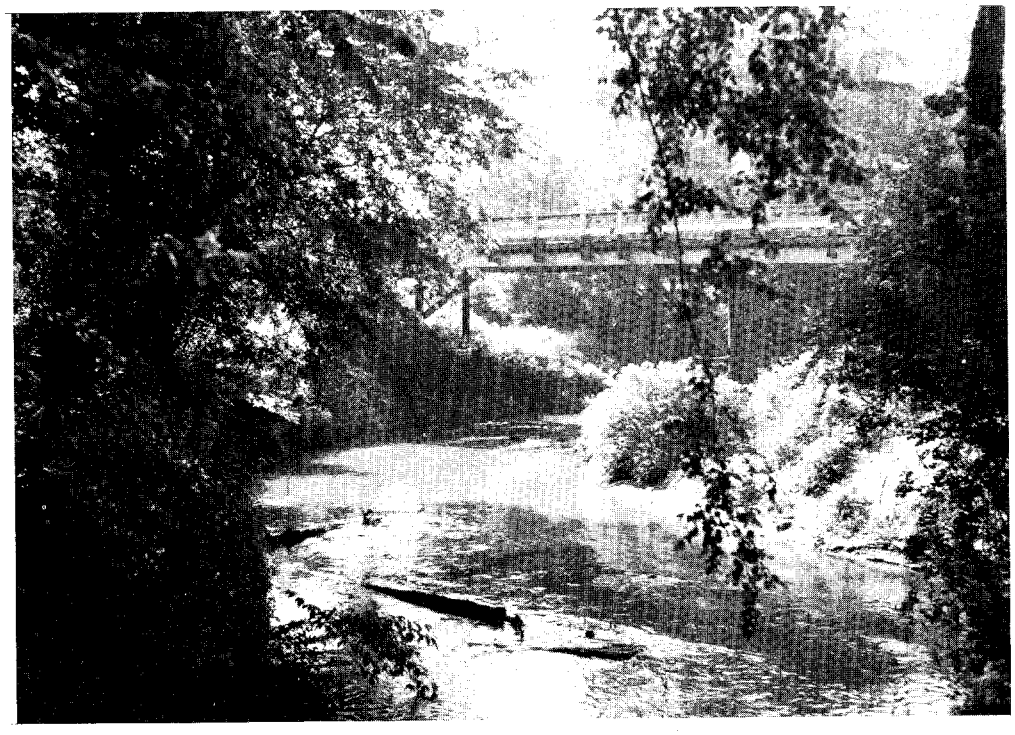
The profile shows that the Standard Project Flood overflows 5 bridges in the Hunting Creek Basin study area; City Dump Road, Amherst Road, Bethel Road, and State Hospital Road on Hunting Creek, and New Laurel Road on East Prong. However, the bridges inundated are low enough that major floods flow over the roadway before reaching great heights.

Tables 5 through 8 and Plates 4 and 5 relate the computed floods to the bridges and culverts, indicating which structures cause obstruction to flow and whether or not roadways would be inundated. Computed flood heights do not allow for clogged bridge openings during floods since there is no way of estimating the amount of debris that will collect at a bridge or culvert. Even though adequately designed, openings clogged with debris will cause water surface elevations in excess of those computed.

Obstructions to Flood Flow

The effect of obstruction due to bridges and the collection of debris has been discussed under the preceeding topic. Other types of obstructions frequently encountered are fills, pipe crossings, dams, and heavy growth in the channel and overbank flow areas. Land filling is one form of flow obstruction common along urban streams. In order to protect new structures from flooding, developers often fill flood plain areas before beginning construction. As other filling operations occur, the stream's natural floodway decreases and consequently the flood heights increase with a loss of the flood protection gained from earlier filling operations.

City Dump Road Bridge



Amherst Road Bridge

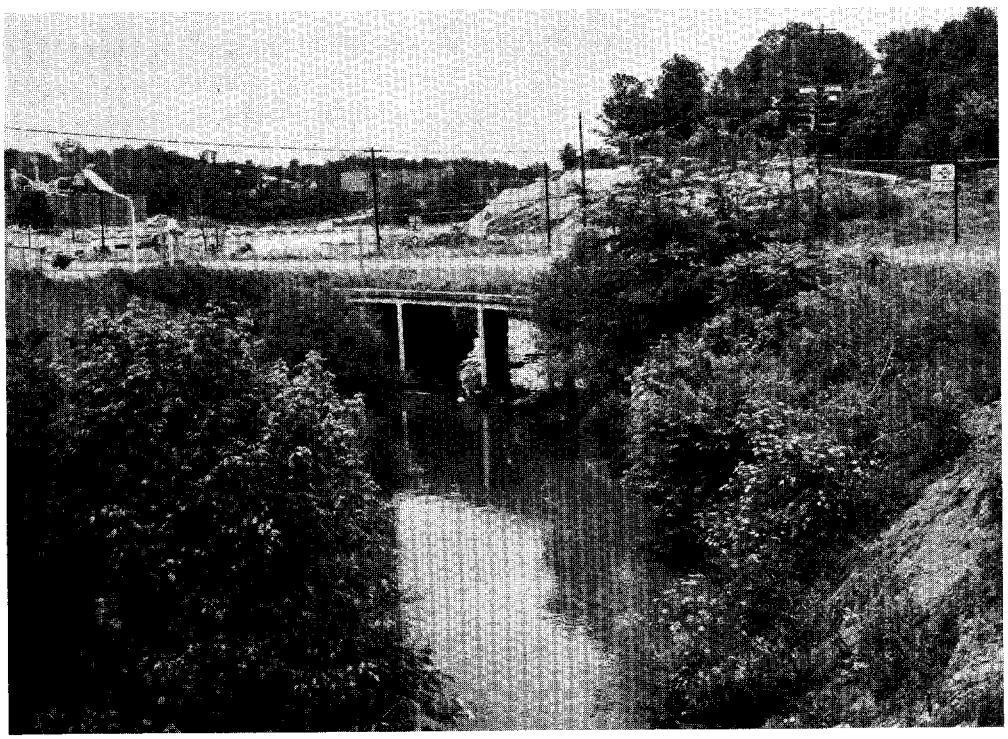
Figure 10 HUNTING CREEK BRIDGES

East Union Street & U. S. Hwy. 64 & 70 Bridge

Fleming Drive & U. S. Hwy. 64 & 70 Byp. Bridge

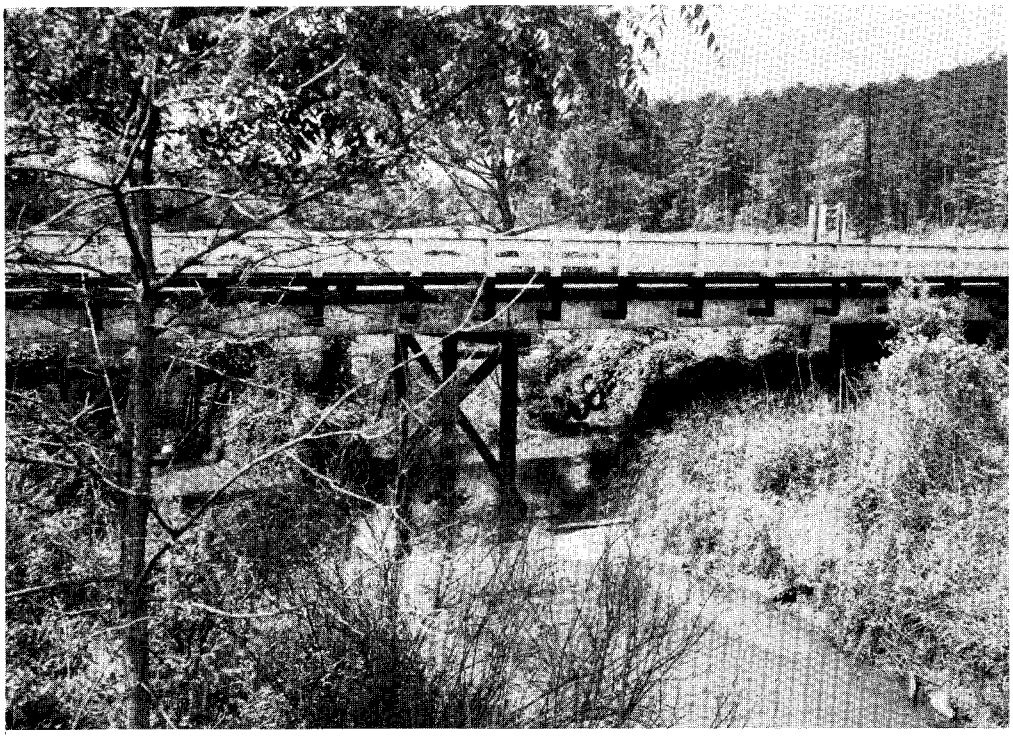
Figure 11 HUNTING CREEK BRIDGES

Bethel Road Bridge



N. C. Hwy. 18 & Sterling Street Culvert

Figure 12 HUNTING CREEK BRIDGE & CULVERT



Bethel Street Bridge

Bethel Road Bridge

Figure 13 EAST PRONG BRIDGES

N. C. Hwy. 18 Culvert

New Laurel Road Bridge

Figure 14 EAST PRONG BRIDGE & CULVERT

N. C. Hwy. 18 Culvert

Figure 15 FIDDLERS RUN CULVERT

U. S. Hwy. 64 & 70 Byp. & Fleming Drive Culvert

Figure 16 SANDY RUN CULVERT

FLOOD SITUATION

Flood Records

The United States Geological Survey began gaging streamflow on East Prong and Hunting Creek in 1966. Future data collected on these streams may be used to confirm or adjust the findings of this report.

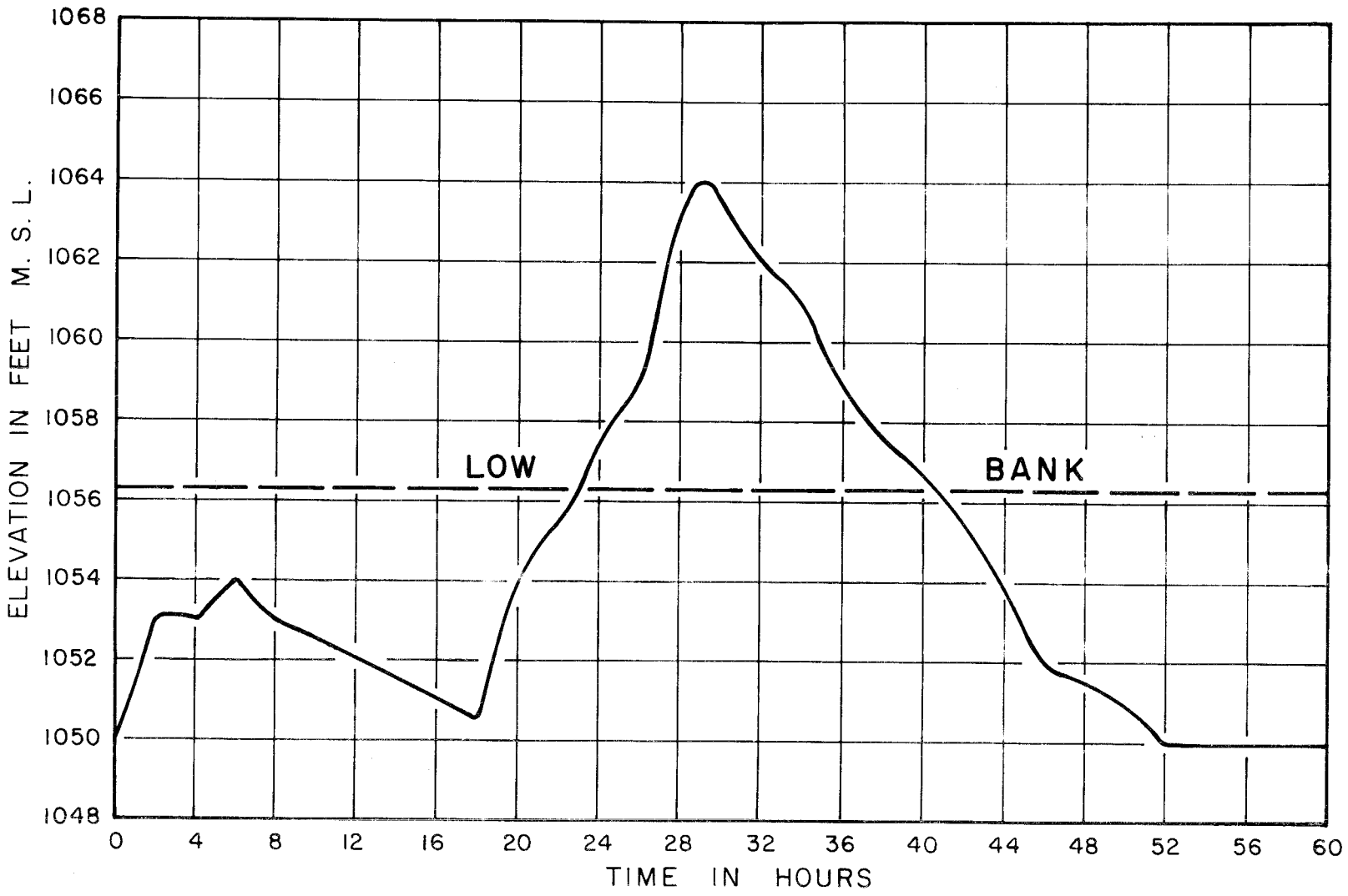
Flood Occurrences

The flood descriptions in this report were obtained from the files of The News Herald and from a paper prepared by Mr. Cliff Avery of Morganton on the 1916 Flood. The greatest Catawba River flood on record was that of 1916. However, the 1940 Flood caused the greatest flooding of the creeks in the Morganton area.

Standard Project Flood elevations on Hunting Creek would be very close to elevations of the 1940 Flood.

Velocities

The flood plain is open in most areas above Amherst Road, having been cleared for agricultural use. Below Amherst Road, the flood plain is densely wooded. During major floods, a large portion of water would flow in the overbank areas. Overbank velocities would be lower than channel velocities below Amherst Road due to the restrictions imposed by undergrowth. The Standard Project Flood would produce overbank velocities as high as 13.2 feet per second and channel velocities as high as 17.0 feet per second. Velocities of 3 feet per second or greater combined with water depths greater than 3 feet are considered to be hazardous. Tables 14 through 17 list computed velocities at selected points along the streams within the study area.



STAGE HYDROGRAPH FOR STANDARD PROJECT FLOOD
HUNTING CREEK 50' UPSTREAM FROM S. COLLEGE ST. STA. 266+00

PLATE 2

Flooded Areas

Plates 6 through 11 show approximate areas that would be flooded by the Standard Project and Intermediate Regional Floods with Plate 6 showing the area affected by river flooding. The study area was selected to include the area for which topographic map coverage was available and where present and potential flood problems were found. The actual limits of flooding may vary somewhat on the ground from those shown on the maps because the contour interval and scale of the maps do not permit precise plotting of the flood area boundaries. Structures located within the flood area are shown in black.

Figure 17 illustrates one type of flood plain structure which should be designed with sufficient water-handling capacity to maintain the degree of protection desired in the flood plain.

Flood Profiles

Flooding from the Catawba River is important in an analysis of the Hunting Creek flood problem. A detailed study of the Catawba River is not within the scope of this report; however, a study of the river has been made and will form a part of the Morganton Volume II report. River flood elevations were used in this report where they surpassed those on Hunting Creek for floods of the same frequency.

The lower 2.8 miles of the Hunting Creek flood plain would be inundated to a greater depth by a Standard Project Flood on the Catawba River than by a flood of the same frequency on Hunting Creek. Therefore, flooding from the river would dominate in the analysis of Hunting Creek flood plain management problems along this reach.

Plates 4 and 5 show highwater profiles for the Standard Project Flood and the Intermediate Regional Flood, stream bed profile, low bank profile, and road crossings. The horizontal scale on the profiles represents distance along the stream centerline measured from its mouth; the vertical scale is graduated in feet above mean sea level.

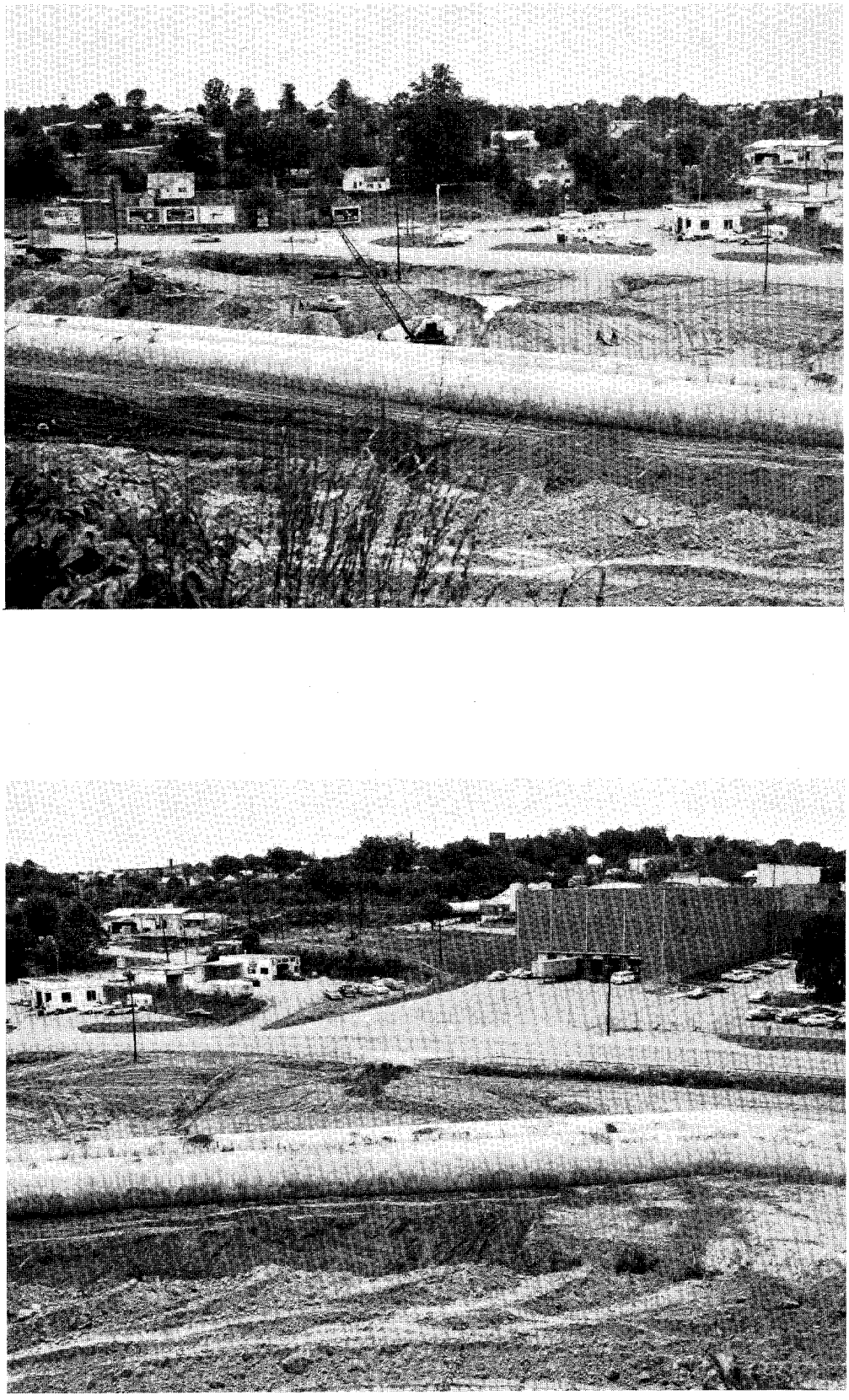


Figure 17 SITE OF FUTURE SHOPPING CENTER ON HUNTING CREEK

Cross Sections

Plates 4 and 5 show typical cross sections within the study area. Cross sections illustrate channel and flood plain topography in relation to computed flood heights. Horizontal scales show section width in feet; vertical scales are graduated in feet above mean sea level. Shown on the cross sections are flood heights for the Standard Project Flood and the Intermediate Regional Flood.

FUTURE FLOODS

This section of the report discusses the Standard Project and the Intermediate Regional Floods and some of the hazards involved. The Standard Project Flood represents reasonable upper limits of expected inundation. Floods of the size of the Intermediate Regional Flood will occur more frequently, but will not be as high as the Standard Project Flood. Since large floods have already been experienced on the streams in this area, it is practical to assume that storms similar to those causing these floods could occur again.

Determination of the Intermediate Regional Flood

The Intermediate Regional Flood is defined as a flood having an average frequency of once in 100 years at a designated location, although the flood may occur in any year.

Flood frequency analysis for determination of the Intermediate Regional Flood was based on regional rainfall published by the U.S. Weather Bureau.

Peak discharges and drainage areas for the Intermediate Regional Flood at various locations are shown in Tables 9 through 12.

Determination of Standard Project Flood

Only in rare instances has a specific stream experienced the largest flood that is ever likely to occur. Severe as the maximum known flood may have been on any given stream, a larger flood can occur. The Corps of Engineers, in cooperation with the Weather Bureau, has made broad and comprehensive studies and investigations based on

the vast records of experienced storms and floods and has evolved generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood, defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. Standard Project Flood discharges are given in Tables 9 through 12.

Frequency

Frequency of flooding is expressed either in terms of "recurrence interval" or "probability." A 100-Year Flood is a flood with recurrence interval of 100 years. This means that in a period of 200 years a flood of this magnitude or larger would likely be equaled or exceeded twice. The concept implies no regularity in the time of recurrence.

It is not practical to assign a frequency to the Standard Project Flood. Although the occurrence of such a flood would be a rare event, it could happen any year.

Possible Larger Floods

Floods larger than the Standard Project Flood are possible; however, the simultaneous occurrence of hydrologic conditions and other factors necessary to produce such floods would be rare.

TABLE 9

HUNTING CREEK
PEAK DISCHARGES

Location	Miles above Mouth	Drainage Area (Sq.Mi.)	Intermediate Regional Flood Discharge (cfs)	Standard Project Flood Discharge (cfs)
Lower Limit of Study Area	0.0	25.7	8,100	14,500
Amherst Road	2.3	22.7	8,100	14,500
Southern Railroad	3.1	21.5	7,410	13,040
Bethel Road	4.1	9.3	3,670	6,560
College Street	5.0	8.9	3,670	6,560
Interstate Hwy. 40	6.7	6.5	3,020	5,250
Upper Limit of Study Area	7.6	4.9	2,380	4,130

TABLE 10

SANDY RUN
PEAK DISCHARGES

Location	Miles above Mouth	Drainage Area (Sq.Mi.)	Intermediate Regional Flood Discharge (cfs)	Standard Project Flood Discharge (cfs)
Mouth of Sandy Run	0.0	2.8	1,315	2,240
Upper Limit of Study Area	0.6	1.6	1,070	1,785

TABLE 11

EAST PRONG
PEAK DISCHARGES

Location	Miles above Mouth	Drainage Area (Sq.Mi.)	Intermediate Regional Flood Discharge (cfs)	Standard Project Flood Discharge (cfs)
Mouth of East Prong	0.0	9.1	3,550	6,170
Bethel Road	0.5	6.6	2,730	4,775
N. C. Hwy. 18	2.0	5.4	2,460	4,280
Upper Limit of Study Area	2.3	5.1	2,190	3,810

TABLE 12

FIDDLERS RUN
PEAK DISCHARGES

Location	Miles above Mouth	Drainage Area (Sq.Mi.)	Intermediate Regional Flood Discharge (cfs)	Standard Project Flood Discharge (cfs)
Mouth of Fiddlers Run	0.0	2.3	1,140	1,910
N.C. Highway 18	1.4	1.8	900	1,310

HAZARDS OF GREAT FLOODS

The amount and extent of damage caused by any flood depends in general upon how much area is flooded, the height of flooding, the velocity of flow, the rate of rise, and the duration of flooding.

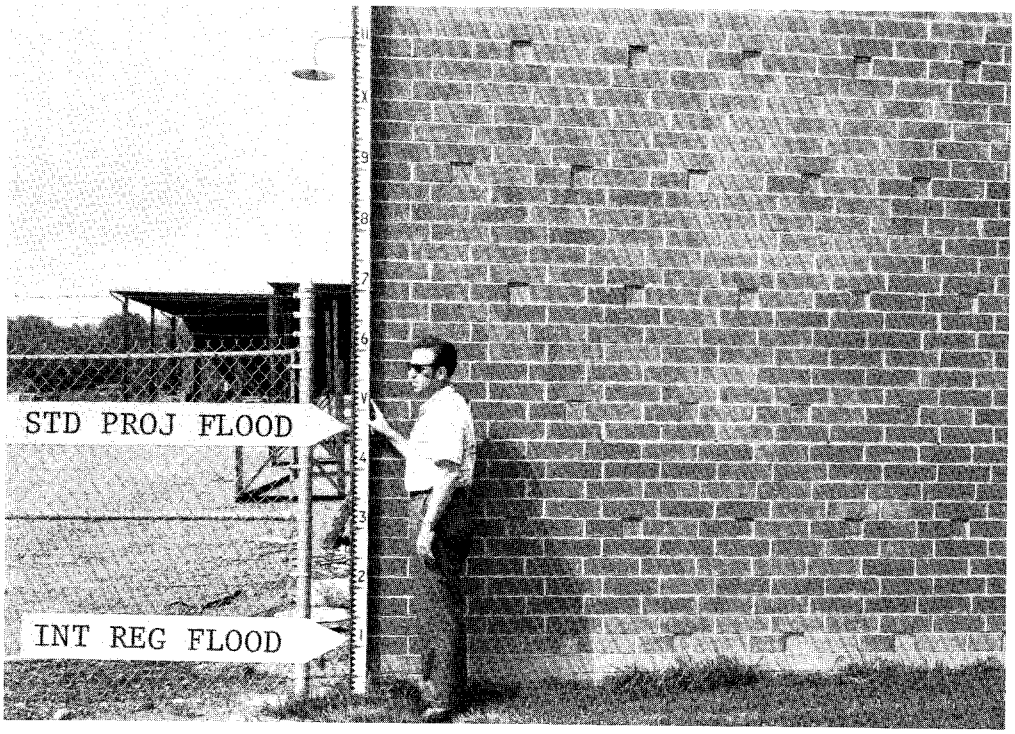
Areas Flooded and Heights of Flooding

The areas along the study reaches which would be flooded by the Standard Project Flood and the Intermediate Regional Flood are shown on Plates 6 through 11. Depths of flow can be estimated from the crest profiles, Plates 4 and 5, as was done for Figure 18.

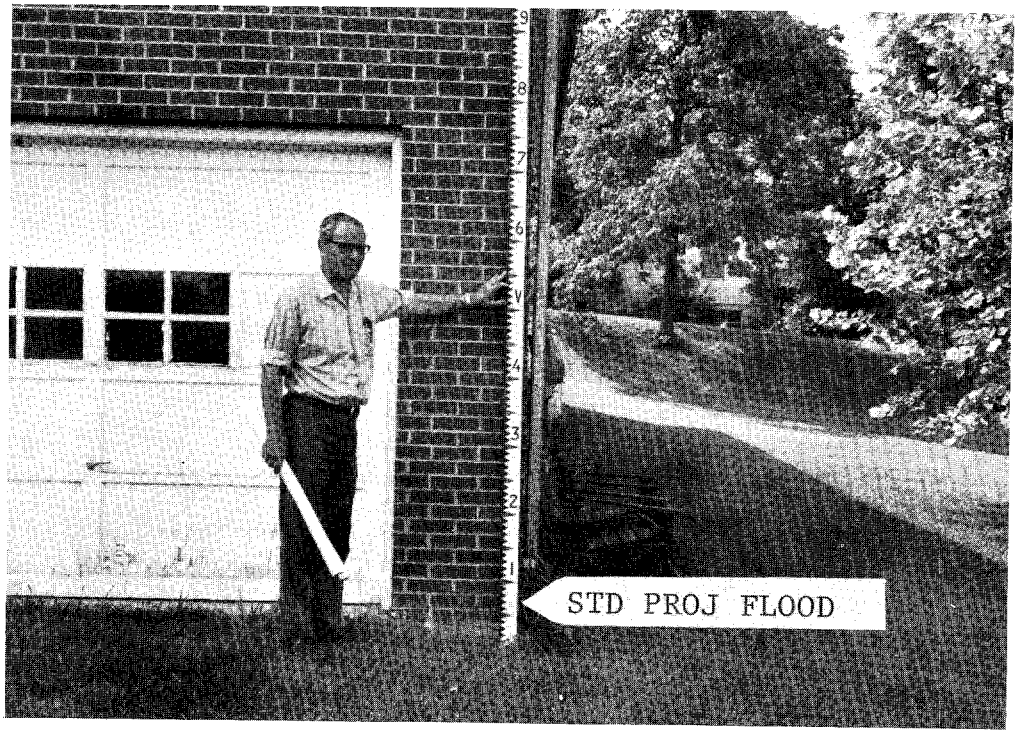
Standard Project and Intermediate Regional Flood estimates have been made for the 25.69 square mile drainage area in the Hunting Creek Basin. Within the study area, the Standard Project Flood would inundate about 475 acres and the Intermediate Regional Flood would inundate about 400 acres.

The profiles for the streams were computed by using stream characteristics as determined from topographic maps and valley cross sections which were surveyed in 1968. The elevations shown on the profiles and the overflow areas shown on the flood maps have been determined with an accuracy consistent with the purpose of this study and the accuracy of the basic data.

The profiles of the Standard Project Flood and the Intermediate Regional Flood depend in part upon the degree of destruction and clogging of bridges during the flood. Because it is impossible to forecast these events, it was assumed that all bridge structures would stand and that no clogging would occur.



Arrows show approximate heights that would be reached by the Standard Project and Intermediate Regional Floods at an industrial building upstream from Bethel Road.



Arrow shows approximate height that would be reached by the Standard Project Flood at a home on Bethel Road.

Figure 18 HUNTING CREEK FLOODING

Velocities, Rates of Rise, and Durations

Water velocities during floods depend largely upon the size and shape of the cross sections, the condition of the stream, and the bed slope, all of which may vary at different locations along the stream. The reaches investigated for this report had varying bed slopes and cross sections throughout, thus causing the changes in velocities noted in Tables 14 through 17 which show maximum velocities that might be expected during floods.

Table 13 gives the rise and recession time between low bank and Standard Project Flood crest at the gage at College Street on Hunting Creek.

TABLE 13

STANDARD PROJECT FLOOD DATA
AT HUNTING CREEK GAGE

Location	College St.
River Mile	5.0
Low Bank Elevation	1056.4
Flood Crest Elevation	1064.0
Rainfall	10.05"
Rainfall Run-off Duration	52 hrs.
Maximum Rate of Rise	2.15 ft/hr.
Rise Time	29 hrs.
Recession Time	23 hrs.
Time Out of Banks	18 hrs.

TABLE 14

HUNTING CREEK
COMPUTED VELOCITIES

Location	Intermediate Regional Flood Maximum Velocities (feet per second)		Standard Project Flood Maximum Velocities (feet per second)	
	Channel	Overbank	Channel	Overbank
Below City Dump Road	10.1	4.6	10.9	5.0
Below E. Union Street	10.2	4.8	10.2	6.0
Below Southern RR	12.3	6.5	15.2	9.4
Below N.C. Hwy. 18 and Sterling Street	10.4	5.2	11.7	6.1
Below State Hosp. Road	16.8	2.0	9.0	2.9
Below Interstate Hwy. 40	8.4	3.8	7.3	3.6

TABLE 15

SANDY RUN
COMPUTED VELOCITIES

Location	Intermediate Regional Flood Maximum Velocities (feet per second)		Standard Project Flood Maximum Velocities (feet per second)	
	Channel	Overbank	Channel	Overbank
Mouth of Sandy Run	6.3	3.2	7.2	4.2
Below U.S. Hwy. 64 & 70 Bypass and Fleming Drive	14.0	3.4	17.0	4.7
Upper Limit of Study Area	6.2	2.2	3.9	2.0

TABLE 16

EAST PRONG
COMPUTED VELOCITIES

Location	Intermediate Regional Flood Maximum Velocities (feet per second)		Standard Project Flood Maximum Velocities (feet per second)	
	Channel	Overbank	Channel	Overbank
Below Bethel Street	8.2	4.5	11.7	7.1
Below Bethel Road	3.8	2.1	5.2	2.9
Above N.C. Hwy. 18	11.0	9.4	13.2	11.4
Below Interstate Hwy. 40	10.8	9.9	13.8	11.7
Above New Laurel Road	10.8	4.5	2.6	1.2

TABLE 17

FIDDLERS RUN
COMPUTED VELOCITIES

Location	Intermediate Regional Flood Maximum Velocities (feet per second)		Standard Project Flood Maximum Velocities (feet per second)	
	Channel	Overbank	Channel	Overbank
Below N.C. Hwy. 18	6.4	3.8	7.5	4.8
Below Old N.C. Hwy. 18	11.7	10.2	14.3	12.6
Above Old N.C. Hwy. 18	8.9	7.8	11.0	9.8

GLOSSARY OF TERMS

Flood. An overflow of lands not normally covered by water and that are used or useable by man. Floods have two essential characteristics: The inundation of lands is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in stream flow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water, which have been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above the mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Low Cord. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as underclearance in some regions.

Mean Sea Level. A reference from which elevations are measured. Mean Sea Level refers to the "United States Coast and Geodetic Survey, 1936 Supplemental Adjustment" datum.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40% to 60% of the Probable Maximum Floods for the same basin. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

AUTHORITY, ACKNOWLEDGEMENTS, AND INTERPRETATION OF DATA

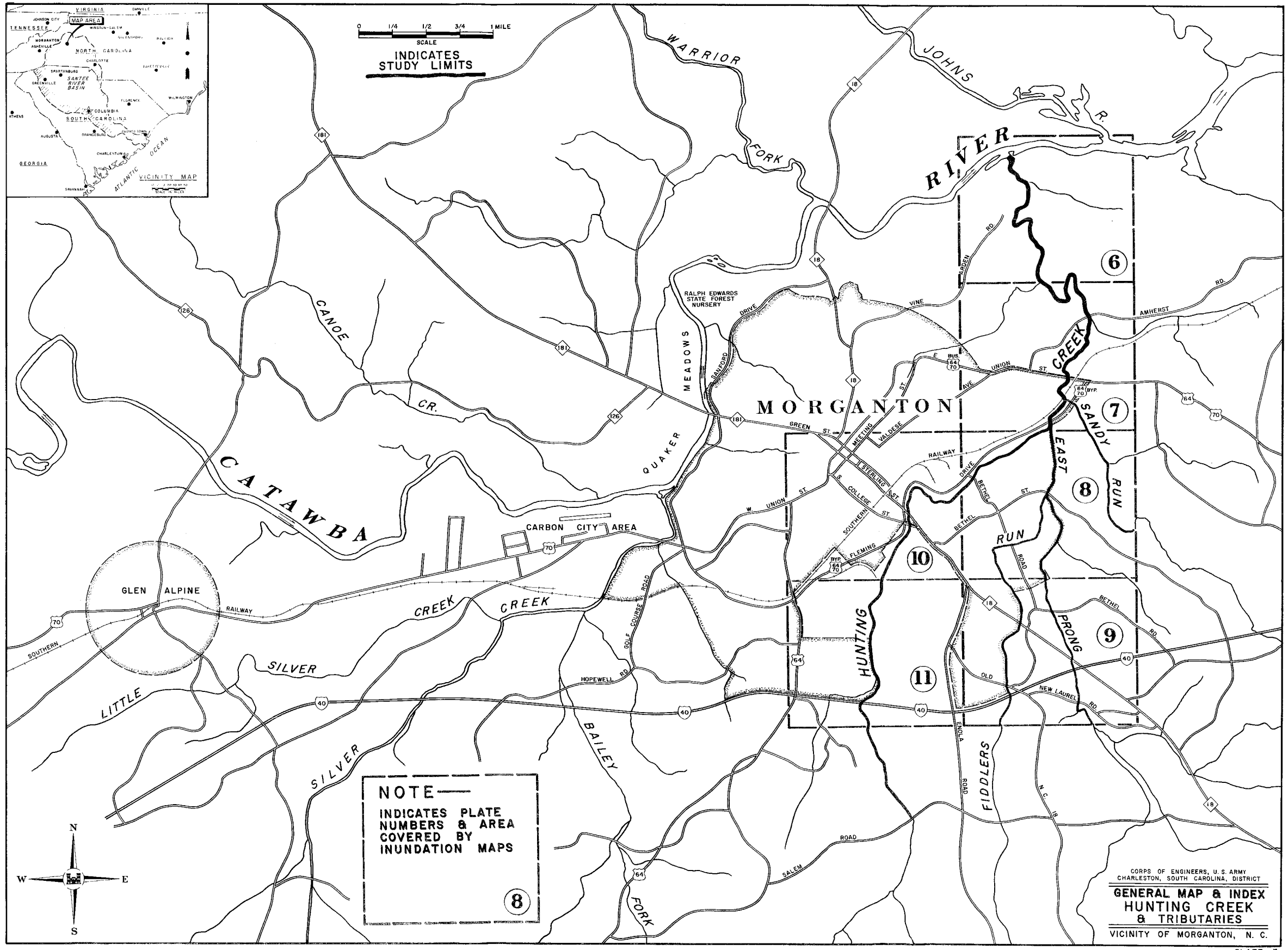
This report has been prepared in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-645), as amended.

* * *

Assistance and cooperation of the U.S. Weather Bureau, the U.S. Geological Survey (with special acknowledgement to Mr. Duncan Murrow), the North Carolina Department of Water and Air Resources, the City of Morganton, The News Herald, Mr. C.K. Avery, and other private citizens have been invaluable in the preparation of this report. The help of these agencies and individuals is greatly appreciated.

* * *

The Charleston District of the Corps of Engineers will, upon request, provide interpretation and limited technical assistance in the application of data presented in this report and will provide other available flood data related thereto.


VIRGINIA
DANVILLE
JOHNSON CITY
MAP AREA
TENNESSEE
WINSTON-SALEM
MORGANTON
ASHEVILLE
NORTH CAROLINA
RALEIGH
CHARLOTTE
FAYETTEVILLE
SPARTANBURG
GREENVILLE
SANTEE RIVER BASIN
FLORENCE
WILMINGTON
COLUMBIA
ATHENS
SOUTH CAROLINA
AUGUSTA
ORANGEBURG
MYRTLE BEACH
CHARLESTON
GEORGIA
ATLANTIC OCEAN
SAVANNAH
VICINITY MAP
0 1/4 1/2 3/4 1 MILE
SCALE
INDICATES STUDY LIMITS
WARRIOR FORK
JOHNS R.
RIVER
CANOE CR.
CATAWBA
QUAKER MEADOWS
RALPH EDWARDS STATE FOREST NURSERY
DRIVE
VINE
RIDGEN RD.
AMHERST RD.
CREEK
SANDY
EAST
RUN
MORGANTON
GREEN ST.
MEETING
VALDESE
STERLING
RAILWAY
W. UNION ST.
S. COLLEGE ST.
SOUTHERN ST.
FLEMING
BETHEL ST.
BETHEL ROAD
CARBON CITY AREA
GLEN ALPINE
SOUTHERN RAILWAY
CREEK
SILVER
LITTLE
SILVER CREEK
90° COURSE ROAD
HOPEWELL RD.
BAILEY
HUNTING
PRONG
OLD NEW LAUREL RD.
FIDDLERS
ENOLA ROAD
N.C. 18
SALEM ROAD
FORK
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NOTE—
INDICATES PLATE NUMBERS & AREA COVERED BY INUNDATION MAPS
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CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
GENERAL MAP & INDEX
HUNTING CREEK
& TRIBUTARIES
VICINITY OF MORGANTON, N. C.

PLATE 3

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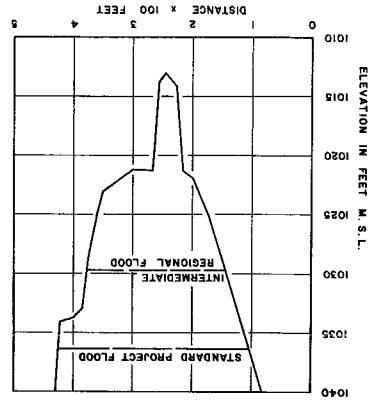
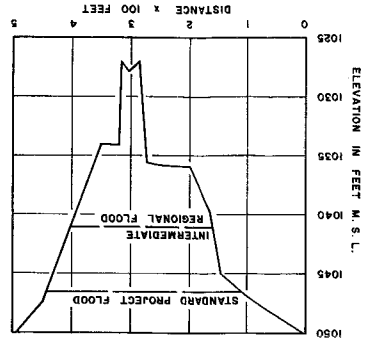
FLOOD PROFILES
& CROSS SECTIONS
HUNTING CREEK

VICINITY OF MORGANTON, N. C.

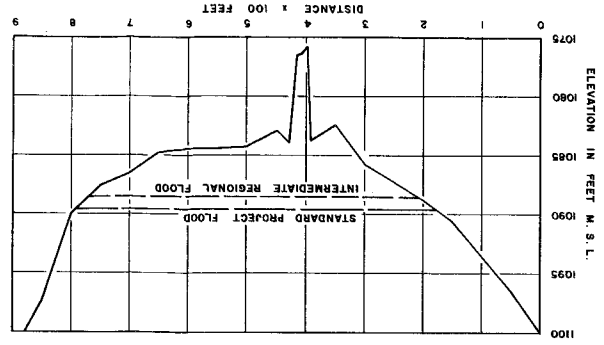
HUNTING CREEK CROSS SECTION STA. 121+00
100 FEET DOWNSTREAM FROM AMHERST RD.

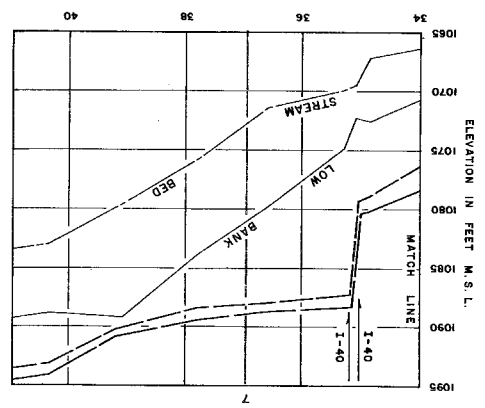


HUNTING CREEK CROSS SECTION STA. 180+00
100 FEET UPSTREAM FROM FLEMING DRIVE



HUNTING CREEK CROSS SECTION STA. 378+00
2700 FEET UPSTREAM FROM INTERSTATE HWY. 40





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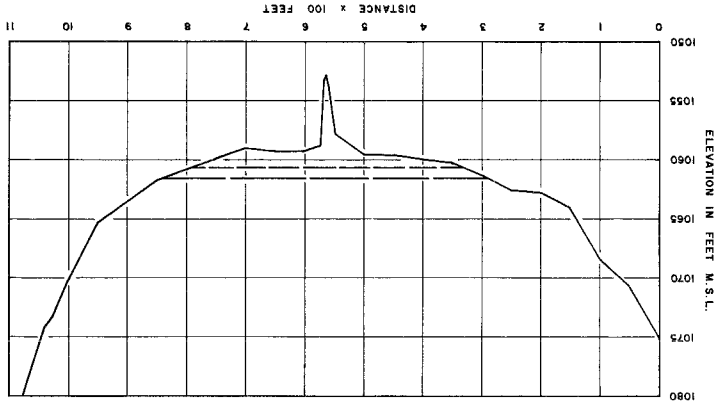
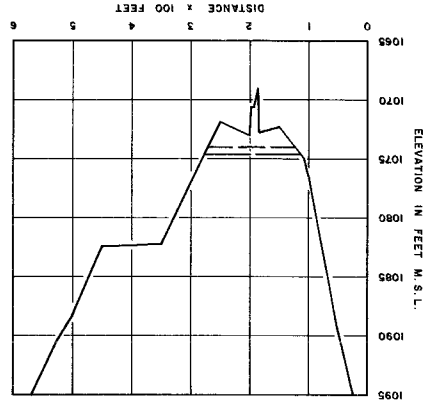
CHARLESTON, SOUTH CAROLINA DISTRICT

FLOOD PROFILES & CROSS SECTIONS
HUNTING CREEK TRIBUTARIES
VICINITY OF MORGANTON, N. C.

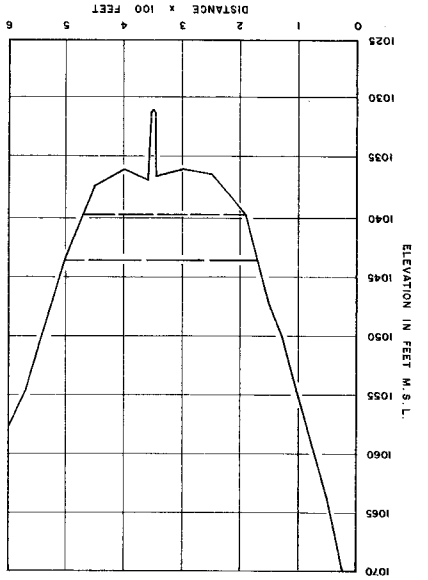
EAST PRONG CROSS SECTION STA. 93+30
MIDWAY BETWEEN BETHEL ROAD & N. C. HWY. 18



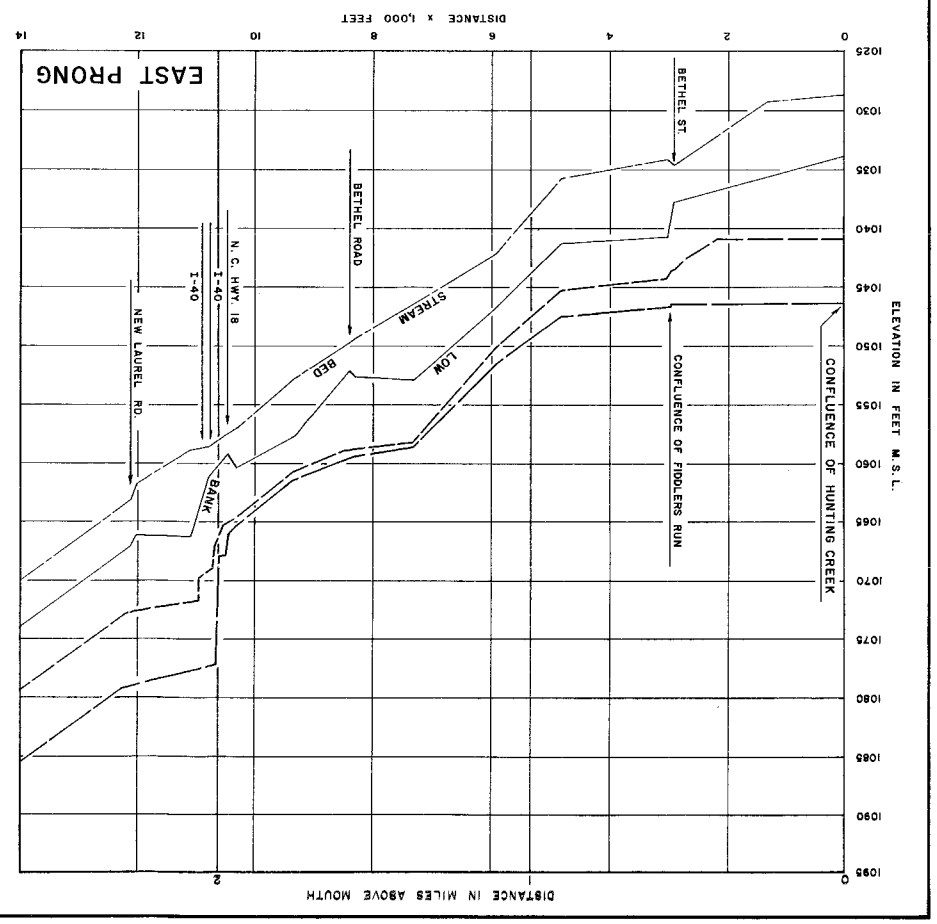
FIDDLERS RUN CROSS SECTION STA. 71+00
200 FEET DOWNSTREAM FROM N. C. HWY. 18

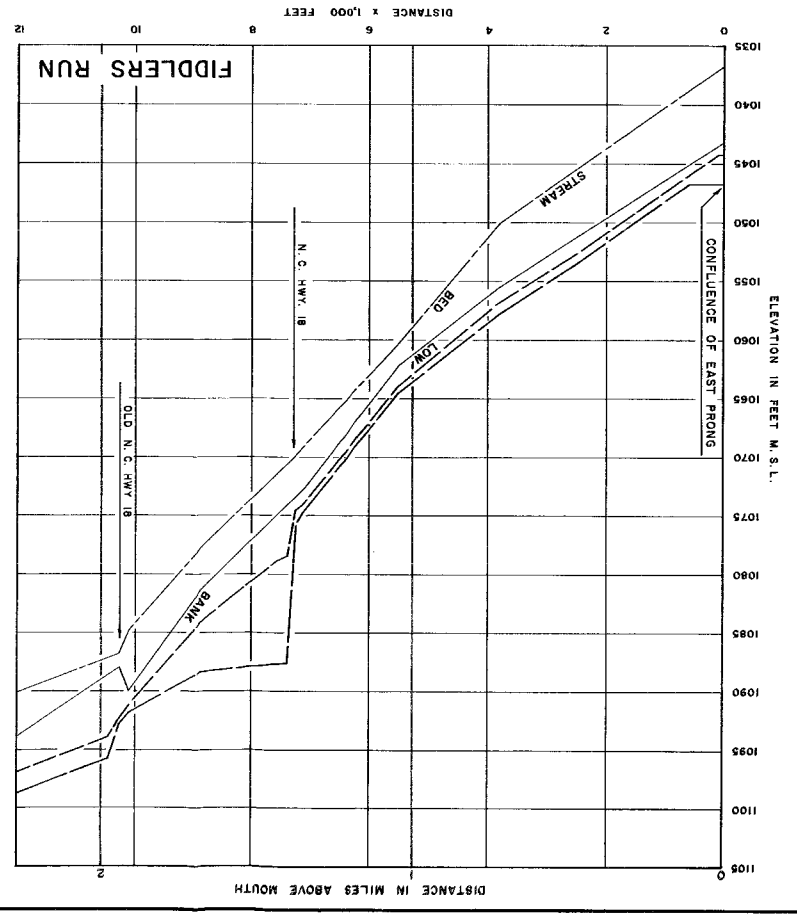


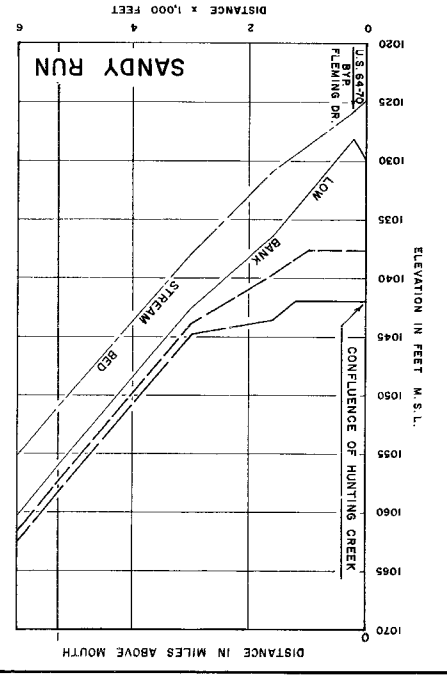
SANDY RUN CROSS SECTION STA. 16+00
1400 FEET UPSTREAM FROM FLEMING DRIVE

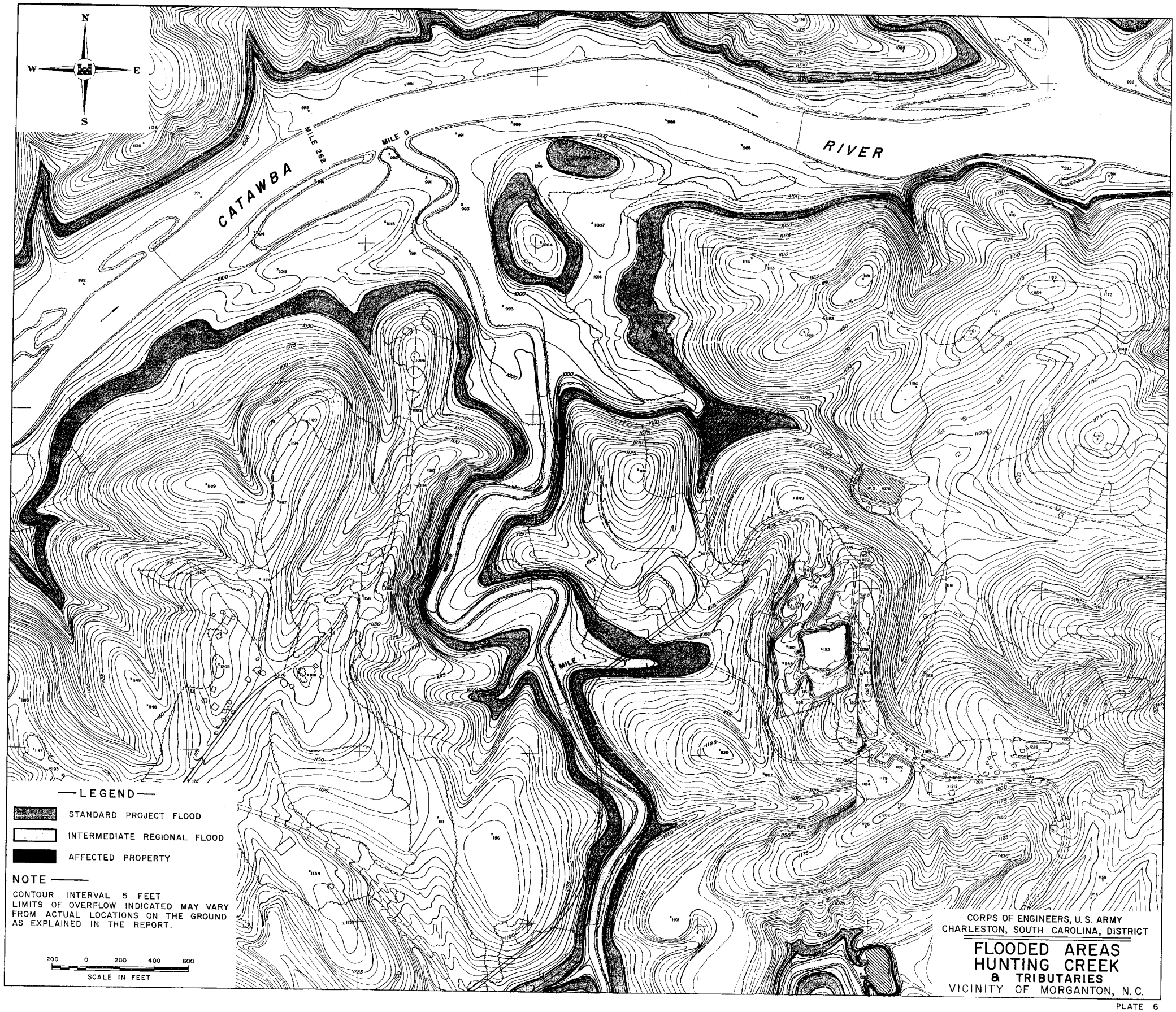


LEGEND — STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD





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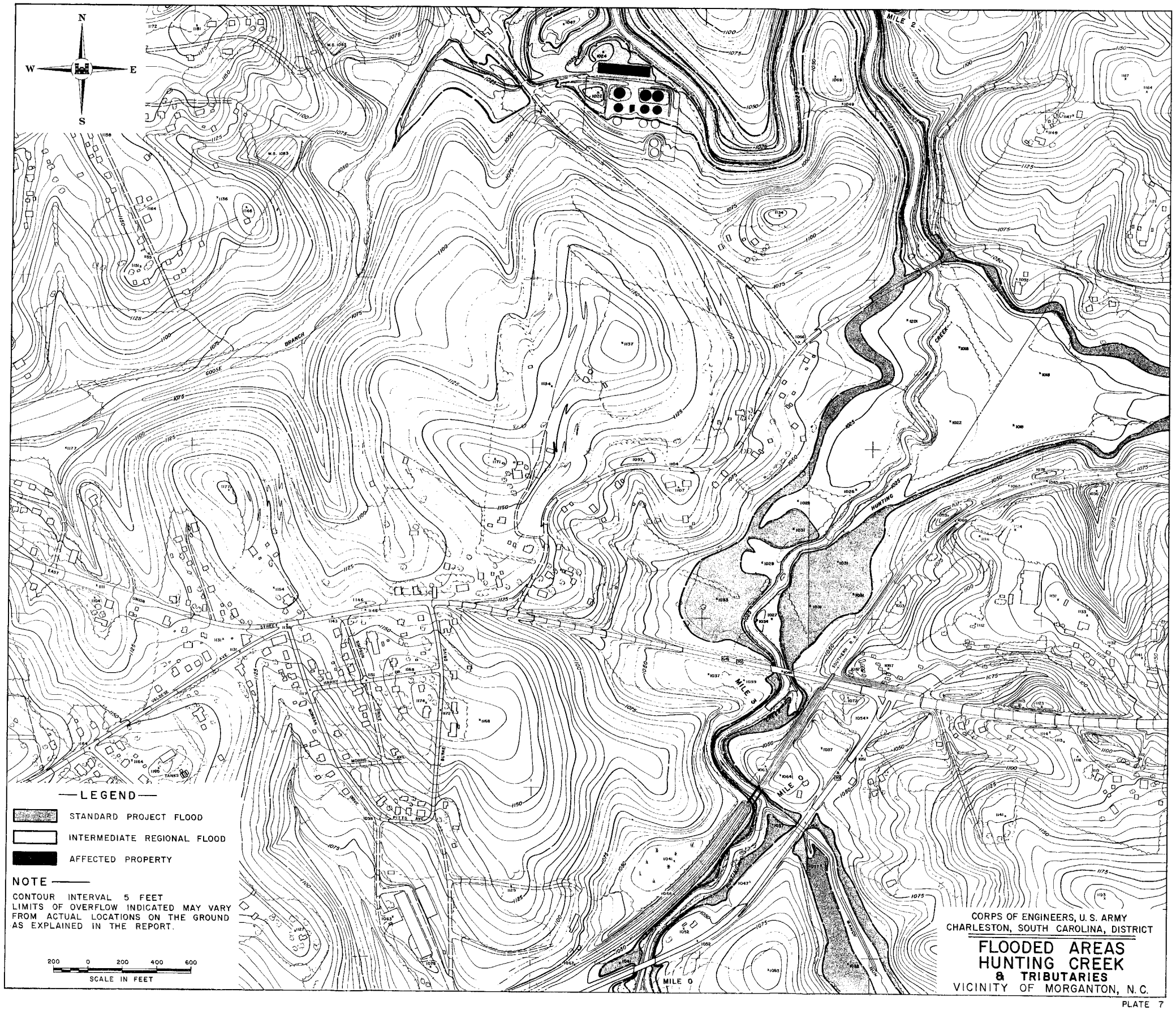
MILE 0
MILE
—LEGEND—
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
AFFECTED PROPERTY
NOTE
CONTOUR INTERVAL 5 FEET
LIMITS OF OVERFLOW INDICATED MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AS EXPLAINED IN THE REPORT.
200 0 200 400 600
SCALE IN FEET
CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FLOODED AREAS
HUNTING CREEK
& TRIBUTARIES
VICINITY OF MORGANTON, N.C.

PLATE 6


N
W
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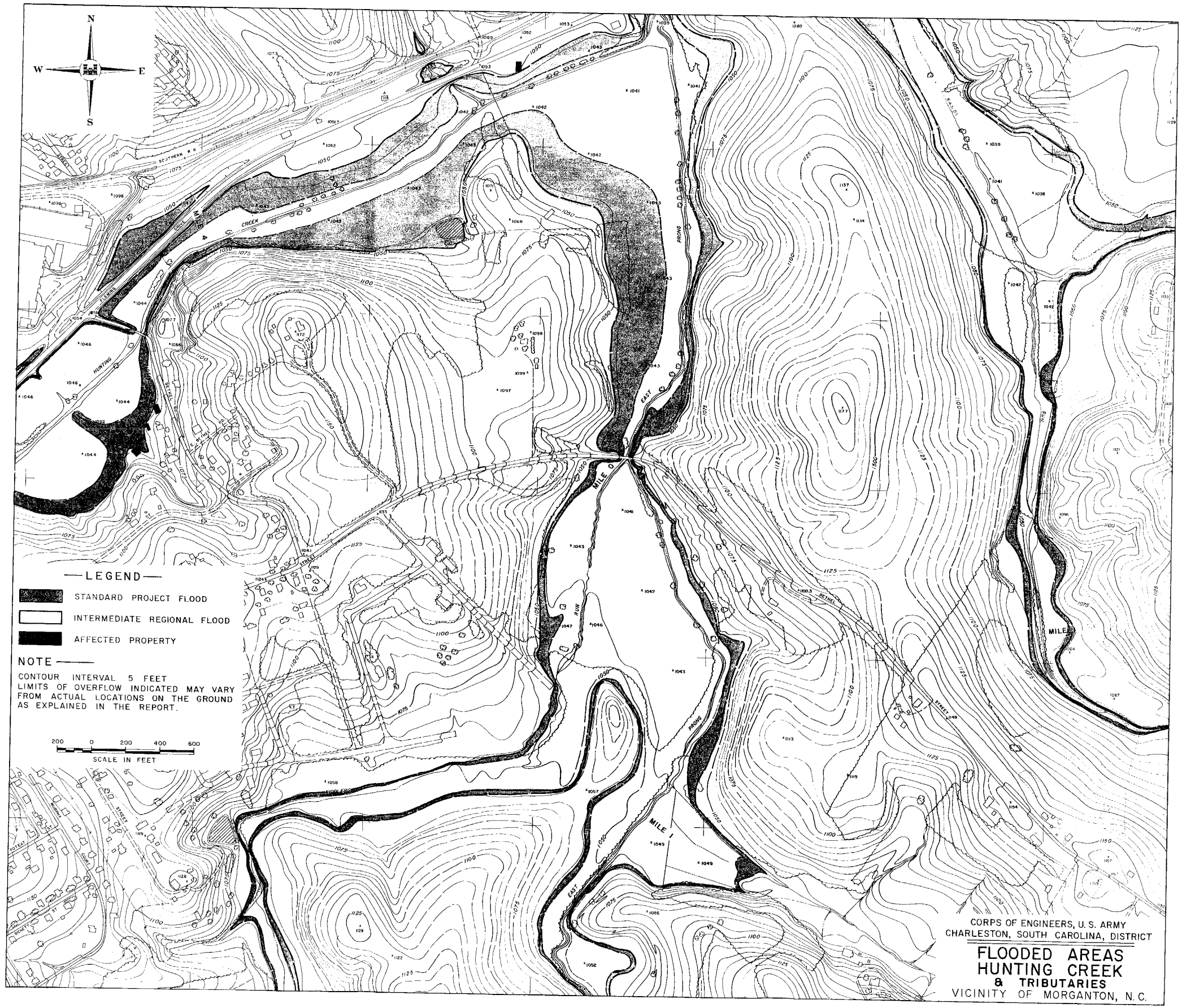
MILE 2
MILE 1
MILE 0
HUNTING CREEK
GOOSE BRANCH
—LEGEND—
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
AFFECTED PROPERTY
NOTE
CONTOUR INTERVAL 5 FEET
LIMITS OF OVERFLOW INDICATED MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AS EXPLAINED IN THE REPORT.
200 0 200 400 600
SCALE IN FEET
CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FLOODED AREAS
HUNTING CREEK
& TRIBUTARIES
VICINITY OF MORGANTON, N.C.

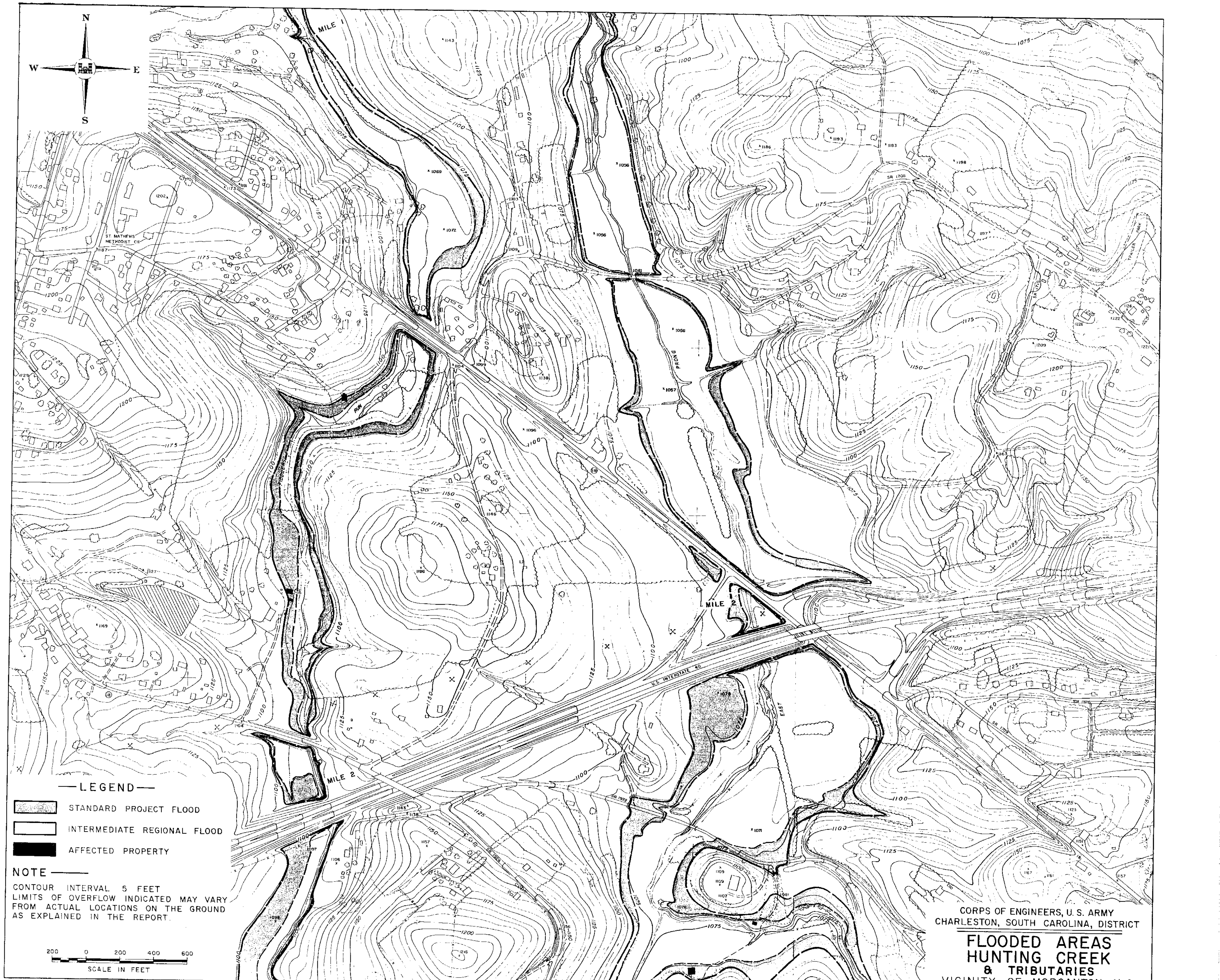
PLATE 7



CORPS OF ENGINEERS, U. S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT

FLOODED AREAS HUNTING CREEK & TRIBUTARIES VICINITY OF MORGANTON, N. C.

PLATE 8



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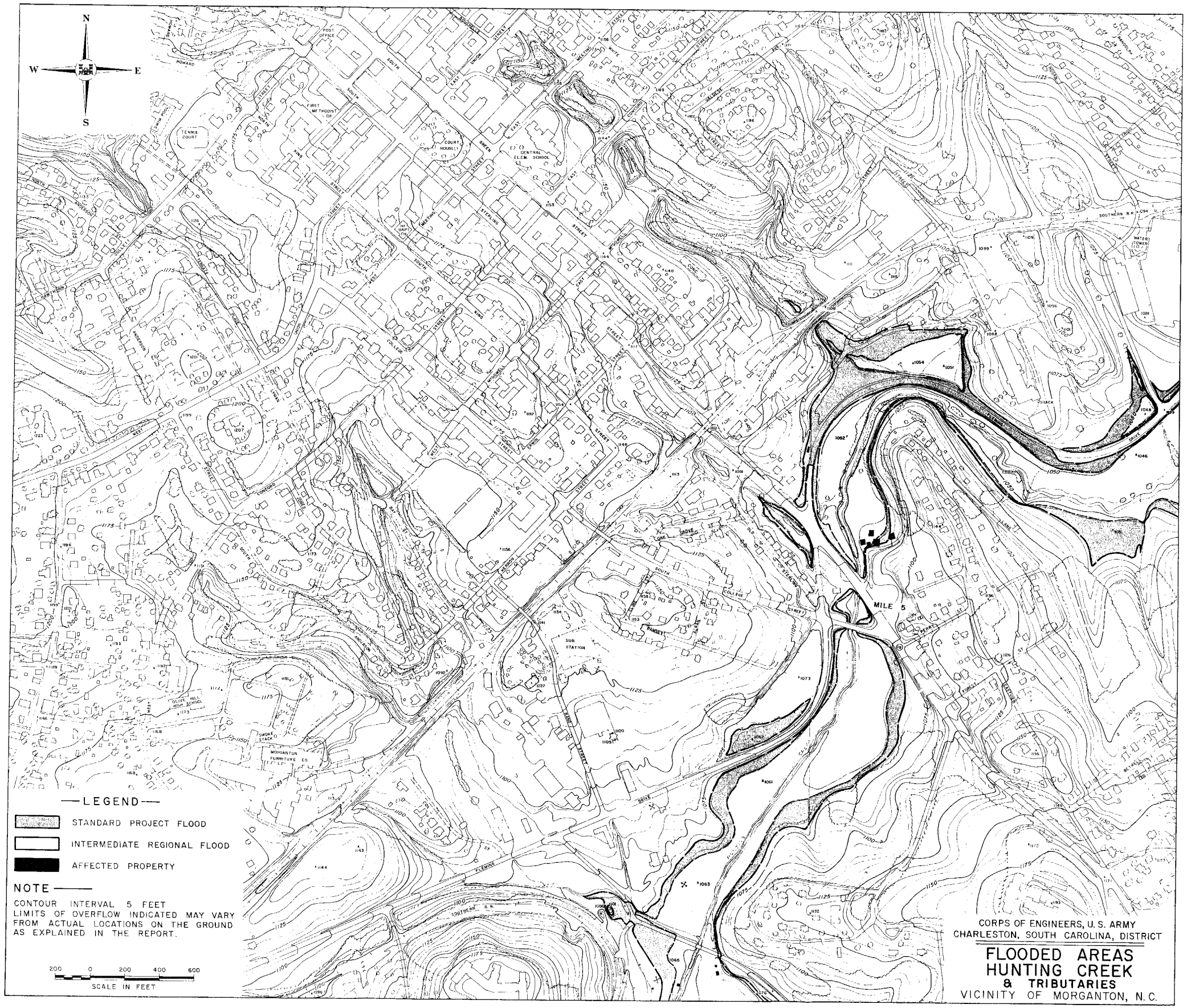
CHARLESTON, SOUTH CAROLINA, DISTRICT

FLOODED AREAS HUNTING CREEK & TRIBUTARIES

VICINITY OF MORGANTON, N. C.

PLATE 9


N
W
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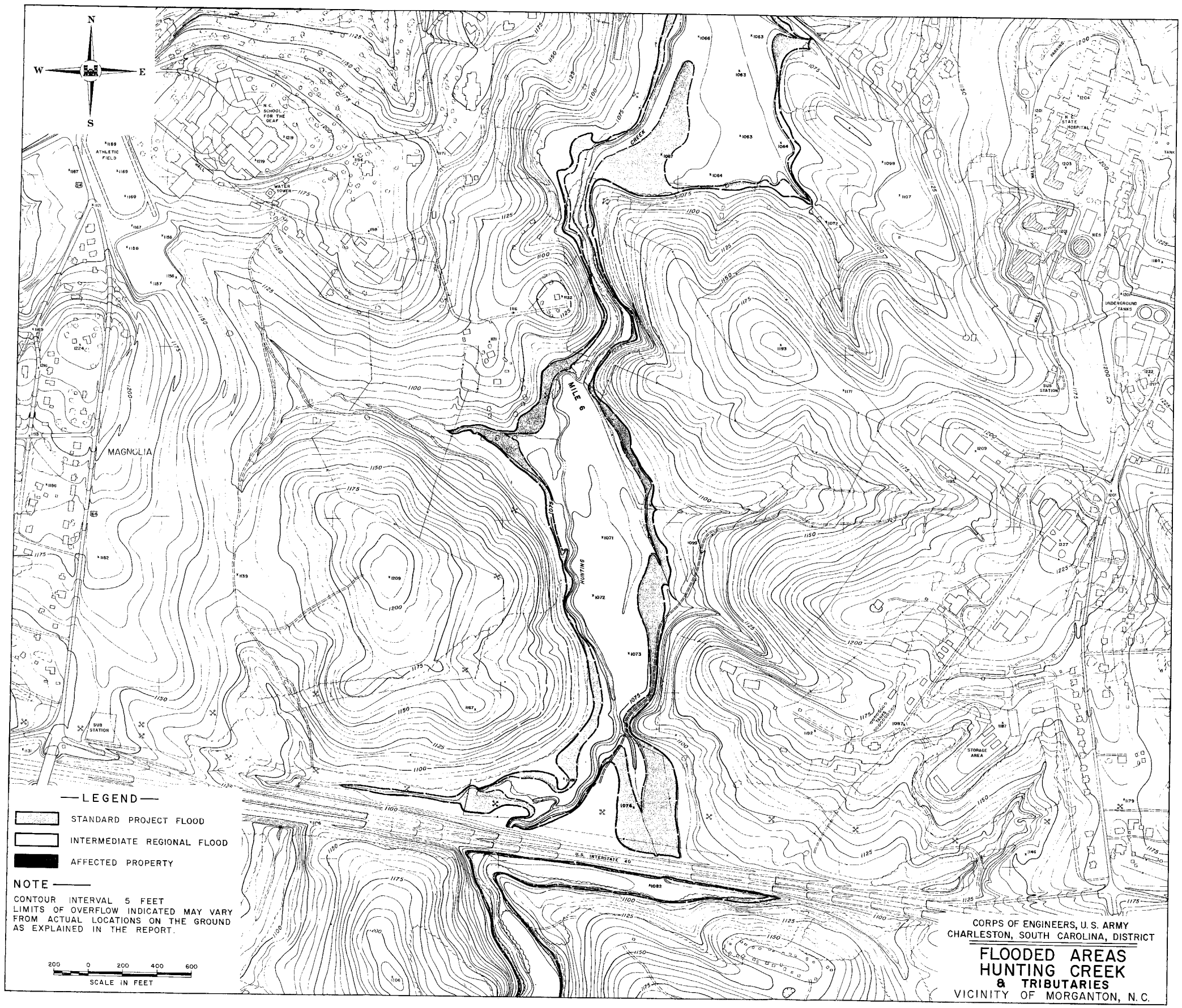
S
POST OFFICE
FIRST METHODIST CH
TENNIS COURT
COURT HOUSE
CENTRAL ELEM. SCHOOL
SOUTHERN R.R.
WATER TOWER
MILE 5
SUB STATION
GLOVE MFG. & KNITTING MILL
SMOKE STACK
MORGANTON FURNITURE CO.
LEGEND
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
AFFECTED PROPERTY
NOTE
CONTOUR INTERVAL 5 FEET
LIMITS OF OVERFLOW INDICATED MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AS EXPLAINED IN THE REPORT.
200 0 200 400 600
SCALE IN FEET
CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FLOODED AREAS
HUNTING CREEK
& TRIBUTARIES
VICINITY OF MORGANTON, N.C.

PLATE 10


N
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N.C. SCHOOL FOR THE DEAF
ATHLETIC FIELD
WATER TOWER
MAGNOLIA
MILE 6
HUNTING CREEK
N.C. STATE HOSPITAL
UNDERGROUND TANKS
SUB STATION
SUB STATION
STORAGE AREA
U.S. INTERSTATE 40
— LEGEND —
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
AFFECTED PROPERTY
NOTE
CONTOUR INTERVAL 5 FEET
LIMITS OF OVERFLOW INDICATED MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AS EXPLAINED IN THE REPORT.
200 0 200 400 600
SCALE IN FEET
CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FLOODED AREAS
HUNTING CREEK
& TRIBUTARIES
VICINITY OF MORGANTON, N.C.

PLATE II