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FLOOD PLAIN INFORMATION, LITTLE NESHAMINY CREEK, BUCKS COUNTY, --ETC(U)
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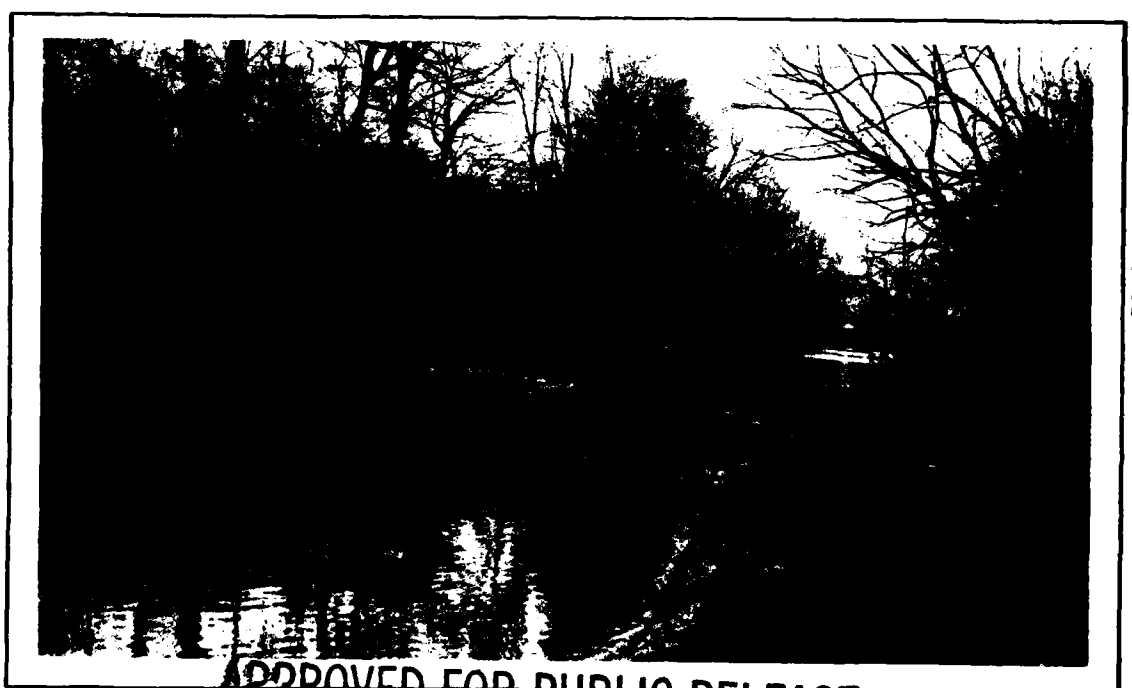
FLOOD PLAIN INFORMATION

LITTLE NESHAMINY CREEK

BUCKS COUNTY, PENNSYLVANIA



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PREPARED FOR THE BUCKS COUNTY PLANNING COMMISSION
BY CORPS OF ENGINEERS, U.S. ARMY PHILADELPHIA DISTRICT

NOVEMBER 1973

REPT. NO: DAEN/NAP-82040/FI21-73/11

TO THE REQUESTOR:

This Flood Plain Information (FPI) Report was prepared by the Philadelphia District office of the U.S. Army Corps of Engineers, under the continuing authority of the 1960 Flood Control Act, as amended. The report contains valuable background information, discussion of flood characteristics and historical flood data for the study area. The report also presents through tables, profiles, maps and text, the results of engineering studies to determine the possible magnitude and extent of future floods, because knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning floodplain utilization. These projections of possible flood events and their frequency of occurrence were based on conditions in the study area at the time the report was prepared.

Since the publication of this FPI Report, other engineering studies or reports may have been published for the area. Among these are Flood Insurance Studies prepared by the Federal Insurance Administration of the Federal Emergency Management Agency, Flood Insurance Studies generally provide different types of flood hazard data (including information pertinent to setting flood insurance rates) and different types of floodplain mapping for regulatory purposes and in some cases provide updated technical data based on recent flood events or changes in the study area that may have occurred since the publication of this report.

It is strongly suggested that, where available, Flood Insurance Studies and other sources of flood hazard data be sought out for the additional, and, in some cases, updated flood plain information which they might provide. Should you have any questions concerning the preparation of, or data contained in this FPI Report, please contact:

U.S. Army Corps of Engineers
Philadelphia District
Custom House, 2nd and Chestnut Streets
Philadelphia, PA 19106

ATTN: Flood Plain Mgt. Services Branch, NAPEN-M

Telephone number: (215) 597-4807

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: DAEN/NAP-82040/FPI21-73/11	2. GOVT ACCESSION NO.: AD-A101536
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE *(and Subtitle)*: Flood plain information, Little Neshaminy Creek, Bucks County, Pa.	5. TYPE OF REPORT & PERIOD COVERED: Flood plain information
	6. PERFORMING ORG. REPORT NUMBER: DAEN/NAP-82040/FPI21-73/11
7. AUTHOR(s):	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U.S. Army Corps of Engineers Philadelphia, 2nd & Chestnut Sts., Philadelphia, PA 19106	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Corps of Engineers Philadelphia, 2nd & Chestnut Sts., Philadelphia, PA 19106	12. REPORT DATE: Nov. 1973 13. NUMBER OF PAGES: 37 p.
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*:	15. SECURITY CLASS. *(of this report)*: UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT *(of this Report)*

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Little Neshaminy Creek, Pa.
Bucks County Planning Commission
Floods
Flood forecasting
Flood plains

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report covered the flood situation along Little Neshaminy Creek from its confluence with the Neshaminy Creek near the town of Rushland, Pa. to the Bucks-Montgomery County boundary at County Line Road. A history of flooding along Little Neshaminy Creek was presented. Special emphasis was given to possible future floods thru maps, photographs, profiles and cross sections.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Under authority of Section 206 of the 1960 Flood Control Act as amended the flood plain information was prepared by the U.S. Army Corps of Engineers Philadelphia District at the request of the Bucks County Planning Commission. The information should be considered for its historical nature. Since the publication of this FPI report other Flood Insurance studies have been undertaken and should also be consulted for more current information.

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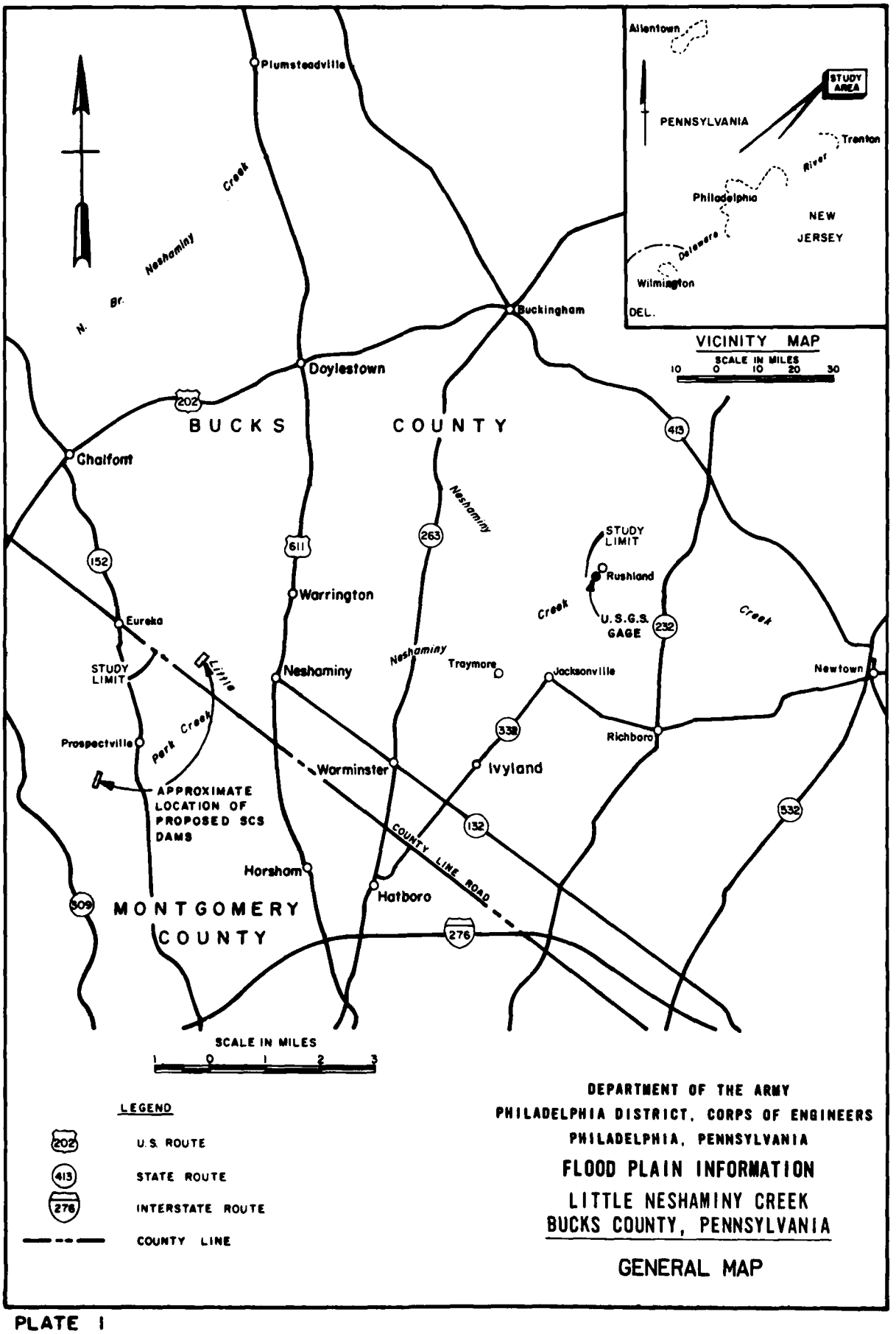


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

GENERAL MAP

PLATE 1

PREFACE

This report covers the flood situation along Little Neshaminy Creek from its confluence with the Neshaminy Creek near the town of Rushland, Pennsylvania, to the Bucks-Montgomery County boundary at County Line Road. The properties located on the flood plain along Little Neshaminy Creek are primarily residential and commercial and have been damaged by past floods. Many areas along Little Neshaminy Creek may become more populated and developed in the future. Although large floods have occurred in the past, studies indicate that even larger floods are possible.

This report presents information about flood potential and flood hazards because this knowledge is important in land use planning and for management decisions concerning flood plain utilization. It includes a history of flooding along Little Neshaminy Creek and identifies those areas that are subject to possible future floods. Special emphasis is given to the possible future floods through maps, photographs, profiles and cross sections. The report does not provide solutions to flood problems; however, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevent intensification of the loss problems. It will also aid in the identification of areas where flood damage reduction techniques such as works to modify flooding and adjustments including flood proofing might be embodied in an overall flood plain management (FPM) program. Other FPM program studies — those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings — would also profit from this information.

At the request of the Bucks County Planning Commission this report was prepared by the Philadelphia District Office of the United States Army Corps of Engineers under the continuing authority provided in Section 206 of the 1960 Flood Control Act, as amended.

The assistance and cooperation of the United States Geological Survey (U.S.G.S.), the U.S. Department of Agriculture, Soil Conservation Service, the Bucks County Planning Commission Natural Resources Division, and the "Doylestown Daily Intelligencer" in supplying useful data and photographs is appreciated.

Additional copies of this report can be obtained from the Bucks County Planning Commission. The Philadelphia District Office, upon request, will provide technical assistance to planning agencies in the interpretation and use of the data presented as well as planning guidance and further assistance, including the development of additional technical information.

BACKGROUND INFORMATION

Settlement

Little is written of the history of the lands that bordered the Little Neshaminy prior to William Penn's establishment of the colony of Pennsylvania. Unlike the lands that bordered the Delaware River which were explored considerably by the Dutch, Swedes, and English, the interior of Bucks County remained relatively wild, the only settlements being Indian villages. In 1681, William Penn was granted land in the New World by King Charles II of England as payment for a debt owed to Penn's father. Penn sought to create a settlement in the new land, built on the principles of religious toleration and individual freedom. This "Holy Experiment" led to the intense settlement of Philadelphia and the lower Bucks County area by immigrants who had suffered religious persecution in other countries.

The Quakers were the primary immigrants and they settled mostly in the lower portion of Bucks County. By the 1720's, the Germans and Scotch-Irish had moved into Philadelphia and began to settle in the central and upper parts of Bucks County. Townships were soon formed and by 1730, Warwick and Warrington were the only areas in central Bucks County that had not been organized as townships. Their formation occurred in 1733 and 1734, respectively.

As in most early American settlements, life revolved around the meetinghouse or church. The influence of the various faiths in the lives of the early settlers was almost total. On the banks of the Little Neshaminy, the Neshaminy Warwick Presbyterian Church was erected to serve the Scotch-Irish congregation which had been meeting in this area under the leadership of William Tennent. Tennent, a notable leader in American Presbyterian history, was the creator of the "Log College" which was a school of instruction for young ministers and later the model for the College of New Jersey (now Princeton University) in 1746.

Throughout the nineteenth century, the Little Neshaminy watershed was transformed gradually from woodland to prime farmland. Two mills that served this agriculture industry and used the Little Neshaminy Creek as a source of power were Mearn's Mill and the old Hartsville Mill owned by John Hart. Farming remained the principal industry of the area until the middle of the twentieth century when the Naval Air Station at Willow Grove and the Naval Air Development Center at Johnsville began to expand their facilities and attract additional residential settlement of the area. Rapid suburban expansion of Philadelphia

brought additional industrial and residential development to this area in the 1950's and 1960's. The trend of suburban expansion continues to this date with increasing pressure to develop the flood plain of the Little Neshaminy as attractive home sites.

The Stream and Its Valley

Little Neshaminy Creek, with a drainage area of 43.0 square miles, originates in Montgomery Township, Montgomery County, and meanders easterly to its confluence with Neshaminy Creek in Rushland, Bucks County. The watershed is rolling, agricultural land with heavily wooded areas occupying the steeper, more unfavorable terrain. Underlying the watershed are formations of sandstone and shale. The flood plain is fairly narrow on the lower reach, being confined by the more rugged terrain, but the width increases on the upper reach as the terrain becomes more rolling.

The stream has low banks throughout most of its length. Its channel bottom is composed of small, loose rocks and sediment deposits have formed in areas of low water velocity. These deposits support the growth of vegetation and small trees. Overbank areas are heavily wooded with many trees extending over the channel. The 11.3 mile study reach has a uniform slope averaging 12 feet per mile. Drainage areas contributing to runoff at locations in or near the study area are noted in Table 1 and the study limits are noted on Plate 1, the General Map.

The climate of the area may be considered almost ideal for the northeastern section of the country, having the moderating influence of a nearby ocean. Temperatures may occasionally rise above 85 degrees in the summer or drop below 20 degrees in the winter. Rainfall averages slightly more than 44 inches per year and, normally, it is distributed evenly throughout the year.

TABLE 1

DRAINAGE AREAS

Location	Mileage Above Mouth	Drainage Area	
		Tributary sq. mi.	Total sq. mi.
Confluence with Neshaminy Creek	0.00	---	43.0
Upstream of Almshouse Road	2.82	---	39.5
Upstream of Pa. Rte. 263	5.02	---	30.1
Park Creek	8.72	11.8	23.4
County Line Road	11.26	---	6.7

Developments in the Flood Plain

From the confluence of Little Neshaminy Creek with Neshaminy Creek upstream to Old York Road, the flood plain is undeveloped farmland and wooded area. Above this location, in Warminster Township, residential subdivisions and the Warminster Township Sewage Treatment Plant are located on the flood plain. In Warrington Township, a few homes can be found on the flood plain. Near Easton Road (U.S. Rte. 611), a drive-in theater, a small factory, and several commercial buildings are constructed on the flood plain. Near the upper limit of the study, the flood plain is pasture and farmland.

There is only one dam on Little Neshaminy Creek and it has no flood storage capacity. Two Soil Conservation Service (SCS) flood control projects are planned for the Little Neshaminy Creek watershed. (See "Flood Damage Reduction Measures," Page 6.)

In addition to the residential and commercial buildings in the flood plain, numerous state roads, local roads and sanitary sewer lines would be subject to flooding. A population projection for communities in Bucks County (Table 2) shows the anticipated increase in the population up to the year 1990. Rapid development of residential areas is occurring in the watershed at the present time, and future growth and expansion of both residential and commercial areas will result in additional pressures to utilize the flood plain of LIttle Neshaminy Creek.

TABLE 2

BUCKS COUNTY POPULATION PROJECTIONS[a]

Municipality	1970 Federal Census	Percent[b] Increase	Bucks Co. Planning Comm. 1975 Proj.	Percent Increase	Bucks Co. Planning Comm. 1980 Proj.	Percent Increase	Bucks Co. Planning Comm. 1985 Proj.	Percent Increase	Bucks Co. Planning Comm. 1990 Proj.
Warminster Township	34,900	26.1	44,000	19.3	52,500	6.7	56,000	3.0	57,700
Warrington Township	7,550	35.1	10,200	27.5	13,000	23.1	16,000	18.8	19,000
Ivyland Borough	600	6.7	640	7.8	690	13.0	780	15.4	900
Northampton Township	15,807	58.2	25,000	28.0	32,000	9.4	35,000	5.7	37,000
Warwick Township	2,138	21.6	2,600	15.4	3,000	10.0	3,300	21.2	4,000

[a]Source of Information: Bucks County Planning Commission, November 1971.

[b]Projected percent increase in population over the five-year interval.

FLOOD SITUATION

Sources of Data and Records

The United States Geological Survey maintains a gaging station on the Neshaminy Creek at Langhorne, Pennsylvania, which has recorded maximum daily peak discharges from the year 1933 to date. The Langhorne Gage records are supplemented by those from the Rushland Gage, located immediately downstream from the confluence of the Little Neshaminy with Neshaminy Creek. Although not in operation today, the Rushland Gage was in operation from 1885 through 1912, with an additional three-year period of record beginning in 1932. Information from both gages was valuable in evaluating the flood potential of Little Neshaminy Creek for which there are no peak discharge records available.

Additional information was obtained from a study of the main stem of Neshaminy Creek entitled "Flood Plain Information Report on the Neshaminy Creek, Bucks County, Pennsylvania", dated April 1965. This report was prepared for the Bucks County Planning Commission by the U.S. Army Corps of Engineers, Philadelphia District.

Valuable data was also taken from a document entitled "Water Resources Bulletin No. 2, Water Resources Study, Neshaminy Creek Basin", as published by the Commonwealth of Pennsylvania, Department of Forests and Waters, (Now the Pennsylvania Department of Environmental Resources). Harrisburg, Pennsylvania.

Maps prepared for this report were based on U.S. Geological Survey quadrangle sheets entitled "Ambler, Pennsylvania", 1966; "Buckingham, Pennsylvania", 1968; Doylestown, Pennsylvania", 1968; and "Hatboro, Pennsylvania", 1966. Structural data on bridges and culverts were obtained by field surveys performed by Corps of Engineers, Philadelphia District, personnel.

Flood Season and Flood Characteristics

Floods have occurred during all seasons on Little Neshaminy Creek. Minor flooding can occur in winter from conditions of snowmelt in combination with rainfall. Two major floods occurred in August 1955 and September 1960 and resulted from rainfall associated with hurricane activity. High water marks from these floods are shown on Plates 7 and 8. Flooding usually results from any heavy rainfall within the watershed and from runoff after several days of continuous general rainfall. Flood stages can rise from normal flow to extreme flood peaks in relatively short time periods with high velocities in the main stream channel.

Factors Affecting Flooding and Its Impact

Obstructions to floodflows - Natural obstructions to floodflows include trees, brush and other vegetation growing along the stream banks in floodway areas. Man-made encroachments on or over the streams such as dams, bridges and culverts can also create more extensive flooding than would otherwise occur.

During floods, trees, brush and other vegetation growing in floodways impede floodflows, thus creating backwater and increased flood heights. Trees and other debris may be washed away and carried downstream to collect on bridges and other obstructions to flow. As floodflows increase, masses of debris break loose and a wall of water and debris surges downstream until another obstruction is encountered. Debris may collect against a bridge until the hydraulic load exceeds its structural capacity and the bridge is destroyed. The limited capacity of obstructive bridges or culverts, debris plugs at the culvert mouth or a combination of these factors retard floodflows and result in flooding upstream, erosion around the culvert entrance and bridge approach embankments and possible damage to the overlying roadbed.

In general, obstructions restrict floodflows and result in overbank flows and unpredictable areas of flooding; destruction of or damage to bridges and culverts; and, an increased velocity of flow immediately downstream. It is impossible to predict the degree or location of the accumulation of debris; therefore, for the purposes of this report, it was necessary to assume that there would be no accumulation of debris to clog any of the bridge or culvert openings in the development of the flood profiles. Representative photographs of obstructions to floodflows may be seen in Figures 1 and 2.

The small dam located in this reach of the Little Neshaminy has no flood control capacity nor does it seriously alter flow characteristics of floodwaters. The two proposed Soil Conservation Service (SCS) Dams would reduce the 100-year flow computed by the Soil Conservation Service by about 50 percent. (See "Flood Damage Reduction Measures"). Eleven bridges presently span Little Neshaminy Creek within this study, with a new bridge under construction near the confluence with Neshaminy Creek. Many of these bridges are obstructive to floodflows. Since the August 1955 flood, the bridges at Almshouse Road, Valley Road, Street Road and Easton Road have been replaced by structures with larger waterway openings. Pertinent information on all bridges can be found in Table 5 on Page 18.

Flood damage reduction measures - There are only two communities, Warrington Township and Northampton Township, along the Little Neshaminy Creek that have flood plain zoning ordinances. Upon completion of this report, these two townships will have a basis for strengthening their existing ordinances and the remaining communities will be able to enact new flood plain zoning ordinances.

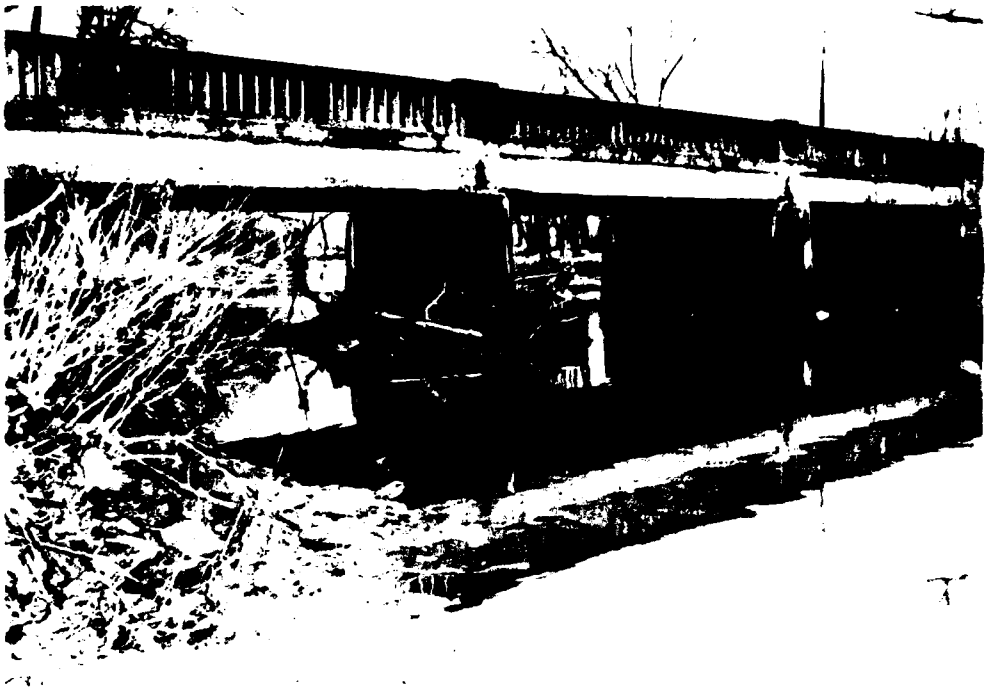


FIGURE 1 - Debris begins to accumulate against pier of Bristol Road Bridge.

FIGURE 2 - Island upstream of Almshouse Road could be restrictive during times of high flow on Little Neshaminy Creek.

Two flood control structures are being planned for the Little Neshaminy Creek watershed by the Soil Conservation Service (See the General Map, Plate 1.) One structure will be located on Park Creek, a tributary to Little Neshaminy Creek, in Horsham Township, Montgomery County. The location of this dam is outside the study limits of this report and is not shown on the profiles. The other structure will be located on the main stem of Little Neshaminy Creek above Bradford Road in Warrington Township, Bucks County, Pennsylvania. The location of this proposed dam is shown on the "High Water Profile, Little Neshaminy Creek", Plate 8. These projects are currently under design and construction will take place as soon as funds are made available.

During the years following the flood of August 19, 1955, improvements were made along Little Neshaminy Creek to reduce flooding and flood damages. New bridges with larger water way openings were constructed on Easton Road (U.S. Rte. 611), Street Road (Pa. Rte. 132), Valley Road and Almshouse Road. Between Street Road, (Pa. Rte. 132) and Valley Road the stream alignment was straightened and the channel was widened. Debris and vegetation were removed from the overbank areas.

Other factors and their impacts - The impact of flooding along Little Neshaminy Creek can be affected by the ability of local residents to anticipate and effectively react to a flood emergency. Efficient flood warning and forecasting systems can give homeowners, business and industry valuable time to remove damageable materials from low-lying areas. Increased damages to downstream areas can also be reduced if floatable materials stored on the flood plain can be removed before being carried downstream to block bridge and culvert openings. Implementation of effective flood fighting and emergency evacuation plans can further reduce flood damages and the incidence of personal injury and death once the creek has reached flood stage.

Flood warning and forecasting - The National Weather Service Branch of the National Oceanic and Atmospheric Administration (NOAA) maintains year-round surveillance of weather conditions in the study area with stations at Philadelphia and Trenton. Flood warnings and predicted flood peaks are issued by the NOAA Flood Forecasting Centers at Harrisburg, Pennsylvania, and Trenton, New Jersey. In times of a flood emergency, the Bucks County Civil Defense Office maintains communications with the State Civil Defense Headquarters and the National Weather Service in order to establish a "flood watch" during the earliest stages of a flood threat. Usual warnings are issued by these agencies to the inhabitants of the area through radio, television, and the local press media.

Flood fighting and emergency evacuation plans - Although there are no formal flood fighting or emergency evacuation plans for Little Neshaminy Creek Watershed, provisions for alerting area residents through local communications media and coordinating operations for Bucks County are accomplished by the Bucks County Civil Defense Office. This Office coordinates flood fighting, evacuation and rescue activities on a county-wide basis with local agencies. Plans have been made by the county to provide emergency mass care centers for residents that have been displaced from their homes by floodwaters. During past floods, assistance in carrying out rescue operations has been provided by the Naval Air Development Center at Johnsville, Pennsylvania, and the Willow Grove Naval Air Station in Horsham, Pennsylvania.

Material storage on the flood plain - The largest portion of the flood plain is presently undeveloped. In residential areas adjacent to Little Neshaminy Creek, some homeowners have small buildings and floatable materials stored on the flood plain. Only one small factory and a few commercial buildings occupy the flood plain, but waste containers, pallets and other floatable materials may be carried away during floodflows. All unrestrained objects or materials may be washed downstream to clog bridge and culvert openings.

PAST FLOODS

Summary of Historical Floods

Floods of large magnitude have occurred on the Little Neshaminy in 1865, 1931, 1955, 1960, 1967, 1971, and 1972. There are no gage records available for Little Neshaminy Creek, but the U.S. Geological Survey Gaging Station No. 4655, located on the main stem of Neshaminy Creek at Langhorne, Pennsylvania, recorded its peak flow on August 19, 1955. This peak flow reflects the greatest flood on Little Neshaminy Creek in recent history.

Flood Records

Since no gage records are available for Little Neshaminy Creek, information on historical floods was obtained from stream gaging records at the U.S.G.S. Gages on the Neshaminy Creek at Langhorne, Pennsylvania, and Rushland, Pennsylvania. High water marks for the August 19, 1955, and September 12, 1960, floods were obtained from the Bucks County Planning Commission, Division of Natural Resources.

To supplement the records at the gaging stations, newspaper files, historical documents and records were searched for information concerning past floods. These records have helped in developing a knowledge of floods which have occurred on Little Neshaminy Creek. Crest stages for known floods at the gaging station on Neshaminy Creek at Langhorne, Pennsylvania, are shown in Table 3.

TABLE 3

FLOOD CREST ELEVATIONS
Neshaminy Creek
U.S.G.S. Gaging Station No. 4655 at Langhorne, Pennsylvania[a]

Date of Crest	Estimated Peak Discharge cfs	Stage [b]	Elevation [c]
August 19, 1955	49,300	22.8	63.4
August 23, 1933	30,000	17.3	57.9
July 23, 1938	24,800	15.9	56.5
November 9, 1972	21,800	15.0	55.6
November 26, 1950	21,700	14.9	55.5
August 28, 1971	20,700	14.7	55.3
June 2, 1946	20,500	14.5	55.1
September 13, 1971	19,900	14.3	54.9
September 13, 1960	19,400	14.4	55.0
March 7, 1967	16,600	13.0	53.6

(a) Drainage area equals 210 square miles.
(b) Overbank flooding begins at 7 feet as per U.S.G.S.
(c) Feet, mean sea level datum. Gage datum is 40.57 feet above mean sea level datum of 1929.

Flood Descriptions

July 17, 1865 - The great flood of 1865 is felt to be the greatest flood in the historical record of floods on the Little Neshaminy Creek. The flood resulting from a rainfall belt pattern of twenty miles in width and extending between Dublin and Richboro, caused great destruction to many bridges in the county. Doylestown's rainfall lasted about seven hours and totaled approximately five inches. Newspaper accounts were filled with reports of bridge destruction and estimates of damages ran to $130,000.

EXCERPTS FROM THE BUCKS COUNTY INTELLIGENCER, JULY 18, 1865, [a] RELATIVE TO THE FLOOD OF JULY 17, 1865

Great Fall of Rain on Sunday the 16th

The Little Neshaminy Bridge on the Turnpike at Warrington (Rte. 611) was very seriously damaged as was the bridge at Street Road below Warrington Square. The bridge at Mearn's Mill (Almshouse Rd.) is reported entirely gone.

(a) Simulated from newspaper clippings.

EXCERPTS FROM THE DOYLESTOWN DEMOCRAT, JULY 25, 1865, [a] RELATIVE TO THE FLOOD OF JULY 17, 1865

A Heavy Storm

Our County was visited by one of the heaviest storms last Sunday night, that ever was known in this region of the County. It commenced raining about five o'clock p.m. and continued without any cessation until midnight. We have never seen such a heavy rain outside the tropics, the water literally came down in torrents and our streets were flooded.

So far we have learned there has been great destruction of bridges. The wingwalls on both sides of the Neshaminy Bridge near Yost's Tavern on the Willow Grove Turnpike were washed away. The wingwalls of the covered bridge at Neshaminy Meetinghouse near Hartsville were washed away. The new stone bridge on Street Road and the one over the same stream on the York Road at Hart's Mill are both carried away.

July 14, 1931 - Flooding of great intensity was experienced on the Little Neshaminy on this date, although rainfall amounts measured in Doylestown and at the George School in Newtown were small. Rainfall amounts recorded at Conshohocken, Gratersford, and Shawmont averaged four inches for a twenty-four hour period and the following news article indicates flooding of major importance.

EXCERPTS FROM THE DOYLESTOWN DAILY INTELLIGENCER, [a] JULY 15, 1931, RELATIVE TO THE FLOOD OF JULY 14, 1931

Storm
One of the worst in many years; flood, hail, high winds damaging

One of the most damaging electrical storms accompanied by a cloud burst of rain, and a fifty four mile gale swept Bucks County and adjoining counties last night leaving damage estimated at over a million dollars. Buildings were washed away by high water, barns and other out buildings were destroyed by fire, poles and trees blocked the highways and crops were laid flat in the fields.

Hundreds of motorists became stranded on the highways during the height of the storm. Bus passengers were delayed for four hours until the waters subsided on certain low sections of the main highways.

For the first time in the memory of residents of the Neshaminy section, the Little Neshaminy backed up over the meadows and flatland for a distance of 300 yards, blocking off traffic on the Lackawanna Trail (Rt. 611) for several hours. In less than fifty minutes the stream rose ten feet.

A refreshment stand, located near the banks of Little Neshaminy not far from the bridge, was swept away entirely at a loss of $1,500. One bus became stranded at Paul Valley and was towed out of 4 ft. of water.

August 19, 1955 - In August 1955 torrential rains of Hurricane Diane, preceded one week before by the heavy rainfall of Hurricane Connie, caused a flood disaster on the entire east coast of the United States. Loss of life and severe damage occurred on the flood plain of Little Neshaminy Creek.

(a) Simulated from newspaper clippings.

At Street Road (Pa. Rte. 132) Bridge, a high water mark was recorded that exceeds the calculated Standard Project Flood elevation. This extremely high elevation was caused by an inadequately sized bridge waterway opening that became clogged by debris. This structure and several others have since been replaced by bridges with much larger opening areas. (See "High Water Profile, Little Neshaminy Creek," Plate 8.)

EXCERPTS FROM THE DOYLESTOWN DAILY INTELLIGENCER,[a]
(DOYLESTOWN AND BUCKS COUNTY EDITION)
FRIDAY, AUGUST 19, 1955

Dead, Homeless, Ruin Left in Wake as Diane-Fed Flood Sweeps County

Rescue Teams Save Many on Buildings, Cars Damage Reported Heavy

Two-and-a-half inches of rain falling in the wake of Hurricane Diane last night caused several deaths, flooded homes, streets, stores, and roads and washed away thousands of dollars worth of crops.

Building to cloudburst ferocity shortly before dusk yesterday, the storm cascaded tons of water over the Bux-Mont area before passing northward about 3 a.m. today.

The rampaging Neshaminy Creek and the Delaware River jumped their banks in several places forcing evacuation of residents along a several mile area. Motorists were stranded as the two main arteries through Bucks County were flooded. Route 611 was under three feet of water at Neshaminy, while Route 202 was flooded out at Chalfont.

Some Missing

Several persons have been reported missing and one woman is still being sought along the banks of the Neshaminy. A U.S. Navy helicopter surveying the flooded countryside since early this morning reported bridges out, homes and roads inundated and participated in several roof and car top rescues. Estimates of total damage will not be known for several days.

An 18 year old girl missing shortly after midnight was found at 9:15 this morning in a clump of bushes along the banks of the flooded Neshaminy Creek near Street Rd., a half mile east of Neshaminy. The victim identified as Diane Smith, had drowned sometime during the night. Her home is believed to be in Southampton.

Roads Blocked Off

Route 611 in the Raubsville area was blocked off throughout the night. In the Neshaminy section the same highway was blocked, as was River Rd., Street Rd. and numerous other highways. The program at Bucks County Drive-in was interrupted during the height of the storm to warn patrons that Rtes. 202 and 611 north were flooded out.

(a) Simulated from newspaper clippings.

EXCERPTS FROM THE DOYLESTOWN DAILY INTELLIGENCER, [a] (HATBORO AND EASTERN MONTGOMERY COUNTY EDITION) FRIDAY, AUGUST 19, 1955

Copters Help in Rescues

Three adults and six children clinging to trees in the flooded Richboro area were picked up this morning by Navy helicopters sent out from the Johnsville Naval Air Development Center. . . Meanwhile Commander E. J. Poole, command liaison officer at the public information office of the Willow Grove Naval Air Station, said that rescue crews comprised of more than 150 sailors from the base, had picked up about 20 persons along Neshaminy Creek marooned in trees and automobiles.

Damage Heavy

Of the many rescues during the 11 hour downpour last night and early this morning one of the most dramatic occurred off County Line Road, a short distance west of Route 611 and Keith Valley Road, Horsham.

Mr. and Mrs. Claire Greiner of Sourman Road, Edison, directors of Child Evangelism for Bucks County were saved from the swirling waters of Neshaminy Creek after more than five hours in the rain.

Members of the Horsham Volunteer Fire Co., Horsham CD and a crew from the Willow Grove Naval Station, collaborated on the dramatic rescue which took more than two hours.

Repeated efforts to reach the stranded couple including use of a motor boat, failed. Finally the rescue groups devised a scheme whereby they pulled the boat to the tree in which the couple was lodged.

November 9, 1972 - One of the most recent flooding events to affect the Little Neshaminy occurred on this date and was the product of a 5.4 inch rainfall in a 19-hour period. While damages on the Little Neshaminy were not emphasized in newspaper accounts, this article illustrates that flooding is as much a problem today as it was in the past.

EXCERPTS FROM THE DAILY INTELLIGENCER, NOVEMBER 9, 1972[a]
5.4 INCH RAIN BREAKS 12 YEAR BUCKS RECORD

A twelve year record for precipitation was shattered in the Bucks-Mont area Wednesday and early today as 5.4 inches of rain fell in a 19 hour period. A 45 mile an hour wind whipped the torrential rain at intervals.

Some roads were covered with several feet of water and police had to block many of them to traffic during the late afternoon and evening. There was damage to some roads and to basements of homes and stores were flooded.

Crest stages as high as 14.9 feet occurred along the Neshaminy, the highest flow since 1955.

Doylestown Boro Police Chief Kenneth R. Tutt said the rainfall in the Central Bucks area was 5.40 inches, tabulated for the Neshaminy Valley Watershed Association. Tutt said his records showed that on September 11-12, 1960, there was 5.15 incles of rainfall.

An eastern Montgomery County weather station recorded 4.14 inches in the Horsham-Willow Grove areas.

In Warminster Township, Police Lt. Conrad Yeager and Sgt. Elmer Clauges said sections of Bristol Road were closed off until the early evening hours Wednesday.

"The (Neshaminy) Creek is pretty well up" said Yeager adding that the township police department received numerous calls from residents complaining about flooded basements.

(a) Simulated from newspaper clippings.

FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past could occur in the future. Larger floods have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused these floods could occur in the study area. Therefore, to determine the flooding potential of the study area, it was necessary to consider storms and floods that have occurred in regions of like topography, watershed cover, and physical characteristics. Discussion of the future floods in this report is limited to those that have been designated as the Intermediate Regional Flood and the Standard Project Flood. The estimates of the Intermediate Regional Flood and the Standard Project Flood as presented in this report are based on the existing development of the watershed since future changes within the basin cannot be accurately predicted. The Standard Project Flood represents a reasonable upper limit of expected flooding in the study area. The Intermediate Regional Flood may reasonably be expected to occur more frequently although it will not be as severe as the infrequent Standard Project Flood.

Intermediate Regional Flood

The Intermediate Regional Flood is defined as one that occurs once in 100 years on the average although it could occur in any year. The peak flow of this flood was developed from statistical analyses of streamflow records at Rushland and Langhorne, Pennsylvania, in conjunction with regional synthetic analyses at selected locations along the main stream. Peak flows thus developed for the Intermediate Regional Flood at selected locations in the study area are shown in Table 4.

Standard Project Flood

The Standard Project Flood is defined as a major flood that can be expected to occur from a severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the study area is located, excluding extremely rare combinations. The Corps of Engineers, in cooperation with the NOAA Weather Service, has made comprehensive studies and investigations based on the past records of experienced storms and floods and has developed generalized procedures for estimating the flood potential of streams. Peak discharges for the Standard Project Flood at selected locations in the study area are shown in Table 4. Discharge hydrographs for the Standard Project Flood at Almshouse Rd. and Old York Road are shown on Plate 10. The relative water surface elevations for the Intermediate Regional Flood and the Standard

Project Flood are shown on Plates 7 and 8. On Plate 8, note the high water mark at Street Rd. (Pa. Rte. 32) Bridge that exceeds the Standard Project Flood Elevation.

TABLE 4

PEAK FLOWS FOR INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOODS

Location	River Mile	Drainage Area sq. mi.	Intermediate Regional Flood Discharge cfs	Standard Project Flood Discharge cfs
Confluence with Neshaminy Creek	0.00	43.0	9,000	17,700
Almshouse Road	2.82	39.5	8,380	16,150
Pa. Rte. 263	5.02	30.1	6,340	12,100
Downstream of Confluence with Park Creek	8.72	23.4	5,460	10,350
Upstream of Confluence with Park Creek	8.73	11.6	2,430	5,300
County Line Road	11.26	6.7	1,510	4,100

Frequency

A frequency curve of peak flows was developed from available recorded annual peaks. The curve presents the frequency of floodflows up to the magnitude of once in 100 years (Intermediate Regional Flood). Frequencies of floods equivalent to the Standard Project and larger can be obtained through extrapolation of the curve, but it is not practical to assign a frequency to such large flows as their occurrence is so extremely rare. The curve, which is available upon request, reflects the judgment of engineers who have studied the area and are familiar with the region; however, it must be regarded as approximate and should be used with caution in connection with any planning of flood plain use.

Hazards of Large Floods

The extent of damage caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow, rate of rise, and developments in the flood plain. An Intermediate Regional or Standard Project Flood on Little Neshaminy Creek would result in the inundation of residential, commercial, and industrial properties in

the study area. Deep floodwater flowing at high velocity and carrying floating debris would create conditions hazardous to persons and vehicles attempting to cross flooded areas. In general, floodwater 3 or more feet deep and flowing at a velocity of 3 or more feet per second could easily sweep an adult person off his feet, thus creating definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that may be destroyed or in vehicles that are ultimately submerged or floated. Waterlines can be ruptured by deposits of debris and the force of floodwaters, thus creating the possibility of contaminated domestic water supplies. Damaged sanitary sewer lines and sewage treatment plants could result in the pollution of floodwaters creating health hazards. Isolation of areas by floodwater could create hazards in terms of medical, fire, or law enforcement emergencies.

Flooded areas and flood damages - The areas along the study reach of Little Neshaminy Creek that would be flooded by the Standard Project Flood are shown on Plate 2 which is also an index map to Plates 3 through 6. Areas that would be flooded by the Intermediate Regional Flood and the Standard Project Flood are shown in detail on Plates 3 through 6. The actual limits of these overflow areas may vary somewhat from those shown on the maps because the 20-foot contour interval and scale of the maps do not permit precise plotting of the flooded area boundaries. As may be seen from these plates, floodflows from Little Neshaminy Creek inundate portions of Warrington Township, Warminster Township and several small communities adjacent to the stream. The areas that would be flooded by the Intermediate Regional and Standard Project Floods include commercial and residential properties, along with associated streets and roads. Considerable damage to the facilities would occur during an Intermediate Regional Flood. The two proposed Soil Conservation Service Dams are designed as flood control projects and they would reduce to some degree the depth and consequent damage of an Intermediate Regional Flood. These projects would greatly reduce the damage caused by the more frequent events. Because of the wider extent, greater depth of flooding, higher velocity flow and longer duration of flooding during a Standard Project Flood, damage would be more severe than during an Intermediate Regional Flood. Plates 7 and 8 show the water surface profile for the Intermediate Regional and Standard Project Floods. Depth of flow in the channel can be estimated from these illustrations. Cross sections of the flood plain at selected locations, together with the water surface elevation and lateral extent of the Intermediate Regional and the Standard Project Floods are shown on Plate 9.

Obstructions - During floods, debris collecting on bridges and culverts could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Intermediate Regional and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collecting against the structure, or by deposition of silt in the stream channel under structures. As previously indicated, there is a

dam within the study area which has no flood control capacity nor will it seriously alter flow characteristics of floodwaters. Of the 11 bridges crossing the stream in the study area, some are obstructive to the Intermediate Regional Flood and most are obstructive to the Standard Project Flood. Table 5 shows water surface elevations at these bridges.

TABLE 5

ELEVATION DATA

Bridges Across Little Neshaminy Creek

Identification	Mileage Above Mouth	Under-clearance Elev.[a]	Water Surface Elevation[b]	
			Intermediate Regional Flood	Standard Project Flood
Grenoble Road	1.94	158.7	153.6	157.1
Walton Road	2.26	158.9	160.5	164.3
Almshouse Road	2.82	168.5	164.5	167.7
Pa. Rte. 263	5.02	201.4	188.0	192.4
Old York Road	5.11	188.0	188.6	193.4
Bristol Road	5.70	192.7	193.2	196.7
Valley Road	6.82	201.1	202.5	206.0
Street Road (Pa. Rte. 132)	7.68	216.9	207.8	211.1
Easton Road (U.S. Rte. 611)	8.39	221.8	217.5	220.0
Kansas Road	8.77	219.4	220.2	223.4
County Line Road	11.26	264.6	261.4	264.8

(a) Feet, sea level datum, centerline of stream.
(b) Feet, sea level datum, on upstream side of structure.

Velocities of flow - Water velocities during floods depend largely on the size and shape of the cross sections, conditions of the stream, and the bed slope, all of which vary on different streams and at different locations on the same stream. During an Intermediate Regional Flood, velocities of main channel flow in the study area would be 4 to 9 feet per second. Water flowing at this rate is capable of causing severe erosion to streambanks and fill around bridge abutments and transporting large objects. It is expected that velocity of main channel flow during a Standard Project Flood would be slightly higher than during an Intermediate Regional Flood. During these floods, overbank flow in the study area would average

1 to 2 feet per second. Water flowing at 2 feet per second or less would deposit debris and silt. Table 6 lists the maximum velocities that would occur in the main channel and overbank areas of Little Neshaminy Creek in the study area during the Intermediate Regional and the Standard Project Floods.

TABLE 6

MAXIMUM AVERAGE VELOCITIES

Little Neshaminy Creek

Location	Mileage Above Mouth	Maximum Average Velocities			
		Intermediate Regional Flood		Standard Project Flood	
		Channel ft/sec	Overbank[a] ft/sec	Channel ft/sec	Overbank[a] ft/sec
Cross Section No.					
4	1.83	9.2	2.0	10.2	2.5
13	5.38	4.4	0.8	4.8	1.0
15	6.15	7.0	1.5	8.0	1.9
18	7.47	6.6	0.2	8.3	0.9
23	9.80	5.9	1.2	6.8	1.6
26	10.98	4.0	0.6	6.6	1.1

(a) Value given is the greater of the left and right overbank velocity.

Rates of rise and duration of flooding - Rainfalls accompanying hurricane and other storms covering large land areas usually produce floods on Little Neshaminy Creek. There is a time lag of several hours before overbank flooding occurs along the main stream. Floods generally rise slowly and stay out of banks for long periods of time. Table 7 gives the maximum rate of rise, height of rise (from critical stage level to maximum floodflow level), time of rise (time period corresponding to height of rise), and duration of critical stage (period of time flooding is above critical stage level) for the Standard Project Flood at two locations along Little Neshaminy Creek.

TABLE 7

RATES OF RISE AND DURATION

Little Neshaminy Creek

Flood	Location	Maximum Rate of Rise ft/hr	Height of Rise ft	Time of Rise hrs	Duration of Critical Stage hrs
Standard Project	Near Almshouse Rd.	2.2	7.4	9	24
Standard Project	Near Old York Rd.	1.5	8.7	9	28

Photographs, future flood heights - The levels that the Intermediate Regional and Standard Project Floods are expected to reach at various locations along Little Neshaminy Creek are indicated on the following photographs.

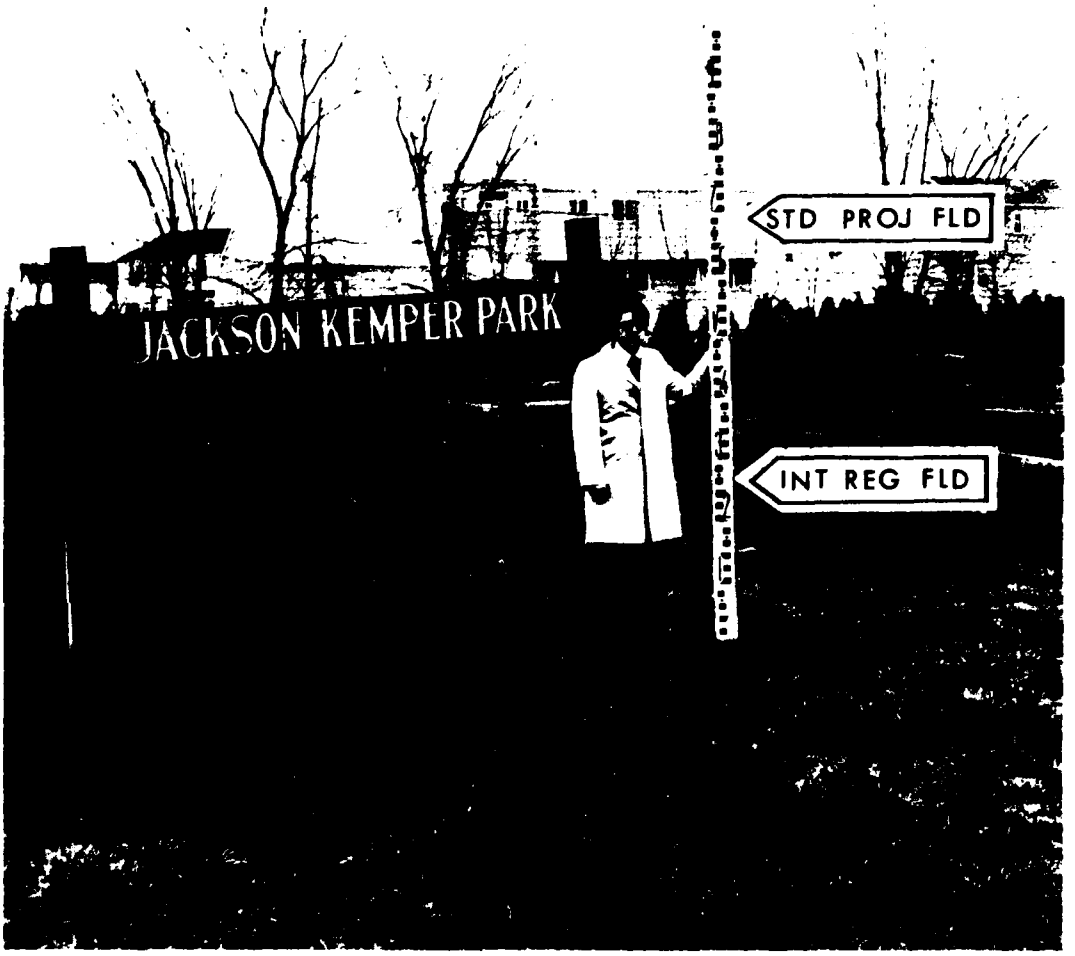


FIGURE 3 - Future flood heights at Jackson Kemper Park near Valley Road Bridge.

FIGURE 4 - Future flood heights on Little Neshaminy Creek near U.S. Route 611 Bridge.

FIGURE 5 - Future flood height on Little Neshaminy Creek at Kansas Road Bridge.

GLOSSARY

Backwater. The resulting high water surface in a given stream due to a downstream obstruction or high stages in an intersecting stream.

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

Normally a "flood" is considered as any temporary rise in streamflow 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 Plain. The areas adjoining a river, stream, watercourse, ocean, lake, or other body of standing water that have been or may be covered by floodwater.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above 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.

Hurricane. An intense cyclonic windstorm of tropical origin in which winds tend to spiral inward in a counterclockwise direction toward a core of low pressure, with maximum surface wind velocities that equal or exceed 75 miles per hour (65 knots) for several minutes or longer at some points. Tropical storm is the term applied if maximum winds are less than 75 miles per hour.

Hydrograph. A graph showing flow values against time at a given point, usually measured in cubic feet per second. The area under the curve indicates total volume of flow.

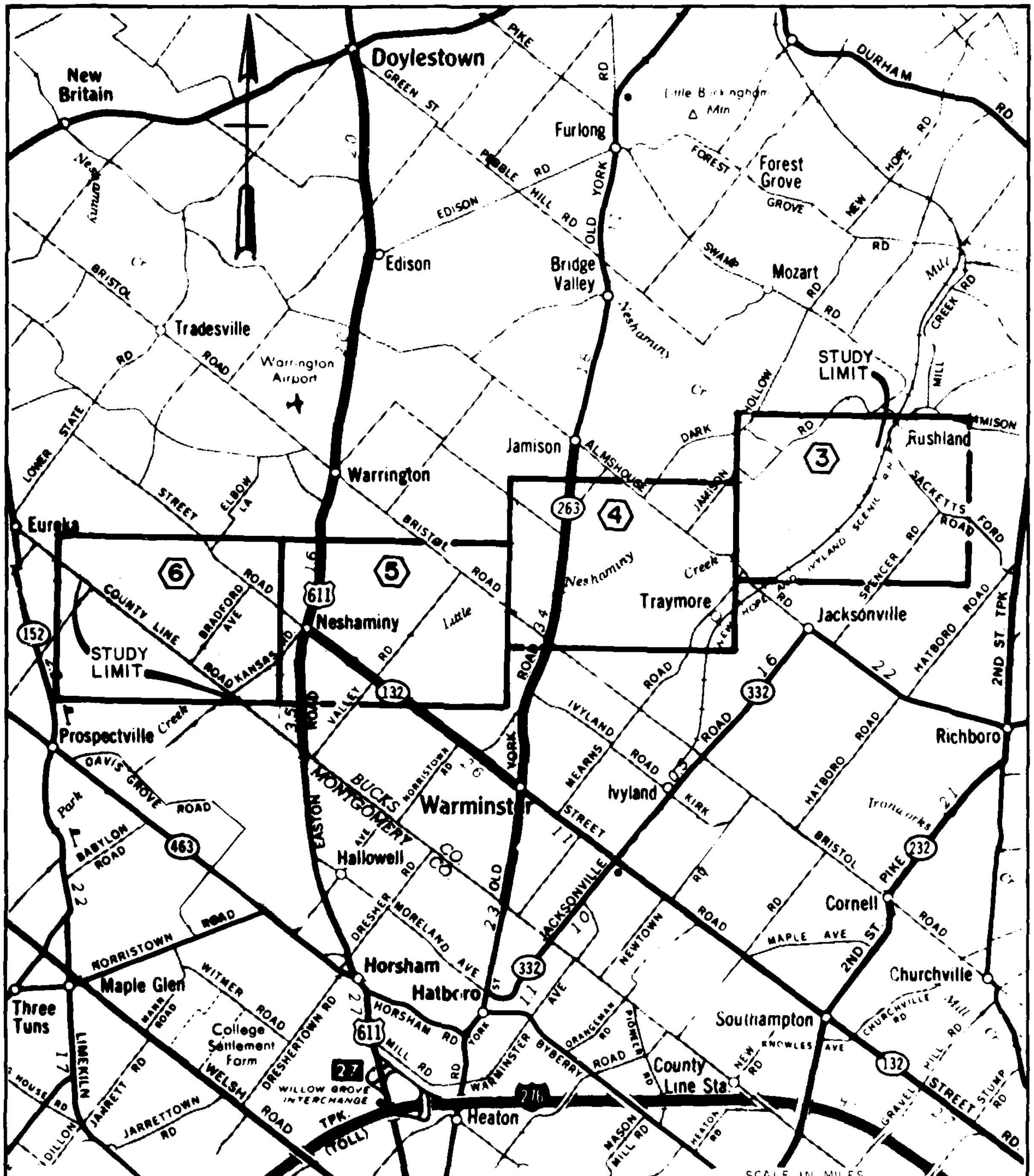
Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the general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

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are 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 40-60 percent of the Probable Maximum Floods for the same basins. As used by the Corps of Engineers, Standard Project Floods 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.

Underclearance Elevation. The elevation at the top of the opening of a culvert, or other structure through which water may flow along a watercourse.



LEGEND

PLATE NUMBER

STREAM

AREA FLOODED BY S.P.F.

U.S ROUTE

INTERSTATE ROUTE

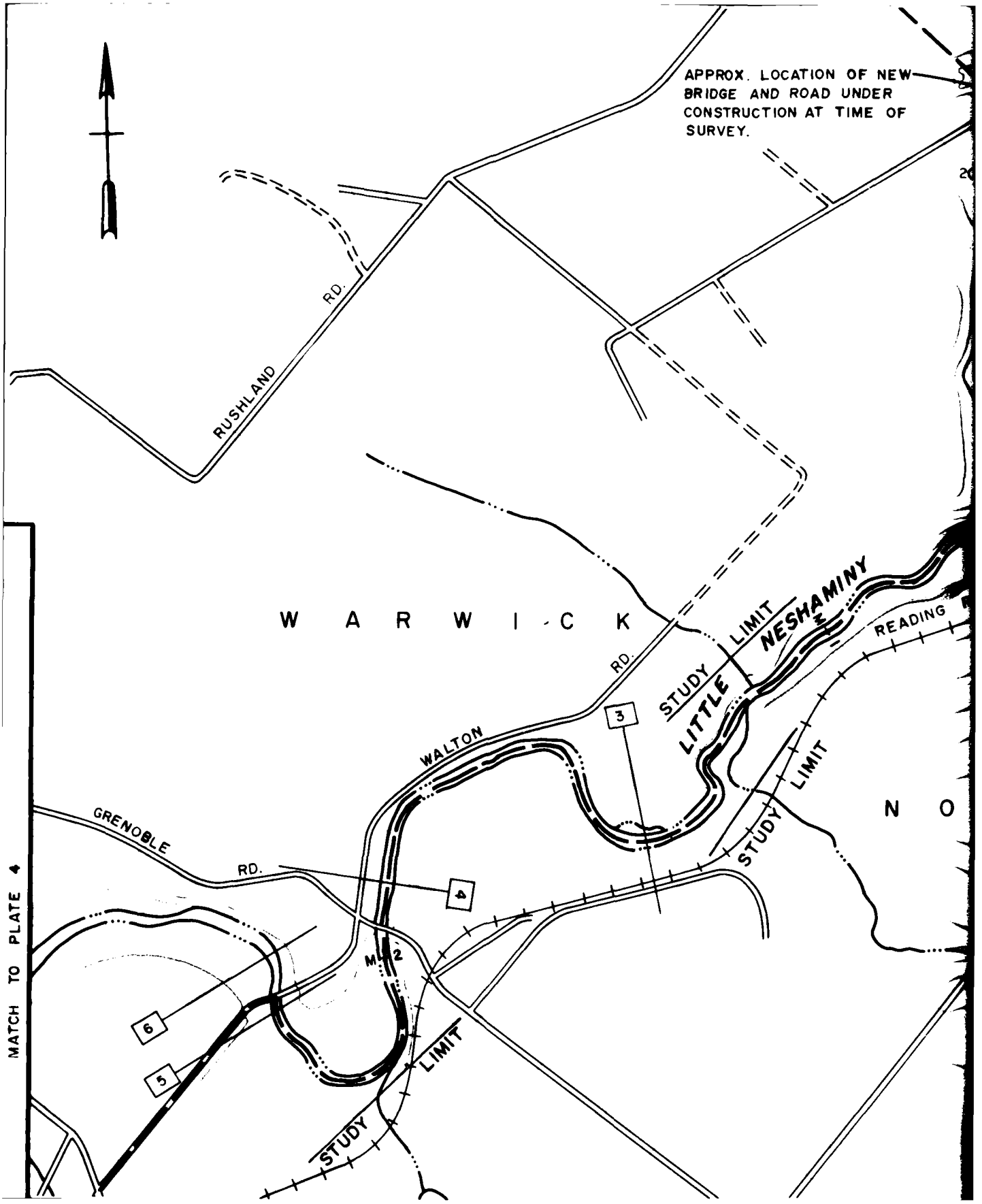
STATE ROUTE

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

INDEX MAP

PLATE 2


APPROX. LOCATION OF NEW BRIDGE AND ROAD UNDER CONSTRUCTION AT TIME OF SURVEY.
RUSHLAND RD.
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NESHAMINY
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LITTLE
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GRENOBLE RD.
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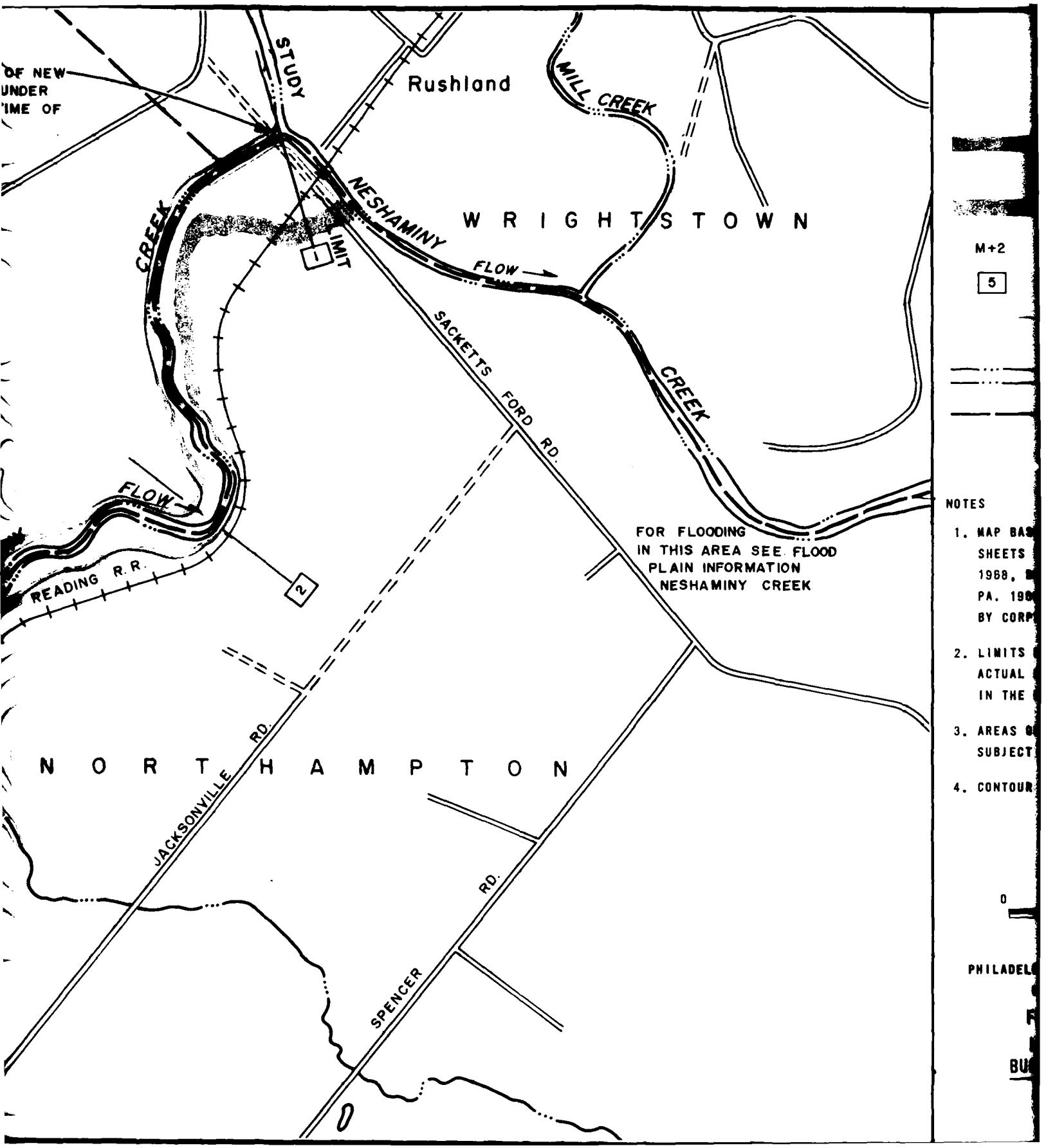
STUDY LIMIT
MATCH TO PLATE 4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LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD		STANDARD PROJECT FLOOD

M+2 — MILES ABOVE MOUTH

5 — CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

CHANNEL

TOWNSHIP OR BORO LIMITS

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS AMBLER, PA. 1966, BUCKINGHAM, PA. 1968, DOYLESTOWN, PA. 1968 AND HATBORO, PA. 1966. ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOODPLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. CONTOUR INTERVAL IS 20 FT.

SCALE IN FEET

0 800 1600

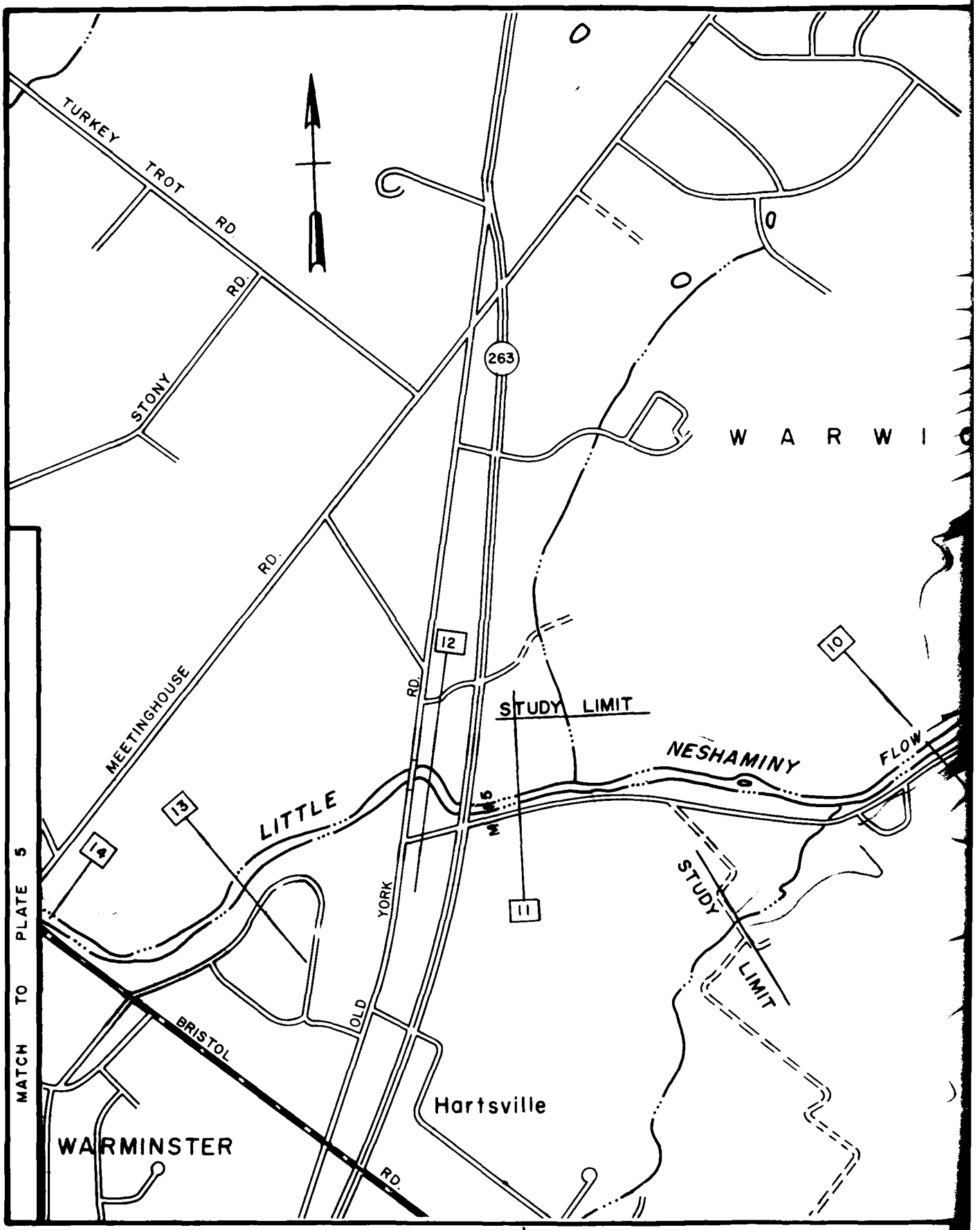
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

FLOODED AREAS

3 PLATE 3


TURKEY TROT RD
STONY RD.
MEETINGHOUSE RD.
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RD.
STUDY LIMIT
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LITTLE
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BRISTOL
RD.
Hartsville
WARMINSTER
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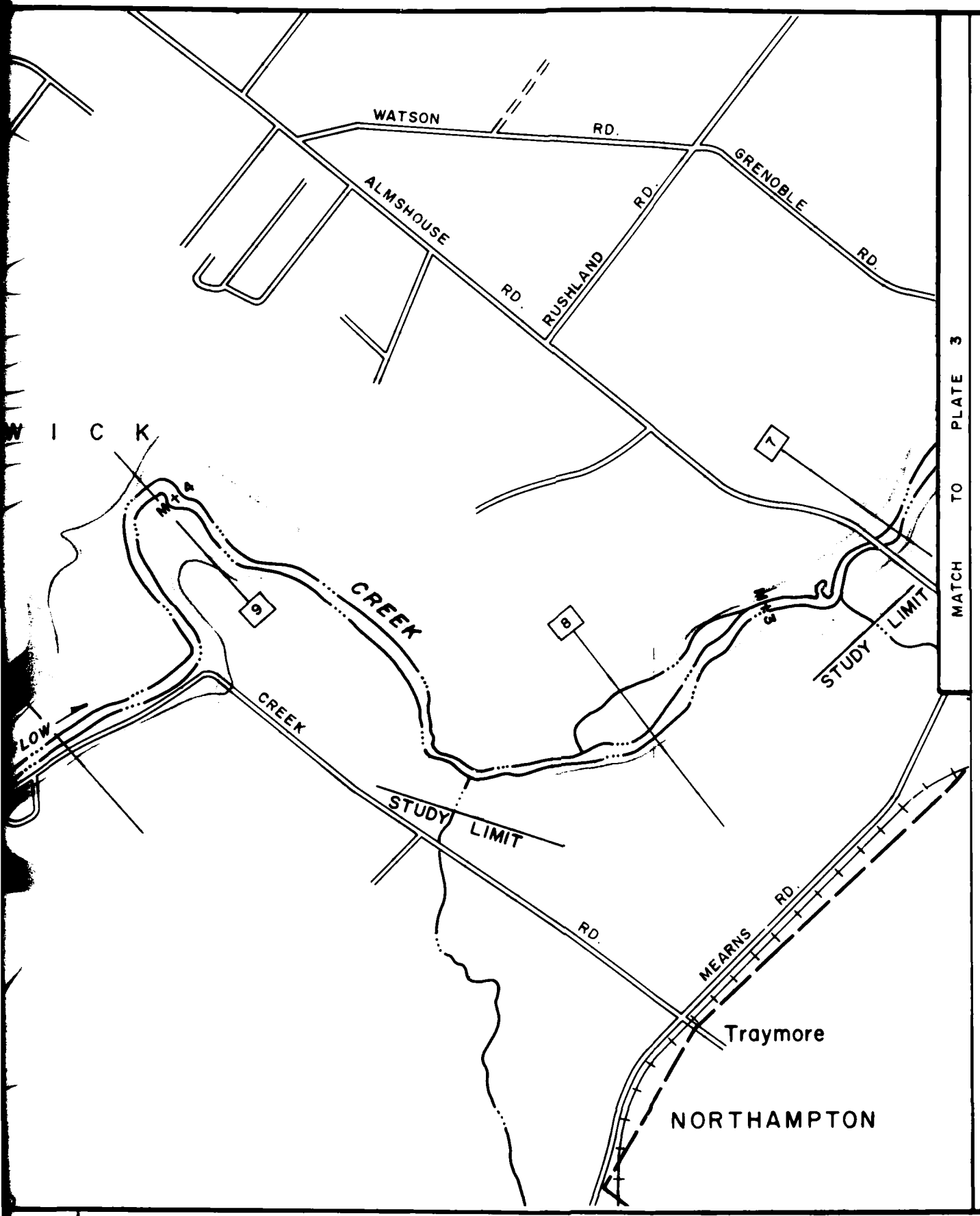
STUDY LIMIT



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263

NOTES

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OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD		STANDARD PROJECT FLOOD

M+5 — MILES ABOVE MOUTH

10 — CROSS SECTION

-2 — GROUND ELEVATION IN FEET SEA LEVEL DATUM

CHANNEL

TOWNSHIP OR BORO LIMITS

(263) — STATE ROUTE

S

MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS AMBLER, PA. 1966, BUCKINGHAM, PA. 1968, DOYLESTOWN, PA. 1968 AND HATBORO, PA. 1966. ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.

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CONTOUR INTERVAL IS 20 FT.

SCALE IN FEET

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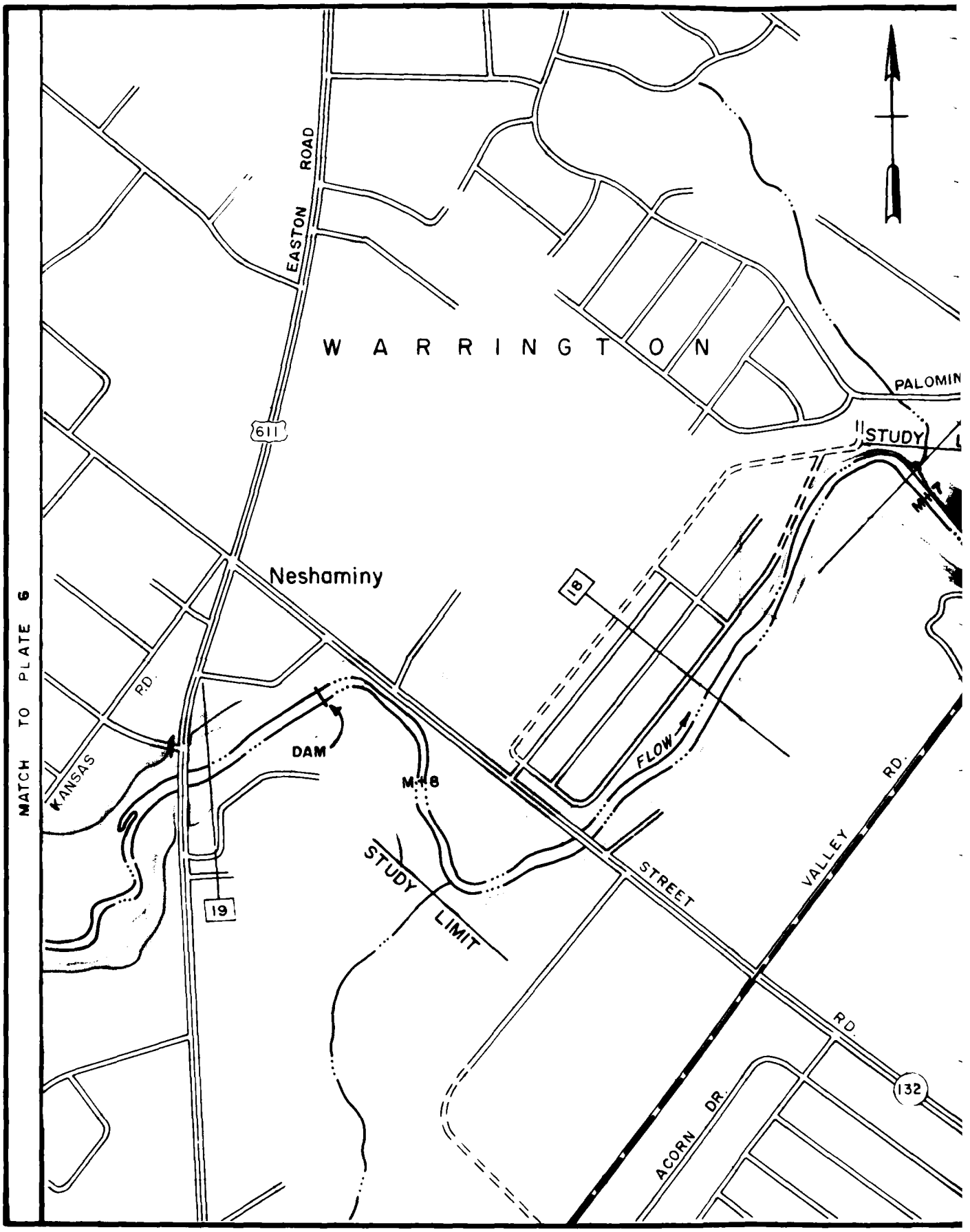
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

FLOODED AREAS

PLATE 4


MATCH TO PLATE 6
EASTON ROAD
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STUDY LIMIT
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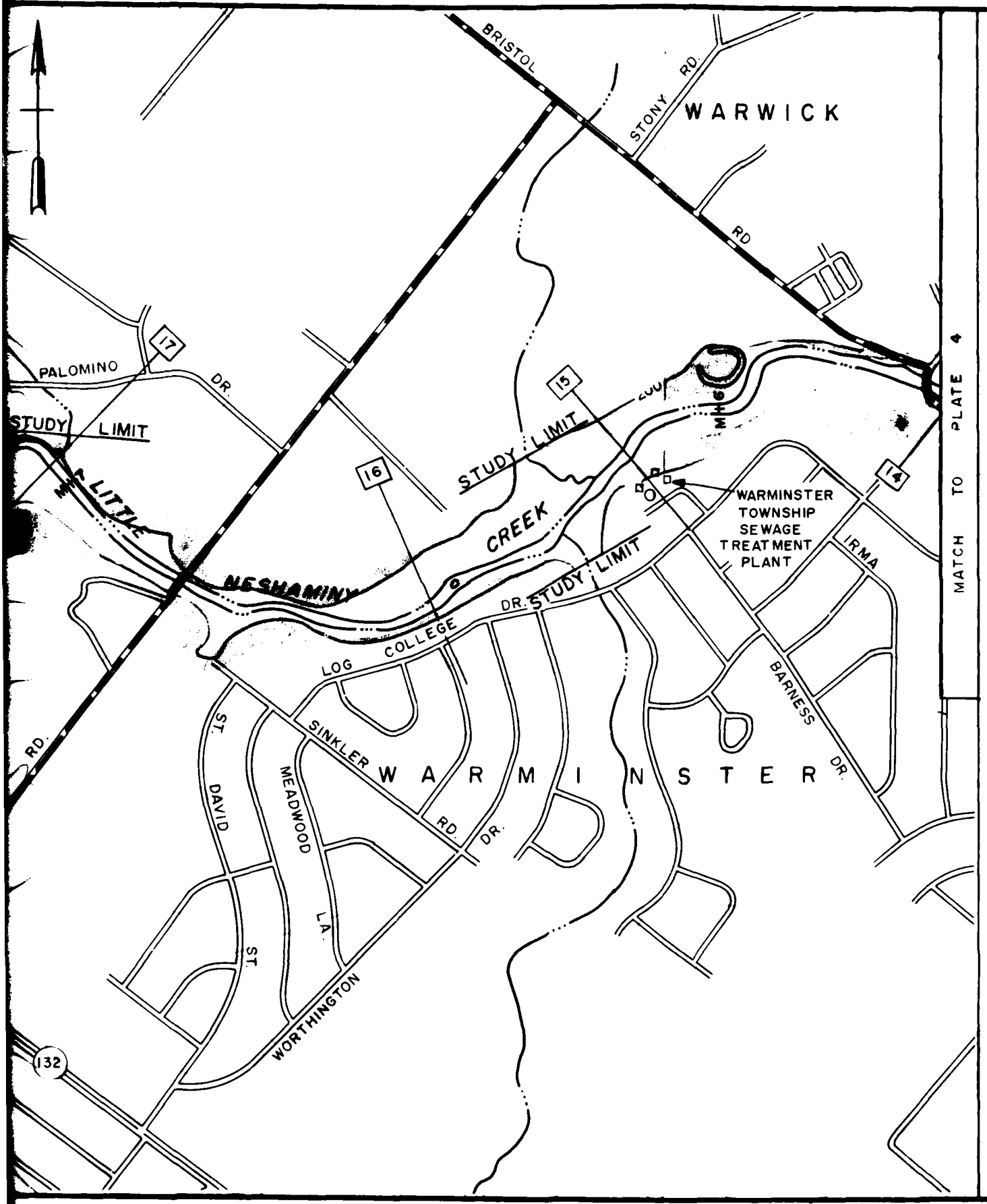
STREET
VALLEY
RD.
ACORN DR.
RD.
132


BRISTOL
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WARWICK
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CREEK
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15
STUDY LIMIT
WARMINSTER TOWNSHIP SEWAGE TREATMENT PLANT
14
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BARNESS DR.
STUDY LIMIT
DR.
COLLEGE
LOG
SINKLER
RD.
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WARMINSTER
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LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD	STANDARD PROJECT FLOOD

M+7 — MILES ABOVE MOUTH

17 — CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

CHANNEL

TOWNSHIP OR BORO LIMITS

611 — U.S. ROUTE

132 — STATE ROUTE

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS AMBLER, PA. 1966, BUCKINGHAM , PA. 1968, DOYLESTOWN, PA. 1968 AND HATBORO, PA. 1966. ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
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4. CONTOUR INTERVAL IS 20 FT.

SCALE IN FEET

0 800 1600

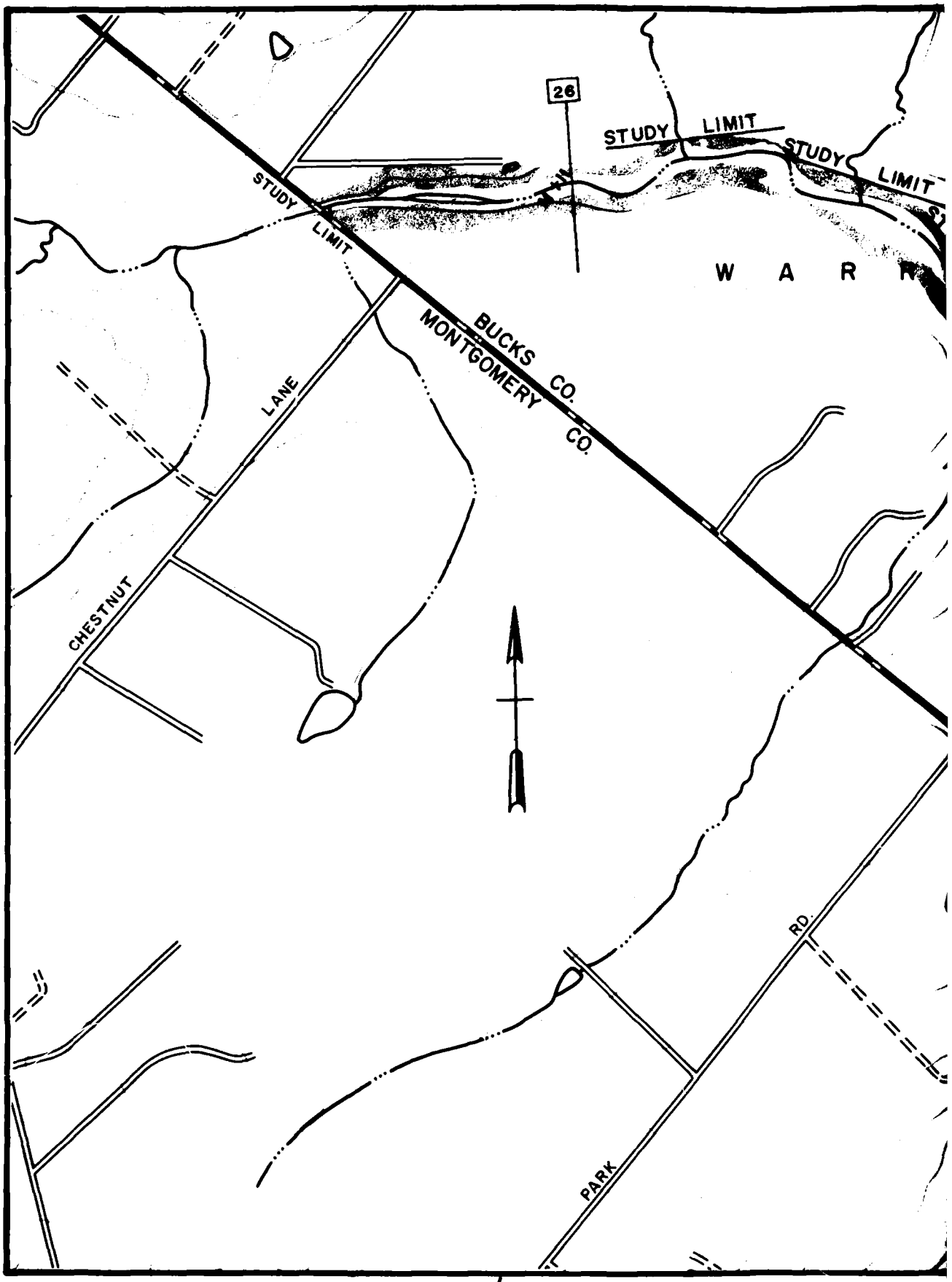
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

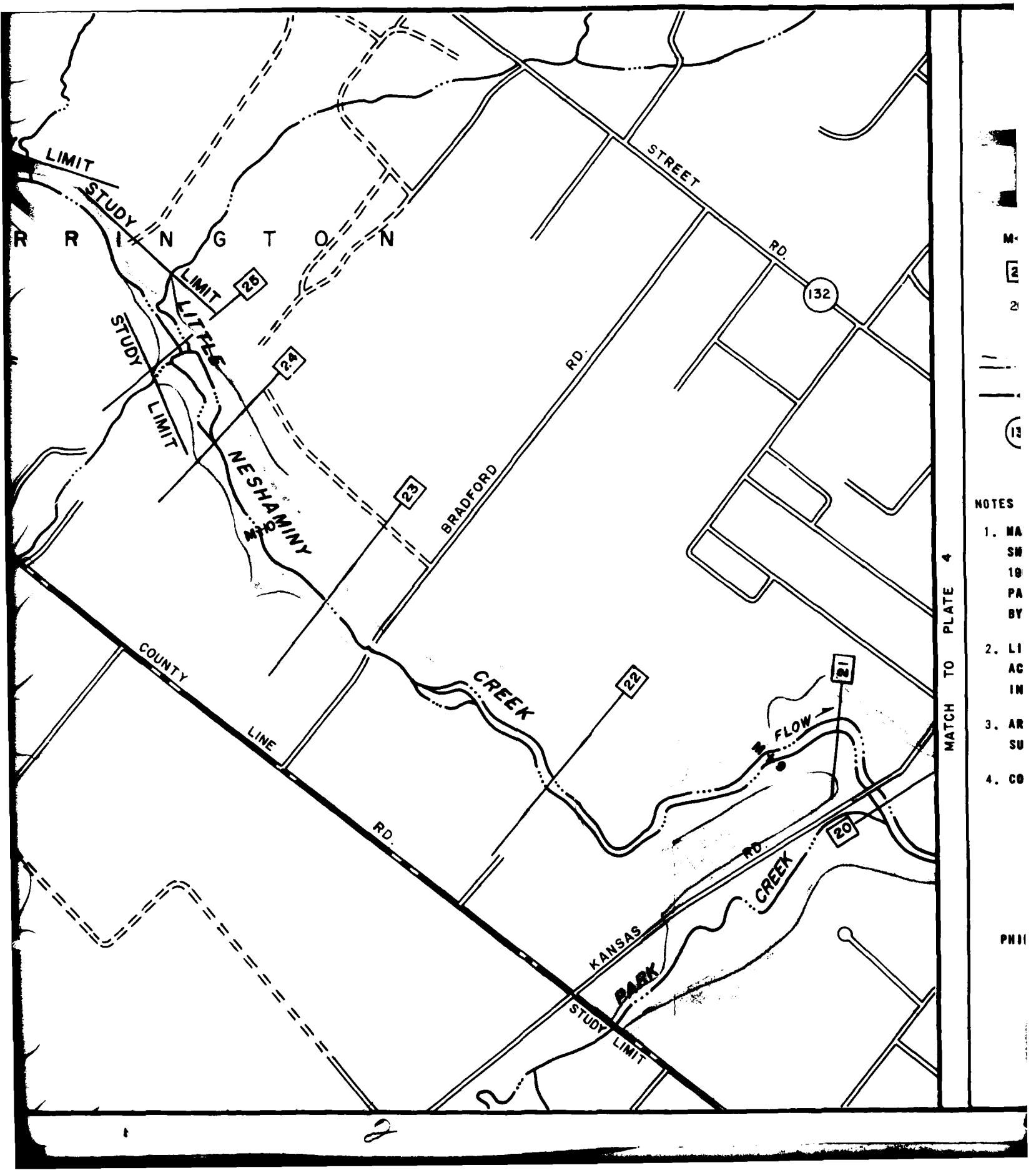
FLOOD PLAIN INFORMATION

LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

FLOODED AREAS

1 3 PLATE 5


26
STUDY LIMIT
STUDY LIMIT
STUDY LIMIT
W A R
BUCKS CO.
MONTGOMERY CO.
LANE
CHESTNUT
RD.
PARK


LIMIT
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LITTLE
STUDY
LIMIT
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NESHAMINY
23
BRADFORD
RD.
STREET
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COUNTY
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KANSAS
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LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD — STANDARD PROJECT FLOOD

M+11 — MILES ABOVE MOUTH

24 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

CHANNEL

COUNTY LIMITS

(132) — STATE ROUTE

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEETS AMBLER, PA. 1966, BUCKINGHAM, PA. 1968, DOYLESTOWN, PA. 1968 AND HATBORO, PA. 1966. ADDITIONS AND ADJUSTMENTS MADE BY CORPS OF ENGINEERS.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOODPLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. CONTOUR INTERVAL IS 20 FT.

SCALE IN FEET

0 800 1600

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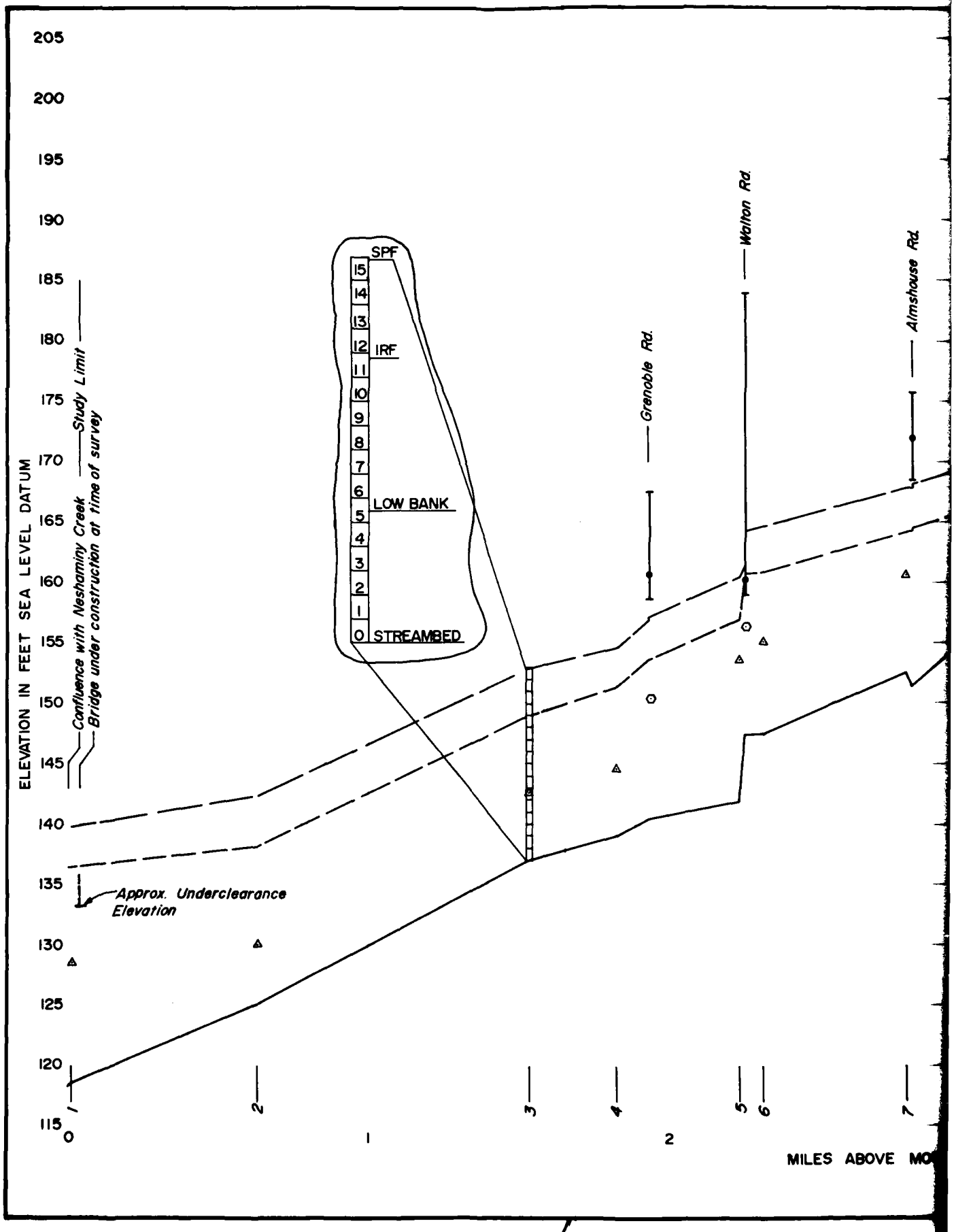
PHILADELPHIA, PENNSYLVANIA

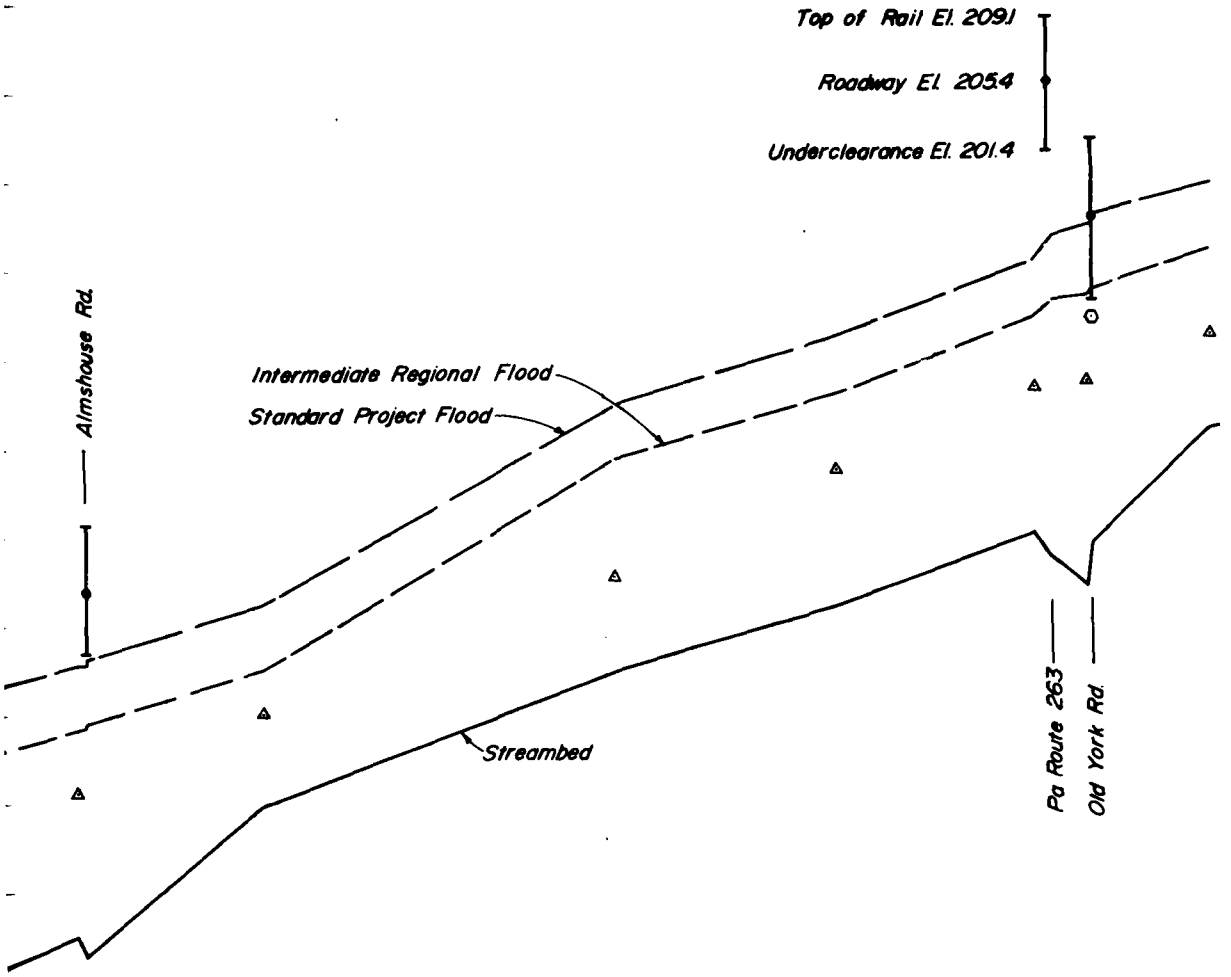
FLOOD PLAIN INFORMATION

LITTLE NESHAMINY CREEK
BUCKS COUNTY, PENNSYLVANIA

FLOODED AREAS

1 3 PLATE 6


205
200
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
115
ELEVATION IN FEET SEA LEVEL DATUM
Confluence with Neshaminy Creek
Study Limit
Bridge under construction at time of survey
SPF
IRF
LOW BANK
STREAMBED
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Approx. Underclearance Elevation
Grenoble Rd.
Walton Rd.
Almshouse Rd.
1
2
3
4
5
6
7
0
1
2
MILES ABOVE MO



LEGEND

- Top of Bridge Railing
- Bridge Floor
- Underclearance
- △ Top of Low Bank
- ⊙ High Water Mark-13

7 8 9 10 11 12 13

3 4 5

OVE MOUTH

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PHILADELPHIA DISTRICT, CORPS OF E
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATIO
LITTLE NESHAMINY CREEK
BUCKS COUNTY,
PENNSYLVANIA
HIGH WATER PROFILES

1 2 1

Bridge Railing

Floor

larance

.ow Bank

lter Mark-13 Sept.1960

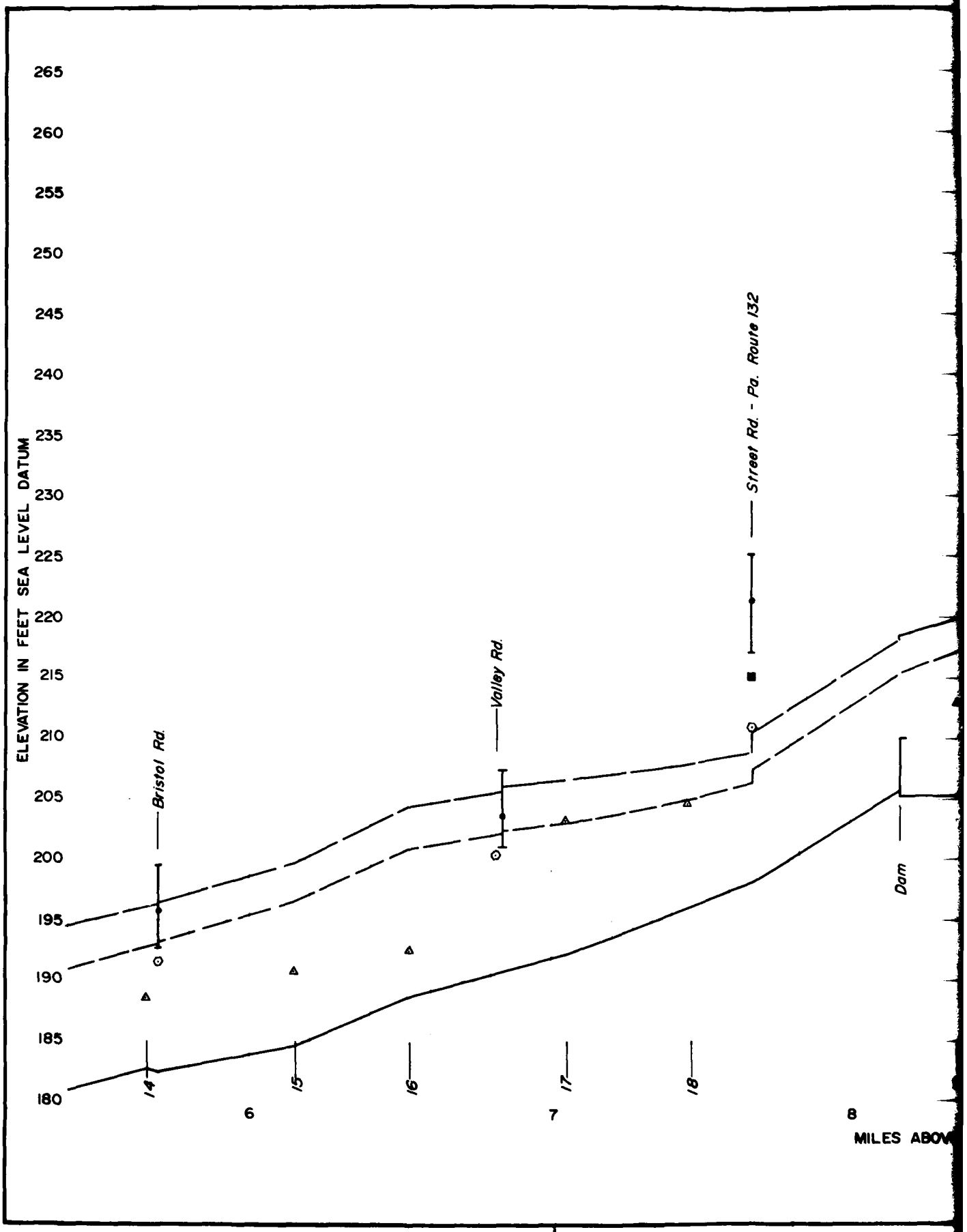
THE ARMY
CORPS OF ENGINEERS
PENNSYLVANIA
NFORMATION

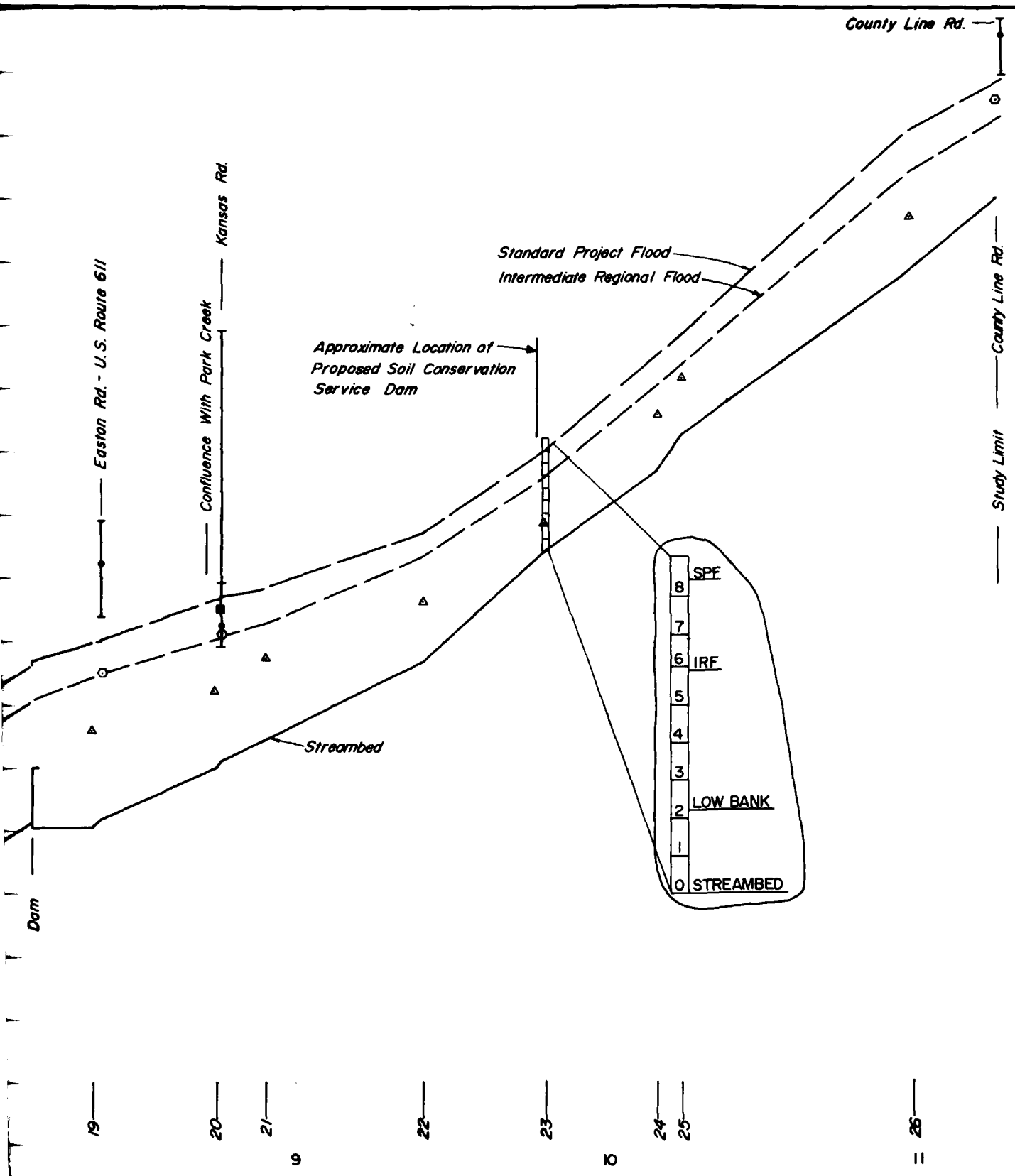
MINY CREEK

UNTY,
SNIA

PROFILES

1 PLATE 7 3


ELEVATION IN FEET SEA LEVEL DATUM
265
260
255
250
245
240
235
230
225
220
215
210
205
200
195
190
185
180
Bristol Rd.
Valley Rd.
Street Rd. - Pa. Route 132
Dam
14
15
16
17
18
6
7
8
MILES ABOV



ES ABOVE MOUTH

NOTE:

Since the August 19, 1955 and September 13, 1960 floods, Valley Road, Street Road, and Easton Road bridges have been replaced by structures with larger waterway openings.

LEGEND

- Top of Bridge Railing
- Bridge Floor
- Underclearance
- △ Top of Low Bank
- ■ High Water Mark-19 Aug. 1955
- ⊙ High Water Mark-13 Sept. 1960

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PHILADELPHIA, PENNSYLVANIA

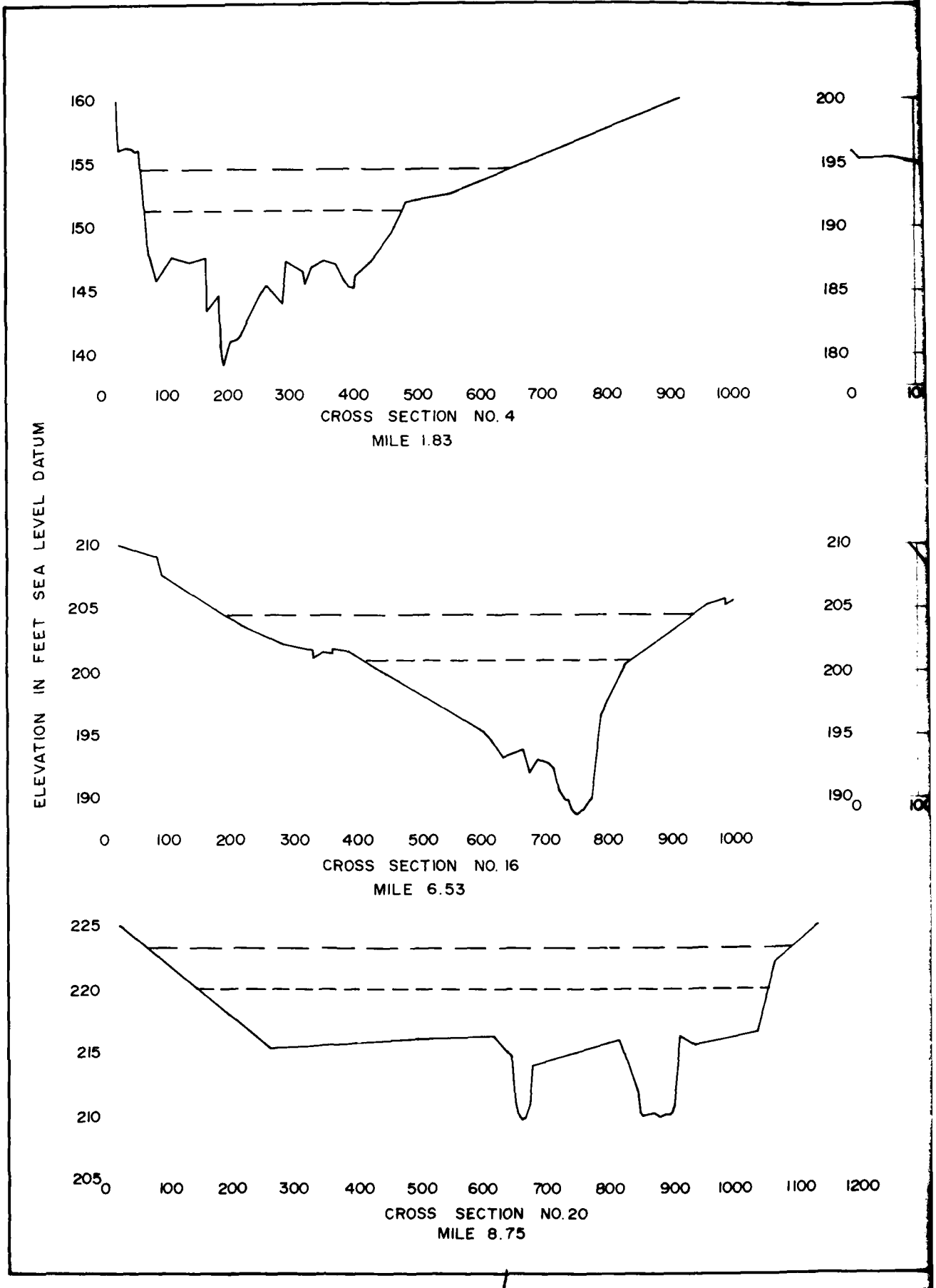
FLOOD PLAIN INFORMATION

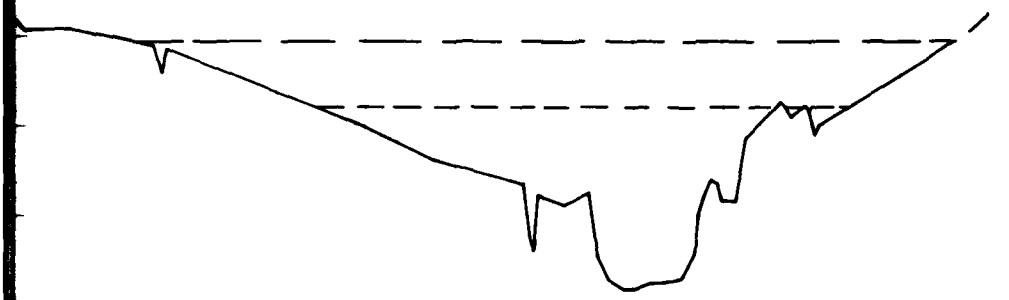
LITTLE NESHAMINY CREEK

BUCKS COUNTY,
PENNSYLVANIA

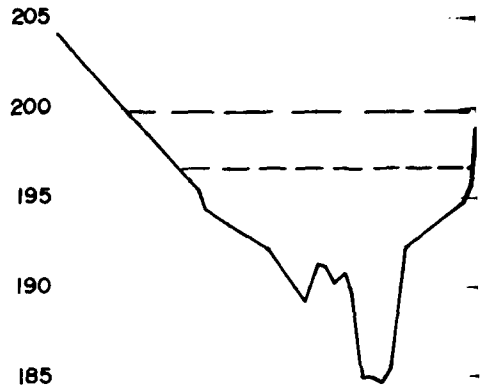
HIGH WATER PROFILES

1 3 PLATE 8

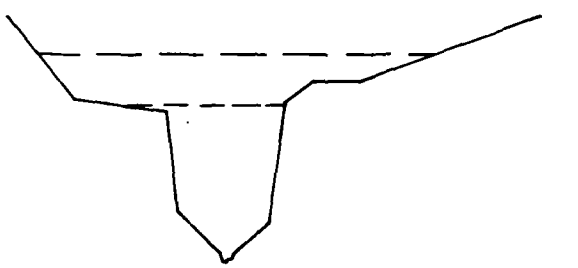

ELEVATION IN FEET SEA LEVEL DATUM
160
155
150
145
140
200
195
190
185
180
0 100 200 300 400 500 600 700 800 900 1000
0
CROSS SECTION NO. 4
MILE 1.83
210
205
200
195
190
210
205
200
195
190
0 100 200 300 400 500 600 700 800 900 1000
0
CROSS SECTION NO. 16
MILE 6.53
225
220
215
210
205
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
CROSS SECTION NO. 20
MILE 8.75



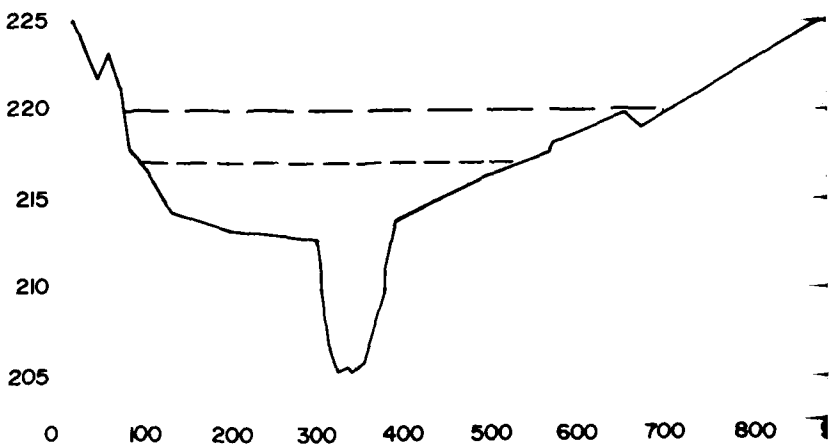
CROSS SECTION NO. 13
MILE 5.38



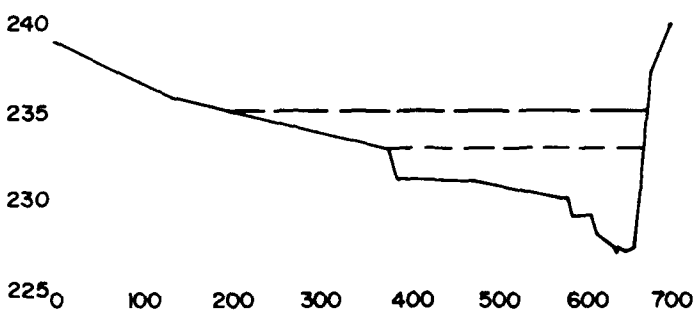
CROSS SECTION N
MILE 6.15



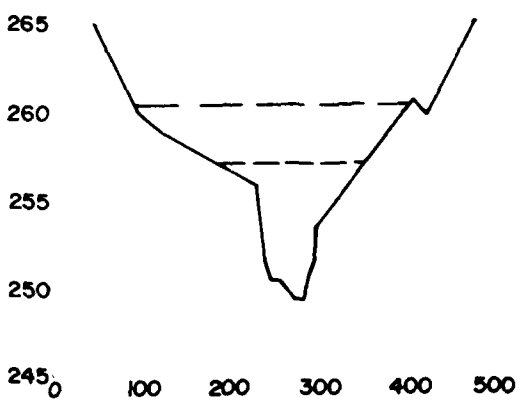
CROSS SECTION NO. 18
MILE 7.47



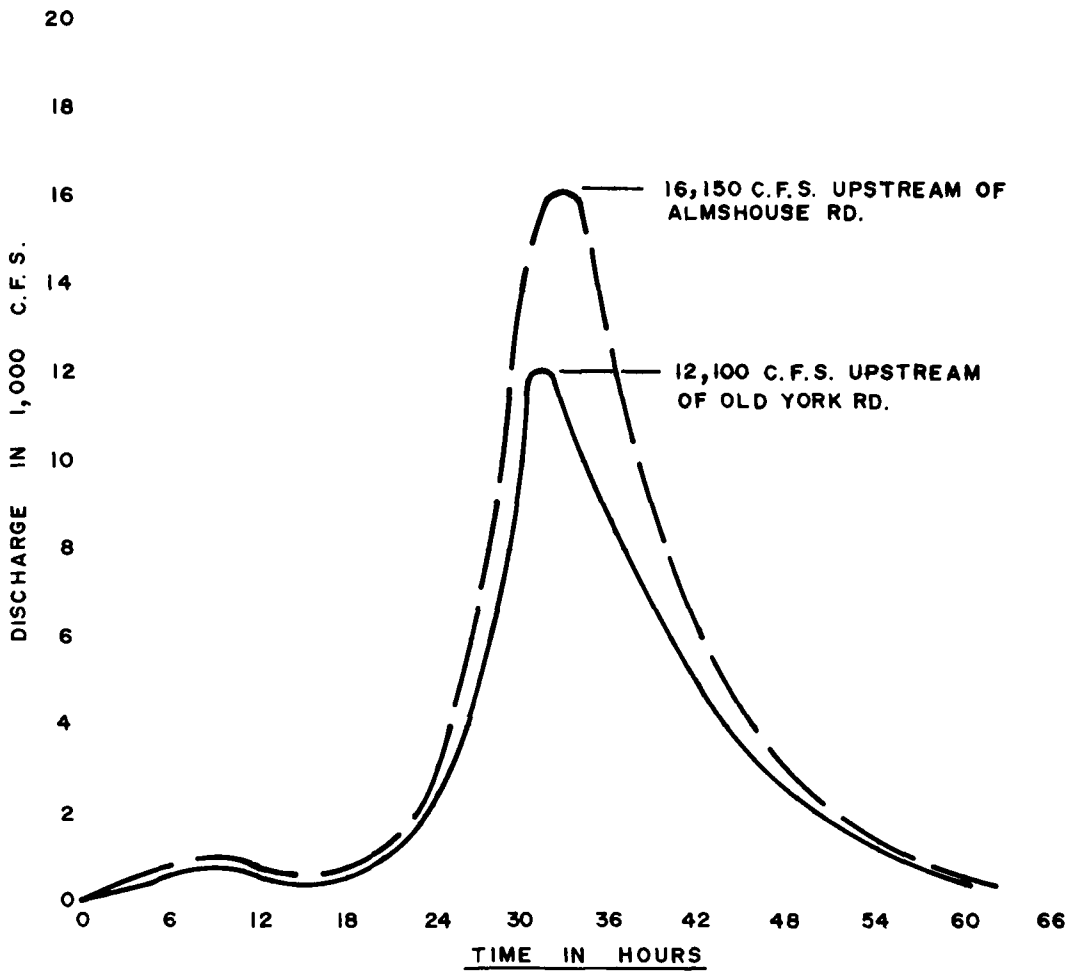
CROSS SECTION NO. 19
MILE 8.38



CROSS SECTION NO. 23
MILE 9.80



CROSS SECTION NO. 26
MILE 10.98



NOTES

DRAINAGE AREA	SQ. MI.
UPSTREAM ALMSHOUSE RD.	39.5
UPSTREAM OLD YORK RD.	30.1

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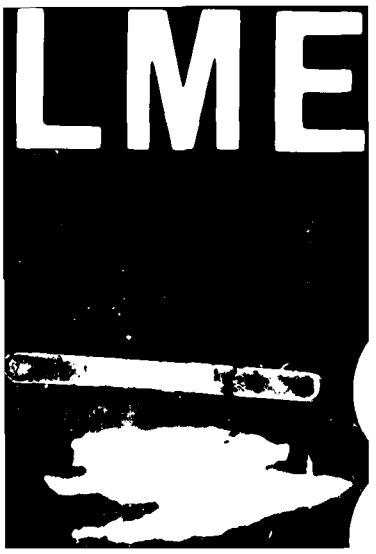
FLOOD PLAIN INFORMATION
LITTLE NESHAMINY CREEK
BUCKS COUNTY, PA.
STANDARD PROJECT FLOOD HYDROGRAPHS

PLATE 10


LME