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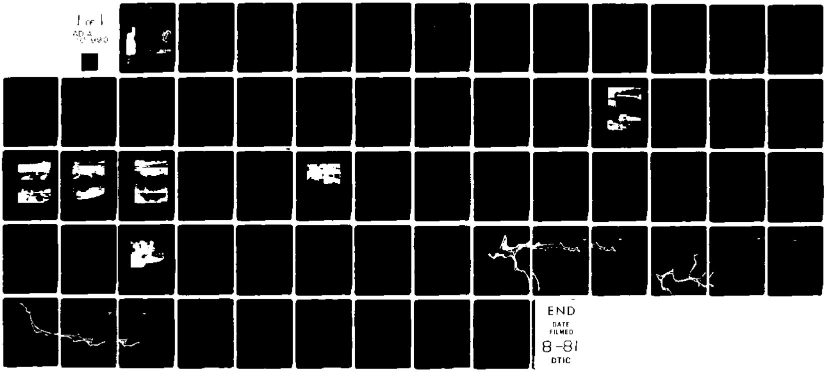

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FLOOD PLAIN INFORMATION

POMPESTON CREEK

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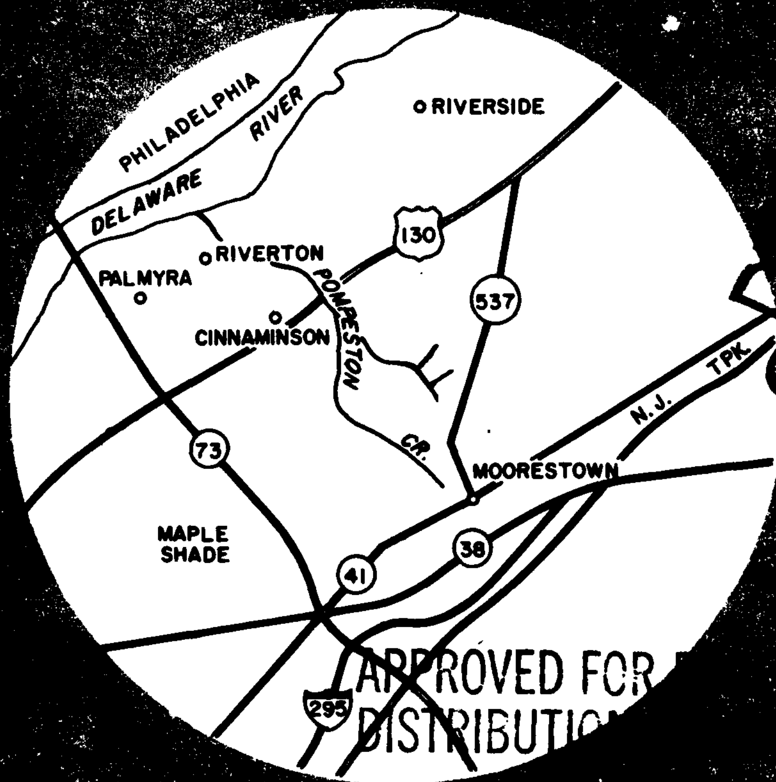

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BURLINGTON COUNTY PLANNING BOARD
AND
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BY
CORPS OF ENGINEERS, U. S. ARMY
PHILADELPHIA DISTRICT
JUNE 1971

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

This report presented flood plain information on Pompeston Creek, NJ. The main stream and its tributaries flow generally in a northwesterly direction entering Delaware River along the northern boundary of Riverton, N.J. Pompeston Creek and its tributaries drain an area of abouth 8 square miles.

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Rainfall, runoff, tide levels in the Delaware River and other technical data bearing upon the occurrence and size of floods within the study area were described. Maps and cross sections which indicate the extent of future flooding were also presented.

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 Burlington County Planning Board and New Jersey Department of Environmental Protection. 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.

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

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FLOOD PLAIN INFORMATION

POMPESTON CREEK

BURLINGTON COUNTY
NEW JERSEY

PREPARED FOR
BURLINGTON COUNTY PLANNING BOARD
AND
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BY
CORPS OF ENGINEERS, U. S. ARMY
PHILADELPHIA DISTRICT
JUNE 1971

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INTRODUCTION

The Pompeston Creek watershed is located in Burlington County, New Jersey. The main stream and its tributaries flow generally in a northwesterly direction entering Delaware River along the northern boundary of Riverton, New Jersey. Pompeston Creek and its tributaries drain an area of approximately 8.0 square miles.

The report was prepared at the request of the Burlington County Planning Board and the New Jersey Department of Environmental Protection (the designated State Coordinating Agency) to aid in the solution of local flood problems and in the best utilization of flood-prone lands. The report is based upon information on rainfall runoff, tide levels in Delaware River and other technical data bearing upon the occurrence and size of floods within the study area.

The two major floods discussed in this report are the Standard Project Flood and the Intermediate Regional Flood. A description of these floods and the method of their derivation is given on pages 22 through 25. When analyzing problems concerned with the planning and control of development in the flood plains, appropriate consideration should be given to the possible recurrence of floods equal to those of the past as well as to the still greater floods that can be expected in the future.

This report contains maps and cross sections which indicate the extent of floods which might occur. These should prove helpful in planning the best use of the flood plains. With this information, floor levels for structures may be planned high enough to avoid flood damage or, if located at lower elevations, with recognition of the chance of flooding and the hazards involved.

Plans for the solution of flood problems are not included in this report. Rather, it is intended to provide the basis for further study and planning on the part of local authorities in arriving at solutions to minimize vulnerability to flood damage. This might involve county or local planning programs to guide developments by controlling the type of use made of the flood plains through zoning and subdivision regulations, the construction of flood protection works or a combination of the two approaches.

The Philadelphia 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 available related flood data.

SUMMARY OF FLOOD SITUATION

The Pompeston Creek watershed is located in the southeastern portion of Burlington County, New Jersey. The stream flows in a northwesterly direction from its headwaters in Moorestown and Delran Townships to its confluence with Delaware River at Riverton.

This report covers Pompeston Creek, its major tributaries consisting of the East and West Branches, and its minor tributaries of Jack's Run, Pheasant Run, Southeast Branch and Northeast Branch. The entire Pompeston Creek has a drainage area of 8.0 square miles while its major tributaries, East and West Branches, have drainage areas of 2.1 and 3.3 square miles, respectively. Plate 1 shows the entire Pompeston Creek watershed.

Floods within Pompeston Creek watershed are comprised of three types: tidal flooding, fluvial flooding and inadequate drainage. High tides on Delaware River produce the major flooding in Pompeston's lower reaches. This tidal influence extends upstream through marshland to within 3,000 feet of the U. S. Route 130 highway bridge. The upper reaches are subjected to fluvial flooding, especially the East Branch and Jack's Run. Both are frequently dry and easily overflow during storms of high intensity and short duration. Urbanization has decreased the ability of the watershed to absorb water, creating more surface water for a given frequency rainfall than existed in the past. This "excess" water has become a drainage problem and has flooded many streets of elevations higher than the flood plain.

There are no stream gaging stations located on the Pompeston Creek watershed. Therefore, there are no substantial stream flow records available and no recorded high water marks were obtained.

The following paragraphs summarize the significant findings which are discussed in more detail in succeeding sections of this report:

THE GREATEST FLOOD experienced in the lower reaches of Pompeston Creek in this century was the August 1933 flood resulting from tidal flooding on Delaware River. Stages of 8.8 feet, mean sea level datum (m.s.l.d.), were recorded at the mouth of Pompeston Creek.

* * *

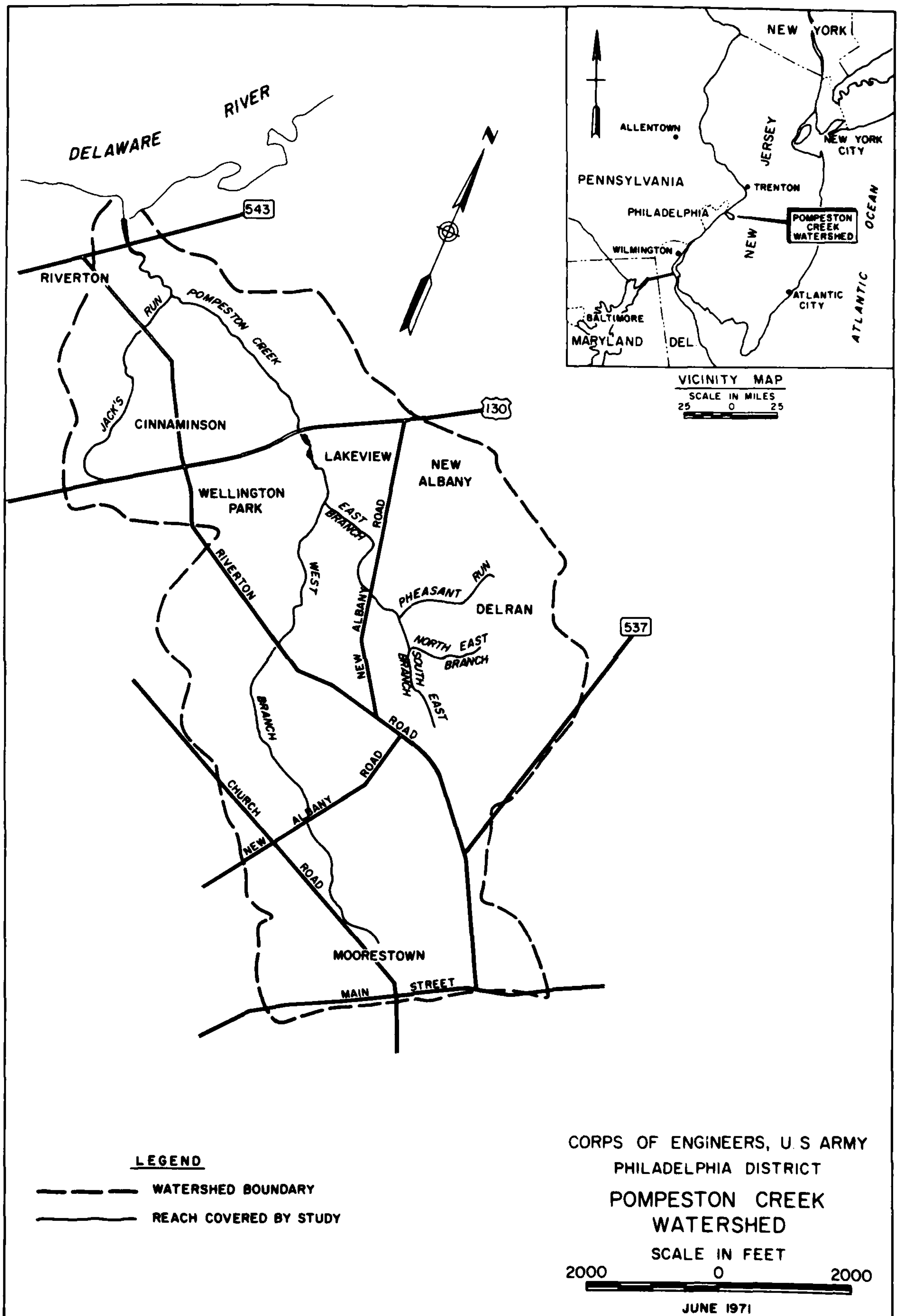
OTHER FLOODS. Little information as to dates, flood heights reached and severity of damage is available. An accurate description of past flooding is therefore not included. The Pompeston Creek watershed, however, has suffered frequent damage from minor floods.

* * *

INTERMEDIATE REGIONAL FLOOD on Pompeston Creek is a flood that has an average frequency of occurrence in the order of once in 100 years. It is determined from an analysis of tidal flooding and rainfall and runoff characteristics in the general region of the watershed. The analysis indicates that the Intermediate Regional Flood at the mouth of Pompeston Creek would reach a height of 1.6 feet above the August 1933 flood.

* * *

STANDARD PROJECT FLOOD determinations indicate that a flood about 6.6 feet higher than the August 1933 flood could occur on Pompeston



CORPS OF ENGINEERS, U S ARMY
PHILADELPHIA DISTRICT

POMPESTON CREEK
WATERSHED

JUNE 1971

PLATE 1

Creek. This flood would be about 5.0 feet higher than the Intermediate Regional Flood. The derivation of the Standard Project Flood is discussed on page 24 of this report.

* * *

FLOOD DAMAGES from recurring minor flooding would be substantial. More extensive damage would be caused by the Standard Project Flood because of its wider extent, greater depth and higher velocities.

* * *

MAIN FLOOD SEASONS for Pompeston Creek are in the summer and fall. However, large floods may occur at any time of the year. Summer floods are usually the result of intense local thunderstorms; however, the largest tidal flood recorded was a direct result of hurricane activity.

* * *

VELOCITIES OF WATER. Velocities in the flood plain would vary widely, depending upon location, but generally would be less than 4 feet per second. Velocities greater than 3 feet per second combined with water depths of 3 feet or greater are generally considered hazardous.

* * *

DURATION OF FLOODS is difficult to determine for Pompeston Creek because of the tidal influence. Tidal flood stages follow the tide cycles and thus can rise from normal levels to extreme flood peaks in a very short time, and may continue for several days. Fluvial floods are generally of short duration (24 hours or less).

* * *

HAZARDOUS CONDITIONS would occur during large floods as a result of the rapidly rising streams, high velocities, and deep flows.

* * *

FLOOD DAMAGE PREVENTION MEASURES. There are no existing, authorized or proposed flood control or related measures within the study area or upstream in the watershed, nor are there any existing local flood plain regulations within the area. However, the State of New Jersey has enacted certain encroachment laws which are discussed on pages 7 and 8 of this report.

* * *

FUTURE FLOOD HEIGHTS that would be reached if the Standard Project Flood or the Intermediate Regional Flood occurred within the study area are shown and compared in table 3 on page 26.

* * *

GENERAL CONDITIONS

Population centers within Pompeston Creek watershed include sections of Moorestown and Cinnaminson Townships and the Borough of Riverton. The watershed receives 44 inches average annual rainfall; its climate is temperate with winter average temperatures slightly above freezing and summer average temperatures above 73°F. Ample water exists for farm, urban and industrial use.

Burlington County is a direct and vital link between the economies of New Jersey and Pennsylvania. Burlington, Camden, Gloucester and Mercer Counties constitute the New Jersey Members of the Delaware Valley Regional Planning Commission. Burlington and Camden Counties, along with Philadelphia and its adjacent areas in Pennsylvania, are the center of one of the world's largest commercial and industrial complexes.

Contemplated improvements in Delaware River Port facilities and a developing regional transportation system, including public transit, will have a great impact on the diversity and extent of major industries locating in the county area. With the generation of new jobs will come new business and housing developments. Therefore, a knowledge of the flood plain areas and their vulnerability to serious flooding will be of great benefit in planning for the future.

SETTLEMENT

Although the upper reaches of Pompeston Creek and its tributary, Pheasant Run, are located in Moorestown Township, the majority of the stream's watershed lies within the boundaries of Cinnaminson Township.

Swedish settlers began colonizing Cinnaminson in 1682. The population was not large enough to form a township until 1860 when the township charter was signed on March 15th. The name "Cinnaminson", meaning sweet water in the language of the Lenni-Lenape, was retained.

The principal industries in the 1860-1880 period were: the Hains flour mill on the Burlington Turnpike between New Albany and Fairview along Swedes Run, a saw mill bordering on Pompeston Creek at the Turnpike, and at Fork Landing a planing mill, machine shop and shutter factory owned by I. W. Heuling. All three industries used the available water power. Along the Delaware, a fishery and barge building enterprise were established. A large section of Cinnaminson was converted to farm lands and nurseries.

Access to the township was gained by ferry across the Pennsauken and Rancocas Creeks. Freight was largely handled by barges. The building of bridges across the major streams and the gradual silting of their mouths caused the creek's water-borne industries to disappear. When the Delaware was spanned by the Tacony-Palmyra Bridge, Cinnaminson's potential for development increased. The development did not materialize until the past two decades; perhaps it was slowed by the depression of the 1930's and high bridge tolls. Today, Cinnaminson is a well-populated suburban area built on former farm land.

Future development of the Burlington County complex is reflected by the following population projection:

ESTIMATED POPULATION PROJECTIONS 1/

County	1970	1980	1990	2000
Burlington	333,000	413,900	495,400	583,200

The Pompeston Creek is bisected into its upper and lower reaches by U. S. Route 130 which provides access to Camden and Northeast and suburban Philadelphia via the Tacony-Palmyra and Burlington-Bristol bridges. Near its mouth, the Pompeston is crossed by the Pennsylvania Railroad passing through the Borough of Riverton.

FLOOD DAMAGE PREVENTION MEASURES

There are no existing, authorized or proposed flood control or related measures in the study area or upstream in the watershed, nor are there any local flood plain zoning regulations in Burlington County. However, the State of New Jersey enacted an Encroachment Law in 1929 which is essentially a preventive flood loss measure. The law is known at the "1929 Encroachment Law (R. S. 58:1-26)" and is administered by the Division of Water Policy and Supply of the Department of Environmental Protection. The law reads in part as follows:

> "No structure within the natural and ordinary high water mark of any stream shall be made by any public authority or private person or corporation without notice to the (Division) and in no case without complying with such conditions as the (Division) may prescribe for preserving the channel and providing for

1/ Population Estimate obtained from the New Jersey Department of Environmental Protection.

> the flow of water therein to safeguard the public against danger from the waters impounded or affected by such a structure and this prohibition shall apply to any renewal of existing structures." 2/

Under the provision of this law, the Division issues permits for the construction of bridges, culverts, fills, walls, channel improvements, pipe crossings and other encroachments located within the natural and ordinary high water mark of the stream. Another New Jersey Encroachment Law [Chapter 229, Laws of 1938, amending a previous law known as R. S. 40:56-1], permits municipalities of the State to construct improvements, remove obstructions, define the location, establish widths, grades and elevations of any stream and to prevent encroachments thereon--subject to approval by the State of the flood carrying capacity to be provided. Under this law, counties in New Jersey are permitted to assist municipalities in local flood damage alleviation programs. The New Jersey flood plain designation and marking law, enacted in 1962 [R. S. 58:16A (50-54)], empowers the Division of Water Policy and Supply to delineate and mark flood hazard areas, and coordinate effectively the development, dissemination, and use of information on floods and flood damage that may be available. The development of adequate flood plain information as furnished in this report will enable state and local authorities to further implement existing statutes and regulations.

FLOOD WARNING AND FORECASTING SERVICES

No specific flood warning or forecasting services are presently available in the study area. Inhabitants of the area depend entirely

2/ "Flood Damage Alleviation in New Jersey", Water Resources Circular No. 3, 1961, State of New Jersey Department of Environmental Protection.

on the usual warnings issued through radio, television and the local press media.

THE STREAM AND ITS VALLEY

Pompeston Creek has two main branches, East and West, and both have their origin in Moorestown Township.

The West Branch flows northwesterly for 2.8 miles to its confluence with the East Branch above Willow Drive draining 3.3 square miles of watershed. Drainage by the East Branch and its tributaries, Southeast Branch, Northeast Branch and Pheasant Run, covers only 2.1 square miles. The smallness of the watershed is verified during the frequent times of no flow on the East Branch. Table 1 shows drainage areas within Pompeston Creek watershed.

From its East-West junction, the Main Branch continues northwesterly over a dam upstream from U. S. Route 130 to the tidal marshes near Riverton. There, Jack's Run joins the Main Branch as the waters of Pompeston Creek travel 0.8 mile farther to feed the Delaware. Total watershed area equals 8.0 square miles.

The flood plains of the upper reaches, both East and West Branches, are relatively narrow. The West Branch slopes from approximately 50 feet, mean sea level datum, to an elevation of 19 feet at its confluence with East Branch in a distance of 3.0 miles. The East Branch is steeper in slope than the West. Gradually, the Main Stem flattens its slope into the tidal plains near Riverton where the flood plain begins to broaden, uniting with Delaware River flood plain. The flood plain is 1,200 feet wide above the Pennsylvania

Railroad tracks at Riverton and approximately 800 feet wide at the East-West Branch confluence.

TABLE 1

DRAINAGE AREAS IN POMPESTON CREEK WATERSHED

Stream	Location	Mileage Above Mouth	Drainage Area Tributary Sq. Mi.	Drainage Area Total Sq. Mi.
West Branch				
	Above Mouth	2.4	3.3	3.3
East Branch				
Southeast Branch	Above Mouth	3.5	0.3	-
Northeast Branch	Above Mouth	3.5	0.7	-
Southeast - Northeast Branch	Confluence	3.5	-	1.0
Pheasant Run	Above Mouth	3.4	0.3	-
East Branch - Pheasant Run	Confluence	3.4	-	1.3
East Branch	Above Mouth	2.4	-	2.1
Main Stem				
East - West Branch	Confluence	2.4	-	5.4
Jack's Run	Above Mouth	0.8	0.9	-
Main Stem - Jack's Run	Confluence	0.8	-	7.7
	Above Mouth	0	-	8.0

DEVELOPMENTS IN THE FLOOD PLAIN

In recent years, Cinnaminson and Moorestown Townships have experienced rapid growth. Housing developments have been increasing and spreading into the upstream reaches of the Pompeston causing a decrease in vegetation and a receding freeline. Very few open fields are left vacant upstream of U. S. Route 130 except Lakeview Memorial Cemetery, public education land and a section of marsh land along the West Branch west of New Albany Road. The extensive development within the watershed has increased the flooding potential by altering storm runoff characteristics. Areas covered by paved parking lots, roads, and buildings are not able to absorb water. Storm sewers then hasten the runoff water directly into the stream forcing more water to be carried by the stream in a shorter period of time.

Urbanization will continue to encroach on the flood plain as other undeveloped land becomes scarce. Such encroachment would further impede overbank flow and create a higher flood damage potential.

DAMS ACROSS POMPESTON CREEK

Two small dams are built across Pompeston Creek. The first dam is immediately upstream from the U. S. Route 130 highway bridge at the Lakeview Memorial Park. This dam has no flood control capacity and would not be restrictive for large flood flows.

The second dam is a concrete-lined earth dam with a three-foot conduit and riprapped banks. Two feet of freeboard above the top of the conduit provides flood control for minor rainfalls only. Riverton Road crosses the West Branch of Pompeston Creek 300 feet below the dam. Figure 1 shows pictures of these two dams.

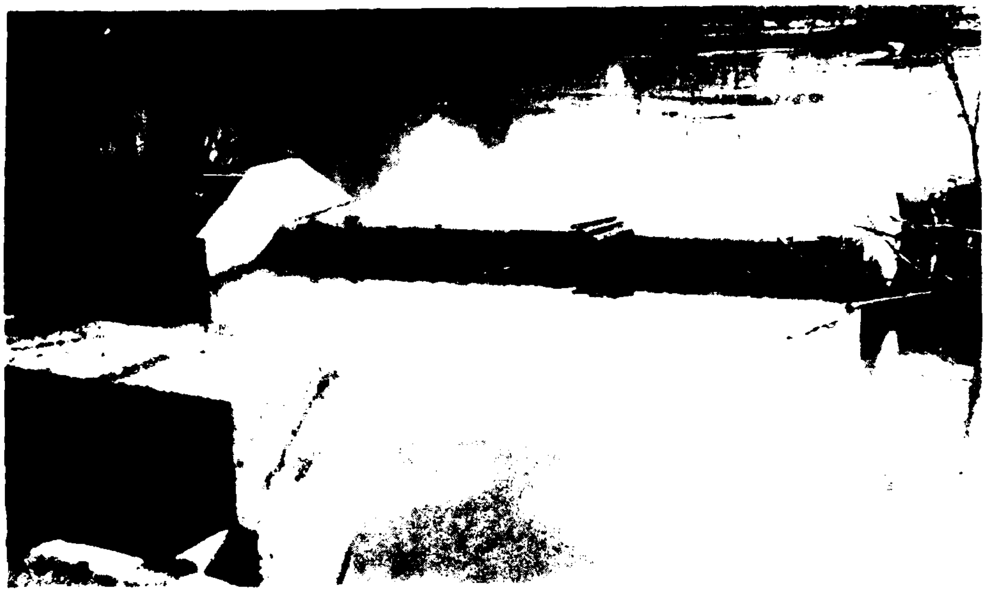


Figure 1.--DAMS ACROSS POMPESTON CREEK

Top view is the Lakeview Memorial Park Dam upstream of U. S. Rt. 130. Bottom view is the dam upstream of Riverton Road.

BRIDGES ACROSS THE STREAM

Pompeston Creek and its tributaries are spanned twenty-two times by roadways and once by a railroad.

The North Broad Street bridge carries the Pennsylvania Railroad across the Pompeston at Riverton. The bridge is a single-span, reinforced concrete structure and is low enough to be inundated by the Standard Project Flood.

U. S. Route 130 spans Pompeston on a six-lane, reinforced concrete bridge. This is the first upstream bridge above the tidal reaches.

The remaining roads are State and local thoroughfares. Crossings are accomplished on ten bridges and ten culverts. Three bridges are of timber construction; two, stone arched; and five, reinforced concrete. Some of the culverts are simple concrete pipes, back filled without retaining walls; two with retaining walls; three conduits are reinforced concrete box culverts; one is corrugated steel; and one is a concrete arched culvert. Figures 2, 3 and 4 show some of the structures discussed in this section. Table 2 classifies the structures according to their effect on flood flows.

OBSTRUCTIONS TO FLOOD FLOWS

Many of the bridges and culverts are restrictive, resulting in ponding on the upstream sides during flood flows. The dam located 300 feet above Riverton Road would contain runoff from light rains by design, but neither dam would restrict large flood flows. Clogging of culverts and bridges would create more extensive flooding than would otherwise be anticipated.

TABLE 2

BRIDGES ACROSS POMPESTON CREEK

Mileage Above Mouth	Identification	Stream Bed Elev. Feet	Floor Elev. Feet	Under-clearance Elev. Feet	Classification
	Pompeston Creek				
0.3	North Broad St.	-0.5	13.0	9.5	Nonrestrictive
1.9	U. S. Route 130	12.3	24.8	21.7	Nonrestrictive
2.0	Lakeview Memorial Park	12.6	25.9	23.9	Nonrestrictive
2.4	Willow Drive	18.3	23.5	22.8	Nonrestrictive
2.5	Service Bridge (Clover Dr.)	17.7	24.9	23.4	Nonrestrictive
	West Branch				
2.6	Wayne Dr.	19.5	26.1	24.8	Partially Restrictive
2.8	Devon Rd.	19.2	29.1	24.3	Partially Restrictive
3.1	Parry Rd.	23.9	30.6	30.2	Partially Restrictive
3.4	Riverton Rd.	25.5	35.0	31.3	Partially Restrictive
3.7	Riding Way	25.6	36.2	32.9	Nonrestrictive
4.6	New Albany Rd.	37.1	44.6	41.1	Highly Restrictive
5.2	Bridge Ave.	47.0	51.3	50.0	Highly Restrictive
5.3	West Maple Ave.	48.2	51.7	51.2	Highly Restrictive

TABLE 2 (Continued)

BRIDGES ACROSS POMPESTON CREEK

Mileage Above Mouth	Identification	Stream Bed Elev. Feet	Floor Elev. Feet	Under-clearance Elev. Feet	Classification
	Jack's Run				
0.9	Cedar St.	6.0	15.2	11.0	Nonrestrictive
1.0	Main St.	11.9	23.7	15.7	Highly Restrictive
1.1	Cherry Lane	15.7	20.9	20.5	Partially Restrictive
1.2	Thomas Ave.	20.8	25.6	24.2	Highly Restrictive
1.9	Highland Ave.	50.3	55.1	52.9	Highly Restrictive
	East Branch				
2.9	School Driveway	24.0	31.9	30.7	Nonrestrictive
3.1	Parry - New Albany Rds.	29.8	32.5	30.7	Nonrestrictive
	Southeast Branch				
3.8	Tom Brown Rd.	41.4	47.4	45.9	Nonrestrictive
	Pheasant Run				
3.4	Waterford Dr.	30.1	35.6	33.6	Nonrestrictive

NOTE: The degree of restrictiveness is based largely on the waterway opening of the bridge and its capacity to carry flood flows. Debris clogging of any bridge would change its classification to highly restrictive and cause an increase in water levels upstream of the bridge.

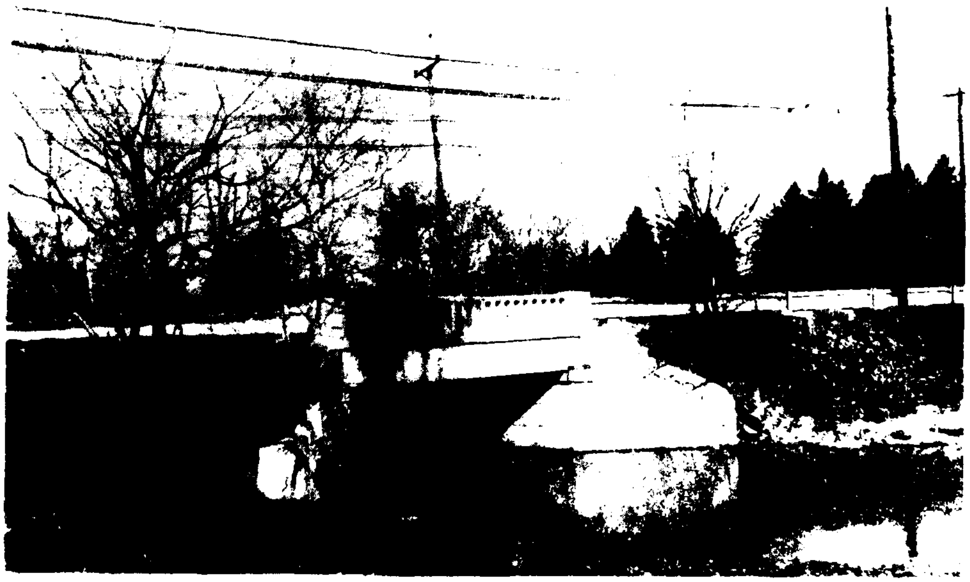


Figure 2.--BRIDGES ACROSS POMPESTON CREEK

Top view is the downstream side of North Broad Street bridge at Mile 0.3. Bottom view is the upstream side of heavily travelled U. S. Rt. 130.

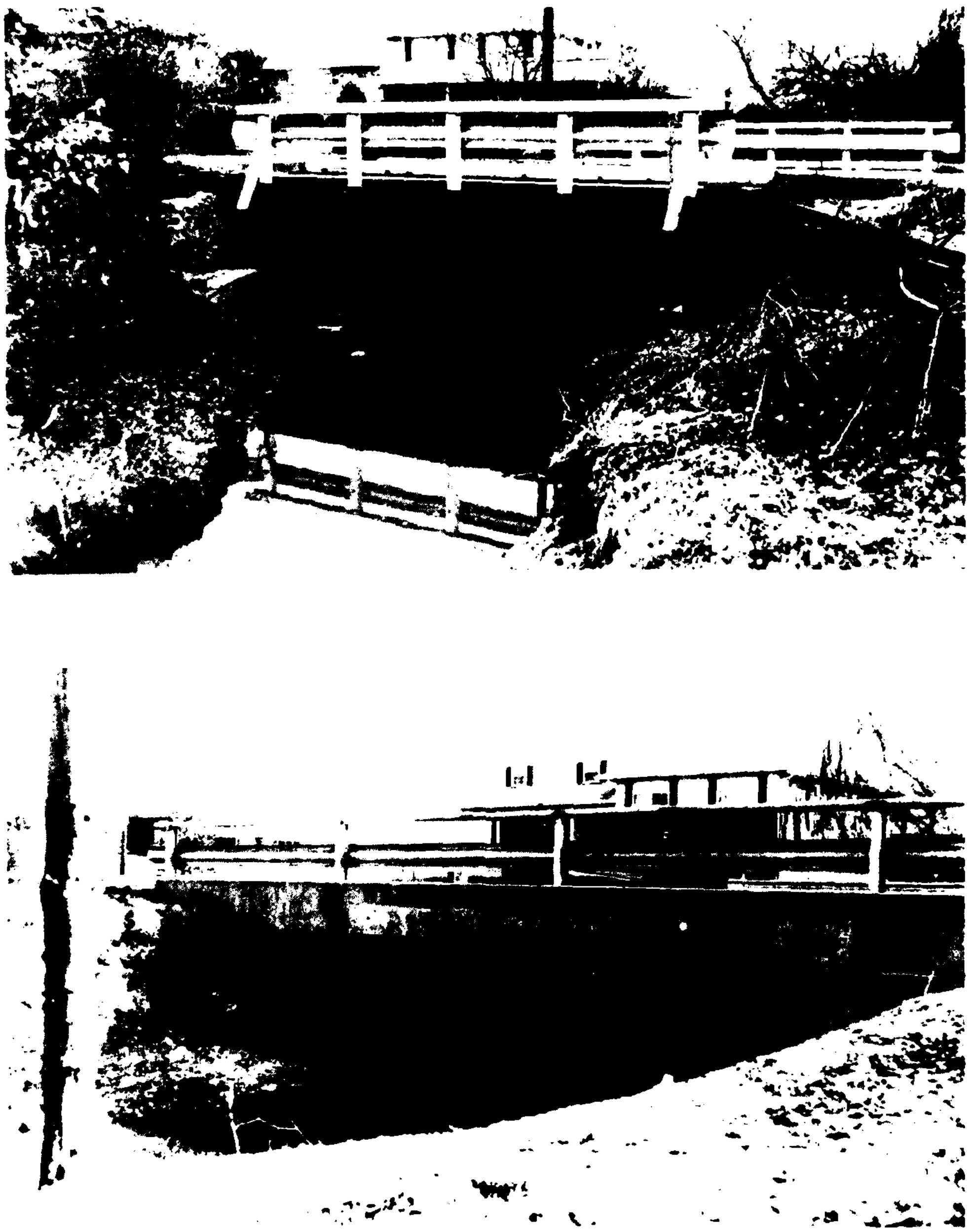


Figure 3.--BRIDGES ACROSS WEST BRANCH POMPESTON CREEK

Top view is the downstream side of Devon Road bridge at Mile 2.8. Bottom view is the downstream side of the Riverton Rd. bridge at Mile 3.4.

Figure 4.--BRIDGES ACROSS EAST BRANCH POMPESTON CREEK AND JACK'S RUN

Top view is the downstream side of Parry - New Albany Road bridge at Mile 3.1. The bottom view is the downstream side of the Main Street bridge over Jack's Run at Mile 1.0.

FLOOD SITUATION

FLOOD RECORDS

No substantial stream gaging information is available for Pompeston Creek watershed. In order to collect information on dates and heights of floods in the study area, local residents were interviewed, and newspaper files, historical documents and records were searched. A knowledge of flooding on Pompeston Creek has been developed.

FLOOD STAGES AND DISCHARGES

The relative flood heights and discharges for the Standard Project Flood and the Intermediate Regional Flood are shown in table 3 on page 26.

The following tide stages were observed in Delaware River near the mouth of Pompeston Creek during the period of record:

TIDAL FLOODS

Date	Elevation Ft. - m.s.l.d.
August 23 - 25, 1933	8.8
November 25, 1950	8.6
August 19 - 20, 1955	8.6

FLOOD OCCURRENCES

Due to the sparse development of a considerable portion of the study area as late as 1940, and the lack of gaging stations, factual information relative to past flood discharges is scarce. Pompeston Creek, however, suffers from frequent minor flooding problems, the last occurring as recently as July 30, 1970.

Figure 5 shows the height of flooding reached during the July 30, 1970, storm by the West Branch Pompeston Creek at Devon Road. The storm was very erratic hitting Cherry Hill and Cinnaminson Townships with a deluge and sprinkling Philadelphia. Damages included flooded streets and lawns and a four-hour loss of electricity for area homes.

Minor flooding has occurred on a yearly basis in the past decade. The Devon Road - Wayne Drive area, which records show flooded January 15, 1968, because of an ice jam, is not the only vulnerable spot. The Waterford Drive - Woodhaven Road area on East Branch has experienced flooding by surface waters and back up from clogged culverts.

Pompeston Creek's most erratic tributary is gentle Jack's Run. In recent years, flooding has occurred February 1966, May 1968, June 1968, July 1969, and July 1970. Damage to twenty-one properties adjacent to Jack's Run resulted from the July 1969 storm.

Since September 1962 to the present, the Township of Cinnaminson and Borough of Riverton have proposed flood control measures totaling $500,000 for the Pompeston Creek watershed.

The tidal flood of record occurred during the hurricane of August 1933 when the tide in Delaware River at the mouth of Pompeston reached an elevation of about 8.8 feet, m.s.l.d.

FLOODED AREAS, FLOOD PROFILES AND CROSS SECTIONS

The smallness of the Pompeston Creek watershed did not permit normal backwater computations along the stream and at bridge

Figure 5.--NONSTRUCTURAL ALTERNATIVE

The photograph above shows portable flood shields used to prevent water from entering the garage. Simple measures such as flood shields for lower openings, check valves for basement drains and cutoff valves on sewer lines can prevent much damage to a building without detracting from the building's beauty, function or value.

Photograph reproduced with permission from THE BURLINGTON COUNTY TIMES.

locations. For this reason a stream profile is not shown and bridges are classified as to flood flow restrictiveness on table 3 on page 26. Flood heights are considered accurate at the surveyed cross sections shown on plates 9 through 11. The location of all sections are shown on plates 6 through 8, "Flooded Area Maps". The depth of flooding at each cross section is considered representative for the overall reach in which the cross section is located.

Plates 6 through 8 show the approximate areas along the East Branch, West Branch, Main Stem and Jack's Run that would be inundated by the Intermediate Regional Flood and the Standard Project Flood. The actual limits of these overflow areas may vary from those shown on the map because the 10-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries.

The topography of the upper reaches of the West Branch has changed due to recent land fills. The plates, however, present a good generalized picture of the flood situation.

FUTURE FLOODS

This section of the report discusses the Standard Project Flood and the Intermediate Regional Flood. The Standard Project Flood represents a reasonable upper limit of expected flooding. The Intermediate Regional Flood may reasonably be expected to materialize more often, but would not rise as high as the more infrequent Standard Project Flood.

Usually, the New Jersey Floodway Design Flood and the New Jersey Flood Hazard Area Design Flood are discussed and illustrated in similar reports within the State of New Jersey. They were not determined for this study because the small drainage areas involved did not permit accurate computations.

DETERMINATION OF THE INTERMEDIATE REGIONAL FLOOD

The Intermediate Regional Flood is defined as a flood having an average frequency of occurrence of once in 100 years at a designated location, although the flood may occur in any year. Probability estimates are based on statistical analyses of stream flow records for the watershed under study. Limitations in such records, however, usually require analyses of rainfall and runoff characteristics on a regional rather than a watershed basis. The Intermediate Regional Flood is considered a major flood although less severe than the Standard Project Flood.

Determining the Intermediate Regional Flood for Pompeston Creek required special calculations because: (1) no stream flow records are available and (2) no nearby basin, with stream flow records, similar in slope, retention time, hydrological characteristics and size is available. The frequency estimates for Pompeston's tributaries were determined using the Rational equation. Frequency estimates for the main stem were developed according to procedures described in the New Jersey Water Resources Circular No. 13, "Floods in New Jersey: Magnitude and Frequency", prepared in 1964 by the U. S. Geological Survey in cooperation with the State of New Jersey.

Because inherent inaccuracies exist for completely synthetic computations, Intermediate Regional Flood heights were only computed for the surveyed cross sections. Plates 9, 10 and 11 show these cross sections with their respective flood heights, while plates 6, 7 and 8 give the location of each cross section. Flood outlines as portrayed by plates 6, 7 and 8 were found by interpolation between the computed cross sections and may only be considered accurate at those cross sections. Actual and assumed flood outlines may vary greatly in the immediate vicinity of bridges, culverts and dams.

In the tidal reaches of Pompeston Creek, the flood outlines follow the greater flood height obtained by either the 100-year fluvial flood discharge or the 100-year tide height. Table 3 gives discharges and stage elevations for all surveyed cross sections.

DETERMINATION OF STANDARD PROJECT FLOOD

It is rare that a specific stream has experienced the largest flood that is likely to occur. Although flooding may have been severe in the past, it is a commonly accepted fact that in practically all cases, sooner or later, a flood of greater magnitude will probably occur. The Corps of Engineers, in cooperation with the United States Weather Bureau, has made broad and comprehensive studies and investigations based on the past 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. This 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. Larger floods are possible and are discussed on page 27.

The methods used in determining the Standard Project Flood were applied to those locations for which unit hydrographs were developed. The resulting Standard Project Flood hydrographs, which are shown on plates 2, 3 and 4, indicate relatively high discharges.

A tide level of 15.4 feet, m.s.l.d., at the mouth of the Main Stem was used in the Standard Project Flood determinations. This tide level was obtained from the hurricane study, "Delaware River and Bay - Pennsylvania, New Jersey and Delaware", House Document No. 348, 88th Congress, 2nd Session, and was considered to result from surges due to a Standard Project Hurricane at the mouth of Delaware Bay.

The peak discharges and stages for the Standard Project Flood at the surveyed cross sections are given in table 3.

FREQUENCY

It is not practical to assign a frequency to the Standard Project Flood. The occurrence of such a flood would be a rare event; however, it could occur in any year.

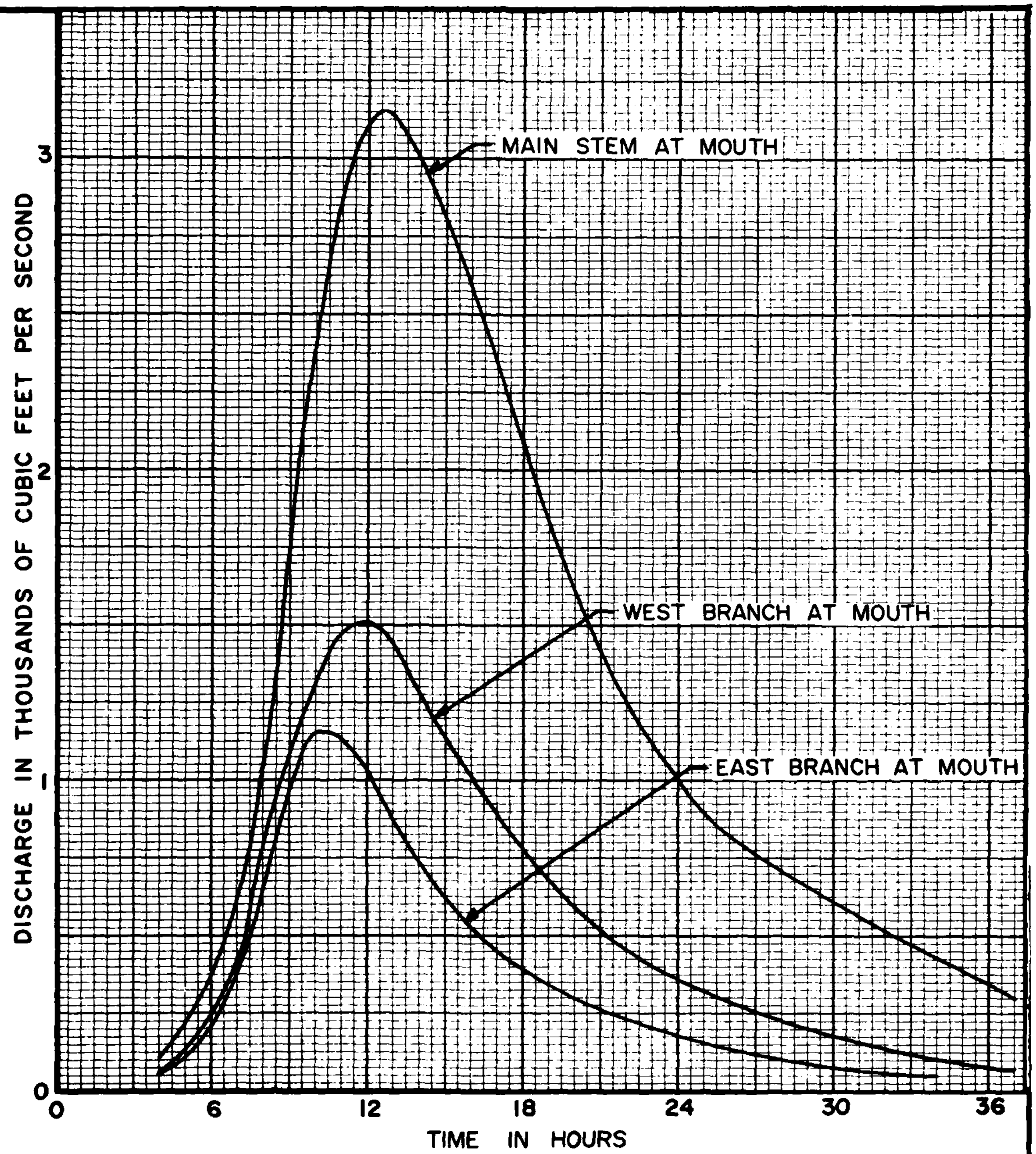
POSSIBLE LARGER FLOODS

Floods larger than the Standard Project Flood are possible; however, the combination of factors that would be necessary to produce a flood of this magnitude would seldom occur. The consideration of such a severe flood is of greater importance in some areas than in others but should not be overlooked in the study of any flood-prone area.

TABLE 3
STAGE DISCHARGE FREQUENCY RELATIONSHIPS

Section	Station	Location	Reach	Intermediate Regional Flood			Standard Project Flood		
	Ft. abv. Mouth			Disch. cfs	Stage Ft.	Elev. Ft.*	Disch. cfs	Stage Ft.	Elev. Ft.*
1	1 + 100	Main Stem	1	1,415	6.6	10.4**	3,120	8.6	15.4**
2	3 + 800	Main Stem	1	1,395	4.9	10.4**	3,070	5.6	15.4**
3	6 + 500	Main Stem	1	1,300	5.8	10.4**	2,860	7.7	15.4**
4	9 + 900	Main Stem	2	1,260	5.1	14.9	2,770	6.1	15.9
5	12 + 500	Main Stem	2	1,225	5.4	21.0	2,690	7.4	23.0
6 (L)	13 + 500	West Br.	3	825	7.8	23.0	1,470	8.5	23.7
7	14 + 500	West Br.	3	785	7.0	25.5	1,400	8.2	26.7
8	16 + 900	West Br.	3	675	5.4	27.8	1,200	6.1	28.5
9	22 + 300	West Br.	3	435	4.9	35.6	770	6.5	37.2
10	26 + 000	West Br.	4	275	2.8	44.7	490	2.9	44.8
11	28 + 400	West Br.	4	165	2.7	51.7	290	3.1	52.1
12	5 + 200	Jack's Run	8	300	3.9	10.4**	460	4.2	15.4**
13	7 + 700	Jack's Run	8	180	2.3	33.5	280	2.7	33.9
6 (R)	13 + 300	East Br.	5	650	6.4	22.8	1,120	6.8	23.2
14	15 + 900	East Br.	5	520	4.5	30.4	900	5.7	31.6
15 (L)	19 + 000	Southeast Br.	5	140	2.0	37.7	250	2.1	37.8
16	19 + 900	Southeast Br.	5	110	2.8	41.9	200	3.5	42.6
17	18 + 700	Pheasant Run	6	115	2.2	39.9	180	2.4	40.1
18	21 + 500	Pheasant Run	6	65	3.2	55.4	100	3.5	55.7
15 (R)	19 + 000	Northeast Br.	7	235	3.8	36.7	500	4.3	37.2
19	20 + 300	Northeast Br.	7	215	2.5	39.9	460	3.2	40.6

* Elevations are referenced to mean sea level datum, USC & GS 1929 General Adjustment Datum.
** Results from tide on Delaware River.



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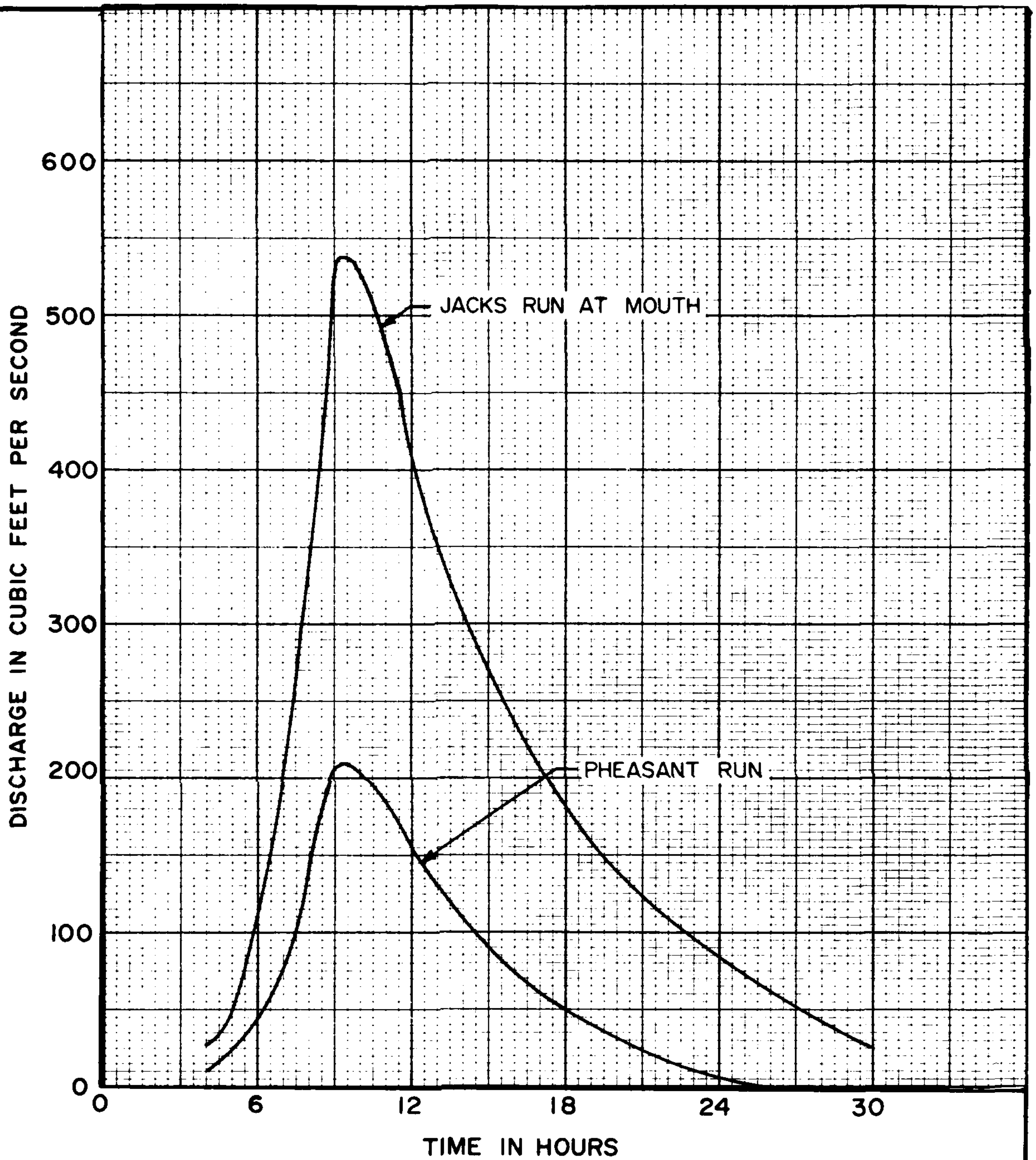
PHILADELPHIA DISTRICT

STANDARD PROJECT FLOOD HYDROGRAPHS

POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY
JUNE 1971

PLATE 2



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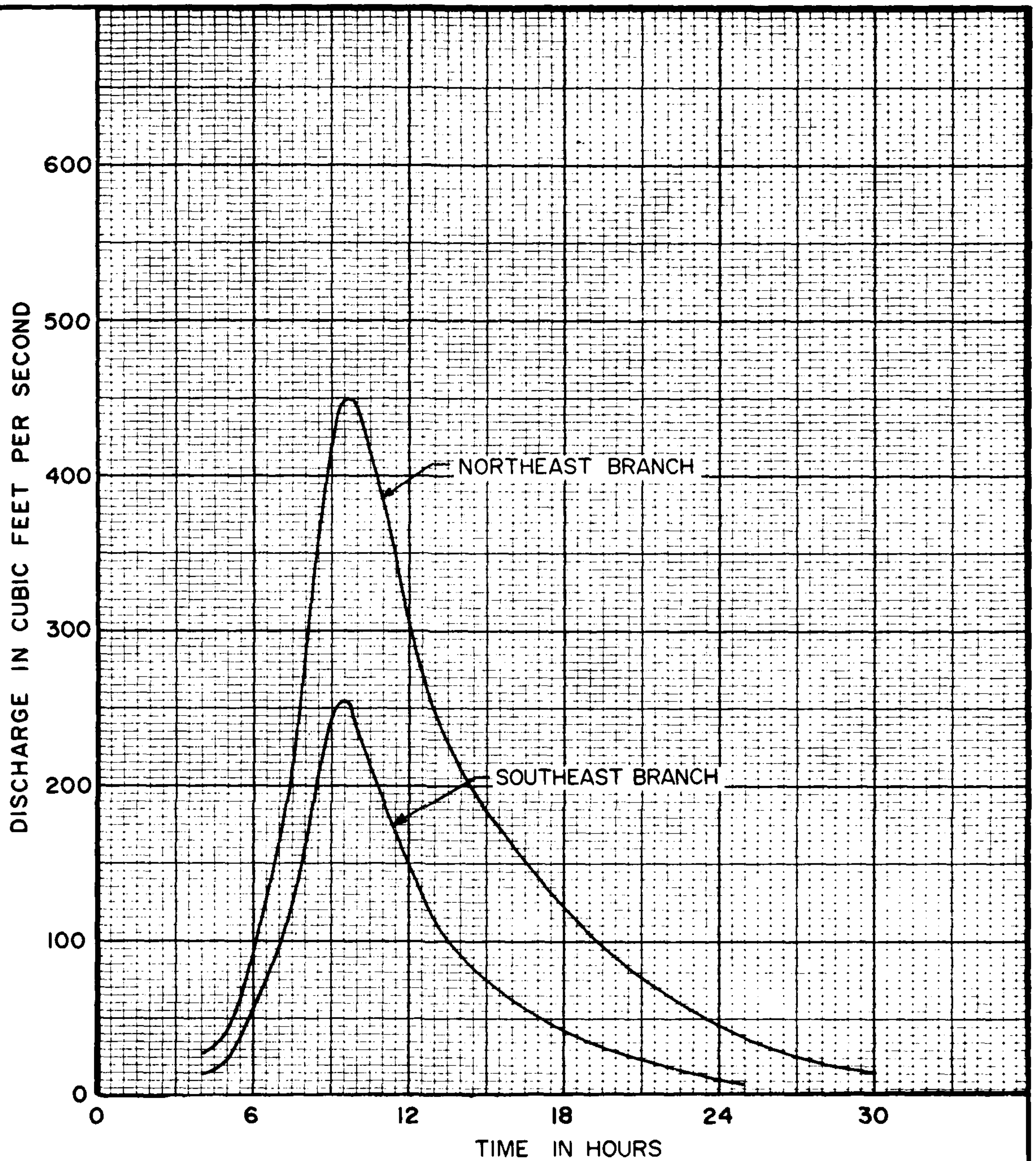
PHILADELPHIA DISTRICT

STANDARD PROJECT FLOOD
HYDROGRAPH

POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY

JUNE 1971

PLATE 3



CORPS OF ENGINEERS, U.S. ARMY
PHILADELPHIA DISTRICT

STANDARD PROJECT FLOOD HYDROGRAPHS

POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY
JUNE 1971

HAZARDS OF GREAT FLOODS

Hazardous conditions occur during floods as a result of the rapid rise of water, wind and water velocities. The hydrology of the study area involves two typical flooding conditions which generate flood hazards: fluvial flooding and tidal flooding. Fluvial flooding causes hazardous conditions by its characteristic high water velocities and by inundation when the stream overflows its banks. Inundation causes extensive damage from water and silt and is often a serious menace to health.

Tidal flooding presents the same general hazards as fluvial flooding. The high velocities of flood waters can damage and destroy bridges, embankments and paving; undermine and collapse buildings; and, pile up debris and transport sediment to slack water areas where damaging deposits are formed.

Hazards may also be produced by buildings, piers, and man-made land deflecting the normal currents against a formerly safe and unprotected opposite bank. Even though such structures may be protected in themselves, they may cause serious damage to the opposite bank and detrimental changes in the stream channel for some distance downstream. Other flood hazards not evident in an individual reach may be produced by causes outside the reach itself, such as the sudden release of water from upstream debris jams. Rising water can also cause short circuits in electrical systems resulting in fires destroying structures that might otherwise have been subject to only minor damage. Flood waters can also seriously hamper the operation of emergency vehicles such as fire engines and rescue vehicles.

AREAS FLOODED AND HEIGHTS OF FLOODING

The areas along the Main Stem, East and West Branches and their tributaries which would be flooded by the Standard Project and the Intermediate Regional Floods are shown on plates 6 through 8.

The elevation of flooding, shown on the cross sections, plates 9, 10 and 11, and the overflow areas, plates 6 through 8, have been determined with an accuracy consistent with the purposes of this study and the accuracy of the basic data as discussed on page 20.

Figure 6 on page 29 shows the heights that would be reached by future floods at selected sites along the stream.

VELOCITIES, RATES OF RISE AND DURATION

Water velocities during floods depend largely on the size and shape of the cross sections, condition of the stream, and the bed slope, all of which vary on different streams and at different locations on the same stream.

Results of the flood plain studies indicate that the peak discharge value of the Standard Project Flood for Pompeston Creek at Delaware River is 1,415 cubic feet per second and 1,225 cubic feet per second below the East - West Branch confluence.

The maximum velocities that would occur in the main channel and overbank areas would generally be less than 4 feet per second for the Intermediate Regional and the Standard Project Floods. Flood depths in excess of 3 feet in conjunction with velocities in excess of 3 feet per second are considered hazardous.

Figure 6.--FLOOD HEIGHTS ALONG POMPESTON CREEK

The arrows indicate the heights the Standard Project and the Intermediate Regional Floods would reach at the Lippincott Boat Works.

GLOSSARY OF TERMS

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 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 area, 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 stream flow, and other problems.

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

Flood Hazard Area Design Flood. A flood greater than the Floodway Design Flood that inundates the Floodway and additional portions of the flood plain. This area is known as the Flood Hazard Area. The Floodway (see Floodway Design Flood) is an integral part of the Flood Hazard Area. This flood is also used extensively by the State of New Jersey for planning purposes.

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 lowlands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water, which has 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 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.

Floodway Design Flood. A flood that inundates the channel and portions of the adjacent flood plain necessary for the reasonable passage of flood waters. This area is known as the Floodway and represents the minimum area of the flood plain required for passage of flood waters without aggravating flood conditions upstream or downstream. This flood is used extensively by the State of New Jersey for planning purposes. (See also: Flood Hazard Area Design Flood).

Head Loss. The loss of energy experienced by water flowing through a constriction such as a culvert, bridge or narrow channel, resulting in a drop in water surface elevation on the downstream side of the constriction.

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 stream flow 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.

Low Steel (or Underclearance). See "Underclearance".

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 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 basins. 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.

Underclearance. 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 "low steel" in some regions.

AUTHORITY, ACKNOWLEDGMENTS 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.

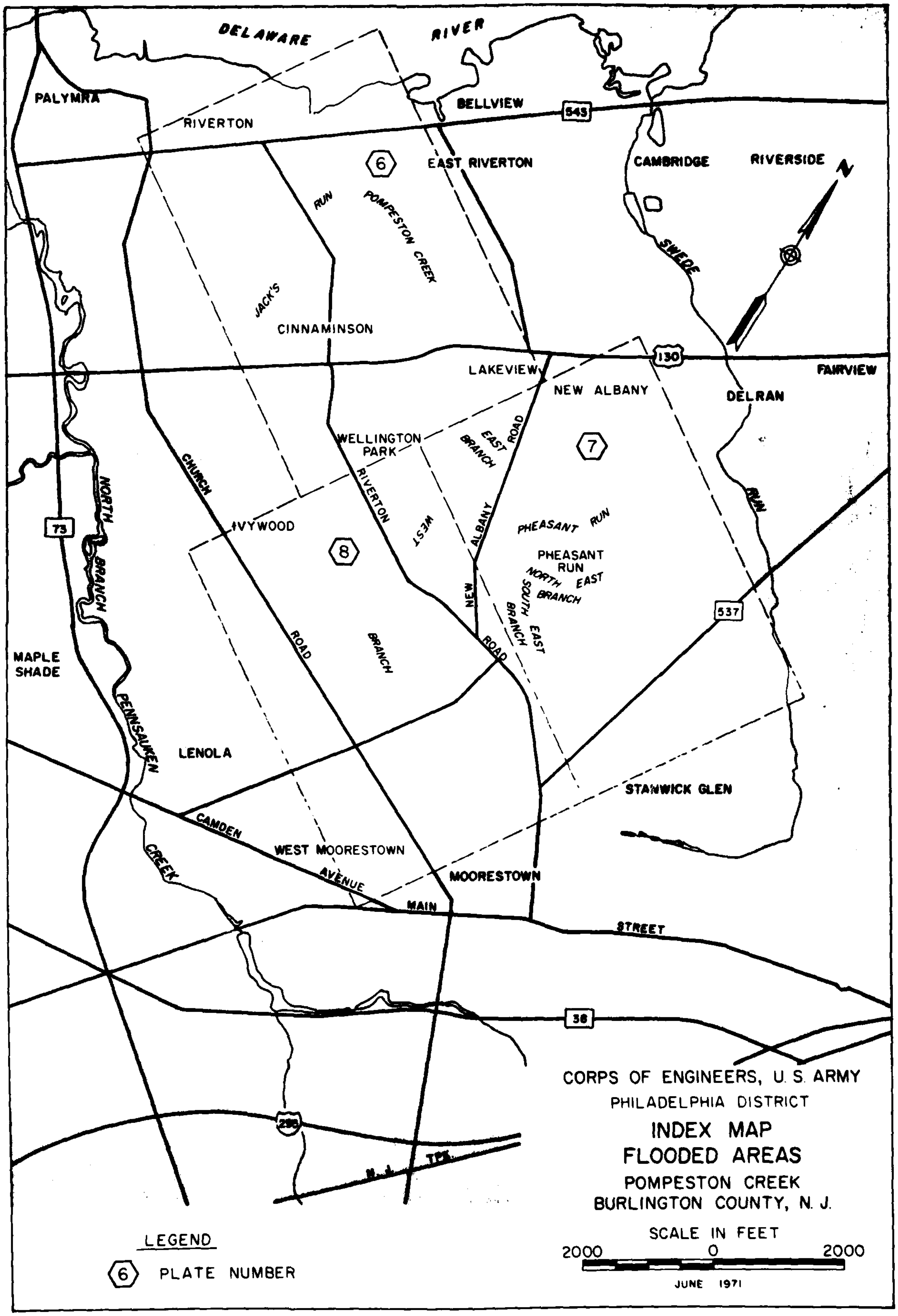
* * *

Assistance and cooperation of the U. S. Weather Bureau, U. S. Geological Survey, New Jersey Department of Environmental Protection, Burlington County Planning Board and private citizens in supplying useful data are appreciated.

* * *

This report presents the flood situation for Pompeston Creek and its tributaries in Burlington County, New Jersey. The Philadelphia District of the Corps of Engineers will, upon request, provide interpretation and limited technical assistance in application of data presented in this report.

* * *



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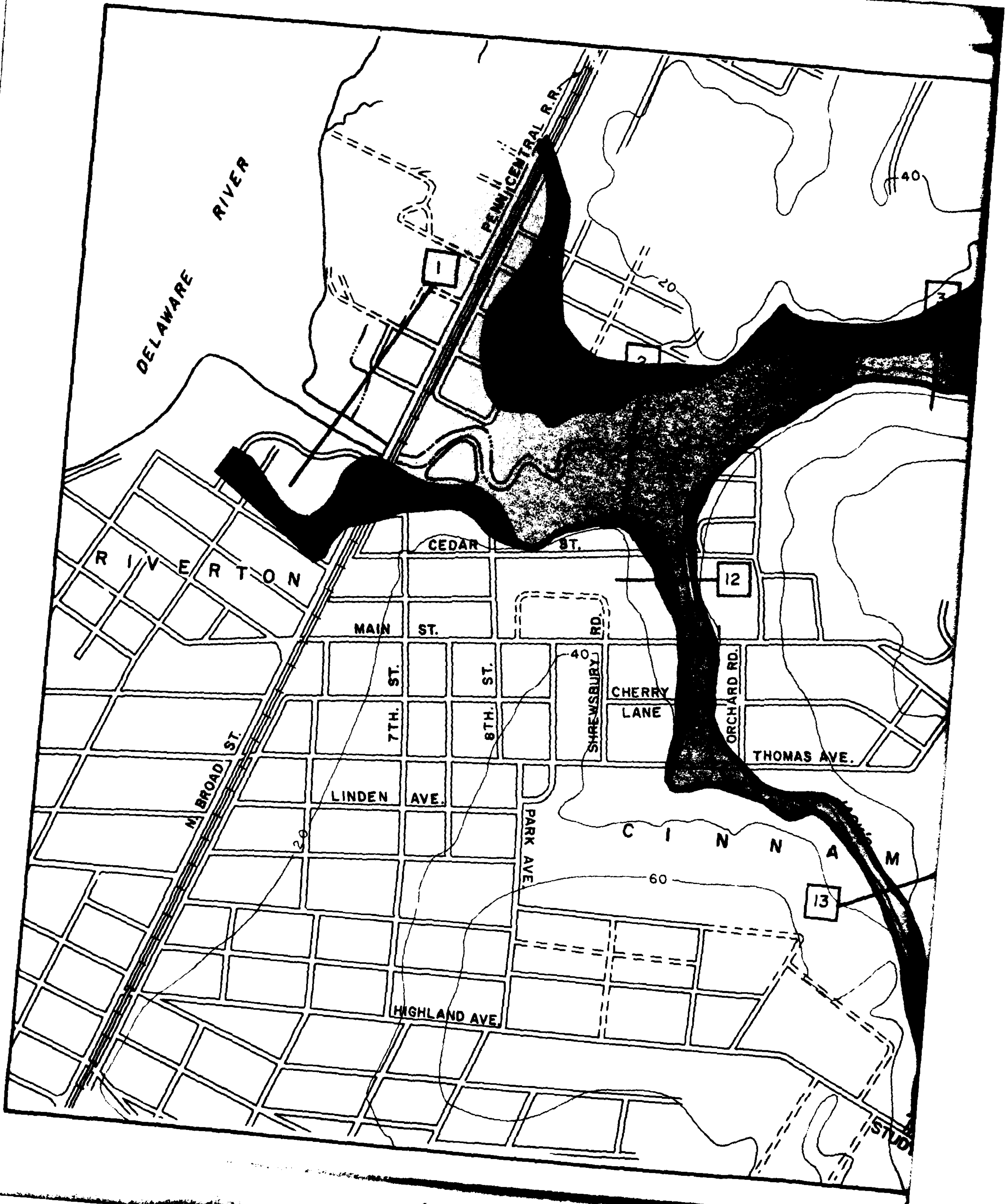
PHILADELPHIA DISTRICT

INDEX MAP
FLOODED AREAS
POMPESTON CREEK
BURLINGTON COUNTY, N. J.

SCALE IN FEET
2000 0 2000

JUNE 1971

LEGEND
(6) PLATE NUMBER


DELAWARE RIVER
PENN CENTRAL R.R.
1
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3
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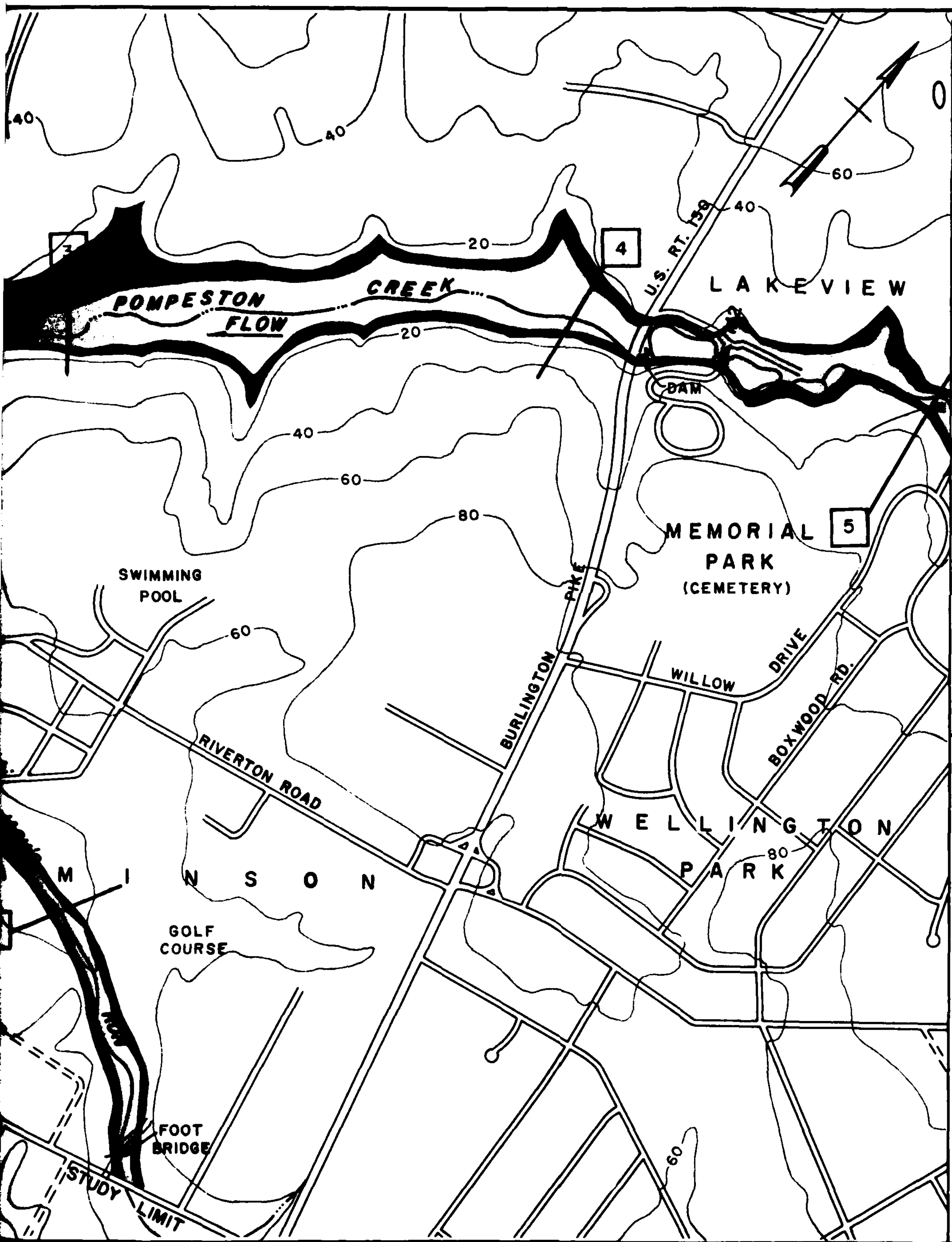
13
20
40
60
RIVERTON
CINNAM
CEDAR ST.
MAIN ST.
7TH. ST.
8TH. ST.
SHREWSBURY RD.
CHERRY LANE
ORCHARD RD.
THOMAS AVE.
N. BROAD ST.
LINDEN AVE.
PARK AVE.
HIGHLAND AVE.



M + 6

5

— 20 —

NOTES:

1. LIMITS ... MAY ... LOCAT... EXPLA...

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2

LEGEND

OVERFLOW LIMITS

- STANDARD PROJECT FLOOD
- INTERMEDIATE REGIONAL FLOOD
- M + 6 — MILES ABOVE MOUTH
- 5 — CROSS SECTION
- 20 — GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

NOTES:

1. LIMITS OF OVERFLOWS SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
2. MINIMUM CONTOUR INTERVAL IS 10 FEET.

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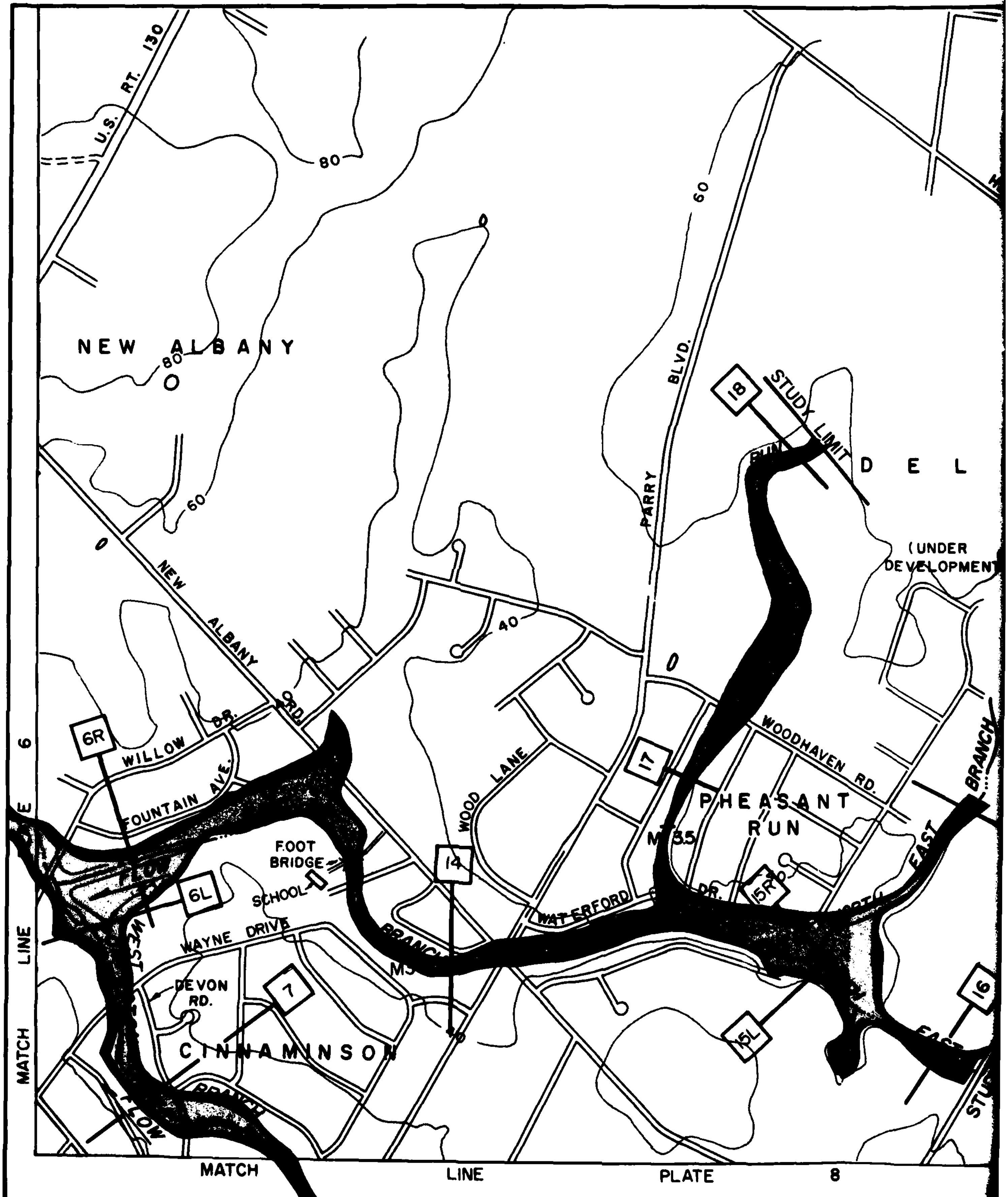
PHILADELPHIA DISTRICT

FLOODED AREAS
POMPESTON CREEK
BURLINGTON COUNTY
NEW JERSEY

SCALE IN FEET
0 800 1600

JUNE 1971


U.S. RT. 130
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NEW ALBANY
80
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NEW ALBANY RD.
PARRY BLVD.
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18
STUDY LIMIT
RUN
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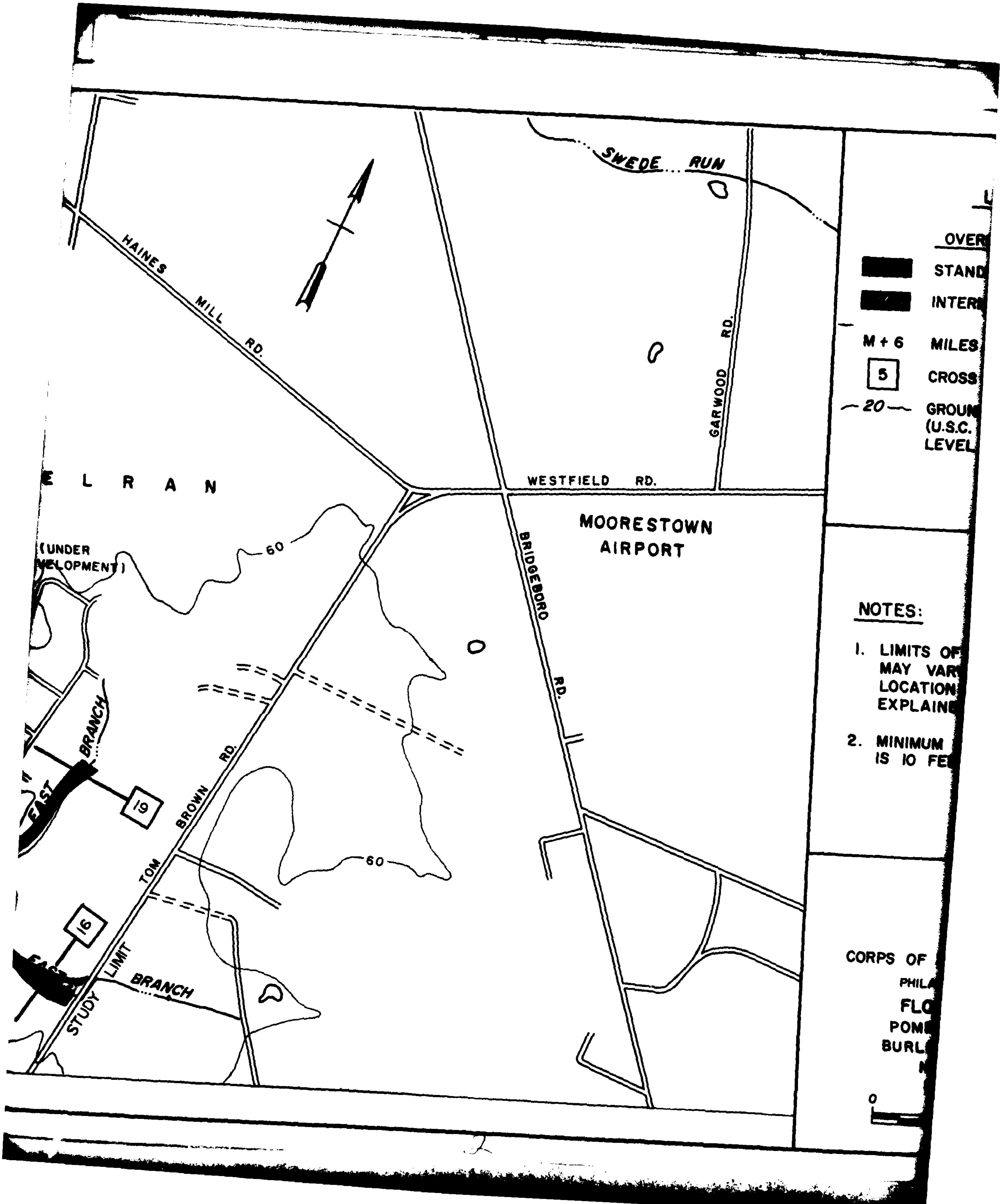
40
WOODHAVEN RD.
17
PHEASANT RUN
M 3.5
6R
WILLOW DR.
FOUNTAIN AVE.
FOOT BRIDGE
SCHOOL
6L
14
WOOD LANE
WATERFORD DR.
15R
EAST BRANCH
WAYNE DRIVE
DEVON RD.
7
CINNAMINSON
BRANCH
WEST
FLOW
15L
16
EAST
STU
MATCH LINE 6
MATCH LINE PLATE 8


SWEDE RUN
HAINES MILL RD.
GARWOOD RD.
WESTFIELD RD.
MOORESTOWN AIRPORT
BRIDGEBORO RD.
(UNDER
VELOPMENT)
60
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EAST
BRANCH
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STUDY LIMIT
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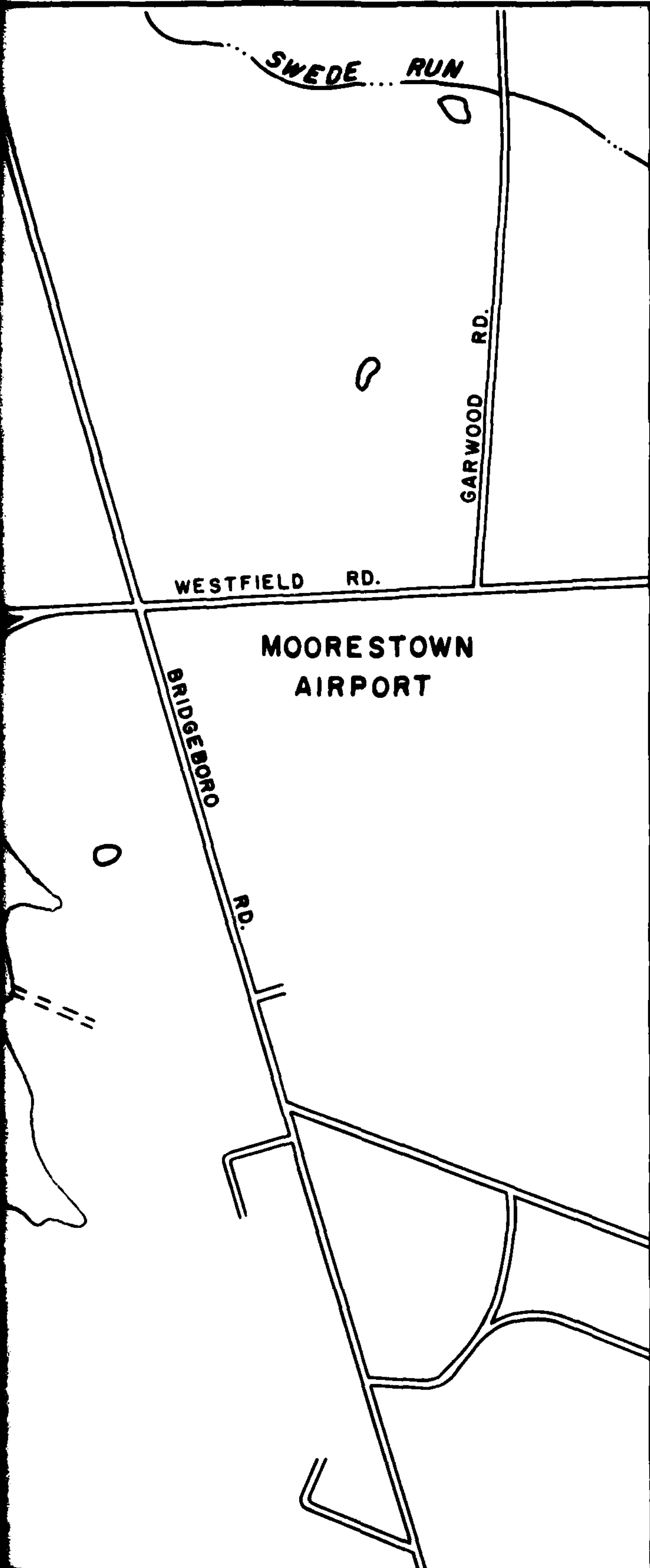

LEGEND

OVERFLOW LIMITS

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

M + 6 MILES ABOVE MOUTH

5 CROSS SECTION

20 GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

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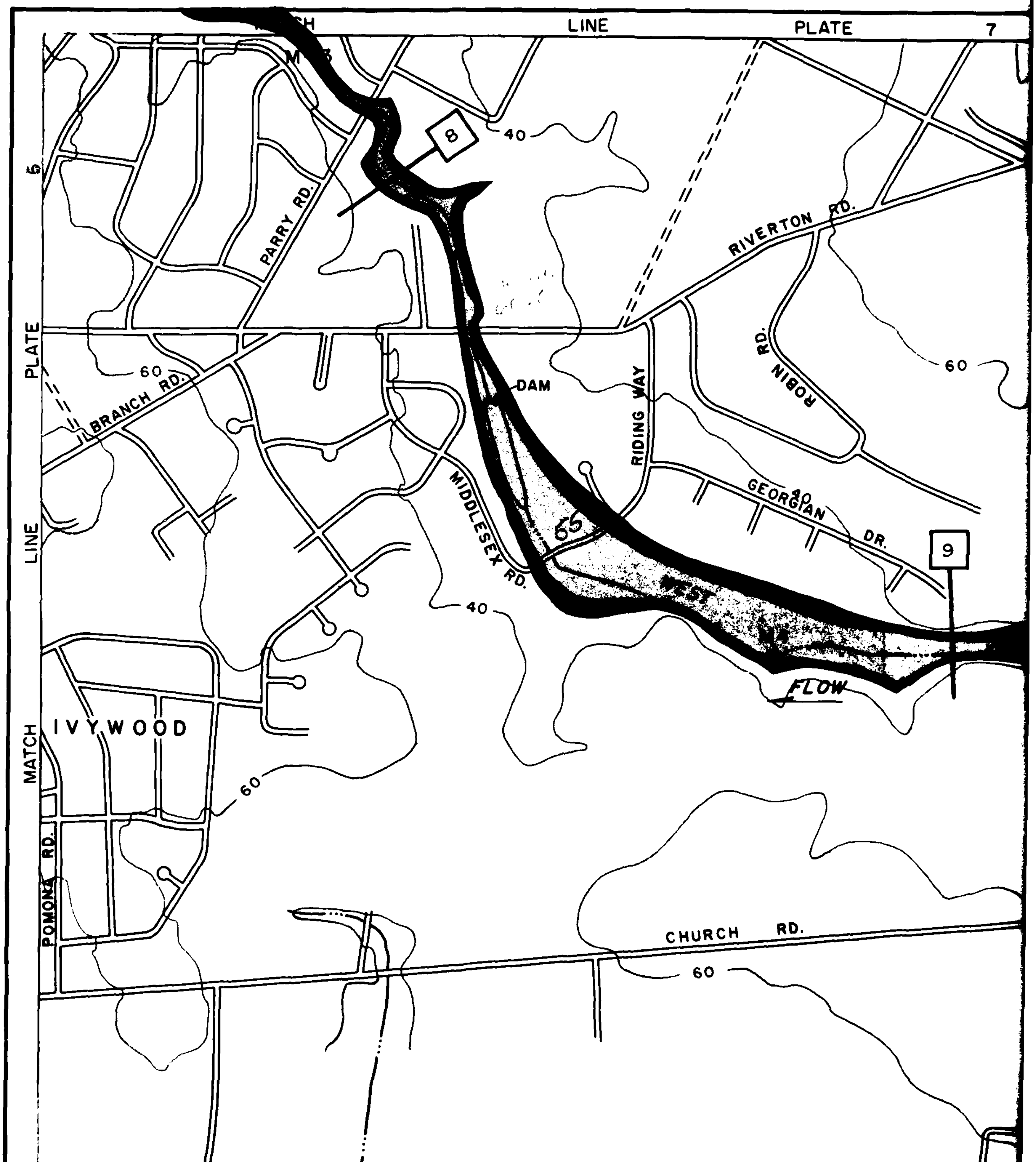
PHILADELPHIA DISTRICT

FLOODED AREAS
POMPESTON CREEK
BURLINGTON COUNTY
NEW JERSEY

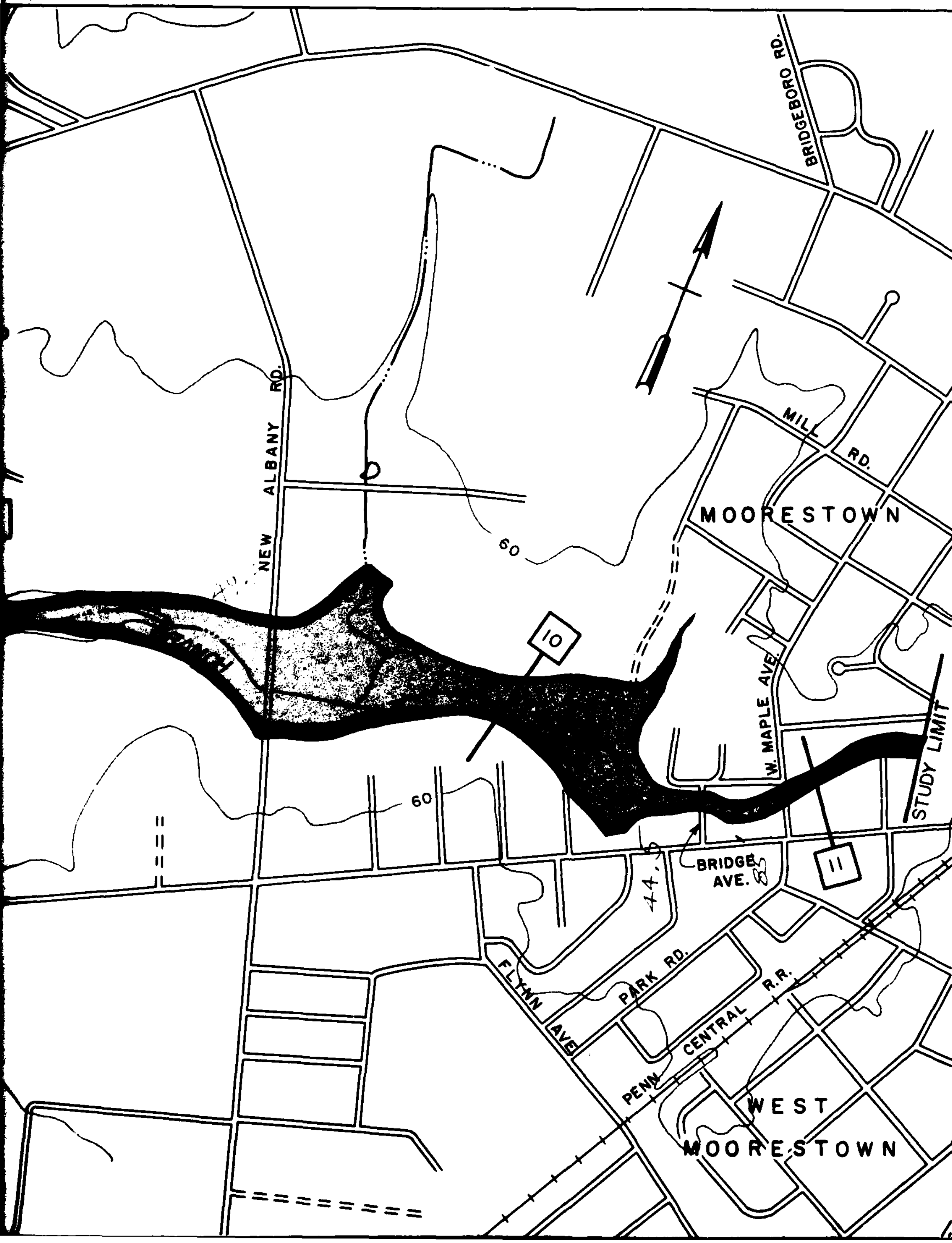
SCALE IN FEET
0 800 1600

JUNE 1971

PLATE 7


MATCH LINE PLATE 7
MATCH LINE PLATE 5
PARRY RD.
BRANCH RD.
RIVERTON RD.
ROBIN RD.
RIDING WAY
DAM
MIDDLESEX RD.
GEORGIAN DR.
FLOW
IVYWOOD
POMONA RD.
CHURCH RD.
8
9
40
60
65

7



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M + 6 MILES

5 CROSS

200 GROUND (U.S.C. & LEVEL

NOTES:

1. LIMITS OF MAY VARY LOCATION EXPLAINED

2. MINIMUM C IS 10 FEET

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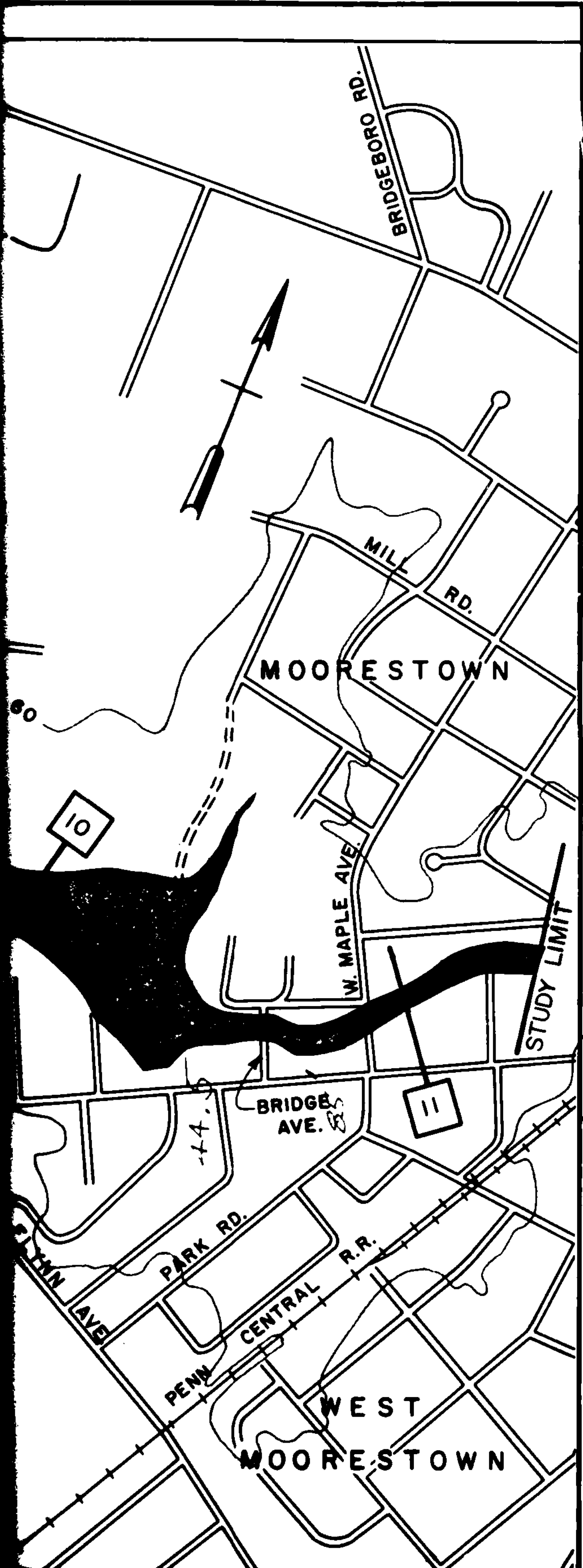

LEGEND

OVERFLOW LIMITS

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

M + 6 MILES ABOVE MOUTH

5 CROSS SECTION

200 GROUND ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM

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CORPS OF ENGINEERS, U.S. ARMY
PHILADELPHIA DISTRICT

FLOODED AREAS

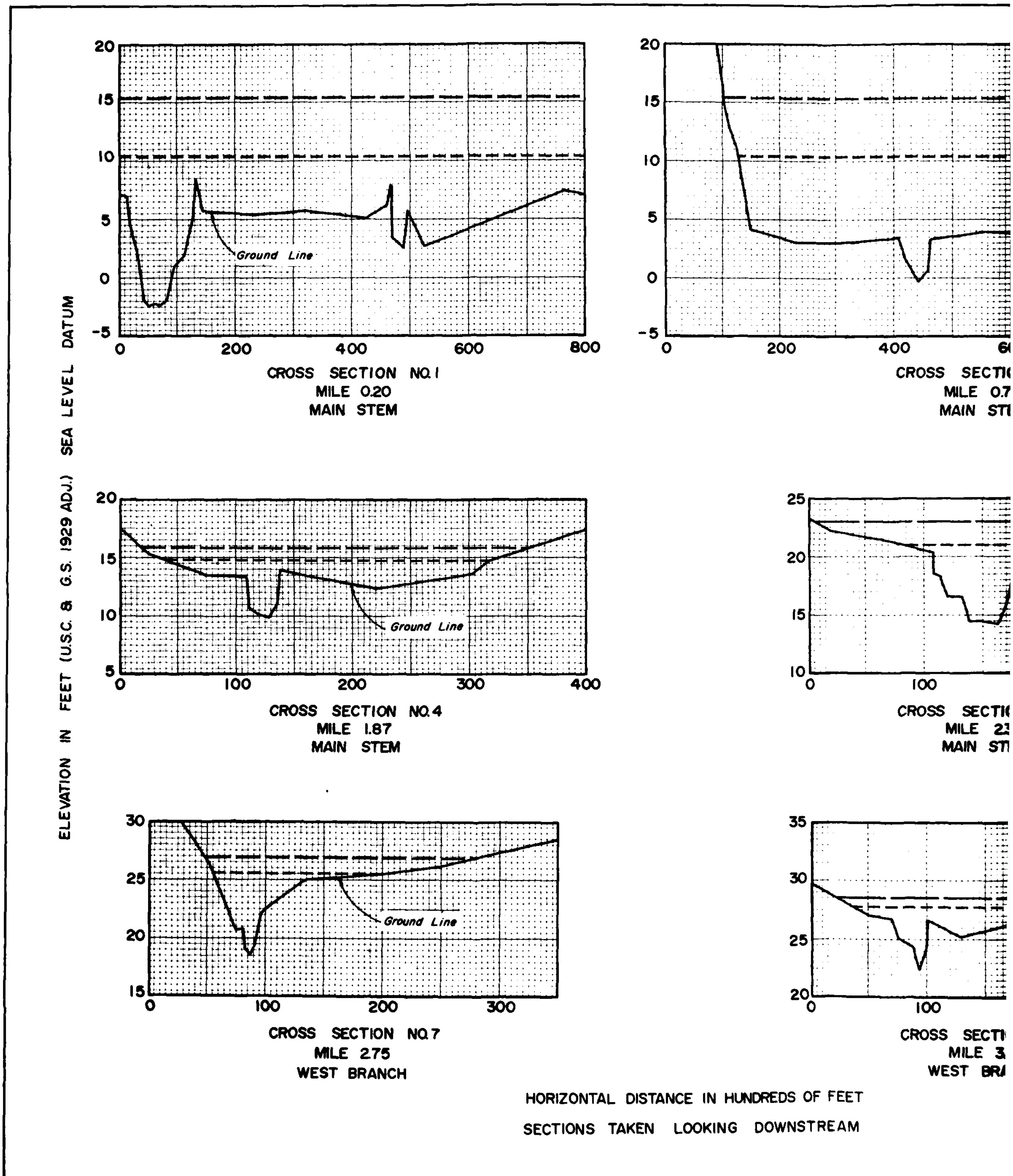
POMPESTON CREEK
BURLINGTON COUNTY
NEW JERSEY

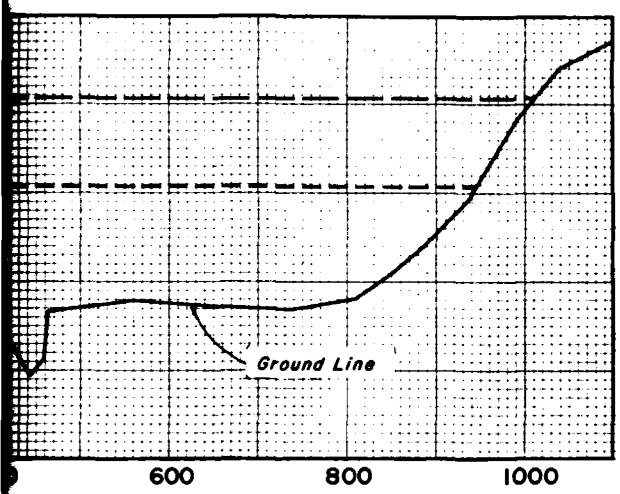
SCALE IN FEET

0 800 1600

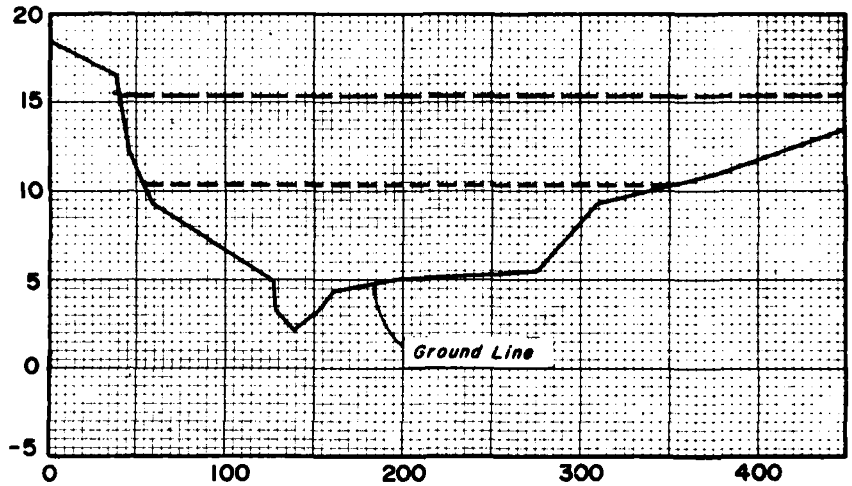
JUNE 1971

PLATE 8

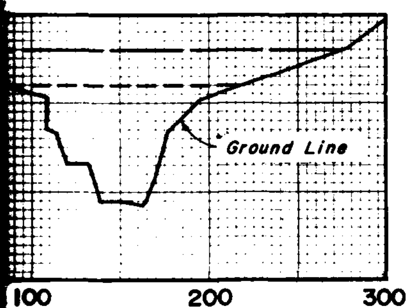

ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM
Ground Line
CROSS SECTION NO. 1
MILE 0.20
MAIN STEM
Ground Line
CROSS SECTION NO. 4
MILE 1.87
MAIN STEM
Ground Line
CROSS SECTION NO. 7
MILE 2.75
WEST BRANCH
HORIZONTAL DISTANCE IN HUNDREDS OF FEET
SECTIONS TAKEN LOOKING DOWNSTREAM



ROSS SECTION NO. 2
MILE 0.72
MAIN STEM



CROSS SECTION NO. 3
MILE 1.23
MAIN STEM



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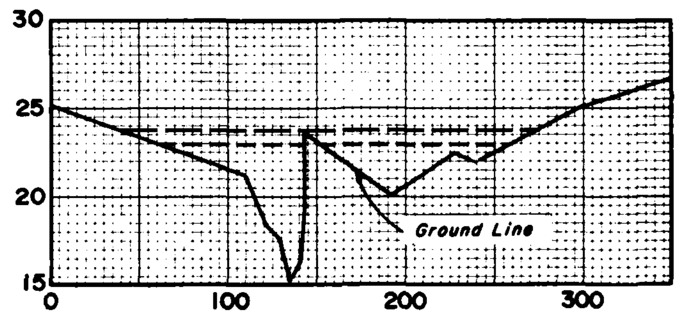
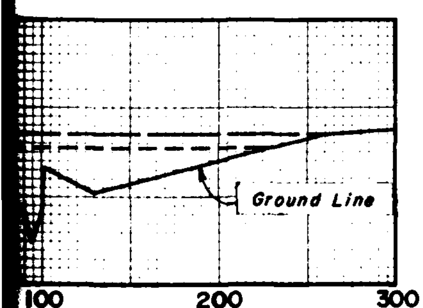
MILE 2.37
MAIN STEM



CROSS SECTION NO. 6L
MILE 2.56
WEST BRANCH



OSS SECTION NO. 8
MILE 3.20
WEST BRANCH

LEGEND

— — — STANDARD PROJECT FLOOD

- - - - INTERMEDIATE REGIONAL FLOOD

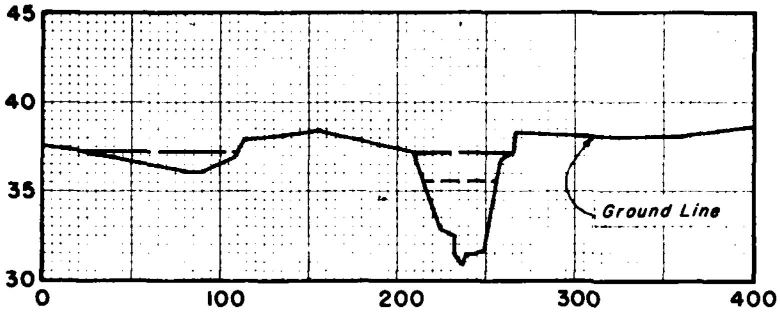
ALL SECTIONS SHOWN

CORPS OF ENGINEERS, U.S. ARMY
PHILADELPHIA DISTRICT

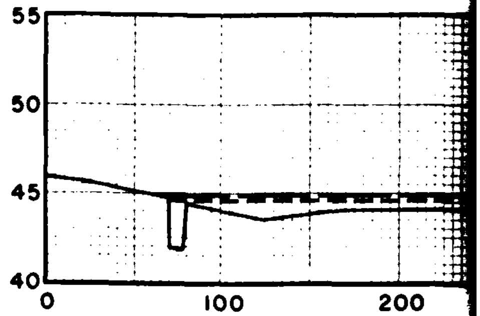
CROSS SECTIONS

POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY
JUNE 1971

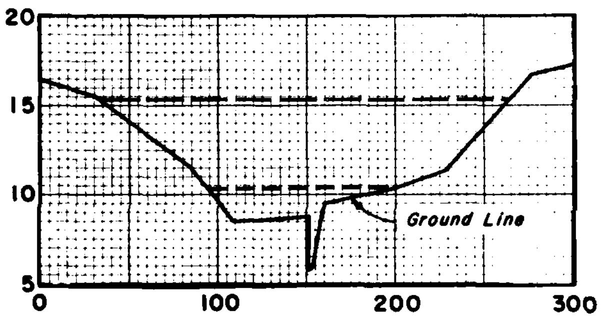
ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM



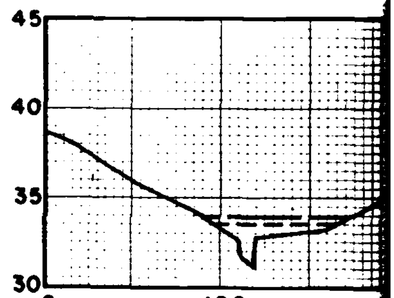
CROSS SECTION NO. 9
MILE 4.22
WEST BRANCH



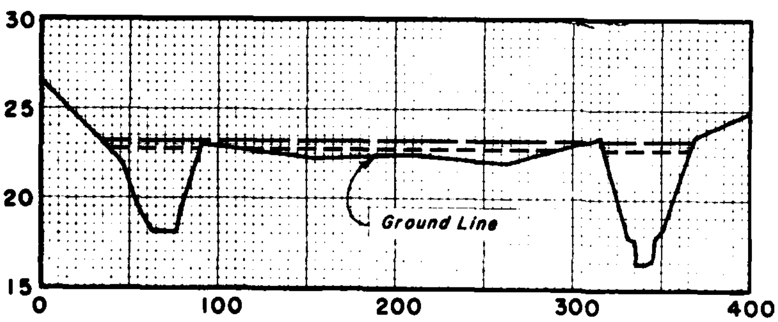
CROSS SECTION NO.
MILE 4.92
WEST BRANCH



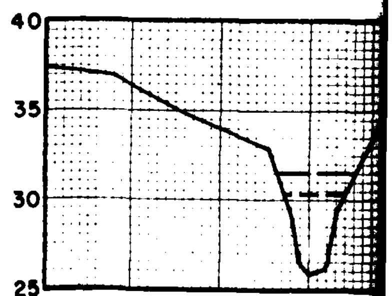
CROSS SECTION NO. 12
MILE 0.98
JACKS RUN



CROSS SECTION
MILE 1.4
JACKS RU

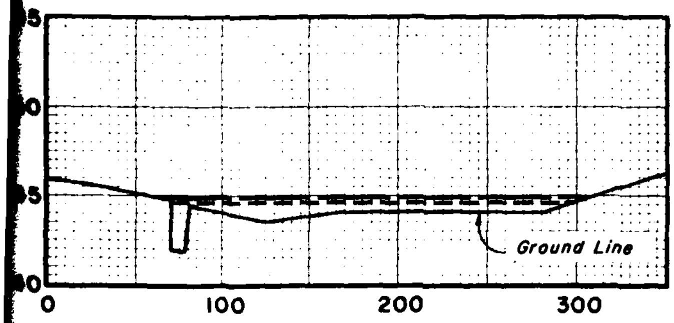


CROSS SECTION NO. 6(R)
MILE 2.52
EAST BRANCH



CROSS SECTION
MILE 3.
EAST BRA

HORIZONTAL DISTANCE IN FEET



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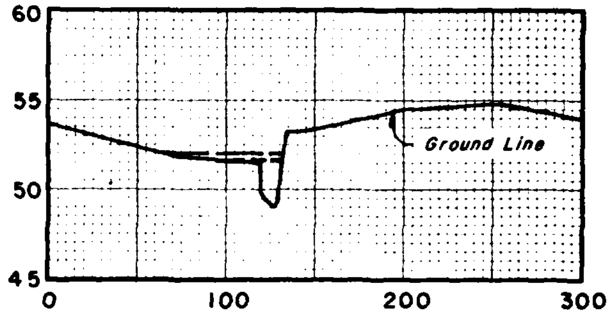
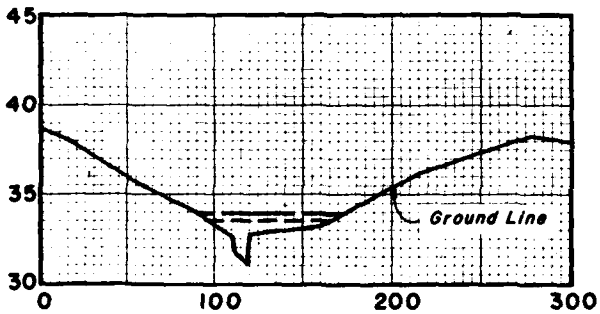
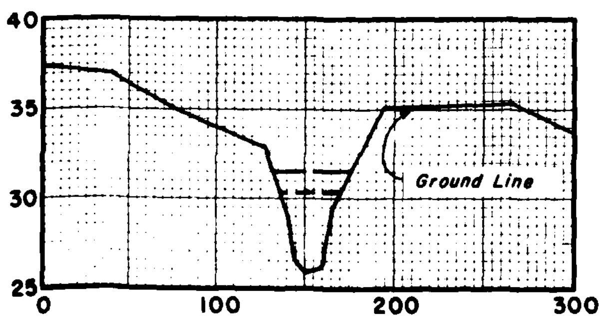
MILE 4.92
WEST BRANCH



CROSS SECTION NO. 11
MILE 5.38
WEST BRANCH



CROSS SECTION NO. 13
MILE 1.46
JACKS RUN



CROSS SECTION NO 14
MILE 3.01
EAST BRANCH

IN FEET

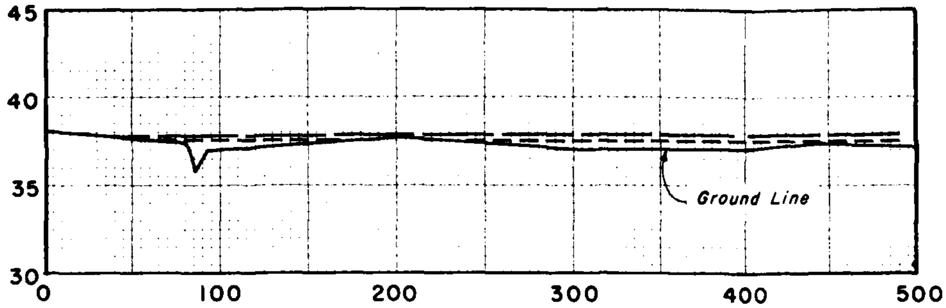
NOTE:
FOR LEGEND SEE PLATE 9

CORPS OF ENGINEERS, U. S. ARMY
PHILADELPHIA DISTRICT

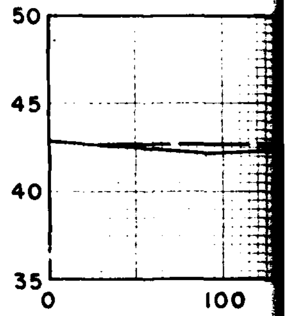
CROSS SECTIONS

POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY
JUNE 1971

ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ.) SEA LEVEL DATUM



CROSS SECTION NO. 15L
MILE 3.60
SOUTHEAST BRANCH



CR

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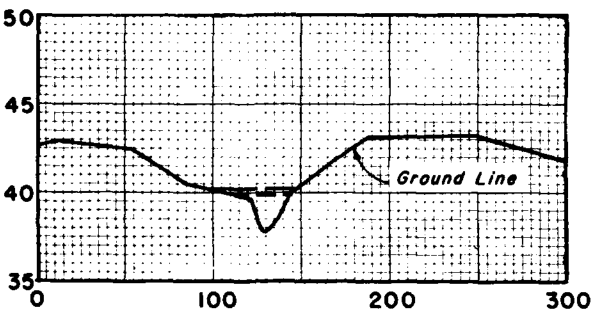
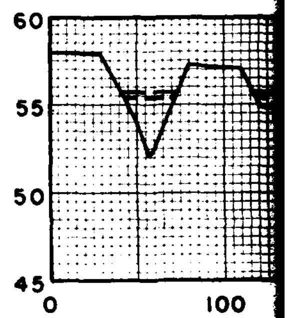


CROSS SECTION NO. 17
MILE 3.54
PHEASANT RUN



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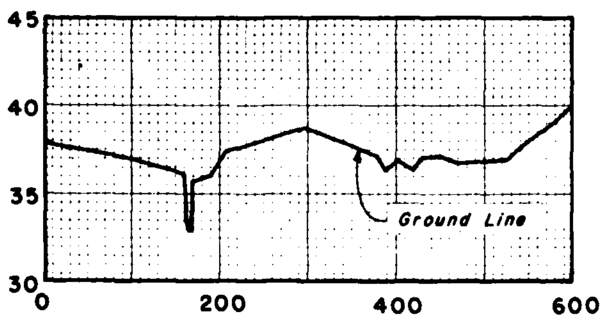
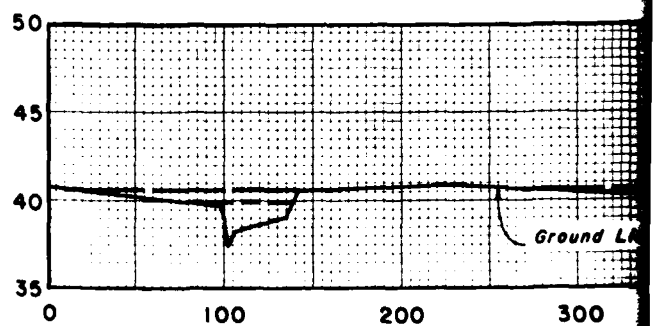
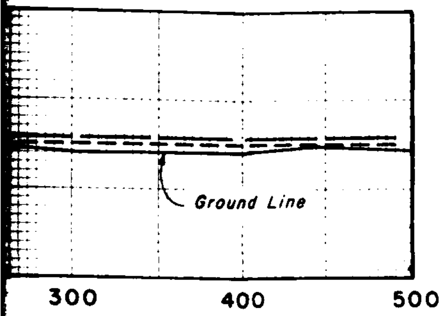


CROSS SECTION NO. 15(R)
MILE 3.60
NORTHEAST BRANCH

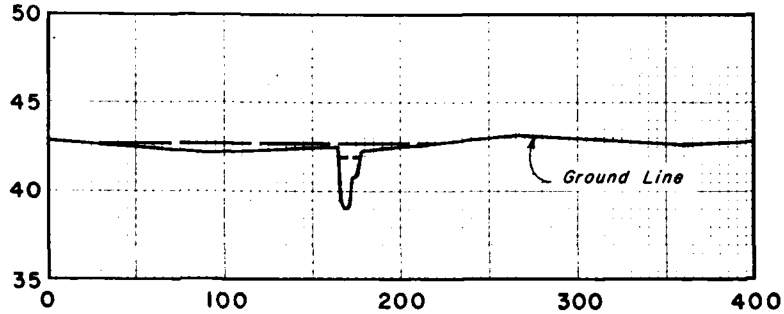


CROSS SECTION NO. 19
MILE 3.28
NORTHEAST BRANCH

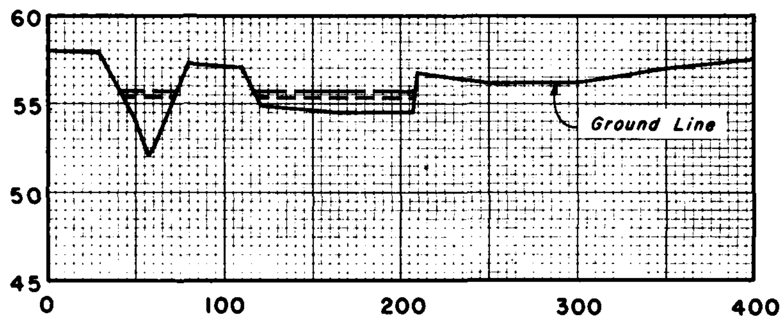
HORIZONTAL DISTANCE IN FEET



ON NO. 15L
.60
BRANCH

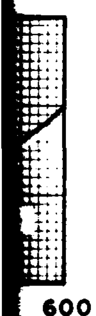


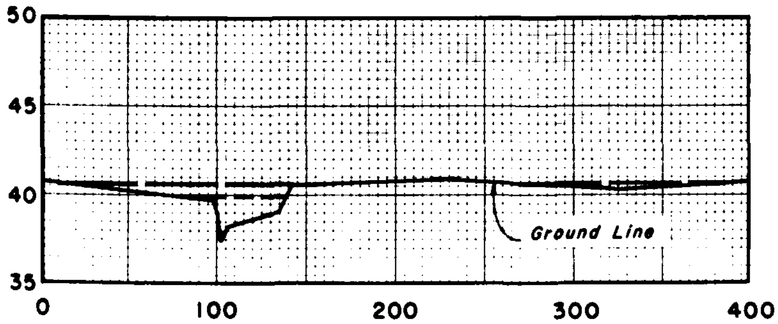
CROSS SECTION NO. 16
MILE 3.77
SOUTHEAST BRANCH



CROSS SECTION NO. 18
MILE 4.07
PHEASANT RUN

NOTE:
FOR LEGEND SEE PLATE 9





CROSS SECTION NO. 19
MILE 3.28
NORTHEAST BRANCH

ONTAL DISTANCE IN FEET

CORPS OF ENGINEERS, U. S. ARMY
PHILADELPHIA DISTRICT

CROSS SECTIONS
POMPESTON CREEK
BURLINGTON COUNTY, NEW JERSEY

JUNE 1971