AD-A099 845 ARMY ENGINEER DISTRICT PHILADELPHIA PA F/G 8/8
FLOOD PLAIN INFORMATION, LEHIGH RIVER, JORDAN CREEK, TROUT CREE--ETC(U)
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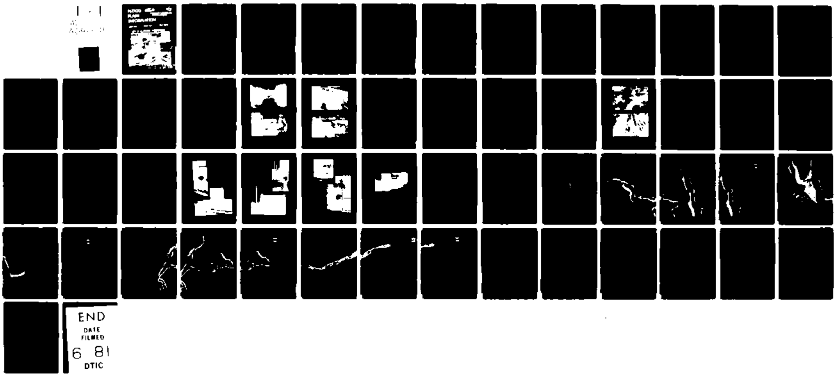

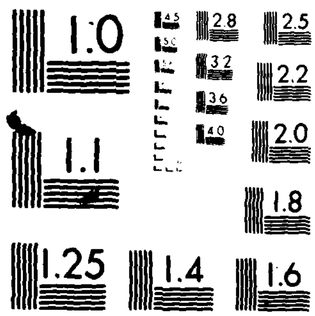

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TO THE REQUESTOR:

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

The portion of the City of Allentown, Pa. covered by this report (the first of 2 reports) is subject to flooding from the Lehigh River, Jordan Creek, Trout Creek and West Creeks. The properties on the flood plains along these streams are primarily residential and industrial.

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This report includes a history of flooding in Allentown, Pa and identifies those areas which are subject to possible future floods. Special emphasis is given to these possible future floods through maps, photographs, profiles and cross sections. While this report doesn't provide solutions it can aid in the identification of flood damage reduction techniques.

Under authority in Section 206 of the 1960 Flood Control Act as amended this report was prepared with governmental monies by U.S. Army Corps of Engineers Philadelphia District in response to the request of the Allentown City Planning Commission. This information should be considered of an historical nature. Since the publication of this FPI report, other Flood Insurance Studies have been undertaken and should also be consulted.

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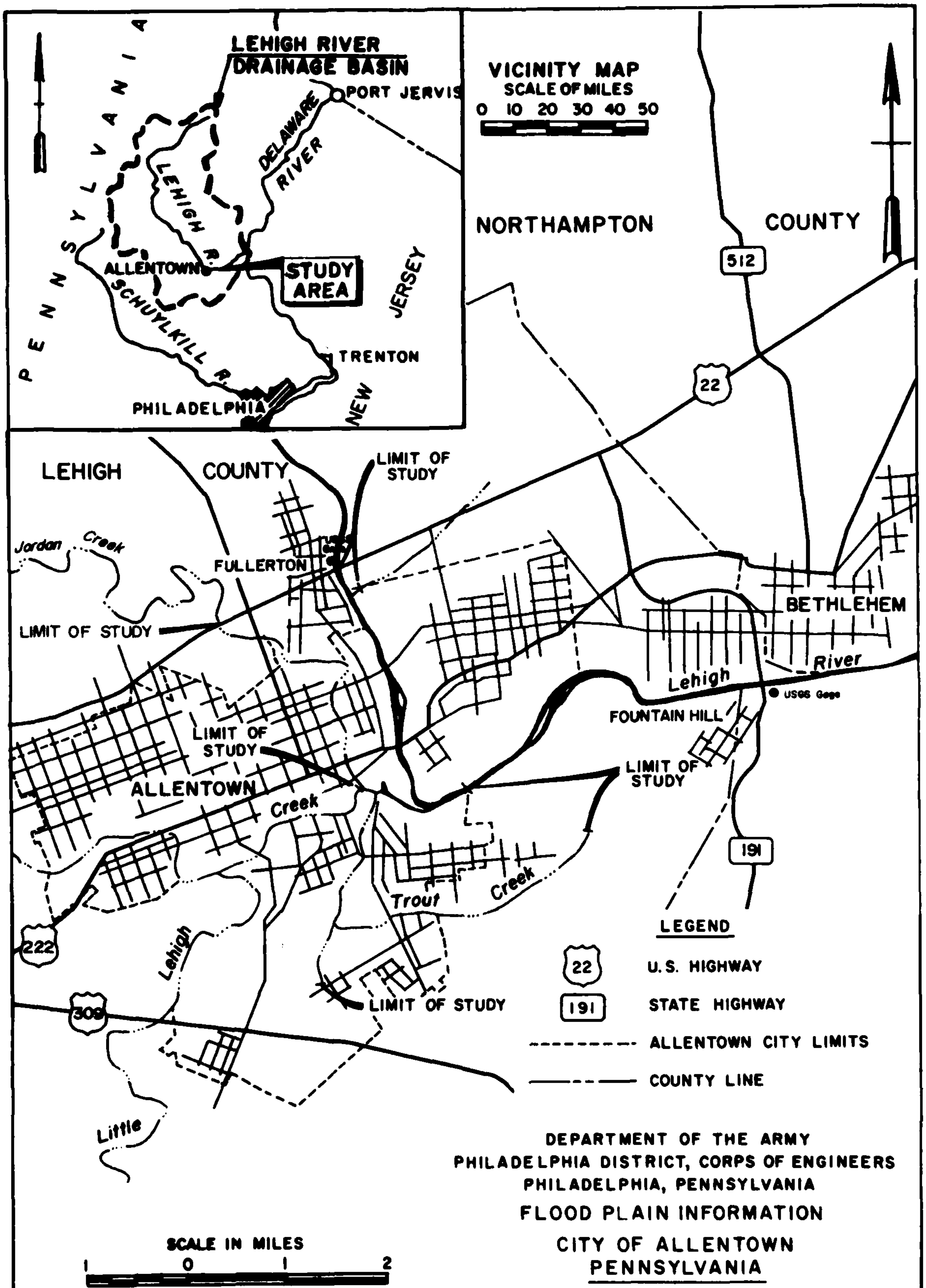


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA

GENERAL MAP

SEPTEMBER 1971

PLATE 1

PREFACE

The portion of the City of Allentown covered by this report, the first of two reports, is subject to flooding from the Lehigh River, Jordan Creek, Trout Creek and West Creek. The properties on the flood plains along these streams are primarily residential and industrial and have been severely damaged by the floods of 1955 and 1942. The open spaces in the flood plains which may come under pressure for future development are limited. Although large floods have occured in the past, studies indicate that even larger floods are possible.

This report has been prepared because a knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. It includes a history of flooding in Allentown and identifies those areas that are subject to possible future floods. Special emphasis is given to these 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 other flood damage reduction techniques such as works to modify flooding and adjustments including flood proofing which 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.

Under the continuing authority provided in Section 206 of the 1960 Flood Control Act as amended, this report was prepared in response to the request of the Allentown City Planning Commission. The Planning Commission will make information available to all interested agencies and individuals. Upon further request, the Corps of Engineers, Philadelphia District Office, 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

In 1735 William Allen purchased a tract of land on a broad plateau marked by the confluence of three streams. The Lehigh River gave access to the south while Cedar and Jordan Creeks gave access to the west and north, respectively. His settlement was called Northampton Town until 1811 when it was incorporated and renamed Allentown. The following year it became the seat of Lehigh County. Allentown expanded stead 'y owing its prosperity to the rich mineral deposits and fertile farm land of the surrounding country. In order to improve its transportation from its inland location, construction of a canal system was started in 1827 and locations in the flood plain along waterways were intensely developed. After the storm of 1862 which damaged the canal, railroads came into their own and development proceeded throughout the Lehigh Valley. With the construction of highways connecting other cities in all directions, Allentown expanded into an industrial center surpassed only by Philadelphia and Pittsburgh in Pennsylvania. The City of Allentown is also now noted as the retail center for the entire Lehigh Valley.

The Stream and Its Valley

The Lehigh River, with a total drainage area of 1,370 square miles, is a major tributary of the Delaware River. Rising in the Pocono Plateau of Wayne County, it drains portions of nine northeastern Pennsylvania counties. Above Lehigh Gap, the Lehigh River flows swiftly through high bordering hills. Below the Lehigh Gap, the fall of the river is more gradual. Above the City of Allentown, the average slope of the river is 6.5 feet per mile. Below Allentown to the City of Easton, the Lehigh River loses 68 feet in elevation in 16.5 miles of length for an average slope of 4.0 feet per mile.

Those sections of Lehigh River and its tributaries, Jordan, Trout and West Creeks, included in this study are shown on the general map. Lehigh River flows through the City of Allentown in a horseshoe-shaped fashion toward the south and winding its way around to the northeast toward Easton, Pennsylvania. Jordan Creek, with a drainage area of 88.0 square miles flows generally toward the southeast emptying into Little Lehigh Creek a short distance from the confluence with Lehigh River. The stream slope within the 2.9 mile study area falls 30 feet or 10 feet per mile. Trout Creek and its small tributary, West Creek, with a total drainage area of 8 square miles, flows first westerly then changes direction abruptly toward the north emptying into Little Lehigh Creek a short distance downstream from the junction of Jordan Creek and Little Lehigh Creek. In its 4.8 mile study reach, Trout Creek falls approximately 60 feet per mile. Drainage areas contributing to runoff at locations in or near the study area are shown in Table 1.

TABLE 1
DRAINAGE AREAS

Location	Drainage area sq. mi.
Lehigh River at Easton	1,370
Lehigh River, U.S.G.S. Gage at Bethlehem	1,279
Lehigh River, Above Little Lehigh Creek	1,034
Lehigh River, Hamilton St. Bridge	1,033
Little Lehigh Creek	188
Jordan Creek	81
Trout Creek	8

The climate is characterized by moderately warm summers, when temperatures may rise above 85 degrees, and cool winters, when temperatures reach below 20 degrees with an annual average temperature of 50 degrees. Annual precipitation over the basin averages 41 inches with a major portion occurring in spring and fall of the year.

Developments in the Flood Plain

The flood plain of Lehigh River is narrow and developed with industry. There are several islands in the City of Allentown of which only Adam's Island and Kline's Island are developed. The only dam on the Lehigh River within the study area is located north of the Hamilton Street bridge. It was constructed in 1827 to supply water for the Lehigh coal navigation canal. The canal parallels the Lehigh River from the dam to its confluence with the Delaware River at Easton.

There are a number of industrial firms located on or near the flood plain of Jordan Creek. Between the Fifth Street and Seventh Street bridges, the flood plains have been developed into a park. There are three small dams on Jordan Creek within the park and two more dams upstream of the Seventh Street bridge. The dams are all of similar construction and are the low-flow type having no storage capacity. United States Geological Survey has maintained a stream gaging station at the dam upstream of the Seventh Street bridge since 1944.

The lower end of Trout Creek is lined with industrial and commercial firms. The upper reaches of Trout Creek flow through a residential area with much of the flood plain in this area developed for park purposes.

The flood plains within the City of Allentown include residential, commercial and industrial development. Railroads, highways, streets, utility lines, production facilities and a sewage treatment plant would be subject to flooding. The flood plains of Allentown are almost fully developed and future urban expansion is not likely. However, urban expansion has and will probably continue to extend to suburban areas adjacent to Allentown.

FLOOD SITUATION

Data Sources and Records

The City of Allentown and the National Weather Service has maintained stream gages on the Lehigh River. The U.S. Geological Survey has a stream gage at Bethlehem, Pennsylvania, which has been in operation since September 1902. A stream gaging station has been maintained by U.S. Geological Survey on Jordan Creek since October 1944. This gage is located about 100 feet upstream of the Seventh Street bridge.

To supplement the records at the gaging stations, newspaper files, historical documents and records were searched for information concerning past floods. These records have developed a knowledge of floods which have occurred on Lehigh River and Jordan Creek.

Maps prepared for this report were based on U.S. Geological Survey quadrangle sheet entitled "Allentown East, Pennsylvania," dated 1964. Structural data on bridges and culverts were obtained by field surveys performed by Corps of Engineers, Philadelphia District, personnel.

Crest stages and discharges for known floods at the gaging stations on Lehigh River at the Hamilton Street bridge and Jordan Creek in Allentown, Pennsylvania, are shown in Tables 2 and 3. The discharges and stages of the floods prior to 1970 would be substantially lowered at the present time due to Francis E. Walter and Beltzville Dams which are now in operation.

TABLE 2
FLOOD CREST ELEVATIONS
Lehigh River at Hamilton Street Bridge

Date of Crest	Estimated Peak Discharge cfs	Stage[a]	Elevation[b]
August 19, 1955	84,900	22.5	257.0
May 23, 1942	80,500	21.9	256.4
March 12, 1936	49,200	17.7	252.2
November 25, 1950	41,340	17.0	251.5

(a) Overbank flooding begins at a stage of 11.5 feet
(b) Feet, mean sea level datum.

TABLE 3
FLOOD CREST ELEVATIONS
Jordan Creek at Allentown, Pennsylvania

Date of Crest	Estimated Peak Discharge cfs	Stage[a]	Elevation[b]
August 19, 1955	9,520	8.0	267.8
September 13, 1960	2,820	6.0	265.9
March 12, 1962[c]	3,180	6.2	266.0
February 18, 1965[c]	5,720	7.3	267.1

(a) Overbank flooding begins at a stage of 5.5 feet.
(b) Feet, mean sea level datum. Elevations are based on gage height of 259.8 feet.
(c) Based on high water marks near gaging station.

Flood Season and Flood Characteristics

Major floods have occurred in the study reaches of Lehigh River, Jordan Creek, Trout Creek and West Creek during all seasons of the year with the greatest recorded flood occurring in August 1955. Floodflow stages can rise from normal flow to extreme flood peaks in a relatively short period of time with high velocities in the main channel of the streams.

The precipitation in the August 1955 hurricane and May 1942 storm consisted entirely of rainfall. In addition to floods caused by runoff from general rainfall, the Lehigh River Valley is susceptible to hurricane activity and floods from snowmelt in combination with rainfall.

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. Representative obstructions to floodflows are shown in Figures 1 through 4.

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 floodflow increases, 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 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.

The dam upstream of Hamilton Street on Lehigh River and the five dams on Jordan Creek have no flood control capacities nor will they seriously alter flow characteristics of floodwaters.

Lehigh River, Jordan Creek, Trout Creek and West Creek are spanned 51 times by bridges and culverts. Pertinent information on all bridges and culverts can be found in Table 6 on Pages 18 and 19. Many of these bridges are obstructive to Floodflows.

Flood damage reduction measures - In 1961 the Corps of Engineers completed a flood control project at Allentown, Pennsylvania. The flood protection work located on the right bank of Lehigh River consists of a low levee, 750 feet long, on a relatively high bank at the upstream end of the project. There is a concrete flood wall extending 204 feet upstream from the old Hamilton Street bridge abutment and a short levee spanning the 69 feet between the abutments of the old and new Hamilton Street bridges. Continuing downstream from the new bridge, there is a levee for 1,125 feet that abuts into the existing Kline's Island levee. A levee or training dike approximately 1,300 feet long was constructed around a sharp bend to reduce backwater stages in the Little Lehigh River. In addition to the structures, the local flood protection included a straightened and deepened main channel, 8,280 feet in length, with graded banks revetted as needed. The City of Allentown is responsible for the maintenance of levees and channels and necessary work has been performed as required.

There are two U.S. Army Corps of Engineers Dams in operation in the Lehigh River Basin: Francis E. Walter Dam, located about 55 miles above Allentown, Pennsylvania, on the Lehigh River and Beltzville Lake, located about 24 miles above Allentown, Pennsylvania, on Pohopoco Creek, a tributary to the Lehigh River. The Flood Control Act of 1962 authorized the construction of the Trexler Lake on Jordan Creek which is currently in the design stage. All three projects are designed for flood control and low flow augmentation. Beltzville Lake and Trexler Lake will also be used for water supply.

There are no existing city or county zoning ordinances, building codes, or other regulatory measures specifically for the reduction of flood damages. This study has been requested so that it may be used as a basis for the development of flood plain management regulatory measures that are to be included in the Comprehensive Plan and Zoning Ordinance which is presently being revised.

Other factors and their impacts - The majority of the inundated area at Allentown has been along the banks of Jordan Creek and Little Lehigh Creek near their confluence due largely to the compounded backwater influence of the Lehigh River at high stages. When high runoff from the tributaries has occurred during these periods of high stages at Lehigh River, it has aggravated the flooding by increasing the height and duration of the river's back-water effects. Flooding and threats of flooding promote action by local officials in flood warning and flood fighting activities. Materials stored in the flood plain loom as another adverse factor during floodflows.

Flood warning and forecasting - The National Oceanic and Atmospheric Administration (NOAA) maintains year-round surveillance of weather conditions at Allentown, Pennsylvania. Flood warnings and anticipated weather conditions are issued by the National Weather Service to city officials, radio and television stations and the local press media for further dissemination to residents of the area. Flood warning for the Lehigh River and Jordan Creek within the City of Allentown is carried out by the Department of Operations and Public Safety working with Civil Defense agencies. When the National Weather Service's forecasts indicate high water stages could be expected, observations of river stages are made at strategic locations.

Flood fighting and emergency evacuation plans - Although there are no formal flood fighting or emergency evacuation plans for the Allentown area, provisions for alerting area residents and coordinating operations of city and county public service agencies in time of emergency are accomplished through the Lehigh County Civil Defense Office. This office maintains communication with the State Civil Defense Headquarters National Weather Service at its control center and establishes a "flood watch" during the earliest stages of a flood threat.Inhabitants of Adam's Island and industries along the river are warned by telephone of approaching flood conditions and advised to evacuate the area. Subsequent flood fighting, evacuation, and rescue activities are coordinated on a county-wide basis with local public agencies.

Material storage on the flood plain - Due to the intense industrial development along the Lehigh River and Jordan Creek, there are large quantities of floatable materials stored on flood plain lands. In addition, Allentown is a major rail center with materials being handled and transshipped on tracks which are subject to inundation by floods. Much of the material handled is floatable such as lumber, crates and large volume lightweight containers. In addition, throughout the area there are many storage tanks and containers which may be unrestrained and buoyant. During time of floods, these floatable materials may be carried away by floodflows causing serious damage to structures downstream and could clog bridge openings creating more hazardous flooding problems.

FIGURE 1 - Debris and overgrowth partially clog a Lehigh Valley Railroad bridge across Jordan Creek.

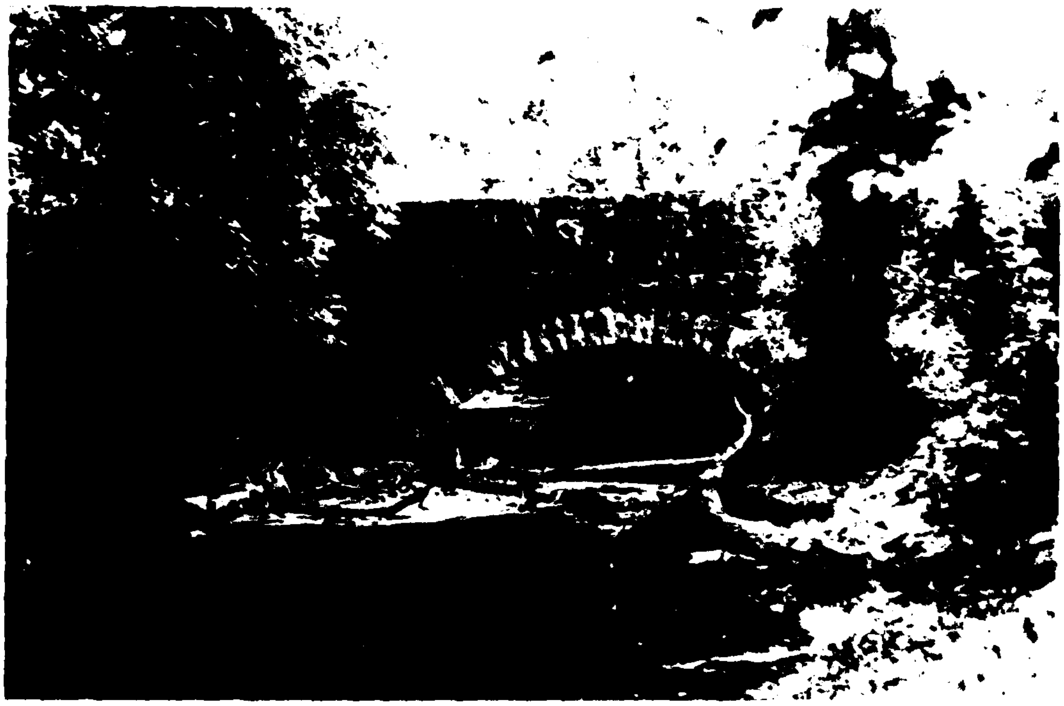


FIGURE 2 - Debris gathers at the City incinerator road bridge across Trout Creek.

FIGURE 3 - Auburn Street bridge across Trout Creek is a common place for the gathering of debris.

FIGURE 4 - Vegetation obstructs the channel upstream of a box culvert across Trout Creek. Culvert is located in the vicinity of 4th and Brookdale Streets.

PAST FLOODS

Summary of Historical Floods

Damaging floods have been reported to have occurred in the Allentown area as early as 1841. Floods causing significant damage are described to have occurred in 1841, 1862, 1902, 1936, 1942, 1950, 1952, 1955 and 1970. Among these, the August 19, 1955, flood was the highest of record on the Lehigh River and Jordan Creek. The floods of March 2, 1902, and June 5, 1862, were reported to have produced very high stages; however, little data is available concerning their severity.

Flood Records

Information on historical floods in the Allentown area was obtained from stream gaging stations maintained by the U.S. Geological Survey at a number of locations within the Lehigh River watershed at or near Allentown. There are no streamflow records for Trout Creek or West Creek. The stream gage located at the Hamilton Street bridge on the Lehigh River has been in existence since 1911. High water marks of past floods were obtained, residents along the stream were interviewed and newspaper files and historical documents were searched for information concerning past floods.

Flood Descriptions

The following are descriptions of known large floods that have occurred in the vicinity of Allentown, Pennsylvania:

EXCERPTS FROM THE LEHIGH BULLETIN, 23 JANUARY 1841 [a]

The freshet in the Big Lehigh was tremendous. The water was about twenty feet above low-water mark below the dam, and was about three feet above the highest point on the Big Island. Such a flood is not recollected by our oldest inhabitants. Our excellent bridge over the Big Lehigh and toll-house are gone.

The storehouses have been considerably injured at the basin, and several of our merchants, in not having their goods removed, have met with heavy losses. A large quantity of lumber and a number of boats and scows were lost. The navigation dam has but little, if any, injury done to it. The canal has sustained some injury.

(a) Simulated from microfilm copy.

EXCERPTS FROM THE MORNING CALL, 28 FEBRUARY 1962, 60TH ANNIVERSARY OF THE GREAT FLOOD OF 28 FEBRUARY 1902 [a]

GREATEST FLOOD IN HISTORY OF ALLENTOWN

Lehigh Bridge Swept Away.
City Without Water, Gas or Power.
Damage Estimated at over Million Dollars.

These were the headlines in THE MORNING CALL just 60 years ago this weekend as the disastrous 1902 flood swept through the valley.

The story in and around Allentown was a series of narrow escapes, dramatic rescues and reports of heavy damage along all waterways.

The flood hit Allentown on the afternoon of Friday, Feb. 28 and was covered in striking detail.

Many lives were believed saved because the flood came in the daytime rather than at night as did the bad flood of 1862.

The whole area along Jordan Creek and between the Linden and Hamilton Street bridges was a vast net for materials caught up by the flood. Station and bridge piers piled up the debris.

Sheds, box cars, piles of lumber, hundreds of beer kegs, and bales of straw were jammed together. A wagon hung on top of a tree.

The city was isolated for the night from all directions except the north. Bridges were out in all directions. The Coplay bridges on the upper Little Lehigh were gone as well as the one across at the Fountain House — now 10th Street.

EXCERPTS FROM THE CALL-CHRONICLE, 24 MAY 1942 [a]

Allentown's Flood Damage Almost Beyond Estimate.

Allentown today, in keeping with its sister communities of the Lehigh Valley, is recovering from one of the worst floods in the history of the region.

Torrents of water swept into Allentown yesterday by way of its three streams to cause a sudden May flood which rivalled even the great flood of 1902.

The Lehigh River, already swollen by overtaxed streams that flow into it to the north of Allentown, was unable to carry the burden imposed upon it by the Little Lehigh and Jordan creeks in the south central portion of the city with the result that all overflowed their banks here to inundate homes, factories, mills, railroad yards and streets.

A severe washout of the freight tracks of the Central Railroad of New Jersey on the east side of the river occurred at Kimmets Lock, just to the north of Allentown. A small bridge crossing the canal at that point was washed away and the roadbed under both tracks was washed away for a distance of more than 100 yards.

The washout of the tracks was just as neat as though someone had shoveled the rock and cinders from under the rails and ties. At many places the tracks were suspended in air about four feet above the ground.

The area around the incinerator plant that was made into a small park in the past few years looked more like a boating lake with the tops of all the evergreen trees protruding from the swirling water. Benches were strewn about on high ground where they had been dragged by employees before it was too late.

Much debris was being held back by the bridge over the Jordan near the plant. One could see a contractor's large tool shed that had come bobbing down the swollen stream like a cork. Occasionally it would get a terrific bump from a log or empty steel drum that was washed against it as the angry waters hurried down stream.

It is hard to tell just what the losses in this city alone may be but conservative estimates place the damage at several millions of dollars.

(a) Simulated from microfilm copy.

The following accounts were given in THE MORNING CALL,[a] Allentown, Pennsylvania, 19 through 21 August 1955:

19 AUGUST 1955

Yesterday's Flood Among Valley's Worst

The damaging flood waters that hit the Lehigh Valley area yesterday ranks with some of the most severe storms that have hit here since the turn of the century.

Major Flooding Looms, Many Areas Evacuated, 'Emergency' in City

The Lehigh Valley last night felt the death tremors of Hurricane Diane, and while winds did hardly any damage, veritable cloudbursts of rain resulted in flash floods in in many areas and threatened major flooding of all low-lying territories by daylight today.

20 AUGUST 1955

Salvage workers, including highway crews, were alerted late last night to start cleaning up Allentown's flood-drenched lowlands.

The city's three streams – Lehigh, Little Lehigh and Jordan – were reportedly receding at the rate of six inches an hour.

The Lehigh River, which had spilled over its banks after Thursday night's violent storm, reached a crest of 23.4 feet at 8:30 a.m. It dropped to 16 feet by last midnight.

However, it will be several days before an actual property damage estimate can be given.

It will reach into millions of dollars as industrial plants and home owners, along the Lehigh River's banks, were washed out by the flood waters.

Chief problem for police and firemen was effecting rescues for some 30 families in the areas near the Hamilton St. bridge over the Lehigh River, and along Wire, Union and 4th Sts. which had felt the effects of the overflowing Lehigh and Little Lehigh.

One group of five persons is still stranded in a cottage at Adam's Island on Lehigh River, and all means, Including use of a helicopter, failed in rescuing them from their perches.

Even before the Lehigh reached flood stage last night, there were residences along its many tributaries that had their first floors flooded and there were untold numbers of industries forced to close down operations because boiler rooms were flooded or working floors covered with dirty, surging water.

Before the river's flood, all of the streams that run through Allentown roared from their normal courses and covered wide areas. The Jordan was responsible for covering Route 145 in the vicinity of Penn Fruit Co., and flooded 3rd and Union and the Lehigh Valley Railroad station area.

Union Terrace, Cedar Parkway and Trexler Memorial Park were flooded by Cedar Creek. The Little Lehigh flooded lower Water Street and Mill Street at Lehigh. Also flooded in the Little Lehigh watershed was Auburn Street and railroad tracks and roads at East Penn Junction.

21 AUGUST 1955

Men and machines were getting Allentown back to normal last night after the worst flood in the city's history.

The cleanup proceeded under temperatures that ranged into the 90's and which, in spite of the humidity, aided in the general drying up process.

Down around the section bounded by Front and Hamilton and Union Streets, grim residents carried out soaked and ruined household articles and tossed them in sodden heaps to be carried away by the city.

Across the street at the rear of the D.F. Bast, Inc., motor freight headquarters, huge bulldozers pushed three and four-foot piles of dirt back toward the banks of the Lehigh River which still was swirling dangerously on its way toward juncture with the Delaware and eventually the sea.

All Bridges Open

There were the bridges. All of them were open by last night. But the last to open, the Hamilton Street Bridge over the Lehigh, was taking only limited traffic. There members of the Allentown Emergency Police who had worked around the clock since the heavy rains caused the emergency conditions, were on traffic duty and detouring buses and heavy trucks away from the bridge. During

(a) Simulated from microfilm copy.

the day as the water receded, examiners discovered a cracked abutment on the bridge and deemed it best to restrict traffic until a complete inspection can be made.

The Lehigh River, which rose to its highest point, 23.4 feet at 8:30 Friday morning, continued a steady recession yesterday. At 4 o'clock yesterday morning it had dropped to the 14 foot flood stage. Just 24 hours after its peak, it had dropped back to 12.3 feet. At midnight it stood at 9 feet and and was still falling.

Islanders Rescued

And at long, last, six persons who refused to leave Adam's Island on Thursday night even after they were warned of impending floods, were removed yesterday morning.

EXCERPTS FROM THE EVENING CHRONICLE, 3 APRIL 1970 [a]

Valley Repairing Damage from Buffeting Winds, Driving Rain and Floods

Nature's elements at their worst joined forces yesterday to wreck havoc throughout the Lehigh Valley. The area was buffeted by winds gusting at 56-miles-an-hour, drenched by a 2.37 inch, 18-hour rain and warmed by an 18-degree temperature rise to a high of 56.

Compounding and definitely contributing to the problems which arose as a result of the sudden storm was the blanket of snow dumped on the area Easter Sunday.

The ground rapidly reached its saturation point and the rushing runoff waters inundated low-lying fields and streets, cascaded into the cellers of countless homes and caused the many creeks and streams traversing the area to over-flow their banks.

These rushing waters wended their way to the Lehigh River which reached the 22-foot flood stage at midnight at Allentown's River Front Park where an hourly watch was maintained from 4:30 p.m. yesterday.

Meanwhile, almost hourly watches were maintained on the Jordan Creek and Little Lehigh Creek in Allentown where waters crested to 6.5 feet and 7.10 feet, respectively.

Lehigh County Civil Defense prepared early to meet the impending emergencies which might develop. C.D. telephone operators stationed in the county headquarters in the courthouse started a systematic process of warning 50 business and industry operators along the three key waterways flowing through the city.

(a) Simulated from microfilm copy.

FIGURE 5 - Aerial view of the 19 August 1955 flood at Allentown.

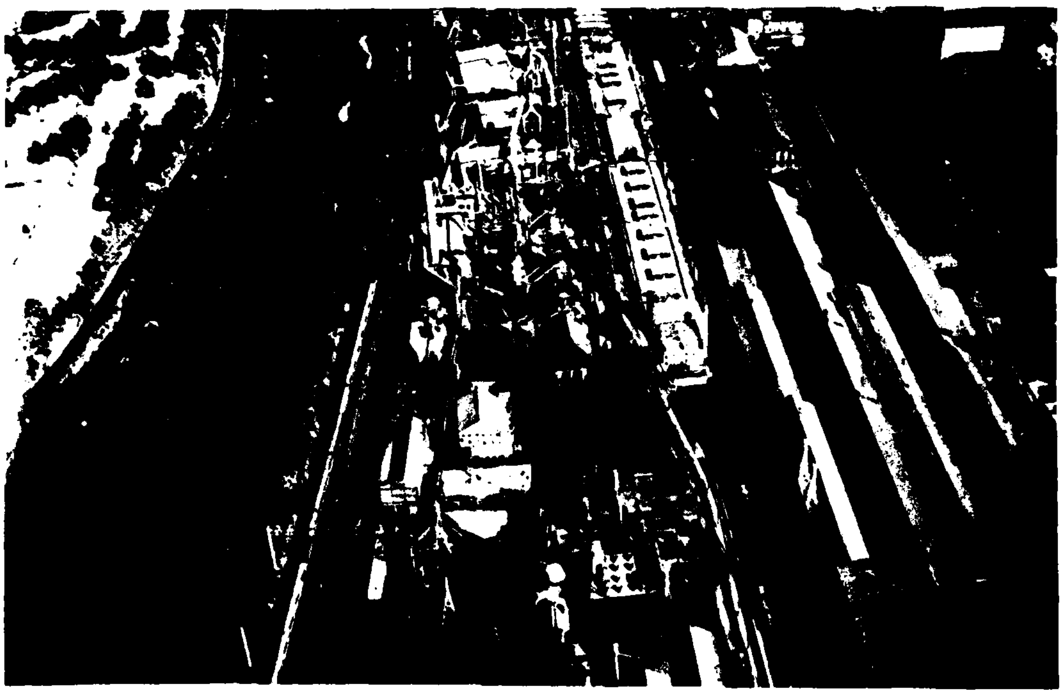


FIGURE 6 - Aerial view of industry that was inundated during the 19 August 1955 flood

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 Allentown 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 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 could occur 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 and precipitation records and runoff characteristics for the stream under study. However, limitations in these records required analyses on a regional rather than a watershed basis. In determining the Intermediate Regional Flood for Lehigh River, Jordan Creek, Trout Creek and West Creek, statistical studies were made using the 68-year record of flood data from the U.S. Geological Survey gaging stations throughout the vicinity of Allentown, Pennsylvania. 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. A discharge hydrograph for the Standard Project Flood at the Hamilton Street bridge on Lehigh River is shown on Plate 11. The relative water surface elevations for the Intermediate Regional Flood and the Standard Project Flood are shown on Plates 7 and 8.

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
Lehigh River				
Downstream of the Confluence with Little Lehigh Creek	16.1	1,221.0	91,200	180,910
Upstream of the Confluence with Little Lehigh Creek	16.11	1,034.0	72,800	131,510
Downstream of Hamilton Street bridge	16.9	1,033.0	72,740	131,400
Tilghman Street bridge	17.7	1,032.0	70,680	131,380
Jordan Creek				
Mouth	0	81.0	13,440	30,000
Near Allentown, Pa. (U.S.G.S. Gage)	2.46	75.8	13,000	29,400
Trout Creek				
Mouth	0	8.1	1,950	5,050
Downstream of the Confluence with West Creek	1.66	7.8	1,900	4,950
Upstream of the Confluence with West Creek	1.67	7.0	1,650	4,290
West Creek				
Mouth	0	0.8	250	660

Recorded discharges for the August 1955 flood at the Hamilton Street bridge, Lehigh River, and the U.S. Geological Survey Gage on Jordan Creek were 84,900 cfs, and 9,520 cfs, respectively. These discharges do not reflect the present reductions as a result of the completed Francis E. Walter and Beltzville Dams. Table 5 shows a flood elevation comparison between the August 1955, the Intermediate Regional, and the Standard Project Floods at the Hamilton Street bridge.

TABLE 5

FLOOD ELEVATIONS
(Lehigh River at Hamilton Street Bridge)

Flood	Elevation[a]
Standard Project	265.4
Intermediate Regional	254.5
August 19, 1955	257.0

(a) Feet, mean sea level datum.

Frequency

A frequency curve of peak flows was constructed on the basis of available information and computed flows of floods up to the magnitude of the Standard Project Flood. The frequency curve thus derived, which is available on 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. Floods larger than the Standard Project Flood are possible but the combinations of factors necessary to produce such large flows would be extremely rare.

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 Lehigh River, Jordan Creek, Trout Creek and West Creek would result in inundation of residential, commercial, and industrial sections in the Allentown 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 are ultimately destroyed, or in vehicles that are ultimately submerged or floated. Water lines 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 in the City of Allentown 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 and Standard Project Floods 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 10-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 the Lehigh River and its tributaries, Jordan Creek, Trout Creek and West Creek, cover a large portion of Allentown east of Union Street behind Kilne's Island. The highest stages of flooding throughout the study area occur when the floodwaters from the Little Lehigh meet with the high stages of Lehigh River. The areas that would be flooded by the Intermediate Regional and Standard Project Floods include commercial, industrial, and residential sections and the associated streets, roads, and private and public utilities in the City of Allentown. Considerable damage to these facilities would occur during an Intermediate Regional Flood. However, due to the wider extent, greater depths of flooding, higher velocity flow and longer duration of flooding during a Standard Project Flood, damage would be even more severe than during an Intermediate Regional Flood. Plates 7 and 8 show water surface profiles of the Intermediate Regional and Standard Project Floods. Depth of flow in the channel can be estimated from these illustrations. Typical cross sections of the flood plain at selected locations, together with the water surface elevation and lateral extent of the Intermediate Regional and Standard Project Floods are shown on Plates 9 and 10.

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 structures, or by deposition of silt in the stream channel under structures. As previously indicated, there are 6 dams within the study area which have no flood control capacities nor will they seriously alter flow characteristics of floodwaters. Of the 51 bridges and culverts crossing the streams in the study area, most of them are obstructive to the Intermediate Regional Flood and even more are obstructive to the Standard Project Flood. In some cases bridges may be high enough so as not to be inundated by floodflows; however, the approaches to these bridges may be at lower elevations and subject to flooding and rendered impassable. Table 6 lists water surface elevations at selected bridges and culverts that may be restrictive during flood flows.

TABLE 6
ELEVATION DATA
Bridges Across Lehigh River, Jordan Creek, Trout Creek and West Creek

Identification	Mileage Above Mouth	Underclearance Elevation (a)	Water Surface Elevation (a) Intermediate Regional Flood	Water Surface Elevation (a) Standard Project Flood
Lehigh River				
Reading Railroad	16.3	254.8	250.6	263.2
Hamilton St.	16.9	265.8	254.5	265.4
New Jersey Central R.R.	18.1	259.9	263.4	271.9
Jordan Creek				
Lehigh Valley R.R.	0.04	245.2	253.5	263.6
Union St	0.08	250.3	253.5	263.9
Hamilton St.	0.26	255.4	255.6	264.0
Lehigh Valley R.R.	0.45	249.1	256.2	264.1
Gordon St.	0.65	251.8	256.4	264.4
Lehigh Valley R.R.	1.28	267.3	259.0	265.9
Seventh St. (MacArthur Dr.)	2.45	265.6	268.7	274.2
Trout Creek				
Allentown Incinerator	0.09	243.2	252.1	261.1
Abandoned R.R. siding	0.15	252.4	253.7	261.6
Reading R.R.	0.23	251.2	255.8	263.6
Auburn St.	0.34	252.5	255.9	263.6
Auburn St. (Mar-Pat)	0.37	252.2	256.0	263.6
Trout Ck. Park (Foot)	0.45	256.2	257.9	263.8
South Fifth St.	0.87	274.4	270.4	272.5
Reading R.R.	1.24	287.0	284.1	289.6
Valley Steel Co. Rd.	1.26	280.5	284.7	289.9
Dixon St.	1.59	296.4	298.9	304.0
South Delaware St.	1.71	299.1	305.5	305.9
Trout Ck. Park (Foot)	1.85	304.7	306.3	308.9
Foot Bridge, Vic. of Seventh St.	1.92	309.2	311.8	312.6
Trout Ck. Park (Foot)	2.00	314.0	315.4	319.4
Foot Bridge, Vic. of Sixth St.	2.09	318.2	319.4	322.5
Downstream side, box culvert	2.19	321.6	321.9	323.5
Upstream side, box culvert	2.36	228.6	333.6	336.2
South Second St.	2.53	338.7	339.7	344.9
Chaple Ave.	2.69	349.8	351.2	352.2
South Albert St.	2.73	353.3	355.8	356.7
Cypress Ave.	2.92	368.9	371.7	375.6
Private Rd.	2.99	370.9	376.9	378.1
Dauphin St.	3.04	376.0	380.8	381.6
Private Foot Bridge	3.14	382.1	383.6	384.6
Private Foot Bridge	3.21	397.3	396.9	400.5
Private Foot Bridge, (opposite Filbert St.)	3.25	397.3	399.8	401.6
Potomac Rd.	3.60	431.6	433.7	434.9
Fairview St.	4.20	502.9	503.4	506.6
Salisbury Community	4.47	507.7	510.3	511.8
Emmaus Ave.	4.68	535.4	538.0	540.0
Hausman Ave.	4.69	540.9	543.3	544.8
Private Dr.	4.77	546.2	548.0	549.4

TABLE 6 (Continued)

ELEVATION DATA
Bridges Across Lehigh River, Jordan Creek, Trout Creek and West Creek

	Mileage Above Mouth	Underclearance Elevation (a)	Water Surface Elevation (a) Intermediate Regional Flood	Water Surface Elevation (a) Standard Project Flood
West Creek				
Vine St.	0.25	316.2	314.2	316.4
South Fountain St.	0.37	322.9	324.9	330.8
South Tenth St.	0.66	345.4	346.8	348.0
Stopp St.	0.72	346.0	348.8	349.5

(a) Feet, mean sea level datum.

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 upper reaches of the streams in the study area would be 7 to 11 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. In the lower reaches, the velocities would be somewhat lower averaging 2 to 6 feet per second. It is expected that velocity of flow during a Standard Project Flood would be slightly higher than during an Intermediate Regional Flood. Overbank flow in the Allentown area would average 1 to 5 feet per second. Water flowing at 2 feet per second or less would deposit debris and silt.

Rates of rise and duration of flooding – Intense rainfalls that accompany severe storm fronts usually produce the floods occurring in the Allentown area. There is a time lag of at least several hours to half a day before overbank flooding occurs in the City. Floods generally rise slowly and stay out of banks for long periods of time. For the Intermediate Regional and Standard Project Floods at Hamilton Street, 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).

TABLE 7
RATES OF RISE AND DURATION
(Lehigh River at Hamilton Street Bridge)

Flood	Maximum Rate of Rise ft/hr.	Height of Rise ft	Time of Rise hrs	Duration of Critical Stage hrs
Intermediate Regional Flood	1.1	7.9	11	17
Standard Project Flood	1.6	18.8	12	34

Photographs, future flood heights – The levels that the Intermediate Regional and Standard Project Floods are expected to reach at various locations in the City of Allentown are indicated on the following photographs.

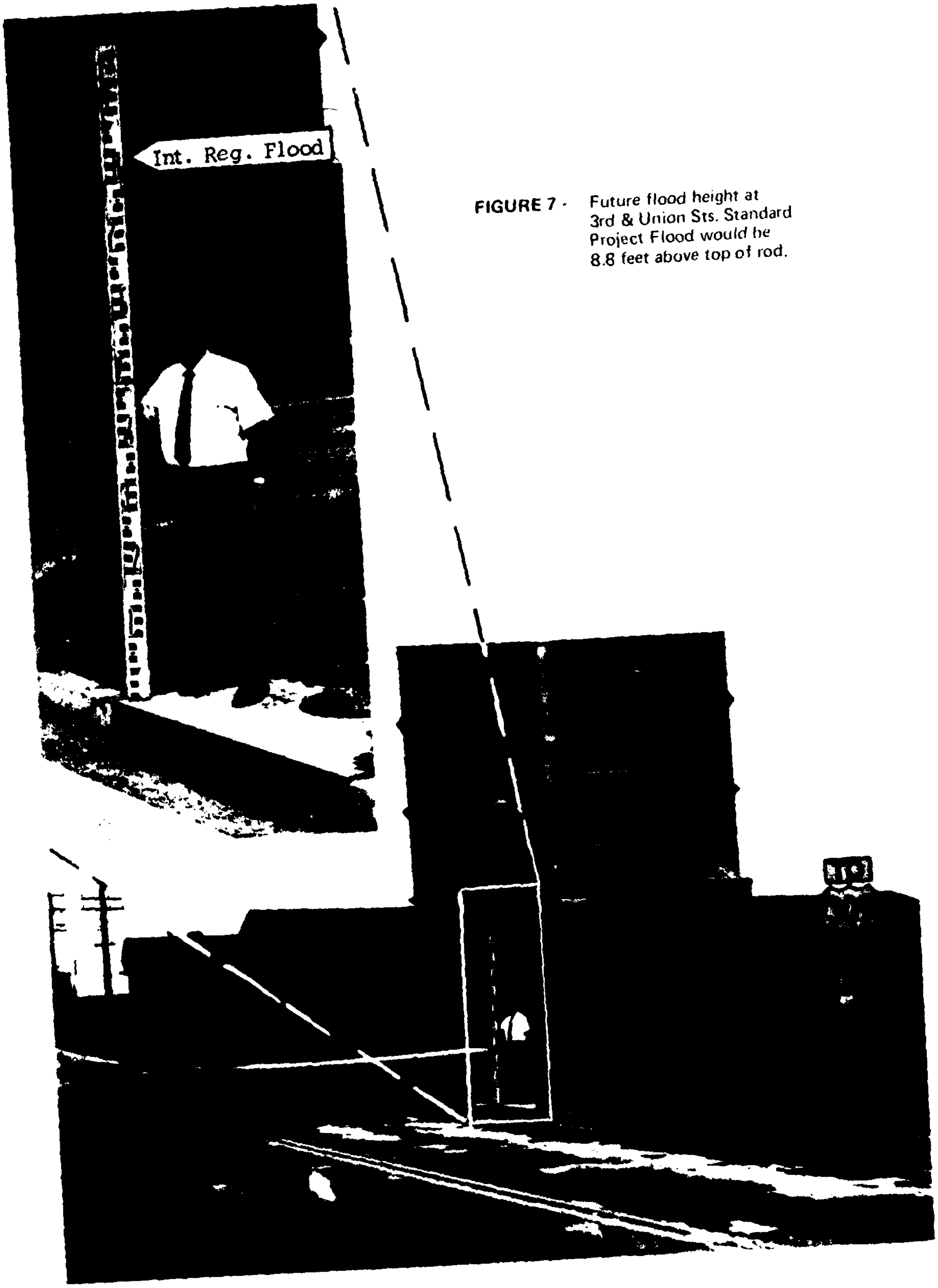


FIGURE 7 - Future flood height at 3rd & Union Sts. Standard Project Flood would be 8.8 feet above top of rod.

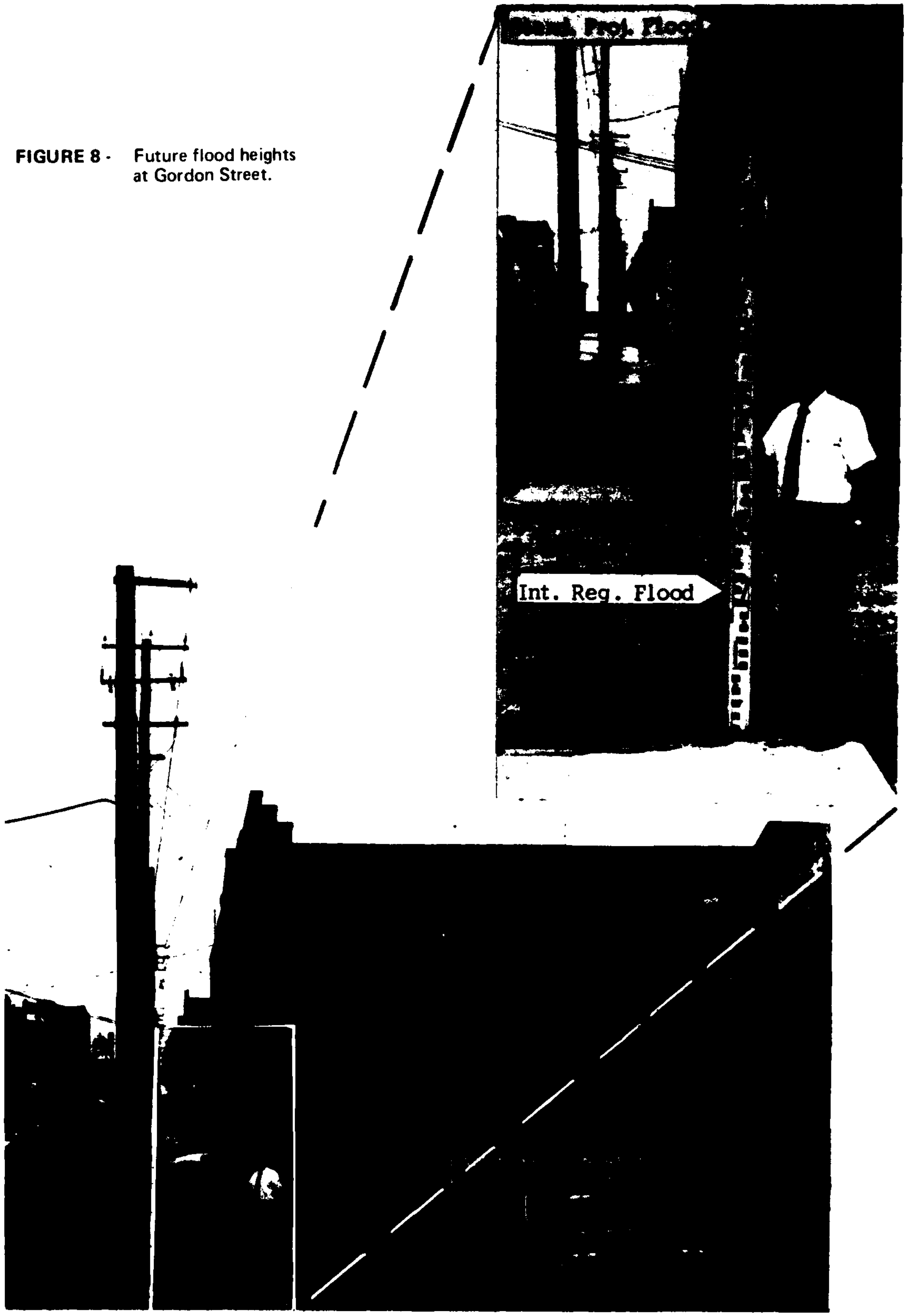


FIGURE 8 - Future flood heights at Gordon Street.

FIGURE 9 - Future flood heights at Auburn St. near the Hummel Warehouse. Standard Project Flood would be 1.8 feet above top of rod.

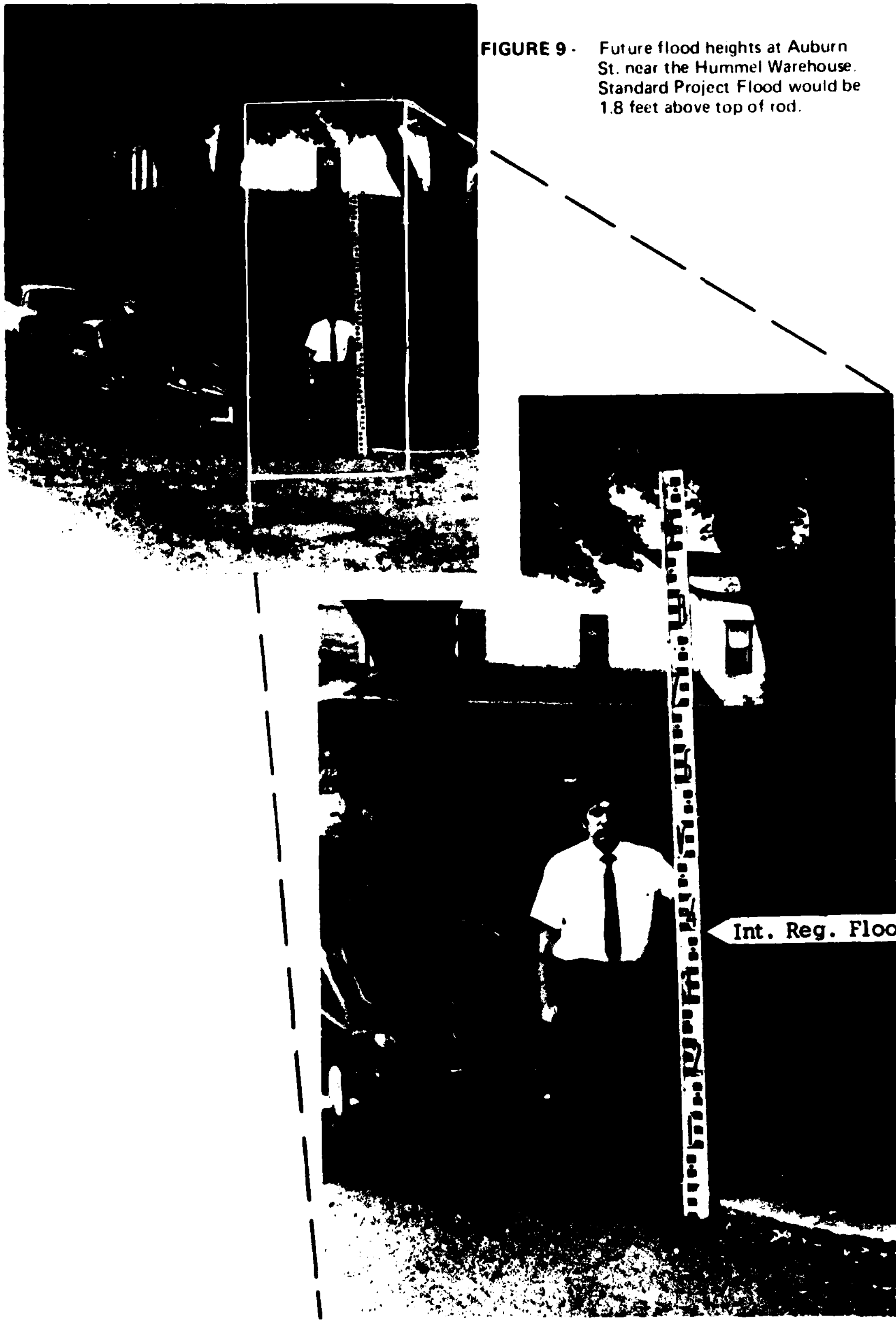


FIGURE 10 - Future flood heights where Mack Boulevard passes under the Reading Railroad.

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.

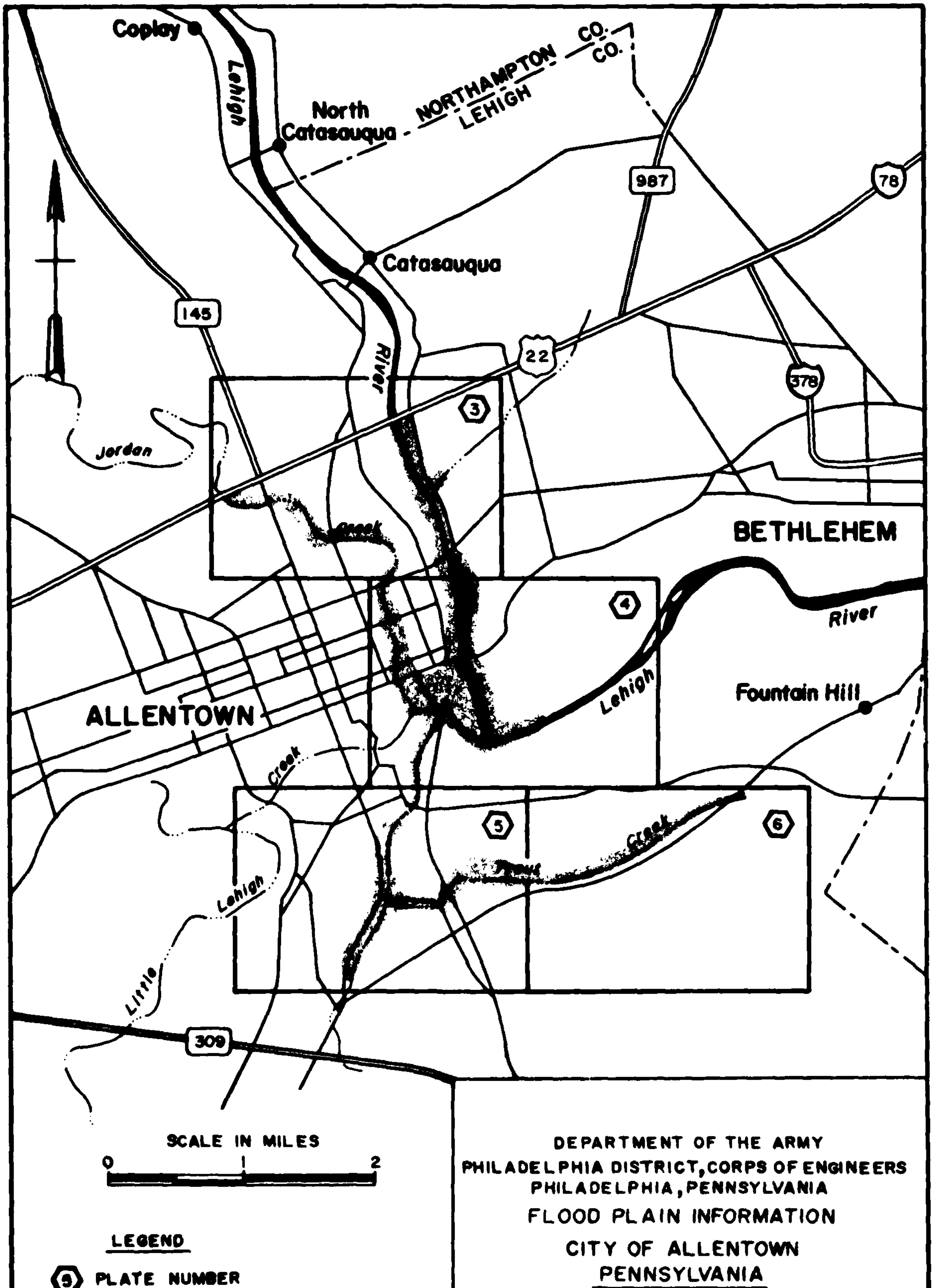
Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the general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



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

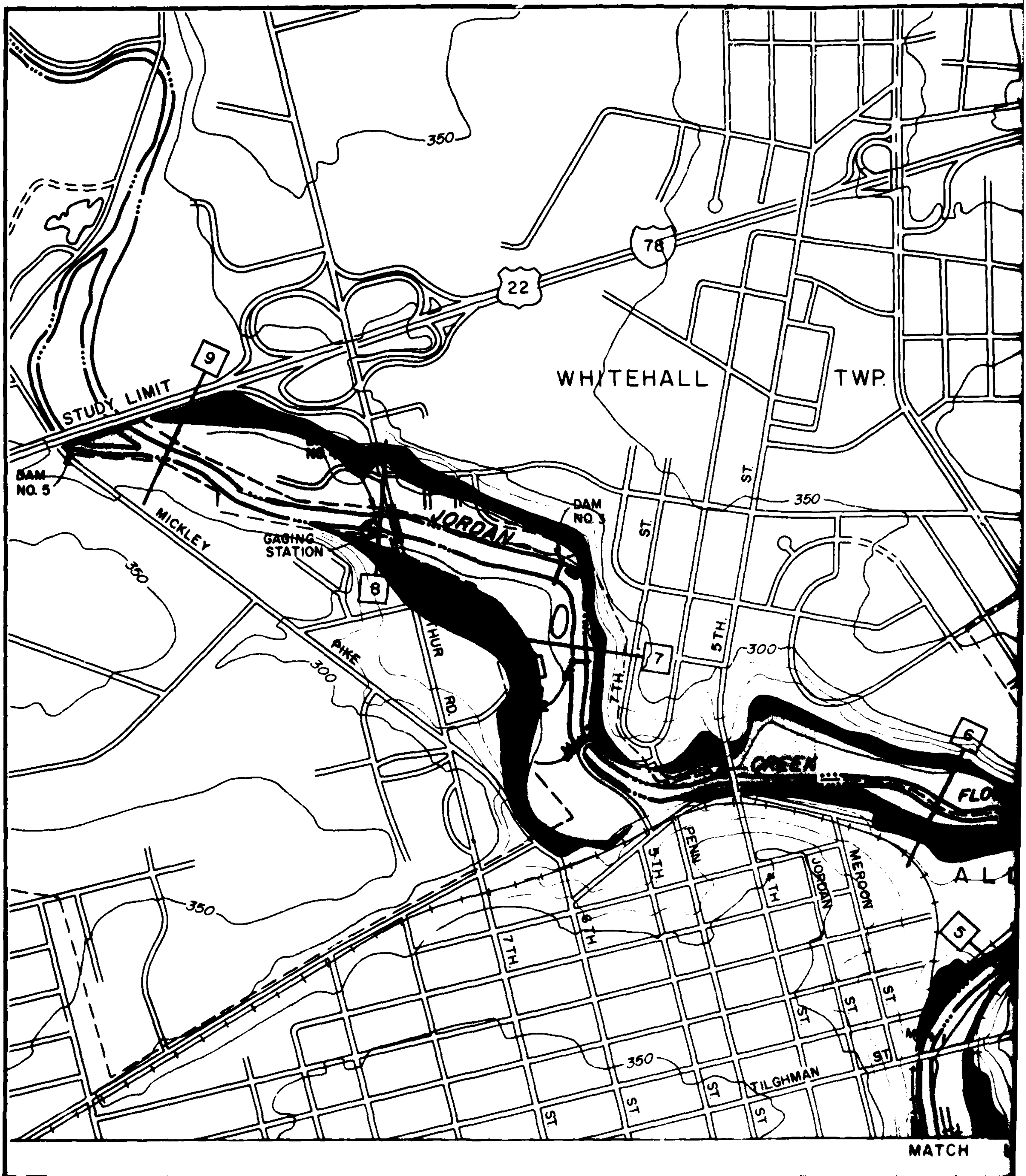
FLOOD PLAIN INFORMATION

CITY OF ALLENTOWN
PENNSYLVANIA

INDEX MAP — FLOODED AREA

SEPTEMBER 1971

PLATE 2



350
78
22
9
STUDY LIMIT
WHITEHALL TWP.
DAM NO. 5
MICKLEY
GAGING STATION
JORDAN
DAM NO. 3
ST.
350
8
PIKE
RD.
300
7
5TH.
7TH.
6
GREEN
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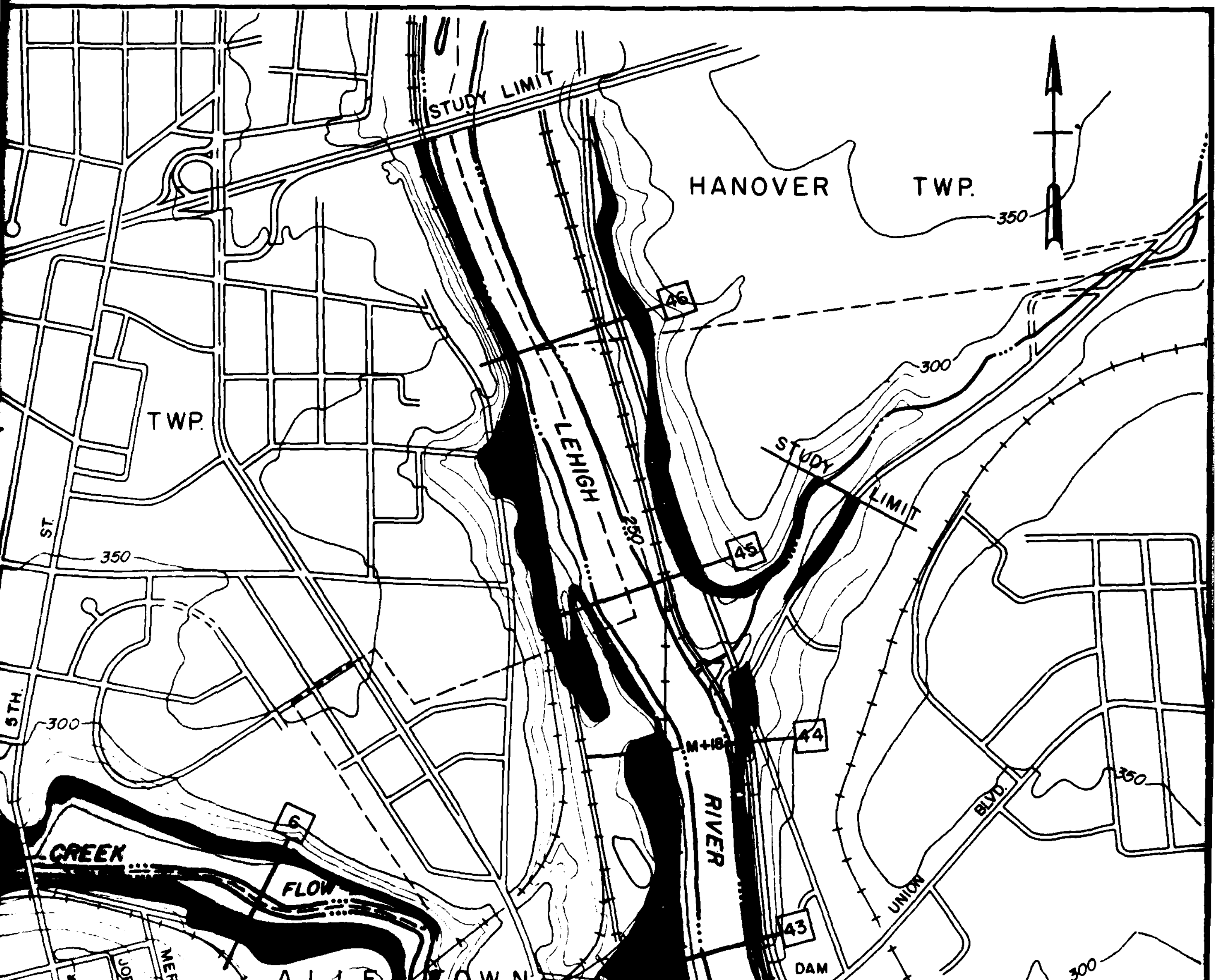
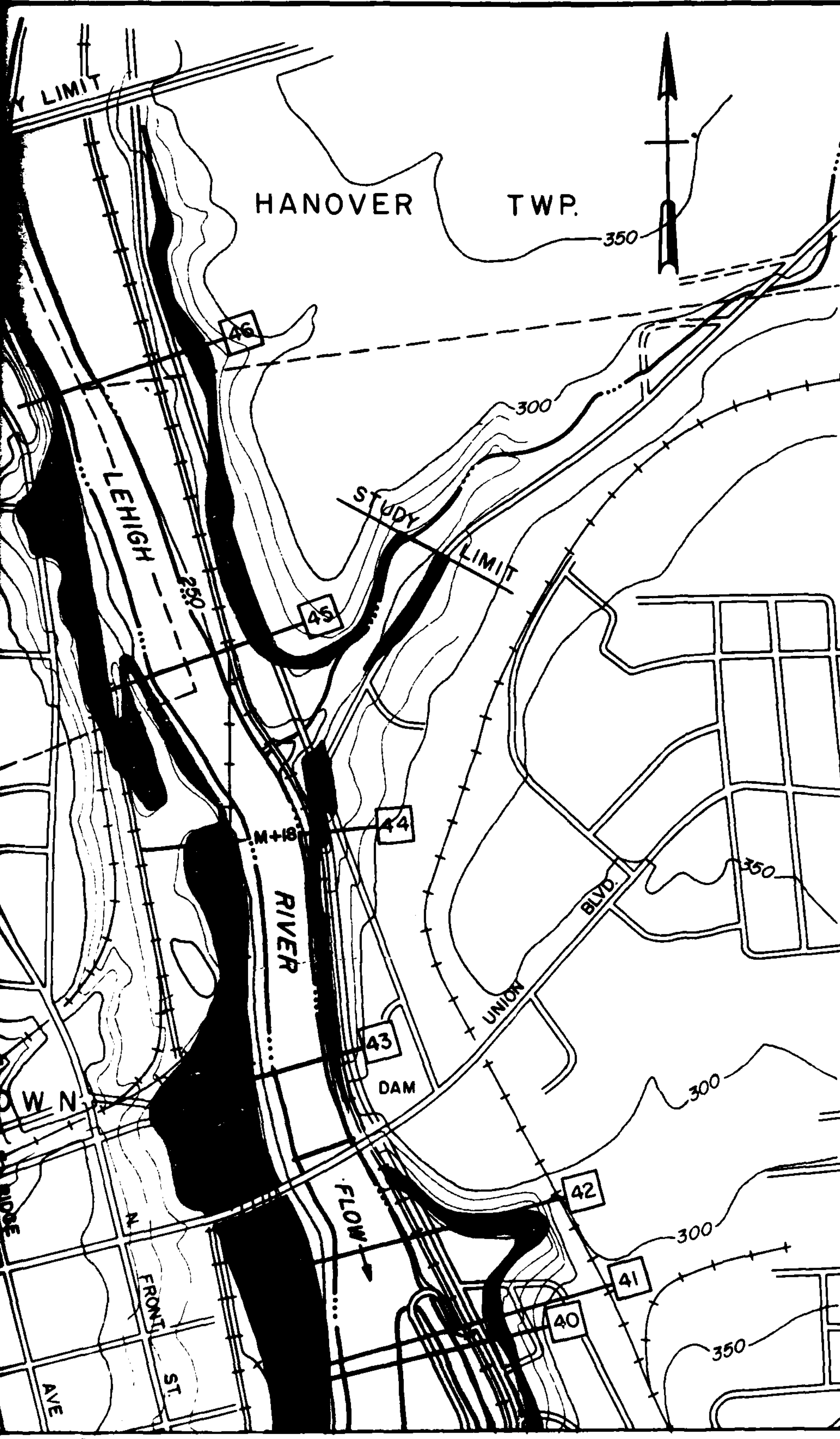


MATCH LINE PLATE 4



TE 4

LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD — STANDARD PROJECT FLOOD

M+4 MILES ABOVE MOUTH

22 CROSS SECTION

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

— — — ALLENTOWN CITY LIMITS

CHANNEL

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET ALLENTOWN EAST, 1964. MINOR 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 FLOODWAY MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

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

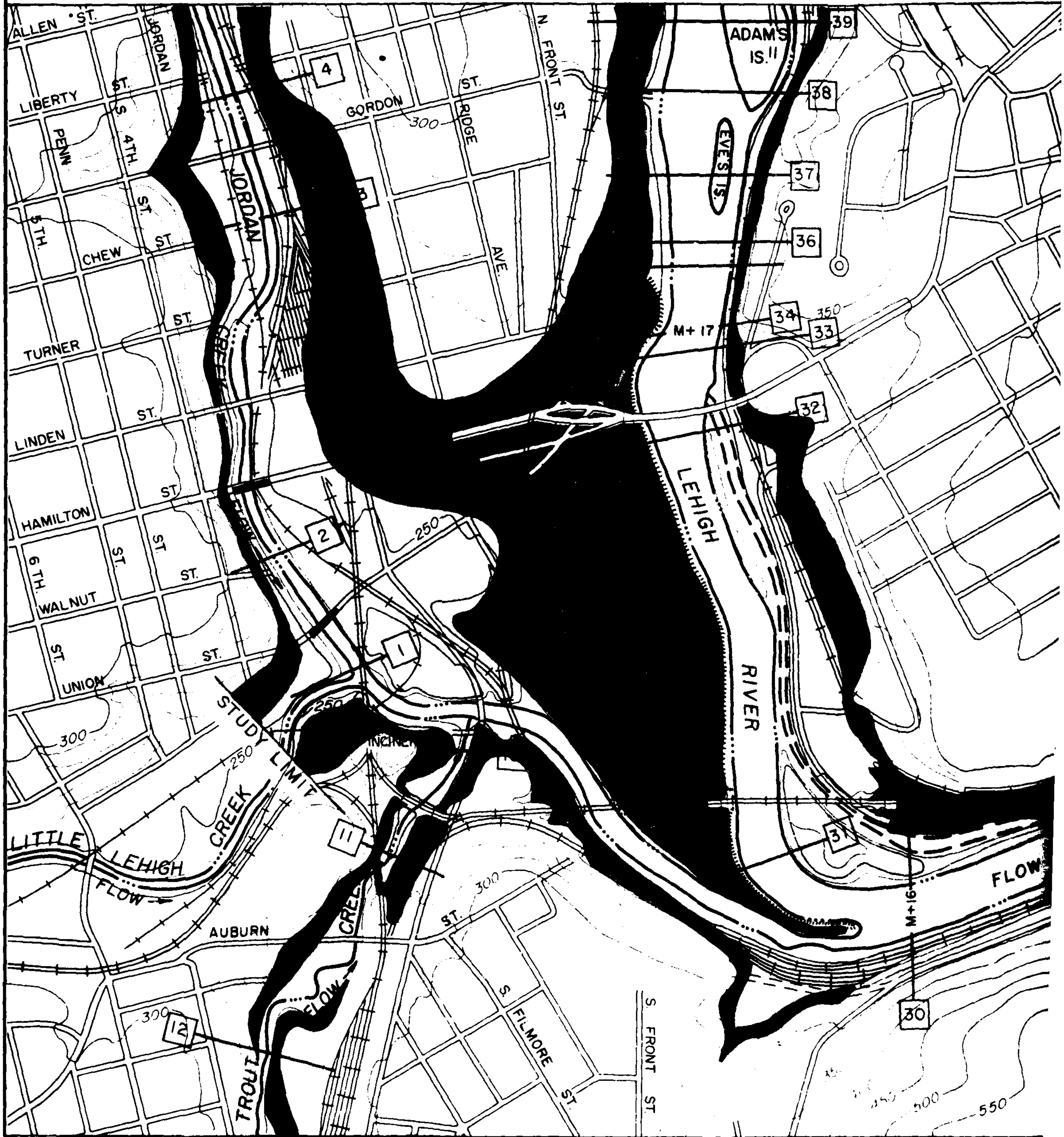
FLOOD PLAIN INFORMATION

CITY OF ALLENTOWN
PENNSYLVANIA

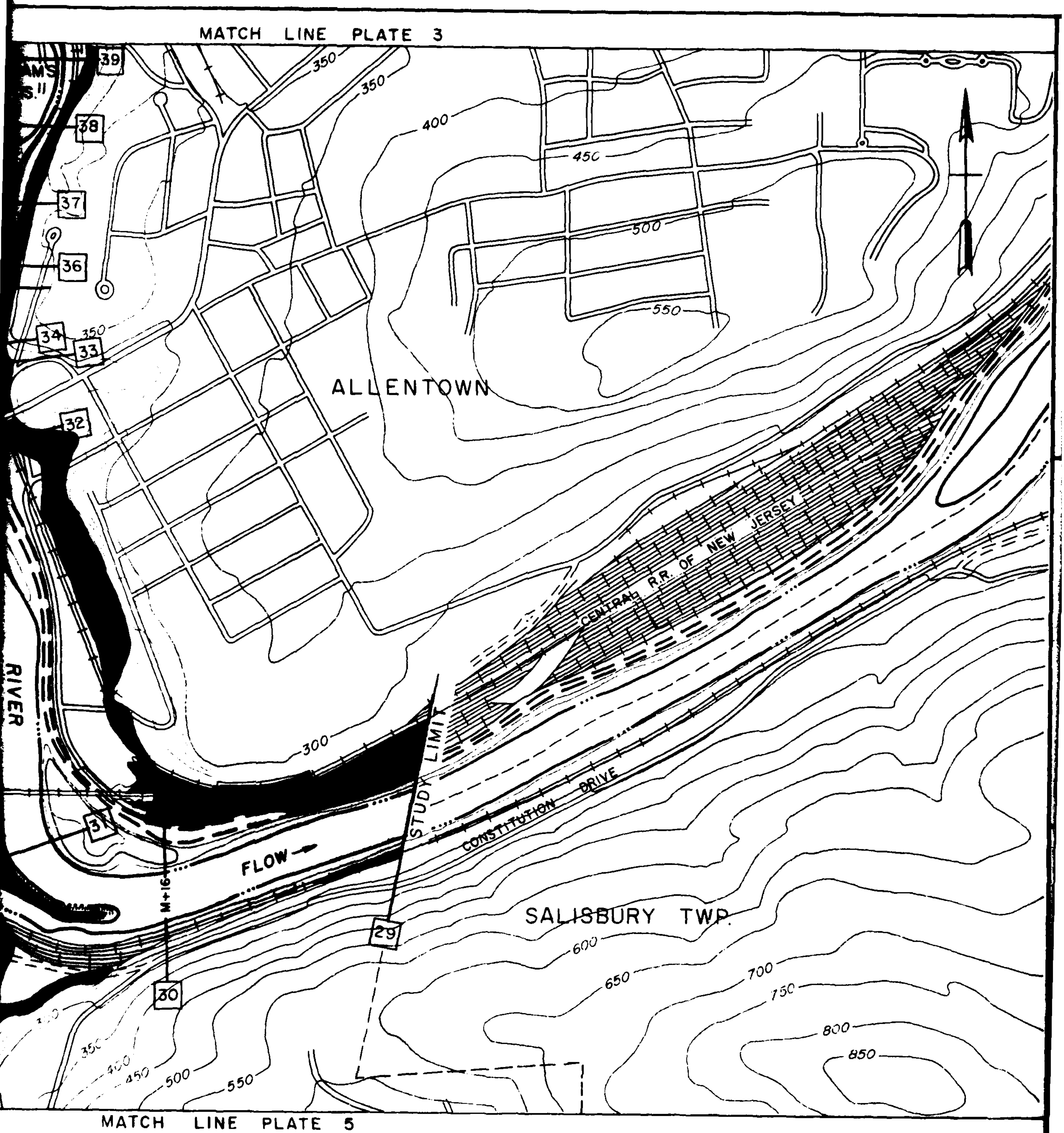
FLOODED AREAS
SEPTEMBER 1971

PLATE 3

MATCH LIN



MATCH LINE PL


MATCH LINE PLATE 3
ALLENTOWN
CENTRAL R.R. OF NEW JERSEY
STUDY LIMIT
CONSTITUTION DRIVE
FLOW
RIVER
SALISBURY TWP.
M+16
29
30
31
32
33
34
36
37
38
39
300
350
400
450
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550
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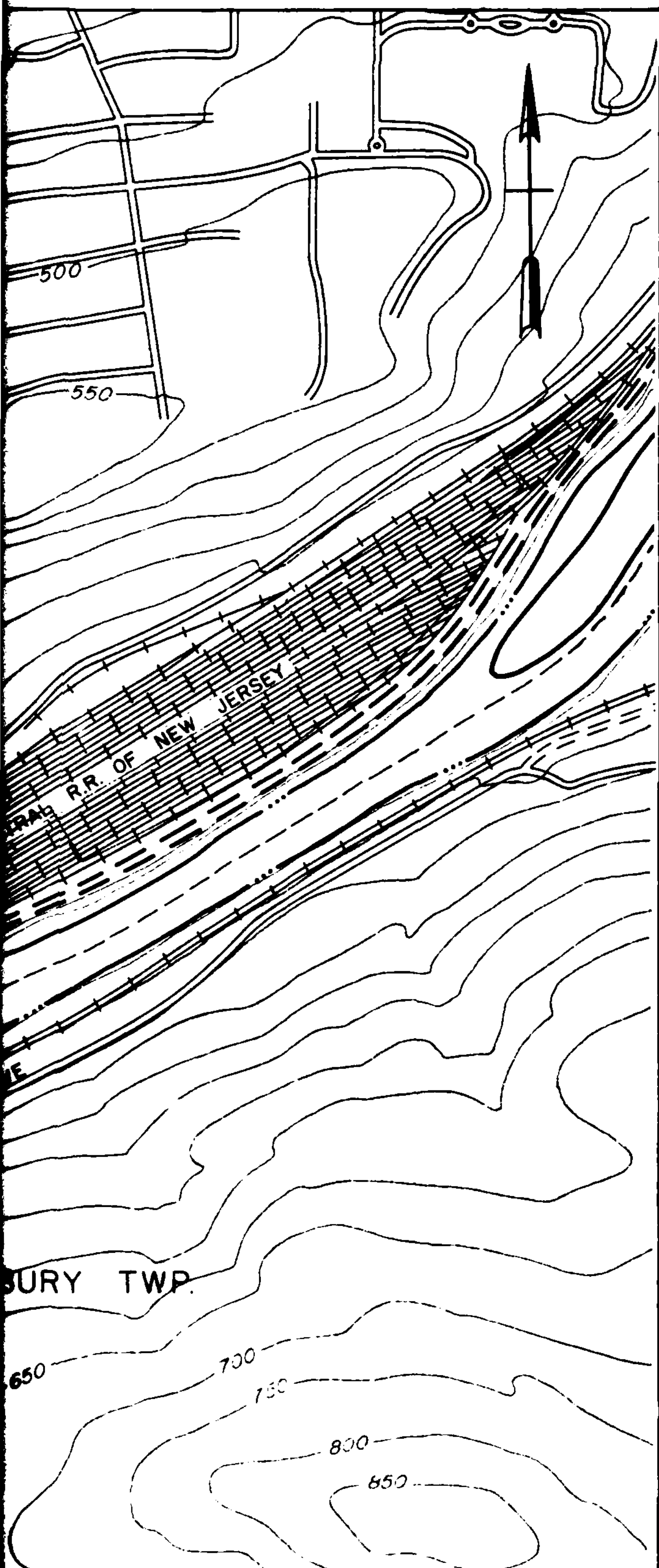
650
700
750
800
850
MATCH LINE PLATE 5



LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD — STANDARD PROJECT FLOOD

M + 17 MILES ABOVE MOUTH

2 CROSS SECTION

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

ALLENTOWN CITY LIMITS

LEVEE

CHANNEL

NOTES

1. MAP BASED ON U.S.G.S. 7.5 MIN. QUADRANGLE SHEET ALLENTOWN EAST, 1964. MINOR 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 FLOODWAY MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM CONTOUR INTERVAL IS 10 FT

SCALE IN FEET

0 800 1600

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

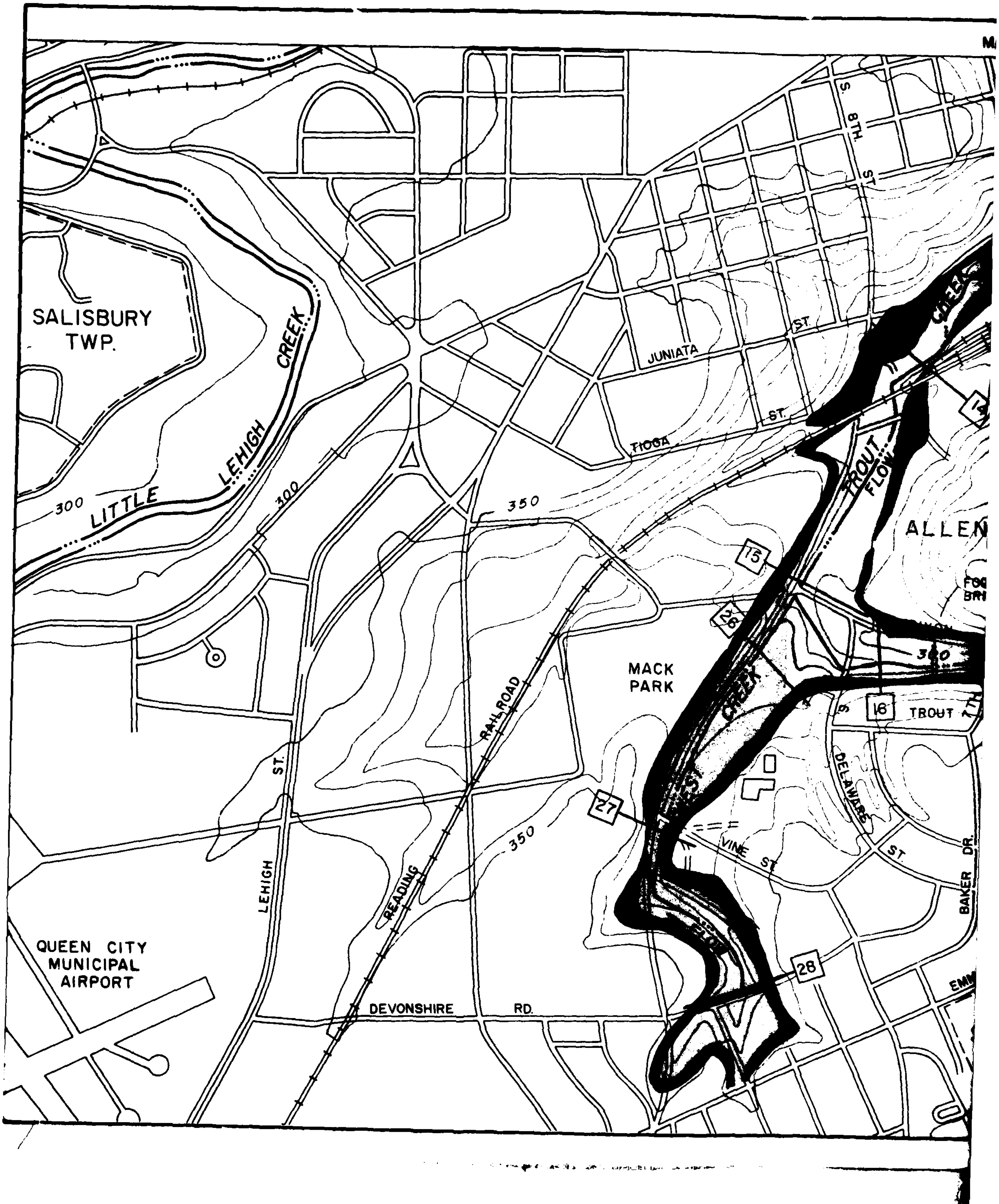
FLOOD PLAIN INFORMATION

CITY OF ALLENTOWN
PENNSYLVANIA

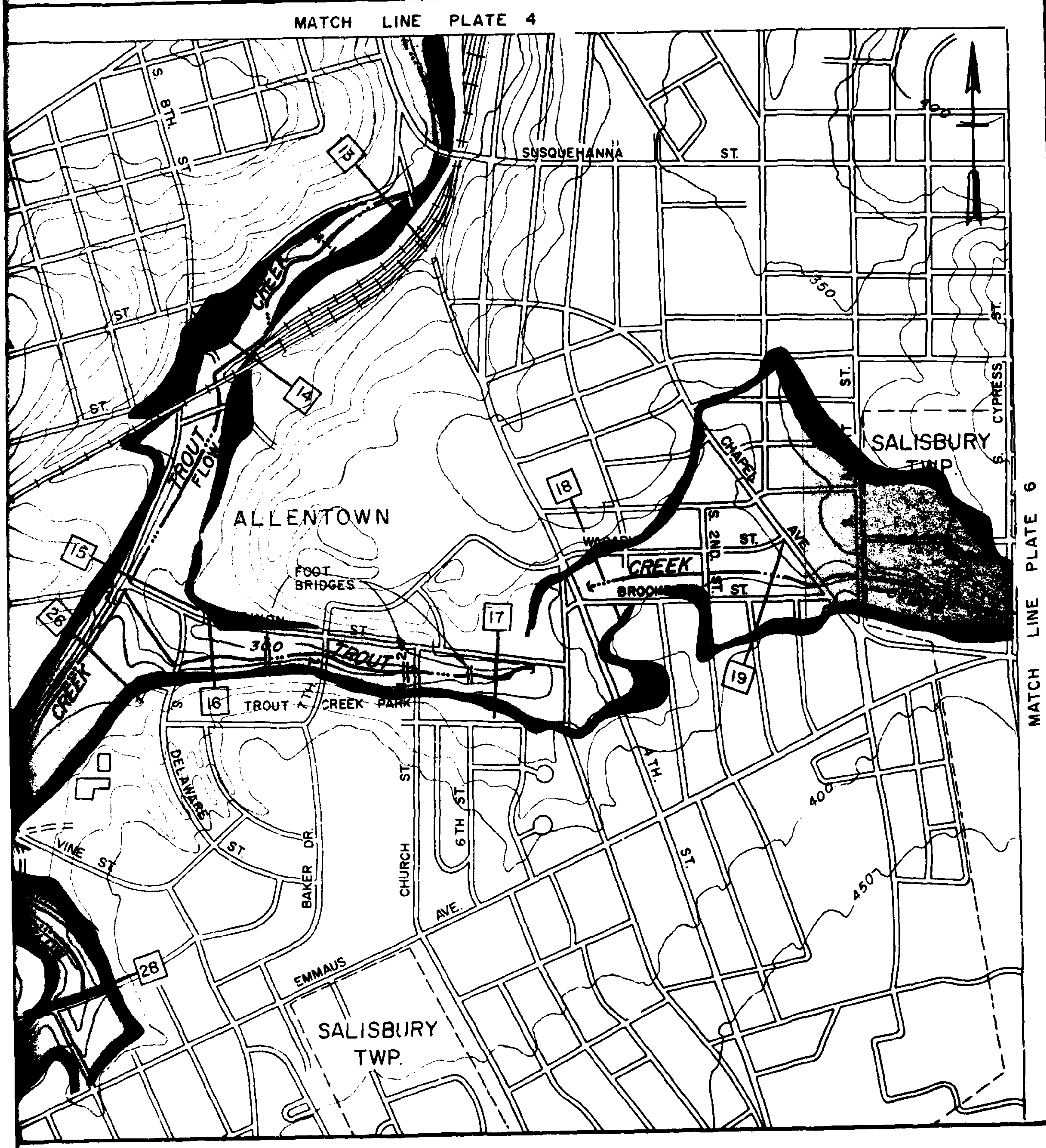
FLOODED AREAS

SEPTEMBER 1971

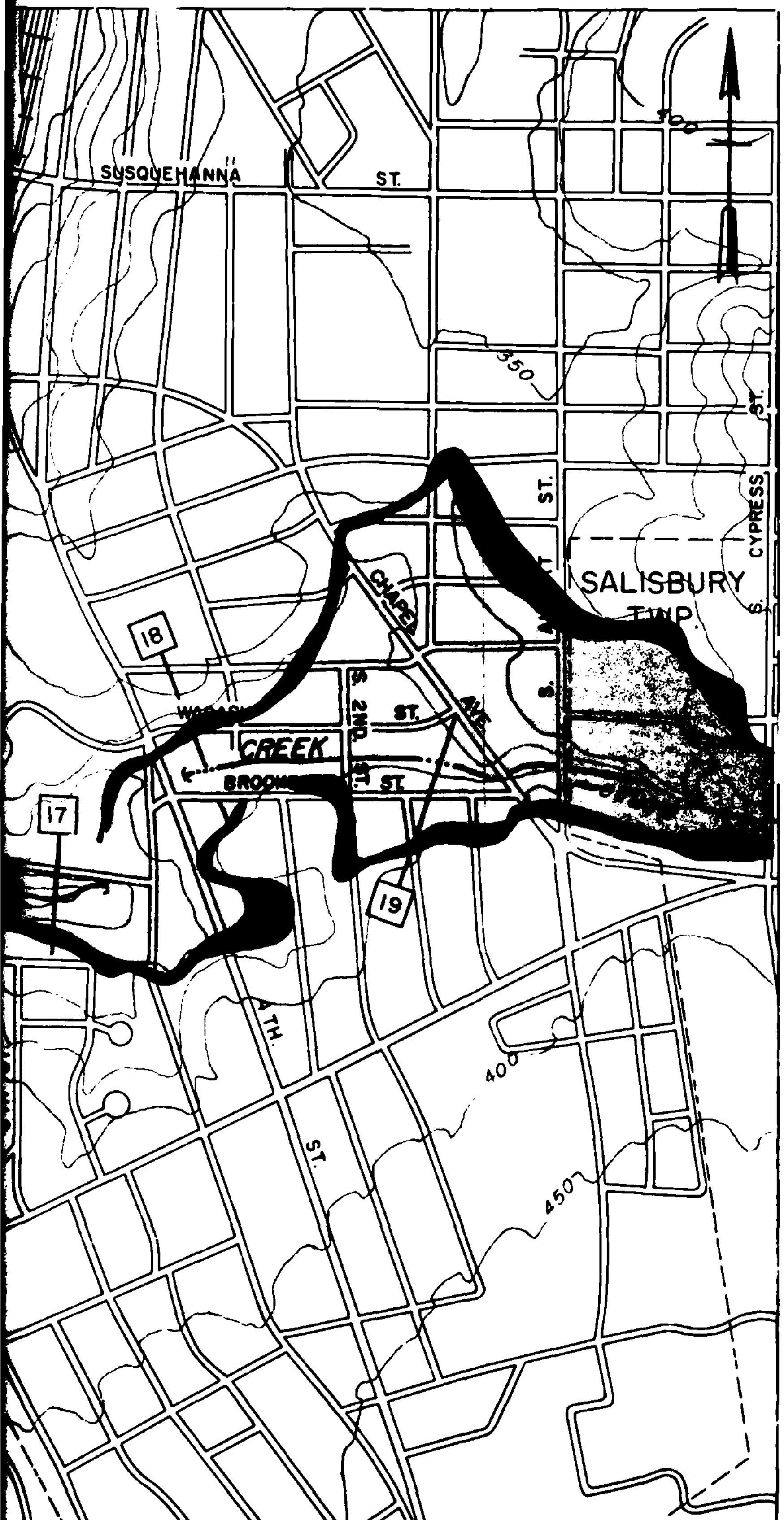
PLATE 4



SALISBURY TWP.
LITTLE LEHIGH CREEK
300
300
350
350
JUNIATA ST.
TIOGA ST.
S. 8TH. ST.
TROUT CREEK
FLOW
ALLEN
15
26
16
27
28
MACK PARK
WEST CREEK
TROUT
DELAWARE ST.
VINE ST.
BAKER DR.
READING RAILROAD
LEHIGH ST.
QUEEN CITY MUNICIPAL AIRPORT
DEVONSHIRE RD.



MATCH LINE PLATE 4
MATCH LINE PLATE 6
ALLENTOWN
SALISBURY TWP.
SALISBURY TWP.
TROUT CREEK
TROUT FLOW
CREEK
TROUT CREEK PARK
FOOT BRIDGES
SUSQUEHANNA ST.
S. 8TH. ST
CHAPEL AVE.
CYPRESS ST.
S. 2ND. ST.
BROOKSIDE ST.
VINE ST.
DELAWARE ST.
BAKER DR.
CHURCH ST.
6TH ST.
EMMAUS AVE.
13
14
15
16
17
18
19
26
28
300
350
400
450



LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD		STANDARD PROJECT FLOOD

M + 1 — MILES ABOVE MOUTH

13 — CROSS SECTION

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

— — — — ALLENTOWN CITY LIMITS

—··· — STREAM CENTERLINE

NOTES

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4. MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 800 1600

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

FLOOD PLAIN INFORMATION

CITY OF ALLENTOWN
PENNSYLVANIA

FLOODED AREAS

SEPTEMBER 1971

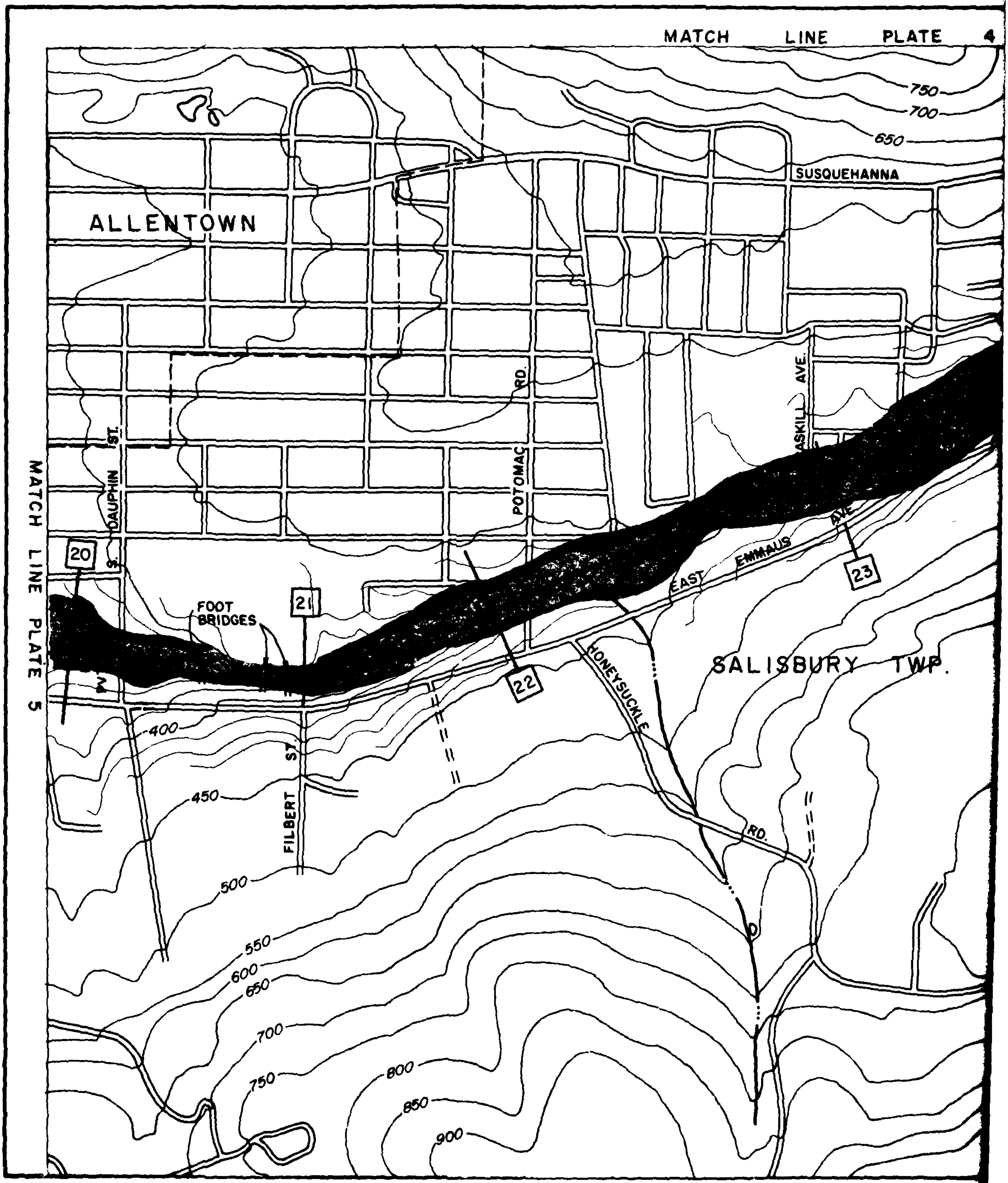
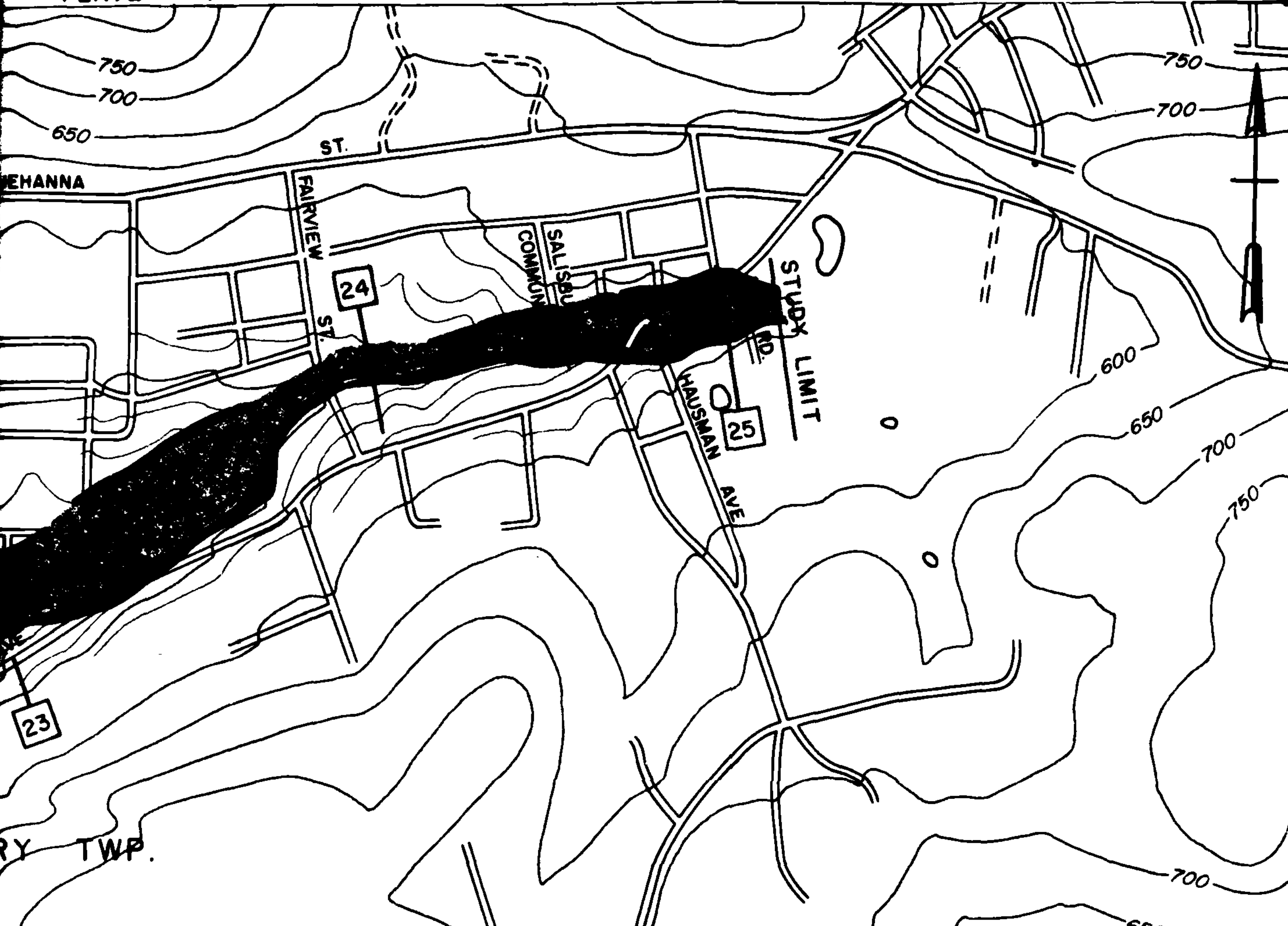

MATCH LINE PLATE 4
MATCH LINE PLATE 5
ALLENTOWN
SUSQUEHANNA
SALISBURY TWP.
DAUPHIN ST.
POTOMAC RD.
KASKILL AVE.
EAST EMMAUS AVE.
HONEYSUCKLE RD.
FILBERT ST.
FOOT BRIDGES
20
21
22
23
750
700
650
400
450
500
550
600
650
700
750
800
850
900

PLATE 4



OV

{IN
RE
FL

M+4 M

24 C

—600— G
G.

AL

ST

NOTES

1. MAP BASED
SHEET ALL
ADDITIONS
CORPS OF

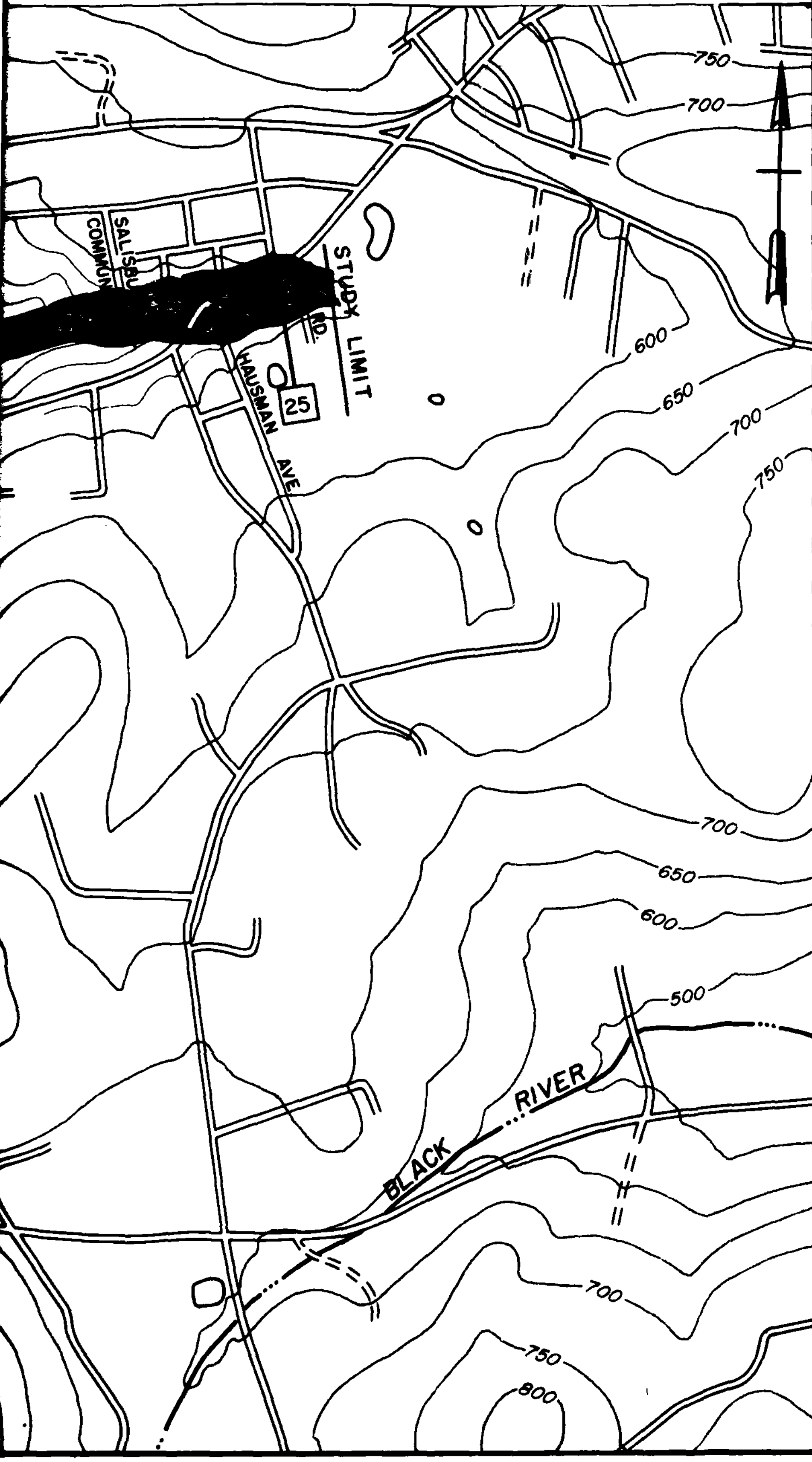
2. LIMITS OF
FROM ACTU
EXPLAINED

3 AREAS OUT
SUBJECT T

4. MINIMUM C

0

DEP
PHILADELPHI
PHILA
FLOO
CI



LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD — STANDARD PROJECT FLOOD

M+4 MILES ABOVE MOUTH

24 CROSS SECTION

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

– – – – ALLENTOWN CITY LIMITS

—··· — STREAM CENTER LINE

NOTES

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SCALE IN FEET

0 800 1600

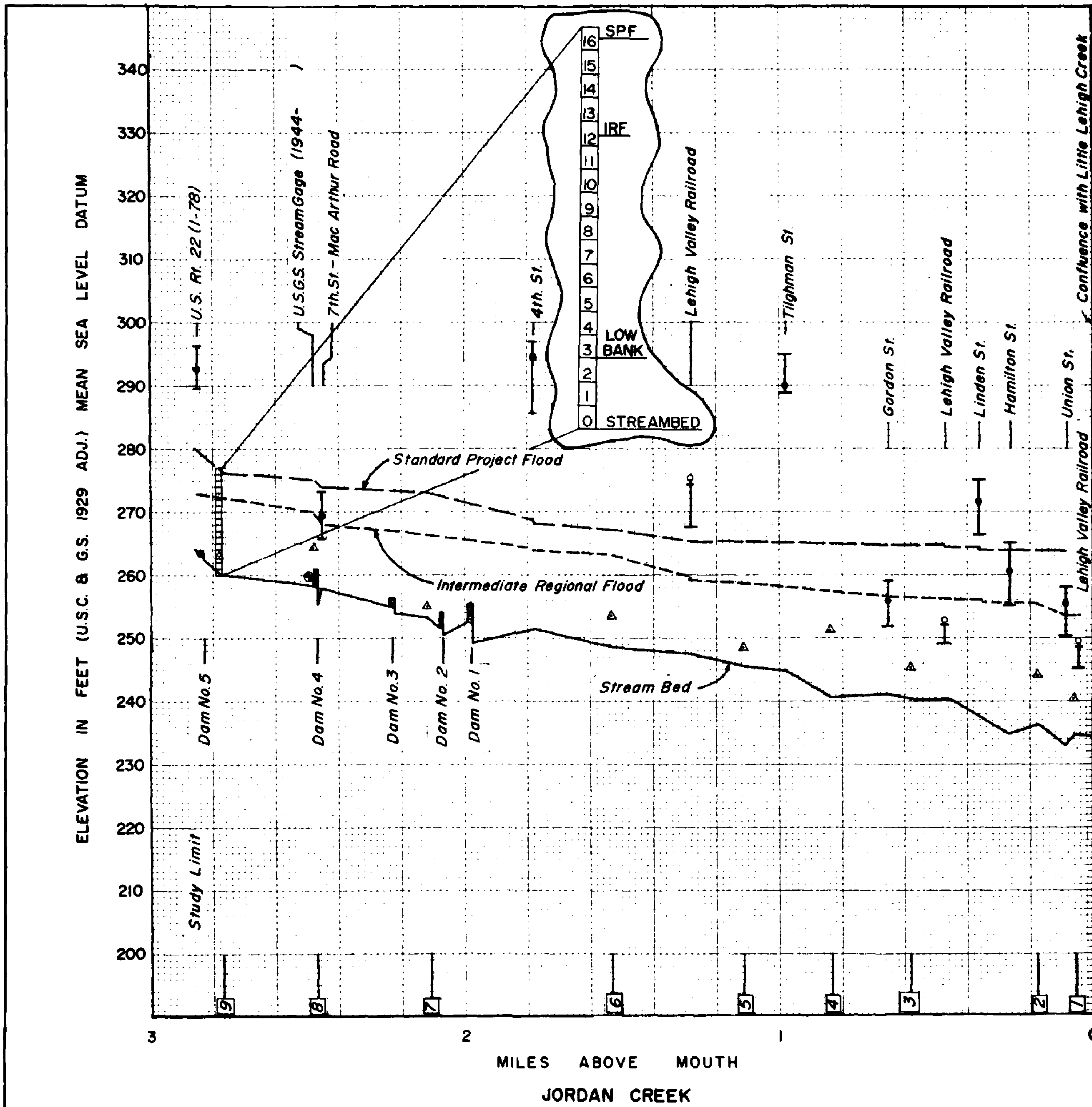
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

CITY OF ALLENTOWN
PENNSYLVANIA

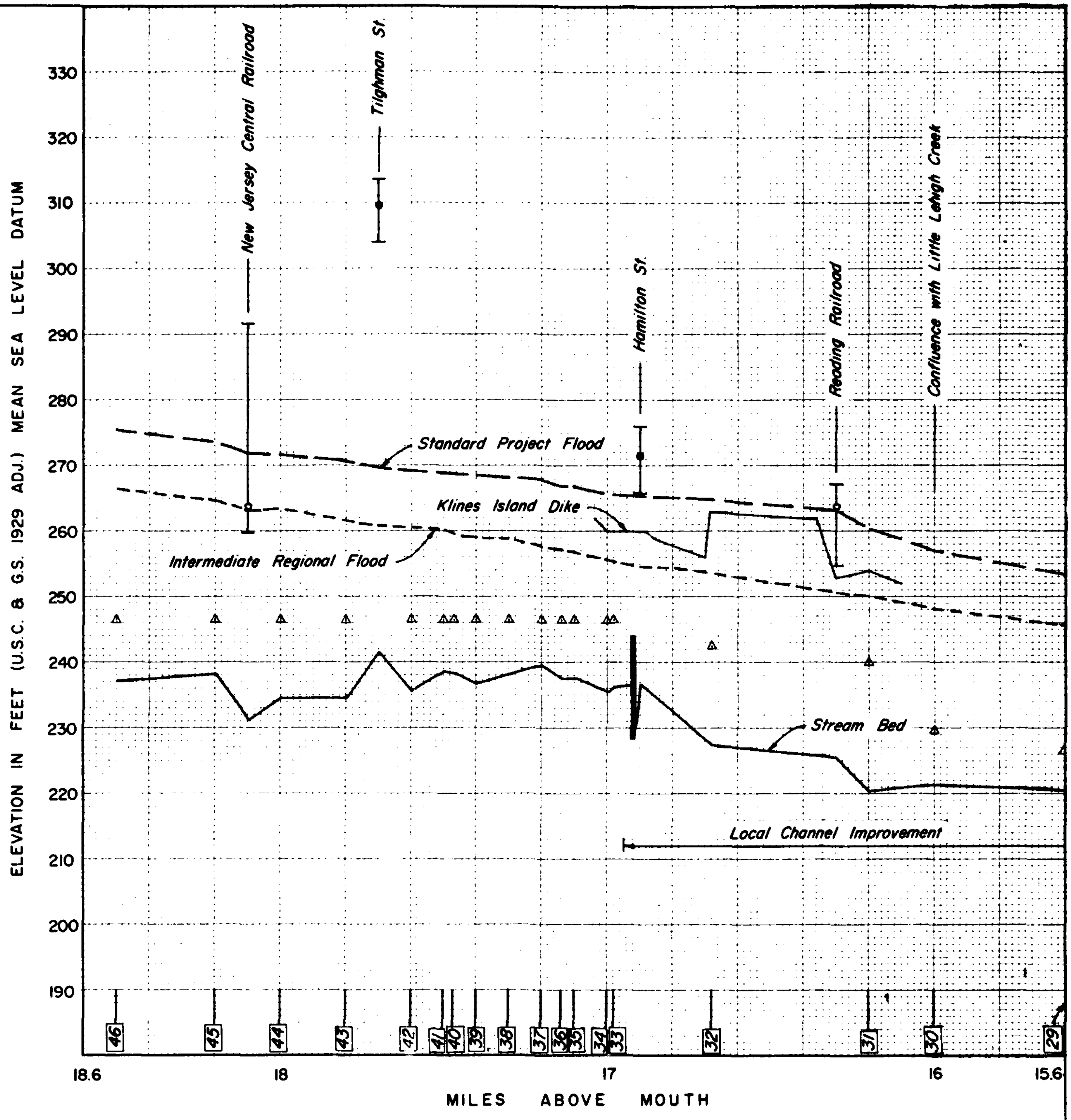
FLOODED AREAS
SEPTEMBER 1971

PLATE 6



LEGEND

Top of Bridge Railing
Bridge Floor
Underclearance
Top of Rail (Railroad Bridge)
Top of Low Bank

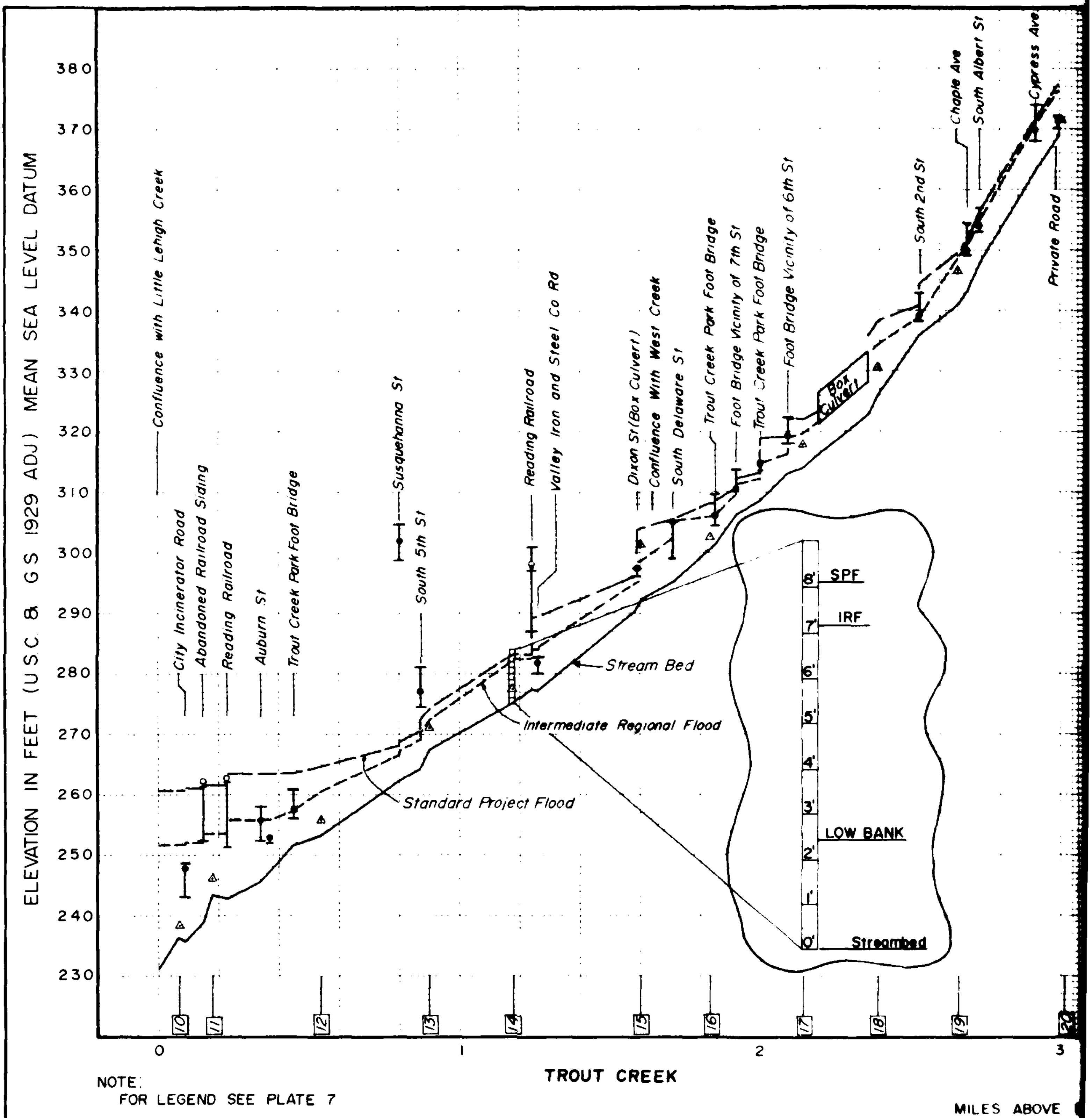


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

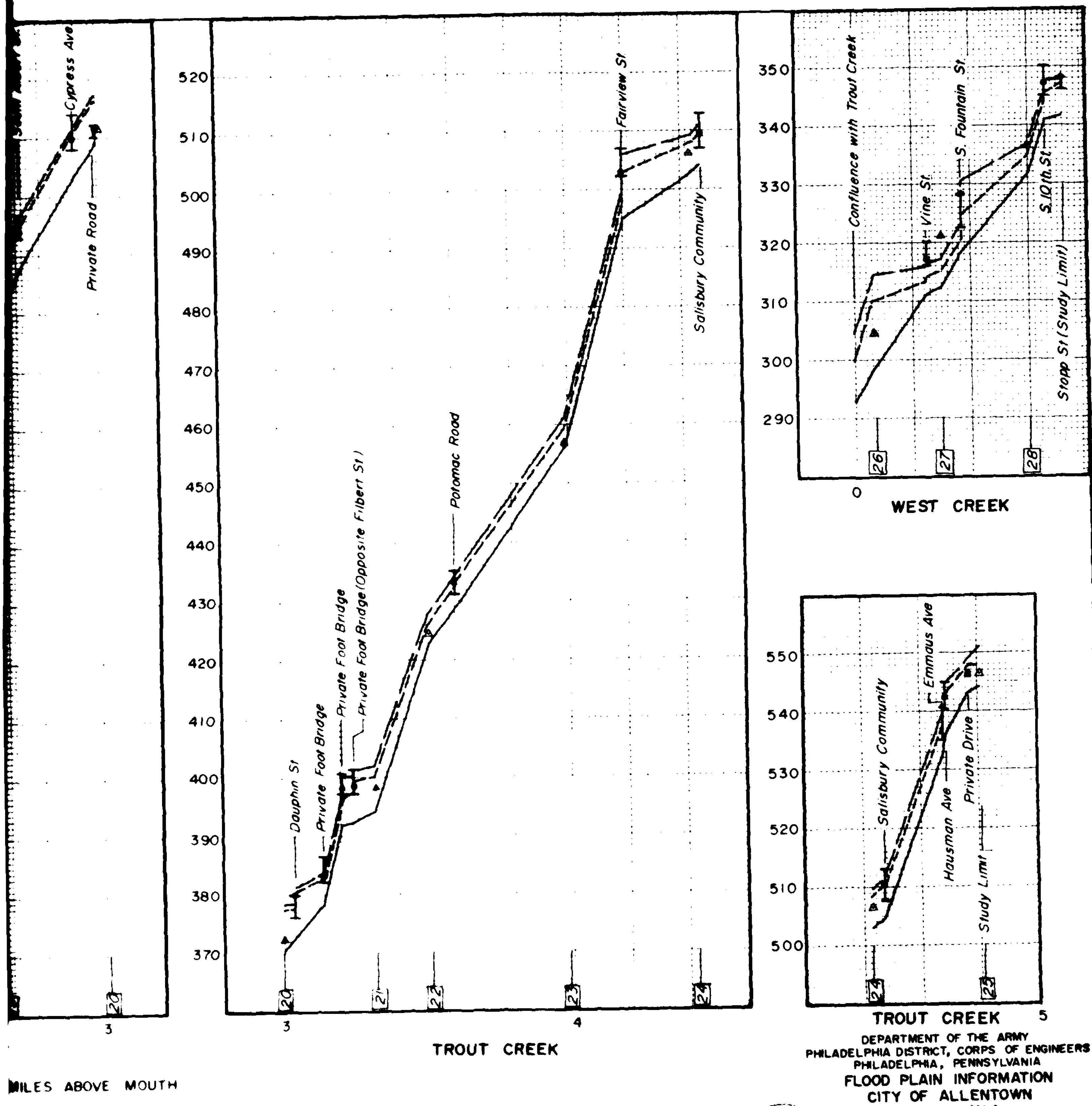
FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA

HIGH WATER PROFILES
JORDAN CREEK & LEHIGH RIVER
SEPTEMBER 1971

PLATE 7



NOTE:
FOR LEGEND SEE PLATE 7



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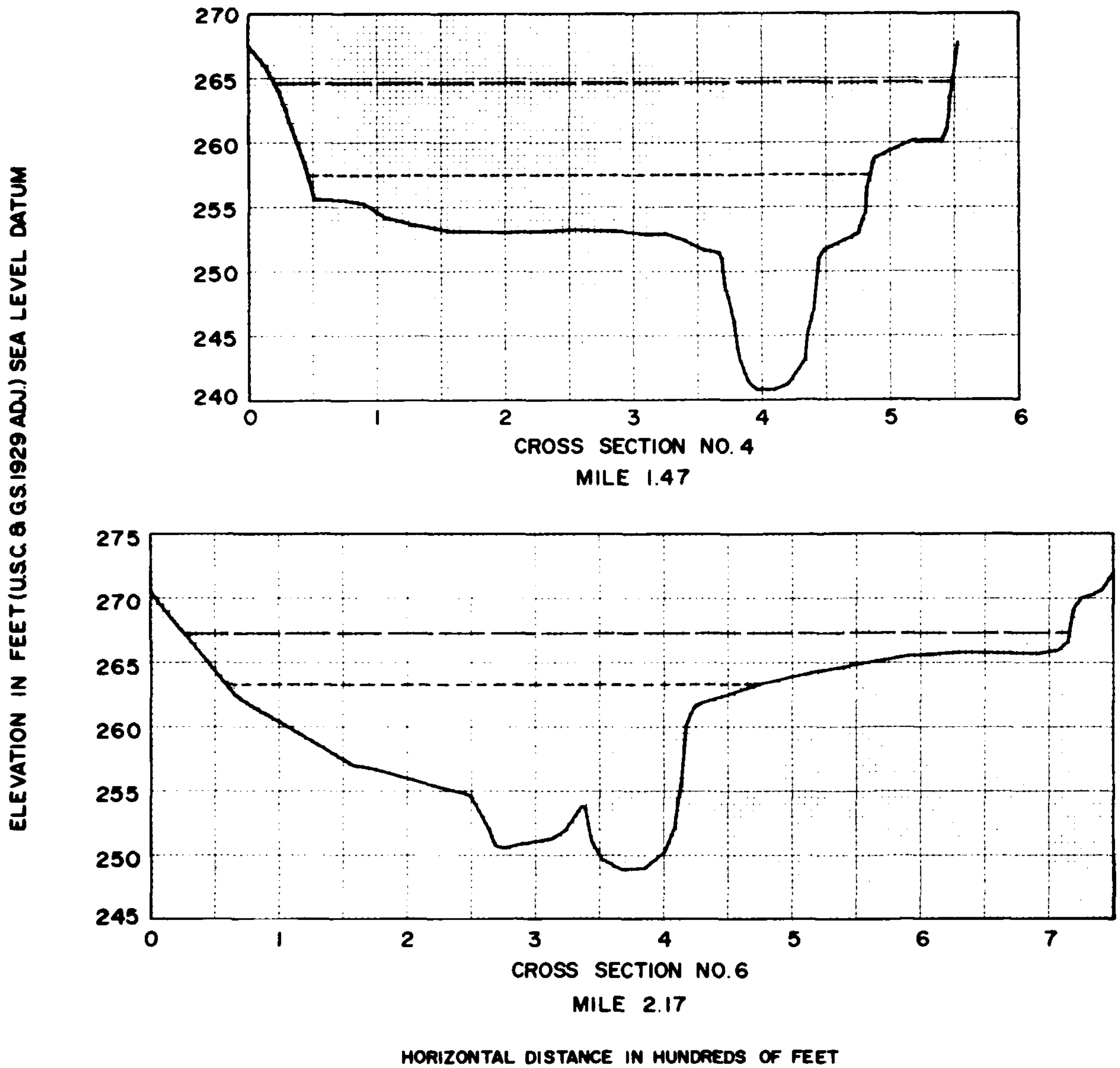
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA

HIGH WATER PROFILES
TROUT & WEST CREEKS
SEPTEMBER 1971

PLATE 8



LEGEND

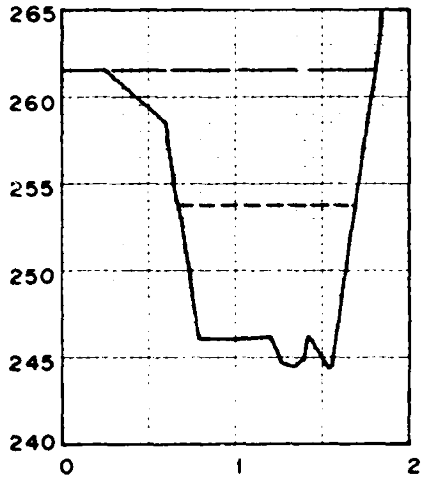
— — — Standard Project Flood
- - - - - Intermediate Regional Flood
Sections taken looking downstream
9 Sections not shown

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

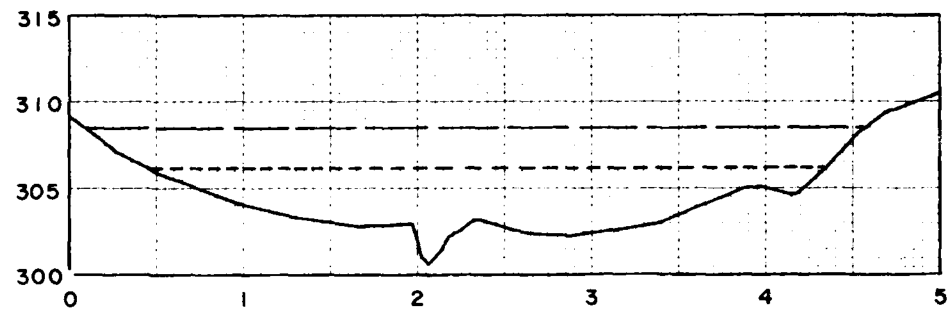
FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA

SELECTED CROSS SECTIONS
JORDAN CREEK
SEPTEMBER 1971

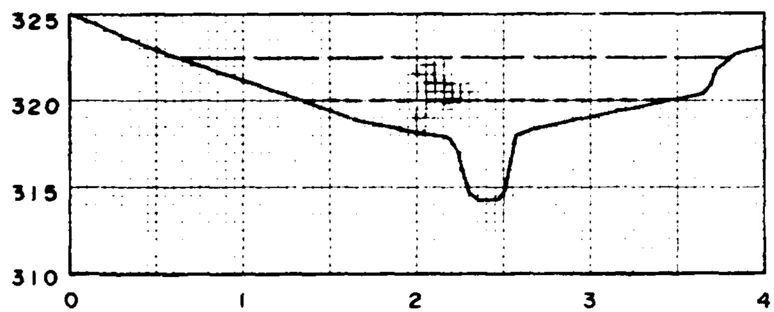
ELEVATION IN FEET (U.S.C. & G.S. 1929 ADJ) SEA LEVEL DATUM



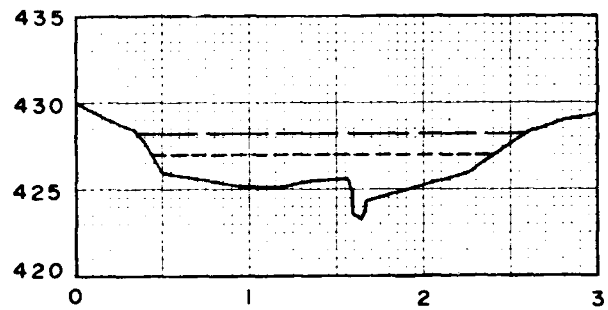
CROSS SECTION NO. 11
MILE 0.18



CROSS SECTION NO. 16
MILE 1.83



CROSS SECTION NO. 19
MILE 2.14



CROSS SECTION NO. 22
MILE 3.51

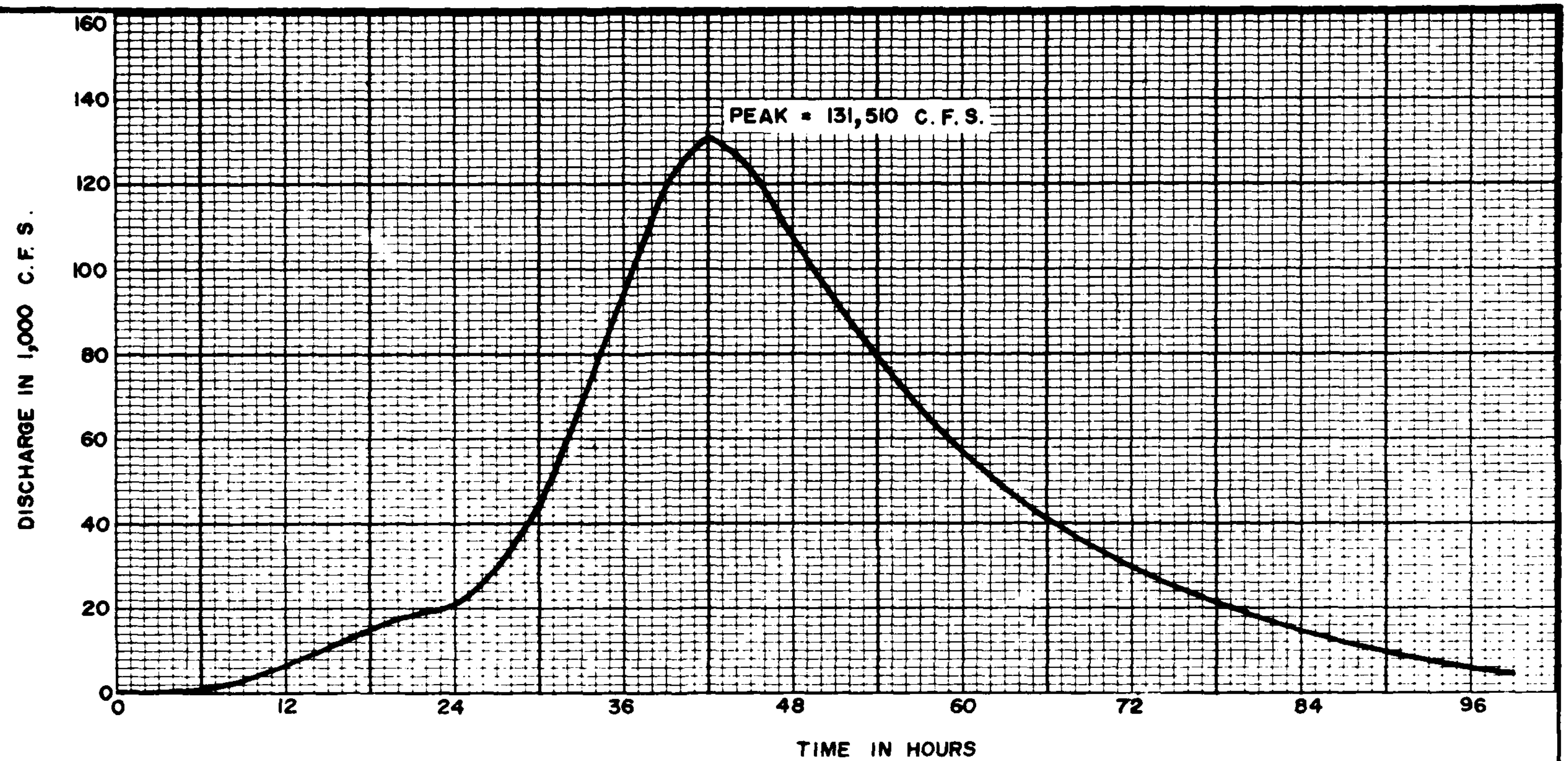
HORIZONTAL DISTANCE IN HUNDREDS OF FEET

LEGEND

——— Standard Project Flood
------- Intermediate Regional Flood
Sections taken looking downstream
15 Sections not shown

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

FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA
SELECTED CROSS SECTIONS
TROUT CREEK
SEPTEMBER 1971



MODIFIED BY RETENTION OF
WALTER & BELTZVILLE RESERVOIRS

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
CITY OF ALLENTOWN
PENNSYLVANIA
LEHIGH RIVER AT
HAMILTON STREET BRIDGE
STANDARD PROJECT FLOOD
HYDROGRAPH
SEPTEMBER 1971

PLATE 11

DATE
FILMED