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ARMY ENGINEER DISTRICT PHILADELPHIA PA
SPECIAL FLOOD HAZARD REPORT, ZACHARIAS CREEK, MONTGOMERY COUNTY--ETC(U)
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LEVEL II



SPECIAL FLOOD HAZARD REPORT

ZACHARIAS CREEK

MONTGOMERY COUNTY, PA

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JUN 1976

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PREPARED FOR
MONTGOMERY COUNTY PLANNING COMMISSION

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

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REPT. NO: DAEN/NAP-82040/SFH05-76/06

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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

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER DAEN/NAP-82040/SFH05-76/06	2. GOVT ACCESSION NO. AD-A104	3. RECIPIENT'S CATALOG NUMBER 107
4. TITLE (and Subtitle) Special flood hazard report, Zacharias Creek, Montgomery County, Pa. <i>SYL...</i>		5. TYPE OF REPORT & PERIOD COVERED Special Flood hazard report
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER DAEN/NAP-82040/SFH05-76/06
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This special flood hazard information report was undertaken by the U.S. Army Corps of Engineers, Philadelphia District at the request of the Montgomery County Planning Commission. It covered the Zacharias Creek from its confluence with Skippack Creek at Skippack Township to the study limit at Morris Road, Upper Gwynedd Township, a distance of 4.8 miles. An unnamed tributary to Zacharias Creek has been referred to within the report as North Branch Zacharias Creek. The		

hydrology, hydraulics and drainage areas of the creek, were described. The data also included peak flows for the 10, 50, 100 year floods, rise and duration of flooding and flood profiles.

The information given within the scope of this report should be considered for its historical value. Since the publication of this report other flood insurance studies have been undertaken and should also be consulted for current information.

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SPECIAL FLOOD HAZARD INFORMATION REPORT
ZACHARIAS CREEK, MONTGOMERY COUNTY, PENNSYLVANIA

Table of Contents

	<u>Page</u>
1.0 AUTHORITY FOR STUDY	1
2.0 DESCRIPTION OF AREA AND LIMITS OF STUDY	1
3.0 HISTORY OF FLOODING	1
4.0 DESCRIPTION OF WORK	2
4.1 Surveys	2
4.2 Hydrology	2
4.3 Hydraulics	2
5.0 ACKNOWLEDGMENTS	3

TABLES

<u>Table</u>	<u>Table Number</u>	<u>Page</u>
Drainage Areas	1	4
Peak Flows for 10-Year, 50-Year, 100-Year and 500-Year Floods	2	5
Elevation Data, Bridges Across Zacharias Creek and North Branch Zacharias Creek	3	6
Maximum Velocities	4	7
Rates of Rise and Duration of Flooding	5	8

PLATES

<u>Plate</u>	<u>Plate Number</u>	<u>Page</u>
General Map	1	End of Report
High Water Profiles	2-5	End of Report
Selected Cross Sections	6	End of Report

SPECIAL FLOOD HAZARD INFORMATION REPORT
ZACHARIAS CREEK, MONTGOMERY COUNTY, PENNSYLVANIA

1.0 AUTHORITY FOR STUDY

This Special Flood Hazard Information Report was undertaken at the request of the Montgomery County Planning Commission with the indorsement of the Pennsylvania Department of Environmental Resources. This report was prepared by the Philadelphia District, U. S. Army Corps of Engineers under continuing authority provided in Section 206 of the 1960 Flood Control Act as amended.

2.0 DESCRIPTION OF AREA AND LIMITS OF STUDY

This report covers the Zacharias Creek from its confluence with Skippack Creek at Skippack Township to the study limit at Morris Road, Upper Gwynedd Township, a distance of 4.8 miles. An unnamed tributary to Zacharias Creek, referred to in this report as North Branch Zacharias Creek, was also studied. The watersheds of Zacharias and North Branch Zacharias Creeks are similar, characterized by rolling, agricultural land with some residential development scattered along the streams. The flood plains vary in width from 200 to 600 feet. The areas adjacent to the stream are generally used for agricultural purposes or are lightly wooded with some areas of sparse development. The study areas of Zacharias Creek and North Branch Zacharias Creek are shown on the General Map. A tabulation of stream mileages and respective drainage areas can be found in Table 1.

3.0 HISTORY OF FLOODING

Floods of large magnitudes have occurred on the Zacharias Creek in 1970, 1971, 1972 and 1973. Major floods have occurred in the study reaches during all seasons of the year. The greatest flood of record for Zacharias Creek occurred in September 1971, with rainfall readings as high as twelve inches recorded in the area. In addition to flooding caused by runoff from general rainfall, the Zacharias Creek Watershed is susceptible to hurricane activity, flash floods and floods from snowmelt in combination with rainfall. A stream gaging station near Skippack, Pennsylvania, has been maintained by the U. S. Geological Survey since 1960 to record flows on Zacharias Creek.

4.0 DESCRIPTION OF WORK

4.1 Surveys

Field surveys, including stream profiles, cross sections and bridge measurements were performed by the Philadelphia District, U. S. Army Corps of Engineers.

4.2 Hydrology

A stream gaging station has been maintained by the U. S. Geological Survey on the Zacharias Creek just downstream of Green Hill Road, Skippack, Pennsylvania. Since the record of this gage is only 14 years in length, additional data was obtained from gaging stations in the vicinity of the Zacharias Creek Watershed. Discharge-frequency relationships for the Zacharias Creek and North Branch Zacharias Creek were developed from available gage data by a regional frequency analysis and distributed throughout the basin by proportional drainage area relationships. Peak flows were thus developed for the 10-Year, 50-Year and 100-Year frequency flood events. The 100-Year Flood is defined as the flood which occurs once in 100 years on the average and has a 1% chance of being equalled or exceeded in any year. Peak flows for the 500-Year Flood were obtained by extrapolating the discharge-frequency curve computed for flood events up to the 100-Year Flood. A tabulation of peak flows for Zacharias Creek and North Branch Zacharias Creek is given in Table 2.

4.3 Hydraulics

Water surface profiles for the 10-, 50-, 100- and 500-Year Flood events for the Zacharias Creek and North Branch Zacharias Creek were computed using the Corps of Engineers' HEC-2 Backwater Program. Starting water surface elevations for the Zacharias Creek were determined from backwater computations of the Skippack Creek. A similar procedure was used to obtain starting water surface elevations on the North Branch Zacharias Creek. Water surface profiles shown in this report were developed based on existing conditions of the watershed at the time field surveys were performed. During an actual flood, debris collecting on bridges and culverts could decrease their water-carrying capacity and cause backwater effects upstream of these structures. However, since the location and extent of debris accumulation are impossible to predict, it was necessary, for the purposes of this report, to assume that bridge and culvert openings would remain unobstructed. In addition to bridges and culverts, there are 3 small dams located on Zacharias Creek within the study area. These dams have essentially no flood storage capacity, nor will they significantly alter the flow characteristics of floodwaters. Water surface profiles thus developed can be found on Plates 1 through 4. A tabulation of flood elevations at all bridges and culverts can be found in Table 3.

Typical stream cross sections on Zacharias Creek and North Branch Zacharias Creek and respective water surface elevations for the four frequency-flood events are shown on Plate 5. Maximum velocities of flow which are expected to occur at these selected cross sections are given in Table 4.

Predicted rates of rise and duration of flooding for the 100-Year Flood on the Zacharias Creek are shown in Table 5.

5.0 ACKNOWLEDGMENTS

The assistance and cooperation of the U. S. Geological Survey, Montgomery County Planning Commission, Pennsylvania Department of Environmental Resources and private citizens in supplying data for the preparation of this report are appreciated.

Additional copies of this report can be obtained from the Montgomery County Planning Commission. The Philadelphia District Office of the Corps of Engineers, Department of the Army, will upon request 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.

TABLE 1
DRAINAGE AREAS
ZACHARIAS CREEK AND NORTH BRANCH ZACHARIAS CREEK

<u>Location</u>	Mileage Above <u>Mouth</u>	<u>Drainage Area</u>	
		<u>Tributary</u> Sq. Mi.	<u>Total</u> Sq. Mi.
<u>Zacharias Creek</u>			
At mouth	0.00	--	8.2
USGS Crest Stage Gage	1.17	--	7.3
Downstream of Unnamed Tributary	1.69	--	6.4
North Branch Zacharias Creek	3.57	0.7	2.7
Downstream of Unnamed Tributary	3.64	--	2.0
<u>North Branch Zacharias Creek</u>			
At mouth	0.00	--	0.7

TABLE 2

PEAK FLOWS FOR THE 10-YEAR, 50-YEAR, 100-YEAR AND 500-YEAR FLOODS

ZACHARIAS CREEK AND NORTH BRANCH ZACHARIAS CREEK

Location	Mileage Above Mouth	Drainage Area Sq. Mi.	Discharges			
			10- Year Flood cfs	50- Year Flood cfs	100- Year Flood cfs	500- Year Flood cfs
<u>Zacharias Creek</u>						
Confluence with Skipack Creek	0.00	8.2	4,500	8,100	10,400	16,200
USGS Crest Stage Partial Record Gage	1.17	7.3	4,200	7,500	9,600	15,000
Downstream of Unnamed Trib- utary	1.69	6.4	3,700	6,600	8,400	13,100
Downstream of North Branch Zacharias Creek	3.57	2.7	2,100	3,700	4,700	7,400
Downstream of Unnamed Trib- utary	3.64	2.0	1,600	2,800	3,600	5,700
<u>North Branch Zacharias Creek</u>						
Confluence with Zacharias Creek	0.00	0.7	500	900	1,200	1,900

TABLE 3

ELEVATION DATA

BRIDGES ACROSS ZACHARIAS CREEK AND NORTH BRANCH ZACHARIAS CREEK

<u>Identification</u>	<u>Mileage</u> Above <u>Mouth</u>	<u>Underclearance</u> <u>Elevation</u> Feet-Mean Sea Level Datum	<u>Water Surface Elevation (a)</u>	
			<u>100-Year</u> <u>Flood</u> Feet-Mean Sea	<u>500-Year</u> <u>Flood</u> Level Datum
<u>Zacharias Creek</u>				
Stump Hall Road	0.01	150.0	158.0	162.8
Green Hill Road	1.19	177.2	183.5	185.0
Frog Hollow Road	1.75	191.6	195.0	196.2
Pa. Rte. 363	2.44	220.3	223.9	227.7
Pa. Rte. 73	2.91	232.6	236.7	237.7
Private Road	3.00	236.4	240.3	242.2
Farm Road	3.27	242.0	250.9	252.7
Weber Road	3.85	266.9	270.8	271.4
Pa. Turnpike (N.E. Ext.)	4.27	288.8	294.0	300.3
Berks Road	4.51	292.1	295.8	300.4
Footbridge	4.66	296.5	300.1	301.1
Morris Road	4.80	303.0	303.7 (b)	304.6 (b)
<u>North Branch Zacharias Creek</u>				
Weber Road	0.53	287.1	289.5	290.1
Pa. Turnpike (N.E. Ext.)	0.63	292.1	293.8	294.4
Morris Road	0.87	312.2	312.8 (b)	313.3 (b)

(a) Flood elevations are reported for the upstream side of the bridge.

(b) Downstream side of the bridge.

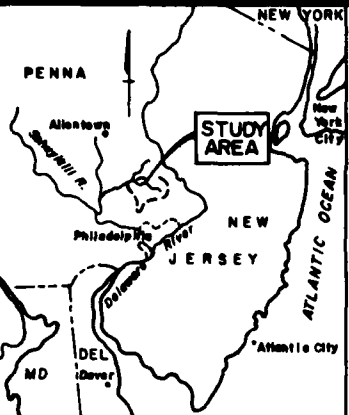
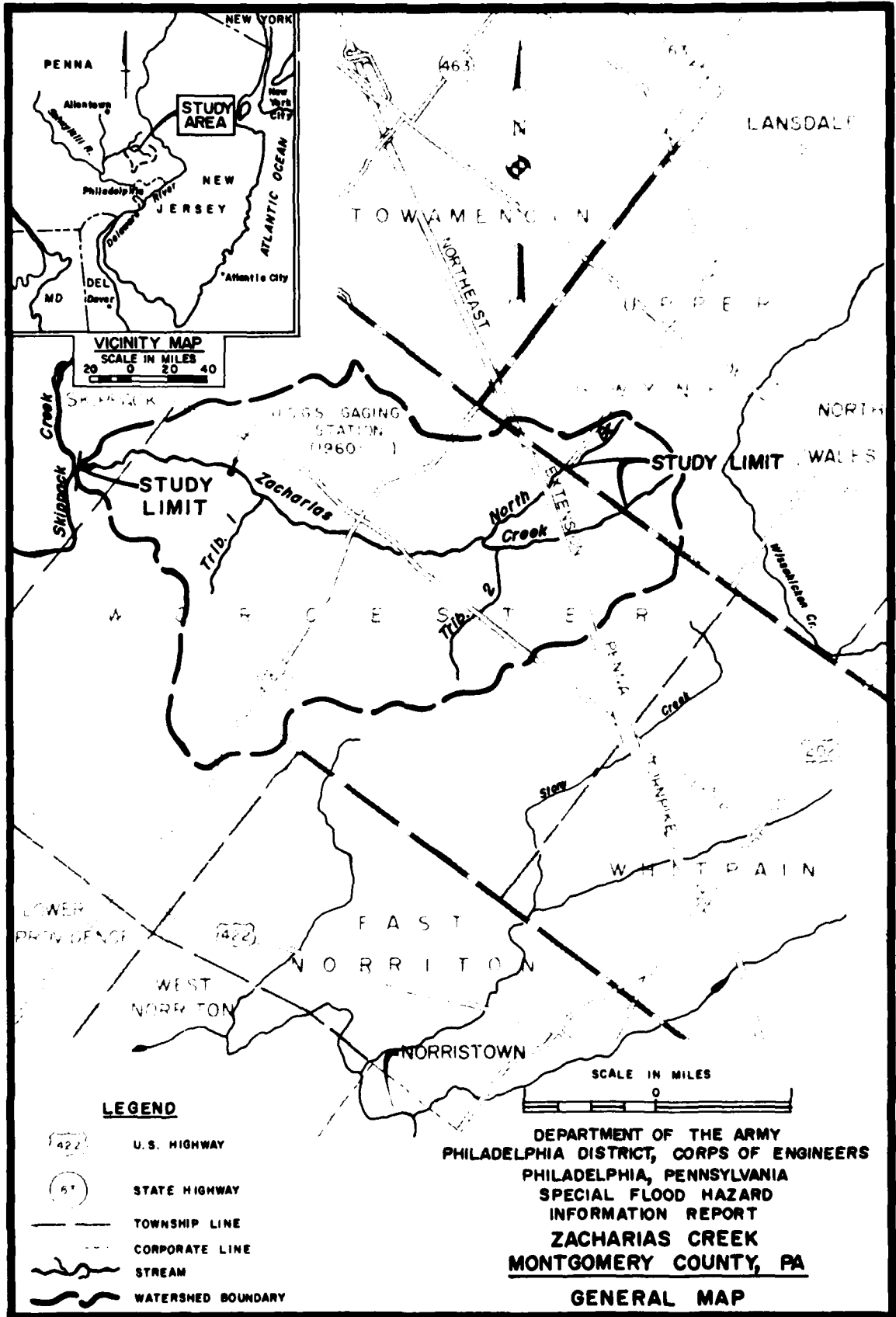
TABLE 4
 MAXIMUM VELOCITIES
 SELECTED CROSS SECTIONS
 ZACHARIAS CREEK AND NORTH BRANCH ZACHARIAS CREEK

<u>Cross Section</u>	<u>Mileage Above Mouth</u>	<u>Maximum Velocities</u>			
		<u>100-Year Flood</u>		<u>500-Year Flood</u>	
		<u>Channel</u>	<u>Overbank(a)</u>	<u>Channel</u>	<u>Overbank(a)</u>
		<u>ft/sec</u>	<u>ft/sec</u>	<u>ft/sec</u>	<u>ft/sec</u>
<u>Zacharias Creek</u>					
4	1.68	11.7	5.9	12.1	6.5
7	3.21	14.5	2.8	16.6	3.5
8	3.50	11.2	4.7	10.8	4.8
11	4.17	10.8	1.8	12.4	2.4
<u>North Branch Zacharias Creek</u>					
15	0.61	10.6	2.4	12.1	2.9

(a) Value given is maximum of left or right overbank velocity.

TABLE 5
 RATES OF RISE AND DURATION OF FLOODING
 ZACHARIAS CREEK
 100-YEAR FLOOD

<u>Location</u>	<u>Mileage Above Mouth</u>	<u>Maximum Rate of Rise ft/hr</u>	<u>Height of Rise ft</u>	<u>Time of Rise hrs</u>	<u>Duration of Critical Stage hrs</u>
Cross Section 4	1.68	2.4	5.4	8.5	11.6



VICINITY MAP
SCALE IN MILES
0 20 40

SCALE IN MILES
0 20 40

LEGEND

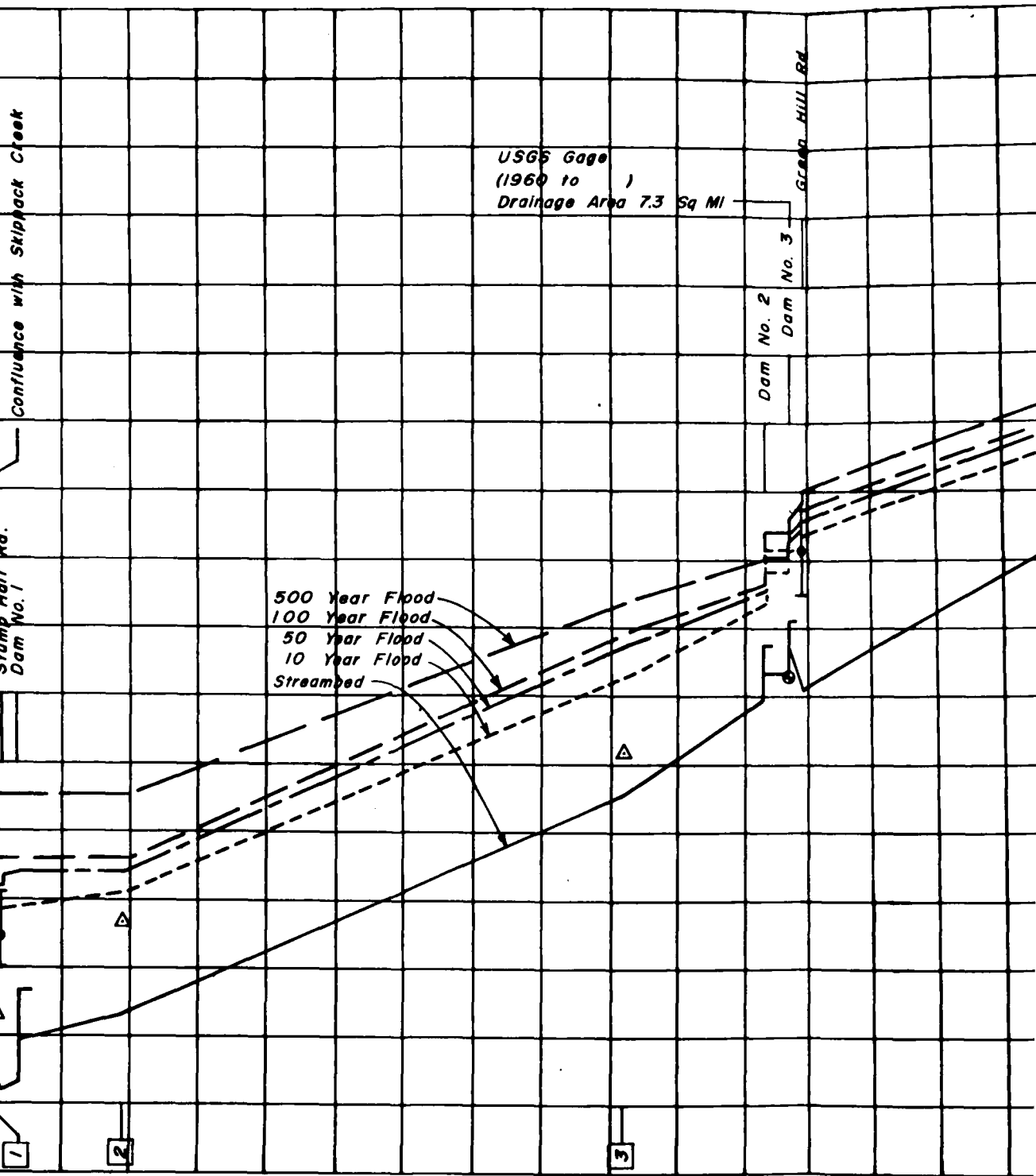
- U. S. HIGHWAY
- STATE HIGHWAY
- TOWNSHIP LINE
- CORPORATE LINE
- STREAM
- WATERSHED BOUNDARY

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ZACHARIAS CREEK
MONTGOMERY COUNTY, PA

GENERAL MAP

ELEVATION IN FEET SEA LEVEL DATUM

220
210
200
190
180
170
160
150
140
0



USGS Gage
(1960 to)
Drainage Area 7.3 Sq Mi

500 Year Flood
100 Year Flood
50 Year Flood
10 Year Flood
Streambed

Confluence with Skipjack Creek

Stump Hill Rd.
Dam No. 1

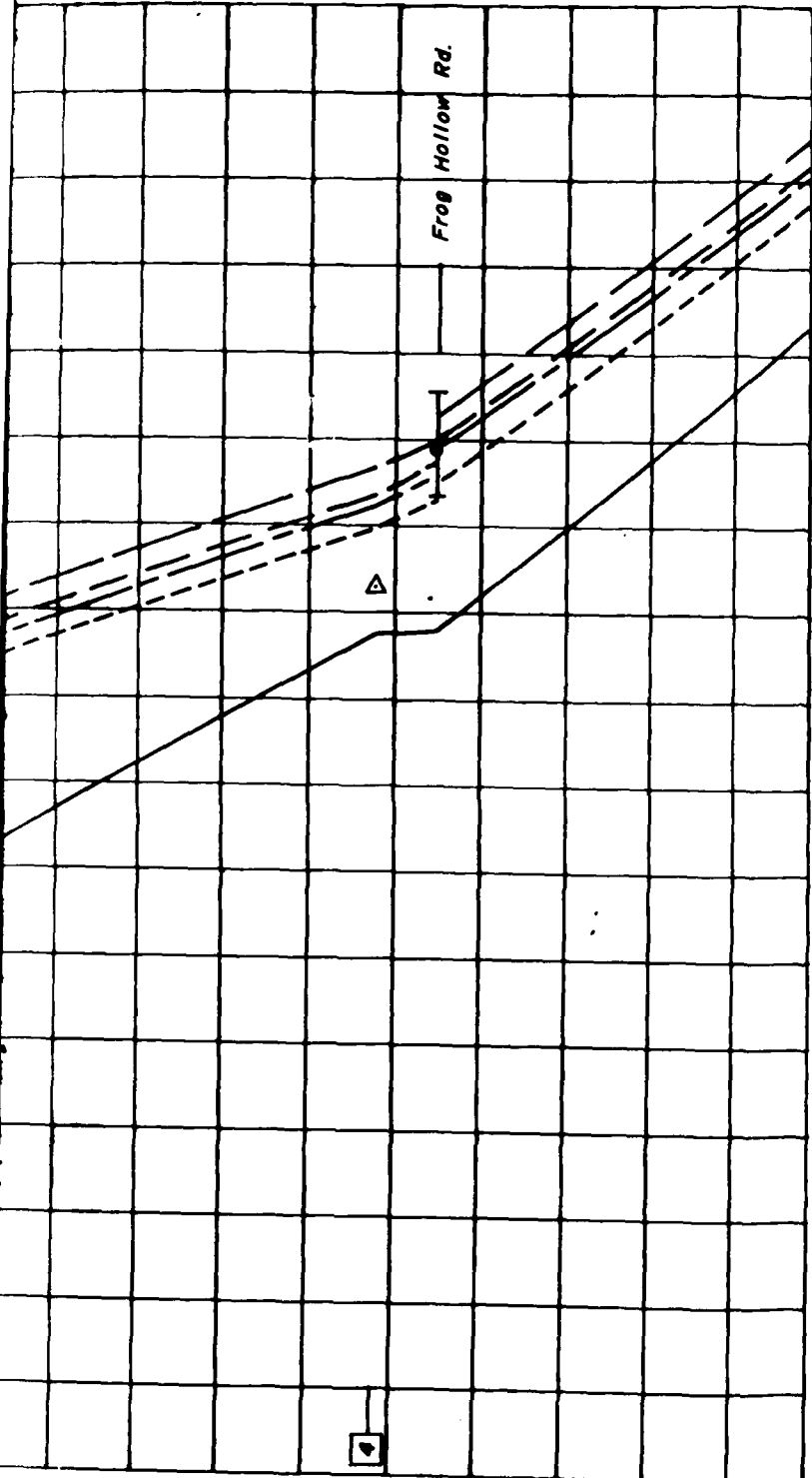
Grand Hill Rd
Dam No. 2
Dam No. 3

MILES ABOVE MOUTH

1

2

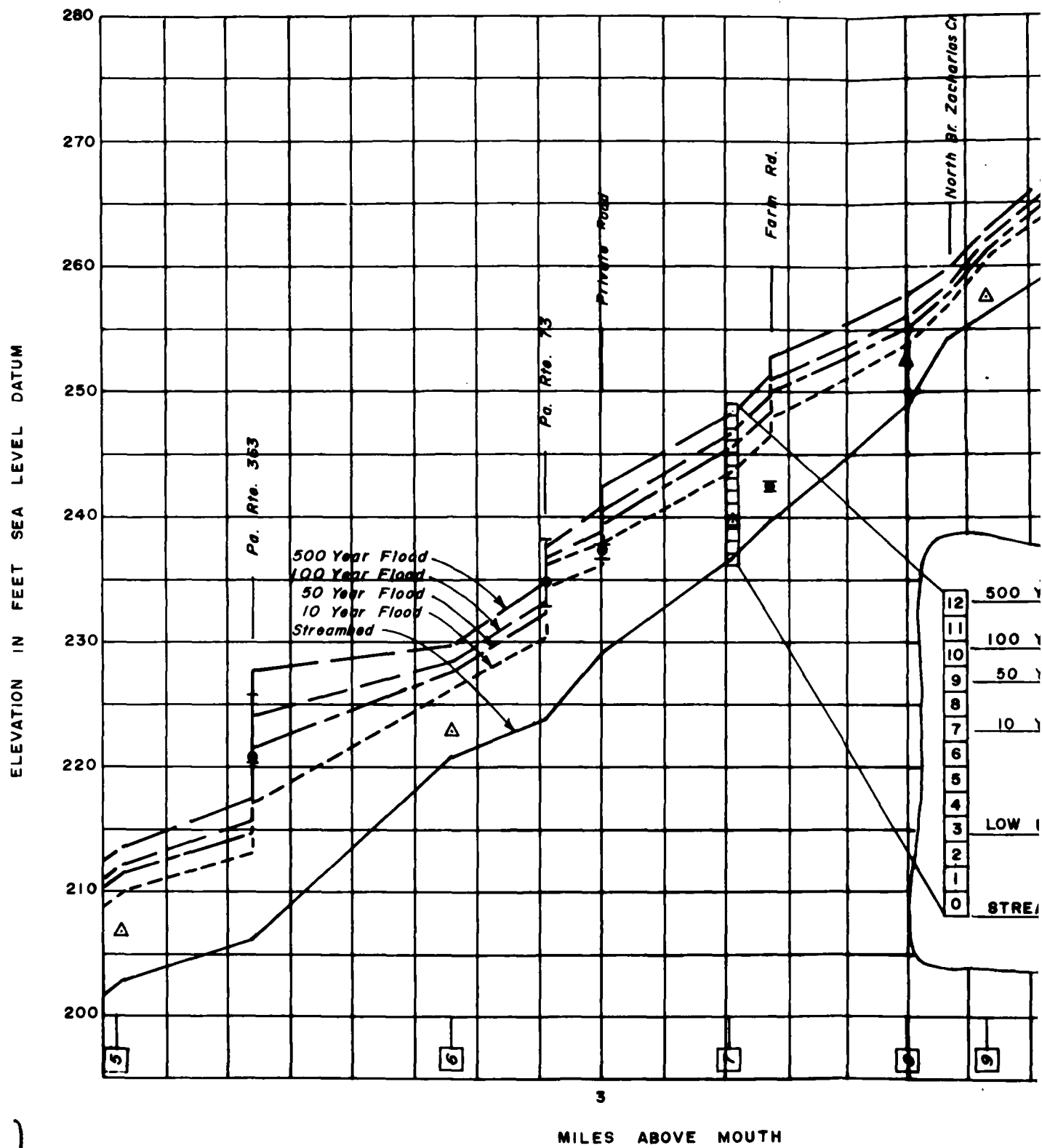
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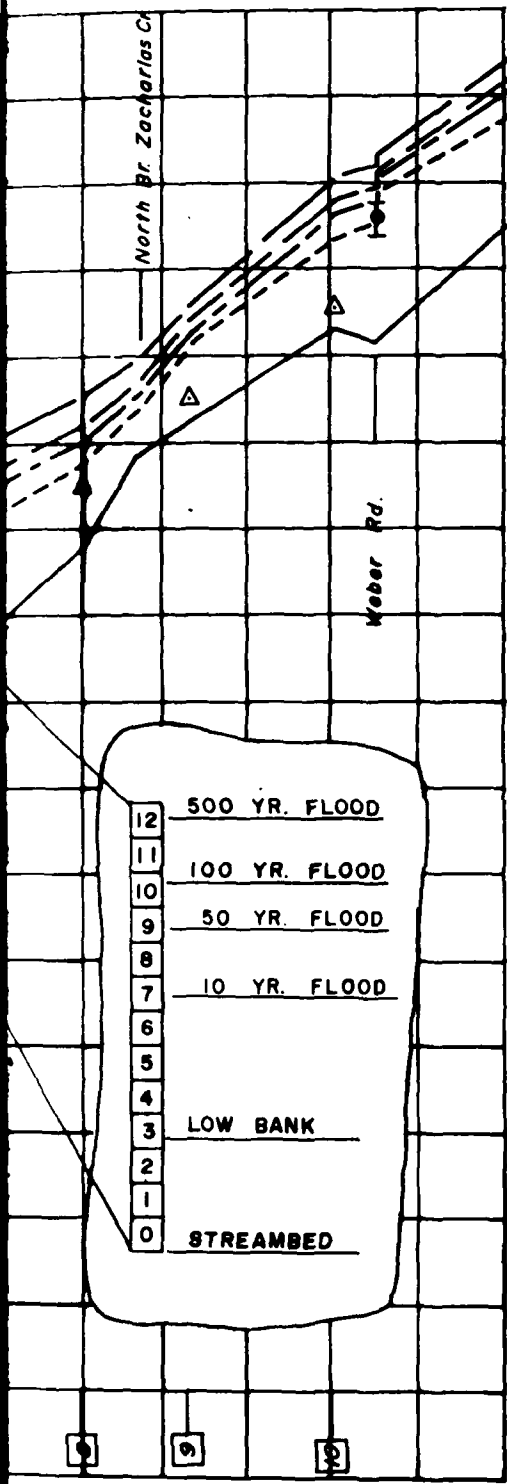
LEGEND

- ⌋ Top of Bridge Railing
- Bridge Floor
- | Underclearance
- △ Top of Low Bank
- / Cross Section

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 MONTGOMERY COUNTY, PA
 HIGH WATER PROFILES
 ZACHARIAS CREEK



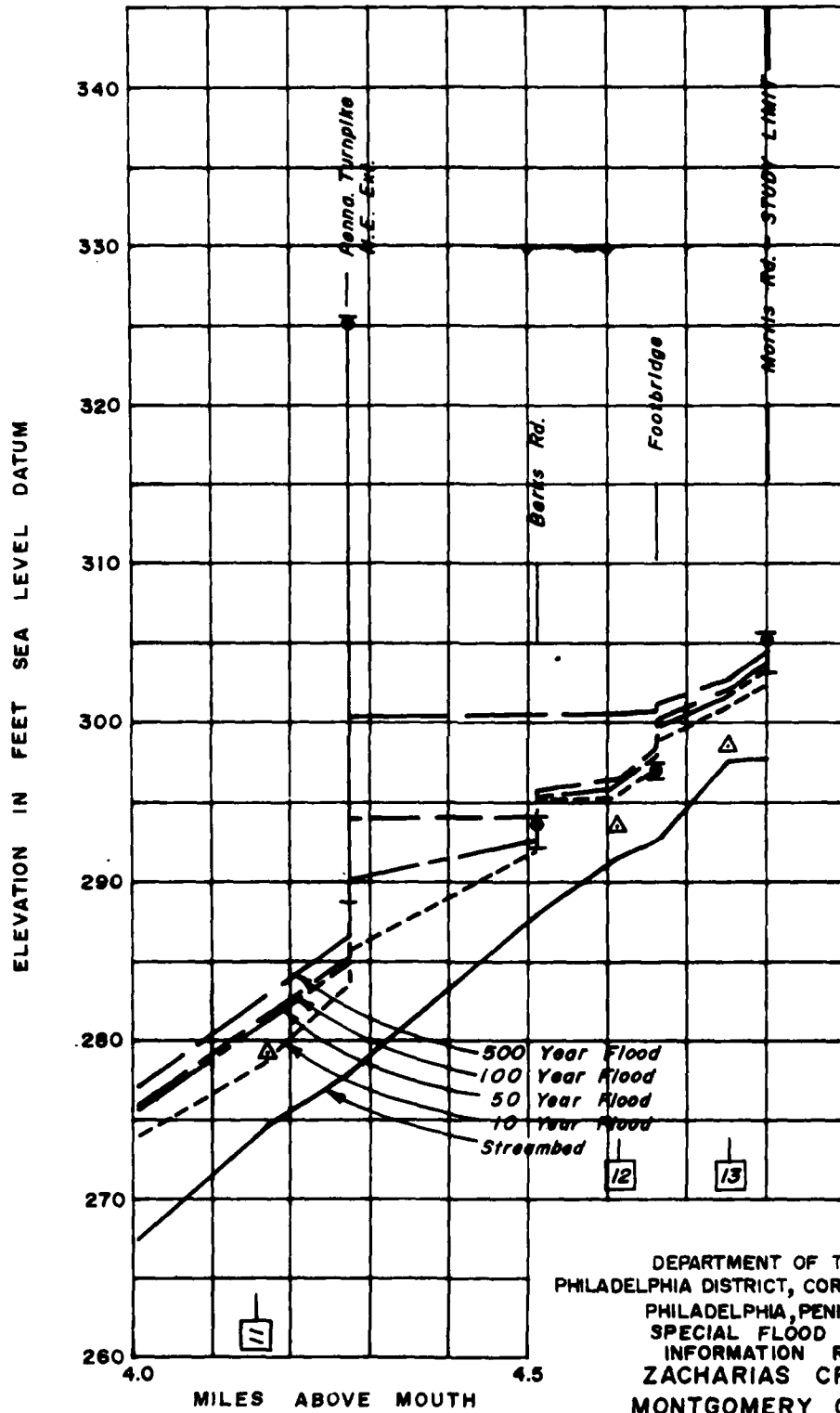
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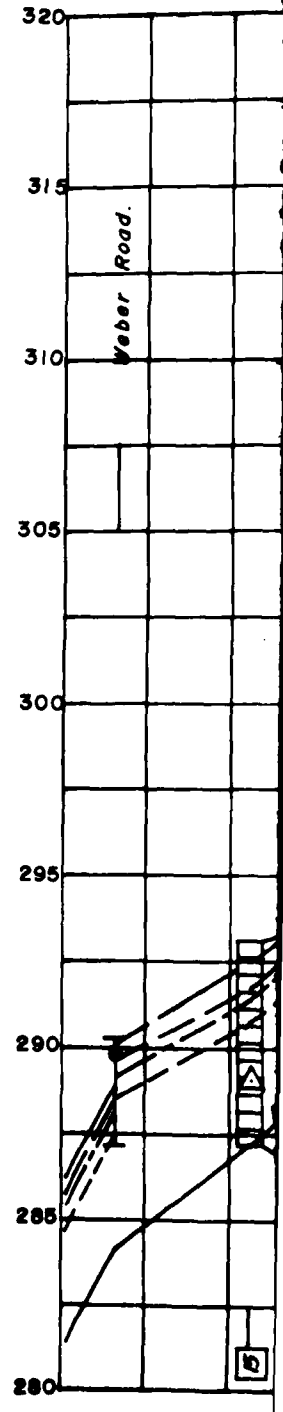
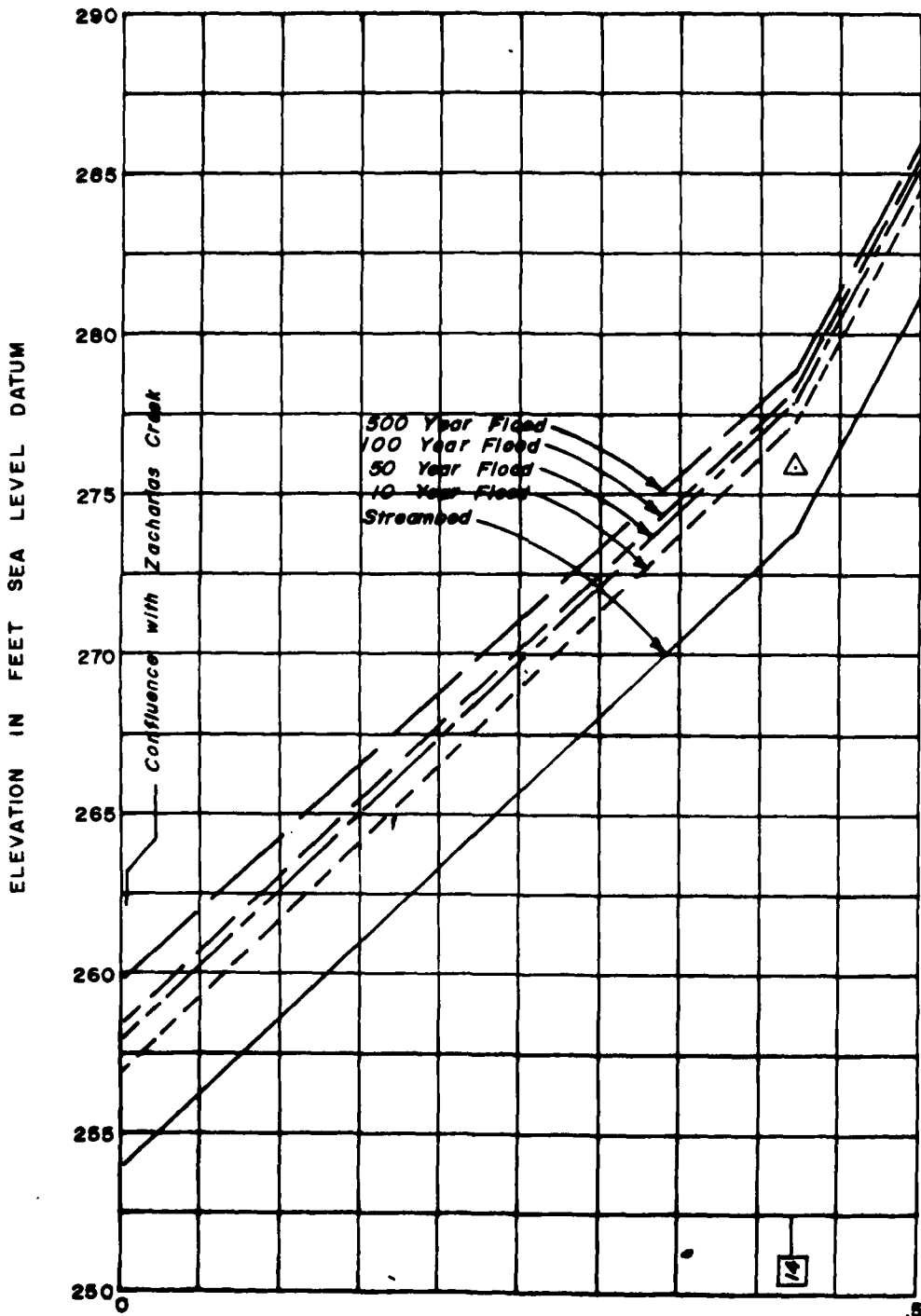
- | Top of Bridge Railing
- Bridge Floor
- | Underclearance
- △ Top of Low Bank
- 5 Cross Section

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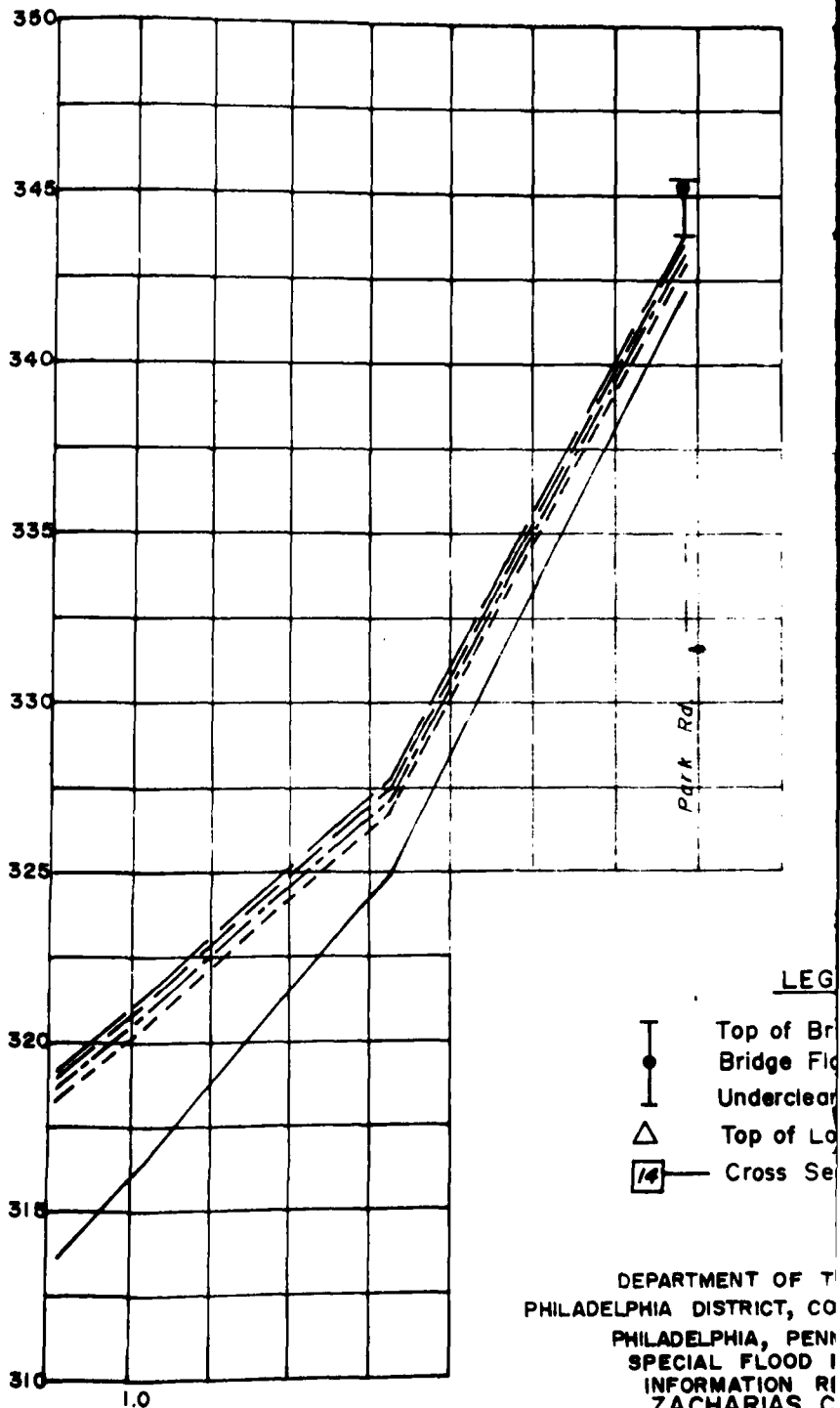
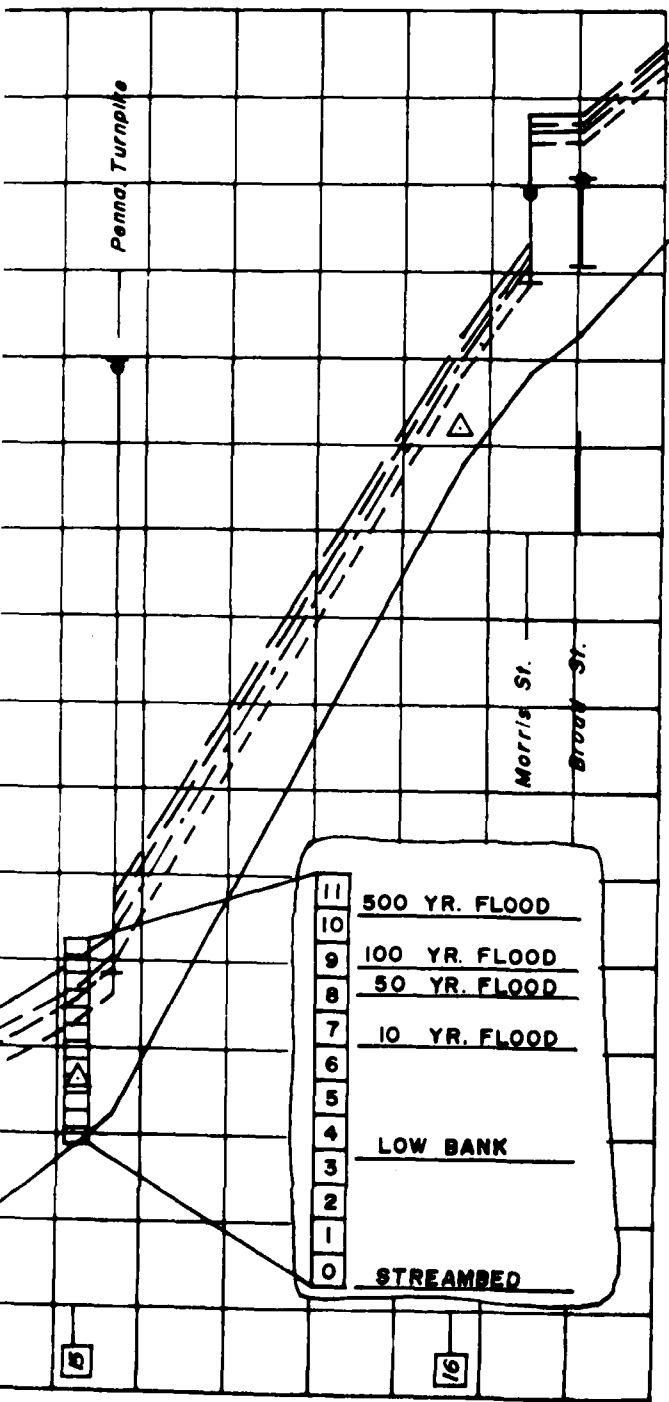


FOR LEGEND SEE PLATE 6

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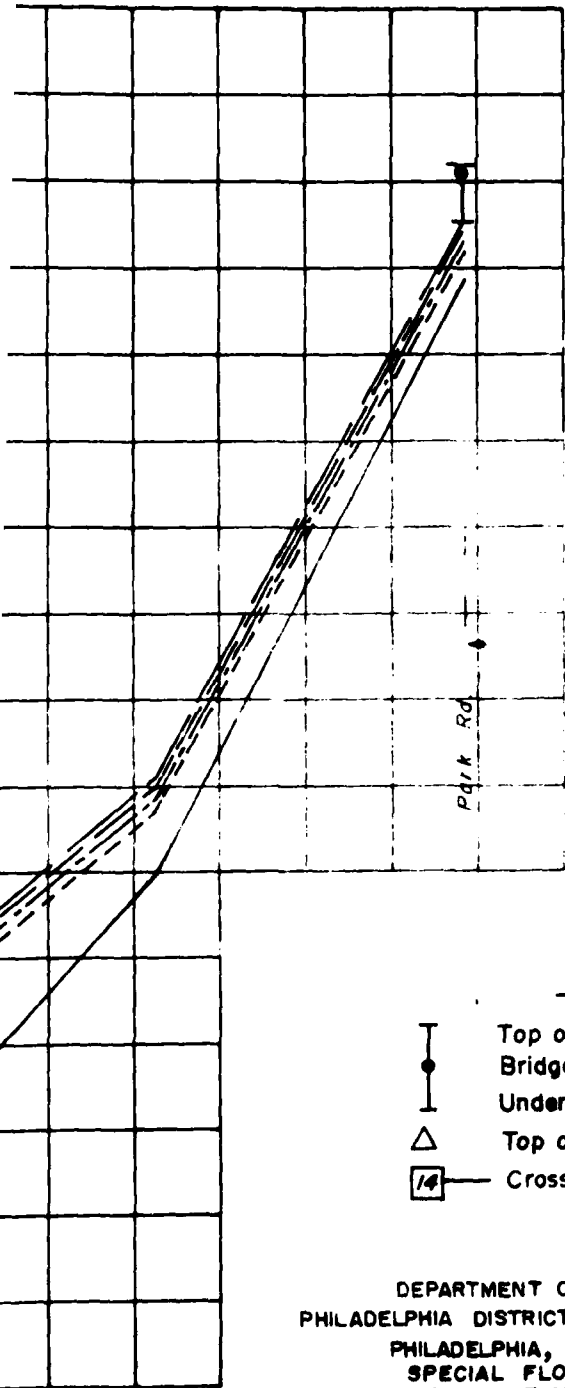
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• MILES ABOVE MOUTH

2



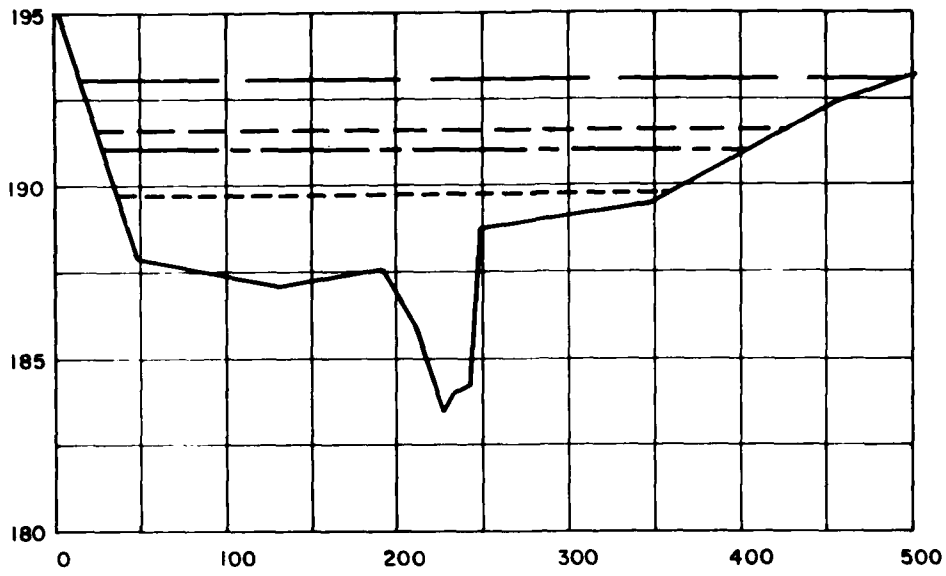
LEGEND

-  Top of Bridge Railing
-  Bridge Floor
-  Underclearance
-  Top of Low Bank
-  Cross Section

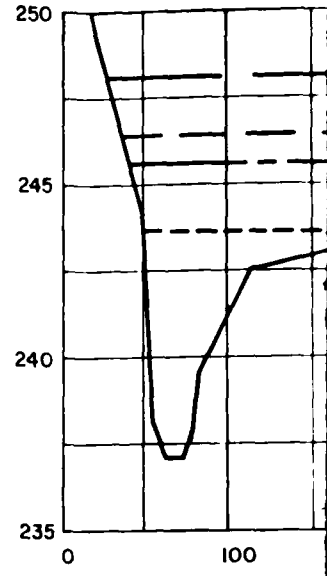
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 NORTH BRANCH ZACHARIAS CREEK

3

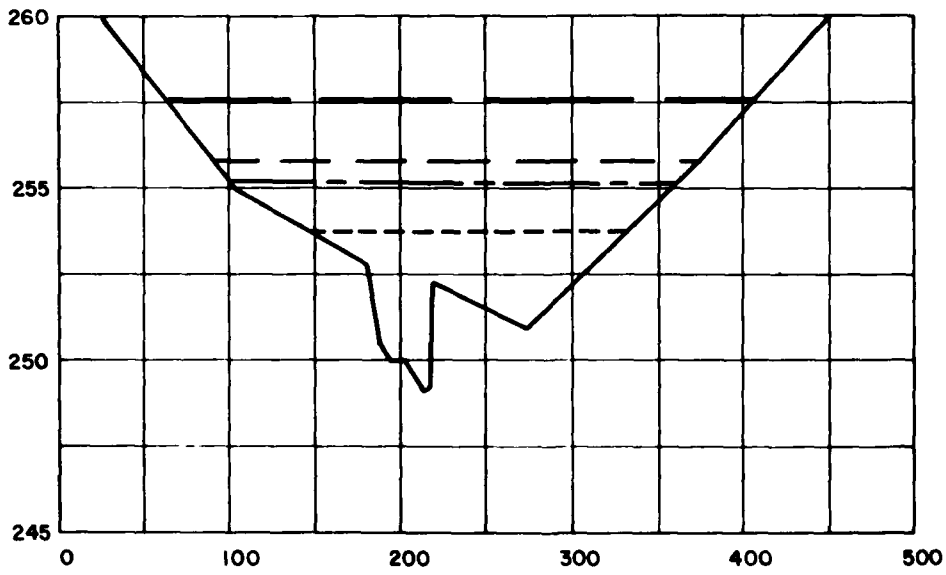
ELEVATION IN FEET SEA LEVEL DATUM



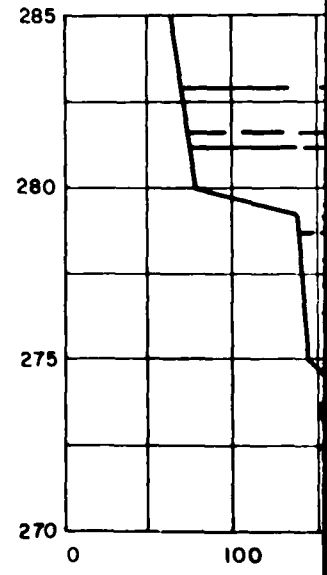
CROSS SECTION NO. 4
MILE 1.68



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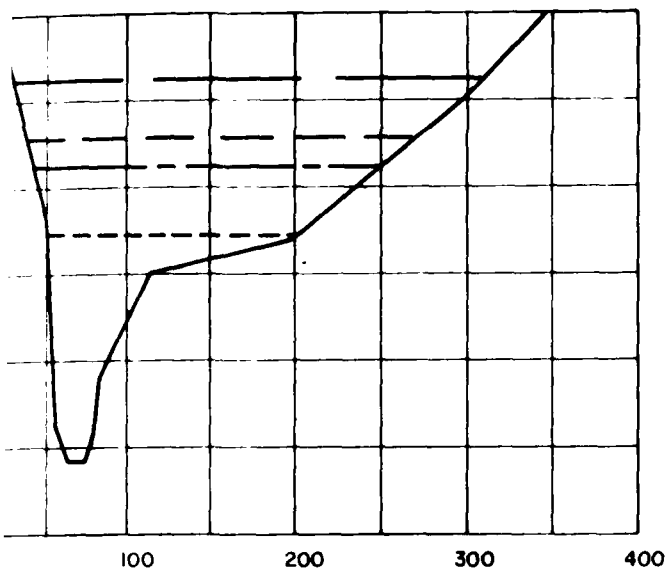


CROSS SECTION NO. 8
MILE 3.50

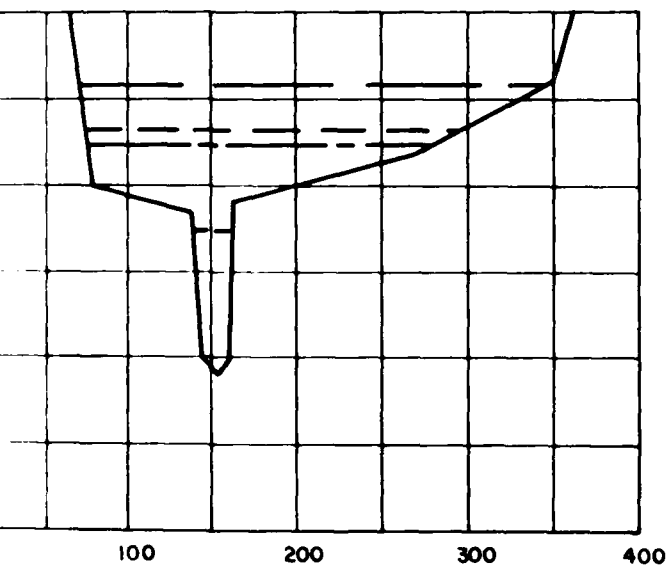


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HORIZONTAL DISTANCE IN FEET



CROSS SECTION NO.7
MILE 3.21



CROSS SECTION NO.11
MILE 4.17

ANCE IN FEET

2

LEGEND

- 500 YR. FLOOD
- - - - - 100 YR. FLOOD
- · - · - 50 YR. FLOOD
- - - - - 10 YR. FLOOD
- GROUND LINE

NOTES.

1. THE 12 SECTIONS ON ZACHARIAS CREEK AND NORTH BRANCH ZACHARIAS CREEK NOT SHOWN IN THIS REPORT ARE ON FILE AT THE PHILADELPHIA DISTRICT, CORPS OF ENGINEERS, AND ARE AVAILABLE FOR INSPECTION UPON REQUEST.
2. CROSS SECTIONS TAKEN LOOKING DOWNSTREAM.

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SELECTED CROSS SECTIONS
ZACHARIAS CREEK

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