UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

FLOOD-PLAIN DELINEATION

For

CAMERON RUN BASIN

FAIRFAX COUNTY-ALEXANDRIA CITY, VIRGINIA

Open-File Report 76-443

Prepared in cooperation with the

County of Fairfax

1976

CONVERSION FACTORS

Factors for converting English units to metric units are shown to four significant figures. However, in the text the metric equivalents are shown only to the number of significant figures consistent with the values for the English units.

English	Multiply by	Metric
acres	4.047×10^{-3}	km^2 (square kilometres)
ft^3/s (cubic feet per second	2.832×10^{-2}	m^3/s (cubic metres per second)
ft (feet)	3.048×10^{-1}	m (metres)
in (inches)	$2.540 \times 10^{+1}$	mm (millimetres)
mi (miles)	1.609	km (kilometres)
mi^2 (square miles)	2.590	km^2 (square kilometres)

UNITED STATES
DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY,
WATER RESOURCES DIVISION

FLOOD-PLAIN DELINEATION

For

CAMERON RUN BASIN

FAIRFAX COUNTY-ALEXANDRIA CITY, VIRGINIA

Pat. L. Soule

Open-File Report 76-443

Prepared in cooperation with the
County of Fairfax

1976

WRSIC ABSTRACT

Flood-Plain Delineation for Cameron Run Basin

Water-surface profiles of the 25-, 50-, and 100-year recurrence interval discharges have been computed for all streams and reaches of channels in Fairfax County, Virginia having a drainage area greater than 1 square mile (2.59 km^2) except for Dogue Creek, Little Hunting Creek, and that part of Cameron Run above Lake Barcroft. Maps having a 2-foot (0.60m) contour interval and a horizontal scale of 1 inch (2.54cm) equals 100 feet (30.5m) have been used for a base on which flood boundaries were delineated for 25-, 50-, and 100-year floods to be expected in each basin under ultimate development conditions. This report is the first of a series and presents a discussion of techniques employed in computing discharges and profiles as well as the flood profiles and maps on which flood boundaries have been delineated for that part of Cameron Run basin below Lake Barcroft in both Fairfax County and the city of Alexandria.

CONTENTS

ILLUSTRATIONS

TABLES

Page

Flood - Plain Delineation for Cameron Run Basin

Fairfax County-Alexandria City, Virginia

Pat L. Soule

ABSTRACT

Water-surface profiles of the 25-year and 100-year floods and maps on which the 25-, 50-, and 100-year flood limits are delineated for streams in the Cameron run basin below Lake Barcroft are presented in this report.

The techniques used in the computation of the flood profiles and delineation of flood limits are presented, and specific hydraulic problems encountered within the study area are also included.

INTRODUCTION

Suburban areas in many parts of the United States have experienced remarkable growth over the last decade or so. Much of this growth, which replaced farms and woodlands with streets, housing developments, and shopping centers, caused serious environmental problems. Continued growth and increased competition for desirable space have required careful guidance and planning of future development to insure optimum land use.

Fairfax County and the city of Alexandria began to experience such growth during the early 1950's. In 1959 much of Fairfax County and parts of the city of Alexandria were still rural, but the desirability of regulating encroachment into the flood-hazard areas had become apparent and appropriate local legislation was being enacted by both Alexandria and Fairfax County. For the legislation to be effective, it was necessary to quantify the effect of development on floods and to delineate the boundaries of flood inundation.

The study of Cameron Run basin described in this report, was done as a pilot research project by the U.S. Geological Survey in cooperation with the city of Alexandria and Fairfax County.

Data collection in Cameron Run basin began in July 1959, and continued through the administrative release of maps and a letter report to the county of Fairfax and city of Alexandria in August of 1965. After work started on the Cameron Run project, the county of Fairfax requested that the Geological Survey study the entire county.

This report is the first of a series summarizing the results of the hydraulic analysis done under the cooperative program between the county of Fairfax, the city of Alexandria, and the Geological Survey. The hydrologic analysis has been published separately (Anderson, 1970).

Purpose and scope

The purpose of the Cameron Run study was to determine the boundaries of floods having recurrence intervals of 25-, 50-, and 100-years under conditions of ultimate development. The flood boundaries were to be delineated on large-scale maps that would become a part of the zoning ordinance documents for both Fairfax County and the city of Alexandria.

To achieve the objective of the study, it was necessary to analyze the effects of urbanization upon floodflows and to develop techniques to compute the flood magnitude from measurable basin parameters for any given recurrence interval and for any degree of development. Reasonably accurate methods were available for estimating the magnitude and frequency of floods expected from drainage basins in a rural to a suburban or an urban condition, the magnitude and frequency of flooding also changes. Changes in flood frequency and magnitude resulting from basin development had received only scant study because of the sparse data available.

The cooperative agreement between the U.S. Geological Survey, Fairfax County, and the city of Alexandria established a project to study the effects of basin development on floods and to delineate flood limits on specially prepared maps of stream valleys. The scope of the project included all of the basins in Fairfax County having a drainage area greater than 1 square mile. Excepted were the Dogue Creek and Little Hunting Creek basins, and the upper tributaries of Cameron Run basin, Tripps Run, and Holmes Run above Lake Barcroft. The maps were to have 2-foot (0.60m) contours and be at a scale of 1 inch (2.54cm) equals 100 feet (30.5m). The project allowed for collection of basic data, for analytical investigation, and for definition of flood-prone areas.

Anderson (1970) described the procedures used and the results obtained in the analysis of the effect of urbanization on flooding. He presented mathematical and graphical relations that could be used to estimate the flood discharge at a given recurrence interval up to 100 years for sites in the Washington Metropolitan area having various degrees of development.

The purpose of this report is to provide a consolidated reference containing a summary of the techniques used in computation of flood profiles, a discussion of specific hydraulic problems encountered within the study area, a graphical presentation and listing of flood profiles, and the maps showing the area inundated by floods having recurrence intervals of 25-, 50-, and 100-years.

Acknowledgments

This report was prepared as a part of a cooperative agreement between Fairfax County and the U.S. Geological Survey. This report is a summary and compilation of data released to the city of Alexandria and Fairfax County in the form of a letter report and on maps. The maps and profile tables presented in this report were prepared under the direction of Daniel G. Anderson of the Geological Survey, Reston, Va.

Description of Study Area

Fairfax County and the city of Alexandria are adjacent to and just west of Washington, D.C., (Fig. 1). Alexandria has been a commercial and residential city since Colonial days and in recent years has undergone considerable development and redevelopment. A large part of Fairfax County remains rural but residential development is increasing.

The Cameron Run basin is in the southeastern part of Fairfax County and the southern part of Alexandria between latitudes 38°45'N and 38°55'N and longitudes 77°02'W and 77°12'W (Fig. 2). Cameron is about 10 miles southwest of Washington, D.C. The entire drainage basin is approximately 45 square miles (116 km^2) in area. The part of the drainage basin discussed in this report comprises about 30 square miles (78 km^2). Beginning at the Potomac River, the study reach extends upstream and includes all of Hunting Creek, Cameron Run, Holmes Run to Columbia Pike just below Lake Barcroft, Backlick Run to Braddock Road, Indian Run to Braddock Road, Turkeycock Run to Little River Turnpike, and Pike Branch to just above the second culvert crossing of Telegraph Road. The basin is bounded by the Fourmile Run basin to the northeast, the Accotink Creek basin to the west, the Dogue Creek and Little Hunting Creek basins to the south, and the Pimmit Run basin to the north.

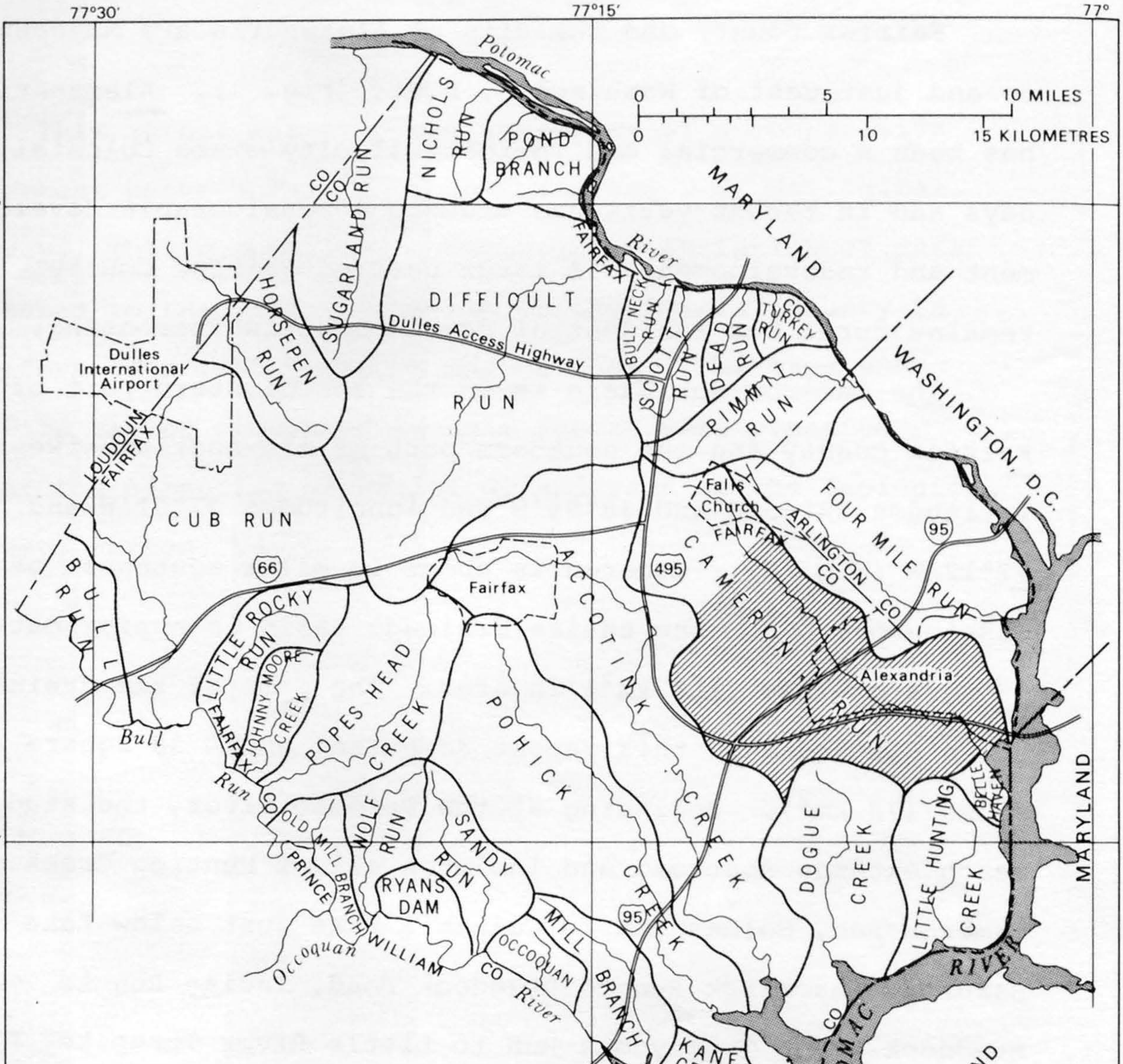

Figure 1. Location map of study area

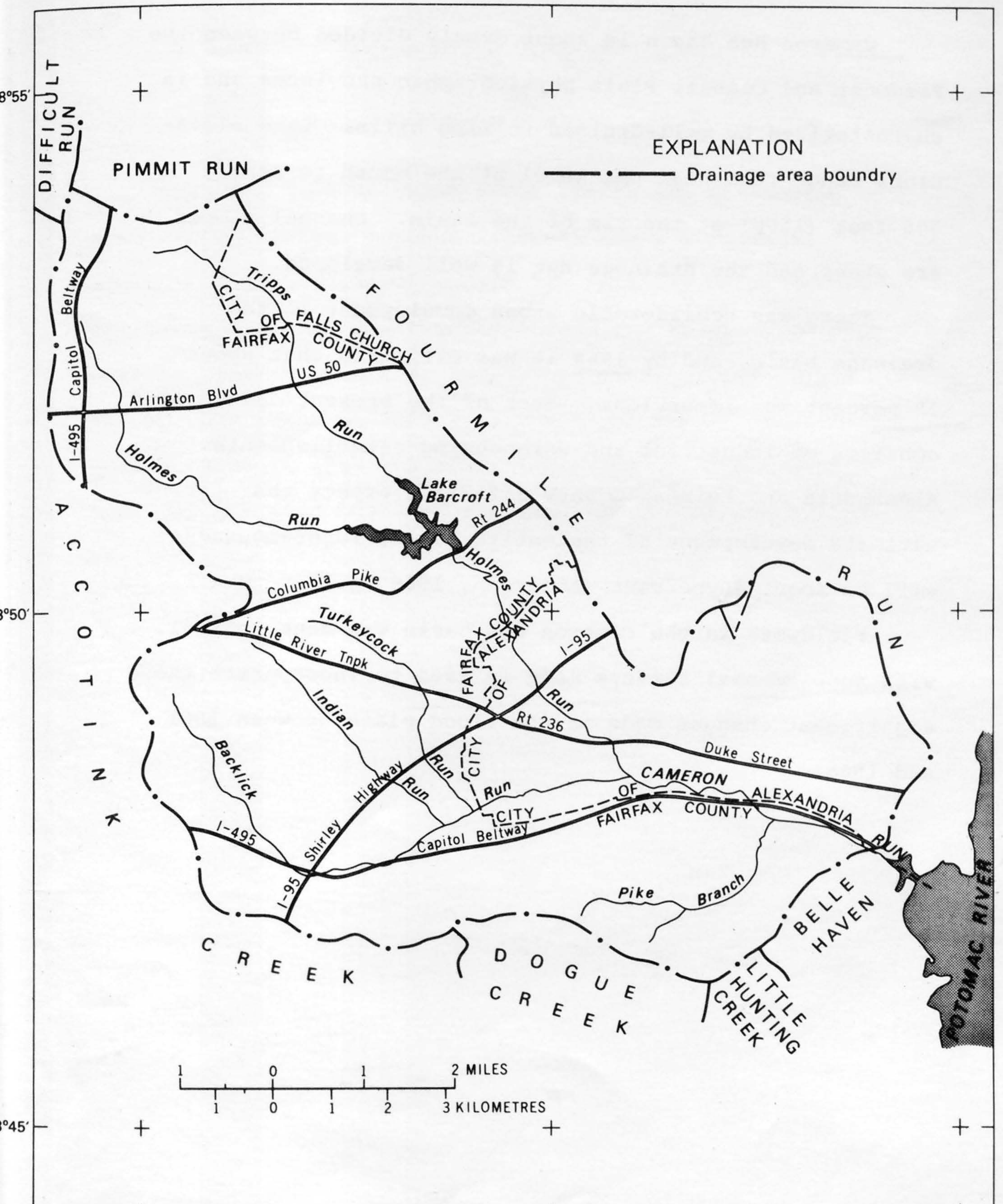

Figure 2. Map of Cameron Run basin

Cameron Run basin is about evenly divided between the Piedmont and Coastal Plain physiographic provinces and is characterized by well-drained rolling hills. Land elevations range from near sea level at the mouth to nearly 500 feet (150m) at the rim of the basin. Channel slopes are steep and the drainage net is well developed.

There was considerable urban development in the drainage basin, and by 1965 it was estimated that about 15 percent was impervious. Much of the present development consists of industrial and warehousing establishments. Alexandria and Fairfax County officials expect that for ultimate development of the entire basin, imperviousness will be about 40 percent (Anderson, 1966, p.2).

Fieldwork in the Cameron Run basin was done in 1961, with supplemental surveys made in 1965 to incorporate those significant changes made in the flood plain between 1961 and 1965.

FLOOD-PLAIN MAPPING

Maps

The base maps on which flood limits are delineated have 2-foot (0.60m) contour interval and a horizontal scale of 1 inch (2.54cm) equals 100 feet (30.5m). Natural and manmade features along the stream are shown. The maps were compiled by the U.S. Geological Survey, from aerial photographs taken in 1960 with revisions made from photographs taken in 1964 and 1965. The maps include a 250-foot (76.2m) grid based on the Virginia coordinate system, north zone.

Discharges

The flood areas delineated are those determined using ultimate-development discharges. Highly developed basins differ from natural basins in that for a given storm (1) runoff is greater, (2) discharge time is much shorter, and (3) floods of comparable magnitude have a higher frequency of occurrence. These factors were analyzed through a study of streamflow and precipitation records, most of which were collected in the vicinity of Washington, D. C. The report entitled "Effects of Urban Development on Floods in Northern Virginia", (Anderson, 1970) describes the analysis used and summarizes the conclusions of that analysis. The effect of imperviousness with respect to runoff volumes was evaluated by comparing typical runoff coefficients for natural and highly developed basins. Regression analysis was used; first, to derive the relation of lag time (the time lapse from the centroid of precipitation excess to the centroid of runoff) as a function of length-slope parameter; and, second, to derive the relation of the mean annual flood (2.33-year recurrence interval), adjusted for effects of imperviousness, as a function of drainage-basin area and lag time. An analysis of flood and rainfall frequencies was made to derive ratios of 25-, 50-, and 100-year floods to the mean annual flood for any percentage of imperviousness. Using the available information for a basin in the project area, the magnitude of the 2.33, 25-, 50-, and 100-year flood peaks can be computed from measurable basin parameters for any percentage of imperviousness in the ultimate development plan.

The term "recurrence interval", as used here, is the average interval of time within which a given flood discharge will be equaled or exceeded once. The recurrence interval is inversely related to the chance of a given flood being equaled or exceeded in any one year. Thus, the 100-year flood has a 1 percent chance of being equalled or exceeded in any one year. No periodicity is implied.

Profile Computation

Having determined the 25-, 50-, and 100-year floods computed as set forth by Anderson (1970), at selected points, the corresponding water-surface profiles were computed using the standard step method of backwater analysis. The method is based on a balance of energy between successive pairs of stream cross-sections. For tranquil flow the computations start at the farthest downstream section, or at a control section, and proceed upstream; but for supercritical flow the computations start at the most upstream section, or critical section, and proceed downstream until flow again becomes tranquil. Peak-discharge magnitudes varied with size of drainage area and were changed at selected points, such as above the confluence of a major tributary. The water-surface profile elevations are available for each cross-section. The cross-sections are referenced to an arbitrary base line, drawn to an approximate centroid of flow, and measured in an upstream direction from an arbitrary starting point. Profiles were computed in accordance with accepted methods of the U.S. Geological Survey.

Following are several general items pertaining to the profile computations:

1. Discharge magnitudes greater than that of the 100-year flood may occur. However, the rate of change of stage per unit discharge generally becomes comparatively less as the discharge increases.
2. No factors of safety were used in the computations. Bridges and culverts were assumed to be free of debris. Roughness coefficients (Manning's "n") were selected based on summer vegetation.
3. New construction and channelization work may modify hydraulic properties, thus changing the flood profiles in the future.

Delineation of Flood Boundaries

The first step in the delineation of flood areas was the transposing of flood profile elevation, computed at each cross section, onto the base maps on which channel cross-section had initially been located. Delineation was then completed by interpreting elevations between these cross sections and between map contours on a linear basis.

The maps show the 25- and 100-year flood limits generally, and include the 50-year flood limits in some places. In areas where topography is steep, there is insufficient space to show both the 25- and 100-year flood limits, and only the 100-year flood was delineated.

The delineation represents the average water-surface elevation. During actual floods, the water-surface may not be level across the stream.

FLOOD PROFILES FOR CAMERON RUN BASIN

Flood-profile data tables for Cameron Run Basin are:

Table 1. Water-surface profile data for Hunting Creek, Cameron Run, and Holmes Run

Table 2. Water-surface profile data for Pike Branch

Table 3. Water-surface profile data for Backlick Run

Table 4. Water-surface profile data for Turkeycock Run

Table 5. Water-surface profile data for Indian Run

The tables were prepared so that the reader can locate the position for which information is desired on the flood plain maps included in this report, determine base-line stationing from the map by projection to the base line, and, using the station number, find in the table the nearest section for which information was determined.

For each cross section used in profile computations, tables 1 to 5 summarize: (1) The base-line reference stationing of that section, (2) the percentage imperviousness taken from pertinent ultimate development plans used for computing discharge for the different recurrence interval flood at that point, (3) the resulting discharge and the water-surface profile elevation for 25-, 50-, and 100-year floods.

Special Hydraulic Condition

Special hydraulic conditions are explained in the following discussion. These are discussed proceeding in an upstream direction from the mouth of Hunting Creek, at the Potomac River.

1. Flow at George Washington Memorial Parkway was computed assuming that a levee would be constructed at the east edge of the Belle Haven golf course. Such a levee would protect the community of New Alexandria from floods on Hunting Creek. The levee, whether constructed or not, would probably have very little effect (perhaps less than 0.1 of a foot (0.03m)) on the water-surface elevations of Hunting Creek. The following is a summary of the division of flow through the bridge and over the road at George Washington Memorial Parkway:

Recurrence interval (years)	Discharge, in ft^3/s	
	Through the bridge	Over the road
25	10,200	6,200
50	7,800	12,300
100	6,700	17,100

The reduction of flow through the bridge as the discharge increases is caused by the concurrent higher Potomac River backwater elevations.

2. Flow between George Washington Memorial Parkway and U.S. Highway 1 was assumed to be ponded. Although there would be a gradient to the water surface, probably not over 0.05 of a foot (15mm), flow would be negligible.
3. There will be reverse flow through the Hooff Run and Taylor Run culverts during large floods on Cameron Run. Those flood areas north of Interstate 495 were not delineated.
4. A contracted section (No. 29), a short distance upstream from the weir at South Quaker Lane, Alexandria, is the basic cause for the indicated overflow of Interstate 495 during a 100-year flood. A delineation of flood areas was made for the bypass flow, designated section No. 950-967 on table 1. This bypass flow is reduced by downstream culverts and flow over the Interstate 495-Telegraph Road exit, thus returning flow to the main channel of Cameron Run. A separate base line was used for this bypass flow.

Another division of flow exists just north of Interstate 495 and is designated as section Nos. 25 a to 29 a on table 1, which shows elevations for that separate bypass flow.

5. A complex flow condition exists in the vicinity of and downstream from the Southern and the Richmond, Fredericksburg, and Potomac Railroad overpass and down the north side of the tracks. The flow down the north side of the tracks divides through the Strawberry Run colvert, and the remaining overflow continues in an easterly direction along the tracks. A part of this flow returns to the main stream through a culvert between section 983 and 984. The remaining flow proceeds north of the tracks, finally returning to the main stream in the vicinity of section 980, which is near South Quaker Lane, Alexandria. Table 1 was compiled so that the reader could trace the changing flow pattern at each section. For example, the discharge of the 100-year flood is 1700 ft^3/s ($48.14m^3/s$) at section 981 with 600 ft^3/s ($170m^3/s$) overflowing the tracks between sections 981 and 982 for a total discharge of 2300 ft^3/s ($65.14m^3/s$) past section 982.

6. The flow pattern in the vicinity of State Routh 236 (Duke Street, Alexandria) is also rather complex. The bridge at State Route 236 and the channel in the vicinity of that bridge are not adequate to convey the computed 25-, 50-, and 100-year discharges. A large volume of water will overflow the road into Cameron Station, and a levee will prevent most of the road overflow from returning to the main channel. Only one base line was used for flow on both sides of the levee. Cross sections through Cameron Station are extensions of the main channel sections and are designated with the subscript "a". The delineation of flow between buildings followed the west edge of the road to the point of confluence with Backlick Run overflow because the water, once flowing between the buildings, would not be free to return to the main channel but would continue to flow down the road.

The computations for the channel upstream from State Route 236 were based upon cross-sections surveyed during the spring of 1962, after fill had been placed north of State Route 236. It may be noted that road overflow occurs between sections 95 and 99, as indicated on table 1.

7. The culvert for Holmes Run at North Van Dorn Street has been relocated since the maps and computations were made. Additional changes are contemplated for Interstate 95 (Shirley Memorial Highway) and North Van Dorn Street in the near future. Because of these and other reasons, the delineation reflects the hydraulic conditions during 1960. Additional culvert openings will be provided at both of these culverts, so that the profile upstream from Interstate 95 will be somewhat lower than that computed in this study.

Tables of water-surface profile data

Cameron Run Basin

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
						7.6	8.9	9.8	Potomac River elevations
Hunting Creek									George Washington Mem.Pkwy.
1	20+00	40	16,400	20,100	23,800	8.6	9.9	10.2	
Cameron Run									U.S. Highway 1
2	22+67	40	16,400	20,100	23,800	8.6	9.7	10.3	
3	30+58	40	16,400	20,100	23,800	8.9	9.9	10.5	
4	36+60	40	15,000	18,400	21,800	9.0	10.0	10.6	
5	43+46	40	15,000	18,400	21,800	9.2	10.2	10.8	
6	49+39	40	15,000	18,400	21,800	9.2	10.2	10.9	
7	54+90	40	15,000	18,400	21,800	9.4	10.4	11.1	
8	60+19	40	15,000	18,400	21,800	9.6	10.6	11.2	
9	65+86	40	15,000	18,400	21,800	9.9	11.0	11.7	
10	70+76	40	15,000	18,400	21,800	10.0	11.1	11.8	
11	75+16	40	15,000	18,400	21,800	10.1	11.2	12.0	
12	80+28	40	15,000	18,400	21,800	10.4	11.5	12.2	
13	84+88	40	15,000	18,400	21,800	10.6	11.8	12.5	
14	87+92	40	15,000	18,400	21,800	10.8	12.0	12.8	
15	91+00	40	15,000	18,400	21,800	11.2	12 4	13.2	
16	91+95								Telegraph Road (State 611)
17	93+87	40	15,000	18,400	21,800	11.6	12.8	14.2	
18	96+49	40	14,000	17,200	20,000	12.0	13.2	14.6	Bypass flow to south
19	100+45	40	14,000	17,200	19,600	12.2	13.6	14.9	Bypass flow to south
20	103+88	40	14,000	17,200	19,300	12.5	13.8	15.1	Bypass flow to south
21	106+42	40	13,800	17,000	19,100	12.5	14.0	15.3	Bypass flow to south
22	107+12	40	13,800	17,000	19,100	12.7	14.0	15.4	Bypass flow to south
23	108+00								Interstate Highway 495 (Capital Beltway)
24	111+57	40	13,300	16,200	17,900	13.0	14.4	15.8	Bypass flow to south and along north edge of belt.
25	116+08	40	13,300	16,200	17,900	13.2	14.6	16.0	Bypass flow to south and along north edge of belt.

a Recurrence interval

Table 1: Water-surface profile data for Hunting, Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
26	120+14	40	13,300	16,200	17 900	13.6	14.8	16.2	Bypass flow to south and along north side of beltway
27	122+15	40	13,100	16,000	17,800	21.9	22.5	22.8	Bypass flow to south and along north side of beltway
28	123+83	40	13,100	16,000	17,800	24.4	24.6	24.8	Bypass flow to south and along north side of beltway
29	126+22	40	13,100	16,000	17,800	25 6	26.4	27.0	Bypass flow to south and along north side of beltway
30	129+57	40	13,300	16,400	19,100	30.8	31.5	32.1	Bypass flow to south
31	135+30	40	12,100	14,500	17,200	31.7	32.4	33.0	Bypass flow to the north and south
32	142+43	40	11,900	14,200	16,900	32.2	33.0	33.6	Bypass flow to the north
33	147+97	40	11,900	14,200	16,900	34.2	34 5	34.9	Bypass flow to the north
34	152+69	40	11,900	14,200	16,900	35.0	35.5	36.0	Bypass flow to the north
35	156+78	40	9,300	11,500	13,800	38.6	39.0	39.3	Bypass flow to the north
36	162+04	40	9,300	11,500	13,800	39.5	40.0	40.5	Bypass flow to the north
37	166+36	40	9,300	11,500	13,800	41.8	42.6	43.8	Bypass flow to the north

End of lower Cameron Run base line

The following is bypass flow south of the Capital Beltway between Pike Branch and Cameron School:

950	1+75		0	0	350			19.4	
951	4+22		0	0	550			20.0	
952	5+75		0	0	700			20.2	
953	7+75		0	0	1000			20.5	
954	9+95		0	0	1000			20.6	

[a] Recurrence interval

Cameron Run Basin

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second			Elevation in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
955	11+14		0	50	1000		19.1	20.8	
956	13+38		200	250	1200	19.6	19.7	21.3	
957	15+26		200	250	1200	19.6	19.8	21.4	
958	16+66		200	250	1200	19.7	19.8	21.5	
959	18+39		500	550	1500	20.0	20.1	21.5	
960	19+76		500	550	1500	22.6	22.6	23.4	
961	21+61		500	550	1500	24.0	24.1	26.0	
962	23+08		500	550	1500	25.7	25.8	26.8	
963	26+13		500	550	1500	26.6	26.7	28.0	
964	28+54		500	550	1100	27.4	27.6	29.0	
965	30+53		500	550	700	27.8	27.8	29.2	
966	32+62		500	550	600	27.8	28.0	29.4	
967	34+78		500	550	600	28.8	28.9	29.8	
Approach	35+30		500	550	600	30.1	30.2	30.3	Exit I-495 to Telegraph Rd. (State 611) south
The following is bypass flow north of railroad tracks from South Quaker Lane to Southern Railway bridge over Cameron Run:									
980	1+100		600	700	800	44.3	44.5	44.7	
981	2+68		1100	1400	1700	44.6	44.8	45.1	
982	4+68		1200	1800	2300	45.0	45.5	45.9	
983	8+40		1200	1900	2500	45.4	46.0	46.7	
984	11+43		1900	2700	3300	45.4	46.1	46.8	
985	14+98		1900	2700	3300	45.5	46.2	46.8	
986	18+72		1900	2700	3300	45.8	46.5	47.2	
987	20+81		1900	2700	3300	49.9	50.4	50.7	
988	22+32		1900	2700	3300	51.5	52.2	52.7	
989	23+95		1900	2700	3300	52.7	53.4	53.8	
990	26+84		1900	2700	3300	53.1	53.9	54.5	
991	28+60		1900	2700	3300	53.2	54.0	54.7	
992	30+69		4100	5000	5700	53.2	54.0	54.7	
993	33+27		4100	5000	5700	53.2	54.1	54.7	
994	37+49		4100	5000	5700	53.2	54.1	54.7	
995	42+90		4100	5000	5700	53.3	54.2	54.8	
996	46+50		4100	5000	5700	53.4	54.3	54.8	
997	51+85		6400	8900	11,000	53.5	54.3	54.9	
998	53+93		6600	9600	12,400	53.6	54.4	55.0	
999	57+12		6600	9900	13,400	54.2	55.0	55.6	

[a] Recurrence interval

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
Start of upper Cameron Run base line (Station 246+85 ahead = Station 166+36 back.)									
75	249+66	40	9,300	11,500	13,800	43.8	44.8	45.6	Bypass flow to the north
76	255+98	40	9,300	11,500	13,800	45.0	45.9	46.7	Bypass flow to the north
77	259+49	40	9 300	11,500	13,800	45.9	46.7	47.5	Bypass flow to the north
78	262+44	40	7,800	9 400	11,200	47.2	47.8	48.4	Bypass flow to the north
79	263+90	40	7 800	9,400	11,200	47.2	47.9	48.5	Bypass flow to the north
80	265+20								R.F. & P. Railroad bridge
81	266+40	40	7,800	9,400	11,200	50.6	52.1	53.9	Bypass flow to the north
82	269+85	40	6,800	6,900	7,100	50.8	52.3	54.0	Bypass flow to the north
83	271+62	40	6,800	6,600	6,100	51.4	52.8	54.4	Bypass flow to the north
84	272+62								Southern Railway bridge
87	276+97	40	13,400	16,500	19,500	54.9	55.6	56.2	
Holmes Run, upstream from confluence with Backlick Run									
88	281+67	40	5,800	6,200	6,400	55.2	55.9	56.6	Bypass flow to the west
89	285+68	40	5,800	6,200	6,400	56.0	56.5	56.9	Bypass flow to the west
90	290+33	40	5,800	6,200	6,400	58.7	58.8	59.0	Bypass flow to the west
91	292+88	40	5,800	6,200	6,400	59.4	59.6	59.8	Bypass flow to the west
92	293+89	40	5,800	6,200	6,400	61.5	61.7	61.9	Bypass flow to the west
93	294+59								Duke Street (State 236)
94	295+19	40	5,800	6,200	6,400	63.8	64.2	64.4	Bypass flow to the west
95	298+48	40	5,800	6,200	6,400	65.8	66.2	66.5	Bypass flow over Duke St.

The following is a summary of flow to the west of Holmes Run that is divided from the main channel by a levee. This portion of Holmes Run is between Backlick Run and Duke Street (State 236). The stationing is considered to be the same as for the above main channel.

Section number	Base-line station (feet)	Impervi-ousness (per cent)	25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	Remarks
88a			2,800	4,400	6,100	55.2	55.9	56.6	
89a			2,800	4,400	6,100	55.5	56.2	57.0	
90a			2,800	4,400	6,100	57.5	57.8	58.2	
91a			2,800	4,400	6,100	61.1	61.5	61.9	

[a] Recurrence interval

Cameron Run Basin

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	

The following is a continuation of the main Holmes Run flow above Duke Street. The discharges for sections 96-99 indicate changes for flow over Duke Street between those sections.

96	301+98	40	6100	6800	7200	66.4	66.8	67.0	Bypass flow over Duke St.
97	304+63	40	7300	8500	9600	66.5	66.8	67.1	Bypass flow over Duke St.
98	306+77	40	8200	9900	11,400	66.6	67.0	67.3	Bypass flow over Duke St.
99	309+17	40	8600	10,600	12,500	67.0	67.4	67.8	
100	311+71	40	8600	10,600	12,500	67.4	67.9	68.4	
101	314+35	40	8600	10,600	12,500	68.0	68.4	68.8	
102	317+10	40	8600	10,600	12,500	68.4	68.8	69.2	
103	319+40	40	8600	10,600	12,500	68.8	69.2	69.7	
104	322+58	40	8600	10,600	12,500	71.9	72.2	72.4	
105	325+38	40	8600	10,600	12,500	73.2	73.7	74.2	
106	328+70	40	8600	10,600	12,500	75.2	75.8	76.4	
107	331+11	40	8600	10,600	12,500	76.1	76.7	77.3	
108	333+13	40	8600	10,600	12,500	76.7	77.5	78.1	
109	336+11	40	8600	10,600	12,500	78.5	79.2	79.7	
110	339+10	40	8600	10,600	12,500	79.6	80.3	80.8	
111	341+24	40	8600	10,600	12,500	80.7	81.3	81.8	
112	343+68	40	8600	10,600	12,500	82.1	83.2	84.2	
113	345+50	40	8600	10,600	12,500	83.8	85.1	85.6	
114	346+95	40	8600	10,600	12,500	85.2	86.4	86.7	
115	348+00	40	8600	10,600	12,500	86.5	87.2	87.7	
116	349+19	40	8600	10,600	12,500	87.8	88.3	88.7	
117	350+46	40	8600	10,600	12,500	88.3	89.0	89.4	
118	352+15								Shirley Highway (I-95)
119	354+00	40	8300	10,200	12,100	93.8	97.3	101.4	
120	355+40	40	8300	10,200	12,100	93.9	97.4	101.5	
121	356+81	40	8300	10,200	12,100	94.0	97.5	101.5	
122	385+21	40	8300	10,200	12,100	94.1	97.5	101.5	
123	360+05	40	8300	10,200	12,100	94.3	97.7	101.5	
124	361+93	40	8300	10,200	12,100	94.5	97.8	101.5	
125	363+75	40	8300	10,200	12,100	94.6	97.8	101.5	
126	365+67	40	8300	10,200	12,100	94.8	98.1	102.1	

[a] Recurrence interval

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
127	367+64	40	8300	10,200	12,100	95.3	98.2	102.1	
128	369+17	40	8300	10,200	12,100	95.6	98.2	102.1	
129	371+45	40	8300	10,200	12,100	95.8	98.4	102.1	
130	372+35								Beauregard Street
131	373+21	40	8300	10,200	12,100	100.9	104.4	108.2	
132	374+32	40	8300	10,200	12,100	101.2	104.4	108.2	
133	375+10	40	8300	10,200	12,100	101.2	104.4	108.2	
134	376+41	40	8300	10,200	12,100	101.3	104.4	108.3	
135	378+45	40	8300	10,200	12,100	102.0	104.9	108.5	
136	380+86	40	8300	10,200	12,100	103.1	105.5	109.0	
137	383+15	40	8300	10,200	12,100	104.2	106.3	109.1	
138	385+72	40	8300	10,200	12,100	106.2	107.8	110.0	
139	387+01	40	8300	10,200	12,100	108.2	109.4	111.0	
140	388+21	40	8300	10,200	12,100	109.1	110.1	111.5	
141	390+91	40	8300	10,200	12,100	109.7	110.9	112.1	
142	393+57	40	8300	10,200	12,100	110.4	111.5	112.6	
143	396+62	40	8300	10,200	12,100	112.1	113.0	113.8	
144	398+84	40	7900	9700	11,500	113.4	114.1	114.8	
145	401+74	40	7900	9700	11,500	114.6	115.4	116.1	
146	405+13	40	7900	9700	11,500	116.3	117.3	118.2	
147	407+62	40	7900	9700	11,500	117.0	117.9	118.7	
148	408+71	40	7900	9700	11,500	117.5	118.4	119.2	
149	409+71	40	7900	9700	11,500	118.1	119.0	119.8	
150	411+50	40	7900	9700	11,500	119.3	120.3	121.3	
151	413+41	40	7900	9700	11,500	120.0	121.1	122.0	
152	415+38	40	7900	9700	11,500	121.3	122.5	123.5	
153	417+31	40	7900	9700	11,500	122.5	123.7	124.8	
154	419+30	40	7900	9700	11,500	123.6	124.9	126.1	
155	421+20	40	7900	9700	11,500	125.0	126.3	127.5	
156	423+38	40	7900	9700	11,500	125.9	127.2	128.4	
157	425+39	40	7900	9700	11,500	126.8	128.1	129.4	
158	427+17	40	7900	9700	11,500	127.2	128.5	129.7	
159	428+48	40	7900	9700	11,500	129.2	130.3	131.4	
160	429+76	40	7900	9700	11,500	130.0	131.1	132.0	

a Recurrence interval

Cameron Run Basin

Table 1: Water-surface profile data for Hunting Creek, Cameron Run and Holmes Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
161	431+12	40	7900	9700	11,500	131.1	132.1	133.0	
162	432+53	40	7900	9700	11,500	132.3	133.4	134.6	
163	434+81	40	7900	9700	11,500	134.6	135.9	137.2	
164	436+42	40	7900	9700	11,500	135.6	137.0	138.2	
165	438+51	40	7900	9700	11,500	136.9	138.3	139.5	
166	440+32	40	7900	9700	11,500	138.0	139.4	140.8	
167	442+51	40	7900	9700	11,500	138.7	140.1	141.6	
168	444+47	40	7900	9700	11,500	139.2	140.6	141.9	
169	445+68	40	7900	9700	11,500	139.2	140.6	141.9	
170	446+83	40	7900	9700	11,500	139.5	140.9	142.2	
171	448+35	40	7900	9700	11,500	139.9	141.3	142.5	
172	450+74	40	7900	9700	11,500	140.3	141.7	142.9	
173	452+16	40	7900	9700	11,500	140.8	142.1	143.3	
174	453+28	40	7900	9700	11,500	142.6	143.5	144.4	
175	454+39	40	7900	9700	11,500	143.3	144.3	145.2	
176	455+46	40	7900	9700	11,500	144.3	145.3	146.2	
177	456+51	40	7900	9700	11,500	147.1	148.4	149.6	
178	457+78	40	7900	9700	11,500	148.6	150.0	151.2	
179	458+84	40	7900	9700	11,500	149.6	151.0	152.2	
180	459+73	40	7900	9700	11,500	151.2	152.8	154.3	
181	460+79	40	7900	9700	11,500	151.4	153.2	154.8	
182	461+96	40	7900	9700	11,500	152.2	153.7	155.1	
183	463+38	40	7900	9700	11,500	153.1	154.9	156.4	
	463+80								Columbia Pike (State 244)

a Recurrence interval

Cameron Run Basin

Table 2: Water-surface profile data for Pike Branch

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
4	13+69	40	2700	3300	3900	12.8	13.9	15.0	
5	14+50	40	2700	3300	3900	13.2	14.2	15.3	
6	15+37	40	2700	3300	3900	13.2	14.3	15.3	
7	15+85								Burgundy Road
8	16+45	40	2700	3300	3900	15.9	17.0	18.1	
9	17+06	40	2700	3300	3900	21.5	22.1	22.5	
10	17+84	40	2700	3300	3900	23.2	23.4	23.5	
11	18+91	40	2700	3300	3900	23.5	23.9	24.0	
12	20+00	40	2700	3300	3900	24.1	24.4	24.6	
13	21+12	40	2700	3300	3900	24.4	24.6	25.0	
14	23+13	40	2700	3300	3900	26.2	26.6	27.0	
15	24+45	40	2700	3300	3900	27.4	27.8	28.1	
16	26+19	40	2700	3300	3900	28.6	28.9	29.4	
17	28+21	40	2700	3300	3900	31.6	32.1	32.6	
18	30+06	40	2700	3300	3900	34.3	34.7	35.2	
19	31+20	40	2700	3300	3900	35.5	35.8	36.1	
20	32+70	40	2700	3300	3900	37.6	38.0	38.4	
21	33+95	40	2700	3300	3900	39.4	40.1	40.7	
22	35+08	40	2700	3300	3900	39.8	40.4	41.0	
23	35+50								Telegraph Road (State 611)
24	35+98	40	2700	3300	3900	43.5	43.9	44.3	
25	37+15	40	2700	3300	3900	44.7	45.4	46.1	
26	38+57	40	2700	3300	3900	44.9	45.6	46.4	
27	40+32	40	2700	3300	3900	45.7	46.3	46.9	
28	42+20	40	2700	3300	3900	47.4	47.8	48.2	
29	44+12	40	2700	3300	3900	48.6	49.0	49.3	
30	44+55								Marl-Pat Drive
31	45+30	40	2700	3300	3900	52.2	52.5	52.7	
32	46+78	40	2700	3300	3900	53.2	53.7	54.2	
33	48+24	40	2700	3300	3900	53.3	53.8	54.2	
34	49+19	40	2700	3300	3900	55.2	55.8	56.3	
35	49+45								Road to Brownie School
36	49+90	40	2700	3300	3900	58.1	58.4	58.8	

a Recurrence interval

Cameron Run Basin

Table 2: Water-surface profile data for Pike Branch - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
37	51+04	40	2700	3300	3900	58.2	58.5	58.8	
38	52+68	40	2700	3300	3900	58.2	58.6	58.9	
39	54+84	40	2700	3300	3900	59.2	59.8	60.1	
40	55+83	40	2700	3300	3900	59.7	60.3	60.8	
41	57+21	40	2700	3300	3900	62.5	63.1	63.7	
42	58+16	40	2700	3300	3900	65.6	66.2	66.8	
43	59+27	40	2700	3300	3900	65.8	66.4	67.1	
44	60+06	40	2700	3300	3900	66.3	66.9	67.4	
45	60+35								Florence Lane
46	60+71	40	2200	2700	3200	67.9	68.9	69.5	
47	62+20	40	2200	2700	3200	68.1	69.1	69.7	
48	64+05	40	2200	2700	3200	68.4	69.3	70.2	
49	65+72	40	2200	2700	3200	72.6	73.1	73.6	
50	65+92								Garage over stream
51	66+10	40	2200	2700	3200	74.7	75.1	75.4	
52	66+92	40	2200	2700	3200	74.7	75.1	75.4	
	68+25								Wilton Road
53	68+59	40	2200	2700	3200	75.4	75.9	76.6	
54	69+27	40	2200	2700	3200	76.0	76.6	77.2	
55	70+63	40	2200	2700	3200	76.7	77.3	77.9	
56	71+95	40	2200	2700	3200	77.8	78.9	80.1	
57	72+65	40	2200	2700	3200	78.6	79.8	81.3	
58	74+10	40	2200	2700	3200	80.5	81.9	84.4	
59	75+38	40	2200	2700	3200	81.6	82.9	85.6	
60	76+11	40	2200	2700	3200	82.7	84.0	85.9	
61	77+47	40	2200	2700	3200	84.4	85.4	86.7	
62	78+81	40	2200	2700	3200	84.9	86.1	87.9	
63	79+33								Telegraph Road (State 611)
64	79+89	40	2200	2700	3200	91.1	92.1	92.5	
65	80+63	40	2200	2700	3200	91.6	92.4	93.1	
66	82+28	40	2200	2700	3200	92.3	93.2	93.9	
67	83+93	40	2200	2700	3200	93.1	94.2	94.8	
68	85+68	40	2200	2700	3200	94.8	95.7	96.6	
69	87+59	40	2200	2700	3200	97.5	98.3	99.2	
70	89+60	40	2200	2700	3200	99.5	100.4	101.3	

a Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run

Section number	Base-line Station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	

Sections 1 to 4 are essentially ponded because of backwater from Cameron Run. Water overflows the main channel in vicinity of section 15 at the 50-yr. and 100-yr. discharge magnitudes. The overflow was computed to be 150 and 700 cfs respectively.

Section number	Base-line Station (feet)	Imperviousness (per cent)	Discharge 25-year[a]	Discharge 50-year[a]	Discharge 100-year[a]	Elevation 25-year[a]	Elevation 50-year[a]	Elevation 100-year[a]	Remarks
1 to 4						55.2	55.9	56.6	Cameron Run elevations used
5									Railway spur bridge
6	17+38	40	7300	8750	9900	61.6	62.0	62.2	Bypass flow to the north
7	18+78	40	7300	8750	9900	61.6	62.0	62.3	Bypass flow to the north
8	20+06	40	7300	8750	9900	61.6	62.0	62.3	Bypass flow to the north
9	23+07	40	7300	8750	9900	61.6	62.0	62.3	Bypass flow to the north
10	27+10	40	7300	8750	9900	63.6	64.3	64.7	Bypass flow to the north
11	31+10	40	7300	8750	9900	66.4	67.0	67.5	Bypass flow to the north
12	35+12	40	7300	8750	9900	68.5	69.2	69.8	Bypass flow to the north
13	39+12	40	7300	8750	9900	72.0	72.7	73.1	Bypass flow to the north
14	43+15	40	7300	8750	9900	75.4	76.2	76.6	Bypass flow to the north
15	46+21	40	7300	8750	9900	78.2	79.3	80.0	Bypass flow to the north
16	47+27	40	7300	8900	10600	79.0	79.9	80.7	
18	49+26	40	7300	8900	10600	81.3	82.7	84.0	
19	53+96	40	7300	8900	10600	83.1	84.8	86.4	
20	54+10								Railway spur bridge
21	54+69	40	7300	8900	10600	84.0	85.2	86.7	
22	56+60	40	7300	8900	10600	84.2	85.4	86.8	
23	60+12	40	7300	8900	10600	84.6	85.7	87.0	
24	64+94	40	7300	8900	10600	86.1	86.3	87.0	
25	67+25	40	7300	8900	10600	87.6	88.2	89.0	
26	67+70								South Van Dorn Street

[a] Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
27	68+32	40	6900	8500	10100	90.3	91.1	92.0	
28	71+97	40	6900	8500	10100	91.3	92.2	93.0	
29	75+22	40	6900	8500	10100	92.6	93.5	94.3	
30	79+00	40	6900	8500	10100	94.2	95.3	96.2	
31	81+43	40	6900	8500	10100	96.0	96.8	97.5	
32	86+56	40	6900	8400	10100	97.4	98.1	98.8	
33	91+48	40	6900	8500	10100	99.6	100.4	100.9	
34	95+75	40	6900	8500	10100	102.4	103.2	103.8	
35	96+65								Railway bridge
36	98+04	40	6900	8500	10100	104.6	105.2	106.0	
37	98+93	40	5400	6600	7800	106.2	107.2	108.1	
38	101+14	40	5400	6600	7800	111.6	113.2	114.0	
39	103+07	40	5400	6600	7800	112.2	113.5	114.2	
40	104+50	40	5400	6600	7800	112.3	113.6	114.3	
41	108+61	40	5400	6600	7800	113.5	114.3	115.0	
42	113+04	40	5400	6600	7800	114.9	115.4	115.9	
43	116+93	40	4000	4900	5800	118.5	118.9	119.3	
44	119+48	40	4000	4900	5800	119.1	119.5	119.9	
45	121+45	40	4000	4900	5800	121.1	121.6	122.0	
46	123+60	40	4000	4900	5800	121.8	122.4	122.8	
47	124+05								Southern Railway bridge
48	124+96	40	4000	4900	5800	125.1	126.6	127.9	
49	126+22	40	4000	4900	5800	125.2	126.7	128.1	
50	128+03	40	4000	4900	5800	125.9	127.1	128.5	
51	129+48	40	4000	4900	5800	126.2	127.5	128.8	
52	131+17	40	4000	4900	5800	126.6	127.8	129.1	
53	133+27	40	4000	4900	5800	127.8	128.7	129.7	

[a] Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
54	135+65	40	4000	4900	5800	130.8	131.1	131.4	
55	138+48	40	4000	4900	5800	133.0	133.4	133.7	
56	140+92	40	4000	4900	5800	134.4	134.8	135.2	
57	144+07	40	4000	4900	5800	136.8	137.2	137.6	
58	146+42	40	4000	4900	5800	138.5	138.8	139.2	
59	148+02	40	3500	4300	5100	139.6	140.0	140.3	
60	150+04	40	3500	4300	5100	141.2	141.5	141.8	
61	153+10	40	3500	4300	5100	143.4	143.7	144.0	
62	155+81	40	3500	4300	5100	145.2	145.5	145.7	
63	157+82	40	3500	4300	5100	148.1	148.4	148.6	
64	160+10	40	3500	4300	5100	150.1	150.4	150.7	
65	162+62	40	3500	4300	5100	151.9	152.2	152.5	
66	164+55	40	3500	4300	5100	153.4	153.8	154.1	
67	166+71	40	3000	3700	4300	154.6	155.0	155.3	
68	169+17	40	3000	3700	4300	155.8	156.2	156.6	
69	171+00	40	3000	3700	4300	157.3	157.8	158.1	
70	173+11	40	3000	3700	4300	159.2	159.6	159.8	
71	174+78	40	3000	3700	4300	160.3	160.6	160.9	
72	176+86	40	3000	3700	4300	161.1	161.4	161.8	
73	178+84	40	3000	3700	4300	161.6	162.0	162.3	
74	180+42	40	3000	3700	4300	162.0	162.4	162.8	
76	183+16								Capital Beltway (I-495)
77	184+56	40	3000	3700	4300	168.6	169.8	171.0	
78	184+41	40	3000	3700	4300	168.7	170.0	171.2	
79	186+62	40	3000	3700	4300	169.2	170.4	171.5	
80	187+72	40	3000	3700	4300	169.6	170.6	171.7	

a Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
81	189+13	40	3000	3700	4300	170.7	171.7	172.6	
82	190+33								Exit ramp from I-495 to I-95 north
83	191+83	40	3000	3700	4300	172.8	174.1	175.3	
84	192+65	40	3000	3700	4300	173.0	174.3	175.7	
85	193+70	40	3000	3700	4300	173.2	174.3	175.7	
86	194+90	40	3000	3700	4300	173.7	174.7	175.7	
87	195+65								On ramp for I-495 west
88	196+72	40	3000	3700	4300	177.6	179.2	180.6	
89	197+21	40	3000	3700	4300	177.8	179.2	180.6	
90	199+00								Shirley Highway (I-95)
91	200+71	40	2400	2900	3400	181.3	183.2	184.8	
92	201+88	40	2400	2900	3400	181.4	183.2	184.8	
93	203+70	40	2400	2900	3400	181.6	183.2	184.8	
94	205+67	40	2400	2900	3400	181.8	183.2	184.8	
95	207+00								Exit ramp from I-495 to I-95 south
96	208+02	40	2400	2900	3400	185.5	187.6	190.2	
97	209+88	40	2400	2900	3400	185.5	187.6	190.5	
98	210+80	40	2400	2900	3400	185.8	187.7	190.5	
99	212+00								Capital Beltway (I-495)
100	213+49	40	2400	2900	3400	186.8	189.0	192.4	
101	214+86	40	2400	2900	3400	187.2	189.1	192.5	
102	216+48	40	2400	2900	3400	188.1	189.6	192.5	
103	218+07	40	2400	2900	3400	189.8	190.5	192.5	
104	219+83	40	2400	2900	3400	191.4	191.9	192.6	
105	221+51	40	2400	2900	3400	192.2	192.6	193.1	
106	223+82	40	2400	2900	3400	192.6	193.1	193.4	
107	225+73	40	2400	2900	3400	194.6	195.2	195.6	
108	227+31	40	2400	2900	3400	196.2	196.8	197.4	

[a] Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
109	228+57	40	2400	2900	3400	197.6	198.2	198.7	
110	229+52	40	2400	2900	3400	197.9	198.6	199.2	
111	230+46	40	2400	2900	3400	198.6	199.4	200.0	
112	231+19	40	2400	2900	3400	199.7	200.4	200.8	Southern Railway Bridge
113	231+71	40	2400	2900	3400	200.2	201.0	201.6	
114	232+60	40	2400	2900	3400	202.3	203.2	203.9	
115	234+21	40	2400	2900	3400	203.4	204.2	205.0	
116	235+34	40	2400	2900	3400	203.4	204.3	205.1	
117	236+37	40	2400	2900	3400	203.5	204.4	205.2	
118	237+63	40	2400	2900	3400	203.9	204.8	205.5	
119	239+58	40	2400	2900	3400	204.2	205.o	205.9	
120	240+33								Backlick Road
121	241+108	40	2300	2800	3300	214.9	215.6	216.1	
122	241+95	40	2300	2800	3300	214.9	215.6	216.1	
123	243+11	40	2300	2800	3300	214.9	215.6	216.1	
124	244+15	40	2300	2800	3300	214.9	215.6	216.1	
125	245+50	40	2300	2800	3300	214.9	215.6	216.1	
126	246+74	40	2300	2800	3300	214.9	215.6	216.1	
127	247+51	40	2300	2800	3300	215.0	215.8	216.3	
128	249+11	40	2300	2800	3300	215.0	215.8	216.3	
129	251+19	40	2300	2800	3300	215.0	215.8	216.3	
130	252+61	40	2300	2800	3300	215.1	215.8	216.3	
131	253+68	40	2300	2800	3300	215.2	215.8	216.4	
132	254+76	40	2300	2800	3300	215.3	216.0	216.6	
133	255+26								Leesville Boulevard
134	255+96	40	2100	2600	3000	218.9	220.9	222.9	
135	256+82	40	2100	2600	3000	219.4	221.2	222.9	
136	258+52	40	2100	2600	3000	219.4	221.2	223.3	

a Recurrence interval

Cameron Run Basin

Table 3: Water-surface profile data for Backlick Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
137	260+32	40	2100	2600	3000	219.6	221.4	223.4	
138	262+47	40	2100	2600	3000	220.2	221.8	223.5	
139	264+13	40	2100	2600	3000	221.6	222.6	223.7	
140	265+93	40	2100	2600	3000	222.6	223.4	224.2	
141	267+80	40	2100	2600	3000	223.2	223.9	224.6	
142	269+45	40	2100	2600	3000	224.7	225.2	225.7	
143	271+20	40	2100	2600	3000	225.8	226.2	226.7	
144	272+84	40	2100	2600	3000	226.8	227.2	227.7	
145	275+24	40	1800	2200	2700	228.2	228.7	229.0	
146	277+36	40	1800	2200	2700	230.2	230.6	230.9	
147	278+63	40	1800	2200	2700	231.8	232.1	232.4	
148	280+80	40	1800	2200	2700	232.5	232.8	233.1	
149	283+24	40	1800	2200	2700	233.9	234.2	234.5	
150	284+81	40	1800	2200	2700	234.7	235.0	235.3	
151	286+39	40	1800	2200	2700	236.0	236.4	236.8	
152	287+31	40	1800	2200	2700	236.6	237.1	237.4	
153	288+71	40	1800	2200	2700	237.2	237.5	237.8	
154	290+68	40	1800	2200	2700	237.8	238.2	238.6	
155	291+89	40	1800	2200	2700	238.6	239.0	239.3	
156	293+43	40	1800	2200	2700	240.5	240.9	241.2	
157	294+44	40	1800	2200	2700	241.4	242.0	242.4	
158	296+16	40	1800	2200	2700	242.9	243.4	243.8	
159	297+42	40	1800	2200	2700	244.0	244.6	245.1	
160	299+51	40	1800	2200	2700	245.8	246.2	246.6	
161	301+32	40	1800	2200	2700	247.2	247.6	248.0	
162	302+26	40	1800	2200	2700	248.0	248.4	248.8	
	303+00								Braddock Road (State 620)

[a] Recurrence interval

Cameron Run Basin

Table 4: Water-surface profile data for Turkeycock Run

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
1	4+08					104.6	105.2	106.0	Backlick Run elevations used
2	7+52	30	2300	2800	3400	106.3	106.5	106.8	
3	10+00	30	2300	2800	3400	108.8	109.0	109.2	
4	13+04	30	2300	2800	3400	113.4	113.6	113.8	
5	14+99	30	2300	2800	3400	115.8	116.0	116.1	
6	15+32								Edsall Road
7	16+09	30	2300	2800	3400	118.3	118.5	118.7	
8	18+94	30	2300	2800	3400	119.7	120.0	120.2	
9	20+92	30	2300	2800	3400	122.0	122.3	122.6	
10	23+18	30	2300	2800	3400	124.7	125.0	125.2	
11	25+72	30	2300	2800	3400	128.4	128.6	128.9	
12	28+74	30	2300	2800	3400	131.2	131.7	132.2	
13	32+18	30	2300	2800	3400	134.2	134.5	134.8	
14	35+29	30	2300	2800	3400	137.3	137.6	138.0	
15	38+43	30	2300	2800	3400	139.8	140.3	140.8	
16	41+21	30	2300	2800	3400	144.2	144.5	144.8	
17	42+82	30	2300	2800	3400	146.8	147.2	147.6	
18	44+38								Shirley Highway (I-95)
19	45+83	30	2300	2800	3400	154.7	157.6	161.5	
20	48+25	30	2300	2800	3400	154.7	157.6	161.5	
21	50+10	30	2300	2800	3400	154.8	157.6	161.5	
22	51+99	30	2300	2800	3400	155.2	157.6	161.5	
23	55+21	30	2300	2800	3400	157.3	158.3	161.5	
24	57+54	30	2300	2800	3400	158.8	159.6	161.5	
25	59+40	30	1900	2400	2900	160.2	160.9	161.7	
26	63+21	30	1900	2400	2900	164.8	165.1	165.3	

[a] Recurrence interval

Table 4: Water-surface profile data for Turkeycock Run - Continued

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
27	65+57	30	1900	2400	2900	167.6	168.1	168.6	
28	67+57	30	1900	2400	2900	169.9	170.2	170.6	
29	69+60	30	1900	2400	2900	171.7	172 1	172.4	
30	71+59	30	1900	2400	2900	173.7	174.1	174.5	
31	73+15	30	1900	2400	2900	175.3	175.7	176.1	
32	73+84	30	1900	2400	2900	175.8	176.2	176.6	
33	74+82	30	1900	2400	2900	176.8	177.2	177.5	
34	75+84	30	1900	2400	2900	177.6	178.0	178.4	
35	76+75	30	1900	2400	2900	178.0	178.4	179.0	
Flow is divided above confluence at section No. 35									
Turkeycock Run									
36	77+36	30	840	1100	1300	178.4	178.6	179.0	
37	77+85	30	840	1100	1300	179.8	180.1	180.3	
38	78+97	30	840	1100	1300	181.6	182.1	182.5	
39	80+00	30	840	1100	1300	183.0	183.4	183.8	
40	80+96	30	840	1100	1300	184.0	184.2	184.5	
41	81+70	30	840	1100	1300	185.2	185.6	186.1	
	82+35								Little River Turnpike (State 236)
Tributary to the west									
36	77+34	30	1200	1400	1700	178.2	178.6	179.0	
37	78+10	30	1200	1400	1700	179.8	180.1	180.3	
38	79+29	30	1200	1400	1700	181.6	182.1	182.5	
39	80+25	30	1200	1400	1700	182.4	182.8	183.2	
40	81+28	30	1200	1400	1700	184.5	184.7	184.9	
41	82+05	30	1200	1400	1700	186.3	186.5	186.7	
42	82+86	30	1200	1400	1700	188.6	189.1	189.5	
	83+56								Little River Turnpike (State 236)

[a] Recurrence interval

Cameron Run Basin

Table 5: Water-surface profile data for Indian Run

Section number	Base-line station (feet)	Impervi-ousness (per cent)	Discharge, in cubic feet per second 25-year[a]	50-year[a]	100-year[a]	Elevation, in feet 25-year[a]	50-year[a]	100-year[a]	Remarks
1	2+20					114.9	115.4	115.9	Backlick Run elevations used
2	6+38	40	2400	2900	3400	116.0	116.6	117.2	
3	8+61	40	2400	2900	3400	118.6	119.2	119.7	
4	9+25								Bren Mar Drive
5	10+30	40	2400	2900	3400	120.3	121.0	121.6	
6	12+96	40	2400	2900	3400	124.6	125.2	125.8	
7	15+92	40	2400	2900	3400	129.4	130.0	130.5	
8	19+20	40	2400	2900	3400	132.0	132.6	133.1	
9	22+28	40	2400	2900	3400	134.2	134.8	135.2	
10	25+70	40	2400	2900	3400	138.2	138.8	139.3	
11	28+96	40	2400	2900	3400	140.9	141.4	141.8	
12	31+16	40	2400	2900	3400	142.9	143.6	144.2	
13	32+68	40	2400	2900	3400	144.8	145.4	146.0	
14	33+60	40	2400	2900	3400	145.1	145.8	146.3	
15	34+05								Edsall Road
16	34+80	40	2400	2900	3400	153.7	155.8	157.5	
17	36+65	40	2400	2900	3400	153.8	155.8	157.5	
18	39+20	40	2400	2900	3400	154.3	155.8	157.5	
19	41+13	40	2400	2900	3400	155.6	156.5	157.5	
20	43+16	40	2400	2900	3400	157.2	157.8	158.5	
21	45+00								Shirley Highway (I-95)
22	46+83	40	2400	2900	3400	167.1	169.5	172.7	
23	47+87	40	2400	2900	3400	167.2	169.5	172.7	
24	49+00	40	2400	2900	3400	167.2	169.5	172.7	
25	49+67	40	2400	2900	3400	167.2	169.5	172.8	
26	50+80	40	2400	2900	3400	167.2	169.5	172.8	

a Recurrence interval

Table 5: Water-surface profile data for Indian Run - Continued

Section number	Base-line station (feet)	Imperviousness (per cent)	Discharge, in cubic feet per second			Elevation, in feet			Remarks
			25-year[a]	50-year[a]	100-year[a]	25-year[a]	50-year[a]	100-year[a]	
27	50+80								Dam at Atlantic Research Co.
28	53+58	40	2400	2900	3400	172.5	172.8	173.0	
29	57+37	40	2400	3900	3400	172.5	172.8	173.0	
30	60+09	40	2400	2900	3400	174.2	174.6	174.9	
31	61+39	40	1600	2000	2300	176.4	176.8	177.1	
32	64+54	40	1600	2000	2300	180.8	181.2	181.4	
33	66+26	40	1600	2000	2300	182.6	183.0	183.3	
34	69+00	40	1600	2000	2300	184.4	185.0	185.3	
35	70+95	40	1600	2000	2300	186.6	186.9	187.2	
36	72+35	40	1600	2000	2300	187.9	188.4	188.8	
37	73+89	40	1600	2000	2300	189.4	189.8	190.2	
38	74+92	40	1600	2000	2300	190.6	191.0	191.3	
39	77+02	40	1600	2000	2300	192.2	192.6	193.2	
40	78+66	40	1600	2000	2300	195.4	195.8	196.2	
41	81+04	40	1600	2000	2300	197.8	198.2	198.7	
42	83+70	40	1600	2000	2300	202.2	202.6	202.9	
43	86+00	40	1600	2000	2300	206.8	207.2	207.4	
44	87+90	40	1600	2000	2300	209.2	209.4	209.8	
45	89+06	40	1600	2000	2300	210.6	211.0	211.2	
46	90+82	40	1600	2000	2300	212.2	212.6	213.0	
47	92+79	40	1600	2000	2300	214.4	215.0	215.6	
	93+00								Braddock Road (State 620)

a Recurrence interval

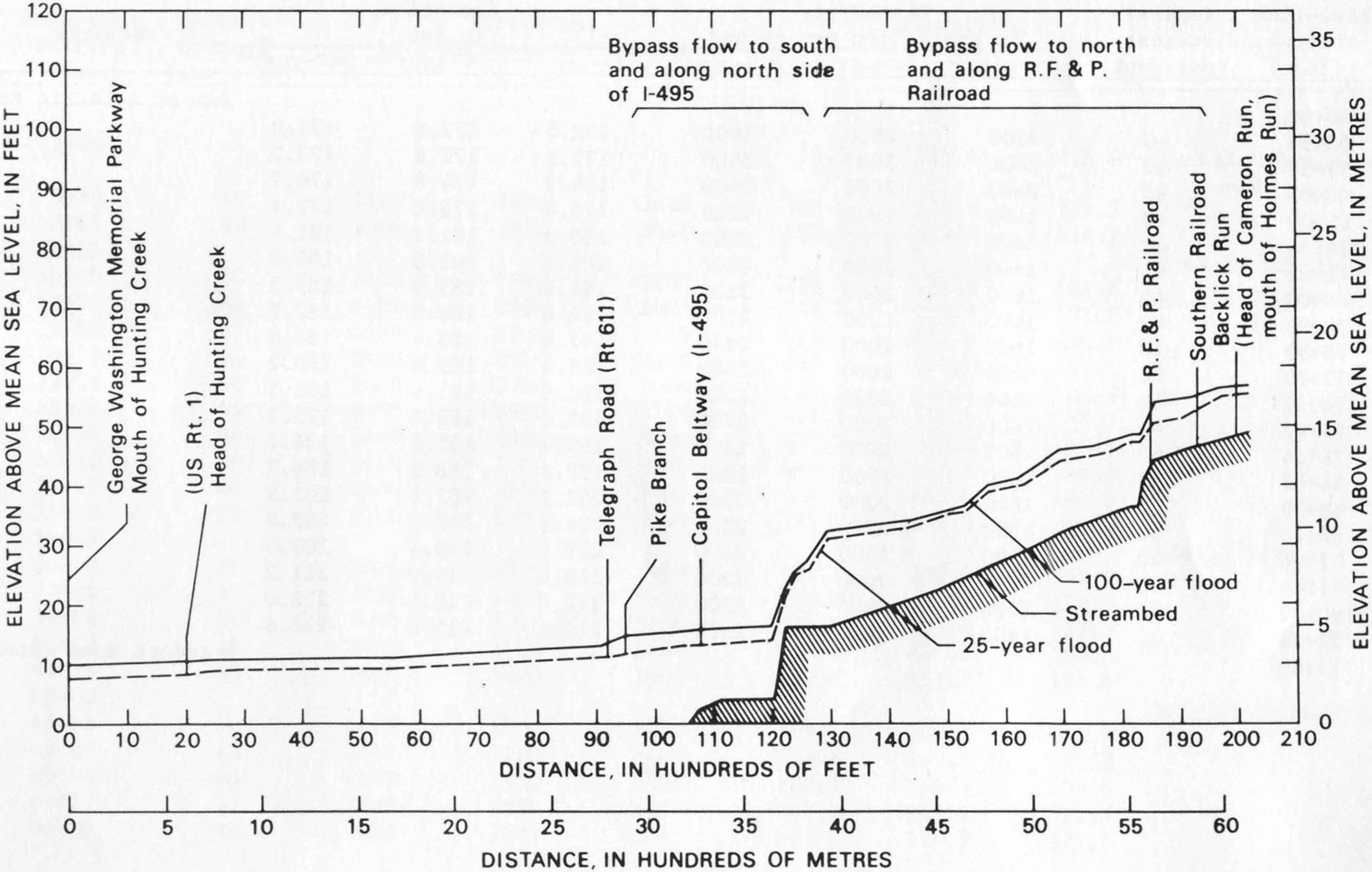

Figure 3. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Hunting Creek-Cameron Run

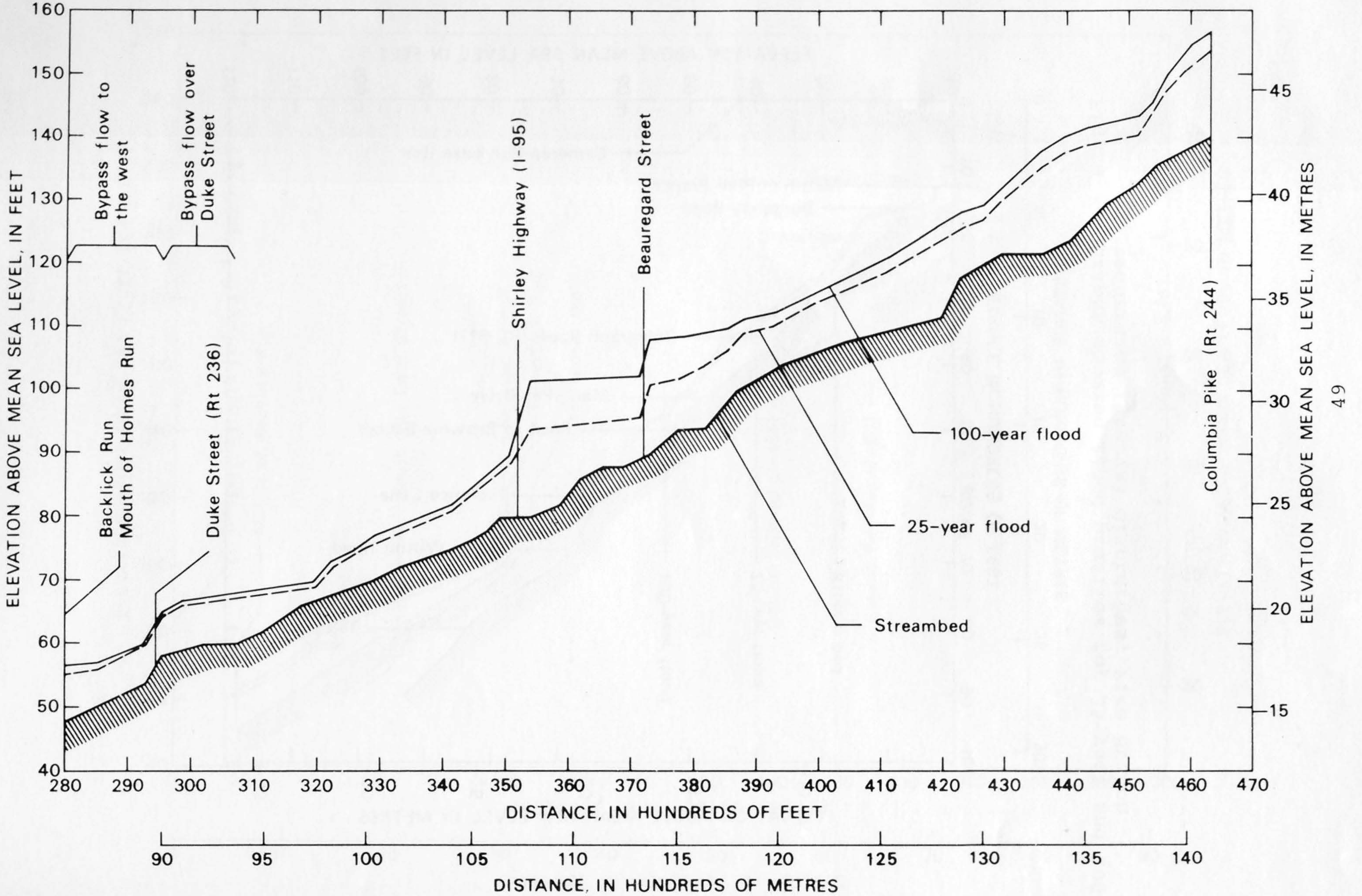

Figure 4. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Holmes Run

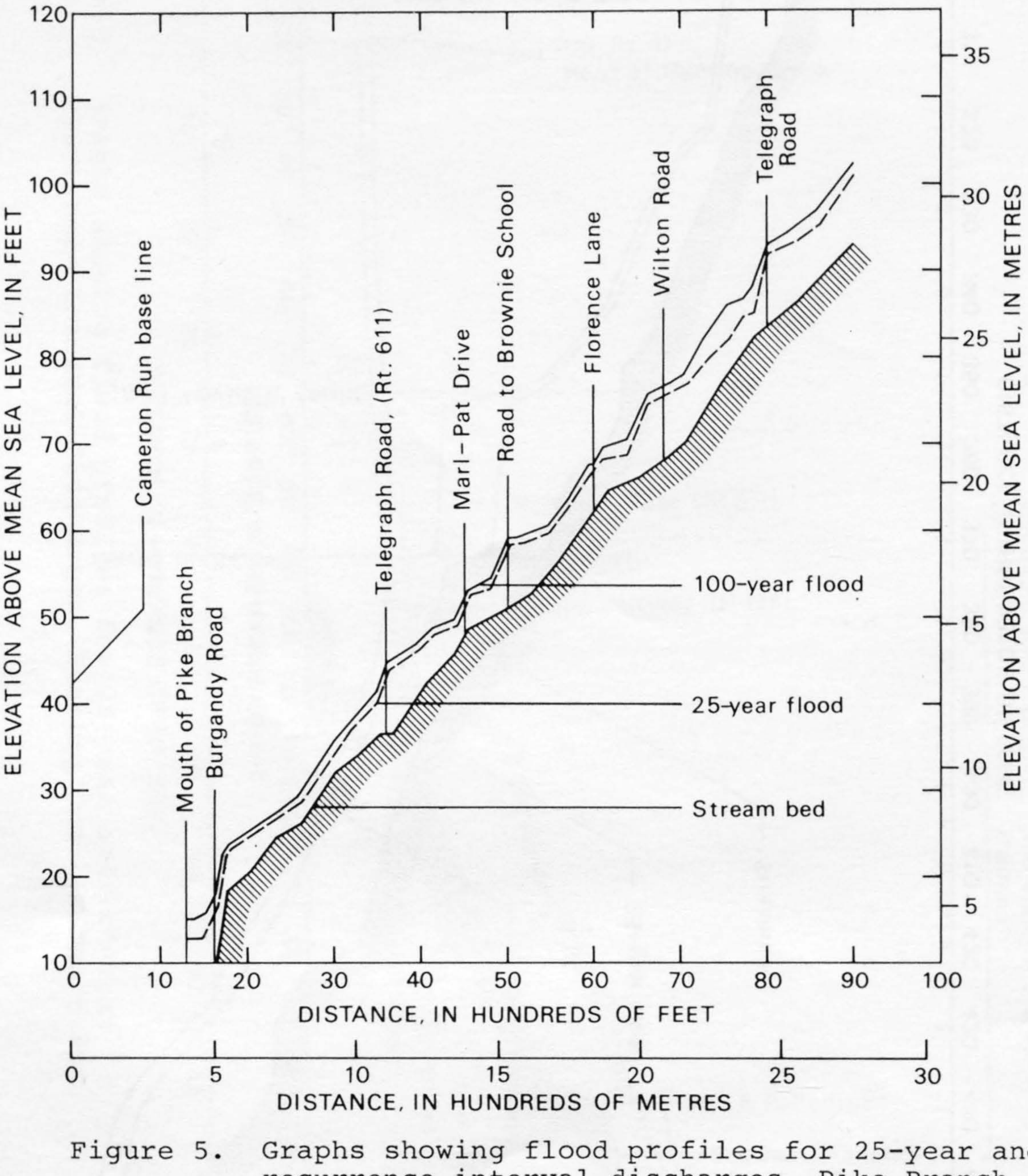

Figure 5. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Pike Branch

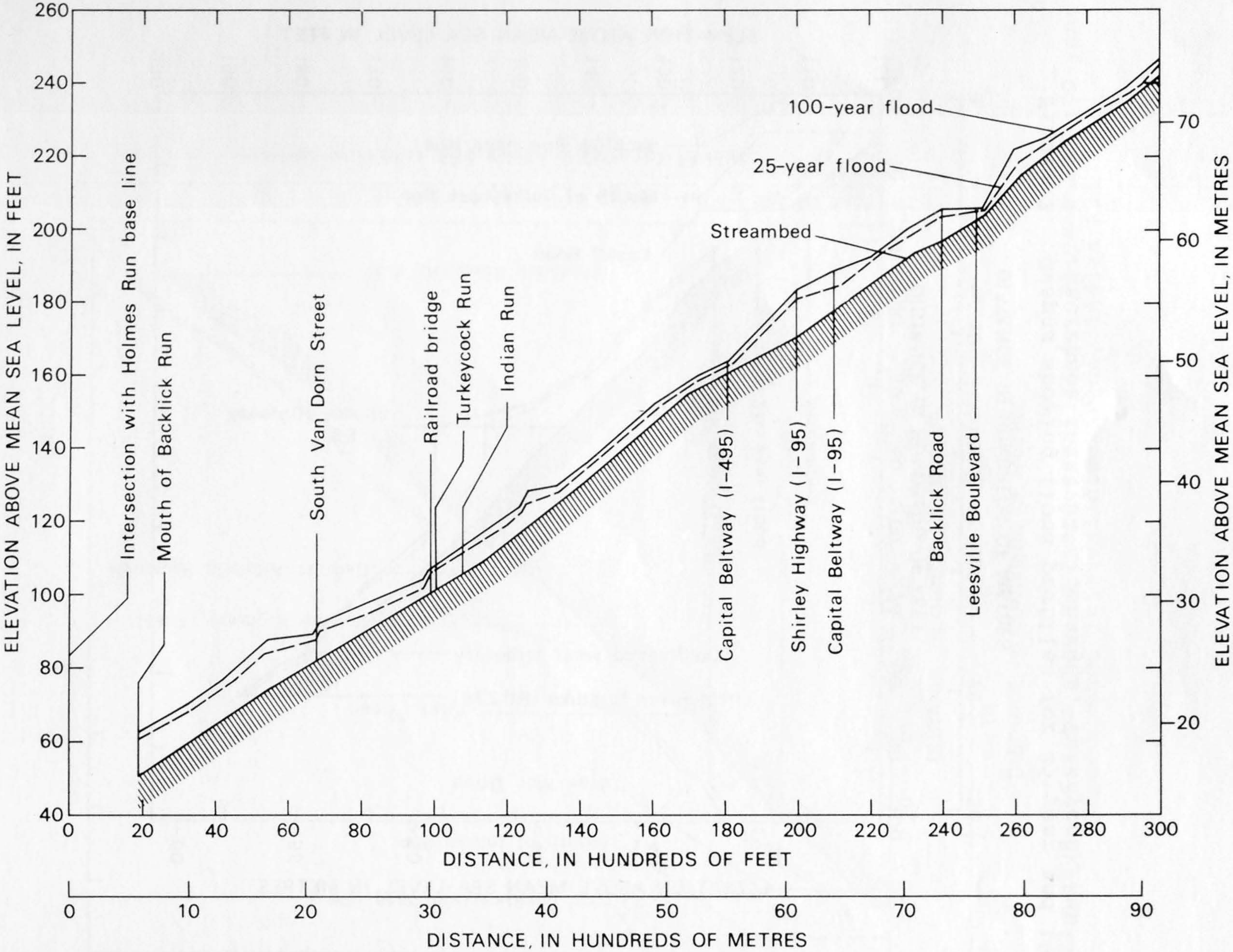

Figure 6. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Backlick Run

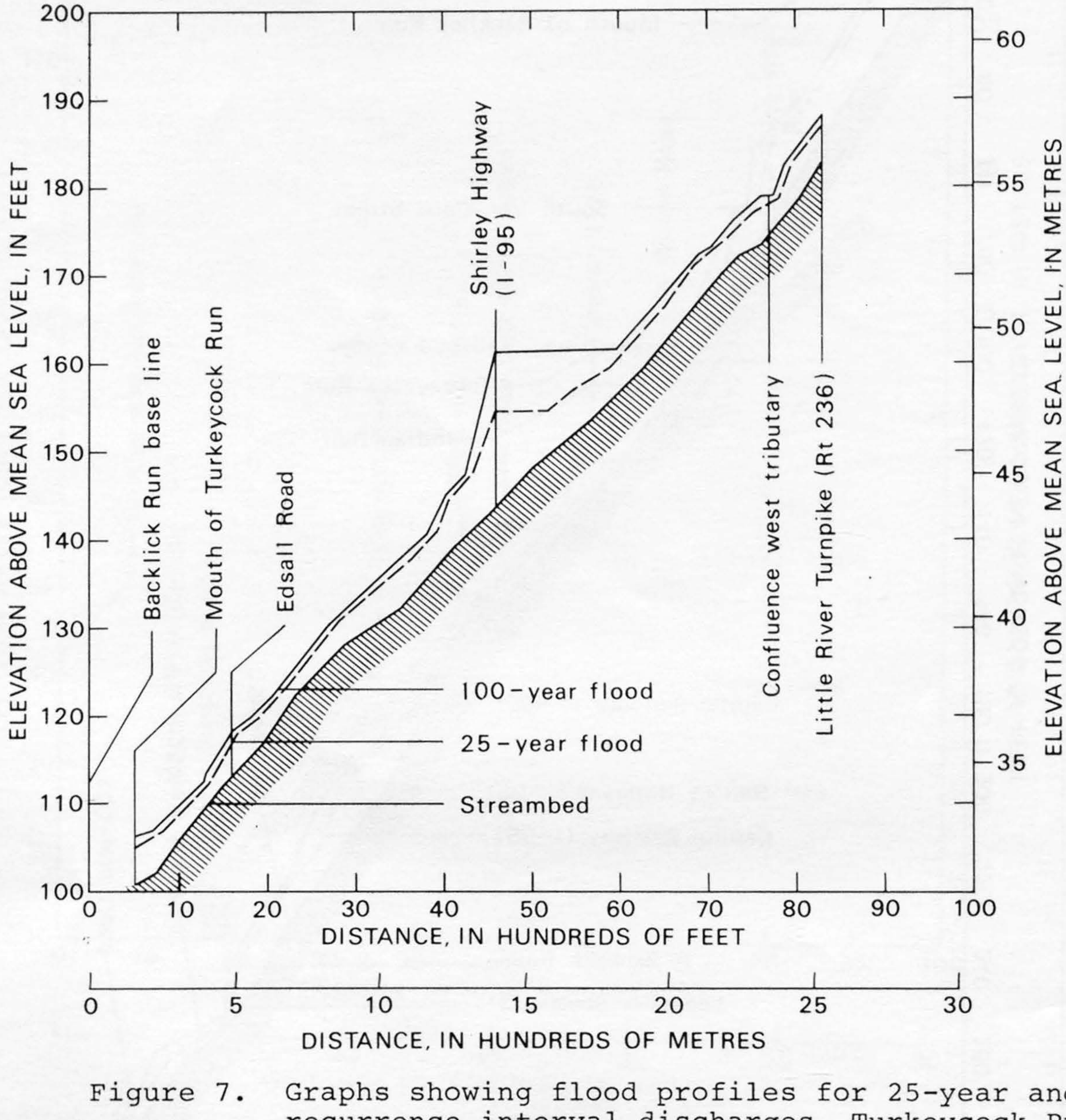

Figure 7. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Turkeycock Run

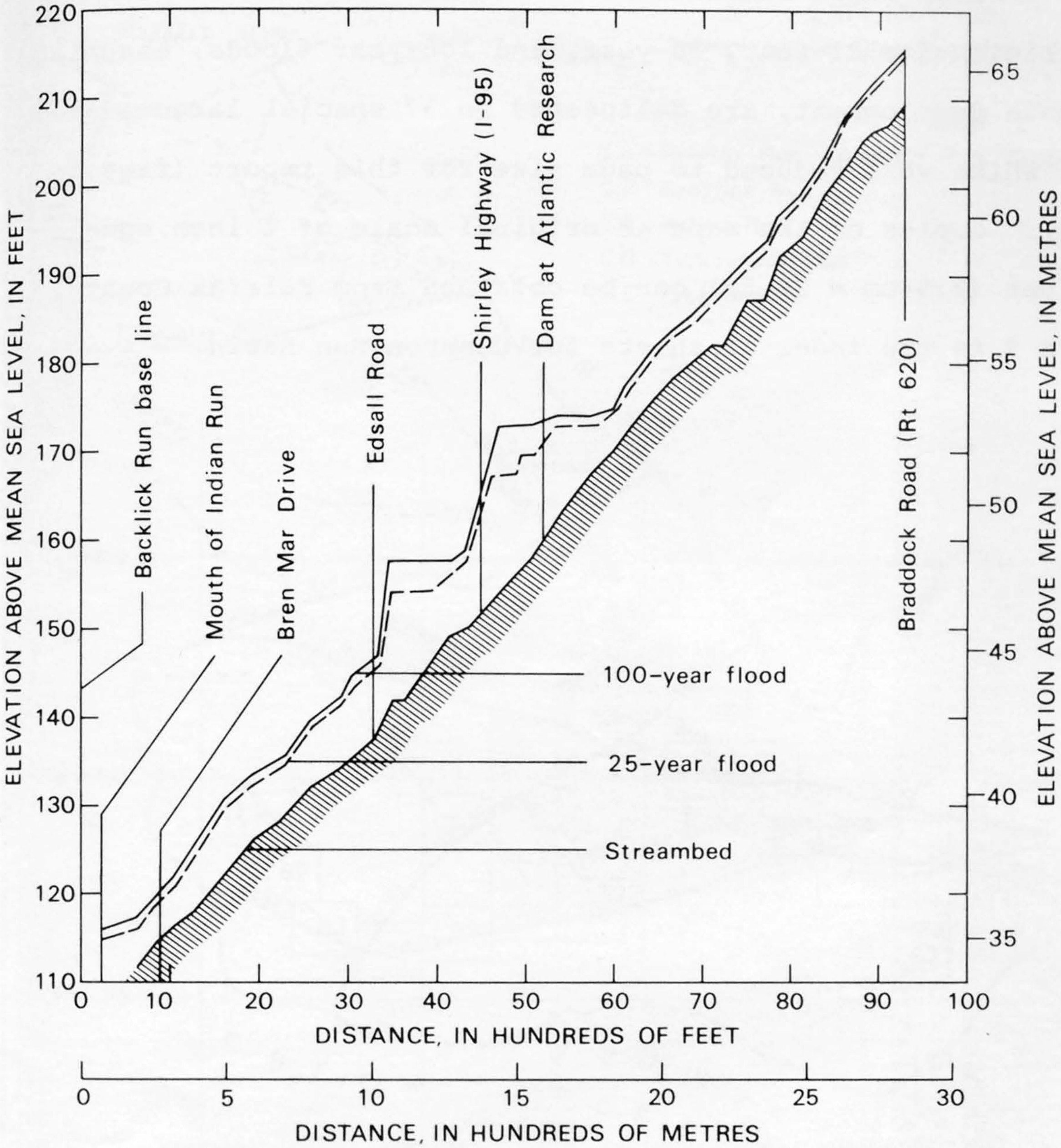

Figure 8. Graphs showing flood profiles for 25-year and 100-year recurrence interval discharges, Indian Run

FLOOD-PLAIN DELINEATION FOR CAMERON RUN BASIN

Limits for 25-year, 50-year, and 100-year floods, assuming ultimate development, are delineated on 37 special large-scale maps, which were reduced to page size for this report (figs. 10-46). Copies of the maps at original scale of 1 inch equals 100 feet (2.54cm = 30.5m) can be obtained from Fairfax County. Figure 9 is the index of sheets for Cameron Run Basin.

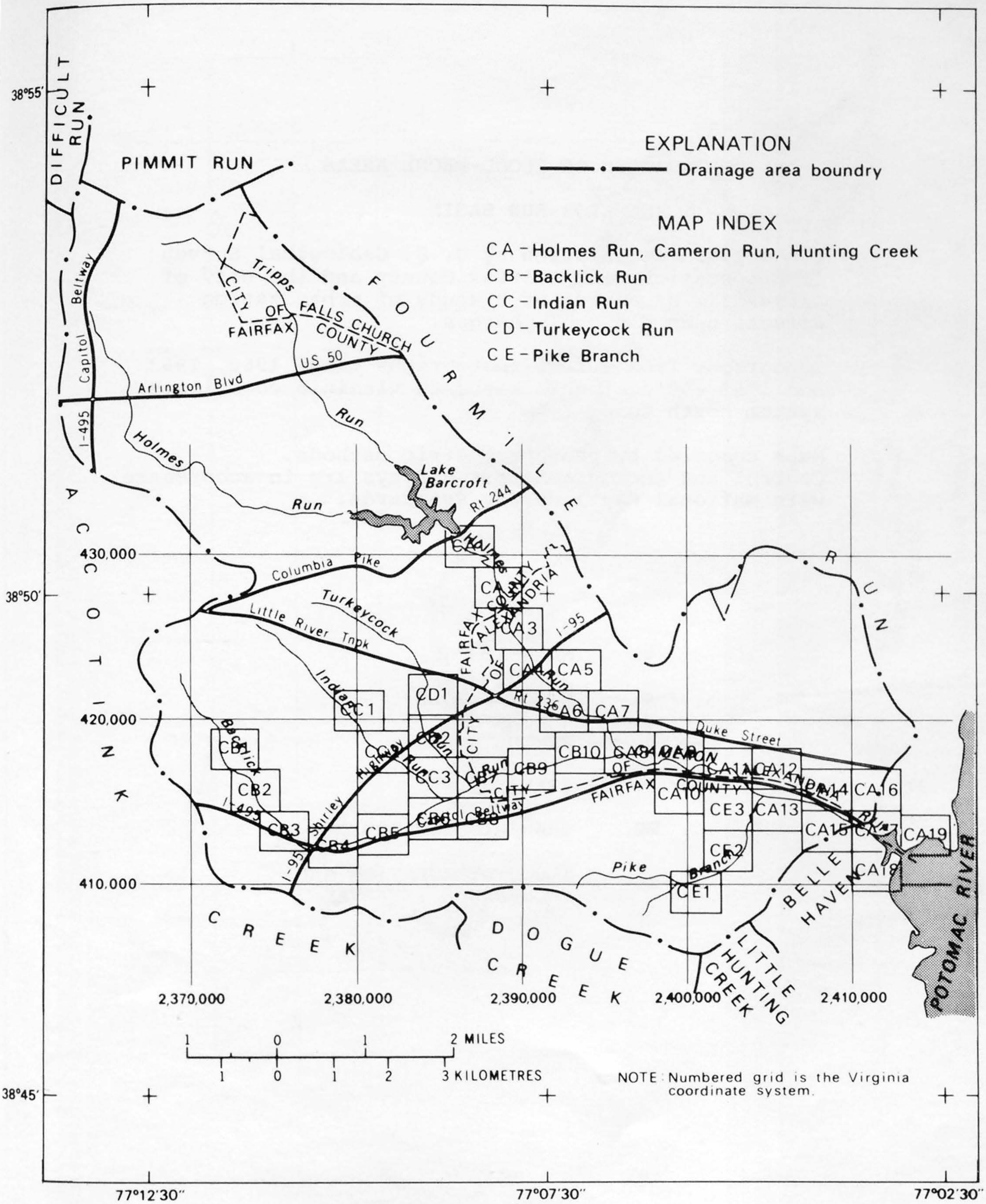

Figure 9. Index of flood maps

DELINEATION OF FLOOD-PRONE AREAS

CAMERON RUN BASIN

Flood plain delineation by U. S. Geological Survey in cooperation with Fairfax County and the city of Alexandria as a part of a study of urbanization effects upon flood discharges.

Topography from aerial photographs taken 1960, 1963 and 1965 250-foot grid based on Virginia coordinate system north zone.

Maps compiled by photogrammetric methods. Control and photogrammetric surveys are in accordance with National Map Accuracy Standards.

SYMBOLS

●	MANHOLE
-●-	UTILITY POLE
—x—x—x—	FENCE
—————	STREAM
⊠	TRANSMISSION TOWER
---25---	FLOOD-DELINEATION AND RECURRENCE INTERVAL

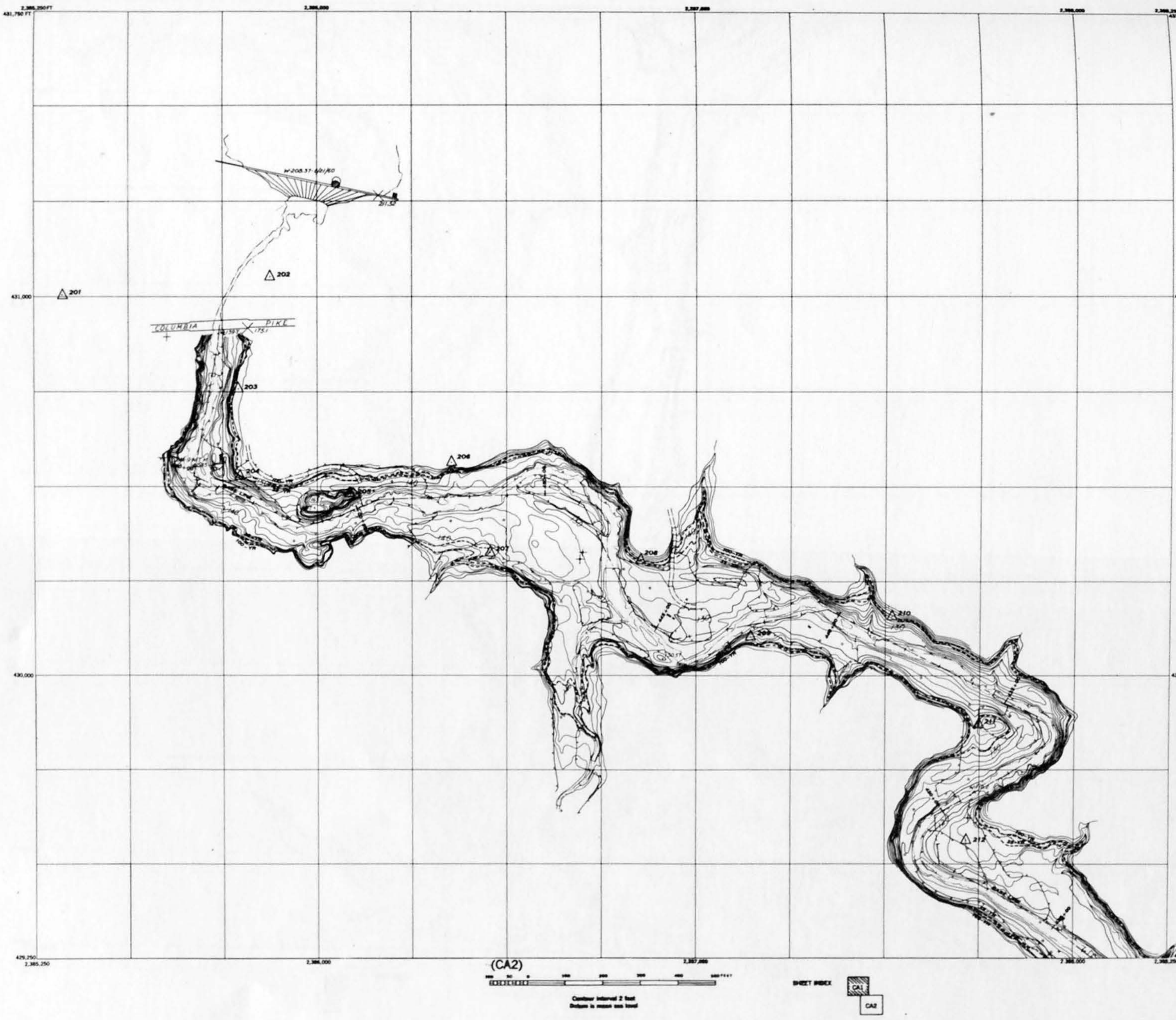

Figure 10. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-1

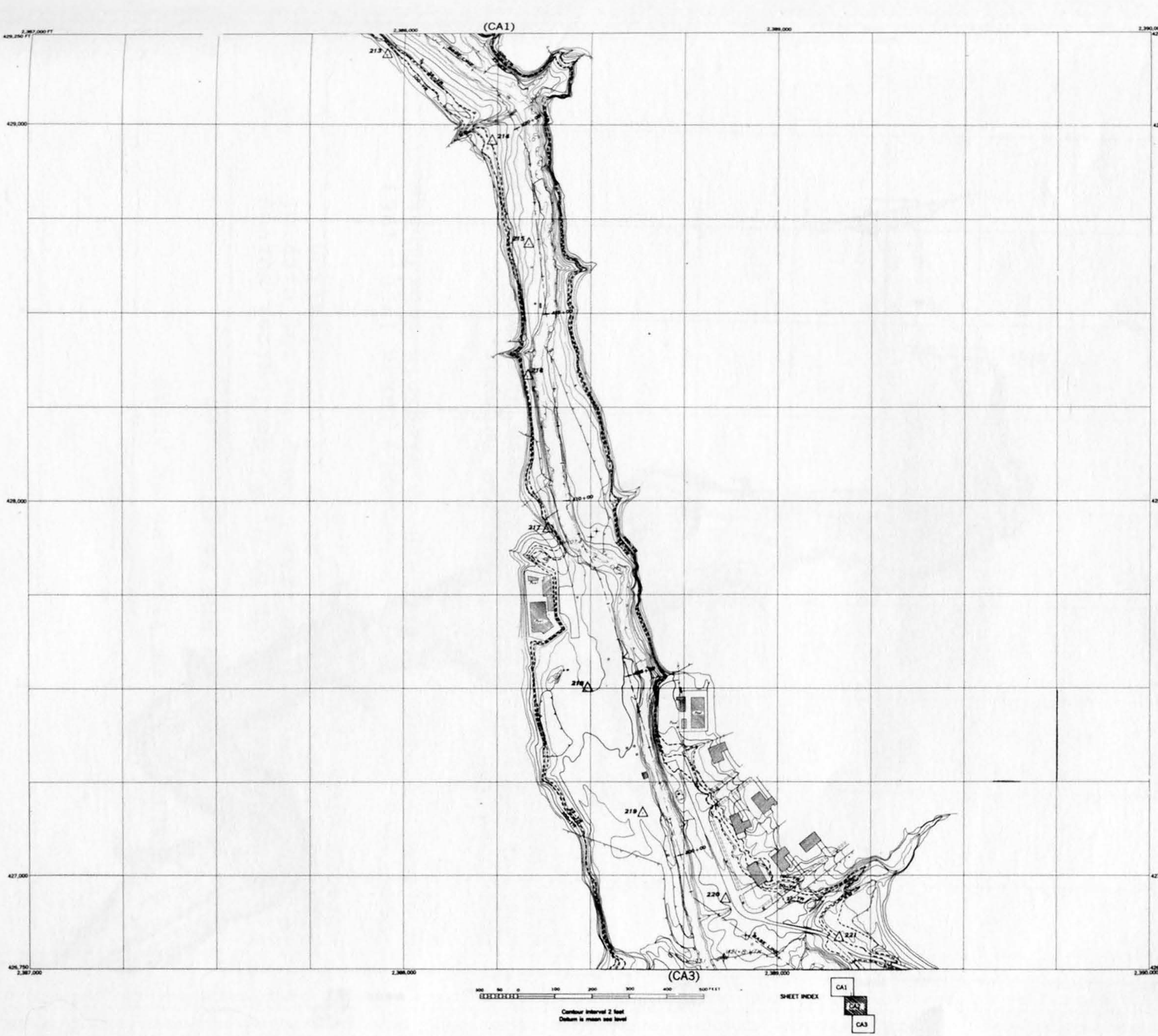

Figure 11. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-2

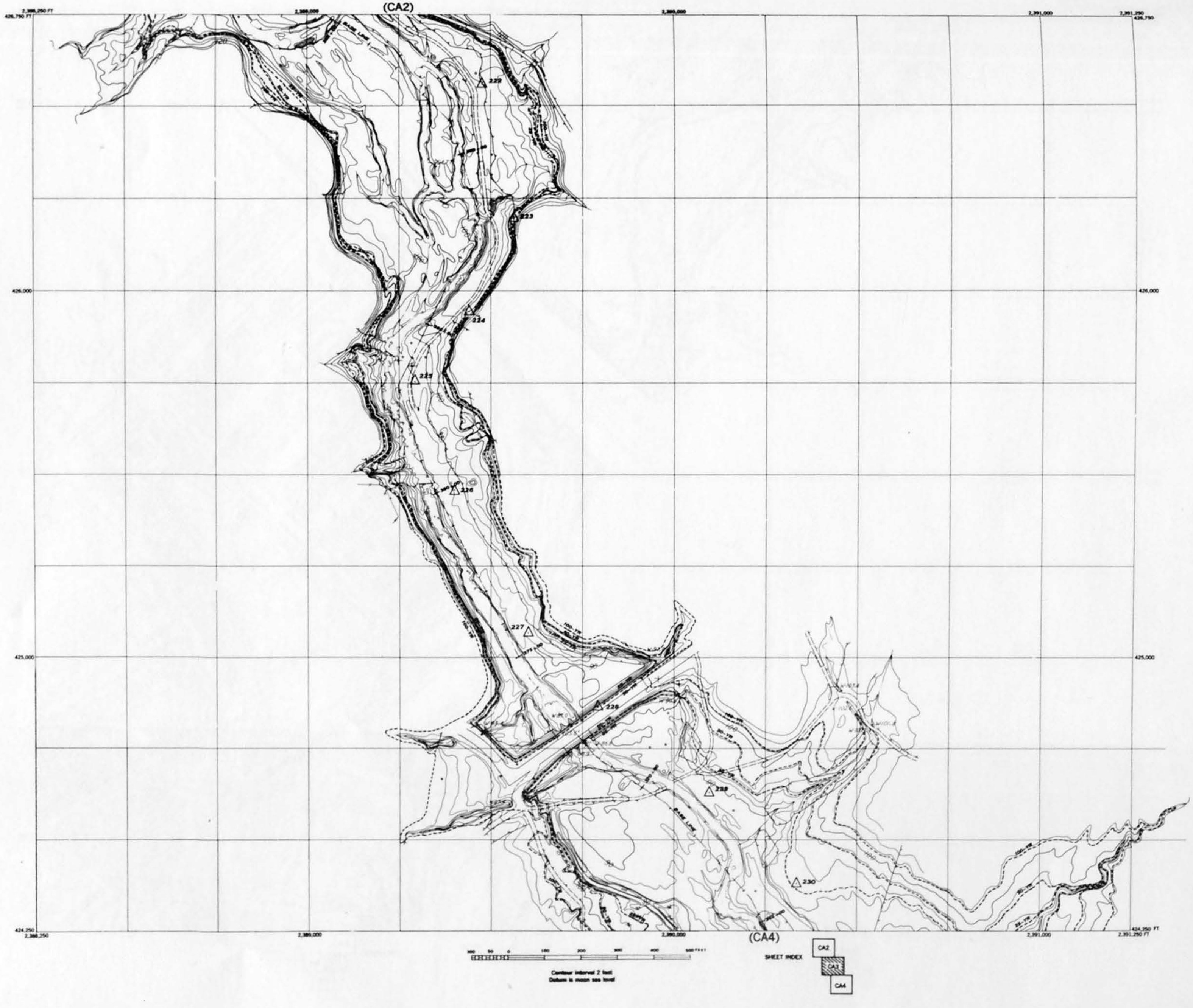

Figure 12. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-3

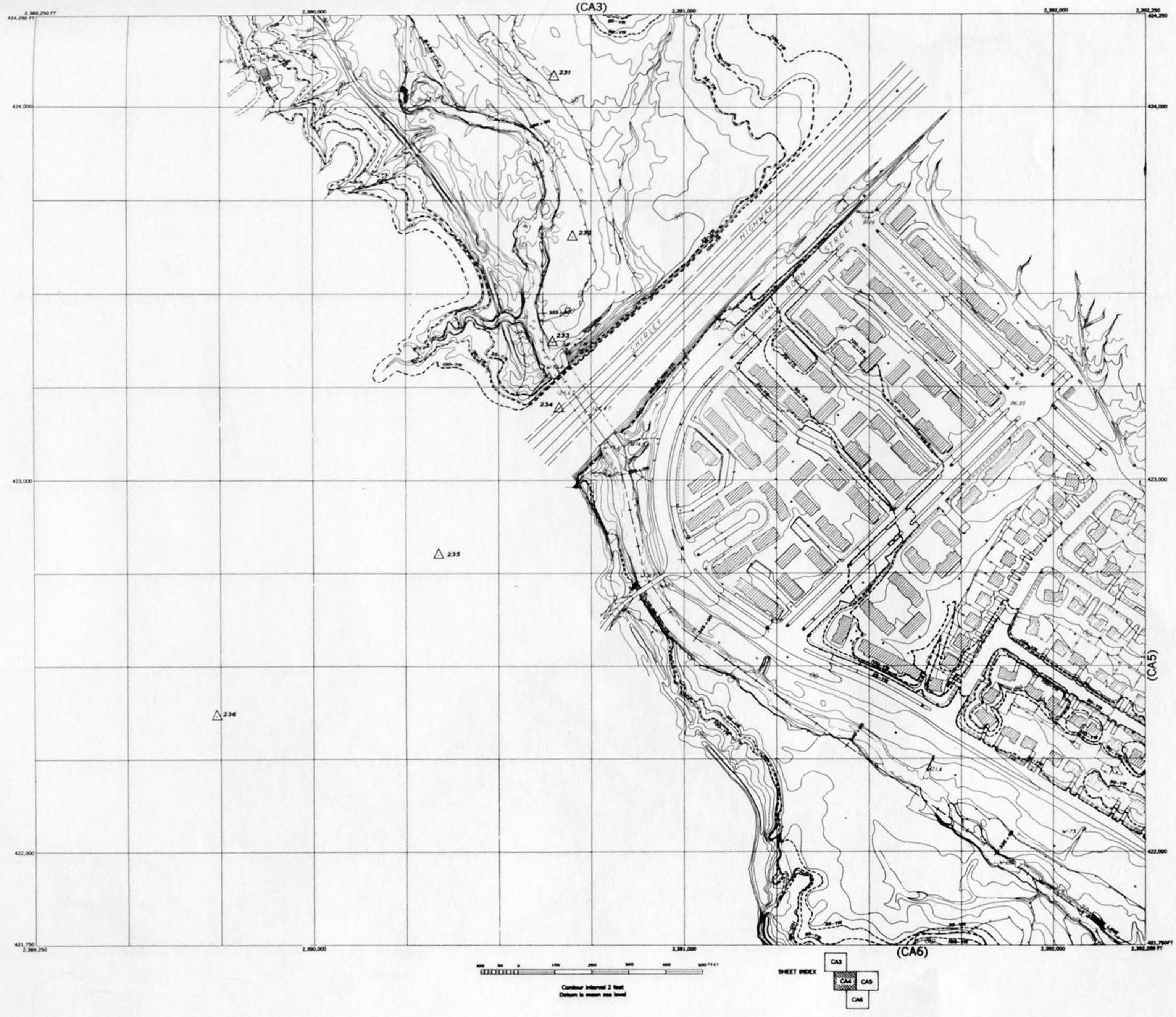

Figure 13. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-4

Figure 14. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-5

Figure 15. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-6

Figure 16. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-7

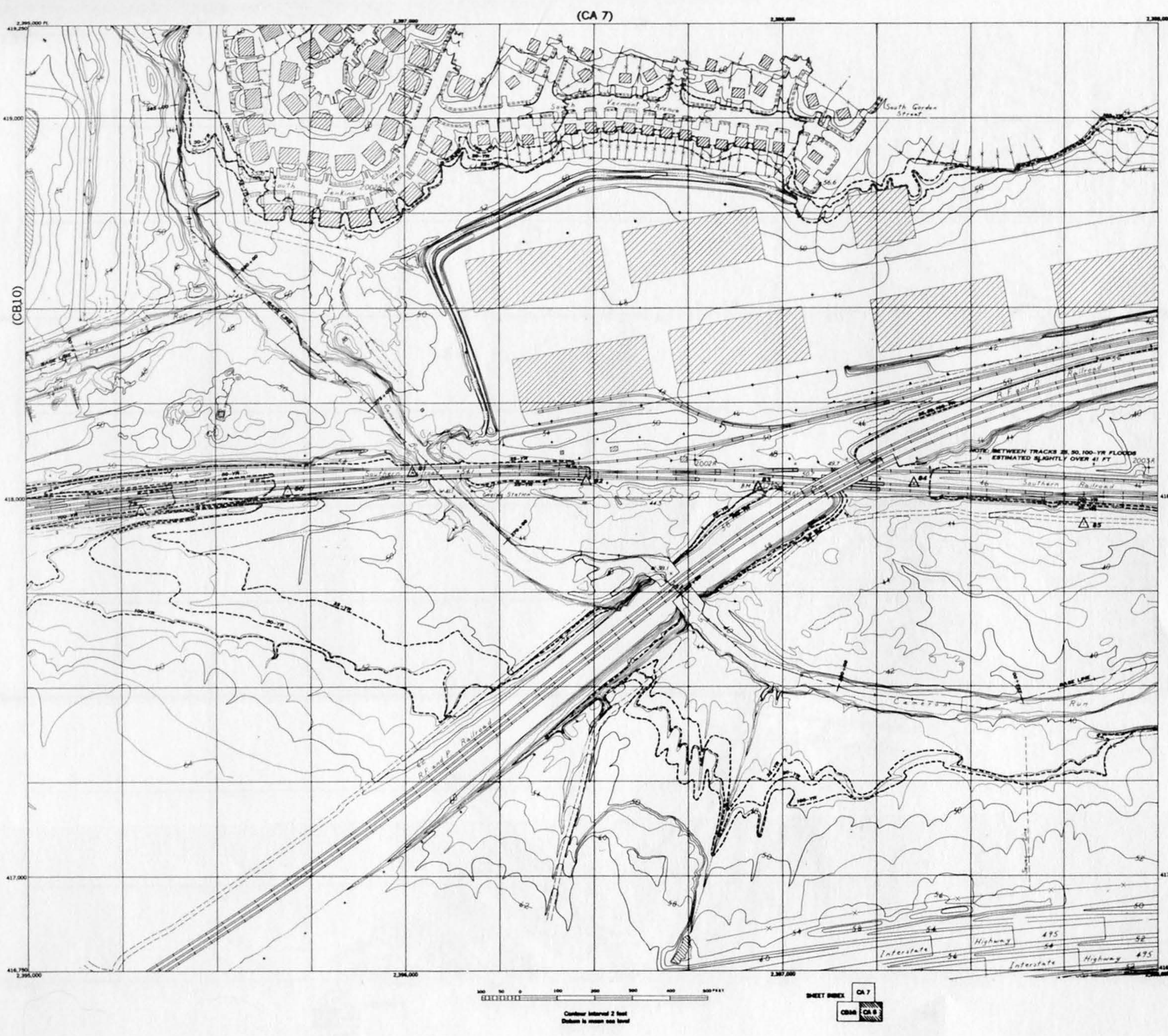

Figure 17. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-8

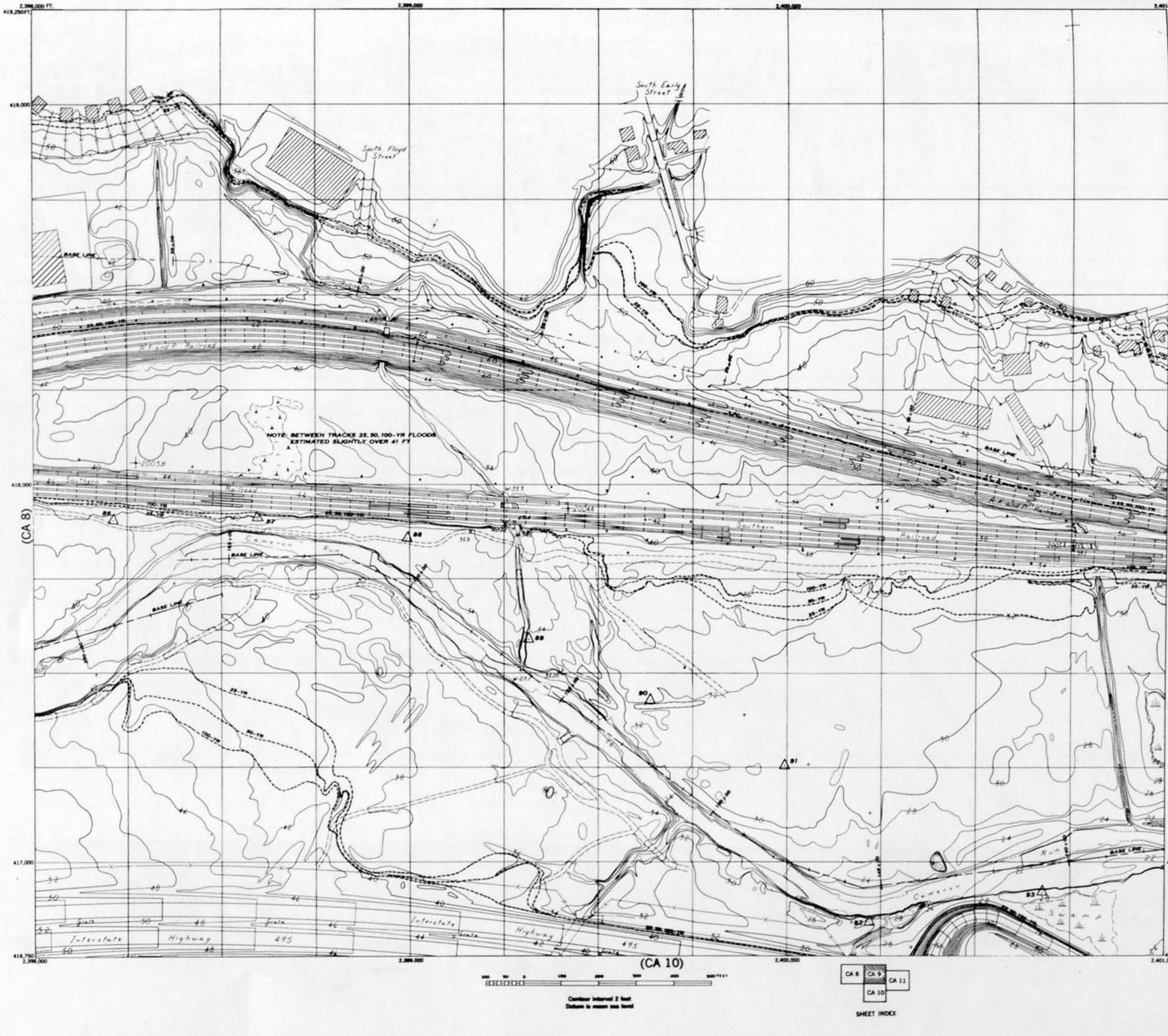

Figure 18. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-9

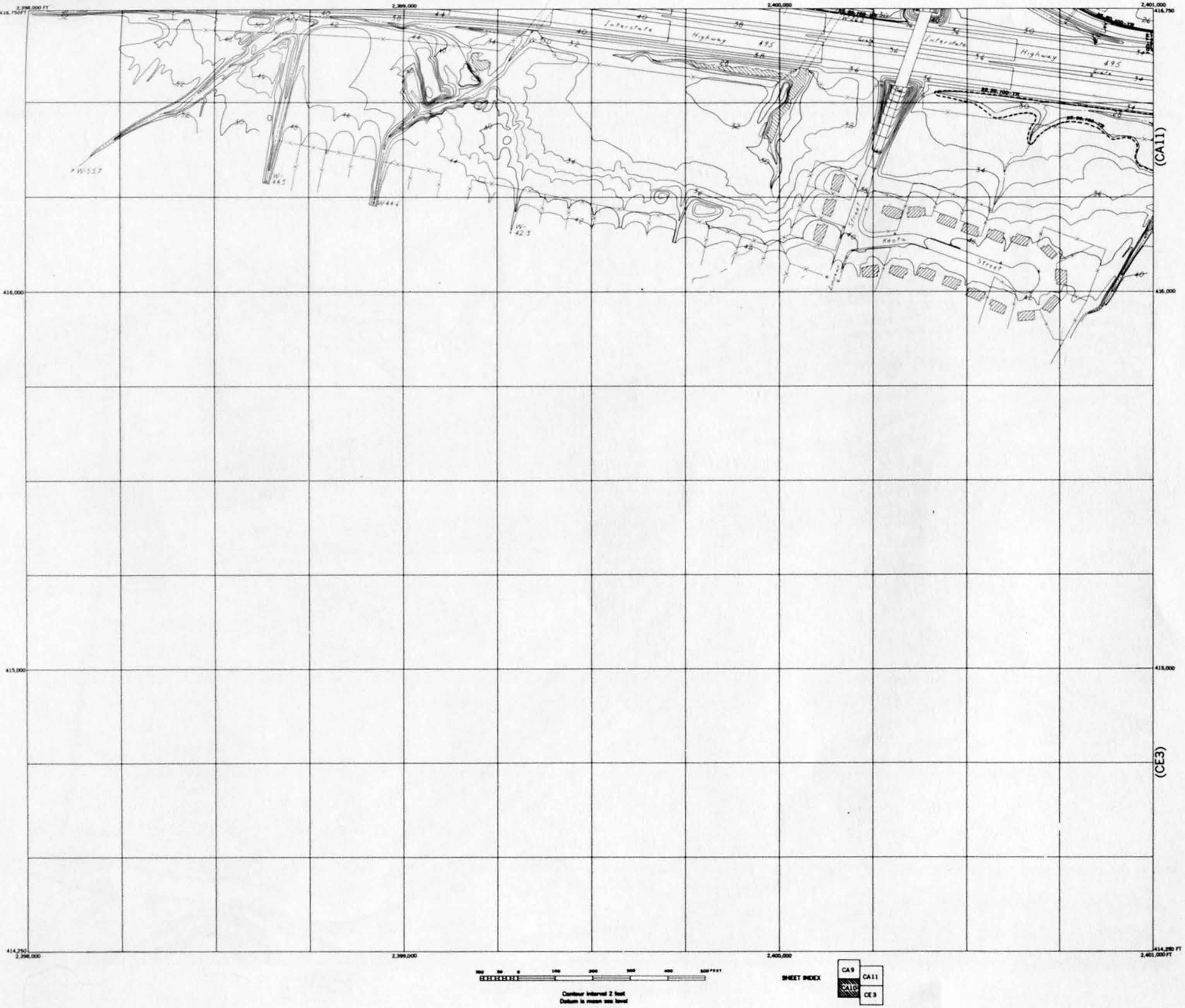

Figure 19. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-10

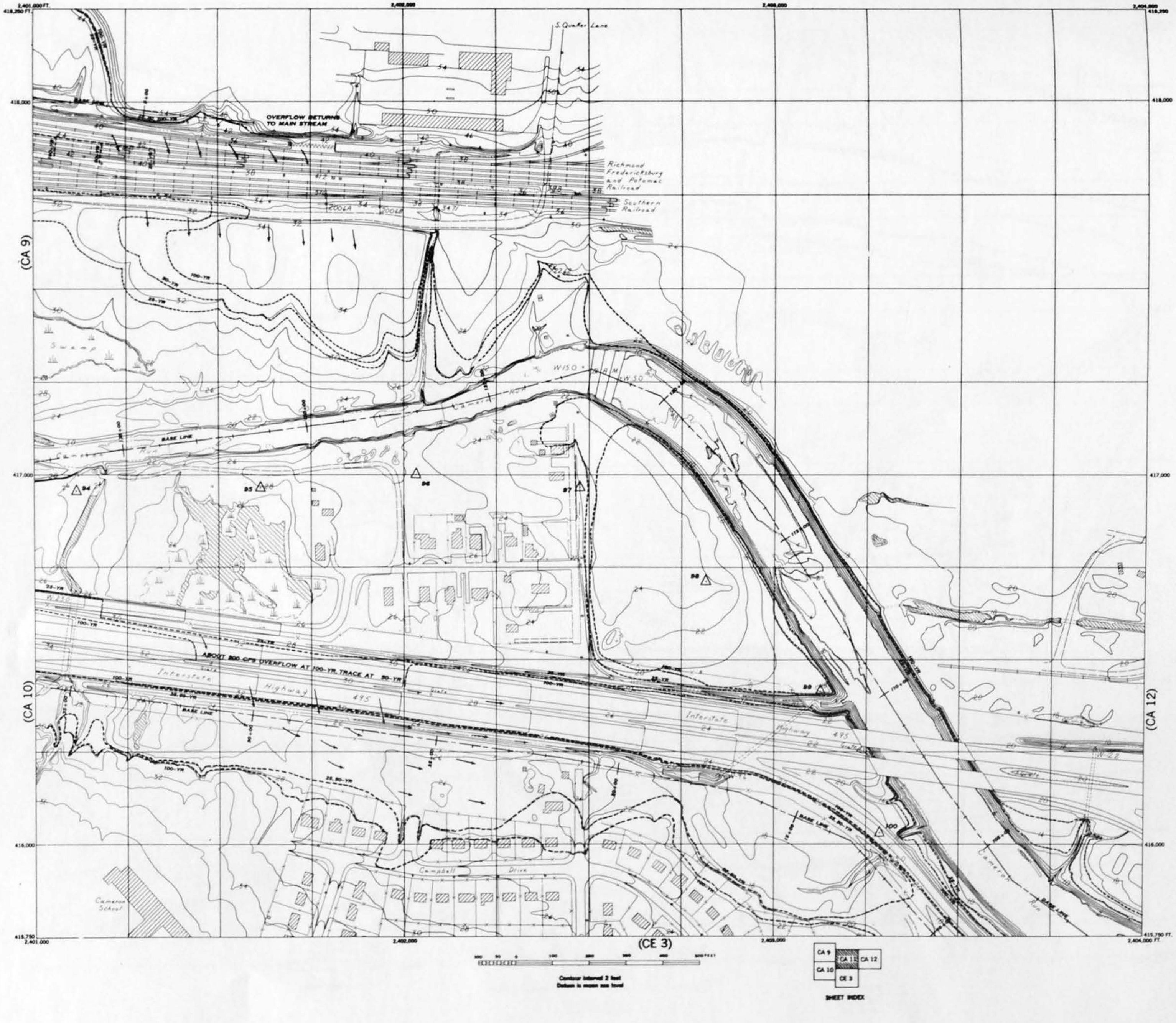

Figure 20. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-11

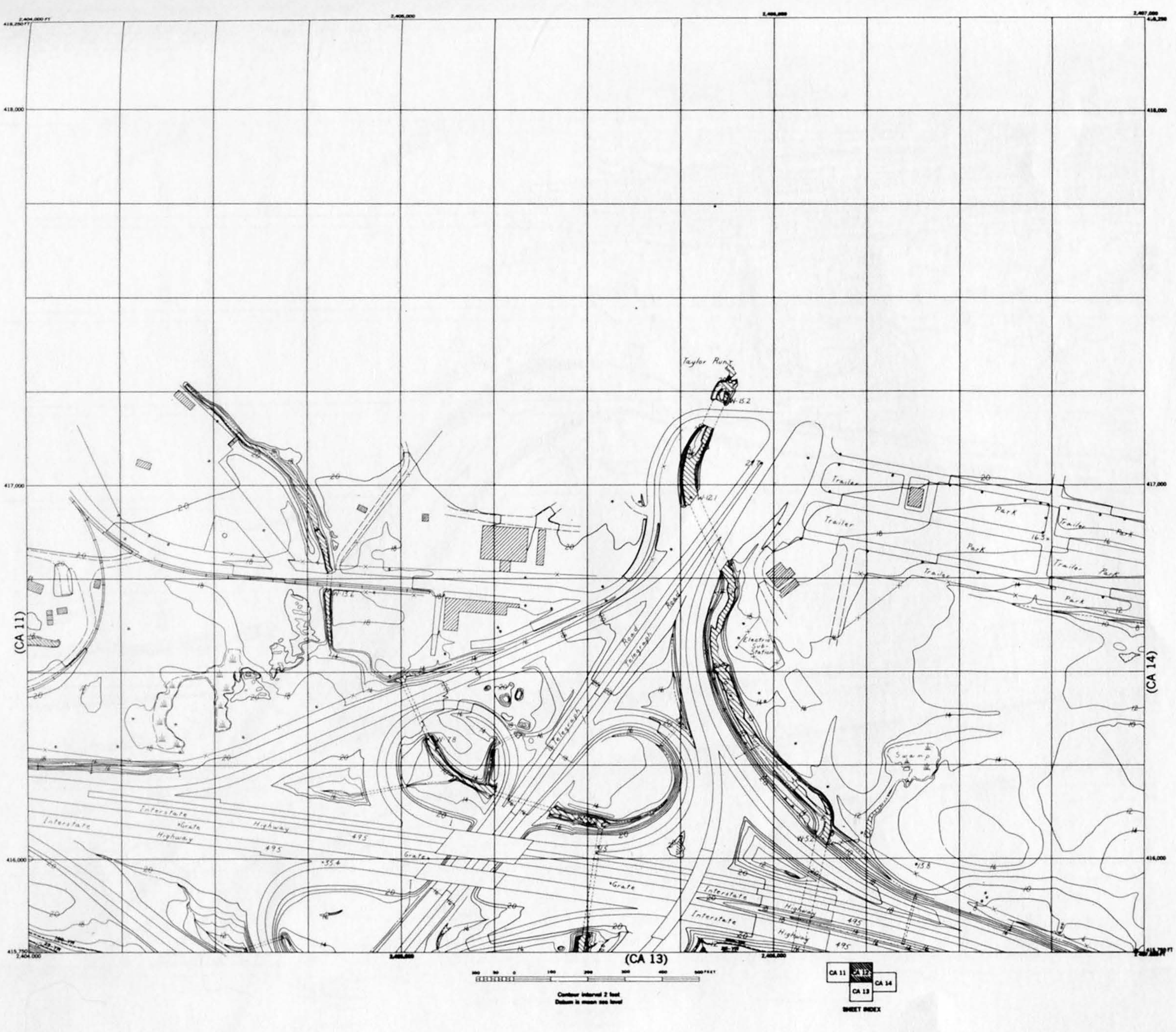

Figure 21. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-12

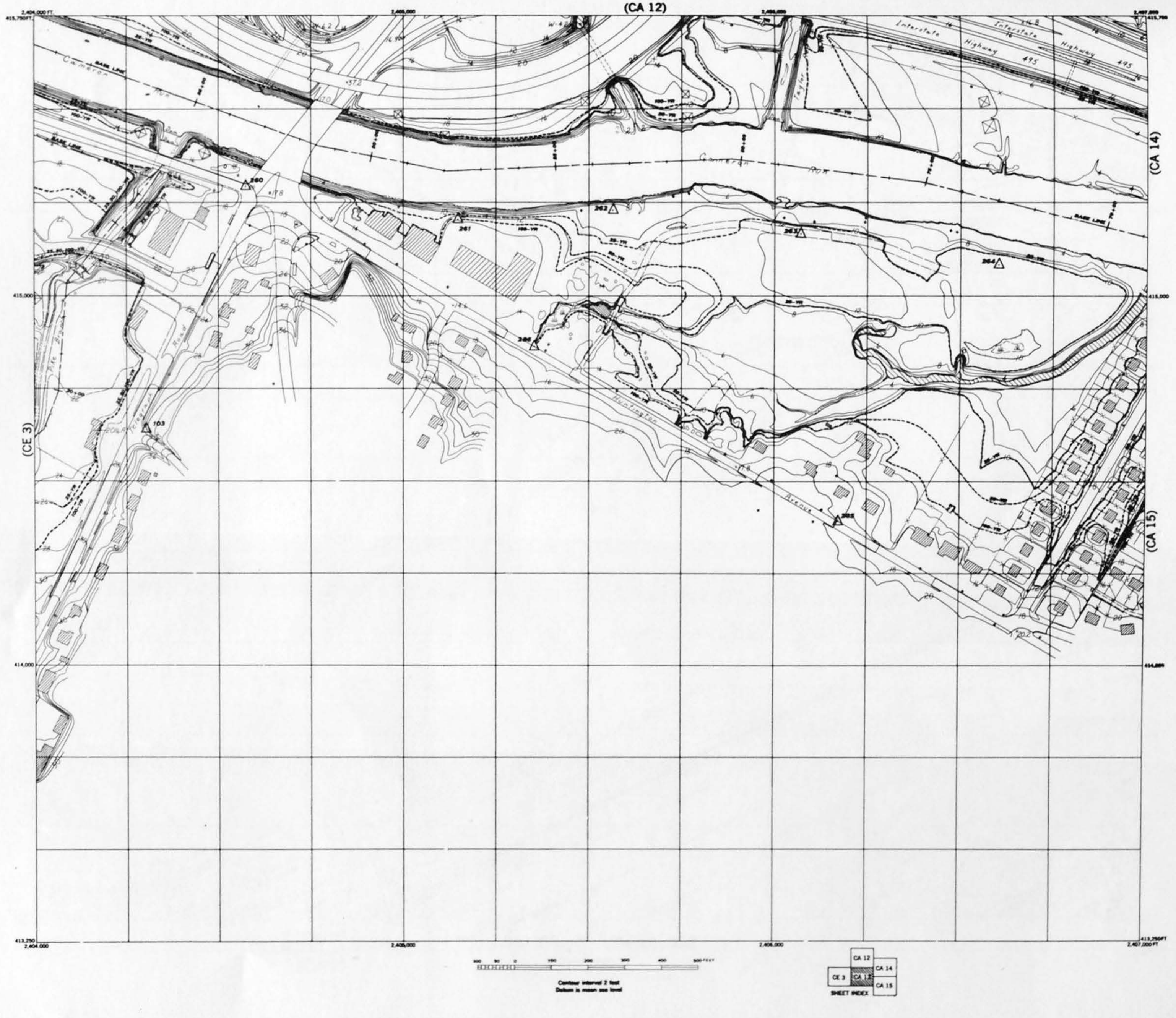

Figure 22. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-13

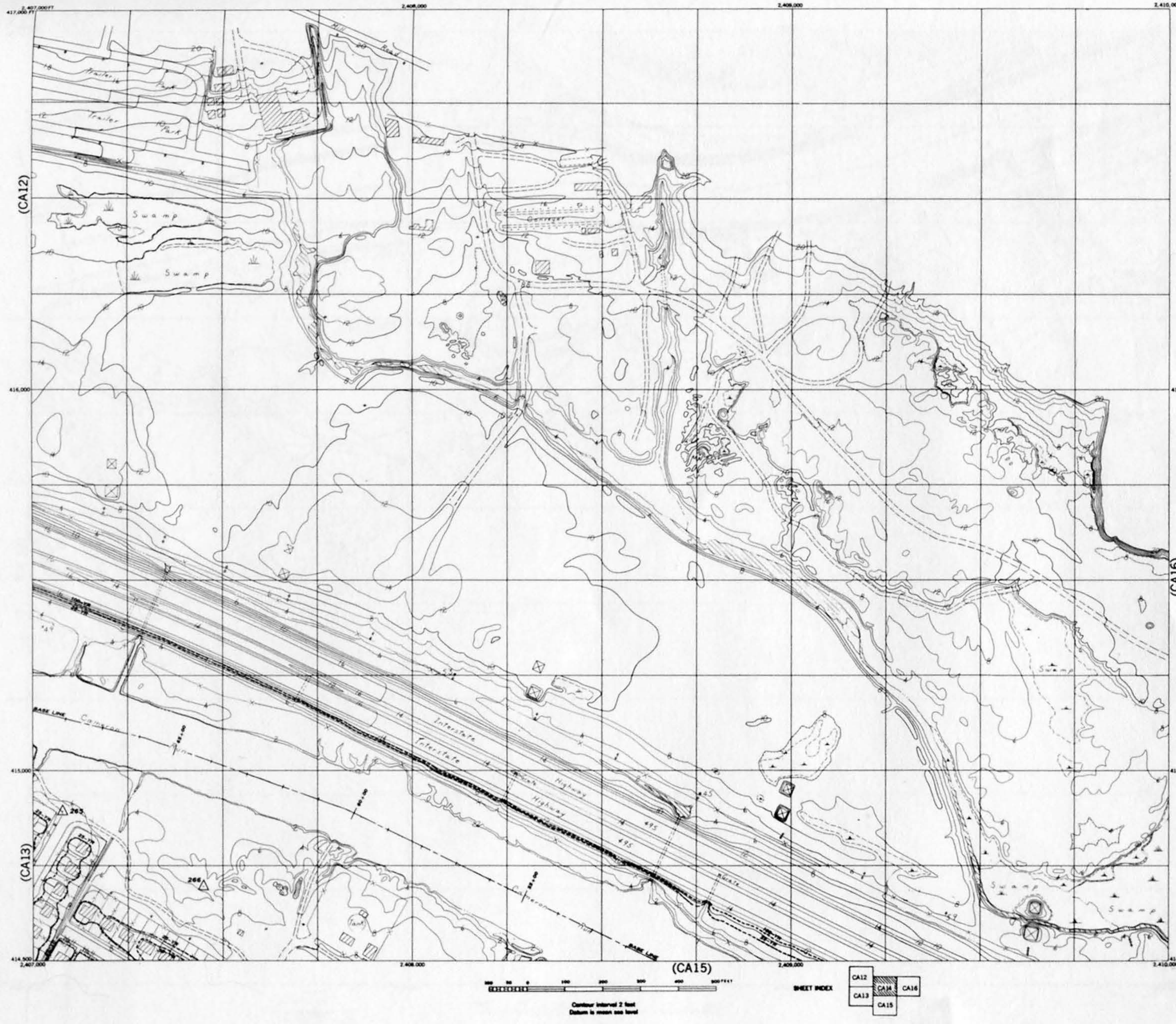

Figure 23. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-14

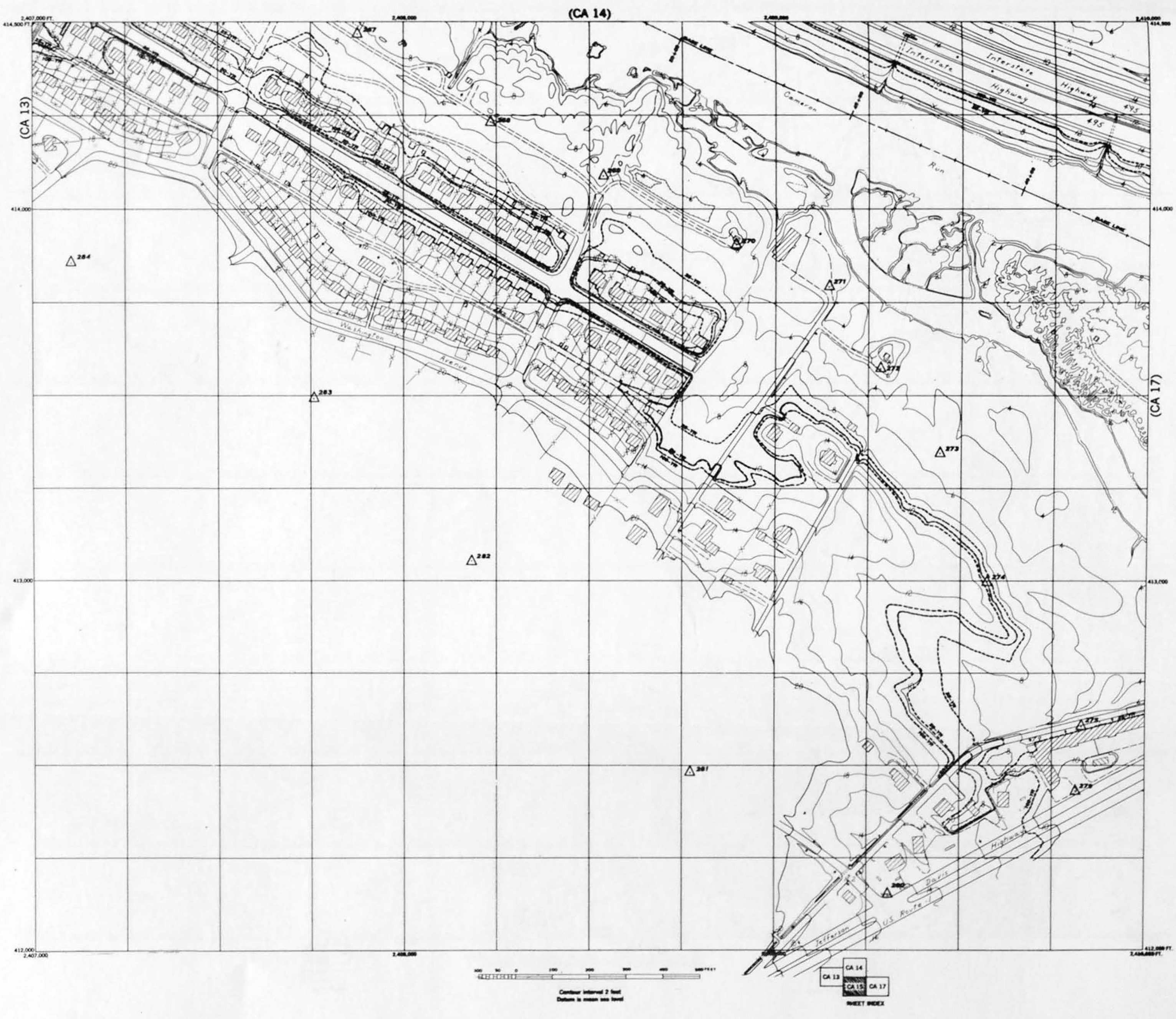

Figure 24. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-15

Figure 25   Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-16

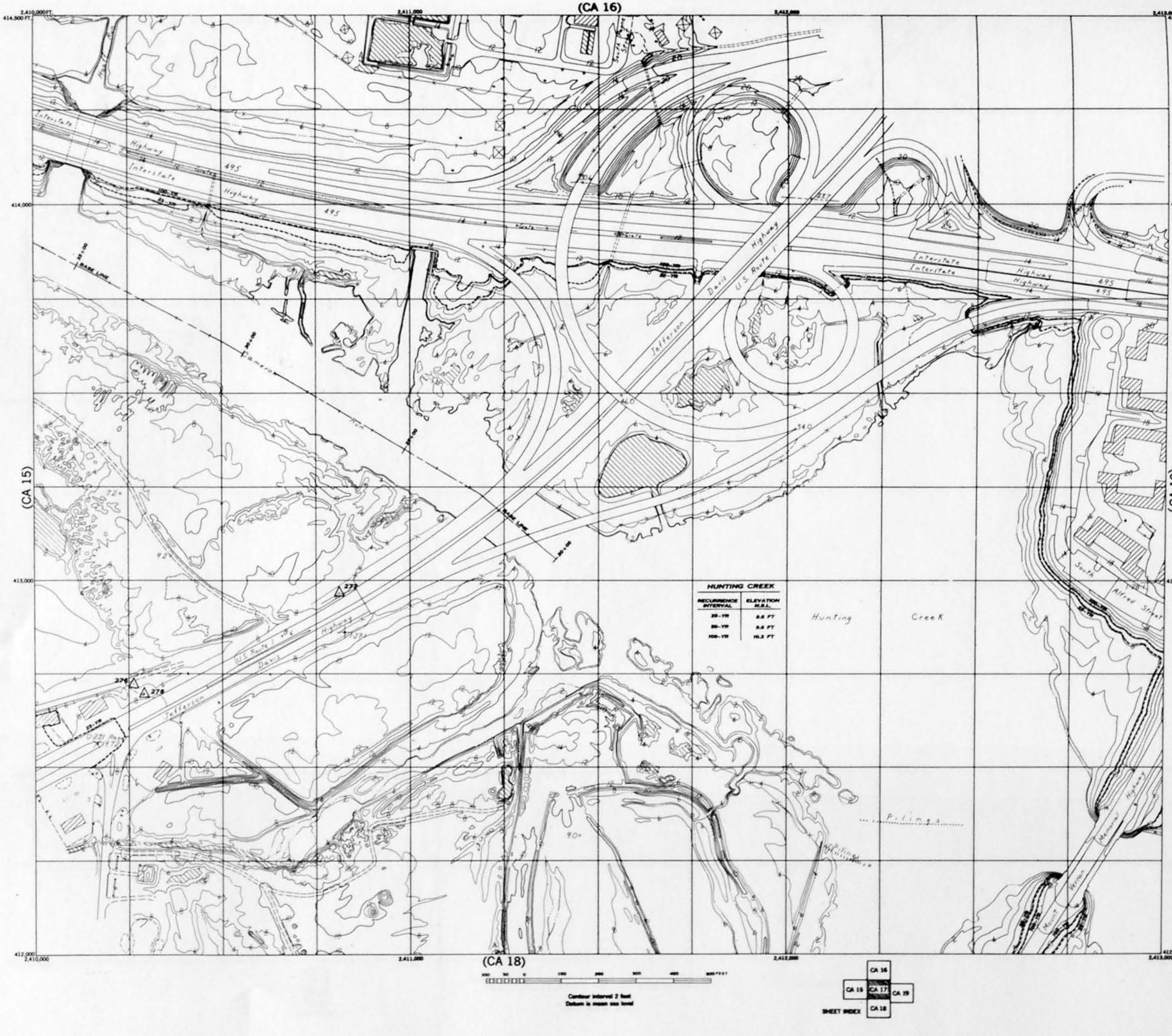

Figure 26. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-17

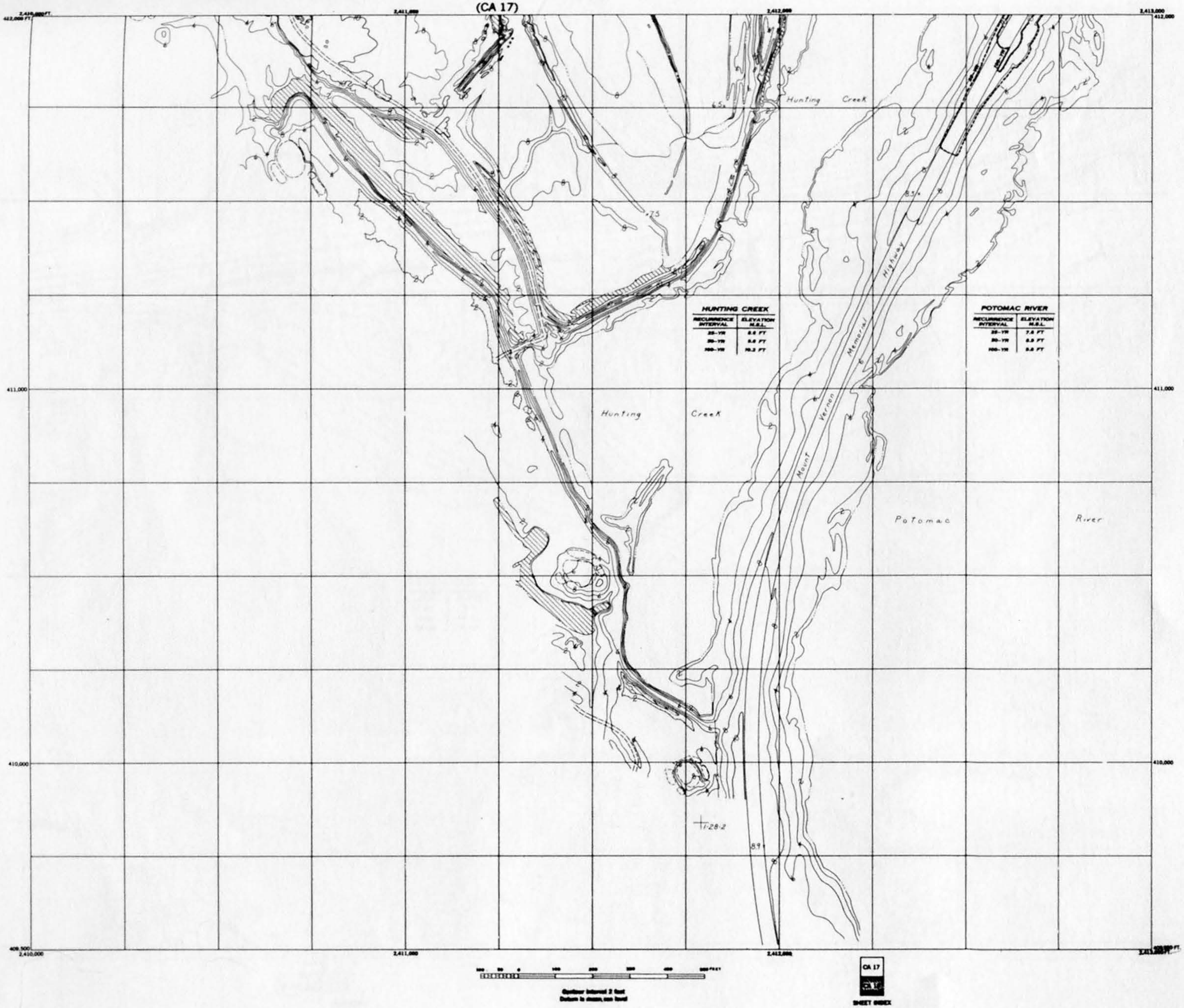

Figure 27. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-18

Figure 28. Topographic map showing flood boundary delineation, Holmes Run, and Cameron Run; CA-19

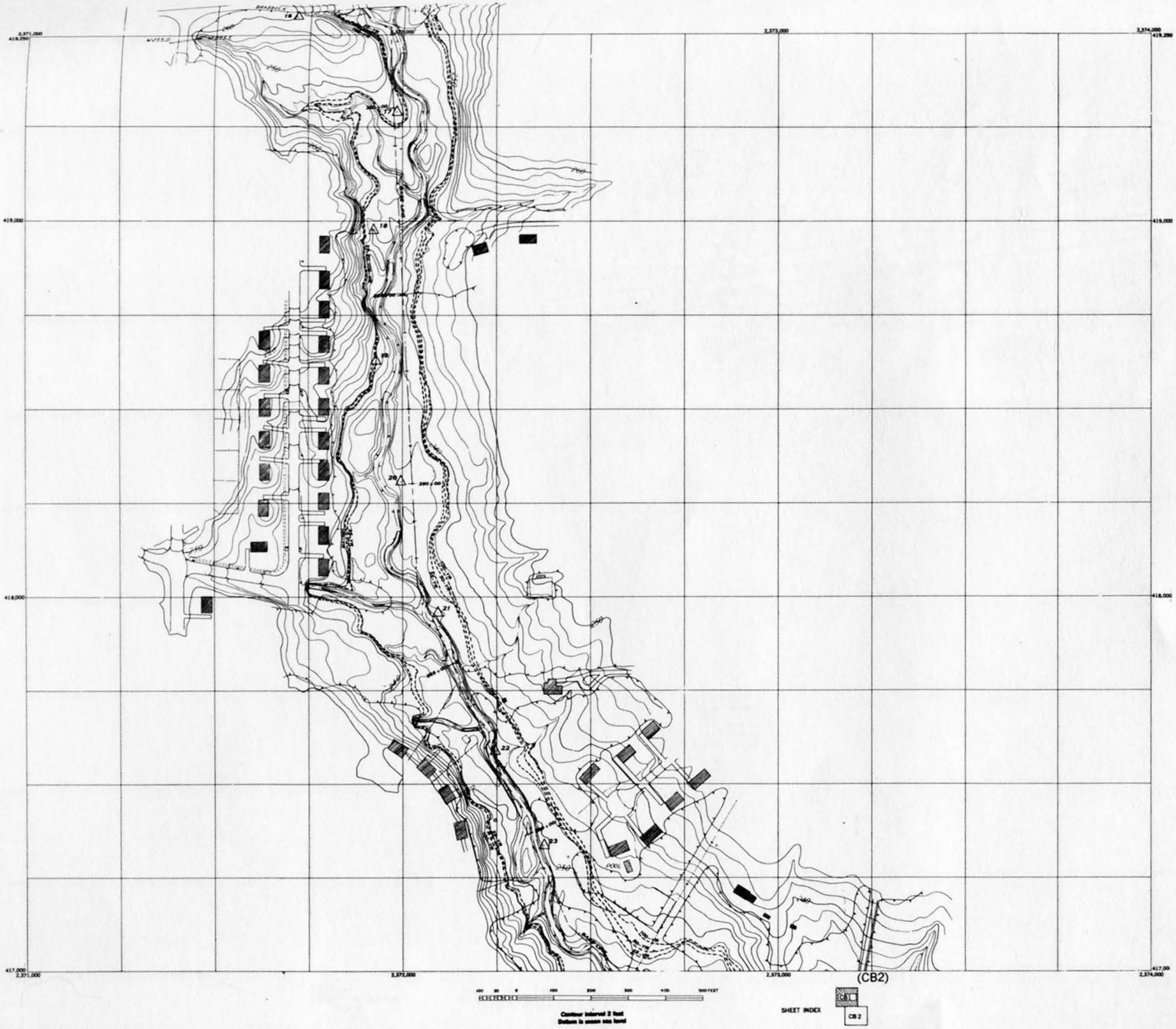

Figure 29. Topographic map showing flood boundary delineation, Backlick Run; CB-1

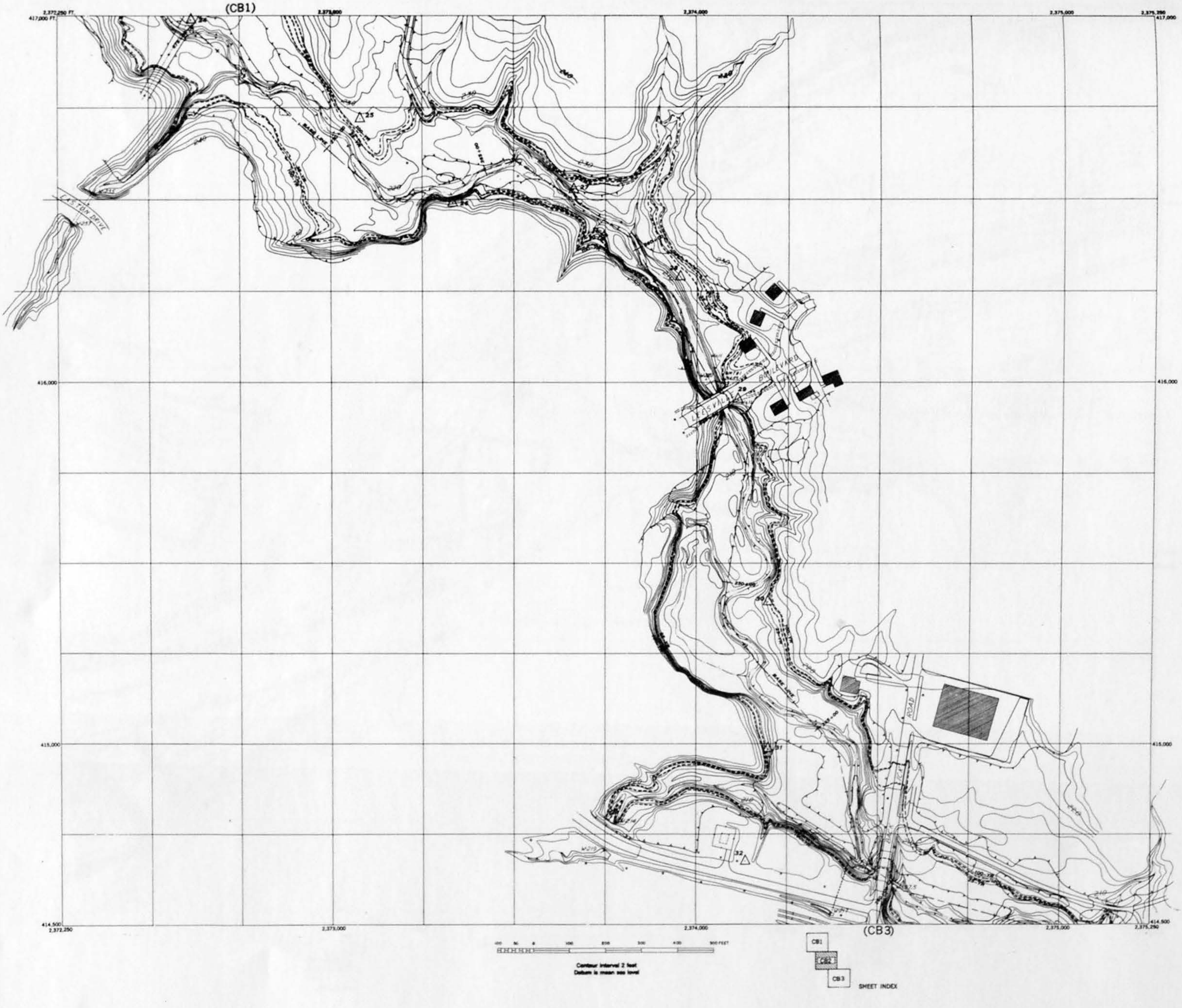

Figure 30. Topographic map showing flood boundary delineation, Backlick Run; CB-2

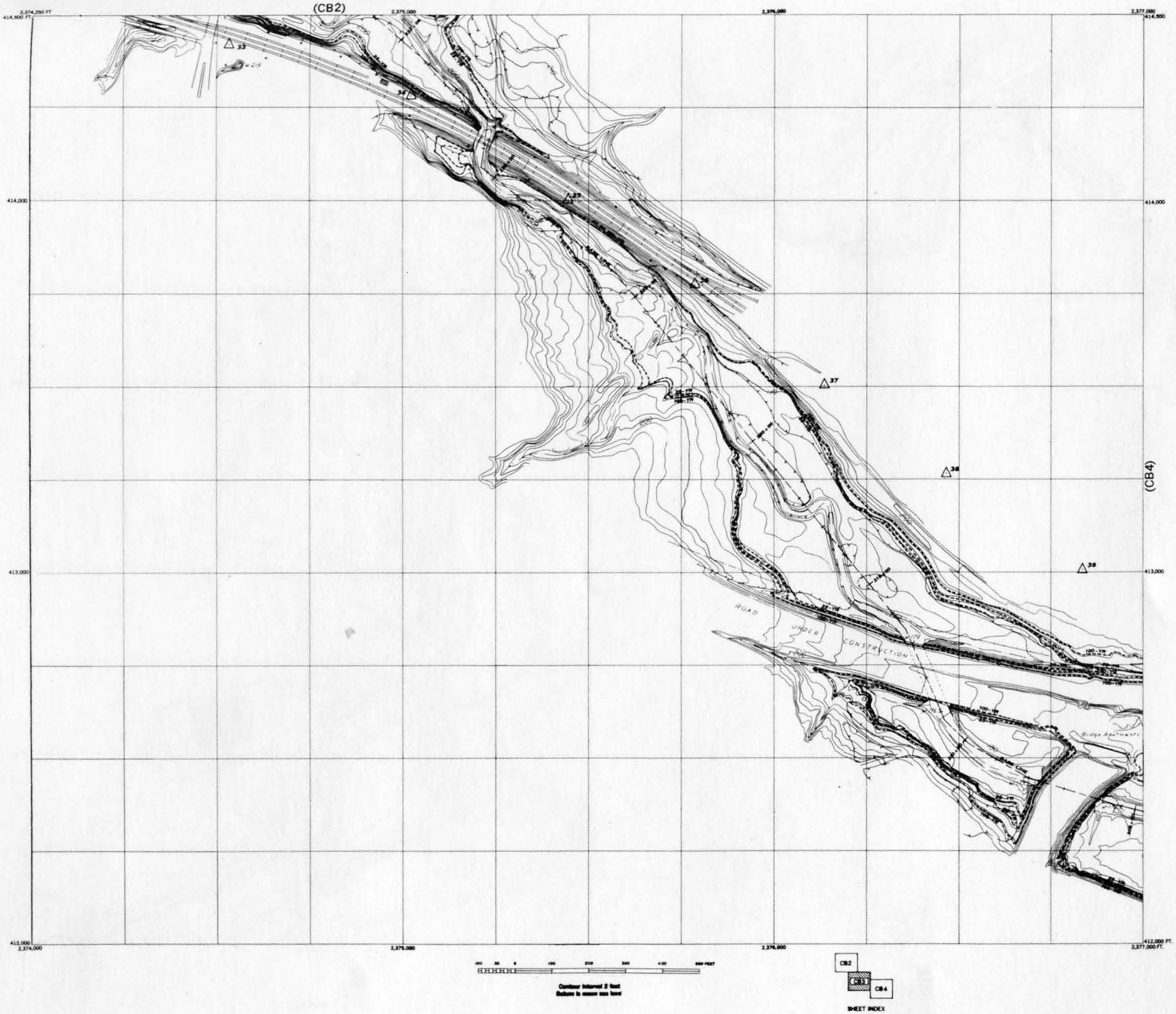

Figure 31. Topographic map showing flood boundary delineation, Backlick Run; CB-3

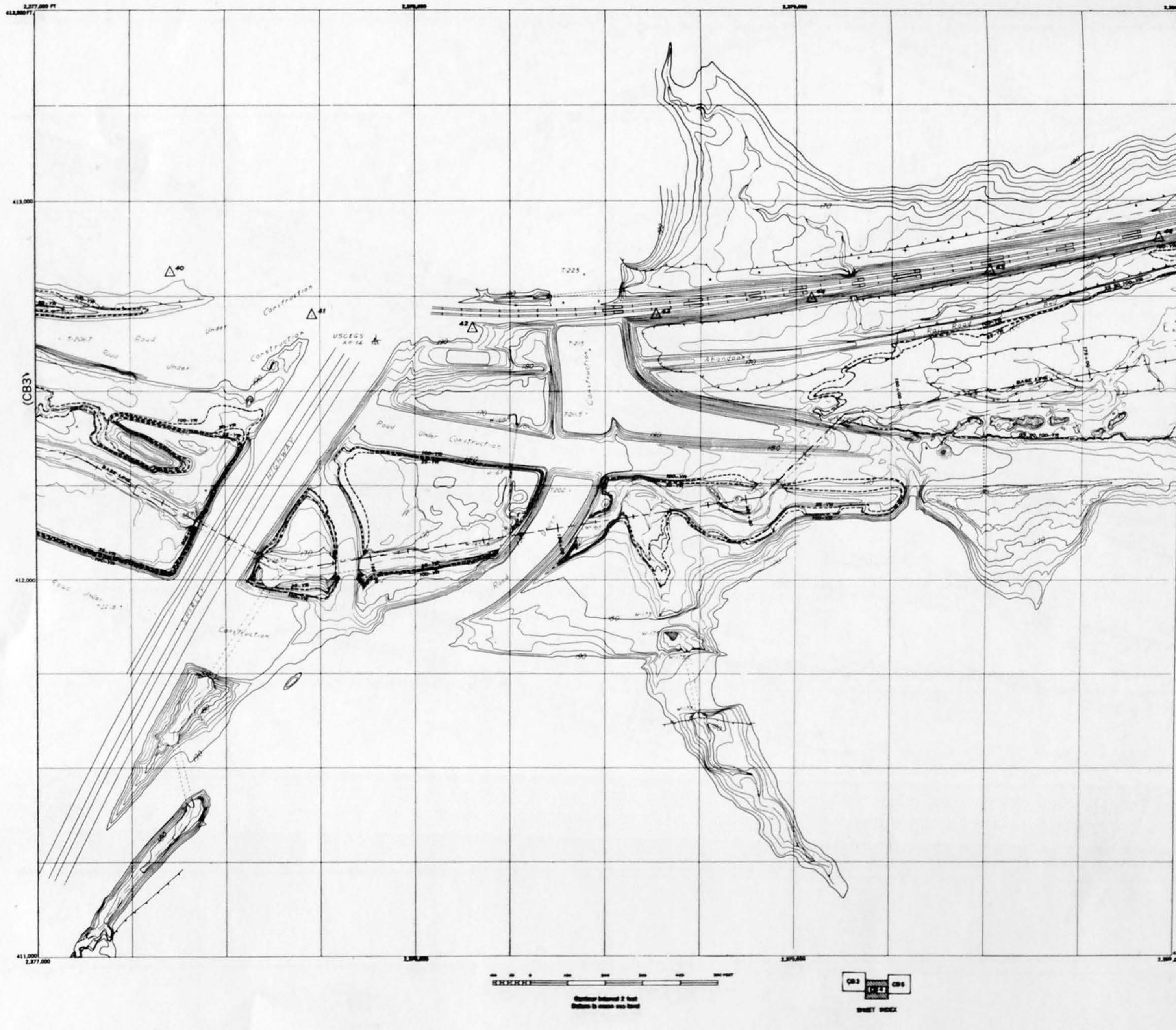

Figure 32. Topographic map showing flood boundary delineation, Backlick Run; CB-4

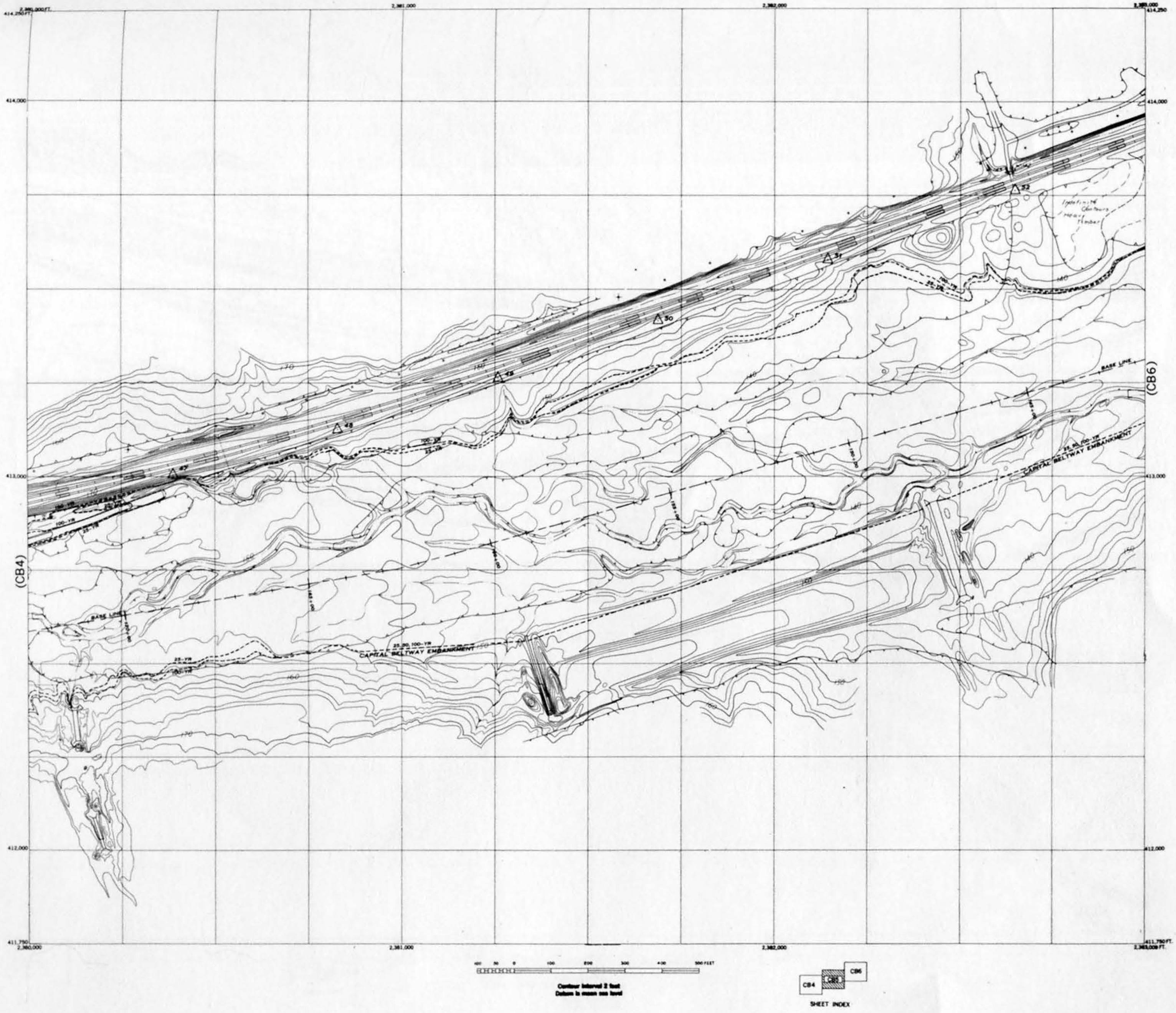

Figure 33. Topographic map showing flood boundary delineation, Backlick Run; CB-5

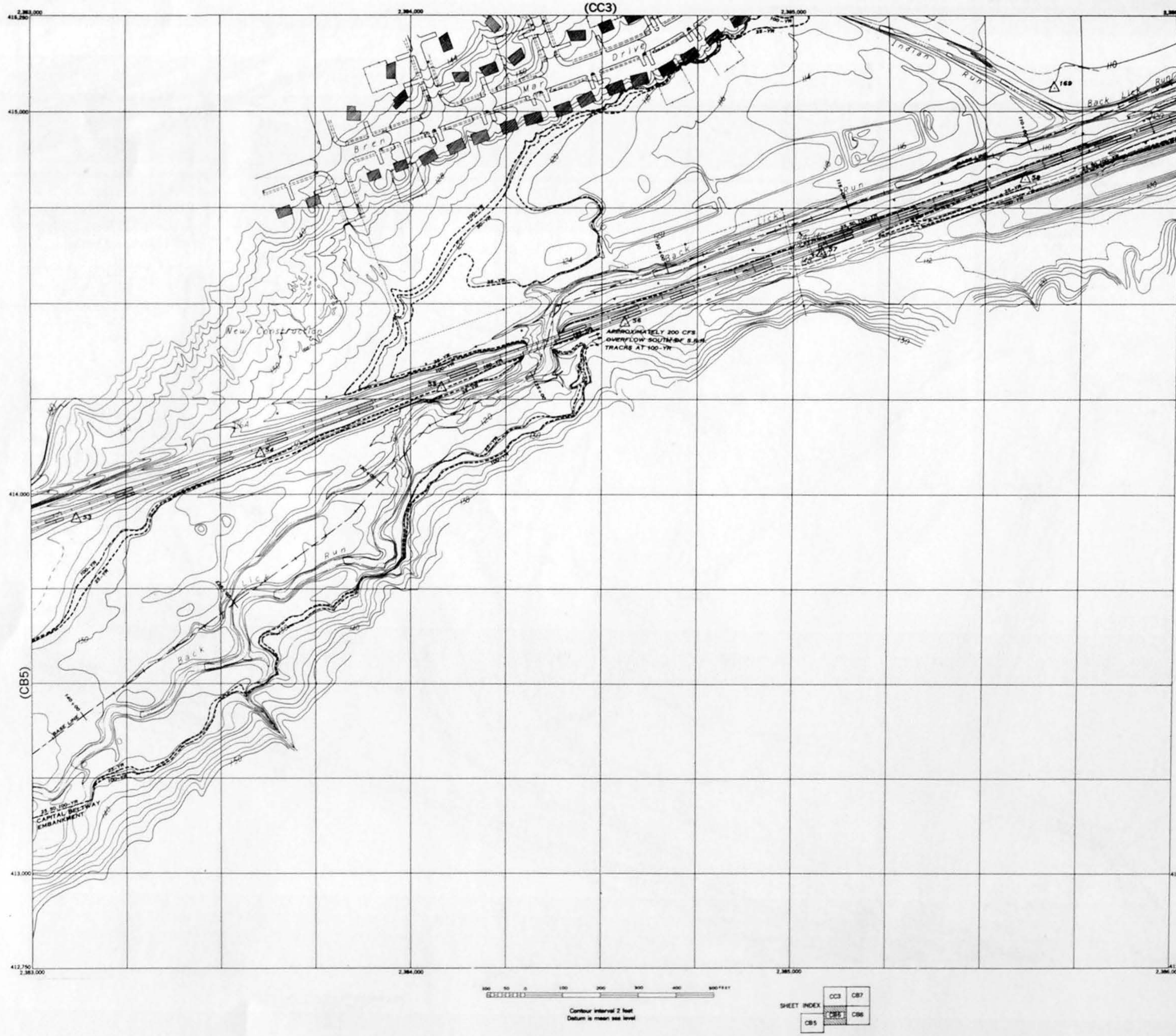

Figure 34. Topographic map showing flood boundary delineation, Backlick Run; CB-6

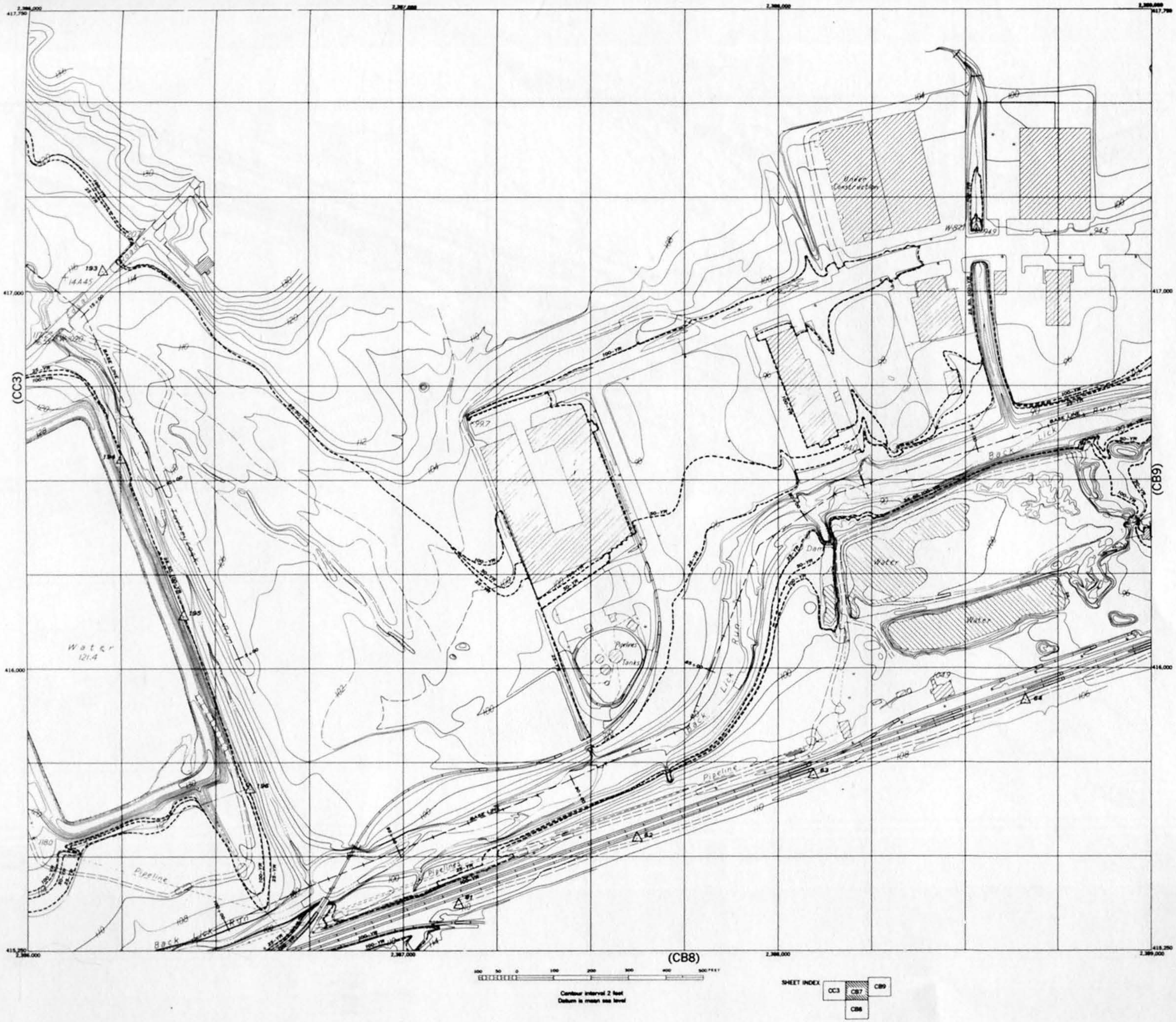

Figure 35. Topographic map showing flood boundary delineation, Backlick Run; CB-7

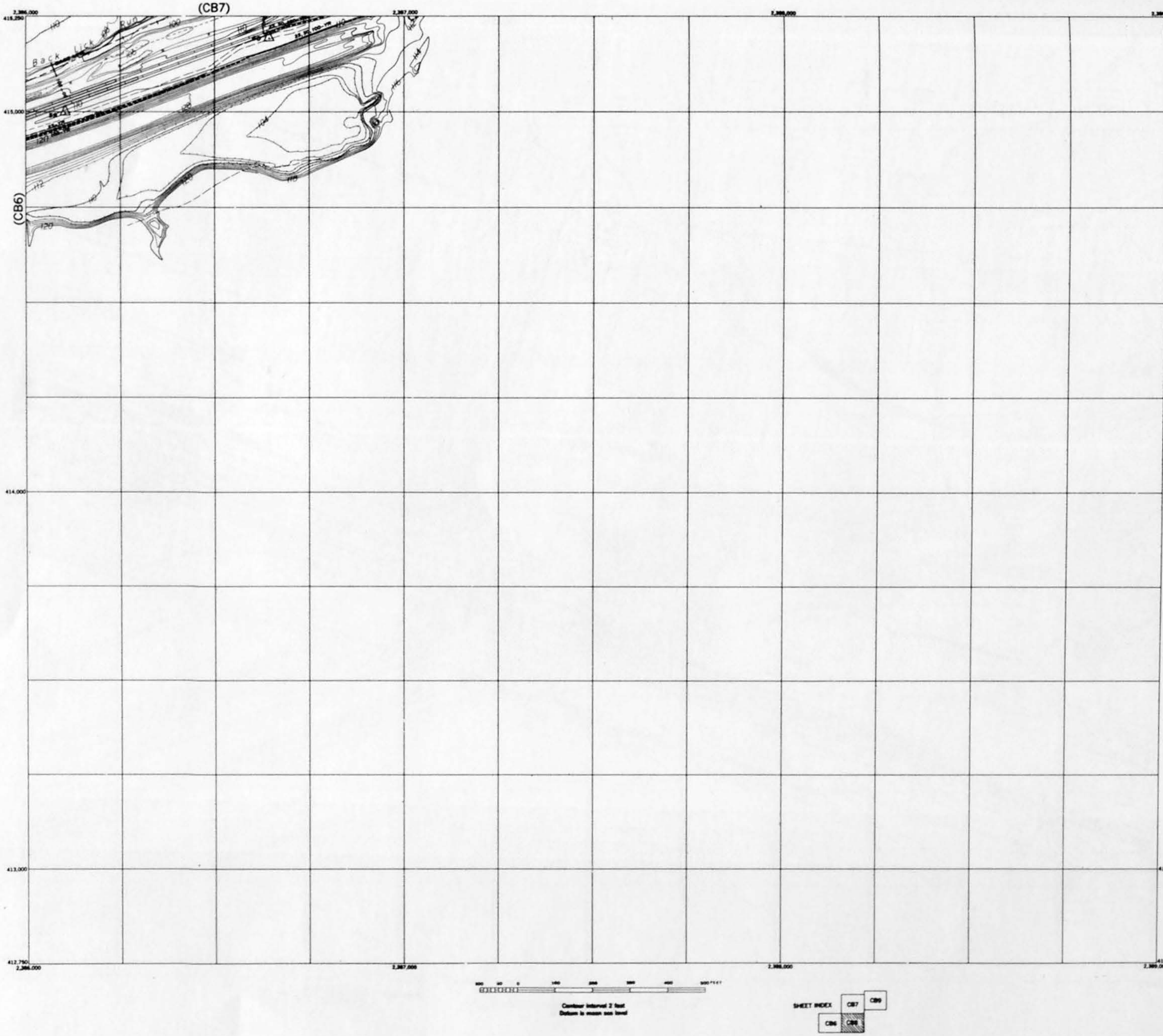

Figure 36. Topographic map showing flood boundary delineation, Backlick Run; CB-8

Figure 37. Topographic map showing flood boundary delineation, Backlick Run; CB-9

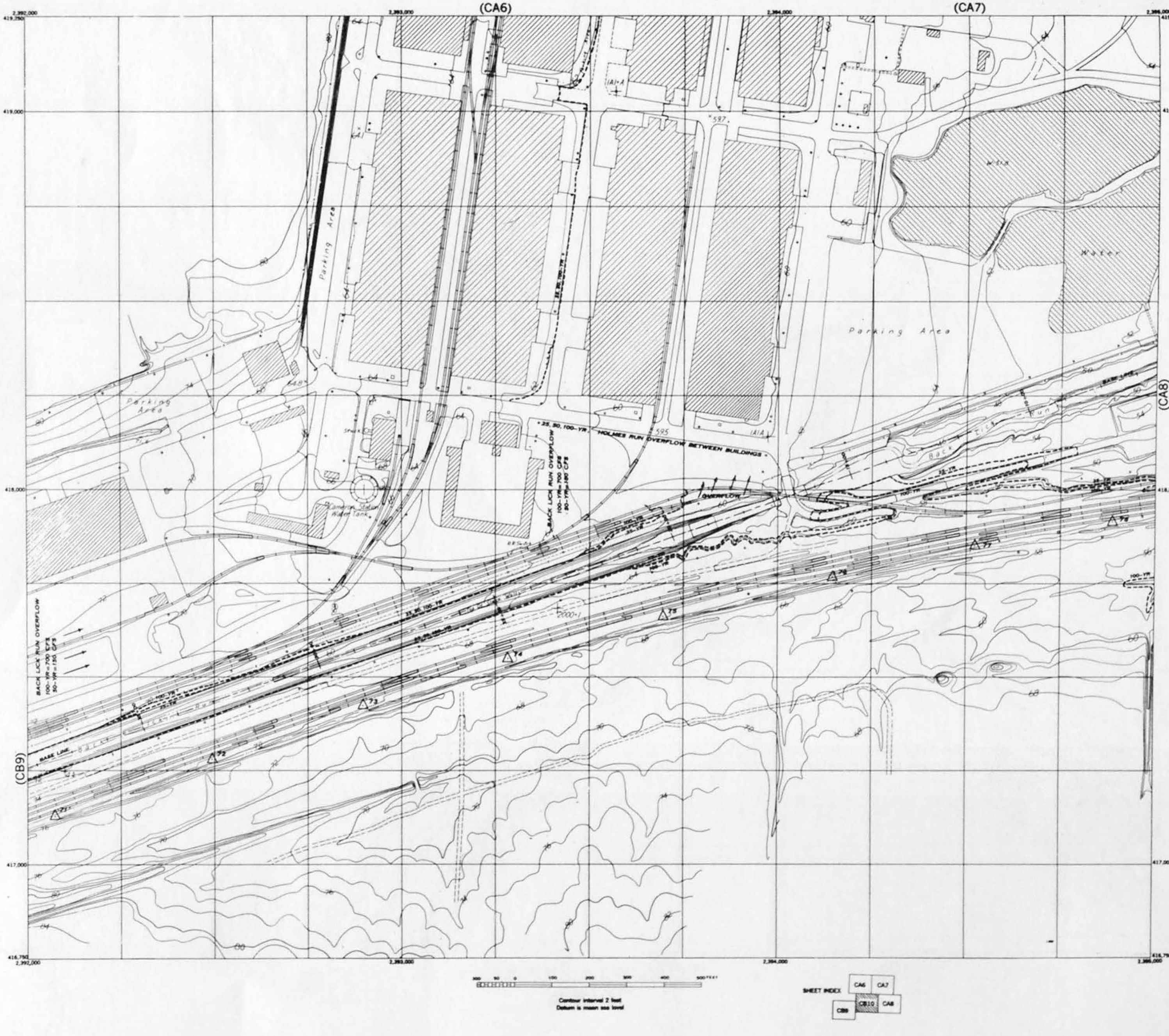

Figure 38. Topographic map showing flood boundary delineation, Backlick Run; CB-10

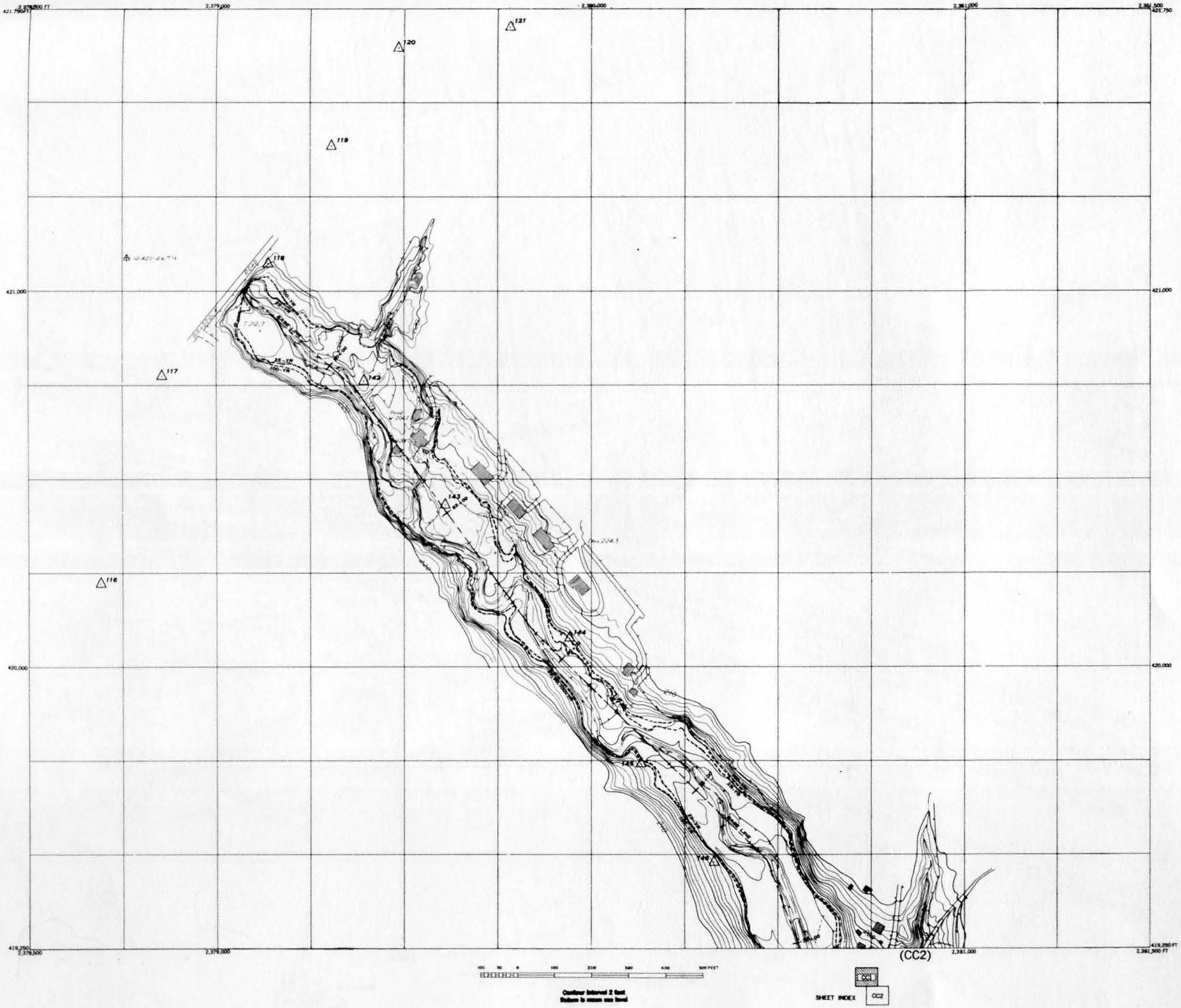

Figure 39. Topographic map showing flood boundary delineation, Indian Run; CC-1

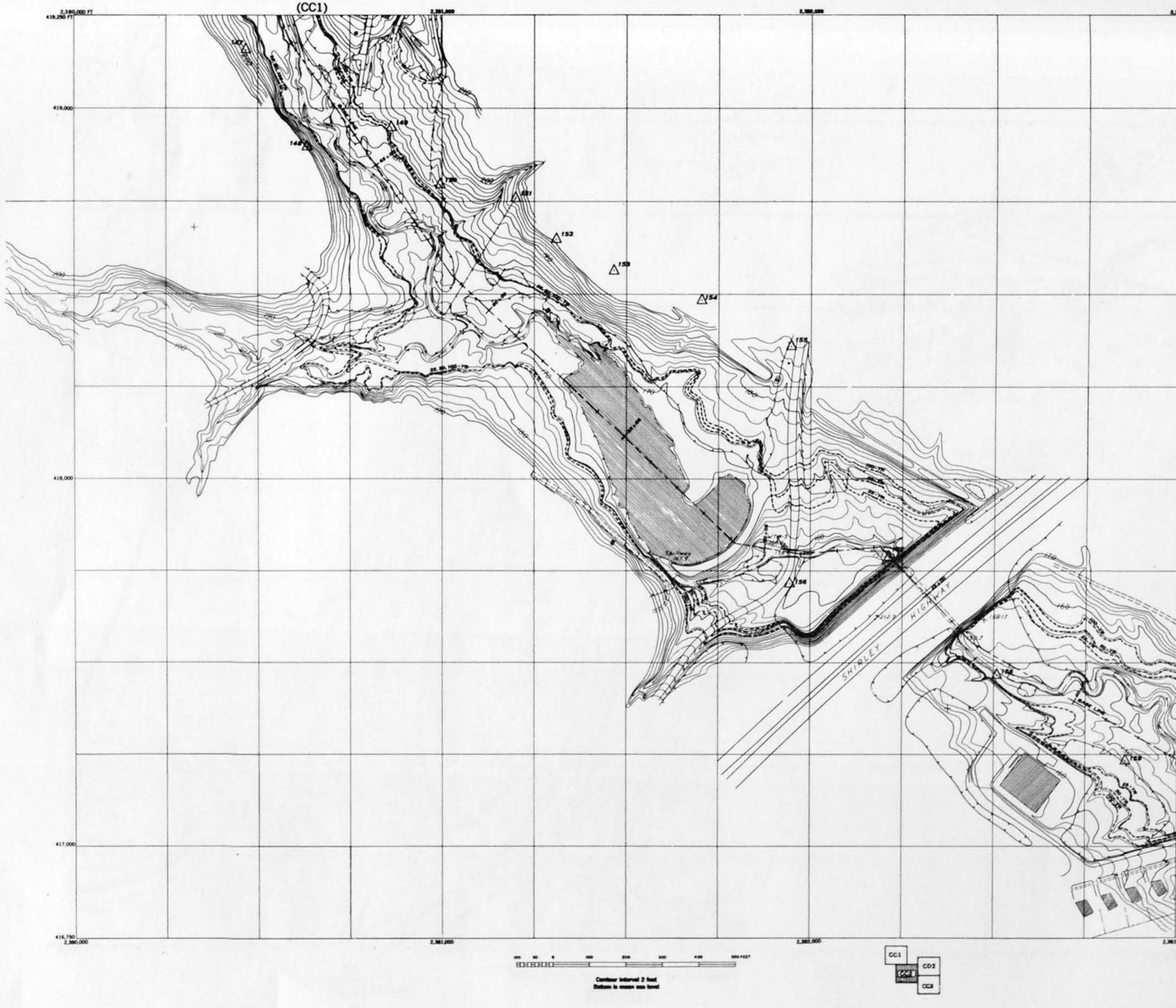

Figure 40. Topographic map showing flood boundary delineation, Indian Run; CC-2

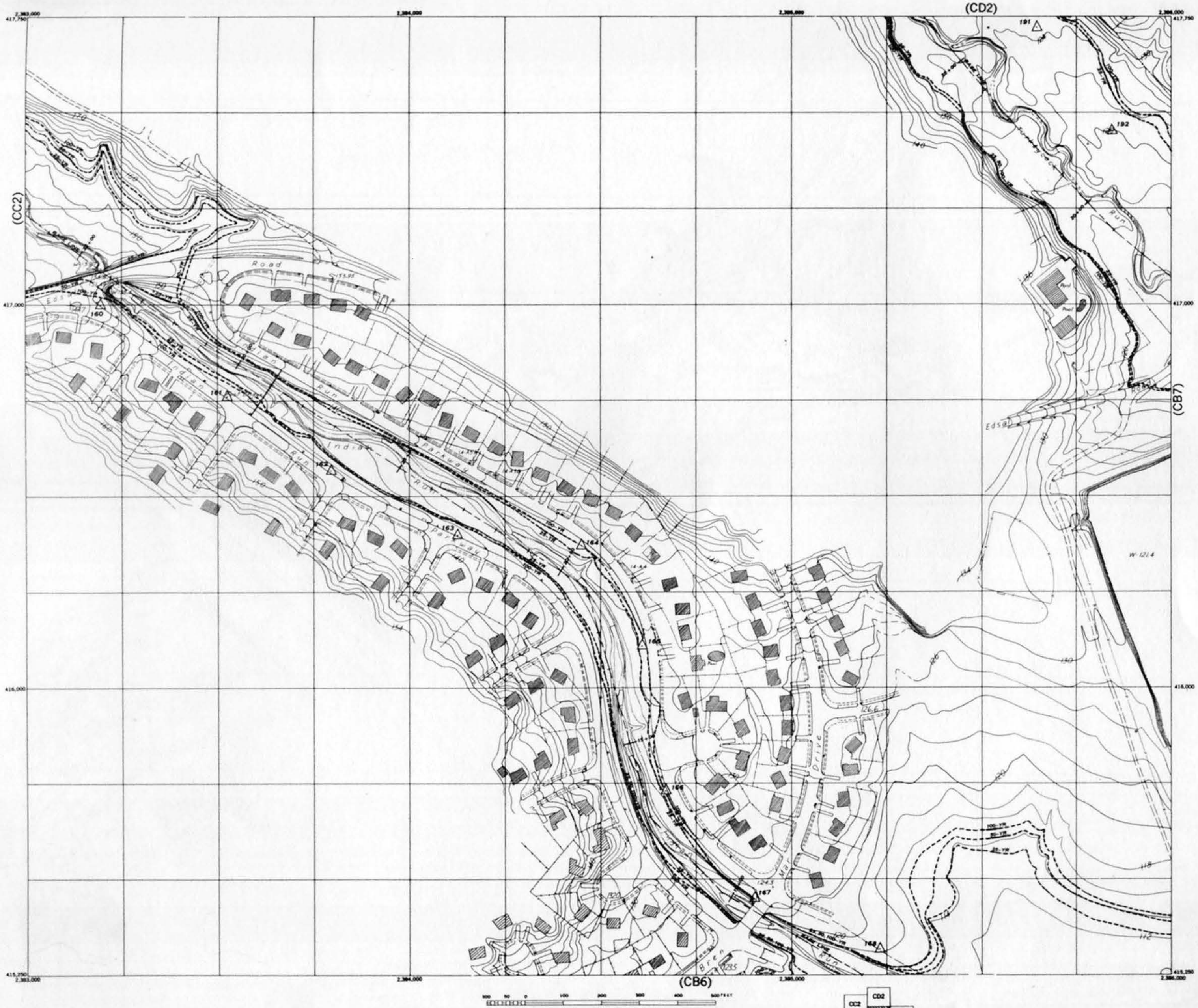

Figure 41. Topographic map showing flood boundary delineation, Indian Run; CC-3

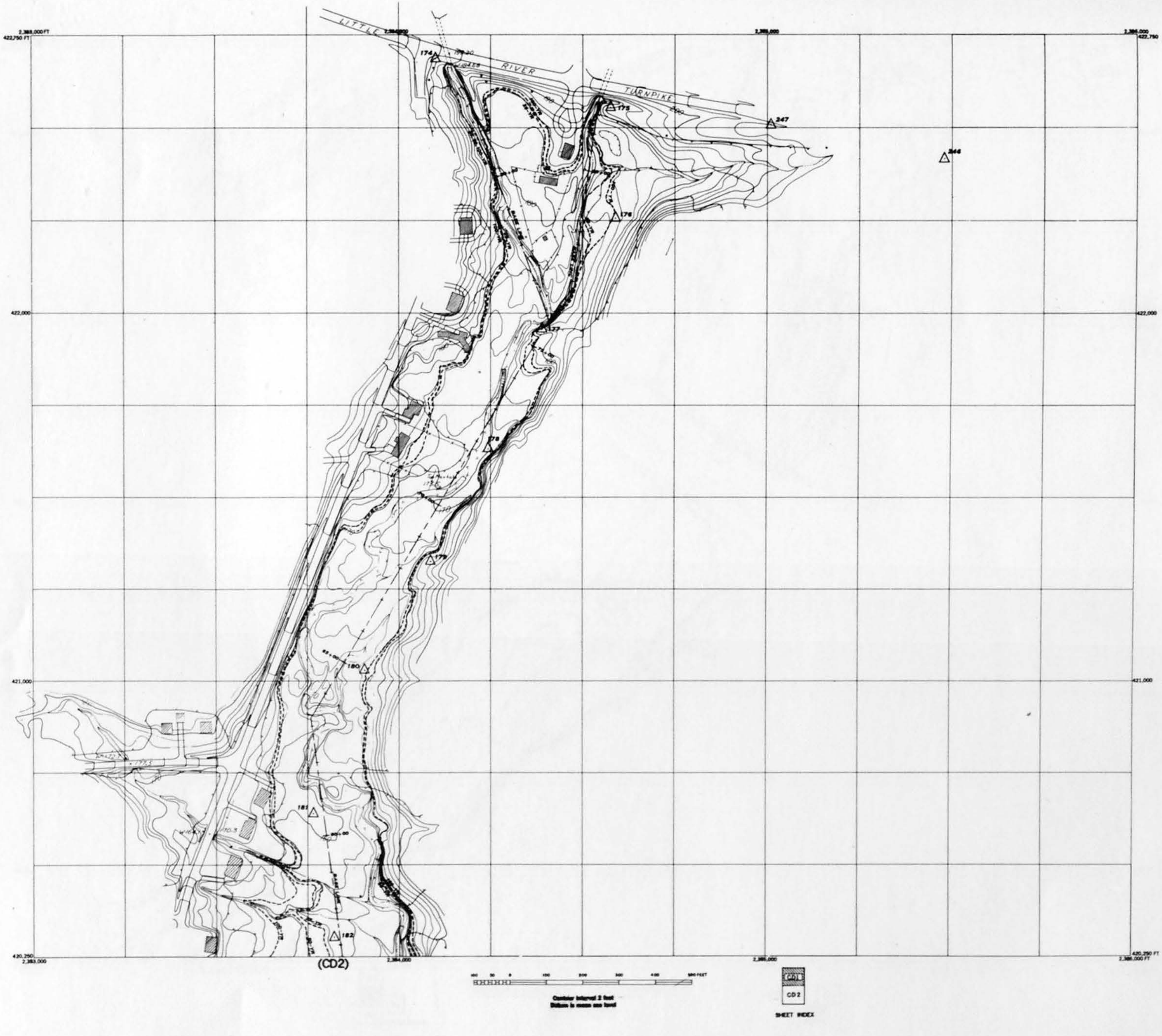

Figure 42. Topographic map showing flood boundary delineation, Turkeycock Run; CD-1

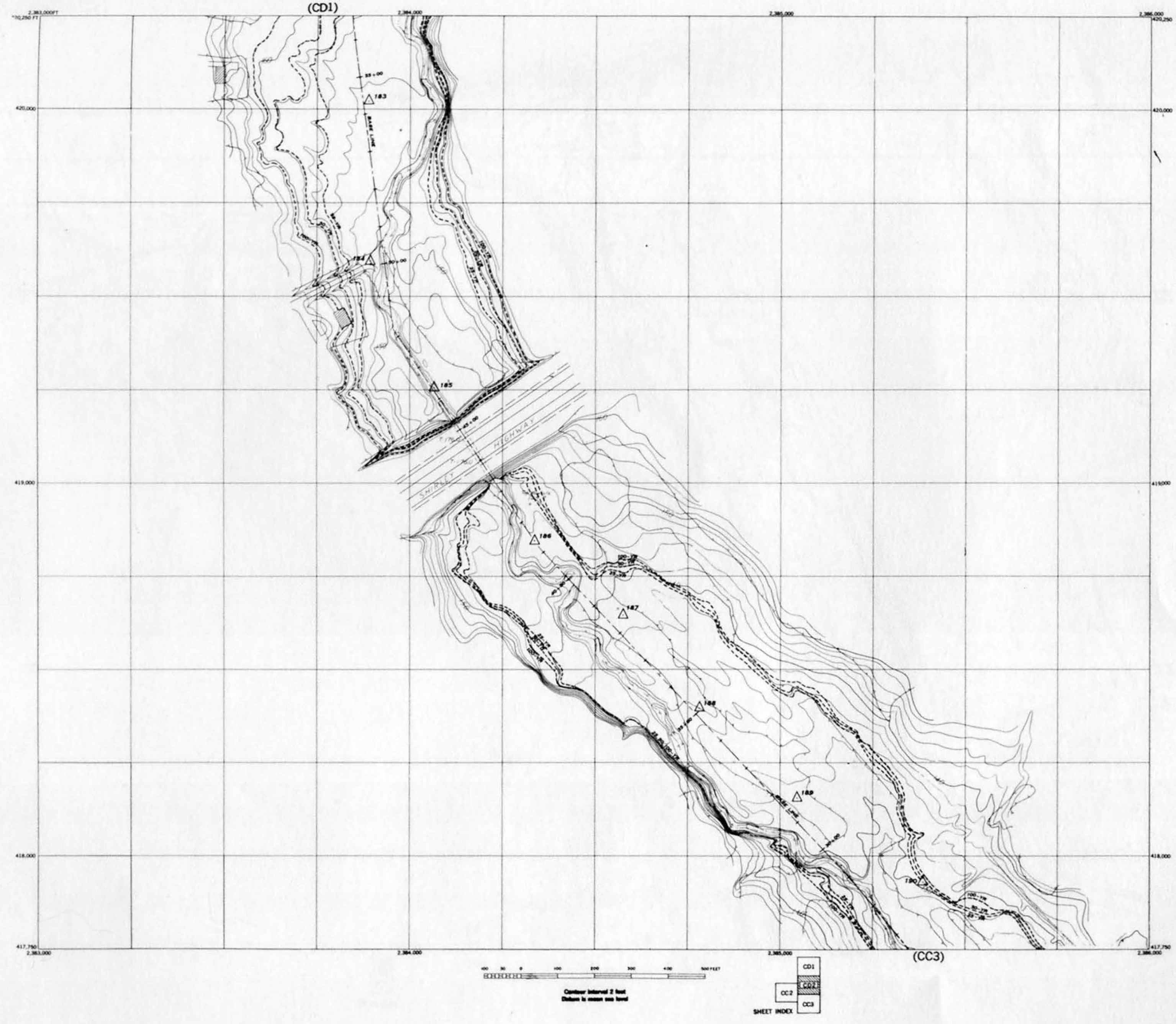

Figure 43. Topographic map showing flood boundary delineation, Turkeycock Run; CD-2

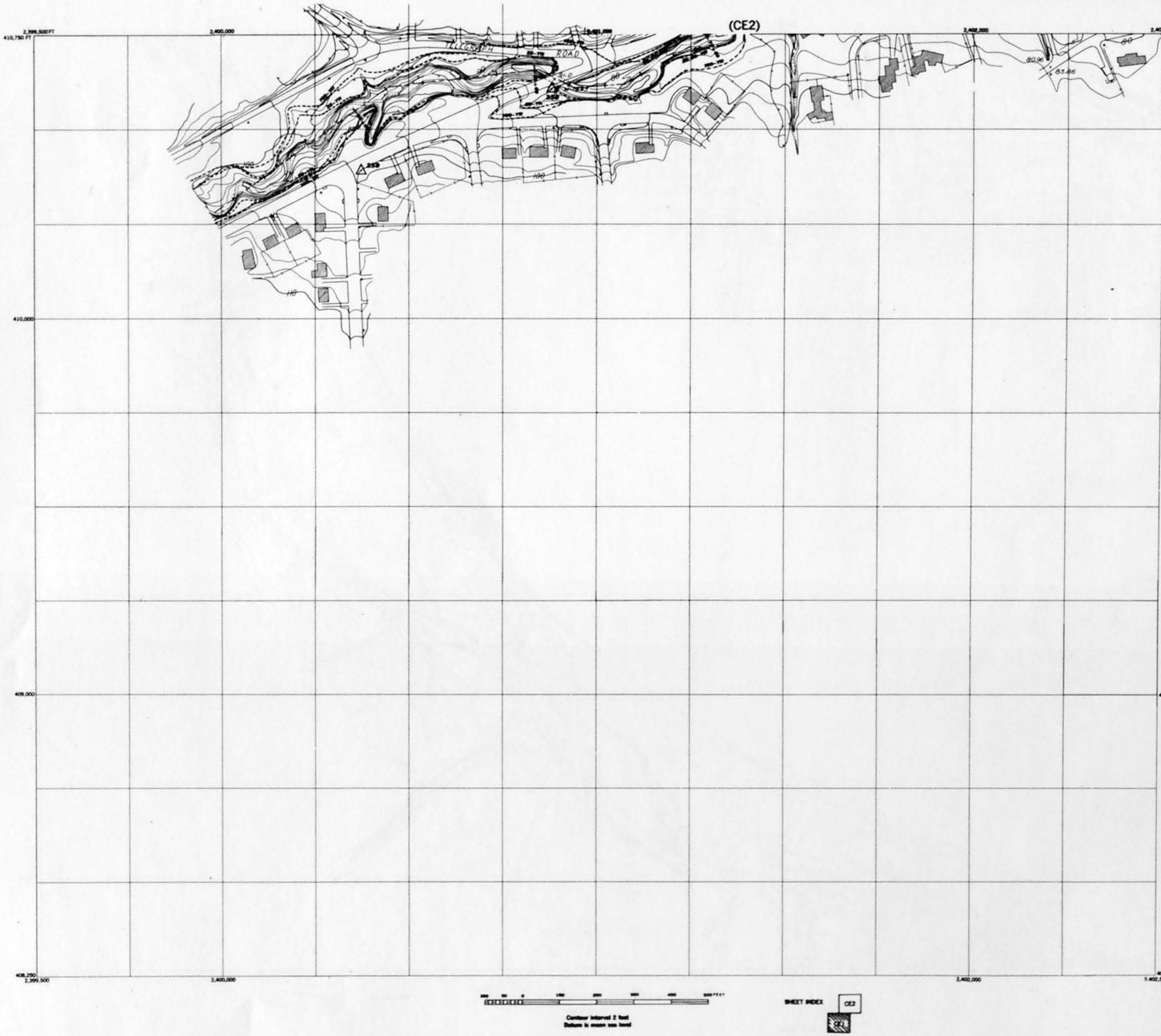

Figure 44. Topographic map showing flood boundary delineation, Pike Branch; CE-1

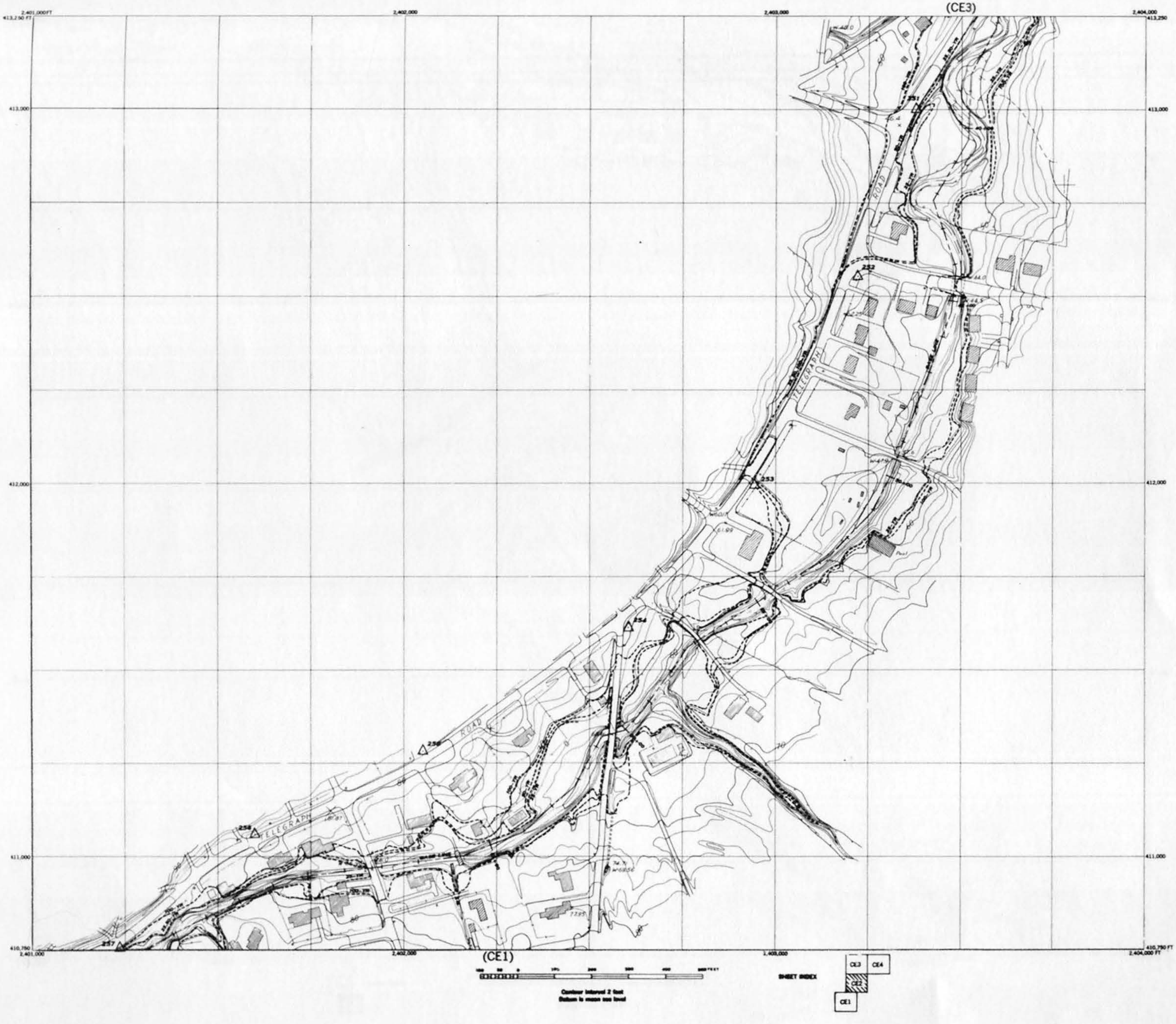

Figure 45. Topographic map showing flood boundary delineation, Pike Branch; CE-2

Figure 46. Topographic map showing flood boundary delineation, Pike Branch; CE-3

SELECTED REFERENCES

Anderson, D. G., 1970, Effects of urban development on floods in Northern Virginia: U.S. Geol. Survey Water-Supply Paper 2001-C. 22 p.

Bodhaine, G. L., 1968, Measurement of peak discharge at culverts by indirect methods: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. A5, 29 p.

Hulsing, Harry, 1967, Measurement of peak discharge at dams by indirect methods: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. A5, 29 p.

Matthai, H. F., 1967, Measurement of peak discharge at width contractions by indirect methods: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. A4, 44 p.