FLOODS
ON
JONATHAN CREEK

IN VICINITY OF
MAGGIE
AND
DELLWOOD
NORTH CAROLINA

Edition of March 1965

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

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REPORT NO. 0-5486-R2

KNOXVILLE, TENNESSEE
MARCH 1965

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Tennessee Valley Authority
Division of Water Control Planning

FOREWORD

This report relates to the flood situation along Jonathan Creek in the vicinity of Maggie and Dellwood, North Carolina.* It has been prepared at the request of the Western North Carolina Regional Planning Commission to aid (1) in the solution of local flood problems and (2) in the best utilization of land subject to overflow. The report is based upon work TVA has been carrying on since its beginning in connection with its water resource operations throughout the Tennessee Valley. TVA has assembled information on rainfall, runoff, historical and current flood heights, and other technical data bearing upon the occurrence and magnitude of floods in localities throughout the region which provide the basis for preparation of this report.

The report does not include plans for the solution of flood problems. Rather, it is intended to provide the basis for further study and planning on the part of the residents of the Jonathan Creek valley in arriving at solutions to minimize vulnerability to flood damages. This might involve (1) the construction of flood protection works, (2) local planning programs to guide developments by controlling the type of use made of the flood plain through zoning and subdivision regulations, or (3) a combination of the two approaches.

The report covers three significant phases of the Jonathan Creek flood problem. The first brings together a record of the largest known floods of the past on the creek. The second treats of Regional Floods. These are derived from consideration of the largest floods known to have occurred on streams of similar physical characteristics in the same general geographical region as that of Jonathan Creek and generally within 50 miles of Maggie and Dellwood. The third develops the Maximum Probable Flood for Jonathan Creek. Floods of this magnitude

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*The original report on the Maggie flood situation, requested by the Maggie Valley Development Association through the Department of City and Regional Planning of the University of North Carolina, was issued in November 1954, and minor revisions were made in a May 1957 edition of the report. This edition brings up to date this previously published material, and includes discussions of the Regional and Maximum Probable Floods. The investigation was also extended from Dellwood downstream to the mouth of the creek.

on most streams are considerably larger than any that have occurred in the past. They are the floods of infrequent occurrence that are considered in planning protective works, the failure of which might be disastrous. Such floods are used by TVA in the design of physical features of reservoirs, dams, powerhouses, and some kinds of local flood protection works.

In problems concerned with the control of developments in the flood plain of Jonathan Creek, and in reaching decisions on the magnitude of floods to consider for this purpose, appropriate consideration should be given to the possible future occurrence of floods of the magnitude of (1) those that have occurred in the past, (2) the Regional Flood, and (3) the Maximum Probable Flood.

The report contains maps, profiles, and cross sections which indicate the extent of flooding that has been experienced and that might occur in the future in the vicinity of Maggie and Dellwood. This should be useful in planning new developments in the flood plain. From the maps, profiles, and cross sections, the depth of probable flooding either by recurrence of the largest known flood or by occurrence of the Regional or Maximum Probable Flood at any location may be ascertained. By having this information, floor levels for buildings may be planned either high enough to avoid flood damage or at lower elevations with recognition of the chance and hazards of flooding that are being taken.

I.

RESUME

OF

FLOOD SITUATION

I.

RESUME OF FLOOD SITUATION

Maggie and Dellwood are located on Jonathan Creek in Haywood County, North Carolina. The creek, with a drainage area of 66.4 square miles, joins the Pigeon River about 10 miles downstream from Dellwood. Neither Maggie nor Dellwood is incorporated, but the communities extend along the creek from Mile 9.5 to the upper limits of this investigation, which covers Jonathan Creek from the mouth to Mile 14.8.

In 1947 U. S. Highway 19, which is one of the main approaches to the Great Smoky Mountains National Park, was relocated through Maggie and Dellwood. Since then there has been considerable commercial and residential development on land along that reach of Jonathan Creek. Portions of the land have been inundated by floods of the past and a substantially greater area is within reach of the greater floods of the future.

The U. S. Geological Survey has maintained a stream gaging station on Jonathan Creek near Cove Creek since May 24, 1930. The gage is located about 9 miles downstream from Dellwood at Mile 0.68. In compiling a record of the early floods on the stream, it has been necessary to interview residents along the stream who have knowledge of past floods and to conduct research in newspaper files and historical documents. From these investigations and from studies of possible future floods on Jonathan Creek in the vicinity of Maggie and Dellwood, the flood situation, both past and future, has been developed. The following paragraphs summarize the significant findings with regard to the flood situation which are discussed in more detail in succeeding sections of this report.

THE GREATEST FLOOD known to have occurred since stream gage records were started on Jonathan Creek occurred on February 25, 1961. There were high velocities and considerable overflow along the stream, but the damages were not great.

* * *

ANOTHER GREAT FLOOD on March 6, 1963, was the second highest flood on the creek. The flood was about one-tenth foot lower than the 1961 flood at the stream gage.

* * *

OTHER LARGE FLOODS on Jonathan Creek occurred on August 30, 1940; January 31, 1957; January 21, 1959; December 12, 1961; and March 12, 1963. These floods were within one-half foot of the March 6, 1963, flood.

* * *

A REGIONAL FLOOD on Jonathan Creek in the vicinity of Maggie and Dellwood is based upon floods experienced on streams within 50 miles of the communities, a number of which are larger than any known floods on the creek. This indicates that greater floods than those experienced so far may reasonably be expected in the future. Based upon the magnitude of floods that have occurred on neighboring streams, a Regional Flood may occur on Jonathan Creek that would be generally 6 feet higher than the March 6, 1963, flood above the mouth of Cove Creek, and about 16 feet higher below Cove Creek.

* * *

MAXIMUM PROBABLE FLOOD determinations indicate that floods could occur on Jonathan Creek in the vicinity of Maggie and Dellwood about 7 or 8 feet higher than the March 6, 1963, flood crest above Cove Creek, and about 21 feet higher below the mouth of Cove Creek.

* * *

FLOOD DAMAGES that would result from a recurrence of a flood as large as that of February 1961 would cause little damage; however, extensive damages would be caused by the Regional and Maximum Probable Floods because of their greater depths and velocities.

* * *

MOST FREQUENT FLOOD OCCURRENCES on Jonathan Creek have been in the winter and spring months. Most of the higher floods have resulted from general heavy rainfall. However, floods due to intense local thunderstorms occur in the summer, and large floods may occur any time.

* * *

VELOCITIES OF WATER during the March 6, 1963, flood ranged up to 9 feet per second in the channel of Jonathan Creek in the Maggie-Dellwood vicinity. Velocities during the March 1963 flood were up to 3 feet per second on the flood plain. During a Maximum Probable Flood, velocities in the channel would range up to 23 feet per

second on Jonathan Creek, and on the flood plain the corresponding figure would be 9 feet per second, extremely dangerous to life and property.

* * *

DURATION OF FLOODS is relatively short on Jonathan Creek. During past floods the creek had a maximum rate of rise of about 3 feet per hour. During a Maximum Probable Flood on Jonathan Creek, the stream would rise 27 feet in 8 hours at the gage, with a maximum rate of rise of 6 feet per hour. In the vicinity of Maggie the Maximum Probable Flood would rise 11 feet in 8 hours with a maximum rate of rise of 3 feet in one hour, and the stream would remain out of banks for about 2 days.

* * *

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

* * *

FUTURE FLOOD HEIGHTS that would be reached if floods of the magnitude of the Regional and Maximum Probable occurred in the vicinity of Maggie and Dellwood are shown in Table 1. The table compares these flood crests with the crest of a historical flood at each location.

TABLE 1

RELATIVE FLOOD HEIGHTS ON JONATHAN CREEK

Flood	Location	Mile	Estimated Peak Discharge cfs	Above Feb. 1953 or March 1963 Stage feet
March 6, 1963	USGS stream gage	0.68	3,460	0
Regional			27,400	15.9
Maximum Probable			39,000	21.0
February 21, 1953	Dellwood	9.74	2,000	0
Regional			22,000	6.2
Maximum Probable			29,000	7.2
February 21, 1953	Maggie (County road 1305)	13.95	1,600	0
Regional			19,600	6.6
Maximum Probable			27,000	7.5

II.

PAST FLOODS

II.

PAST FLOODS[1]

This section of the report is a history of floods which have occurred on Jonathan Creek in the vicinity of Maggie and Dellwood, in Haywood County, North Carolina. The portion of the creek considered extends from the mouth at Pigeon River Mile 45.9 upstream to a point below the mouth of Fie Creek, a distance of 14.8 miles. Jonathan Creek drains an area of 66.4 square miles, and the entire watershed is within Haywood County.

From its headwaters at Soco Gap, Jonathan Creek flows in an easterly direction through the community of Maggie. At Dellwood, Mile 9.8, the creek turns north and flows generally in that direction to its mouth. Below the mouth of Cove Creek at Mile 2.7 the creek banks are steep and there is little land subject to overflow, but upstream from Cove Creek the flood plain reaches widths as great as 2200 feet.

Prior to World War II the Jonathan Creek valley was a rural area and development of the flood plain was limited to agricultural use. After the war U. S. Highway 19 was relocated in the valley from Dellwood to Soco Gap. Since then there has been a large amount of development along that highway, most of it related to the tourist trade. The highway is the principal eastern approach to the Great Smoky Mountains National Park. Sections of the highway and much of the new development along it are subject to flooding. North Carolina Highway 284 follows the creek from Dellwood downstream to the mouth of Cove Creek and there is some development along it which is subject to flooding.

Continuous records of stage and discharge have been maintained by the U. S. Geological Survey on Jonathan Creek near Cove Creek since May 24, 1930. The stream gage is located 0.7 mile above the mouth of Jonathan Creek and about 9 miles downstream from Dellwood.

Flood history investigations which were made by TVA engineers in 1954 developed information on Jonathan Creek in the vicinity of Maggie and Dellwood. Local residents were interviewed, a search was made of newspaper files and

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1. Prepared by Hydraulic Data Branch.

historical documents, and a detailed profile was developed for the flood of February 21, 1953. An investigation was made following the flood of January 31, 1957, covering the same 5-mile reach above Dellwood. Following the flood of March 6, 1963, a detailed profile was developed for Jonathan Creek extending from Dellwood to the mouth of the creek. From these sources it has been possible to develop a history of the known floods on Jonathan Creek covering the past 50 years or more. This section of the report discusses the flood history of the creek.

JONATHAN CREEK VALLEY

Settlement

Settlement of the Jonathan Creek valley dates back to the early 1800's. The creek got its name from one of the first settlers who lived in the Hemphill Creek section north of Dellwood. A post office at the mouth of Hemphill Creek was called Jonathan Creek and later Jonathan. Other old settlers of the valley were the Plotts, Setzers, Henrys, and Fergusons, names that are still found among the area residents.

There are no large towns in the watershed. Dellwood, one of the early settlements, had a 1950 population of 160. Maggie, named in honor of Maggie Setzer, daughter of the first postmaster, had 100 residents in 1950. Cove Creek, near the mouth of Jonathan Creek, also had a population of 100.

Since 1950 the development of the tourist industry in Maggie Valley, as the Jonathan Creek valley upstream from Dellwood is called, has caused a large increase in population. The 1960 census does not show the population of unincorporated communities of less than 1,000 persons, and Maggie is not listed; however, present estimates of the permanent population of the community are over 1,000. There are now many motels in the valley and the transient population during the tourist season is considerably higher. Recent developments include a ski slope and an ice skating rink, and several of the motels are remaining open all year. Downstream from Dellwood there has been little change in the population of the Jonathan Creek valley since 1950.

The Stream and Its Valley

Jonathan Creek, a tributary of the Pigeon River, drains an area of 66.4 square miles, all of which lies in Haywood County, North Carolina. The watershed is shown on Plate 1.

The roughly rectangular watershed is about 13 miles long and 5 miles wide. Numerous small tributaries enter the creek from the steep north and south slopes. Jonathan Creek heads on the high ridges that form the western boundary of Haywood County. Elevations along these ridges range up to 6292 on Waterrock Knob, 6200 on Jones Knob, and 6088 on Plott Balsam. Much of the watershed boundary above Dellwood is more than one mile above sea level. From its headwater the creek flows eastward, dropping to an elevation of near 3000 feet at Maggie and down to 2750 at Dellwood where it turns northward. The creek flows into the Pigeon River at Mile 45.9 at an elevation of 2360 feet.

The average fall of the creek in the 4.3-mile reach from Maggie to Dellwood is 63 feet per mile. The channel from Dellwood to the mouth falls at a fairly uniform rate of about 36 feet per mile except in one short reach between Miles 1.1 and 0.9 where it falls 23 feet, or at a rate of 115 feet per mile. Upstream from the mouth of Cove Creek at Mile 2.65 the flood plain ranges from 200 to 2,200 feet in width and has an average width of about 1,000 feet. Downstream from the mouth of Cove Creek the stream flows through a gorge where the over-all width of the flood plain seldom exceeds 300 feet.

The soil in the creek bottoms is productive although it contains numerous boulders. These boulders are turned up at each plowing and are in some cases hauled from the fields to the creek bank where they serve in some slight measure to restrain floods. The boulders are also used as building material.

Pertinent drainage areas in the Jonathan Creek watershed are listed in Table 2.

Developments in the Flood Plain

Plates 5, 6, and 7 show the flood plain of Jonathan Creek for the reach covered by this report. Plate 7 covers the portion upstream from Dellwood and Plates 5 and 6 show the reach downstream from Dellwood.

TABLE 2

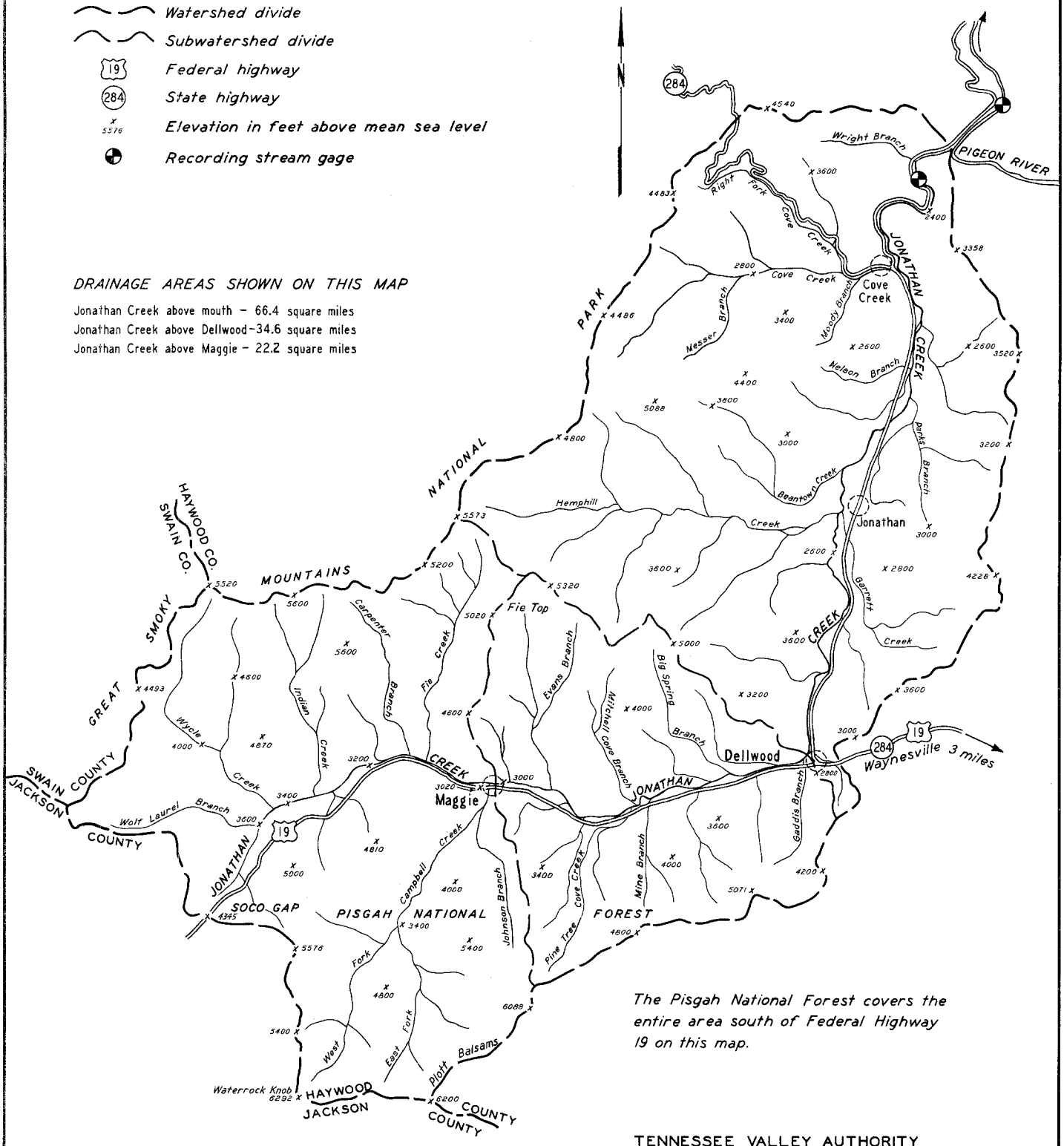
DRAINAGE AREAS IN WATERSHED OF JONATHAN CREEK

Stream	Location	Mile above Mouth	Drainage Area sq. mi.
Jonathan Creek	Mouth	0.0	66.4
	USGS stream gage	0.68	65.3
	County road 1321	6.13	48.0
	Dellwood	9.74	34.6
	County road 1307	12.16	26.5
	Maggie (County road 1305)	13.95	22.2
	Upper limit of study	14.78	13.3

Prior to World War II the development in the Jonathan Creek valley was almost entirely for agricultural purposes, but an active development of tourist facilities began in the area in 1947 when U. S. Highway 19 was relocated to its present alignment up Jonathan Creek and through Soco Gap. The first enterprise of this type was Mountain Valley Inn, the location of which is shown on Plate 7 at Mile 12.4. Since then new tourist courts, shops, and cafes have been built each year along the highway.

In 1962, TVA engineers made a detailed survey of structures in the flood plain of Jonathan Creek in the reach extending from Mile 15.11, above Maggie, downstream to Mile 9.37, just below Dellwood. The location, floor elevation, and ground elevation for each structure are shown in Table 3. Also shown are the elevations at each location of the possible floods of the future which are discussed in Sections III and IV of this report. Plates 3 and 4 are building identification maps which show the location of the structures listed in Table 3.

The development of tourist facilities along U. S. Highway 19 in the flood plain upstream from Dellwood has continued, but downstream from Dellwood the land in the flood plain is used chiefly for agricultural purposes except for highway locations.



The Pisgah National Forest covers the entire area south of Federal Highway 19 on this map.

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING
HYDRAULIC DATA BRANCH

JONATHAN CREEK WATERSHED

Scale 0 1 2 3 4 5 Miles

MAY 1954

TABLE 3

FLOOD PLAIN STRUCTURES
JONATHAN CREEK IN VICINITY OF MAGGIE, NORTH CAROLINA

Map Reference Number[a]	Identification	River Mile	Bank	Floor Elevation	Ground Elevation	Flood Elevations 14,000 cfs*	Flood Elevations Regional	Flood Elevations Maximum Probable
1	Maggie Coffee Shop	15.11	R	3139.3	3139.2	(d)	(d)	(d)
2	Residence	14.99	R	3130.9	3130.5	(d)	(d)	(d)
3	Rocky Waters Motel	14.84[b]	L	3111.6-3113.9[c]	3110.9-3112.5[c]	(d)	(d)	(d)
	Swimming pool				3108.2			
	Garage			3108.1				
4	Residence (basement - 3096.8)	14.79	L	3103.0	3103.0	(d)	(d)	(d)
5	Residence	14.78	L	3103.6	3102.2	3098.8	3100.4	3101.7
6	Residence	14.77	L	3102.3	3098.9	3097.8	3099.3	3100.4
7	Cabin	14.73	L	3091.2	3089.5	3092.0	3093.6	3094.9
8	Residence	14.75	L	3104.8	3100.5	3094.9	3096.3	3097.8
9	Woody Motel	14.57	R	3072.6	3072.6	3069.8	3070.9	3071.8
10	Falling Waters Gift Shop	14.57	R	3069.3	3067.0	3069.8	3070.9	3071.8
11	Falling Waters Motel	14.53[b]	L	3078.1	3077.2	3064.2	3065.0	3066.0
12	Residence	14.55	R	3065.1	3063.2	3067.0	3068.0	3069.0
13	Residence	14.47	R	3058.0	3055.8	3057.2	3058.0	3059.0
14	Barn	14.43	R	3051.8	3051.8	3052.8	3053.7	3054.6
15	Residence	14.42	R	3053.1	3051.0	3051.7	3052.6	3053.6
16	Residence	14.43	L	3052.8	3051.0	3052.8	3053.7	3054.6
17	Residence	14.36	R	3044.8	3043.3	3045.2	3046.0	3047.0
18	Barn	14.33	R	-	3041.2	3041.6	3042.5	3043.4
19	Residence	14.35	L	3041.3	3039.3	3044.0	3044.8	3045.7
20	Residence	14.34	L	3042.8	3039.1	3043.2	3044.0	3044.9
21	Barn	14.32	L	3046.6	3044.4	3040.8	3041.5	3042.3
22	Shady Brook Cottages	14.30	L	3037.6	3034.8	3038.5	3039.4	3040.2
23	Shady Brook Cottages	14.30	L	3036.3	3033.9	3038.5	3039.4	3040.2
24	Barn	14.29	R	3037.3	3037.3	3037.4	3038.3	3039.2
25	Coach Stop Inn	14.23	R	3030.3	3029.3	3030.8	3031.6	3032.4
26	Garage	14.16	R	3029.1	3029.1	3023.0	3023.8	3024.8
27	Methodist Church (basement - 3015.7)	14.12	R	3020.4	3017.9	3018.6	3019.3	3020.2
28	Residence	14.13	R	3016.7	3019.2	3019.7	3020.6	3021.3
29	Garage	14.10	R	-	3013.9	3016.3	3017.2	3018.0
30	Residence	14.09	R	3014.6	3011.9	3015.2	3016.2	3017.3
31	Residence	14.08	R	3012.3	3010.2	3014.2	3015.0	3015.9
32	Rhinehart's Courts	14.09[b]	R	3014.6	3014.1	3015.2	3016.2	3017.3
33	Antique Shop (basement - 3009.8)	14.08	R	3016.8	3014.1	3014.2	3015.0	3015.9
34	Barn	14.07	L	-	3008.3	3012.9	3013.9	3015.0
35	Residence	14.04	R	3009.2	3007.8	3009.6	3010.5	3011.5
36	Hillbilly Gift Shop	14.03	R	3011.4	3011.3	3008.6	3009.5	3010.5
37	Bradley's Motel	14.01	R	3009.2	3009.0	3006.2	3007.1	3008.1
38	Residence	14.01	R	3008.8	-	3006.2	3007.1	3008.1
39	Cottage (Bradley's Motel)	14.01	R	3012.0	3011.1	3006.2	3007.1	3008.1
40	Office (Bradley's Motel)	13.99	R	3009.4	3008.3	3004.8	3005.9	3006.9
41	Cottage (Bradley's Motel)	13.99	R	3010.8	3009.4	3004.8	3005.9	3006.9
42	Barn	13.98	R	2999.4	2999.4	3003.9	3005.2	3006.2
43	Residence (under construction)	13.96	R	3007.6	3004.8	3002.6	3003.7	3004.9
44	Residence	13.88	L	2991.8	2989.1	2992.1	2993.1	2994.2
45	Residence	13.91	L	2996.5	2994.4	2994.2	2995.1	2996.2
46	Garage	13.90	L	-	2993.3	2993.6	2994.4	2995.6
47	Shed	13.89	L	2993.7	2992.6	2992.8	2993.8	2995.0
48	Residence	13.87	L	2991.3	2989.4	2991.4	2992.5	2993.6
49	Smokehouse	13.88	L	2988.7	2989.3	2992.1	2993.1	2994.2
50	Residence	13.96	L	3015.5	3011.1	3002.6	3003.7	3004.9
51	Residence	13.92	R	2999.0	2998.1	2994.9	2995.8	2996.8
52	Maggie Playhouse	13.93	R	3011.1	3009.0	2997.2	2998.2	2999.2
53	Residence	13.90	R	3011.0	3008.3	2993.4	2994.2	2995.6
54	Residence	13.89	R	3018.3	3015.7	2992.8	2993.8	2995.0
55	Pumphouse (at school)	13.91	R	3008.1	3007.5	2994.2	2995.1	2996.2
56	Maggie Grammar School (basement - 2997.2)	13.89	R	3005.5-3007.7[c]	3003.9-3005.9[c]	2992.8	2993.8	2995.0
57	Presley's Motor Court	13.87[b]	R	2998.4	2997.0	2991.4	2992.5	2993.6
	Office			2997.5	-			
	Downstream riverside corner			2993.2	2992.6			
	Downstream landside corner			2993.5	2993.4			
	Swimming pool (filter - 2994.6)			-	2998.1			
58	Presley's Restaurant	13.83	R	2993.8	2993.5	2988.5	2989.8	2991.2
59	Residence	13.82	R	2993.3	2992.3	2987.8	2989.2	2990.4
60	Maggie's Valley Choo-Choo	13.73	R	2986.9	2987.5	2981.6	2983.4	2984.4
61	Barn	13.73	R	-	2990.7	2981.6	2983.4	2984.4
62	Barn	13.79	L	-	2984.4	2985.8	2987.2	2988.5
63	Barn	13.67	R	-	2972.9	2977.0	2978.6	2979.7
64	Garage	13.65	R	-	2971.6	2975.2	2976.6	2977.6
65	Residence	13.64	R	2972.9	2970.4	2974.4	2975.8	2976.8
66	Maggie Post Office (basement - 2969.3)	13.64	R	2976.2	2976.0	2974.4	2975.8	2976.8
67	Little Ranch Motor Court	13.63	R	2973.2	2969.1	2973.6	2974.8	2975.7
68	Campbell Bros. Store & Shell Station	13.59	R	2970.1	2969.9	2970.2	2971.1	2971.6
69	Olivet Church	13.56	R	2968.3	-	2967.4	2968.2	2969.4
70	Vacant store	13.52	R	2961.0	2960.6	2964.0	2965.0	2966.0

TABLE 3

FLOOD PLAIN STRUCTURES (Continued)
JONATHAN CREEK IN VICINITY OF MAGGIE, NORTH CAROLINA

Map Reference Number[a]	Identification	River Mile	Bank	Floor Elevation	Ground Elevation	Flood Elevations 14,000 cfs*	Regional	Maximum Probable
71	Residence	13.52	R	2959.8	2958.0	2964.0	2965.0	2966.0
72	Chicken house	13.51	R	2959.2	2959.2	2963.2	2964.0	2965.2
73	Maggie's Kitchen	13.50	R	2959.5	2958.3	2962.4	2963.2	2964.4
74	Pumphouse	13.49	R	2956.6	2956.6	2961.4	2962.4	2963.6
75	Residence	13.48	R	2958.9	2956.1	2960.5	2961.4	2962.6
76	Residence	13.48	R	2964.7	2959.7	2960.5	2961.4	2962.6
77	Barn	13.57	L	2965.3	2965.3	2968.4	2969.2	2970.0
78	Ward's Groc. & Gulf Sta.	13.48	R	2957.0	2957.0	2960.5	2961.4	2962.6
79	Soco Garden (entrance bldg.)	13.48	R	2960.2	2958.4	2960.5	2961.4	2962.6
80	Flamingo Motor Court	13.46	R	2956.5	2955.6	2958.8	2959.6	2960.8
81	Residence	13.47	R	2956.2	2954.6	2959.8	2960.7	2961.8
82	Residence	13.45	R	2957.6	2955.2	2958.0	2958.9	2960.0
83	Maggie Valley Antiques	13.45	R	2956.5	2955.0	2958.0	2958.9	2960.0
	Building at rear			2956.0	2955.0			
84	Smoky Mt. Crafts	13.41	R	2955.1	2952.8	2954.6	2955.6	2956.7
	Garage			-	2951.8			
85	Barn	13.42	R	-	2950.3	2955.3	2956.4	2957.6
86	Residence	13.45	R	-	2959.0	2958.0	2958.9	2960.0
87	Residence	13.42	R	2955.8	2953.9	2955.3	2956.4	2957.6
88	Residence	13.42	R	2955.6	2954.1	2955.3	2956.4	2957.6
89	Residence	13.47	R	2958.6	2956.2	2959.8	2960.7	2961.8
90	Shed	13.42	R	-	2953.3	2955.3	2956.4	2957.6
91	Residence	13.37	R	2950.7	2947.5	2951.7	2952.7	2953.7
92	Residence	13.41	L	2960.2	2956.5	2954.6	2955.6	2956.7
93	Residence	13.31	L	2955.3	2948.1	2947.2	2948.2	2949.2
94	Barn	13.32	R	-	2944.5	2948.0	2949.0	2950.0
95	Residence	13.29	L	2945.0	2944.3	2945.6	2946.7	2947.6
96	Chicken house	13.21[b]	L	-	2950.0	2939.7	2940.7	2941.6
97	Residence	13.20	R	2934.2	2933.0	2938.9	2939.8	2940.6
98	Cottage	13.17	R	2931.8	2930.9	2936.7	2937.7	2938.5
99	Smoky View Cottages	13.10[b]	R	2927.2-2929.3[c]	2926.0-2928.4[c]	2931.7	2932.7	2933.5
100	Residence	13.00	R	2922.7	2921.3	2925.2	2926.4	2927.3
101	Residence (basement - 2922.9)	13.04	L	-	2922.9	2927.8	2929.0	2929.9
102	Residence	13.02	L	2923.7	2921.5	2926.4	2927.6	2928.5
103	Barn	13.02	L	-	2921.7	2926.4	2927.6	2928.5
104	Residence	12.92	L	2917.7	2915.3	2920.1	2921.2	2922.4
105	Residence	12.95	R	2920.3	2914.8	2922.0	2923.3	2924.2
106	Barn	12.90	L	-	2912.6	2918.8	2920.4	2921.2
107	Siler Grocery	12.89	R	2917.7	2917.6	2918.3	2919.8	2920.7
108	Residence	12.97	R	2929.6	2926.0	2923.2	2924.5	2925.4
109	Barn	13.09	R	-	2926.5	2931.1	2932.2	2933.0
110	Barn	13.10	R	-	2927.0	2931.7	2932.7	2933.5
111	Cottage	13.10	R	2928.6	2928.1	2931.7	2932.7	2933.5
112	Residence	13.10	R	2931.9	2929.2	2931.7	2932.7	2933.5
	Shed			2927.9	2927.3			
113	Motel (under construction)	13.13	R	2933.7	2931.5	2933.6	2934.6	2935.3
114	Residence	13.18	R	2938.0	2935.8	2937.3	2938.3	2939.3
115	Residence	13.18	R	2938.3	2935.7	2937.3	2938.3	2939.3
116	Residence	13.19	R	2938.4	2937.4	2938.2	2939.2	2940.1
117	Caldwell's Housekeeping Cottages	13.19[b]	R	2936.1-2938.5[c]	2935.8-2936.9[c]	2938.2	2939.2	2940.1
	Office			2938.6	2936.9			
	Garage				2937.4			
118	Barn	13.21	R	-	2939.2	2939.7	2940.7	2941.6
119	Residence	13.22	R	2942.3	2940.0	2940.4	2941.3	2942.2
120	Residence	13.28	R	2947.1	2943.6	2945.0	2945.9	2946.8
121	Star Motel	13.28[b]	R	2942.6-2945.0[c]	2942.1-2944.7[c]	2945.0	2945.9	2946.8
122	Ivy Hill Motel	12.82[b]	L	2910.4-2911.1[c]	2909.8-2910.2[c]	2913.7	2915.0	2916.4
	Pumphouse				2911.6			
123	Residence	12.82	R	2919.6	2917.4	2913.7	2915.0	2916.4
124	Garage (apartment above)	12.84	R	2918.7	2918.7	2915.3	2916.5	2917.5
125	Trailer Court office	12.75	R	2917.9	2916.1	2910.3	2911.6	2913.1
126	Cool Water Cottages	12.72[b]	R	2904.2-2905.7[c]	2902.7-2906.0[c]	2907.1	2908.3	2909.5
	Owner's residence (basement - 2905.0)			2912.4	2910.1			
	Office (basement - 2905.5)			2912.8	2909.8			
127	Meadow Lark Motel	12.65[b]	R	2901.2-2901.2[c]	2900.9	2903.5	2904.2	2905.2
	Pumphouse			-	2900.9			
128	Maggie Valley Restaurant	12.61	R	2903.3	2901.5	2900.0	2901.0	2902.0
	Shed			2905.3	2901.9			
129	Residence	12.59	R	2898.0	2896.6	2898.9	2900.0	2900.9
130	Barn	12.66[b]	L	-	2897.6	2903.2	2904.2	2905.2
	Trailer (permanent)			2896.8-2899.9[c]	2898.6			
131	Residence	12.63	L	2899.1	2897.2	2901.3	2902.2	2903.1
	Shack			-	2897.2			
132	Residence	12.58	R	2901.3	2900.3	2898.0	2899.2	2900.2
133	Residence	12.61	L	2901.0	2896.3	2900.0	2901.0	2902.0
134	Shed	12.56	R	2894.4	2894.0	2896.8	2898.0	2899.1
135	Concrete block building	12.55	R	2897.1	2894.8	2896.1	2897.4	2898.6

TABLE 3

FLOOD PLAIN STRUCTURES (Continued)

JONATHAN CREEK IN VICINITY OF MAGGIE, NORTH CAROLINA

Map Reference Number[a]	Identification	River Mile	Bank	Floor Elevation	Ground Elevation	Flood Elevations 14,000 cfs*	Regional	Maximum Probable
136	Shed	12.54	R	2892.9	2892.8	2895.4	2896.8	2898.0
137	Residence	12.57	L	2892.8	2891.2	2897.3	2898.6	2899.6
138	New foundation	12.54	R	2895.1	2891.0	2895.4	2896.8	2898.0
139	Residence	12.54	L	2897.4	2894.2	2895.4	2896.8	2898.0
140	Barn and sheds	12.52	L	-	2888.8-2890.4[c]	2894.1	2895.6	2896.8
141	Residence	12.51	L	2891.5	2889.5	2893.5	2895.0	2896.2
	Shed			-	2888.5			
142	Gray Shed	12.50	L	2890.1	2888.5	2892.8	2894.4	2895.6
143	Nikki O'Conner's Pottery Place	12.55	R	2897.2	2896.2	2896.1	2897.4	2898.6
144	Residence	12.55	R	2904.6	2900.2	2896.1	2897.4	2898.6
145	Plott's Grill	12.55	R	2901.3	2899.4	2896.1	2897.4	2898.6
146	Chamber of Commerce	12.54	R	2898.0	2897.2	2895.4	2896.8	2898.0
147	Maggie Valley Motel	12.52[b]	R	2895.9-2896.0[c]	2894.7-2895.0[c]	2894.1	2895.6	2896.8
	Garage			-	2892.8			
148	Plott's Motor Court	12.49[b]	R	2890.0-2895.1[c]	2889.4-2894.5[c]	2892.4	2893.8	2895.0
149	Esso Station (Humble Oil Co.)	12.47	R	2890.3	2890.3	2890.9	2892.6	2893.8
150	Cottage	12.52	R	2893.8	2891.5	2894.1	2895.6	2896.8
151	Residence	12.44	R	2891.0	2888.0	2889.0	2890.8	2892.0
	Garage			2889.0	2888.5			
152	Mount Valley Court	12.46[b]	R	2886.7-2887.5[c]	2885.6-2887.0[c]	2890.3	2892.0	2893.2
153	Shed	12.44	R	2885.5	2884.7	2889.0	2890.8	2892.0
154	Residence	12.42	R	2885.9	2884.0	2888.0	2889.6	2891.0
155	Residence	12.43	R	2888.7	2886.8	2888.4	2890.3	2891.4
156	Shell Home (demonstration)	12.39	R	2886.2	2884.2	2886.0	2887.8	2889.2
157	Satin's Candy Shop	12.36	R	2883.1	2883.1	2884.0	2885.8	2887.2
158	Valley Art Gallery - Auction	12.34	R	2883.4	2882.6	2882.6	2884.6	2886.1
159	Mount Valley Motel	12.40[b]	R	2883.7-2884.8[c]	2882.5-2884.2[c]	2886.5	2888.4	2889.7
160	Mountain Valley Inn	12.37[b]	R	2882.8-2883.5[c]	2881.2-2881.7[c]	2884.6	2886.5	2887.8
161	Barn	12.41	L	-	2881.9	2887.2	2889.0	2890.3
162	Residence (basement - 2886.5)	12.38	L	2894.1	2885.9	2885.2	2887.1	2888.4
163	Barn	12.40	L	2882.2	2881.9	2886.5	2888.4	2889.7
164	Medford Motel	12.32[b]	R	2878.4-2879.4[c]	2877.1-2879.1[c]	2881.2	2883.2	2884.9
165	Barn	12.28	L	-	2874.4	2878.7	2880.6	2882.5
166	Residence	12.30	L	2880.6	2877.6	2879.9	2881.8	2883.5
167	Residence	12.28	L	2880.7	2879.3	2878.7	2880.6	2882.5
168	Chicken house (commercial)	12.24[b]	L	2874.9-2875.2[c]	2875.7	2876.3	2878.2	2880.0
169	Concrete block building	12.27	L	2875.2	2875.7	2878.0	2879.9	2881.7
170	Crib	12.26	L	-	2874.1	2877.3	2879.2	2881.1
171	Trailer (permanent)	12.29	R	2876.8-2879.0[c]	2876.4	2879.3	2881.2	2883.0
172	Residence	12.29	R	2876.8	2876.6	2879.3	2881.2	2883.0
173	Residence	12.27	R	2877.3	2875.6	2878.0	2879.9	2881.7
174	Garage	12.26	R	2875.1	2874.9	2877.3	2879.2	2881.1
175	Shop	12.26	R	2877.5	2877.3	2877.3	2879.2	2881.1
176	Residence & office (Beatty Real Estate)	12.28	R	2884.9	2879.6	2878.7	2880.6	2882.5
177	Maggie Country Store	12.23[b]	R	2876.0	2875.7	2875.8	2877.8	2879.6
178	Phillips 66 Station	12.22	R	2874.2	2873.9	2875.4	2877.3	2879.2
179	Residence	12.22	R	2873.3	2872.5	2875.4	2877.3	2879.2
180	Souvenir Shop	12.19	R	2873.2	2872.7	2874.2	2876.2	2878.0
181	Residence	12.17	R	2870.3	2867.1	2873.3	2875.4	2877.2
182	Residence	12.19	R	2871.6	2870.1	2874.2	2876.2	2878.0
183	Residence (basement - 2863.1)	12.06	L	2870.7	2868.6	2868.0	2870.2	2871.6
	Garage			-	2868.1			
184	Residence (basement - 2816.4)	11.25	L	2824.1	2821.7	2819.6	2820.6	2821.4
	Garage			-	2819.6			
185	Residence	11.37	L	2827.3	2824.9	2827.2	2828.5	2829.3
186	Residence	11.31	L	2823.3	2821.7	2823.4	2824.4	2825.4
	Shop at rear			2821.8	2820.2			
187	Shed	11.05	L	-	2807.7	2807.5	2808.4	2809.3
188	Residence	11.07	L	-	2819.4	2808.7	2809.6	2810.4
189	Residence	11.33	R	2821.8	2826.1	2824.7	2825.8	2826.6
190	Shed	11.01	L	2801.8	2800.5	2805.1	2806.1	2807.1
191	Garage	10.95	L	2797.7	2795.8	2801.6	2802.7	2803.7
192	Residence (basement - 2795.7)	10.93	L	2802.5	2797.5	2800.5	2801.5	2802.6
	Shed			2800.4	2798.3			
193	Barn	10.88	L	-	2794.5	2797.5	2798.8	2799.7
	Shed			-	2793.8			
194	Dairy barn	11.11	R	-	2809.1	2811.0	2811.8	2812.7
195	Shed	11.15	R	2819.9	2812.9	2813.4	2814.2	2814.9
196	Residence	10.83	R	2798.3	2793.4	2794.8	2796.0	2797.0
197	Barn	10.82	R	-	2793.0	2794.4	2795.6	2796.6
198	The Poag's Antique Shop	10.68	R	2791.4	2790.3	2787.6	2789.0	2790.0
199	Barn	10.67	R	-	2784.0	2787.1	2788.5	2789.4
200	Residence (basement - 2779.8)	10.63	R	2786.1	2781.9	2785.3	2786.7	2787.6

TABLE 3

FLOOD PLAIN STRUCTURES (Continued)

JONATHAN CREEK IN VICINITY OF MAGGIE, NORTH CAROLINA

Map Reference Number[a]	Identification	River Mile	Bank	Floor Elevation	Ground Elevation	Flood Elevations 14,000 cfs*	Regional	Maximum Probable
201	Residence	10.62	R	2781.7	2780.1	2784.8	2786.2	2787.2
	Garage			2779.7	2779.0			
	Shed			-	2779.1			
202	Residence	10.53	R	2777.9	2775.0	2780.4	2781.8	2782.9
	Shed			-	2775.6			
203	Stable	10.50	R	2777.0	2775.0	2778.2	2779.7	2780.6
204	Residence	10.46	R	2773.3	2771.7	2775.6	2776.8	2777.6
205	Residence	10.43	R	2773.6	2772.0	2773.5	2774.7	2775.3
	Shed			2772.7	2772.2			
206	Pumphouse (top of cistern - 2772.1)	10.37	R	2769.1	2769.1	2769.8	2770.9	2771.6
207	Barn	10.26	L	-	2773.4	2764.6	2766.0	2767.0
208	Residence	10.14	R	2766.4	2762.7	2759.4	2760.8	2762.0
209	Residence	10.05	R	2756.6	2753.2	2754.8	2756.0	2757.1
	Shed			2754.6	2754.0			
210	Residence (basement - 2753.2)	10.05	R	2760.9	2753.2	2754.8	2756.0	2757.1
211	Residence	10.02	R	2755.1	2753.2	2753.2	2754.4	2755.5
212	House	9.99	R	2752.0	2749.5	2751.6	2752.8	2753.8
213	Barn	9.98	R	-	2748.0	2751.0	2752.2	2753.2
214	Pott's Apts. (basement - 2749.7)	9.98	R	2758.1	2749.7	2751.0	2752.2	2753.2
215	Stone house at Pott's Apts.	9.98	R	2754.6	2751.7	2751.0	2752.2	2753.2
216	Residence (basement - 2744.8)	9.96	R	2752.6	2749.2	2750.0	2751.1	2752.2
	Garage			-	2748.2			
	Shed			-	2745.6			
217	Garage (apartment above)	9.93	R	-	2747.1	2748.4	2749.5	2750.4
218	Carver Motel (basement - 2743.7)	9.92	R	2750.9	2748.0	2747.9	2749.0	2749.9
219	Residence	9.92	R	2752.2	2750.8	2747.9	2749.0	2749.9
220	Residence	9.92	R	2747.3	2744.1	2747.9	2749.0	2749.9
221	Dellwood Motel	9.86[b]	R	2746.8	2745.6-2746.4[c]	2744.7	2745.5	2746.5
222	Residence	9.89	L	2746.2	2742.8	2746.3	2747.3	2748.3
223	Barn	9.86	L	-	2739.6	2744.7	2745.5	2746.5
224	Barn	9.77	L	2735.9	2733.9	2740.7	2741.8	2742.8
225	Residence	9.69	R	2735.4	2733.8	2737.3	2738.7	2739.7
226	Residence	9.69	R	2736.1	2734.0	2737.3	2738.7	2739.7
	Garage			-	2734.9			
227	Dellwood Baptist Church (basement - 2731.9)	9.67[b]	R	2741.6	2735.7	2736.5	2737.9	2739.0
228	Residence	9.69	R	2738.1	2734.8	2737.3	2738.7	2739.7
229	Residence	9.66	R	2736.4	2734.0	2736.0	2737.4	2738.5
	Garage			2732.7	2731.7			
230	Residence	9.67	R	2737.5	2735.4	2736.5	2737.9	2739.0
231	Residence	9.66	R	2737.5	2736.2	2736.0	2737.4	2738.5
232	Public garage	9.66	R	2745.8	2741.2	2736.0	2737.4	2738.5
233	Old stone building	9.65	R	2743.4	2739.4	2735.7	2737.0	2738.2
234	Residence	9.64	R	2738.9	2738.9	2735.3	2736.8	2737.8
235	Residence	9.58	R	2733.1	2733.2	2732.8	2734.4	2735.5
236	Residence (basement - 2723.6)	9.53	L	2730.5	2724.3	(d)	(d)	(d)
237	Residence (basement - 2722.5)	9.52	L	2729.2	2723.9	(d)	(d)	(d)
238	Barn	9.46	L	-	2723.6	(d)	(d)	(d)
239	Residence	9.42	L	2728.2	2723.3	(d)	(d)	(d)
240	Barn	9.37	L	-	2715.6	(d)	(d)	(d)

(a) See special maps for building locations.

(b) Mileage at center of a large building or group of buildings.

(c) Range in elevation of the floor or ground of a large building or group of buildings.

(d) Upstream or downstream from limits of profile.

* Discharge for this flood varies from 12,000 cubic feet per second at Mile 14.78 to 14,500 cubic feet per second at Mile 9.58.

Prepared June 1962

North Carolina Highway 284, which is a connecting link between U. S. Highway 19 at Dellwood and U. S. Highway 25-70 at Newport, Tennessee, follows the right bank of Jonathan Creek from Dellwood downstream to Mile 4.76, and then follows the left bank to the mouth of Cove Creek where it turns up that stream. A county road continues down the left bank of Jonathan Creek to its mouth, and several county and private roads cross the flood plain in the reach between Dellwood and Cove Creek. Floods such as that of 1963 have overtopped some of the county and private roads at several points along the creek with depths up to 2 feet. North Carolina Highway 284 is generally above the height of past floods, but a Regional Flood would overtop the highway for most of its length along the creek with depths up to 5 feet. At Mile 8.5 a natural constriction in the flood plain results in higher stages upstream, and in that reach a Regional Flood would reach depths of as much as 11 feet in the highway. A Maximum Probable Flood would overtop the highway with depths generally ranging up to 6 feet, but up to 14 feet upstream from the constricted section.

A Regional Flood would overtop all of the county roads by at least 5 feet at the low points, and the road on the left bank downstream from Cove Creek would be flooded with depths up to 13 feet. A Maximum Probable Flood would be $\frac{1}{2}$ foot to 5 feet higher. Most of the private roads in the flood plain would be flooded to even greater depths than the county roads.

The Smoky Mountain Speedway race track and stands are located on the left bank of the creek at Mile 7.7. The track is above flood levels, but the access road crossing the flood plain would be flooded by depths up to 5 feet during a Regional Flood and 6 feet during a Maximum Probable Flood.

A private airstrip is located on the right bank between Miles 5.3 and 6.0. It would be flooded to depths of 4 feet during a Regional Flood and 5 feet during a Maximum Probable Flood.

Approximately 30 residences are located in the flood plain of Jonathan Creek downstream from Dellwood. During past floods some of these have been reached by the overflowing creek and some basements have been flooded. During a Regional or Maximum Probable Flood all of these would be surrounded by floodwaters and water would enter several. Floodwaters would also surround the Rocky Hill School on the right bank at Mile 5.25 during a Regional or Maximum Probable Flood.

Channel Changes

Some channel improvement work has been undertaken by property owners along the creek. This has been relatively inexpensive work by bulldozers in which the boulders in the stream bed have been pushed back to widen and deepen the channel. In the vicinity of Maggie and Dellwood there are several short reaches where this type of work has been done. In addition, gravel removal operations in the vicinity of Miles 10.2 and 13.2 have substantially increased the channel size at these two points. Most of this channel work has been done since the February 1953 flood.

When North Carolina Highway 284 was constructed in 1935-36 the Jonathan Creek channel was relocated at three short sections in the vicinity of Miles 3.1, 7.5, and 8.5 to improve the highway alignment. As in the reach above Dellwood, property owners along the creek frequently remove gravel deposits in the creek and do some channel straightening to improve flow conditions. Several residents along the creek told investigating engineers that the channel had shifted several feet right or left at various reaches since 1900.

Bridges across the Stream

Eight highway bridges, five private road bridges, and two footbridges cross Jonathan Creek downstream from Dellwood. Table 4 lists pertinent elevations for these bridges and shows their relation to the crest of the flood of March 6, 1963, and the Regional Flood. Plates 8, 9, and 10 show the relation of the floor and under-clearance at the bridges to the flood profiles for the reach.

One of the highway bridges carries North Carolina Highway 284 across the stream at Mile 4.76. It is a concrete structure with approach fills 6 feet high on the flood plain. It has had no effect upon past floods, but the bridge and its approaches would cause heading up of about 5 feet during a Regional or Maximum Probable Flood.

County road 1313 at Mile 7.11 is also a concrete structure and has approach fills which partially obstruct the flood plain so that heading up of more than 2 feet would occur during major floods. The other six highway bridges are county bridges consisting of steel trusses or steel beams with timber decks. They have short approach fills and heading up would be negligible during floods.

TABLE 4

BRIDGES ACROSS JONATHAN CREEK

Mile above Mouth	Identification	Low Water Elev. feet	Floor Elev. feet	Regional Flood Crest Elev. feet	Flood Crest Elev. feet	Underclearance Elev. feet	Underclearance Above 1953 or 1963 Flood feet	Underclearance Below 1953 or 1963 Flood feet
					Mar. 6, 1963			
0.91	County road 1349	2393.3	2404.2	2414.8	2399.6	2402.9	3.3	
1.21	Footbridge	2419.6	2429.5	2438.7	2426.7	2428.9	2.2	
1.91	Private road	2442.4	2451.5	2466.1	2450.8	2450.5		0.3
2.67	County road 1350	2469.3	2478.4	2490.6	2475.1	2477.2	2.1	
3.05	Footbridge	2478.3	2485.1	2499.6	2486.5	2484.5		2.0
3.90	County road 1364	2502.2	2513.3	2515.2	2508.3	2510.7	2.4	
4.76	N. C. Highway 284	2531.0	2544.9	2547.0	2537.0	2542.0	5.0	
5.26	County road 1322	2549.1	2557.4	2559.2	2554.2	2555.7	1.5	
6.13	County road 1321	2582.4	2589.7	2590.4	2586.9	2586.9	0	
7.11	County road 1313	2621.6	2630.2	2629.9	2626.0	2628.6	2.6	
7.78	Private road	2643.6	2650.8	2654.6	2649.0	2649.4	0.4	
8.40	Private road	2668.7	2676.7	2685.3	2676.5	2675.2		1.3
8.81	County road 1309	2688.0	2697.5	2700.7	2692.5	2695.0	2.5	
9.18	Private road	2703.0	2711.3	2716.1	2707.9	2710.0	2.1	
9.41	Private road	2714.1	2720.4	2727.2	2719.5	2719.2		0.3
					Feb. 21, 1953			
9.74	Private road	2729.4	2735.9	2740.6	2734.4	2734.2		0.2
9.87	Footbridge	2736.5	2744.3	2746.1	2739.8	2743.5	3.7	
10.42	County road 1307	2765.5	2774.6	2774.1	2770.4	2772.3	1.9	
11.24	Private road	2810.0	2816.0	2820.0	2814.4	2814.8	0.4	
12.16	County road 1307	2863.0	2872.5	2874.9	2868.5	2870.8	2.3	
12.63	Private road	2892.9	2898.8	2902.3	2898.0	2897.8		0.2
12.84	Private road	2906.6	2912.8	2916.4	2910.6	2911.2	0.6	
12.92	Private road	2911.2	2915.3	2921.6	2915.2	2914.2		1.0
13.42	County road 1306	2948.4	2951.0	2956.4	2952.0	2953.4	1.4	
13.95	County road 1305	2992.5	3002.3	3003.5	2996.3	2999.8	3.5	
14.29	Private road	3029.7	3036.0	3038.4	3035.5	3034.9		0.6
14.47	Private road	3049.3	3054.5	3058.2	3054.3	3053.3		1.0
14.49	Private road	3051.6	3057.5	3060.5	3056.7	3056.5		0.2
14.68	Old county road 1304	3076.9	3081.8	3086.1	3080.8	3079.6		1.2
14.71	New county road 1304	3079.6	3088.6	3090.4	3083.4	3084.8	1.4	

Four of the five private road bridges are of timber construction and would probably wash out during major floods. The fifth, at Mile 7.78, is a concrete bridge. Heading up during great floods would be negligible at all of the private bridges except that at Mile 8.40 where approach fills would cause heading up of 3 to 4 feet.

Both footbridges are suspension bridges which would have no effect upon flood flows and which would probably wash out during large floods.

Upstream from Dellwood there are six highway bridges, eight private road bridges, and one footbridge. These are also listed in Table 4, but their relation to the February 21, 1953, flood is shown rather than the relation to the 1963 flood. Plate 11 shows the relation of the floor and underclearance at the bridges to the flood profiles for the reach.

Past floods have flooded the approaches to several of the bridges and have reached or come close to the floors of three of the private road bridges, and to the floor of the old North Carolina Route 1304 bridge at Mile 14.68. The new bridge just upstream is above the level of past floods. A Regional Flood on Jonathan Creek would overtop all of the bridges upstream from Dellwood with the exception of the Route 1307 bridge at Mile 10.42. A Maximum Probable Flood would be about 1 foot higher than the Regional Flood and would overtop all of the bridges in the vicinity of Maggie and Dellwood with depths ranging up to 7 feet.

Heading up during past floods has been negligible at the bridges upstream from Dellwood, and would not be great during the possible larger floods of the future.

Obstructions to Flood Flow

The effect of obstructions due to the bridges and their approach fills has been described in the previous section. There have been some changes in the flood plain due to grading or filling at the site of developments in the vicinity of Maggie and Dellwood, and these will slightly affect future flood heights.

FLOOD SITUATION

Flood Records

The U. S. Geological Survey has operated a gaging station on Jonathan Creek near Cove Creek, 9 miles downstream from Dellwood, since May 24, 1930. Data on flood crest stages and discharges near the mouth of the creek are available from these records. These data afford an index to floods in the Maggie-Dellwood reach. However, because of the difference in drainage areas at Maggie and Cove Creek, and the considerable variation in storm precipitation that is possible in this mountain area, the gage record may not reflect all floods in the Maggie-Dellwood reach.

To supplement the record obtained at this gaging station, local residents were interviewed for information on dates and heights of floods. Files of the Waynesville and Asheville newspapers were searched, as were historical documents and records. Valuable data were obtained from reports of field investigations made by TVA engineers after the important floods which have occurred since 1954. These records and investigations have developed a knowledge of floods on Jonathan Creek covering the past 50 years or more.

Flood Stages and Discharges

Table 5 lists peak stages and discharges for the known floods exceeding bankfull stage of 6 feet at the U. S. Geological Survey gaging station on Jonathan Creek near Cove Creek. Dates of floods prior to 1930 were obtained from interviews with local residents and flood records on other streams in the vicinity of Jonathan Creek.

Flood Occurrences

Table 6 shows the monthly distribution of the 21 known floods on Jonathan Creek. The record shows that floods have occurred most frequently in the winter and early spring months of January through March; however, a longer period of record would probably show that floods can occur in any month of the year, the summer and fall floods resulting from local thunderstorms or decadent tropical hurricanes.

TABLE 5

FLOOD CREST ELEVATIONS ABOVE BANKFULL STAGE

JONATHAN CREEK NEAR COVE CREEK, NORTH CAROLINA

1867-1964

This table includes all known floods above bankfull stage of 6 feet at the U. S. Geological Survey gaging station near Cove Creek, Mile 0.68. Drainage area is 65.3 square miles.

Date of Crest	Gage Heights		Discharge
	Stage feet	Elevation feet	cfs
March 6, 1867	(a)		
June 15, 1876	(a)		
March 18, 1899	(a)		
February 28, 1902	(a)		
March 27, 1913	(a)		
March 4, 1917	(a)		
January 19, 1936	6.20	2390.09	2,270
February 3, 1939	6.02	2389.91	2,120
August 13, 1940	6.08	2389.97	2,190
August 30, 1940	7.51	2391.40	3,200
February 10, 1946	6.75	2390.64	2,680
January 20, 1947	6.96	2390.85	2,820
February 21, 1953	6.90	2390.79	2,750
January 22, 1954	6.03	2389.92	2,140
January 31, 1957	7.33	2391.22	3,070
April 30, 1957	6.38	2390.27	2,390
January 21, 1959	7.51	2391.40	3,200
February 25, 1961	7.95	2391.84	3,560
December 12, 1961	7.34	2391.23	3,080
March 6, 1963	7.82	2391.71	3,460
March 12, 1963	7.32	2391.21	3,060

(a) Stage unknown--Flood history investigations indicate that large floods occurred at this time.

TABLE 6

MONTHLY FLOOD DISTRIBUTION

JONATHAN CREEK NEAR COVE CREEK, NORTH CAROLINA

Month	Number of Occurrences	Month	Number of Occurrences
January	5	July	0
February	5	August	2
March	6	September	0
April	1	October	0
May	0	November	0
June	1	December	1
		Total	21

Duration and Rate of Rise

Floods on Jonathan Creek reach their peak rapidly, rising at a rate of as much as 3 feet per hour, and the duration of flooding during past floods has been short, the creek seldom remaining above bankfull stage more than a few hours.

Velocities

During floods such as those of February 21, 1953, and March 6, 1963, velocities in the channel of Jonathan Creek range up to 9 feet per second, and overbank velocities range up to 3 feet per second. During larger floods, velocities would be even greater.

Flooded Areas, Flood Profiles, and Cross Sections

Plates 5 and 6 show the areas along Jonathan Creek downstream from Dellwood that were inundated by the flood of March 6, 1963, and that would be inundated by the Maximum Probable Flood. Plate 7 shows the approximate areas along Jonathan Creek in the vicinity of Maggie and Dellwood that were inundated by the flood of February 21, 1953, and that would be inundated by the Maximum Probable Flood. The actual limits of these overflow areas on the ground may vary somewhat

from those shown on the maps because the contour interval of the maps does not permit precise plotting of the flooded area boundaries. The contour interval of Plates 5, 6, and 7 is 40 feet.

Plates 8, 9, and 10 show the profiles for the flood of March 6, 1963, in the reach downstream from Dellwood. Also shown are the profiles for the Regional Flood and a lesser flood discussed in Part III of this report, and the profile of the Maximum Probable Flood discussed in Part IV of this report. Plate 11 shows the profile for the flood of February 21, 1953, and the possible greater floods discussed in Parts III and IV of this report in the vicinity of Maggie and Dellwood.

Plate 12 shows typical cross sections of Jonathan Creek in the reach downstream from Dellwood, and Plate 13 shows cross sections in the reach from Dellwood upstream. The locations of all sections are shown on the profiles, Plates 8, 9, 10, and 11, and on the maps, Plates 5, 6, and 7. The cross sections show the elevation and the extent of overflow of the February 1953 or the March 6, 1963, flood, and of the Regional and Maximum Probable Floods.

FLOOD DESCRIPTIONS

Following are descriptions of known large floods that have occurred on Jonathan Creek ~~in the vi~~cinity of Maggie and Dellwood. These are based upon newspaper accounts, historical records, and investigations by TVA engineers.

Early Floods

Large floods occurred on the lower Pigeon River on March 6, 1867; June 15, 1876; March 18, 1899; and February 28, 1902. Investigation of these floods showed that the lower tributaries, notably Jonathan and Richland Creeks, contributed heavily to the river floods. No specific data on Jonathan Creek are available.

March 27, 1913

H. M. Plott, who has lived at the old Plott place at Mile 12.0 since 1894, recalled two large floods of equal height, one on March 27, 1911, and one in February 1953. Streamflow records for Pigeon River at Newport and for other

streams in the general area show only a small rise on March 27 and 28, 1911; however, a large flood occurred on March 27, 1913. Probably the flood that Mr. Plott recalled occurred on the latter date. Grady Henry, who lives at Mile 14.3, also recalled a high flood about 40 years prior to 1954 which may have been the 1913 rise.

August 30, 1940

This flood is the third largest in the 35 years of record at the gaging station near Cove Creek and is one of the largest known to local residents in the reach of the study above Dellwood. At Mile 10.9, A. J. Moody and Merlin Evans said that the 1940 crest was the highest in the 30 to 40 years prior to 1954 and that it exceeded the 1953 height by one-half to one foot. Above Mile 13 the 1940 flood was about the same as the 1953 rise.

November 28, 1948

According to R. F. Hall, caretaker at the Rocky Waters Court, Mile 14.8, the highest flood at that location in the period from 1947 to 1954 occurred in November 1948. No mention was made of this flood below Maggie, and it was apparently important only in the extreme headwaters. At the gage near Cove Creek the crest stage was 5.78 feet.

September 1, 1951

Late in the afternoon of September 1, 1951, an intense thunderstorm with up to 6.5 inches of rain in one hour fell on the Fie Creek, Evans Branch, and Hemphill Creek watersheds in the upper Jonathan Creek basin. The center of the storm was on the mountain slopes about 4 miles north of Maggie. Discharges during this storm were as follows:

Stream	Drainage Area	Discharge	
		Total	Per Square Mile
	sq. mi.	cfs	cfs
Fie Creek	2.06	1,000	490
Evans Branch	2.11	310	150
Hemphill Creek	2.74	1,700	620

Only small rises occurred on the other tributaries above Dellwood, however, and the flood on Jonathan Creek was important only between Maggie and Fie Creek which enters at Mile 14.86. Frank Setzer, who has lived near Mile 14.7 all his life, said the 1951 rise was the highest he had seen above Maggie. R. F. Hall, who furnished information on the 1948 flood, thought the 1951 crest was slightly lower than that of 1948. The crest stage at the stream gage was only 4.99 feet.

February 21, 1953

During the investigation made in 1954 there was fairly general agreement that the February 1953 flood was the highest in recent years below Maggie. Campbell Creek, which enters from the south at Maggie, reached its highest stage in many years. It was principally the contribution from Campbell Creek and the other streams along the south side of the basin that produced this flood.

The 1953 overflow in the vicinity of Maggie and Dellwood is shown on Plate 7. This overflow was generally shallow and caused no damages of consequence.

January 31, 1957

This flood was the second highest in the 27 years of record up to that time, and it was only a few inches lower than the flood of August 1940. However, three floods since then have exceeded the 1957 crest stage. In the vicinity of Maggie and Dellwood, high water marks indicate the flood was about the same height as that of February 21, 1953. Damages from the 1957 overflow were insignificant.

January 21, 1959

An investigation made following this flood showed that in the reach from Maggie to Dellwood it was about the same height as the February 1953 flood. At the gaging station near Cove Creek the crest stage was identical to that of the previous highest flood of record which occurred in August 1940.

Campbell Creek, a tributary of Jonathan Creek at Maggie, flooded five units of Presley's Motor Court, one unit of Rhinehart's Tourist Courts, the Tastee-Freeze Shop, and Mr. Ed Mehaffey's basement. Damage was small and confined to the cost of clean-up. On Jonathan Creek, the swift current carried away a small barn belonging to Raymond Smith. Mr. Smith's 1953 pickup truck was washed away from the same location and later recovered 0.6 mile downstream.

February 25, 1961

Rainfall averaging near 2 inches falling on ground that had been saturated by a week of nearly steady rain caused many streams in western North Carolina to go out of banks on this date. On Jonathan Creek the crest stage of 7.95 feet is the highest since records started in 1930 and is 0.4 foot higher than the previous highest stage which occurred in August 1940 and January 1959. In spite of the record stage, damage was not extensive. Some land scour occurred and roads were flooded at several places.

December 12, 1961

From December 10 to 12, 1961, rainfall over the Jonathan Creek watershed averaged nearly 6 inches, and on this date the stream reached a crest stage 0.6 foot lower than the high stage of February. Private and secondary roads were again flooded and fields were scoured.

March 6, 1963

This is the second highest flood of record on Jonathan Creek, with a stage only 0.1 foot lower than the greatest flood of February 1961. Some scour occurred in fields along the creek, and county and private roads were flooded for a few hours, but damage was slight. The profile for this flood has been developed from high water marks located along Jonathan Creek from Dellwood to the mouth.

March 12, 1963

This second flood of the month was $\frac{1}{2}$ foot lower than the March 6 flood. Roads were again flooded and additional land scour occurred. The heavy rain which caused the flood also caused a large landslide which blocked North Carolina Highway 284 near Dellwood.

III.

REGIONAL FLOOD

REGIONAL FLOOD[1]

This section of the report relates particularly to floods on streams whose watersheds are comparable with that of Jonathan Creek.

Large floods have been experienced in the past on streams in the general geographical and physiographical region of Maggie and Dellwood, North Carolina. Heavy storms similar to those that caused these floods could occur over the watershed of Jonathan Creek and its tributaries. In this event, a flood would result on this stream comparable in magnitude with those that were experienced on neighboring streams. Floods of this size are designated as Regional Floods. It is therefore desirable, in connection with any determination of future floods that may occur on Jonathan Creek, to consider floods that have occurred in the region on watersheds with similar topography, watershed cover, and physical characteristics.

Maximum Known Floods in the Region

Table 7 lists the maximum known floods experienced on watersheds comparable with those of Jonathan Creek and within about 50 miles of Maggie and Dellwood. Streams which differ significantly in watershed characteristics from those of Jonathan Creek have not been included. This limits the streams considered to those which have their headwaters in the Southern Appalachian Mountains.

Not included in the table are those floods caused by the decadent tropical hurricanes of July 1916 and mid-August 1940. The reason for this lies in the location of the Jonathan Creek watershed and the nature of hurricanes. During a hurricane, moist air moving from the Gulf and Atlantic coast is forced upward by the gradually sloping ground rising to the crest of the Tennessee Valley Divide. As a result of this orographic influence, the heaviest rainfall occurs on the south and east slopes of the Divide, and the area affected within the Tennessee Valley is confined to a relatively narrow spill-over area immediately beyond the crest. The Jonathan Creek watershed is further protected by the mile-high Pisgah Ridge.

One of the earliest floods known to have occurred in the Maggie-Dellwood region was the flood of May 1840. Very little is known about this storm which caused record flooding along the Tuckasegee River and Deep Creek.

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1. Prepared by Hydraulic Data Branch.

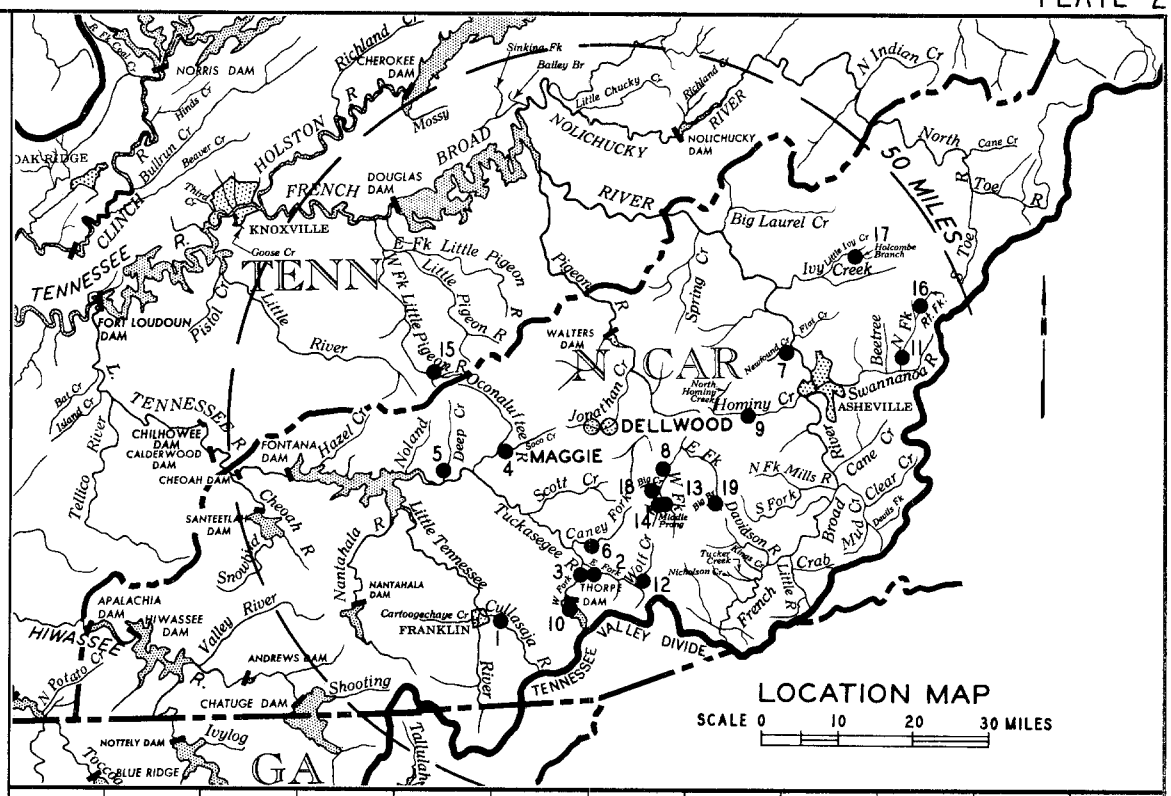
TABLE 7

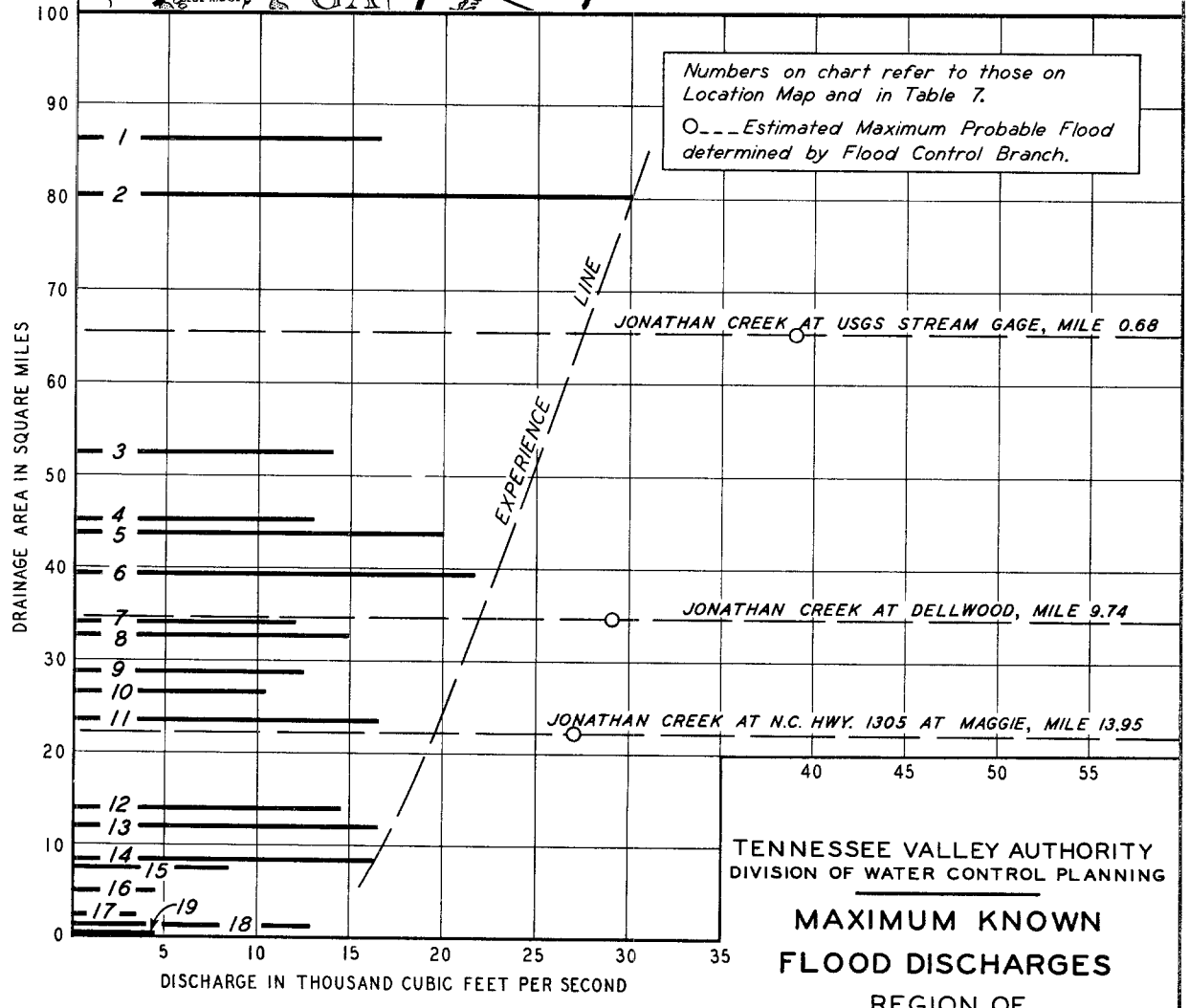
MAXIMUM KNOWN FLOOD DISCHARGES ON STREAMS

IN THE REGION OF MAGGIE AND DELLWOOD, NORTH CAROLINA

No.	Stream	Location	Drainage Area sq. mi.	Date	Peak Discharge Amount cfs	Peak Discharge Per Sq. Mi. cfs
1	Cullasaja River	nr Cullasaja, N. C.	86.5	August 30, 1940	16,500	191
2	East Fork Tuckasegee River	at Tuckasegee, N. C.	80.3	August 30, 1940	30,000	374
3	West Fork Tuckasegee River	nr Tuckasegee, N. C.	52.5	August 30, 1940	14,000	267
4	Soco Creek	nr Cherokee, N. C.	45.3	November 19, 1906	13,000	287
5	Deep Creek	nr Bryson City, N. C.	43.9	May 1840	20,000	456
6	Caney Fork	ab Cowarts, N. C.	39.4	August 30, 1940	21,700	551
7	Newfound Creek	nr Leicester, N. C.	34.2	August 30, 1940	12,000	350
8	West Fork Pigeon River	nr Waynesville, N. C.	32.8	August 30, 1940	14,900	454
9	North Hominy Creek	ab Candler, N. C.	28.9	August 30, 1940	12,400	429
10	West Fork Tuckasegee River	at Glenville, N. C.	26.8	August 30, 1940	10,300	384
11	North Fork Swannanoa River	nr Black Mountain, N. C.	23.8	June 16, 1949	16,500	693
12	Wolf Creek	nr Tuckasegee, N. C.	14.1	August 30, 1940	14,500	1,030
13	West Fork Pigeon River	nr Spruce, N. C.	12.2	August 30, 1940	16,500	1,350
14	Middle Prong West Fork Pigeon River	nr Spruce, N. C.	8.4	August 30, 1940	16,400	1,950
15	West Fork Little Pigeon River	below Trout Branch, Sevier Co., Tenn.	7.6	September 1, 1951	8,500	1,120
16	Right Fork Swannanoa River	nr Black Mountain, N. C.	5.1	June 16, 1949	4,500	882
17	Holcombe Branch	nr Ivy, N. C.	2,41	June 2, 1937	3,400	1,410
18	Big Creek	nr Waynesville, N. C.	1.32	August 30, 1940	12,900	9,770
19	Big Branch	nr Waynesville, N. C.	0.4	August 30, 1940	4,500	11,200

PLATE 2





TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

MAXIMUM KNOWN FLOOD DISCHARGES

REGION OF
MAGGIE AND DELLWOOD, N.C.

MARCH 1965

HD-1311

Another storm for which records are not available occurred in November 1906. This storm caused the highest known flood on Soco Creek.

One of the most severe storms known to have occurred in the Maggie-Dellwood region was the storm of August 29-30, 1940. This storm was a fairly local meteorological disturbance centered in the Little Tennessee and French Broad River basins, the heaviest rainfall occurring over the headwaters of the Tuckasegee and Cullasaja Rivers. The rainfall occurred in a period of 20 to 28 hours and totaled 10.2 inches on the Tuckasegee River watershed above Tuckasegee, 10.7 inches on the Wolf Creek watershed, and 10.0 inches on the Cullasaja River watershed above Cullasaja. This storm occurred only $2\frac{1}{2}$ weeks after a tropical hurricane had brought heavy rains over much of the area; this may have contributed to the severe flooding.

The storm of June 14-16, 1949, was part of a widespread disturbance that produced floods of considerable magnitude throughout much of the southeastern part of the Tennessee Valley. The highest flood of record was experienced on the North Fork Swannanoa River near Black Mountain, North Carolina, where 8.50 inches of rainfall was recorded in 21 hours. Approximately 2.5 inches of rain had fallen during the two days prior to the storm.

All of the floods listed in Table 7 have occurred on watersheds in the region of Maggie and Dellwood that are similar in physical characteristics. This indicates that floods of like magnitude, modified to take into account differences in drainage area characteristics, could occur in the future on Jonathan Creek.

Determination of Regional Flood

Plate 2 is a diagram of the discharges listed in Table 7 along with a map showing the locations of these discharge measurements. Most of the discharges in the table occurred during the late August 1940 flood. This flood as well as the June 1949 flood resulted from general thunderstorm activity with intense rainfall over a localized area. Undoubtedly storms of this type occur quite often in the mountain regions, but because of the limited size and remoteness of the area affected, very little damage is sustained and the storm is not recorded. Although this is the type of storm most likely to cause severe flooding in the Maggie-Dellwood region, floods can occur from the cyclonic type of storm which causes heavy rainfall over a wide area. This type of storm usually lasts over a period of several days and could occur during any part of the year, although it would more likely occur in

the winter or early spring months. The May 1840 and November 1906 floods were probably caused by storms of this type.

Based upon the maximum flood discharges experienced in the region it is reasonable to expect future flood discharges on Jonathan Creek at the USGS stream gage near Cove Creek, North Carolina, to be in the order of 27,400 cubic feet per second. For the purposes of this report, a flood of this magnitude is designated as a Regional Flood. Upstream at Maggie and Dellwood, discharges during such a flood would be about 20,000 and 22,000 cubic feet per second, respectively.

A Regional Flood may occur on Jonathan Creek in the reach from the mouth upstream to Dellwood that would be from 2 to 17 feet higher than the March 6, 1963, flood. In the gorge section downstream from the mouth of Cove Creek the Regional Flood would average about 16 feet higher, and in the reach from Cove Creek to Dellwood it would average about 6 feet higher than the 1963 flood. In the reach investigated upstream from Dellwood a Regional Flood would be from 3 to 7 feet higher than the flood of February 21, 1953, being about 6 feet higher in the vicinity of both Dellwood and Maggie.

The profile of the Regional Flood on Jonathan Creek is shown on Plates 8, 9, 10, and 11.

These plates also show the profile of a flood on Jonathan Creek with flows approximately midway between those of the greatest flood of the past and the Regional Flood. These flows vary from 12,000 cubic feet per second at the upper limits of the study to about 18,000 cubic feet per second at the mouth.

IV.

MAXIMUM PROBABLE FLOOD

IV.

MAXIMUM PROBABLE FLOOD[1]

This section discusses the Maximum Probable Flood on Jonathan Creek and some of the hazards of great floods. Floods of the magnitude of the Maximum Probable are the kind considered in planning construction and operation of protective works, the failure of which might be disastrous. They represent reasonable upper limits of expected flooding.

Jonathan Creek has a drainage area of 13.3 square miles at Mile 14.8 above Maggie and 66.4 square miles at the mouth.

Extreme floods on this stream are most likely to result from either of two types of storms--intense periods of rainfall during winter storms of fairly long duration, or short-duration storms of the cloudburst or hurricane type usually occurring during summer or early fall. Infiltration and other losses are generally low in winter and generally high in summer.

DETERMINATION OF FLOOD DISCHARGE

In determining the Maximum Probable Flood on Jonathan Creek in the vicinity of Maggie and Dellwood, consideration was given to great storms and floods that have already occurred on the watershed and to those which have occurred elsewhere but could have occurred in this area. This procedure provides information about possible floods and storms additional to that which can be gained from the short-term local hydrologic records alone.

The maximum known flood on Jonathan Creek in the vicinity of Maggie and Dellwood occurred on February 25, 1961. The peak discharge is estimated to have been 3560 cubic feet per second at the gage near Cove Creek, Mile 0.68 near the downstream limit of the study.

It is reasonable to expect that greater floods will occur on this stream.

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1. Prepared by Flood Control Branch.

Observed Storms

Observed storms are meteorologically transposable to the Maggie-Dellwood area from within a broad region extending generally from the Atlantic Ocean to the Appalachian Divide and from Florida through Pennsylvania. The moisture source for storms in this region is the warm, moist air flowing northward from the tropical Atlantic Ocean. In general, the moisture potential for a given region decreases with its increased distance from the moisture source. Transposition of storms from within the broad region includes adjustments for the particular meteorological conditions to be expected at Maggie and Dellwood. Table 8 lists known rainfall depths for several large storms transposable to this area.

TABLE 8

SELECTED MAXIMUM OBSERVED STORMS

TRANSPOSABLE TO THE REGION OF

MAGGIE AND DELLWOOD, NORTH CAROLINA

Date	Location	Area	Rainfall	
			Duration	Depth
		sq. miles	hours	inches
July 1916	North Carolina	15	6	7.8
		65	6	7.5
July 1938	North Carolina	4	1	6.0
September 1940	New Jersey	15	6	19.8
		65	6	17.6
September 1951	North Carolina	2.5	1	6.5
July 1960	Georgia	Point	3	12.5
July 1961	North Carolina	3.49	2.5	8.5

Upon the basis of these and other data, as adjusted for conditions at Maggie and Dellwood, the following rainstorms were adopted for computing the Maximum Probable Flood.

Location	Drainage Area sq. miles	Rainfall Duration hours	Rainfall Depth inches
Jonathan Creek			
Upper limit	13.3	2	7.9
Maggie	22.2	4	11.4
Dellwood	34.6	4	10.9
USGS stream gage	65.3	6	14.1

From a meteorological standpoint, storms as much as 65 percent greater than these can occur.

Observed Floods

Factors such as the meteorology of the region and flood-producing characteristics of the watershed were given consideration in determining whether peak discharges on other streams are applicable. Tables 7 and 9 list peak discharges for observed floods on streams approximately the size of Jonathan Creek. For comparison the discharge of the maximum known flood on this stream is included in the list.

TABLE 9

SELECTED MAXIMUM OBSERVED FLOODS

IN VICINITY OF MAGGIE-DELLWOOD, NORTH CAROLINA

Stream	Location	Drainage Area sq. mi.	Year	Peak Discharge Amount cfs	Peak Discharge Per Sq. Mi. cfs
Swannanoa River	Black Mt., N. C.	11.2	1916	17,000	1520
Steels Creek	Tablerock, N. C.	16	1940	24,000	1500
Cane Creek	Bakersville, N. C.	22	1901	29,500	1340
Stony Fork	Hendrix, N. C.	27.1	1940	37,000	1370
Watauga River	Valle Crucis, N. C.	33.1	1940	38,000	1150
N. F. Catawba River	Woodlawn, N. C.	41.8	1940	55,000	1320
Elk Creek	Elkville, N. C.	50	1940	70,000	1400
Watauga River	Sugar Grove, N. C.	55.1	1940	41,000	745
Linville River	Branch, N. C.	65	1940	39,500	608
Wilson Creek	Adako, N. C.	66	1940	99,000	1500
Jonathan Creek	nr Cove Creek, N. C.	65.3	1961	3,560	56

Maximum Probable Flood Discharge

From consideration of the flood discharges in Tables 7 and 9 and of the transposition to the Maggie-Dellwood area of outstanding storms, the peak discharge of the Maximum Probable Flood at selected locations was determined to be as follows:

Location	Drainage Area sq. miles	Peak Discharge cfs
Jonathan Creek		
Upper limit	13.3	24,000
Maggie	22.2	27,000
Dellwood	34.6	29,000
USGS stream gage	65.3	39,000

Frequency

It is not possible to assign a probability of occurrence or frequency to the Maximum Probable Flood. The occurrence of such a flood would be a rare event; however, it could occur in any year.

Possible Larger Floods

Floods larger than the Maximum Probable are hydrologically possible; however, the combination of factors that would be necessary to produce such floods would seldom occur. The consideration of floods of this magnitude is of greater importance in some problems than in others but should not be overlooked in the study of any problem.

HAZARDS OF GREAT FLOODS

The amount and extent of damage caused by any flood depend in general upon how much area is flooded, the height of flooding, the velocity of flow, the rate of rise, and the duration of flooding.

Areas and Heights of Flooding

The areas flooded by the Maximum Probable Flood and the maximum known flood are shown on Plates 5, 6, and 7. Depths of flow can be estimated from the crest profiles which are shown on Plates 8, 9, 10, and 11.

The profiles were computed by using stream characteristics for selected reaches as determined from available observed flood profiles, topographic maps, and valley cross sections which were surveyed in 1954 or 1964. The elevations shown on Plates 8 to 11 and the overflow areas shown on Plates 5 to 7 have been determined with an accuracy consistent with the purposes of this study and the accuracy of the basic data. More precision would require costly surveys not warranted by this study.

The profile of the Maximum Probable Flood depends in part upon the degree of destruction or clogging of various bridges during the flood. Because it is impossible to forecast these events, it was assumed that all bridge structures would stand and that no clogging would occur.

The Maximum Probable Flood profile on Jonathan Creek is from 3 to 22 feet higher than elevations experienced in the March 1963 flood below Dellwood and from 4 to 10 higher than the February 1953 flood above Dellwood, being about 7 feet higher in the vicinity of Maggie and Dellwood. The maximum difference occurs just upstream from the mouth and is the result of narrow cross sections available for flood flows. In this gorge section downstream from the mouth of Cove Creek the Maximum Probable Flood is generally 21 feet higher than the 1963 flood. Between Cove Creek and Dellwood it averages 8 feet higher.

Velocities, Rates of Rise, and Duration

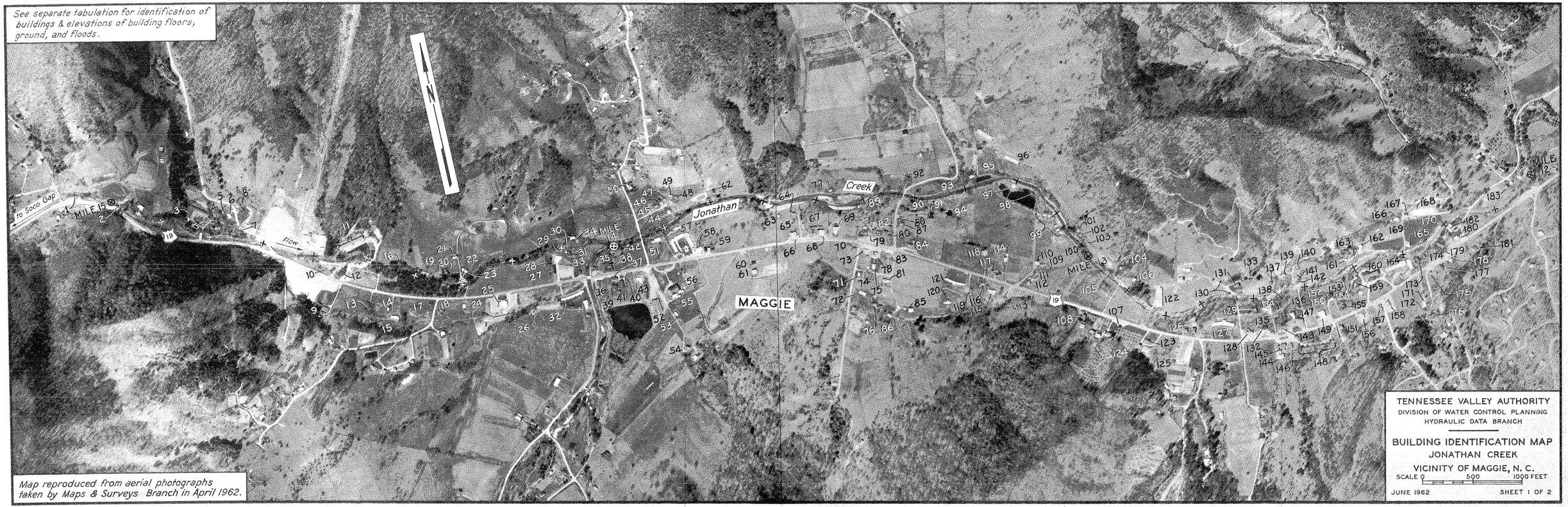
Water velocities during the Maximum Probable Flood depend largely upon the size and shape of the cross section, the condition of the stream, and the bed slope, all of which vary at different locations on the stream.

During the Maximum Probable Flood, velocities in the main channel of Jonathan Creek in the vicinity of Maggie would range as high as 23 feet per second. In the overflow area, velocities would range up to 9 feet per second. The maximum velocities in the channel and overflow areas would occur at a number of locations along the stream within the study limits.

The Maximum Probable Flood on Jonathan Creek at the gage, Mile 0.68, would rise about 27 feet above low water to its crest stage in about 8 hours with a maximum rate of rise of about 6 feet in 1 hour.

In the vicinity of Maggie the Maximum Probable Flood on Jonathan Creek would rise 11 feet in 8 hours with a maximum rate of rise of 3 feet in one hour and would exceed bankfull stage for approximately 2 days.

These rapid rates and high stream velocities in combination with deep, long-duration flooding would create a hazardous situation in developed areas.



TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING
HYDRAULIC DATA BRANCH

BUILDING IDENTIFICATION MAP
JONATHAN CREEK
VICINITY OF MAGGIE, N. C.

SCALE 0 500 1000 FEET

JUNE 1962

SHEET 1 OF 2

PLATE 4

Map reproduced from aerial photographs taken by Maps & Surveys Branch in April 1962.

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING
HYDRAULIC DATA BRANCH

BUILDING IDENTIFICATION MAP
JONATHAN CREEK
VICINITY OF MAGGIE, N. C.

SCALE 0 500 1000 FEET

JUNE 1962 SHEET 2 OF 2

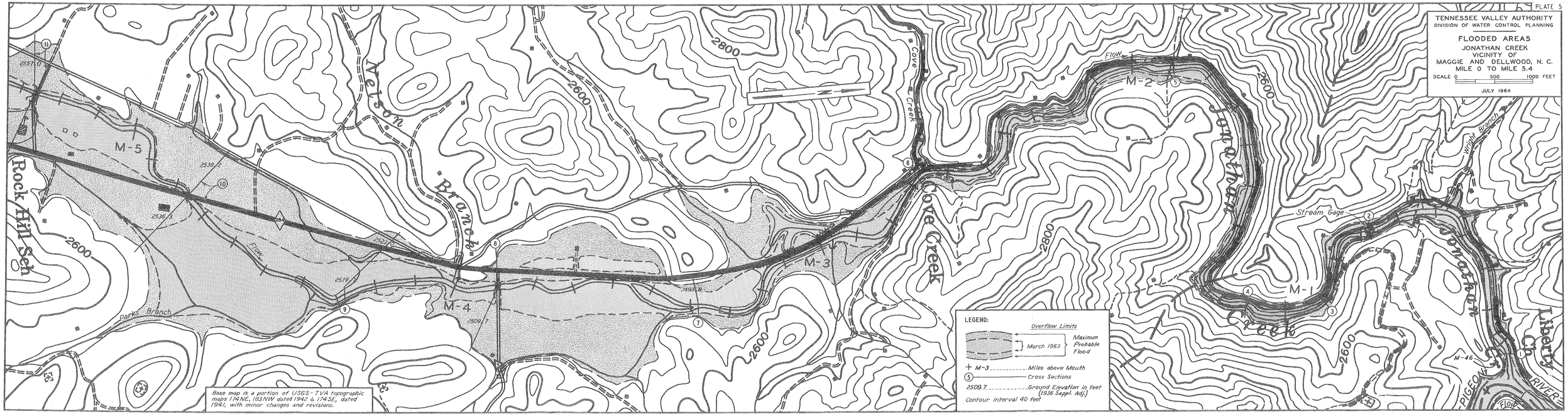
PLATE 5

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

FLOODED AREAS
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N. C.
MILE 0 TO MILE 5.4

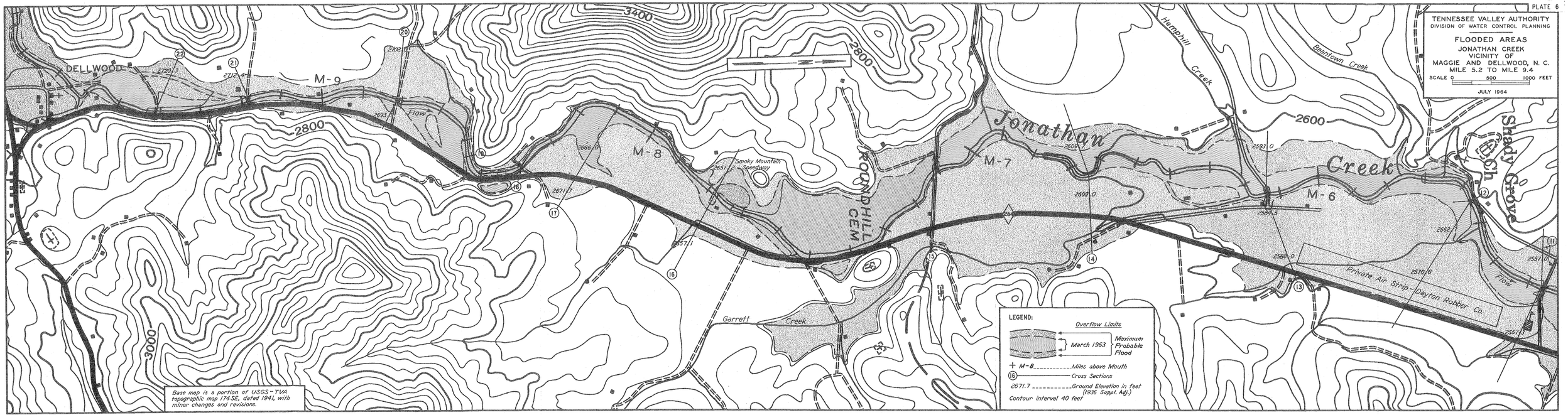
SCALE 0 500 1000 FEET

JULY 1964



HD-1311

PLATE 6



HD-1311

ASF 1311


TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING
FLOODED AREAS
JONATHAN CREEK
VICINITY OF MAGGIE AND DELLWOOD, N.C.
Scale 0 500 1000 1500 2000 Feet
NOVEMBER 1954
LEGEND:
Overflow Limits
February 1953
Maximum Probable Flood
12 - - - - Miles above Mouth
2917.6 Ground Elevations
(2982) Elevation of Maximum Probable Flood at location indicated
5 —— Location of Cross Section
Overflow areas developed by Hydraulic Data Branch. Elevations for Maximum Probable Flood determined by Flood Control Branch.
Overflow not shown above this point.
Rocky Waters Court
Channel widened
MAGGIE
Campbell Creek
Johnson Branch
Presley's Court
Olivet Church
Campbell Bros. Store
Gravel removal area
Evans Branch
Channel improved mile 13.1 - 13.45
Piott Motel
Maggie Grill
Channel improved (mile 12.28 - 12.53)
Pine Tree Cove Creek
Mtn Valley Motel
Medford Motel
Maggie Country Store
Mine Branch
Jonathan Creek
Big Spring Branch
Gravel removal area
Foot bridge
Beadin Branch
DELLWOOD
19
284
PLATE 7

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

HIGH WATER PROFILES
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N.C.
MILE 0 TO 2.75
JULY 1964

LEGEND:
- February 1961 High Water Mark
- March 6, 1963 High Water Mark

(*)
Discharge varies from 16,800 cubic feet per second at Mile 2.75 to 17,700 cubic feet per second at Mile 0.00

ELEVATION IN FEET (USC & GS 1936 SUPPL. ADJ.)

2480
2460
2440
2420
2400
2380
2360

Gorge
Top of Bank
17,500 cfs(*)
Maximum Probable Flood
Regional Flood
March 6, 1963
Water Surface - January 1964
Stream Bed
County Road No. 1350
Cove Creek
Private Road
Footbridge
County Road No. 1349
USGS Stream Gage (1930-
Pigeon River
6 Section
5
4
3
2
1 Section

2
1
0

MILES ABOVE MOUTH

HD - 1311

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

HIGH WATER PROFILES
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N.C.
MILE 2.75 TO 6.25
JULY 1964

LEGEND:
- February 1961 High Water Mark
- March 6, 1963 High Water Mark

(*) Discharge varies from 15,300 cubic feet per second at Mile 6.25 to 16,800 cubic feet per second at Mile 2.75

ELEVATION IN FEET (USC & GS 1936 SUPPL. ADJ.)

2580
2560
2540
2520
2500
2480
2460

Hemphill Creek
Garrett Creek
County Road No. 1321
Beantown Creek
County Road No. 1322
N.C. Hwy. 284
Parks Branch
County Road No. 1004
Footbridge

Maximum Probable Flood
Regional Flood
Top of Bank
16,400 cfs (*)
Water Surface - January 1964
Stream Bed
March 6, 1963

6 5 4 3

MILES ABOVE MOUTH

HD-311

PLATE 10

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

HIGH WATER PROFILES
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N.C.
MILE 6.25 TO 9.41
JULY 1964

LEGEND:
- February 1961 High Water Mark
- March 6, 1963 High Water Mark

(*)
Discharge varies from 14,500 cubic feet per second at Mile 9.41 to 15,300 cubic feet per second at Mile 6.25

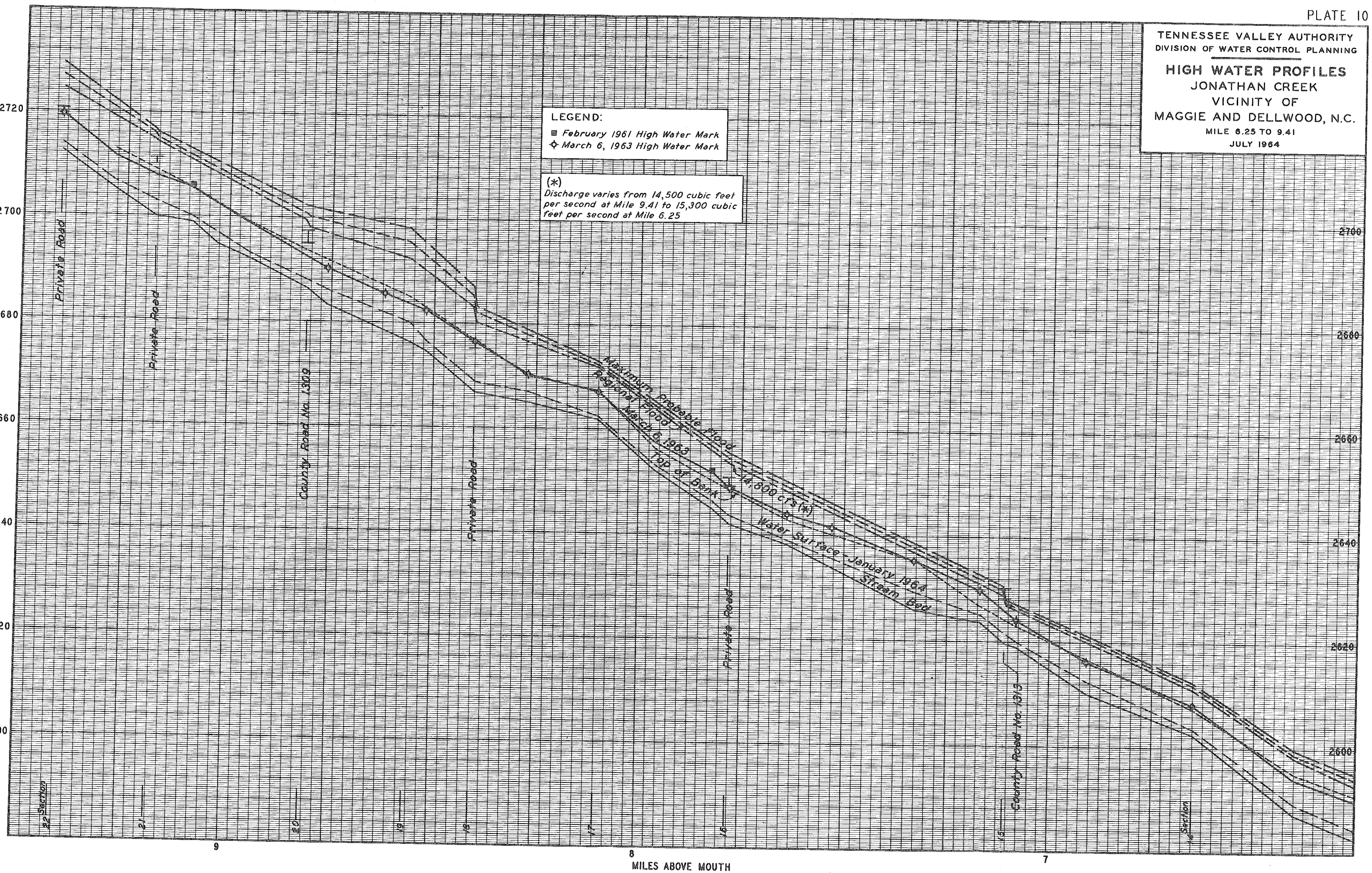
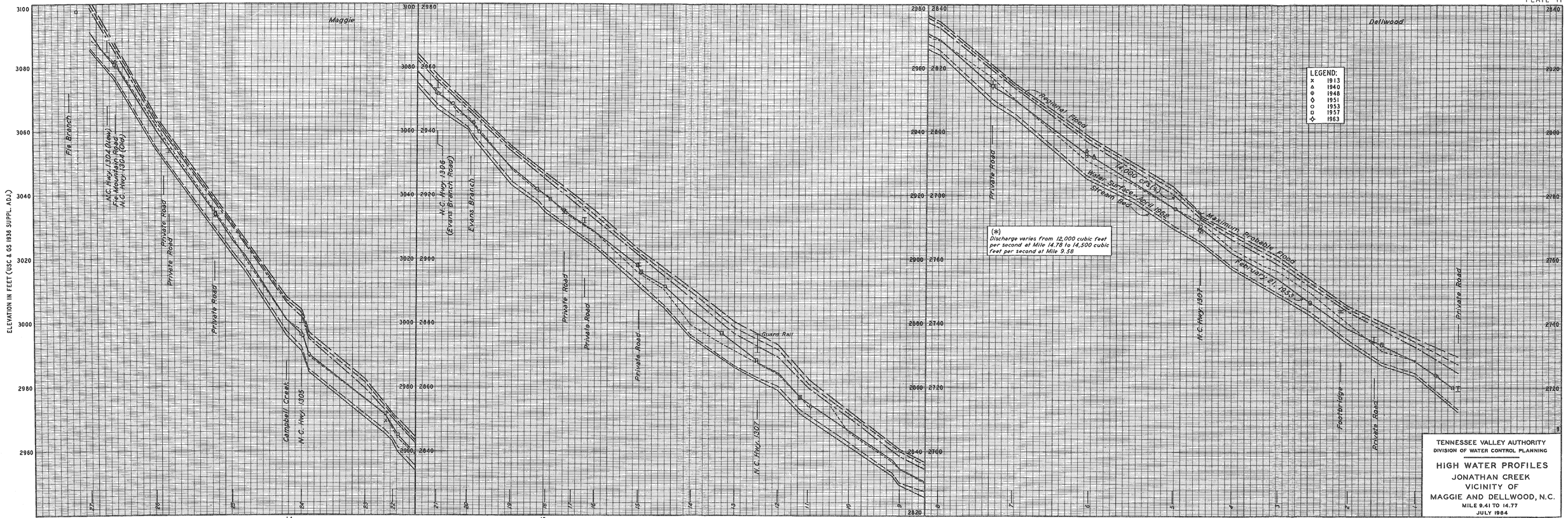


PLATE 11

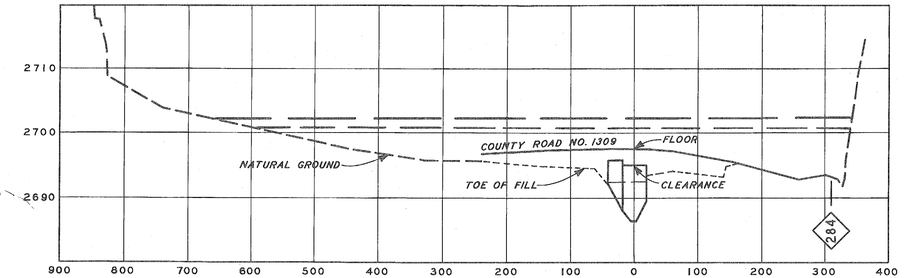


TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

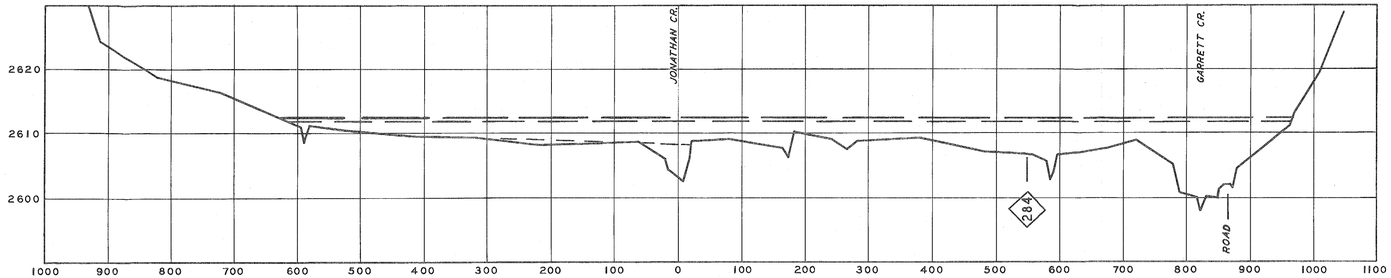
HIGH WATER PROFILES
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N.C.

MILE 9.41 TO 14.77

JULY 1984

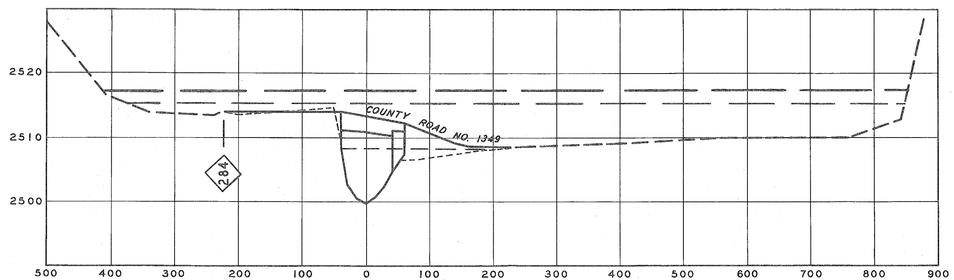


SECTION 20 – MILE 8.81

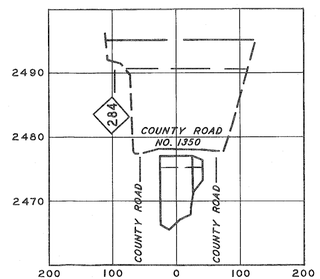


SECTION 14 – MILE 6.65

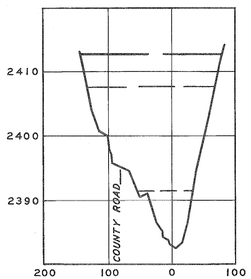
ELEVATION IN FEET (USC & GS 1936 SUPPL. ADJ.)



SECTION 8 – MILE 3.90



SECTION 6 – MILE 2.67



SECTION 2 – MILE 0.68

HORIZONTAL DISTANCE IN FEET

LEGEND:

MAXIMUM PROBABLE FLOOD

REGIONAL FLOOD

MARCH 6, 1963

SECTIONS TAKEN LOOKING DOWNSTREAM

17 SECTIONS NOT SHOWN

TENNESSEE VALLEY AUTHORITY

DIVISION OF WATER CONTROL PLANNING

CROSS SECTIONS

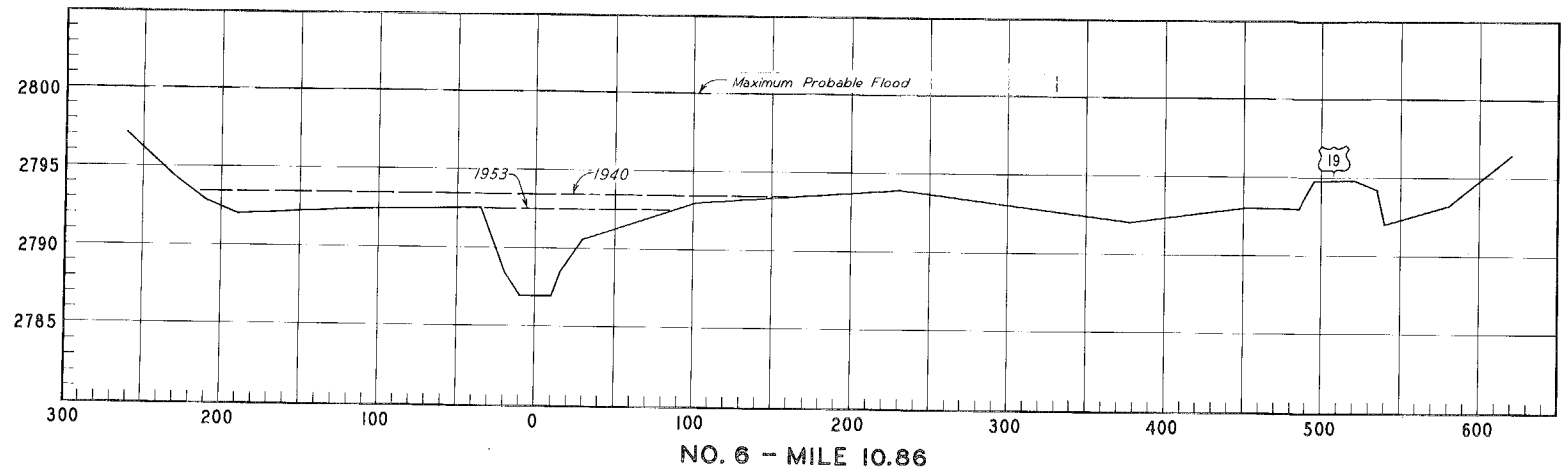
JONATHAN CREEK

VICINITY OF

MAGGIE AND DELLWOOD, N. C.

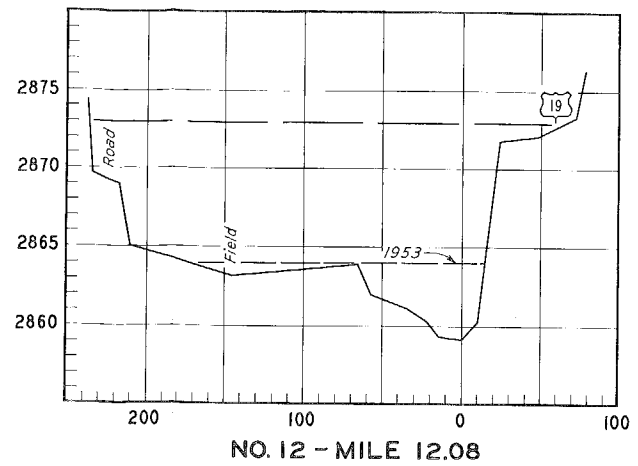
MARCH 1965

HD-1311

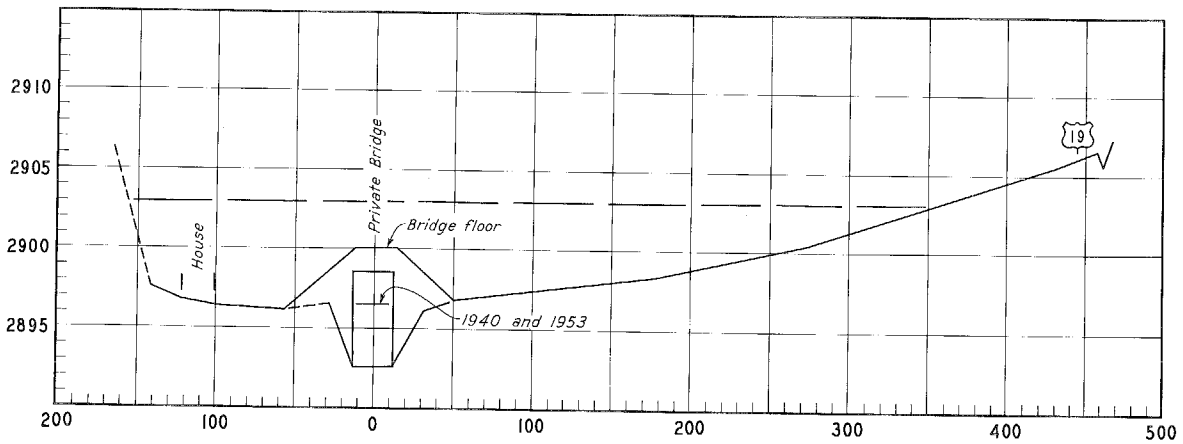


NO. 6 – MILE 10.86

Valley cross sections and historic flood elevations by Hydraulic Data Branch. Elevations of Maximum Probable Flood determined by Flood Control Branch.

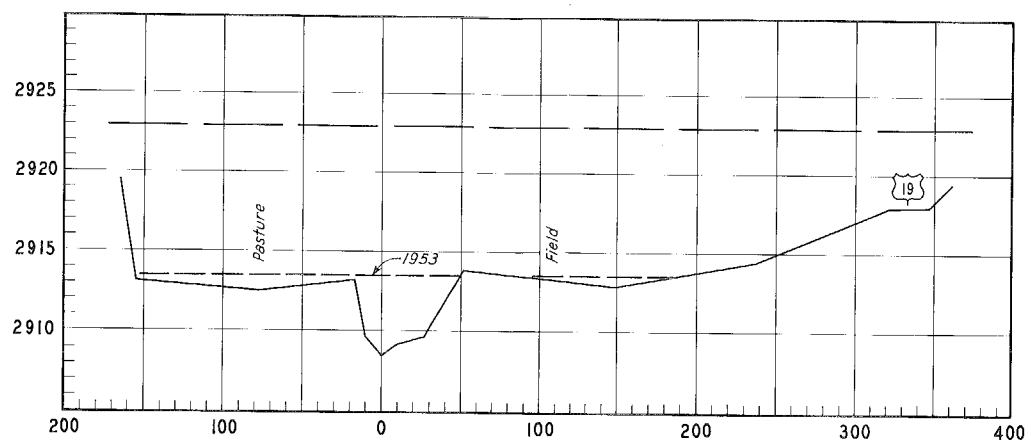


NO. 12 – MILE 12.08



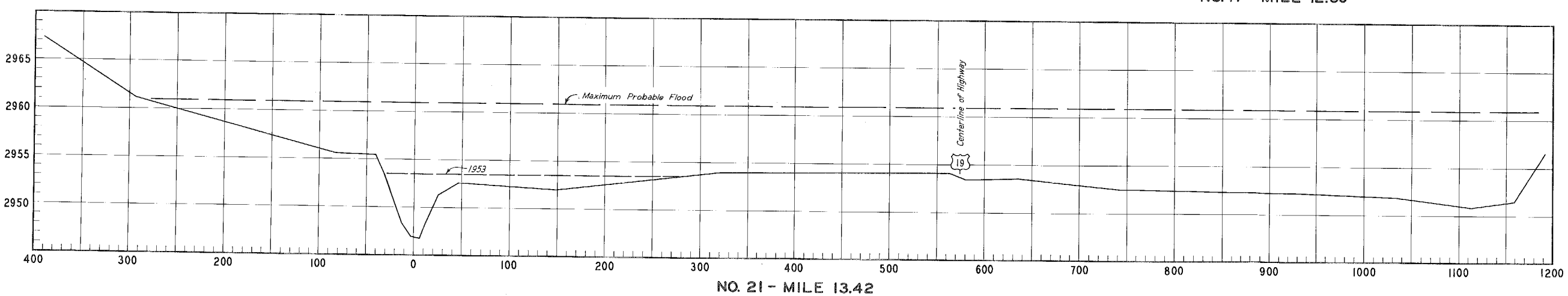
NO. 15 – MILE 12.63

Sections taken looking downstream

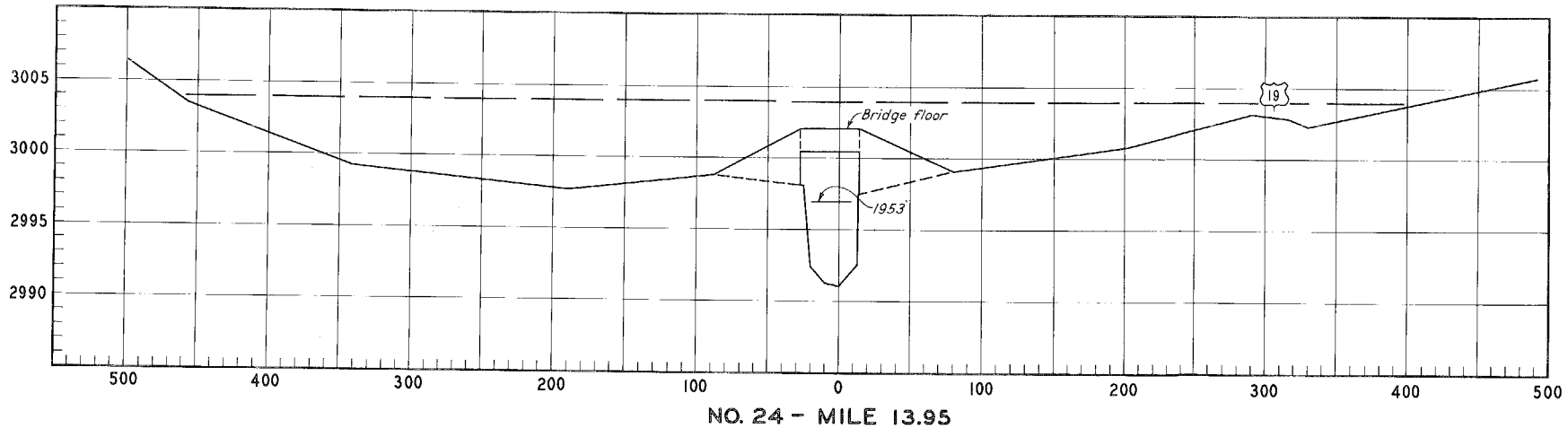


NO. 17 – MILE 12.89

ELEVATION IN FEET (USC & GS 1936 SUPP ADJ)



NO. 21 – MILE 13.42



NO. 24 – MILE 13.95

HORIZONTAL DISTANCE IN FEET

TENNESSEE VALLEY AUTHORITY
DIVISION OF WATER CONTROL PLANNING

TYPICAL VALLEY CROSS SECTIONS
JONATHAN CREEK
VICINITY OF
MAGGIE AND DELLWOOD, N. C.
NOVEMBER 1954