Chance Brook

New Hampshire

WEBSTER LAKE DAM
DAM - BREAK FLOOD ANALYSIS

March 1986

US Army Corps
of Engineers
New England Division

WEBSTER LAKE DAM

DAM-BREAK FLOOD

ANALYSIS

SUBMITTED TO:

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION

WALTHAM, MASSACHUSETTS

SUBMITTED BY:

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CONTRACT NUMBER:

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WEBSTER LAKE DAM
DAM-BREAK FLOOD ANALYSIS

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WEBSTER LAKE DAM
DAM-BREAK FLOOD ANALYSIS

1. INTRODUCTION AND PURPOSE

This report presents the findings of a dam-break flood analysis performed for Webster Lake Dam. The dam is owned, operated and maintained by the New Hampshire Water Resources Board. Included in the report are a description of pertinent features of the dam, the procedure used for the analysis, the assumed dam-break conditions, and the resulting effect on downstream flooded areas. This study was not performed because of any known likelihood of a dam-break at Webster Lake Dam. Its purpose is to provide quantitative information for emergency planning use.

2. DAM DESCRIPTION

Identification No.:	NH 00410
Name of Dam:	Webster Lake Dam (Chance Brook Dam)
Town:	Franklin
County and State:	Merrimack, NH
Stream:	Chance Brook

Chance Brook Dam is located in Franklin, New Hampshire approximately one mile southeast of the Webster Lake outlet. The dam is a 14-foot high concrete gravity structure with a 110 foot long ogee spillway, a three-bay sluiceway with stop-logs, and a 4 foot by 4.5 foot gated sluice-way. The stop-log bays are each approximately 3-1/2 feet wide. The dam impounds water in Chance Pond and Webster Lake for recreational use. The downstream brook flows into the Pemigewasset River, which eventually discharges into the Merrimack River.

3. PERTINENT DATA

Data is taken from "Phase I Inspection Report" for Webster Lake Dam (Chance Brook Dam) dated August 1978.

a. Drainage Area

Webster Lake as shown on the U.S.G.S. Quadrangle Sheet (Plate 1) is located along the Chance Brook.

The dam impounds both Chance Pond and Webster Lake. The drainage area above the dam has rolling topography with an area of 19.5 square miles. The drainage area at Webster Lake is approximately 17.3 square miles. The site plan is shown on Plate 2.

b. Elevation Feet (N.G.V.D.)

(1) Top of dam - 404.2
(2) Spillway crest - 398.6

c. Reservoir

(1) Length of recreation pool - 2.5 miles

d. Storage (Acre-Feet)*

(1) Top of dam - 2,650 acre-feet
(2) Spillway crest - 1,100 acre-feet

e. Reservoir Surface (Acres)

(1) Top of dam - 675 acres
(2) Spillway crest - 575 acres

f. Dam

(1)	Type	Concrete gravity
(2)	Length	133 feet
(3)	Height	14 feet

g. Spillway

(1)	Type	Concrete ogee
(2)	Length of weir	110 feet
(3)	Crest elevation	398.7 feet NGVD

h. Regulating Outlets

The regulating outlets consist of a three bay sluiceway with stop-logs and a manually operated gated sluiceway.

The openings of the three bay sluiceway are 3.75 feet, 4.17 feet, and 3.75 feet wide, respectively with invert elevation 393.7 feet. The stop-logs in each bay are pulled and replaced by hand with lifting hook and only one or at most two boards can be so removed under head.

*For purposes of the dam break flood analysis, storage was adjusted to include the total volume including surcharge storage of Chance Pond and Webster Lake during pre-breach conditions: 1985 acre feet at elevation 398.6 and 10,369 acre feet at elevation 401.6 N.G.V.D.

The gated sluiceway consists of a five foot square timber sluice gate which controls a 4 foot by 4.5 foot concrete waterway opening. The invert of the opening is elevation 392.2 feet. The gate is operated by a pedestal mounted hand crank which is in a wood framed gate house.

4. VALLEY DESCRIPTION

The stream valley of Chance Brook below Webster Lake Dam is steeply sloping, averaging 155 feet per mile to the Pemigewasset River. The floodplain is generally narrow, averaging about 100 feet wide. The brook flows through residential and commercial areas of the Town of Webster. The Pemigewasset River and Merrimack River average approximately 6 feet per mile with floodplains approximately 300-600 feet wide. Chance Brook joins the Pemigewasset River approximately 0.7 mile downstream of the dam. There is one run-of-the-river dam on Chance Brook in the study reach. This dam behind the Oak Laminates Company on Route 3A does not have significant surchage storage volume available to attenuate flood discharges and therefore was excluded from the dam break analysis. The total study each is shown on Plate 1.

5. MODEL DESCRIPTION

The Webster Lake Dam-Break Analysis was made using the NWS version, dated July 1984, of the "National Weather Service Dam-Break Flood Forecasting Computer Model", developed by D.L. Fread, Research Hydrologist, Office of Hydrology, National Weather Service, NOAA, Silver Spring, Maryland 20910. Input for the model consisted of: (a) storage characteristics of the reservoir, (b) selected geometry and duration of the breach development, (c) hydraulic inflows, (d) hydraulic roughness coefficients, and (e) active and inactive flow regions. Based on the input data, the model computes the dam-break outflow hydrograph and routes it downstream. The analysis provides output on the attentuation of the flood stages, and timing of the flood wave as it progresses downstream.

6. ASSUMED DAM BREAK CONDITIONS

General: The magnitude of a flood resulting from the hypothetical failure of Webster Lake Dam is a function of many different parameters including size of breach, initial pool level and storage, rate of breach formation, channel and overbank roughness and antecedent flow conditions. Engineering assumptions of conditions which could be reasonably expected to exist prior to a failure of Webster Lake Dam and which were used in the analysis are presented below:

(1) Initial Pool Level: 401.6 feet N.G.V.D., 3.0 feet above spillway crest.

(2) Reservoir Inflow: Maximum known flood at dam site March 1936 = 2,500 cfs.

(3) Breach Invert: 390.0 feet N.G.V.D.

(4) Breach Base Width: 145 feet, vertical side slopes 1V: 0.0.H.

(5) Time To Complete Formation of Breach: 0.5 hour.

(6) Downstream Channel Roughness: Manning's "n" = .050 to .140.

(7) Pre-Breach River Flows: The pre-breach river flow was assumed equal to the estimated flood of record - March 1936 - 2500 cfs.

Several constrictions exist along Chance Pond between Webster Lake and Webster Lake Dam. These constrictions could very well reduce the flow capacity of the brook and cause high water levels in Webster Lake during floods. Plate 2 shows the location of these structures. Basic data on these constrictions is as follows:

Carr Street: 10 ft. diameter corregated steel culvert with accumulated rocks and other debris on the invert. Road embankment allows for an 11.4 ft. depth of headwater. Invert = 393.5 NGVD. Assumed water surface elevation at time of failure: 406.4 Ft. NGVD.

R.R. Culvert: Split stone with mortar; vertical sides and arched top (dimensions: 13.6 ft. wide x 14.0 ft. at crown). Sand, rock and debris for the streambed. Height of embankment allows for a headwater of 38 ft. Invert = 395.0 NGVD. Assumed water surface elevation at time of failure: 413.0 Ft. NGVD.

Rte. 11: Concrete box culvert with sand, rock and collected debris for a streambed (dimensions: 13.2 ft. wide x 8 ft. high). Headwater conditions and lakeside development allows for a maximum pond elevation of 405.7 or 10.3 ft. depth without severe damage. Invert = 394.6 NGVD (in sand). Assumed water surface elevation at time of failure: 413.0 Ft. NGVD.

For the dam break analysis, storage was calculated at the elevations corresponding to a discharge of 2500 cfs through the Carr Street and R.R. culverts. This volume

was then assumed to sustain the failure wave through the downstream valley. In the event of an actual failure at Webster Lake Dam, secondary controls would develop upstream at Carr Street and the R.R. culvert.

However, due to the uncertain nature of the events leading to a major dam failure and in the interest of providing the worst case scenario, the three upstream constrictions were assumed to have no impact on the failure of Webster Lake Dam.

7. RESULTS

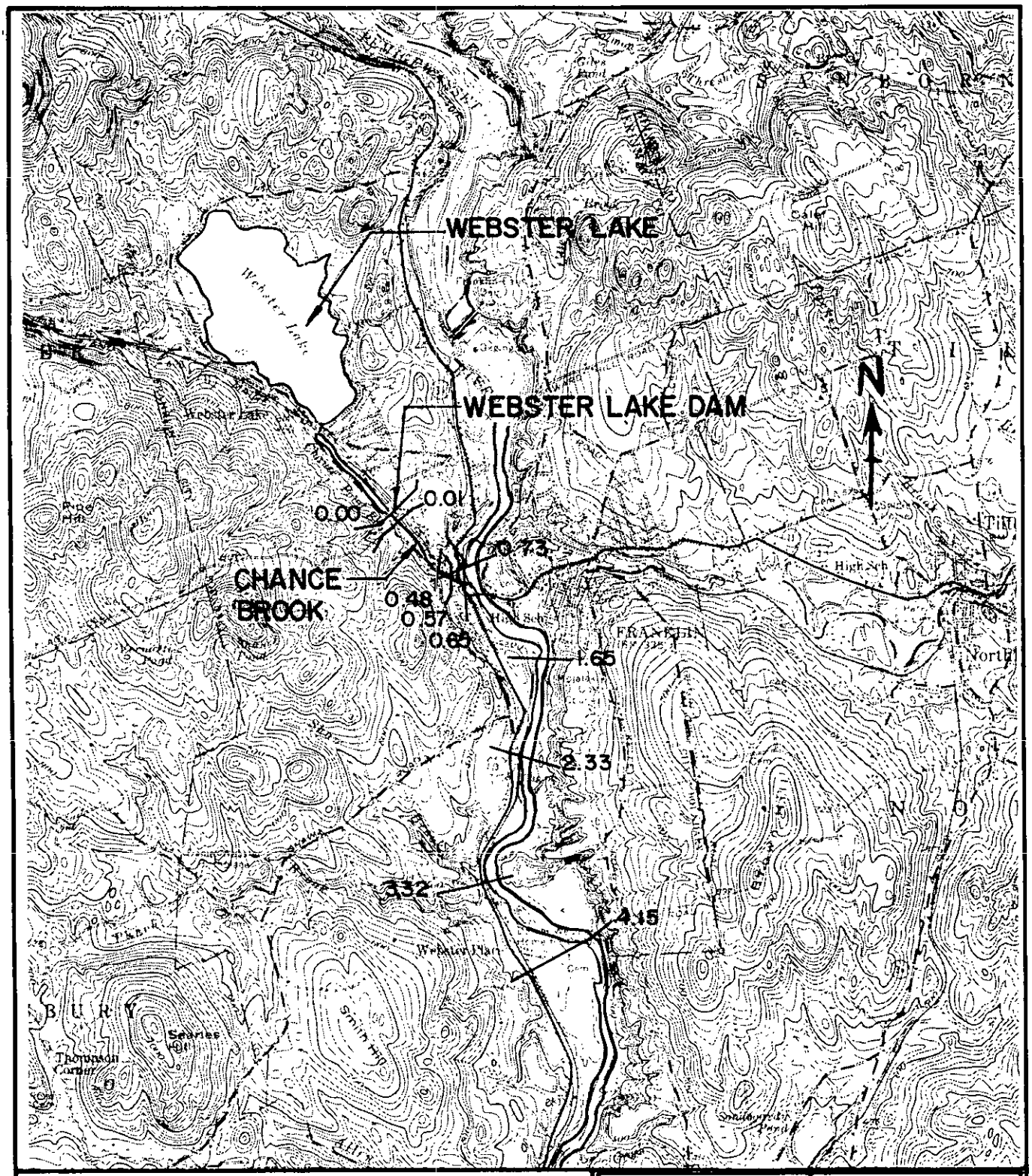
The resulting peak stage flood profile is shown on plate 3. Because of the scarcity of good topographic mapping in the area, profiles are shown in feet above normal summertime (July-August) low water (NLW). Users of the information can establish depth of flooding at particular properties by establishing its relative elevation with respect to the adjacent stream level. Variations in depth above NLW progressing downstream, is attributable to changes in natural stream hydraulic capacity as well as changes in peak discharge.

The peak dam break discharge from Webster Lake is 6,170 cfs producing a rise of approximately 12.5 feet above the NLW river depth at a point 0.01 miles downstream from the dam.

The initial computer analysis was run using a storage routing option but results indicated tailwater to be above the starting pool level of the lake. Therefore, the analysis was changed to a dynamic option whereby the tailwater would be included in a submerged breach solution. The submerged breach solution reduced the failure discharged by approximately 1000 cfs.

At a distance of 0.48 miles below Webster Lake Dam, within the City of Franklin, peak discharge is 6130 cfs and the rise over NLW stage would be about 9.9 feet. At 0.65 miles downstream from the dam, the peak discharge is 6130 cfs with an associated rise of 11.4 feet over NLW stage. Peak discharge, stages and timing for three stations downstream from Webster Lake Dam are shown on Plate 3. The stations are located .01, 0.48 and 0.65 miles downstream of the dam. The dam-break does not attenuate along Chance Brook due to the steep channel slope. The dam-break is attenuated to insignificant levels along the Pemigewassett and Merrimack Rivers.

The input data file is in Appendix A, wile Appendix B contains the output file.



MAP BASED UPON U.S.G.S.
PENACOOK N.H. QUADRANGLE
1956

CROSS-SECTION LOCATION IN
MILES BELOW DAM

SCALE IN MILES

1MI. 0 1MI.

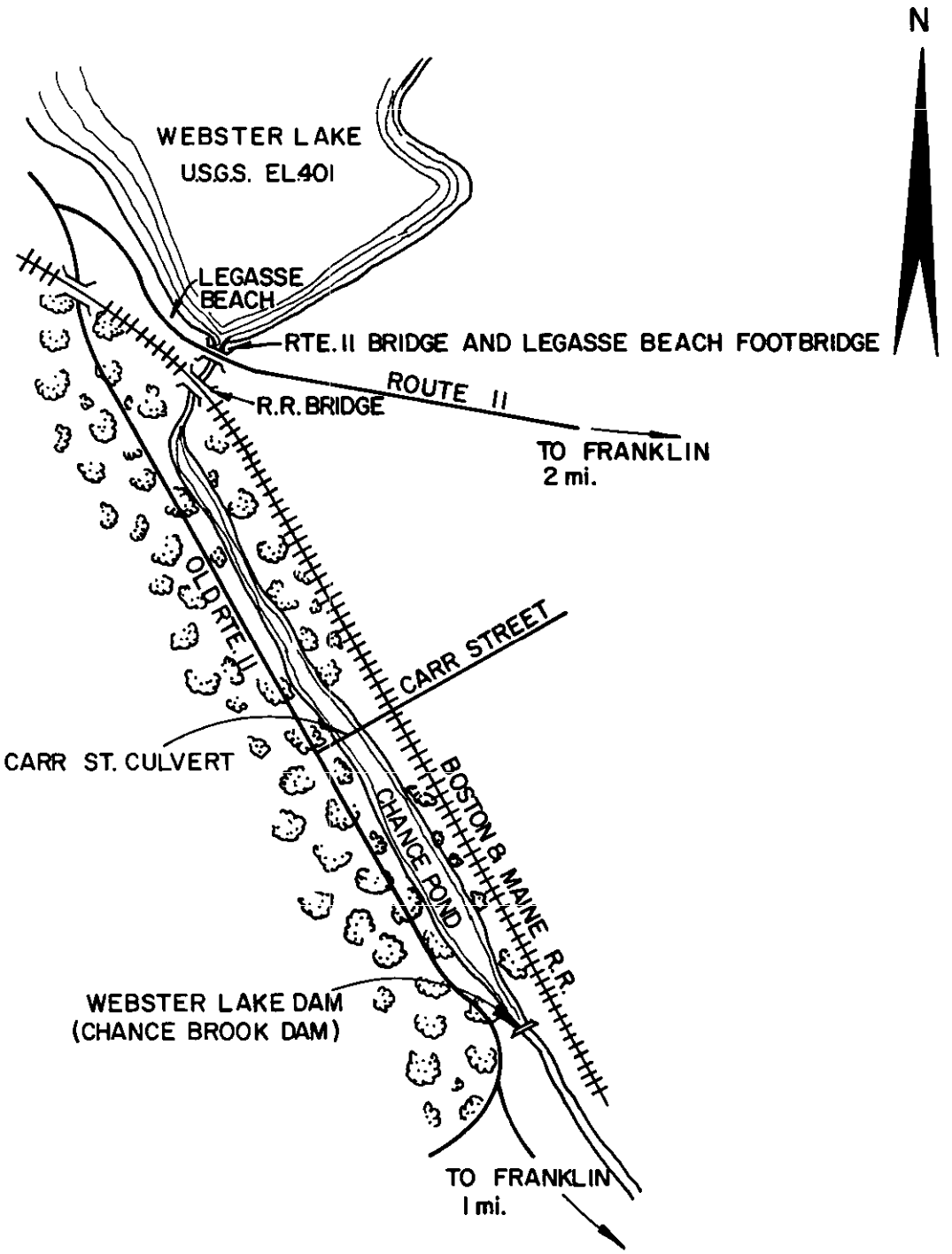
VOLLMER ASSOCIATES CONSULTING ENGINEERS BOSTON, MASS.	DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORP OF ENGINEERS WALTHAM, MASS.

WEBSTER LAKE DAM

DAM-BREAK FLOOD ANALYSIS

INDEX MAP

PLATE 1



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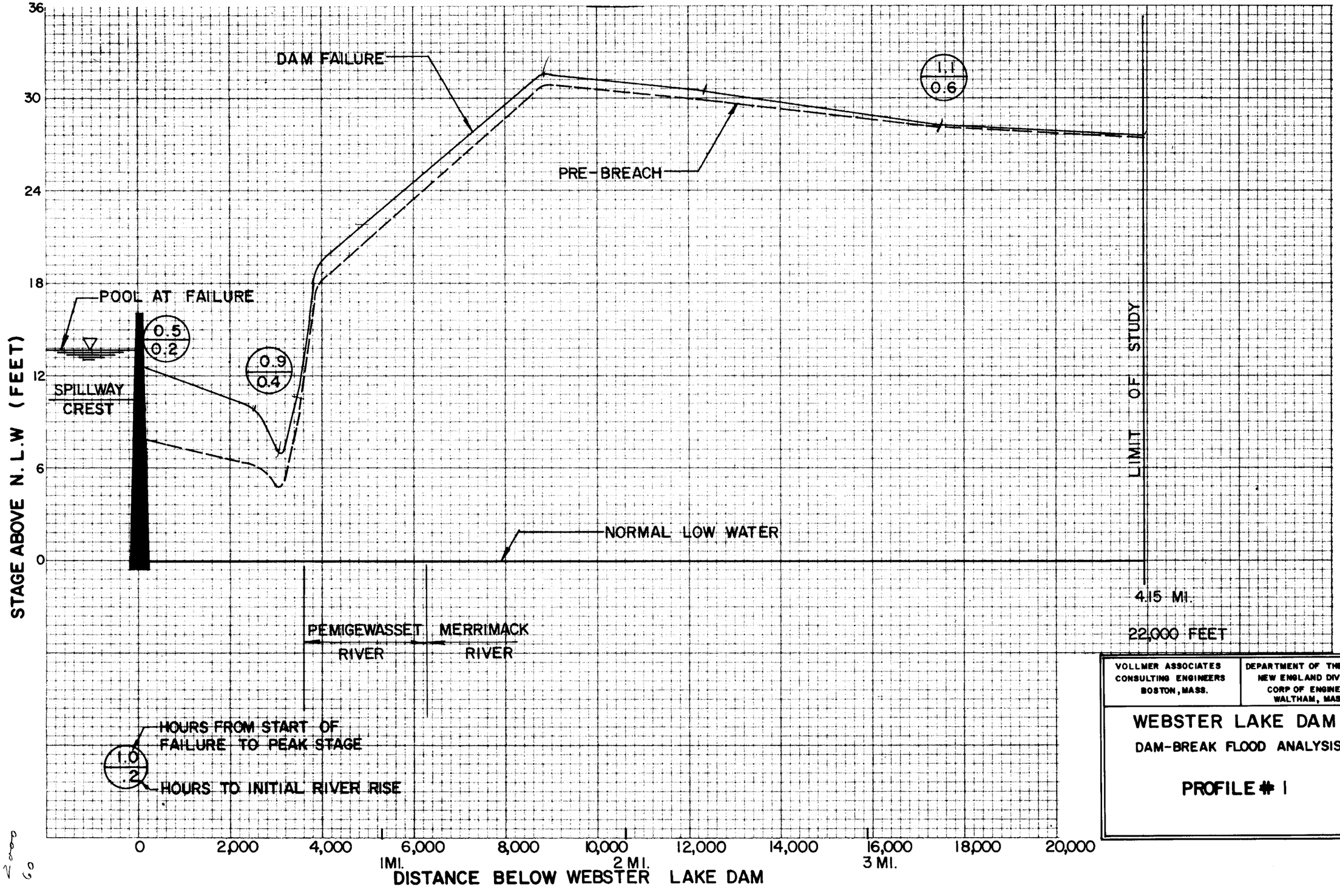
WEBSTER LAKE DAM

DAM-BREAK FLOOD ANALYSIS

SITE PLAN

NOT TO SCALE



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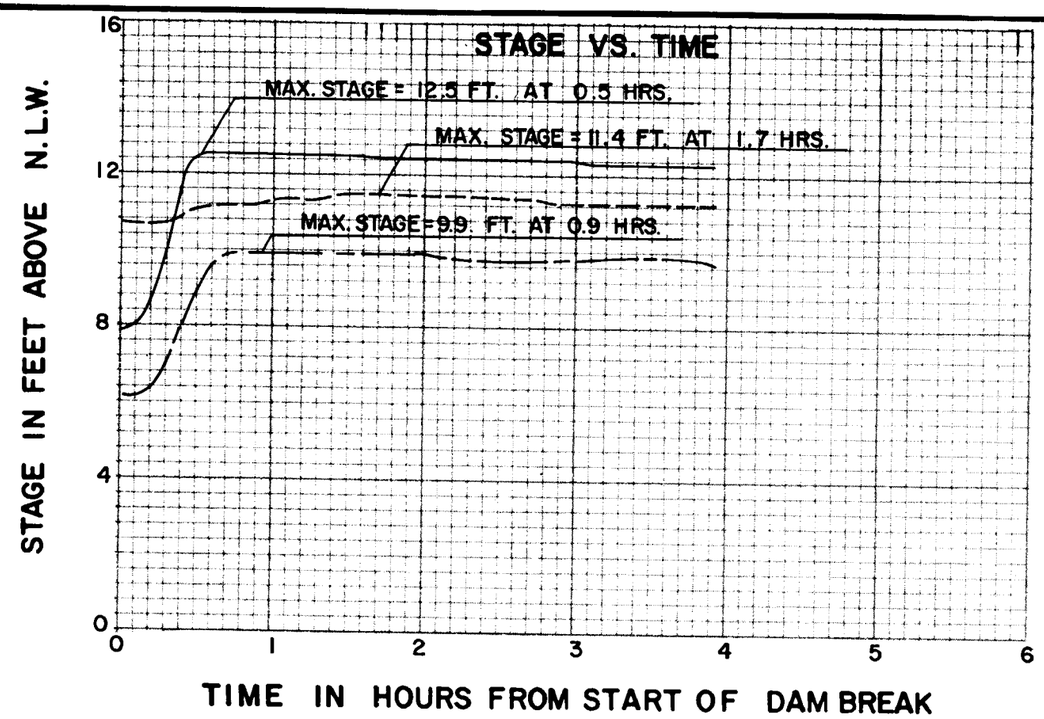
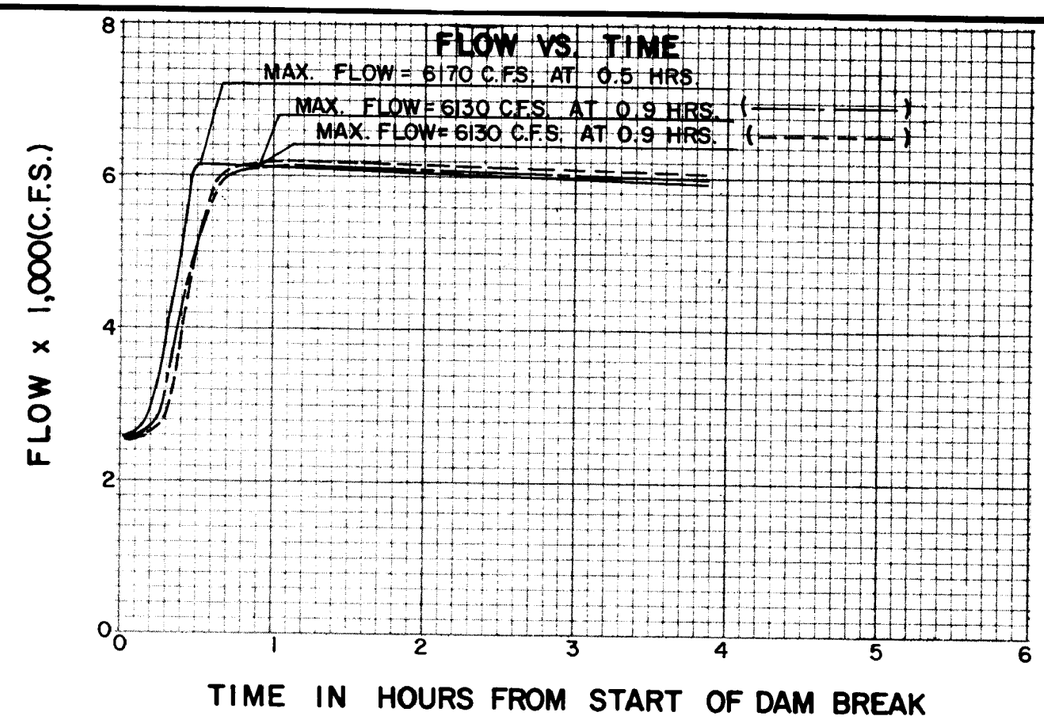
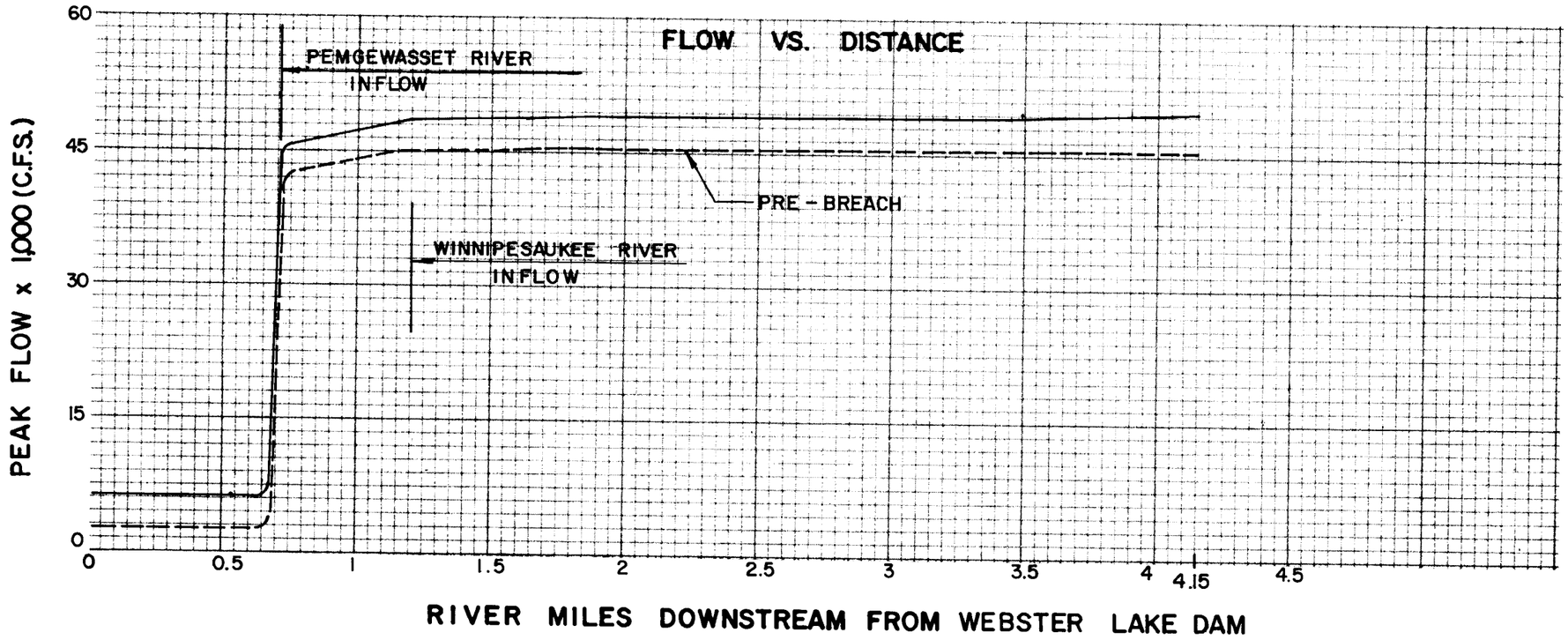
WEBSTER LAKE DAM

DAM-BREAK FLOOD ANALYSIS

PROFILE # 1







N.L.W. DATUM (FT. N.G.V.D.)

STA. 1 R.M. 0.01 = 388.0 ————
STA. 2 R.M. 0.48 = 357.0 — — —
STA. 3 R.M. 0.65 = 285.8 - - - - - -

NOTE:
SECTION 0.65 AFFECTED BY BACKWATER FROM THE MERRIMACK RIVER.

VOLLMER ASSOCIATES CONSULTING ENGINEERS BOSTON, MASS.	DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORP OF ENGINEERS WALTHAM, MASS.

WEBSTER LAKE DAM

DAM-BREAK FLOOD ANALYSIS

BASE FLOOD DISCHARGES STAGES & TIMING

APPENDIX A
INPUT DATA FILE

```
WEBSTER LAKE DAM    CHANCE POND BROOK   VOLLMER ASSOCIATES
BOSTON, MA 02116                        NOVEMBER 18,1985 #081
       1       1       1       0       5       0       0       0
       1
   10369    1985       0
   401.6   398.6     390
     2.5   401.6       0     390      45     0.5     390       1
   401.6   404.2   398.6       0       0       0       0       0
     135     154     235     475    1175    2500    4200    6300
       0    0.25     0.5     1.0     2.0     3.0     4.0     5.0
       1       4
    2500    2500    2500    2500    2500
       4       4       4       4       0       0       0
       1       2       3       4
   0.005
   387.6     388   404.2     420
       0      30     140     704

    0.01
   387.6     388   404.2     420
       0      30     140     704

    0.48
   356.0     357   367.6     375
       0      22      75     171

    0.57
   339.0     340     360     380
       0      20     440    1232

   0.075   0.085   0.100   0.140
   0.075   0.085   0.100   0.140
   0.060   0.070   0.085   0.100
    0.10    0.10    0.10
       0       0       0
       0       0    0.00    0.00     100       0       0       0
```

```
REACH TWO          CHANCE POND BROOK   VOLLMER ASSOCIATES
BOSTON, MA 02116                       NOVEMBER 18,1985 #081
      9       0       0       0      11       0       0       0
    0.0     4.0
   2554    2642    3128    5244    5846    6131    6128    6101
   6024    5955    5920
      0     0.2     0.3     0.5     0.6   0.900     1.0     1.4
    2.5     3.5     4.0
      6       4       6       4       0       0       2
      1       2       3       4       5       6
   0.65
  284.8   285.8     300     320
      0      14      88    1848

   0.73
  274.0     277     300     320
      0     440     616    1056

   1.65
    257     260     280     300
      0     264     616     968

   2.33
  256.3   259.3     280     300
      0     352     528     792

   3.32
  255.3   258.3     280     300
      0     396     528     968

   4.15
  254.3   257.4     280     300
      0     440    1276    3168

  0.060   0.075   0.080   0.100
  0.055   0.075   0.080   0.100
  0.055   0.075   0.080   0.100
  0.055   0.075   0.080   0.100
  0.055   0.075   0.080   0.100
   0.10    0.10    0.10    0.10    0.10
      0       0       0       0       0
      0       0    0.00    0.00     100       0       0       0
      1       2
  39500   39500   39500   39500   39500   39500   39500   39500
  39500   39500   39500
   3500    3500    3500    3500    3500    3500    3500    3500
   3500    3500    3500
```

APPENDIX B
OUTPUT DATA FILE

PROGRAM DAMBRK---VERSION-07/18/84

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

WEBSTER LAKE DAM

ON

CHANCE POND BROOK

ANALYSIS BY

VOLLMER ASSOCIATES
BOSTON, MA 02116
NOVEMBER 18,1985 #DB1

BASED ON PROCEDURE DEVELOPED BY

DANNY L. FREAD, PH.D., RESEARCH HYDROLOGIST
HYDROLOGIC RESEARCH LABORATORY

W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910

1

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******************************
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***                        ***
***  SUMMARY OF INPUT DATA ***
***                        ***
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******************************
```

INPUT CONTROL PARAMETERS FOR WEBSTER LAKE DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF DYNAMIC ROUTING REACHES	KKN	1
TYPE OF RESERVOIR ROUTING	KUI	1
MULTIPLE DAM INDICATOR	MULDAM	1
PRINTING INSTRUCTIONS FOR INPUT SUMMARY	KDMP	0
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	5
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IDAM= 1

WEBSTER LAKE DAM RESERVOIR

TABLE OF ELEVATION VS SURFACE AREA

SURFACE AREA (ACRES) SA(K)	ELEVATION (FT) HSA(K)
5128.7	401.60
460.6	398.60
1.0	390.00
.0	.00
.0	.00
.0	.00
.0	.00
.0	.00

DAM NUMBER 1

WEBSTER LAKE DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	401.60
SIDE SLOPE OF BREACH		Z	.00
ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	390.00
WIDTH OF BASE OF BREACH	FT	BB	45.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	.50
ELEVATION OF WATER WHEN BREACHED	FT	HF	401.60
ELEVATION OF TOP OF DAM	FT	HD	404.20
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	398.60
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	.00
DISCHARGE COEF. FOR GATE FLOW		CE	.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	.00
DISCHARGE THRU TURBINES	CFS	QT	.00

QSPILL(K, 1)	HEAD(K, 1)
135.	.0
154.	.3
235.	.5
475.	1.0
1175.	2.0
2500.	3.0
4200.	4.0
6300.	5.0

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 1.00 HRS.

TEH(TIME AT WHICH COMPUTATIONS TERMINATE) = 4.0000 HRS.

INFLOW HYDROGRAPH TO WEBSTER LAKE DAM
****

2500.00 2500.00 2500.00 2500.00 2500.00

TIME OF INFLOW HYDROGRAPH ORDINATES

.0000 1.0000 2.0000 3.0000 4.0000

CROSS-SECTIONAL PARAMETERS FOR CHANCE POND BROOK
BELOW WEBSTER LAKE DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	4
MAXIMUM NUMBER OF TOP WIDTHS	NCS	4
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	4

TYPE OF OUTPUT OTHER THAN HYDROGRAPH PLOTS	JNK	4
CROSS-SECTIONAL SMOOTHING PARAMETER	KSA	0
DOWNSTREAM SUPERCRITICAL OR NOT	KSUPC	0
NO. OF LATERAL INFLOW HYDROGRAPHS	LQ	0
NO. OF POINTS IN GATE CONTROL CURVE	NCG	0

NUMBER OF CROSS-SECTION WHERE HYDROGRAPH DESIRED
(MAX NUMBER OF HYDROGRAPHS = 6)
****

1 2 3 4

CROSS-SECTIONAL VARIABLES FOR CHANCE POND BROOK
BELOW WEBSTER LAKE DAM

PARAMETER	UNITS	VARIABLE
LOCATION OF CROSS-SECTION	MI	XS(I)
ELEVATION (MSL) OF FLOODING AT CROSS-SECTION	FT	FSTG(I)
ELEV CORRESPONDING TO EACH TOP WIDTH	FT	HS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	FT	BS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	FT	BSS(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	ACRES	DSA(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	ACRES	SSA(K,I)
NUMBER OF CROSS-SECTION		I
NUMBER OF ELEVATION LEVEL		K

1

CROSS-SECTION NUMBER 1
****

```
XS(I) =    .005   FSTG(I) =    .00        XSL(I) =     .0        XSR(I) =     .0

HS  ...   387.6   388.0   404.2   420.0
BS  ...      .0    30.0   140.0   704.0
BSS ...      .0      .0      .0      .0


CROSS-SECTION NUMBER  2
***********************

XS(I) =    .010   FSTG(I) =    .00        XSL(I) =     .0        XSR(I) =     .0

HS  ...   387.6   388.0   404.2   420.0
BS  ...      .0    30.0   140.0   704.0
BSS ...      .0      .0      .0      .0


CROSS-SECTION NUMBER  3
***********************

XS(I) =    .480   FSTG(I) =    .00        XSL(I) =     .0        XSR(I) =     .0

HS  ...   356.0   357.0   367.6   375.0
BS  ...      .0    22.0    75.0   171.0
BSS ...      .0      .0      .0      .0


CROSS-SECTION NUMBER  4
***********************

XS(I) =    .570   FSTG(I) =    .00        XSL(I) =     .0        XSR(I) =     .0

HS  ...   339.0   340.0   360.0   380.0
BS  ...      .0    20.0   440.0  1232.0
BSS ...      .0      .0      .0      .0

HS(1, 2) IS GREATER THAN HS(1, 1).
THIS ADVERSE SLOPE MAY CAUSE PROBLEMS LATER IN THE ROUTING COMPUTATIONS,PARTICULARLY IF THE BASE FLOW IS SMALL.
```

MANNING N ROUGHNESS COEFFICIENTS FOR THE GIVEN REACHES
(CM(K,I),K=1,NCS) WHERE I = REACH NUMBER

REACH 1 ...	.075	.085	.100	.140
REACH 2 ...	.075	.085	.100	.140
REACH 3 ...	.060	.070	.085	.100

CROSS-SECTIONAL VARIABLES FOR CHANCE POND BROOK
BELOW WEBSTER LAKE DAM

PARAMETER	UNITS	VARIABLE
MINIMUM COMPUTATIONAL DISTANCE USED BETWEEN CROSS-SECTIONS	MI	DXM(I)
CONTRACTION - EXPANSION COEFFICIENTS BETWEEN CROSS-SECTIONS		FKC(I)

REACH NUMBER	DXM(I)	FKC(I)
1	.100	.000
2	.100	.000
3	.100	.000

DOWNSTREAM FLOW PARAMETERS FOR CHANCE POND BROOK
BELOW WEBSTER LAKE DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	.000
INITIAL SIZE OF TIME STEP	HR	DTHM	.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	.00
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SDM	100.00
THETA WEIGHTING FACTOR		THETA	.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

1

```
*******************************
*******************************
***                         ***
***  SUMMARY OF OUTPUT DATA ***
***                         ***
*******************************
*******************************
```

CROSS-SECTION NO.	MILE	BOTTOM ELEVATION FEET	REACH NO.	REACH LENGTH MILES	SLOPE FT/MI	MESAGE
1	.00	387.60				
2	.01	387.60	1	.00	.00	
3	.48	356.00	2	.47	67.23	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW
4	.57	339.00	3	.09	188.89	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 7 (MAXIMUM ALLOWABLE = 200

RE-NUMBERED VALUES FOR IDAM

IDAM(1) = 1

INITIAL CONDITIONS

L= 7	X(L)=	.570	YD(L)=	344.64	K= 2	QDI(L)=	2500.0
L= 6	X(L)=	.480	YD(L)=	363.05	K= 4	QDI(L)=	2500.0
L= 5	X(L)=	.363	YD(L)=	374.76	K= 4	QDI(L)=	2500.0
L= 4	X(L)=	.245	YD(L)=	380.75	K= 1	QDI(L)=	2500.0
L= 3	X(L)=	.127	YD(L)=	388.53	K= 2	QDI(L)=	2500.0
L= 2	X(L)=	.010	YD(L)=	395.88	K= 3	QDI(L)=	2500.0
L= 1	X(L)=	.005	YD(L)=	401.60	K= 0	QDI(L)=	2500.0

LS= ITERATION COUNTER FOR SUBMERGENCE EFFECT AT TIME=0. IM= THE LOCATION OF THE DOWNSTREAM FACE OF THE DAM.

LS= 0 IM= 2 YD(IM)= 395.88 QDI(IM)= 2500.00

INITIAL CONDITIONS

I	X(I)	YD(I)	YNORM(I)
1	.00	401.60	395.88
2	.01	395.88	395.88
3	.13	388.53	388.53
4	.25	380.75	380.75
5	.36	374.76	374.76
6	.48	363.05	363.05
7	.57	344.64	344.64

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TIME PARAMETERS OF OUTFLOW HYDROGRAPH IMMEDIATELY DOWNSTREAM OF DAM

PARAMETER	UNITS	VARIABLE	VALUE
**********	*******	******	**********
TIME TO FAILURE	HR	TFH	.500

TIME TO START OF RISING LIMB OF HYDROGRAPH	HR	TFO	4.000
TIME TO PEAK	HR	TP	.000
TIME STEP SIZE	HR	DTHI	.025

PROFILE OF CRESTS AND TIMES FOR CHANCE POND BROOK
BELOW WEBSTER LAKE DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
.005	401.60	6169	.000	5.93	.00	.00
.010	400.53	6169	.525	6.75	.00	.00
.127	393.73	6137	.800	6.74	.00	.00
.245	387.51	6132	.850	6.42	.00	.00
.363	380.98	6131	.875	5.33	.00	.00
.480	366.91	6130	.900	12.91	.00	.00
.570	346.69	6130	.900	9.99	.00	.00

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 1
BELOW WEBSTER LAKE DAM AT MILE .00

GAGE ZERO = 387.60 MAX ELEVATION REACHED BY FLOOD WAVE = 401.60
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 14.00 AT TIME = .000 HOURS
MAX FLOW = 6169 AT TIME = .500 HOURS

```
HR   STAGE    FLOW  0      2000     4000     6000     8000    10000
 .0   14.0    2500  I        I  *     I        I        I        I
 .1   14.0    2605  I        I  *     I        I        I        I
 .2   14.0    3081  I        I    *   I        I        I        I
 .3   14.0    4112  I        I        I*       I        I        I
 .4   14.0    5578  I        I        I      * I        I        I
 .5   14.0    6169  I        I        I        I*       I        I
 .6   14.0    6145  I        I        I        I*       I        I
 .7   14.0    6141  I        I        I        I*       I        I
 .8   14.0    6134  I        I        I        I*       I        I
 .9   14.0    6127  I        I        I        I*       I        I
1.0   14.0    6120  I        I        I        I*       I        I
```

```
1.1   14.0    6113  I        I        I        I*       I        I
1.2   13.9    6106  I        I        I        I*       I        I
1.3   13.9    6099  I        I        I        *        I        I
1.4   13.9    6092  I        I        I        *        I        I
1.5   13.9    6085  I        I        I        *        I        I
1.6   13.9    6078  I        I        I        *        I        I
1.7   13.9    6071  I        I        I        *        I        I
1.8   13.9    6063  I        I        I        *        I        I
1.9   13.9    6056  I        I        I        *        I        I
2.0   13.9    6049  I        I        I        *        I        I
2.1   13.9    6042  I        I        I        *        I        I
2.2   13.9    6035  I        I        I        *        I        I
2.3   13.9    6029  I        I        I        *        I        I
2.4   13.9    6022  I        I        I        *        I        I
2.5   13.9    6015  I        I        I        *        I        I
2.6   13.9    6008  I        I        I        *        I        I
2.7   13.9    6001  I        I        I        *        I        I
2.8   13.9    5994  I        I        I        *        I        I
2.9   13.8    5987  I        I        I        *        I        I
3.0   13.8    5980  I        I        I        *        I        I
3.1   13.8    5973  I        I        I        *        I        I
3.2   13.8    5966  I        I        I        *        I        I
3.3   13.8    5959  I        I        I        *        I        I
3.4   13.8    5952  I        I        I        *        I        I
3.5   13.8    5946  I        I        I        *        I        I
3.6   13.8    5939  I        I        I        *        I        I
3.7   13.8    5932  I        I        I        *        I        I
3.8   13.8    5925  I        I        I        *        I        I
3.9   13.8    5918  I        I        I        *        I        I
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DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK    ... STATION NUMBER   2
            BELOW WEBSTER LAKE DAM     AT MILE      .01

GAGE ZERO =  387.60     MAX ELEVATION REACHED BY FLOOD WAVE =  400.53
                     FLOOD STAGE NOT AVAILABLE
            MAX STAGE =   12.93     AT TIME =     .525 HOURS
            MAX FLOW =     6169    AT TIME =     .500 HOURS

HR   STAGE     FLOW  0      2000      4000      6000      8000     10000
 .0    8.3     2500  I        I  *      I         I         I         I
 .1    8.4     2605  I        I  *      I         I.        I         I
 .2    9.1     3081  I        I    *    I         I         I         I
 .3   10.5     4112  I        I        I*        I         I         I
 .4   12.3     5578  I        I        I       * I         I         I
 .5   12.9     6169  I        I        I         I*        I         I
 .6   12.9     6145  I        I        I         I*        I         I
 .7   12.9     6141  I        I        I         I*        I         I
 .8   12.9     6134  I        I        I         I*        I         I
 .9   12.9     6127  I        I        I         I*        I         I
1.0   12.9     6120  I        I        I         I*        I         I
```

1.1	12.9	6113	I	I	I	I*	I	I
1.2	12.9	6106	I	I	I	I*	I	I
1.3	12.9	6099	I	I	I	*	I	I
1.4	12.9	6092	I	I	I	*	I	I
1.5	12.9	6085	I	I	I	*	I	I
1.6	12.9	6078	I	I	I	*	I	I
1.7	12.8	6071	I	I	I	*	I	I
1.8	12.8	6063	I	I	I	*	I	I
1.9	12.8	6056	I	I	I	*	I	I
2.0	12.8	6049	I	I	I	*	I	I
2.1	12.8	6042	I	I	I	*	I	I
2.2	12.8	6035	I	I	I	*	I	I
2.3	12.8	6029	I	I	I	*	I	I
2.4	12.8	6022	I	I	I	*	I	I
2.5	12.8	6015	I	I	I	*	I	I
2.6	12.8	6008	I	I	I	*	I	I
2.7	12.8	6001	I	I	I	*	I	I
2.8	12.8	5994	I	I	I	*	I	I
2.9	12.8	5987	I	I	I	*	I	I
3.0	12.8	5980	I	I	I	*	I	I
3.1	12.7	5973	I	I	I	*	I	I
3.2	12.7	5966	I	I	I	*	I	I
3.3	12.7	5959	I	I	I	*	I	I
3.4	12.7	5952	I	I	I	*	I	I
3.5	12.7	5946	I	I	I	*	I	I
3.6	12.7	5939	I	I	I	*	I	I
3.7	12.7	5932	I	I	I	*	I	I
3.8	12.7	5925	I	I	I	*	I	I
3.9	12.7	5918	I	I	I	*	I	I

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DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 6
BELOW WEBSTER LAKE DAM AT MILE .48

GAGE ZERO = 356.00 MAX ELEVATION REACHED BY FLOOD WAVE = 366.91
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 10.91 AT TIME = .900 HOURS
MAX FLOW = 6131 AT TIME = .900 HOURS

HR	STAGE	FLOW	0	2000	4000	6000	8000	10000
.0	7.2	2526	I	I *	I	I	I	I
.1	7.2	2533	I	I *	I	I	I	I
.2	7.4	2659	I	I *	I	I	I	I
.3	8.1	3208	I	I *	I	I	I	I
.4	9.1	4166	I	I	I*	I	I	I
.5	10.2	5316	I	I	I *	I	I	I
.6	10.7	5880	I	I	I	*I	I	I
.7	10.9	6077	I	I	I	*	I	I
.8	10.9	6124	I	I	I	I*	I	I
.9	10.9	6131	I	I	I	I*	I	I
1.0	10.9	6128	I	I	I	I*	I	I

```
1.1   10.9    6122  I         I         I         I*        I         I
1.2   10.9    6115  I         I         I         I*        I         I
1.3   10.9    6108  I         I         I         I*        I         I
1.4   10.9    6101  I         I         I         I*        I         I
1.5   10.9    6094  I         I         I         *         I         I
1.6   10.9    6087  I         I         I         *         I         I
1.7   10.9    6080  I         I         I         *         I         I
1.8   10.9    6073  I         I         I         *         I         I
1.9   10.9    6066  I         I         I         *         I         I
2.0   10.9    6059  I         I         I         *         I         I
2.1   10.8    6052  I         I         I         *         I         I
2.2   10.8    6045  I         I         I         *         I         I
2.3   10.8    6037  I         I         I         *         I         I
2.4   10.8    6030  I         I         I         *         I         I
2.5   10.8    6024  I         I         I         *         I         I
2.6   10.8    6017  I         I         I         *         I         I
2.7   10.8    6010  I         I         I         *         I         I
2.8   10.8    6003  I         I         I         *         I         I
2.9   10.8    5996  I         I         I         *         I         I
3.0   10.8    5989  I         I         I         *         I         I
3.1   10.8    5982  I         I         I         *         I         I
3.2   10.8    5975  I         I         I         *         I         I
3.3   10.8    5968  I         I         I         *         I         I
3.4   10.8    5961  I         I         I         *         I         I
3.5   10.8    5954  I         I         I         *         I         I
3.6   10.8    5948  I         I         I         *         I         I
3.7   10.8    5941  I         I         I         *         I         I
3.8   10.8    5934  I         I         I         *         I         I
3.9   10.7    5927  I         I         I         *         I         I
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DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 7
BELOW WEBSTER LAKE DAM AT MILE .57

GAGE ZERO = 339.00 MAX ELEVATION REACHED BY FLOOD WAVE = 346.69
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 7.69 AT TIME = .900 HOURS
MAX FLOW = 6131 AT TIME = .900 HOURS

```
HR   STAGE    FLOW  0      2000      4000      6000      8000     10000
 .0    5.6    2554  I         I  *      I         I         I         I
 .1    5.6    2554  I         I  *      I         I         I         I
 .2    5.7    2642  I         I  *      I         I         I         I
 .3    6.0    3128  I         I     *   I         I         I         I
 .4    6.6    4048  I         I         *         I         I         I
 .5    7.3    5244  I         I         I     *   I         I         I
 .6    7.6    5846  I         I         I        *I         I         I
 .7    7.7    6068  I         I         I         *         I         I
 .8    7.7    6122  I         I         I         I*        I         I
 .9    7.7    6131  I         I         I         I*        I         I
1.0    7.7    6128  I         I         I         I*        I         I
```

```
 1.1   7.7   6122 I        I        I        I*       I        I
 1.2   7.7   6115 I        I        I        I*       I        I
 1.3   7.7   6108 I        I        I        I*       I        I
 1.4   7.7   6101 I        I        I        I*       I        I
 1.5   7.7   6094 I        I        I        *        I        I
 1.6   7.7   6087 I        I        I        *        I        I
 1.7   7.7   6080 I        I        I        *        I        I
 1.8   7.7   6073 I        I        I        *        I        I
 1.9   7.7   6066 I        I        I        *        I        I
 2.0   7.7   6059 I        I        I        *        I        I
 2.1   7.7   6052 I        I        I        *        I        I
 2.2   7.6   6045 I        I        I        *        I        I
 2.3   7.6   6038 I        I        I        *        I        I
 2.4   7.6   6031 I        I        I        *        I        I
 2.5   7.6   6024 I        I        I        *        I        I
 2.6   7.6   6017 I        I        I        *        I        I
 2.7   7.6   6010 I        I        I        *        I        I
 2.8   7.6   6003 I        I        I        *        I        I
 2.9   7.6   5997 I        I        I        *        I        I
 3.0   7.6   5990 I        I        I        *        I        I
 3.1   7.6   5983 I        I        I        *        I        I
 3.2   7.6   5976 I        I        I        *        I        I
 3.3   7.6   5969 I        I        I        *        I        I
 3.4   7.6   5962 I        I        I        *        I        I
 3.5   7.6   5955 I        I        I        *        I        I
 3.6   7.6   5948 I        I        I        *        I        I
 3.7   7.6   5941 I        I        I        *        I        I
 3.8   7.6   5934 I        I        I        *        I        I
 3.9   7.6   5927 I        I        I        *        I        I
1

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DATE: 11/18/85
FILE: CBD1DB1.DAT


DAMBRK - Version..10/25/84


CPU Time (HH:MM:SS)....00:01:30

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PROGRAM DAMBRK---VERSION-07/19/84

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

REACH TWO

ON

CHANCE POND BROOK

ANALYSIS BY

VOLLMER ASSOCIATES
BOSTON, MA 02116
NOVEMBER 18,1985 #DB1

BASED ON PROCEDURE DEVELOPED BY

DANNY L. FREAD, PH.D., RESEARCH HYDROLOGIST
HYDROLOGIC RESEARCH LABORATORY

W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910

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***                       ***
***  SUMMARY OF INPUT DATA ***
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INPUT CONTROL PARAMETERS FOR REACH TWO

PARAMETER	VARIABLE	VALUE
NUMBER OF DYNAMIC ROUTING REACHES	KKN	9
TYPE OF RESERVOIR ROUTING	KUI	0
MULTIPLE DAM INDICATOR	MULDAM	0
PRINTING INSTRUCTIONS FOR INPUT SUMMARY	KDMP	0
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	IISH	11
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = .00 HRS.

TEH(TIME AT WHICH COMPUTATIONS TERMINATE) = 4.0000 HRS.

INFLOW HYDROGRAPH TO REACH TWO
****

2554.00	2642.00	3128.00	5244.00	5846.00	6131.00	6128.00	6101.00
6024.00	5955.00	5920.00					

TIME OF INFLOW HYDROGRAPH ORDINATES

.0000	.2000	.3000	.5000	.6000	.9000	1.0000	1.4000
2.5000	3.5000	4.0000					

CROSS-SECTIONAL PARAMETERS FOR CHANCE POND BROOK
BELOW REACH TWO

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	6
MAXIMUM NUMBER OF TOP WIDTHS	NCS	4
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	6
TYPE OF OUTPUT OTHER THAN HYDROGRAPH PLOTS	JNK	4
CROSS-SECTIONAL SMOOTHING PARAMETER	KSA	0
DOWNSTREAM SUPERCRITICAL OR NOT	KSUPC	0
NO. OF LATERAL INFLOW HYDROGRAPHS	LQ	2
NO. OF POINTS IN GATE CONTROL CURVE	KCG	0

NUMBER OF CROSS-SECTION WHERE HYDROGRAPH DESIRED
(MAX NUMBER OF HYDROGRAPHS = 6)
****

1 2 3 4 5 6

CROSS-SECTIONAL VARIABLES FOR CHANCE POND BROOK
BELOW REACH TWO

PARAMETER	UNITS	VARIABLE
LOCATION OF CROSS-SECTION	MI	XS(I)
ELEVATION (MSL) OF FLOODING AT CROSS-SECTION	FT	FSTG(I)
ELEV CORRESPONDING TO EACH TOP WIDTH	FT	HS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	FT	BS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	FT	BSS(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	ACRES	DSA(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	ACRES	SSA(K,I)
NUMBER OF CROSS-SECTION		I
NUMBER OF ELEVATION LEVEL		K

CROSS-SECTION NUMBER 1

XS(I) = .650 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	284.8	285.8	300.0	320.0
BS ...	.0	14.0	88.0	1848.0
BSS ...	.0	.0	.0	.0

CROSS-SECTION NUMBER 2

XS(I) = .730 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	274.0	277.0	300.0	320.0
BS ...	.0	440.0	616.0	1056.0
BSS ...	.0	.0	.0	.0

CROSS-SECTION NUMBER 3
****

XS(I) = 1.650 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	257.0	260.0	280.0	300.0
BS ...	.0	264.0	616.0	968.0
BSS ...	.0	.0	.0	.0

CROSS-SECTION NUMBER 4
****

XS(I) = 2.330 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	256.3	259.3	280.0	300.0
BS ...	.0	352.0	528.0	792.0
BSS ...	.0	.0	.0	.0

CROSS-SECTION NUMBER 5
****

XS(I) = 3.320 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	255.3	258.3	280.0	300.0
BS ...	.0	396.0	528.0	968.0
BSS ...	.0	.0	.0	.0

CROSS-SECTION NUMBER 6
****

XS(I) = 4.150 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS: ...	254.3	257.4	280.0	300.0
BS: ...	.0	440.0	1276.0	3168.0
BSS: ...	.0	.0	.0	.0

MANNING N ROUGHNESS COEFFICIENTS FOR THE GIVEN REACHES
(CM(K,I),K=1,NCS) WHERE I = REACH NUMBER
****

REACH 1 ...	.060	.075	.080	.100
REACH 2 ...	.055	.075	.080	.100
REACH 3 ...	.055	.075	.080	.100
REACH 4 ...	.055	.075	.080	.100
REACH 5 ...	.055	.075	.080	.100

CROSS-SECTIONAL VARIABLES FOR CHANCE POND BROOK
BELOW REACH TWO

PARAMETER	UNITS	VARIABLE
MINIMUM COMPUTATIONAL DISTANCE USED BETWEEN CROSS-SECTIONS	MI	DXM(I)
CONTRACTION - EXPANSION COEFFICIENTS BETWEEN CROSS-SECTIONS		FKC(I)

REACH NUMBER	DXM(I)	FKC(I)
1	.100	.000
2	.100	.000
3	.100	.000
4	.100	.000

5 .100 .000

1

DOWNSTREAM FLOW PARAMETERS FOR CHANCE POND BROOK
BELOW REACH TWO

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	.000
INITIAL SIZE OF TIME STEP	HR	DTHM	.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	.00
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	100.00
THETA WEIGHTING FACTOR		THETA	.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

LATERAL INFLOW REACH NUMBER

LQX(I)

1 2

(QL(L, 1),L=1,ITEH)
39500. 39500. 39500. 39500. 39500. 39500. 39500. 39500.
39500. 39500. 39500.

(QL(L, 2),L=1,ITEH)
3500. 3500. 3500. 3500. 3500. 3500. 3500. 3500.
3500. 3500. 3500.

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***                         ***
***  SUMMARY OF OUTPUT DATA ***
***                         ***
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CROSS-SECTION NO.	MILE	BOTTOM ELEVATION FEET	REACH NO.	REACH LENGTH MILES	SLOPE FT/MI	MESAGE
1	.65	284.80				
2	.73	274.00	1	.08	135.00	
3	1.65	257.00	2	.92	18.48	
4	2.33	256.30	3	.68	1.03	
5	3.32	255.30	4	.99	1.01	
6	4.15	254.30	5	.83	1.20	

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 34 (MAXIMUM ALLOWABLE = 200

SLOPE INFORMATION FOR INPUT REACHES

REACH NO.	WATER ELEVATION FEET	HYDRAULIC DEPTH FEET	BOTTOM SLOPE FT/MI	DYNAMIC SLOPE FT/MI	TOTAL SLOPE FT/MI	CRITICAL SLOPE FT/MI	MANNING'S N
1	279.40	.73	135.00	.41	135.41	546.17	.080
1	281.40	1.47	135.00	.57	135.57	518.58	.088
1	300.00	19.23	135.00	1.49	136.49	232.82	.090
1	320.00	17.09	135.00	1.54	136.54	298.96	.100
2	265.50	.75	18.48	1.02	19.50	509.03	.078
2	268.50	1.50	18.48	1.46	19.94	515.00	.086

2	290.00	17.86	18.48	3.53	22.01	238.62	.090
2	310.00	26.96	18.48	4.53	23.01	256.80	.100
3	256.65	.75	1.03	7.23	8.26	509.03	.078
3	259.65	1.50	1.03	12.06	13.09	515.00	.088
3	280.00	16.46	1.03	45.14	46.17	245.18	.090
3	300.00	27.20	1.03	72.19	73.22	256.04	.100
4	255.80	.75	1.01	7.38	8.39	509.03	.078
4	258.80	1.50	1.01	12.35	13.36	515.00	.088
4	280.00	19.18	1.01	50.69	51.70	233.00	.090
4	300.00	27.51	1.01	74.94	75.95	255.07	.100
5	254.80	.76	1.20	6.15	7.36	506.08	.078
5	257.85	1.53	1.20	10.07	11.27	512.03	.088
5	280.00	17.01	1.20	36.28	37.49	242.50	.090
5	300.00	21.78	1.20	49.60	50.81	275.71	.100

1

INITIAL CONDITIONS

I	K	X(I)	YO(I)	QDI(I)	FRD	SOM
34	3	4.150	284.85	45554.00	.07	1.205
34	0	4.150	284.85	45554.00		
33	1	4.046	284.97	45554.00	.08	
32	2	3.942	285.11	45554.00	.08	
31	2	3.839	285.27	45554.00	.09	
30	2	3.735	285.44	45554.00	.09	
29	2	3.631	285.63	45554.00	.10	
28	2	3.527	285.84	45554.00	.10	
27	3	3.424	286.07	45554.00	.11	

26	3	3.320	286.33	45554.00	.12
25	3	3.210	286.66	45554.00	.12
24	3	3.100	286.98	45554.00	.12
23	3	2.990	287.30	45554.00	.12
22	3	2.880	287.61	45554.00	.12
21	3	2.770	287.92	45554.00	.11
20	3	2.660	288.23	45554.00	.11
19	3	2.550	288.53	45554.00	.11
18	3	2.440	288.83	45554.00	.11
17	3	2.330	289.13	45554.00	.11
16	3	2.217	289.43	45554.00	.11
15	3	2.103	289.73	45554.00	.11
14	3	1.990	290.03	45554.00	.11
13	3	1.877	290.33	45554.00	.11
12	3	1.763	290.62	45554.00	.10
11	3	1.650	290.91	45554.00	.10
10	3	1.548	291.16	45554.00	.11
9	3	1.446	291.45	45554.00	.12
8	3	1.343	291.78	45554.00	.13
7	3	1.241	292.15	45554.00	.14
6	3	1.139	292.57	45554.00	.15
5	3	1.037	293.03	45554.00	.16
4	3	.934	293.55	45554.00	.18
3	3	.832	294.15	45554.00	.19
2	3	.730	294.88	42054.00	.18
1	4	.650	296.47	2554.00	.39

TIME PARAMETERS OF OUTFLOW HYDROGRAPH IMMEDIATELY DOWNSTREAM OF DAM

PARAMETER	UNITS	VARIABLE	VALUE
TIME TO FAILURE	HR	TFH	.900
TIME TO START OF RISING LIMB OF HYDROGRAPH	HR	TFO	.000
TIME TO PEAK	HR	TP	.900
TIME STEP SIZE	HR	DTH1	.045

PROFILE OF CRESTS AND TIMES FOR CHANCE POND BROOK
BELOW REACH TWO

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
.650	297.16	6131	1.665	12.41	.00	.00
.730	295.75	45615	1.575	4.50	.00	.00
.832	295.01	49090	1.620	4.64	.00	.00
.934	294.41	49089	1.665	4.41	.00	.00
1.037	293.87	49087	1.710	4.17	.00	.00
1.139	293.39	49087	1.710	3.93	.00	.00
1.241	292.94	49086	1.755	3.69	.00	.00
1.343	292.54	49085	1.755	3.45	.00	.00
1.446	292.19	49083	1.755	3.22	.00	.00
1.548	291.88	49082	1.800	3.00	.00	.00
1.650	291.61	49080	1.800	2.80	.00	.00
1.763	291.30	49079	1.800	2.86	.00	.00
1.877	290.98	49078	1.800	2.93	.00	.00
1.990	290.66	49077	1.845	2.99	.00	.00
2.103	290.33	49076	1.845	3.06	.00	.00
2.217	290.00	49076	1.845	3.13	.00	.00
2.330	289.66	49075	1.845	3.20	.00	.00
2.440	289.34	49075	1.350	3.21	.00	.00
2.550	289.01	49074	1.305	3.22	.00	.00
2.660	288.67	49074	1.305	3.24	.00	.00
2.770	288.33	49073	1.260	3.26	.00	.00
2.880	287.99	49073	1.260	3.28	.00	.00
2.990	287.64	49073	1.215	3.30	.00	.00
3.100	287.29	49073	1.215	3.33	.00	.00
3.210	286.93	49073	1.170	3.35	.00	.00
3.320	286.57	49073	1.170	3.38	.00	.00
3.424	286.29	49072	1.125	3.02	.00	.00
3.527	286.03	49100	1.125	2.74	.00	.00
3.631	285.79	49145	1.125	2.52	.00	.00
3.735	285.58	49184	1.080	2.33	.00	.00
3.839	285.40	49295	1.080	2.17	.00	.00
3.942	285.23	49446	1.080	2.04	.00	.00
4.046	285.08	49623	1.035	1.92	.00	.00
4.150	284.94	49831	1.035	1.82	.00	.00

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 1
BELOW REACH TWO AT MILE .65

GAGE ZERO = 284.80 MAX ELEVATION REACHED BY FLOOD WAVE = 297.16
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 12.36 AT TIME = 1.665 HOURS
MAX FLOW = 6131 AT TIME = .900 HOURS

HR STAGE FLOW 0 2000 4000 6000 8000 10000

```
  .0   11.7    2554  I         I  *      I         I         I         I
  .1   11.7    2598  I         I  *      I         I         I         I
  .2   11.7    2691  I         I  *      I         I         I         I
  .3   11.7    3185  I         I     *   I         I         I         I
  .4   11.9    4186  I         I         I*        I         I         I
  .5   12.0    5224  I         I         I     *   I         I         I
  .6   12.1    5795  I         I         I        *I         I         I
  .7   12.2    5941  I         I         I         *         I         I
  .8   12.2    6036  I         I         I         *         I         I
  .9   12.2    6131  I         I         I         I*        I         I
 1.0   12.3    6128  I         I         I         I*        I         I
 1.1   12.3    6121  I         I         I         I*        I         I
 1.2   12.3    6115  I         I         I         I*        I         I
 1.3   12.3    6108  I         I         I         I*        I         I
 1.4   12.4    6101  I         I         I         I*        I         I
 1.5   12.4    6094  I         I         I         *         I         I
 1.6   12.4    6087  I         I         I         *         I         I
 1.7   12.4    6080  I         I         I         *         I         I
 1.8   12.4    6073  I         I         I         *         I         I
 1.9   12.4    6066  I         I         I         *         I         I
 2.0   12.4    6059  I         I         I         *         I         I
 2.1   12.4    6052  I         I         I         *         I         I
 2.2   12.4    6045  I         I         I         *         I         I
 2.3   12.4    6038  I         I         I         *         I         I
 2.4   12.4    6031  I         I         I         *         I         I
 2.5   12.4    6024  I         I         I         *         I         I
 2.6   12.4    6017  I         I         I         *         I         I
 2.7   12.4    6010  I         I         I         *         I         I
 2.8   12.3    6003  I         I         I         *         I         I
 2.9   12.3    5996  I         I         I         *         I         I
 3.0   12.3    5990  I         I         I         *         I         I
 3.1   12.3    5983  I         I         I         *         I         I
 3.2   12.3    5976  I         I         I         *         I         I
 3.3   12.3    5969  I         I         I         *         I         I
 3.4   12.3    5962  I         I         I         *         I         I
 3.5   12.3    5955  I         I         I         *         I         I
 3.6   12.3    5948  I         I         I         *         I         I
 3.7   12.3    5941  I         I         I         *         I         I
 3.8   12.3    5934  I         I         I         *         I         I
 3.9   12.3    5927  I         I         I         *         I         I
1
```

```
 DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK    ... STATION NUMBER  2
              BELOW REACH TWO            AT MILE      .73

 GAGE ZERO =  274.00     MAX ELEVATION REACHED BY FLOOD WAVE =  295.75
                      FLOOD STAGE NOT AVAILABLE
              MAX STAGE =   21.75     AT TIME =    1.575 HOURS
              MAX FLOW =    45616    AT TIME =     .945 HOURS

 HR   STAGE     FLOW  0     10000     20000     30000     40000     50000
```

```
 .0   20.9   42054 I         I         I         I         I *       I
 .1   20.9   42096 I         I         I         I         I *       I
 .2   20.9   42182 I         I         I         I         I *       I
 .3   21.0   42653 I         I         I         I         I  *      I
 .4   21.1   43629 I         I         I         I         I   *     I
 .5   21.3   44659 I         I         I         I         I    *    I
 .6   21.4   45248 I         I         I         I         I    *    I
 .7   21.5   45412 I         I         I         I         I    *    I
 .8   21.6   45513 I         I         I         I         I     *   I
 .9   21.6   45611 I         I         I         I         I     *   I
1.0   21.7   45615 I         I         I         I         I     *   I
1.1   21.7   45611 I         I         I         I         I     *   I
1.2   21.7   45606 I         I         I         I         I     *   I
1.3   21.7   45601 I         I         I         I         I     *   I
1.4   21.7   45597 I         I         I         I         I     *   I
1.5   21.8   45593 I         I         I         I         I     *   I
1.6   21.8   45587 I         I         I         I         I     *   I
1.7   21.8   45580 I         I         I         I         I     *   I
1.8   21.8   45573 I         I         I         I         I     *   I
1.9   21.8   45566 I         I         I         I         I     *   I
2.0   21.7   45559 I         I         I         I         I     *   I
2.1   21.7   45552 I         I         I         I         I     *   I
2.2   21.7   45546 I         I         I         I         I     *   I
2.3   21.7   45539 I         I         I         I         I     *   I
2.4   21.7   45532 I         I         I         I         I     *   I
2.5   21.7   45525 I         I         I         I         I     *   I
2.6   21.7   45518 I         I         I         I         I     *   I
2.7   21.7   45511 I         I         I         I         I     *   I
2.8   21.7   45504 I         I         I         I         I     *   I
2.9   21.7   45497 I         I         I         I         I    *    I
3.0   21.7   45490 I         I         I         I         I    *    I
3.1   21.7   45483 I         I         I         I         I    *    I
3.2   21.7   45476 I         I         I         I         I    *    I
3.3   21.7   45469 I         I         I         I         I    *    I
3.4   21.7   45463 I         I         I         I         I    *    I
3.5   21.7   45456 I         I         I         I         I    *    I
3.6   21.7   45449 I         I         I         I         I    *    I
3.7   21.7   45442 I         I         I         I         I    *    I
3.8   21.7   45435 I         I         I         I         I    *    I
3.9   21.7   45428 I         I         I         I         I    *    I
```

1

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 11
BELOW REACH TWO AT MILE 1.65

GAGE ZERO = 257.00 MAX ELEVATION REACHED BY FLOOD WAVE = 291.61
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 34.61 AT TIME = 1.800 HOURS
MAX FLOW = 49080 AT TIME = 1.575 HOURS

```
HR   STAGE    FLOW  0     10000     20000     30000     40000     50000
```

```
 .0   33.9    45554 I         I         I         I         I    *   I
 .1   33.9    45557 I         I         I         I         I    *   I
 .2   33.9    45592 I         I         I         I         I    *   I
 .3   33.9    45739 I         I         I         I         I    *   I
 .4   34.0    46193 I         I         I         I         I    *   I
 .5   34.1    46926 I         I         I         I         I     *  I
 .6   34.2    47626 I         I         I         I         I      * I
 .7   34.3    48079 I         I         I         I         I      * I
 .8   34.4    48341 I         I         I         I         I      * I
 .9   34.4    48554 I         I         I         I         I       *I
1.0   34.5    48707 I         I         I         I         I       *I
1.1   34.5    48762 I         I         I         I         I       *I
1.2   34.6    48811 I         I         I         I         I       *I
1.3   34.6    48902 I         I         I         I         I       *I
1.4   34.6    49004 I         I         I         I         I       *I
1.5   34.6    49071 I         I         I         I         I       *I
1.6   34.6    49080 I         I         I         I         I       *I
1.7   34.6    49079 I         I         I         I         I       *I
1.8   34.6    49076 I         I         I         I         I       *I
1.9   34.6    49071 I         I         I         I         I       *I
2.0   34.6    49067 I         I         I         I         I       *I
2.1   34.6    49062 I         I         I         I         I       *I
2.2   34.6    49056 I         I         I         I         I       *I
2.3   34.6    49050 I         I         I         I         I       *I
2.4   34.6    49044 I         I         I         I         I       *I
2.5   34.6    49038 I         I         I         I         I       *I
2.6   34.6    49031 I         I         I         I         I       *I
2.7   34.6    49025 I         I         I         I         I       *I
2.8   34.6    49018 I         I         I         I         I       *I
2.9   34.6    49012 I         I         I         I         I       *I
3.0   34.6    49005 I         I         I         I         I       *I
3.1   34.6    48998 I         I         I         I         I       *I
3.2   34.6    48992 I         I         I         I         I       *I
3.3   34.6    48985 I         I         I         I         I       *I
3.4   34.6    48978 I         I         I         I         I       *I
3.5   34.6    48971 I         I         I         I         I       *I
3.6   34.6    48964 I         I         I         I         I       *I
3.7   34.6    48957 I         I         I         I         I       *I
3.8   34.6    48950 I         I         I         I         I       *I
3.9   34.6    48943 I         I         I         I         I       *I
```

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 17
BELOW REACH TWO AT MILE 2.33

GAGE ZERO = 256.30 MAX ELEVATION REACHED BY FLOOD WAVE = 289.66
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 33.36 AT TIME = 1.845 HOURS
MAX FLOW = 49076 AT TIME = 1.755 HOURS

```
HR   STAGE    FLOW  0     10000     20000     30000     40000     50000
```

```
 .0   32.8    45554  I         I         I         I         I     *   I
 .1   32.8    45554  I         I         I         I         I     *   I
 .2   32.8    45563  I         I         I         I         I     *   I
 .3   32.8    45621  I         I         I         I         I     *   I
 .4   32.9    45841  I         I         I         I         I     *   I
 .5   32.9    46306  I         I         I         I         I     *   I
 .6   33.0    46896  I         I         I         I         I      *  I
 .7   33.1    47428  I         I         I         I         I      *  I
 .8   33.1    47823  I         I         I         I         I       * I
 .9   33.2    48128  I         I         I         I         I       * I
1.0   33.3    48340  I         I         I         I         I       * I
1.1   33.3    48419  I         I         I         I         I       * I
1.2   33.3    48574  I         I         I         I         I        *I
1.3   33.4    48777  I         I         I         I         I        *I
1.4   33.4    48976  I         I         I         I         I        *I
1.5   33.4    49060  I         I         I         I         I        *I
1.6   33.4    49072  I         I         I         I         I        *I
1.7   33.4    49075  I         I         I         I         I        *I
1.8   33.4    49075  I         I         I         I         I        *I
1.9   33.4    49073  I         I         I         I         I        *I
2.0   33.4    49070  I         I         I         I         I        *I
2.1   33.4    49067  I         I         I         I         I        *I
2.2   33.4    49062  I         I         I         I         I        *I
2.3   33.4    49057  I         I         I         I         I        *I
2.4   33.4    49052  I         I         I         I         I        *I
2.5   33.4    49046  I         I         I         I         I        *I
2.6   33.4    49040  I         I         I         I         I        *I
2.7   33.4    49034  I         I         I         I         I        *I
2.8   33.4    49028  I         I         I         I         I        *I
2.9   33.4    49022  I         I         I         I         I        *I
3.0   33.4    49015  I         I         I         I         I        *I
3.1   33.4    49008  I         I         I         I         I        *I
3.2   33.4    49002  I         I         I         I         I        *I
3.3   33.3    48995  I         I         I         I         I        *I
3.4   33.3    48988  I         I         I         I         I        *I
3.5   33.3    48982  I         I         I         I         I        *I
3.6   33.3    48975  I         I         I         I         I        *I
3.7   33.3    48968  I         I         I         I         I        *I
3.8   33.3    48961  I         I         I         I         I        *I
3.9   33.3    48954  I         I         I         I         I        *I
```

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 26
BELOW REACH TWO AT MILE 3.32

GAGE ZERO = 255.30 MAX ELEVATION REACHED BY FLOOD WAVE = 286.57
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 31.27 AT TIME = 1.170 HOURS
MAX FLOW = 49073 AT TIME = 1.945 HOURS

```
HR   STAGE    FLOW  0     10000     20000     30000     40000     50000
```

```
 .0   31.0    45554 I         I         I         I         I    *   I
 .1   31.0    45554 I         I         I         I         I    *   I
 .2   31.0    45554 I         I         I         I         I    *   I
 .3   31.0    45571 I         I         I         I         I    *   I
 .4   31.0    45653 I         I         I         I         I    *   I
 .5   31.1    45885 I         I         I         I         I    *   I
 .6   31.1    46317 I         I         I         I         I    *   I
 .7   31.1    46853 I         I         I         I         I     *  I
 .8   31.1    47342 I         I         I         I         I     *  I
 .9   31.2    47738 I         I         I         I         I      * I
1.0   31.2    47773 I         I         I         I         I      * I
1.1   31.3    48056 I         I         I         I         I      * I
1.2   31.3    48450 I         I         I         I         I      * I
1.3   31.2    48861 I         I         I         I         I       *I
1.4   31.2    49058 I         I         I         I         I       *I
1.5   31.2    49054 I         I         I         I         I       *I
1.6   31.2    49064 I         I         I         I         I       *I
1.7   31.2    49069 I         I         I         I         I       *I
1.8   31.2    49072 I         I         I         I         I       *I
1.9   31.2    49073 I         I         I         I         I       *I
2.0   31.2    49072 I         I         I         I         I       *I
2.1   31.2    49070 I         I         I         I         I       *I
2.2   31.2    49067 I         I         I         I         I       *I
2.3   31.2    49063 I         I         I         I         I       *I
2.4   31.2    49059 I         I         I         I         I       *I
2.5   31.2    49054 I         I         I         I         I       *I
2.6   31.2    49048 I         I         I         I         I       *I
2.7   31.2    49043 I         I         I         I         I       *I
2.8   31.2    49037 I         I         I         I         I       *I
2.9   31.2    49031 I         I         I         I         I       *I
3.0   31.2    49024 I         I         I         I         I       *I
3.1   31.2    49018 I         I         I         I         I       *I
3.2   31.2    49011 I         I         I         I         I       *I
3.3   31.2    49005 I         I         I         I         I       *I
3.4   31.2    48998 I         I         I         I         I       *I
3.5   31.2    48992 I         I         I         I         I       *I
3.6   31.2    48985 I         I         I         I         I       *I
3.7   31.2    48977 I         I         I         I         I       *I
3.8   31.2    48970 I         I         I         I         I       *I
3.9   31.2    48963 I         I         I         I         I       *I
```

1

DISCHARGE HYDROGRAPH FOR CHANCE POND BROOK ... STATION NUMBER 34
BELOW REACH TWO AT MILE 4.15

GAGE ZERO = 254.30 MAX ELEVATION REACHED BY FLOOD WAVE = 284.94
FLOOD STAGE NOT AVAILABLE
MAX STAGE = 30.64 AT TIME = 1.035 HOURS
MAX FLOW = 49831 AT TIME = 1.305 HOURS

```
HR   STAGE    FLOW  0     10000     20000     30000     40000     50000
```

.0	30.5	45677	I	I	I	I	I	* I
.1	30.5	45678	I	I	I	I	I	* I
.2	30.5	45678	I	I	I	I	I	* I
.3	30.5	45679	I	I	I	I	I	* I
.4	30.5	45682	I	I	I	I	I	* I
.5	30.5	45722	I	I	I	I	I	* I
.6	30.5	46139	I	I	I	I	I	* I
.7	30.5	46682	I	I	I	I	I	* I
.8	30.6	47173	I	I	I	I	I	* I
.9	30.6	46690	I	I	I	I	I	* I
1.0	30.6	47126	I	I	I	I	I	* I
1.1	30.6	48096	I	I	I	I	I	* I
1.2	30.6	49008	I	I	I	I	I	*I
1.3	30.5	49794	I	I	I	I	I	*
1.4	30.5	49730	I	I	I	I	I	*
1.5	30.5	49711	I	I	I	I	I	*
1.6	30.5	49709	I	I	I	I	I	*
1.7	30.5	49710	I	I	I	I	I	*
1.8	30.5	49711	I	I	I	I	I	*
1.9	30.5	49712	I	I	I	I	I	*
2.0	30.5	49712	I	I	I	I	I	*
2.1	30.5	49712	I	I	I	I	I	*
2.2	30.5	49711	I	I	I	I	I	*
2.3	30.5	49711	I	I	I	I	I	*
2.4	30.5	49710	I	I	I	I	I	*
2.5	30.5	49708	I	I	I	I	I	*
2.6	30.5	49707	I	I	I	I	I	*
2.7	30.5	49706	I	I	I	I	I	*
2.8	30.5	49704	I	I	I	I	I	*
2.9	30.5	49703	I	I	I	I	I	*
3.0	30.5	49701	I	I	I	I	I	*
3.1	30.5	49700	I	I	I	I	I	*
3.2	30.5	49698	I	I	I	I	I	*
3.3	30.5	49696	I	I	I	I	I	*
3.4	30.5	49695	I	I	I	I	I	*
3.5	30.5	49693	I	I	I	I	I	*
3.6	30.5	49691	I	I	I	I	I	*
3.7	30.5	49690	I	I	I	I	I	*
3.8	30.5	49689	I	I	I	I	I	*
3.9	30.5	49688	I	I	I	I	I	*

1

DATE: 11/18/85
FILE: CBD2DB1.DAT

DAMBRK - Version..10/25/84

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