LITTLEFIELD HYDRO COMPANY
GREENWICH, CONNECTICUT

LITTEFIELD HYDROELECTRIC PROJECT
FERC PROJECT NO. 8158-ME

DAM BREAK ANALYSIS

JANUARY 1988

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

LITTLEFIELD HYDROELECTRIC PROJECT

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LITTLEFIELD HYDROELECTRIC PROJECT
FERC PROJECT NO. 8158 - ME

DAM BREAK ANALYSIS

1. PROJECT DESCRIPTION

1.1 Littlefield Dam

The proposed Littlefield Dam will be located on the Little Androscoggin River near Auburn, Maine (see Figure 1). The dam will be either a concrete or timber-crib structure and will have a maximum height of about 13 feet above the streambed. The dam will consist of a 240-foot-long main spillway section, and a 110-foot-long auxiliary spillway section (see Figure 2 and Figure 3).

The ogee-shaped uncontrolled main spillway will have a crest elevation of 213 feet National Geodetic Vertical Datum (NGVD). The main spillway will have provisions for 3-foot-high flashboards, bringing the normal pool elevation to 216 feet NGVD.

1.2 Downstream Conditions

As can be seen in Figures 4 through 8, several homes and businesses are located along the river banks between the Littlefield Dam and Upper Barker Dam located 3 miles downstream. Most of the buildings are situated on the relatively high river banks and are at or above elevation 210 feet NGVD. There are no buildings located in the area immediately downstream of the Littlefield Dam. Water use around the dam, other than the proposed hydroelectric project, is limited to recreation such as fishing and boating.

The structures most likely to be affected by a dam break are located in the low-lying areas downstream of Littlefield Dam in the flood plains near Route 202. These buildings are situated along the river bank in the lowest-lying inhabitated area downstream of Littlefield Dam and are located approximately 0.6 miles downstream (see Figures 6 and 7). The exact sill elevations of these buildings are not known; however, based on five-foot

contour maps (see Figures 4 through 8) provided by the City of Auburn, Maine, these buildings are at or above elevation 200 NGVD.

The Upper Barker Hydroelectric Project and Dam are located 3 miles downstream of the proposed Littlefield Project. The structure contains a 86-foot-long ogee-shaped main spillway section, and two 15-foot-long gated spillway sections. The main spillway is at elevation 189 feet NGVD and has provisions for 3-foot-high flashboards which are designed to fail at high flows. The gated spillway has a crest elevation of 175 feet NGVD. The headwater elevation at the Upper Barker Dam controls the tailwater elevation at the Littlefield Dam.

2. STREAMFLOW AND FLOODING HISTORY

Streamflow on the Little Androscoggin River was measured by USGS Gage number 01058500 near Auburn, Maine. The gage was located just upstream of the Littlefield Dam and has been discontinued. The average annual flow at the gage was 550 cfs for the period of October 1940 through September 1970. To date, the floods of record had approximate peak instantaneous flows of 16,500 cfs and 16,600 cfs and occurred on March 28, 1953 and March 20, 1936, respectively. Using a Log-Pearson Type III distribution of annual peak-flow data, the U.S. Army Corps of Engineers in cooperation with the Federal Emergency Management Agency (FEMA)[1] defined the following discharge-frequency relationships for the Little Androscoggin River above its confluence with the Androscoggin River:

Frequency (years)	Discharge (cfs)
10	8,400
50	16,800
100	22,100
500	28,500

[1] Flood Insurance Study - City of Auburn, Maine, U.S. Department of Housing and Urban Development, August 4, 1980.

Based on the backwater effects of the spillway at Upper Barker Dam contained in a backwater study conducted by Morrison-Knudsen Engineers[2] (see Appendix B), it was estimated that the low-lying area of homes 0.6 miles below Littlefield Dam would not begin to flood until river flows reached approximately 12,450 cfs (elevation 200 feet). This discharge is less than the 50-year flood.

3. DAM FAILURE MODEL

The Littlefield Dam failure analysis was done using the "National Weather Service Dam-Break Flood Forecasting Model" (DAMBRK[3]) developed by D.L. Fread, Research Hydrologist for the National Weather Service. The model predicts downstream flooding produced by a dam failure and determines flood wave peak flows, depths, velocities, and travel times for selected downstream points.

Input to the computer model consisted of reservoir characteristics, selected geometry at the breached section, duration of the breach development, and downstream river channel features.

The approach used to analyze the potential downstream effects due to a failure of the Littlefield Dam required the input parameters (including time of failure, the channel roughness coefficient, initial pool elevation, etc.) be set as close to worst-case as practical. Typically, a "sunny-day" failure will cause the greatest incremental increase in the water surface downstream of a dam. Therefore, a "sunny-day" dam failure with all input parameters as close to the worst-case conditions as possible was analyzed. After this condition was examined, the breach width, and antecedent flow conditions and the "sensitivity" of the model to a range of these parameters was determined.

[2] Backwater Studies - Little Androscoggin River
Morrison-Knudsen Engineers, Inc. August 1986.

[3] Dambrk: The NWS Dam-Break Flood Forcasting Model D.L. Fread, office of Hydrology, National Weather Service July 18, 1984

3.1 Reservoir Characteristics

The proposed Littlefield Dam will be a 13-foot-high concrete or timber-crib gravity structure that will be founded on bedrock with a total spillway length of 350 feet. The dam has provisions for 3-foot-high flashboards.

The reservoir has a length of 1.8 miles and a storage capacity of approximately 750 acre-feet at elevation 216 feet NGVD. The DAMBRK model uses reservoir characteristics specified via input data to determine the magnitude of the breach outflow and the rate of depletion of the reservoir storage.

3.2 Breach Characteristics

Based on the FERC guidelines for Emergency Action Plans (April 5, 1985 and revised October 8, 1987), the suggested breach width for concrete gravity dams is the width of one or more monoliths with the average breach width less than or equal to half the dam width. The suggested breach width for timber-crib dams is between one and five times the height of the dam. The suggested bottom of the breach for both conditions is the foundation elevation. Therefore, the dimensions of the breach were set at 175 feet wide (half of the spillway length) by 13 feet high (the height of the dam above the streambed) for the concrete dam failure. The dimensions were set at 65 feet wide (five times the height of the dam) by 13 feet high for the timber-crib dam failure.

3.3 Antecedent Flow Conditions

To be conservative, an antecedent flow condition of 3,000 cfs, the maximum river flow before spilling occurs at Upper Barker Dam, was used. The "sunny-day" failure was analyzed with the reservoir at the top of the spillway crest.

Dam failure during flood conditions (12,450 cfs) was also analyzed. The flood flow of 12,450 cfs was selected because this flow is the approximate antecedent flow conditIon at which the buildings near Route 202 would begin

to flood. The incremental rise in water surface elevation would be less than expected under the "sunny-day" failure, but this incremental rise could pose a greater potential for flooding because the river elevation would be approximately at the top of the river bank.

Dam failure at the 100-year or greater flood flows was not analyzed because the dam would approximate a submerged weir at these flood flows and the incremental rise in downstream water surface elevations would be inconsequential (see Section 4.2).

3.4 Time of Failure

FERC suggests a 0.1 to 0.3 hour time of failure for a gravity dam and a 0.1 to 1.0 hour time of failure for a timber crib dam. A time of failure of 0.1 hours was used for the worst-case for both "sunny-day" and flood conditions.

3.5 Sections and Channel Roughness Coefficient

The downstream channel cross-sections used in the analysis were taken from supporting data obtained from the FEMA Flood Insurance Study for the City of Auburn. Section locations are shown in Figure 1. Fourteen cross-sections extending from the base of Littlefield Dam downstream to Upper Barker Dam (3 miles) were used.

The channel roughness coefficient, Manning's "n", is dependent upon not only the channel roughness, but also the size and shape of the channel. The U.S. Bureau of Reclamation has guidelines for determining average values of the Manning roughness factor for various boundary materials. Earth with stones or weeds has a roughness coefficient equal to approximately 0.03. In natural rivers with gravel, cobbles, and boulders, Manning's "n" is 0.04. In moderately wooded areas, Manning's "n" is 0.07.

The calibrated Manning's "n" value for this reach of the Little Androscoggin River was determined to be between 0.02 and 0.035 in the river channel and 0.05 in the overbank areas. These values were calibrated using the U.S. Army Corps of Engineers' HEC-2 Water Surface Profile Program.

As suggested by FERC's October 8, 1987 revision to the breach parameters for a worst-case scenario, Manning's "n" was set at 0.05, a value larger than the maximum value suggested by field investigations.

3.6 Downstream Boundary Conditions

Water levels between Littlefield and Upper Barker Dams are controlled by the water surface elevation at Upper Barker Dam. In general, the higher the water surface elevation at Upper Barker Dam, the higher the maximum height of the flood wave calculated by the dam failure model. Therefore, headwater elevations with flashboards at Upper Barker Dam were used as the downstream boundary conditions because they provide the highest expected elevations for the river below Littlefield Dam. These headwater elevations used as the downstream boundary condition are shown below:

River Flow (cfs)	Upper Barker Headwater Elevation (feet)
3,000	192.0
8,100	193.1
16,800	196.6
22,100	198.5
28,500	200.6

3.7 Summary of Input Data

The input parameters used in the dam breach analyses are summarized below:

	"Sunny-Day" Condition	Flood Condition
Reservoir Elevation (feet)	216.00	216.95
Reservoir Volume (acre-feet)	750	2,500
Bottom Breach Elevation (feet) (Streambed Level)	200.0	200.0
Breach Width (feet) (Timber-Crib and Concrete)	65 and 175	65 and 175
Time of Failure (hours)	0.1	0.1
Antecedent Flow (cfs)	3,000	12,450
Manning's "n"	0.05	0.05

3.8 Model Development

In order to determine the total reservoir outflow as a function of time, DAMBRK determines the simultaneous effects of the reservoir storage characteristics and reservoir inflow using a dynamic routing technique. Reservoir depletion (outflow versus time) is a function of the reservoir volume, breach width, breach height, time of failure, and inflow to reservoir. After the reservoir depletion is calculated, the depth of flow produced is determined based on the geometry of the channel immediately downstream of the dam, the channel roughness coefficient, and the slope of the downstream channel. This depth is then compared to the depth of water in the reservoir to determine if a submergence correction factor must be applied to account for tailwater effects on the breach outflow. That is, the model determines whether the water downstream is restricting the flow of water through the breach.

As the reservoir depletion table and depth are calculated, the flow is routed downstream using a hydraulic flood routing technique known as the dynamic wave method. Channel geometry, frictional resistance, slope, and

downstream boundary conditions are used to determine the hydrographs at selected downstream points. Water surface elevations, flood wave travel time, peak flows, and depths of peak flow are calculated.

The time of occurrence of the peak flow at a selected cross-section is determined by adding the time of failure to the time required for the peak outflow to travel from the dam to that cross-section. Complete computer listings showing the results of the DAMBRK model are provided in Appendix A.

4. RESULTS

Table 1 summarizes the various input parameters and results of the DAMBRK Model for the river immediately downstream of Littlefield Dam for each of the conditions analyzed. Consistent with FERC EAP guidelines (revised October 8, 1987) the effects of a dam failure were examined for both "sunny-day" and flood conditions. As suggested in the guidelines, a sensitivity analysis was performed to examine relative differences in the flood wave peak and time of travel resulting from various failure assumptions.

Table 2 summarizes the initial water surface elevations before the dam breach, maximum water surface elevations after the dam breach, and the time to reach the maximum (peak) water surface elevations for each of the four computer runs. This summary includes fourteen cross-sections downstream of Littlefield Dam. More detailed information is provided in each of the computer listings in Appendix A.

To examine the downstream effects of dam failure, the peak elevations and travel times of the flood wave were analyzed at the locations where significant inundation was most likely to occur. These areas were the buildings near Route 202 located 0.6 miles below Littlefield Dam (cross-sections 16 through 11).

Table 1

TABLE 1
LITTLEFIELD HYDROELECTRIC PROJECT
COMPARISON OF DAMBRK RUNS

	SUNNY DAY CONDITIONS		FLOOD CONDITIONS	
RUN NUMBER	1	2	3	4
RESERVOIR ELEVATION (FT)	216	216	216.95	216.95
RESERVOIR VOLUME (AC-FT)	750	750	2500	2500
BOTTOM BREACH ELEVATION (FT)	200	200	200	200
BOTTOM BREACH VOLUME (AC-FT)	0	0	0	0
BREACH WIDTH (FT)	65	175	65	175
TIME OF FAILURE (HOURS)	0.1	0.1	0.1	0.1
ANTECEDENT FLOW (CFS)	3000	3000	12450	12450
MANNING'S "n"	0.05	0.05	0.05	0.05
DAM BREAK RESULTS				
INITIAL TAILWATER ELEVATION (FT)	196.88	196.88	205.88	205.88
MAXIMUM TAILWATER (FT)	199.77	201.27	206.36	207.02
MAXIMUM FLOW (CFS)	10070	14947	15789	20565
TIME TO MAX. ELEVATION (HOURS)	0.195	0.100	0.100	0.100
CHANGE (FT)	2.89	4.39	0.48	1.14

Table 2

TABLE 2
LITTLEFIELD HYDROELECTRIC PROJECT
COMPARISON OF WATER SURFACE ELEVATIONS
BEFORE AND AFTER DAMBREAK

		RUN 1				RUN 2			
X-SECTION	DISTANCE FROM DAM (MILES)	BEGINNING ELEVATION (FEET)	MAXIMUM ELEVATION (FEET)	INCREMENTAL CHANGE (FEET)	TIME TO PEAK (HOURS)	BEGINNING ELEVATION (FEET)	MAXIMUM ELEVATION (FEET)	INCREMENTAL CHANGE (FEET)	TIME TO PEAK (HOURS)
17.00	0.000	195.88	199.77	2.89	0.195	196.88	201.27	4.39	0.190
916.00	0.568	196.12	198.40	2.28	0.665	196.12	198.65	2.53	0.240
16.00	0.583	196.08	198.32	2.24	0.685	196.08	198.51	2.43	0.275
14.00	0.602	196.05	198.28	2.23	0.695	196.05	198.46	2.41	0.510
913.00	0.731	195.94	198.18	2.24	0.720	195.94	198.36	2.42	0.550
13.00	0.746	195.89	198.09	2.20	0.735	195.89	198.26	2.37	0.575
11.00	0.756	195.88	198.07	2.19	0.740	195.88	198.25	2.37	0.580
10.00	1.443	194.85	196.85	2.00	0.890	194.85	197.01	2.16	0.745
9.00	1.864	193.67	195.31	1.64	0.935	193.67	195.44	1.77	0.790
8.00	2.220	192.33	193.07	0.74	0.980	192.33	193.13	0.80	0.835
6.00	2.224	192.32	193.04	0.72	0.980	192.32	193.10	0.78	0.835
5.00	2.287	192.28	193.00	0.72	0.980	192.26	193.06	0.78	0.835
4.00	2.707	192.05	192.52	0.47	1.005	192.05	192.56	0.51	0.860
3.00	2.949	192.00	192.40	0.40	1.020	192.00	192.43	0.43	0.875

		RUN 3				RUN 4			
X-SECTION	DISTANCE FROM DAM (MILES)	BEGINNING ELEVATION (FEET)	MAXIMUM ELEVATION (FEET)	INCREMENTAL CHANGE (FEET)	TIME TO PEAK (HOURS)	BEGINNING ELEVATION (FEET)	MAXIMUM ELEVATION (FEET)	INCREMENTAL CHANGE (FEET)	TIME TO PEAK (HOURS)
17.00	0.000	205.88	206.36	0.48	0.100	205.88	207.02	1.14	0.100
916.00	0.568	205.02	205.34	0.32	0.920	205.02	205.77	0.75	0.140
16.00	0.583	204.81	205.12	0.31	0.935	204.81	205.41	0.60	0.145
14.00	0.602	204.76	205.07	0.31	1.005	204.76	205.33	0.57	0.150
913.00	0.731	204.78	205.10	0.32	0.995	204.78	205.45	0.67	0.155
13.00	0.746	204.60	204.92	0.32	1.040	204.60	205.15	0.55	0.155
11.00	0.756	204.53	204.89	0.31	1.060	204.58	205.11	0.53	0.160
10.00	1.443	203.60	203.97	0.37	1.195	203.60	204.21	0.61	1.060
9.00	1.864	201.22	201.64	0.42	1.250	201.22	201.92	0.70	1.050
8.00	2.220	196.25	196.44	0.19	1.365	196.25	196.57	0.32	1.180
6.00	2.224	196.16	196.35	0.19	1.365	196.16	196.48	0.32	1.180
5.00	2.287	196.48	196.69	0.21	1.360	196.48	196.85	0.37	1.170
4.00	2.707	195.32	195.52	0.20	1.375	195.32	195.66	0.34	1.185
3.00	2.949	194.85	195.03	0.18	1.380	194.85	195.16	0.31	1.195

4.1 "Sunny-Day" Condition

A "sunny-day" failure at Littlefield Dam would discharge 10,070 cfs for the timber-crib dam failure and 14,947 cfs for the concrete dam failure and would increase the initial water surface elevation immediately below the dam by 2.89 feet and 4.39 feet, respectively (see Tables 1 and 2). More importantly, the water surface elevation in the vicinity of the low-lying area, located 0.6 miles downstream, would increase by a maximum of 2.4 feet. The maximum water surface elevation in this area would occur 17 minutes after the initial dam failure.

As discussed previously, the lowest invert (sill) elevation of the buildings in the low lying area is 200 feet. Therefore, a "sunny-day" failure would not overtop the river bank and would not affect any buildings for either the concrete or timber-crib dam condition.

No impacts are expected to occur between the low lying area near Route 202 and Upper Barker Dam. All of the homes and businesses downstream of cross-section 11 are located above elevation 200 feet and for all conditions analyzed, the flood wave was below this level (see Table 2). The maximum increase in the water level at Upper Barker Dam is approximately 0.4 feet (from elevation 192.0 feet to 192.4 feet) and occurs gradually over 52 minutes. Since this 0.4 foot increase is within the normal range of headwater elevations, no damage to the dam is expected to occur.

4.2 Flood Conditions

Based on the results of the "sunny-day" failure, it became apparent that a condition more likely to affect residents in the low-lying area located 0.6 miles downstream of the dam was a dam failure during substantially higher flow conditions (i.e., floods). More specifically, a dam failure at flood conditions when the river had just overtopped the river bank (approximately elevation 200 feet and a flow of 12,450 cfs) may cause an incremental increase in water surface elevations that could endanger life and property. At higher flood flows this area would be under water, and it was assumed that residences would have been evacuated.

A failure of the Littlefield Dam during the flood condition would result in an overall river flow between 15,789 cfs for the timber-crib dam failure and 20,565 cfs for the concrete dam failure. The additional discharge due to dam failure would increase the initial water surface elevation immediately below the dam by 0.48 feet and 1.14 feet, respectively (see Tables 1 and 2). The water surface elevation in the vicinity of the low lying area, located 0.6 miles downstream, would increase by a maximum increment of 0.7 feet in the event of a concrete dam failure and less than .4 feet for a timber-crib dam failure. The maximum water surface elevation in this area would occur 9 minutes after the initial dam failure.

It is unlikely that the maximum (0.7 feet) incremental rise in the water surface elevation under these river flows would endanger life or create substantial property damage in this low-lying area. This level of inundation at these low-lying residences would be similar to that which periodically occurs during spring.

Other than the low-lying area located 0.6 miles downstream of the dam, other areas along the river upstream of Upper Barker Dam may experience a maximum incremental rise of water surface elevation of 0.3 feet (see Table 2). This incremental rise would occur in areas already experiencing flooding and would cause insignificant effects. The resulting flood levels would be lower than the inundation level for the 50-year flood.

The maximum increase in the water level at Upper Barker is 0.3 feet from elevation 194.85 to 195.16 feet. The elevation reached is within the normal range of elevations experienced during a 50-year flood, and no damage is expected to occur.

A dam failure during the 100-year flood (22,100 cfs), or the probable maximum flood, would have less of impact on downstream residences because the dam would approximate a submerged weir and water released from the dam would be insignificant in relation to the higher river flows. The incremental rise in water surface elevation would be substantially less than one foot. Therefore, a dam failure would cause no damage to life or property beyond that which had already occurred. All residences along the river would be evacuated.

5. CONCLUSION

A "sunny-day" failure of the Littlefield Dam would cause no damage to life, health, or property. The lowest-lying area is located 0.6 miles downstream of the dam. Even under the most extreme "sunny-day" failure conditions (half of a concrete spillway fails, the time of failure set at the lowest recommended value, Manning's "n" set greater than the calibrated value), none of the buildings would be affected because all flows are contained within the river banks.

A failure of the Littlefield Dam during flood conditions would not endanger life. The impact on downstream property would be minor and similar to impacts that periodically occur during spring. The greatest incremental increase in the water surface elevations would be approximately 0.7 feet.

On this basis, Littlefield Dam should be classified as a low hazard structure.

APPENDICES A

DAMBRK RUNS

DAMBRK RUN NO. 1

- DAMBRK -
DAMBREAK PROGRAM BY DANNY L. FREAD
HYDROLOGIC RESEARCH LABORATORY
W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910
VERSION: 07/18/84

PC implementation by:

HAESTAD METHODS
37 BROOKSIDE ROAD
WATERBURY, CONNECTICUT 06708
UNITED STATES OF AMERICA
203 755-1666

PC Version: 4.01.0 - May 1986

S/N: 50002205

DATE: 02/02/1988 TIME: 12:56:44.55

DATA FILE: LITTIN9.DAT

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

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

LITTLEFIELD DAM

ON

LITTLE ANDY RIVER

ANALYSIS BY

MORRISON-KNUDSEN ENGINEERS
50 WASHINGTON STREET - 9TH FLOOR
NORWALK, CONNECTICUT 06854

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 LITTLEFIELD 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	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	2
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IOPUT= 1 0 0 1 0 0 1 1 1 0 0 10

IDAM= 7

DAM NUMBER 1

LITTLEFIELD DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	216.00
SIDE SLOPE OF BREACH		Z	0.00

ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	200.00
WIDTH OF BASE OF BREACH	FT	BB	65.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	0.10
ELEVATION OF WATER WHEN BREACHED	FT	HF	216.00
ELEVATION OF TOP OF DAM	FT	HD	216.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	0.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	0.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	0.00
DISCHARGE COEF. FOR GATE FLOW		CG	0.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	0.00
DISCHARGE THRU TURBINES	CFS	QT	3000.00

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 0.00 HRS.

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

INFLOW HYDROGRAPH TO LITTLEFIELD DAM

****

3000.00 3000.00

TIME OF INFLOW HYDROGRAPH ORDINATES

0.0000 4.0000

CROSS-SECTIONAL PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	21
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	2
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	KCG	0

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

8 21

DOWNSTREAM FLOW PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	0.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	0.000
INITIAL SIZE OF TIME STEP	HR	DTHM	0.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	0.25
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	1.35
THETA WEIGHTING FACTOR		THETA	0.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	0.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

DOWNSTREAM BOUNDARY RATING TABLE

STAGE	DISCHARGE
174.50	0.00
192.00	195.00
192.00	600.00
192.00	3000.00
193.10	8100.00
196.60	16800.00
198.50	22100.00
200.60	28500.00

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 121 (MAXIMUM ALLOWABLE = 200

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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	0.00	204.20				
2	0.34	202.48	1	0.34	5.07	
3	1.22	198.00	2	0.88	5.11	
4	1.33	197.41	3	0.12	5.13	
5	1.34	197.39	4	0.00	5.00	
6	1.64	195.83	5	0.31	5.08	
7	1.80	188.00	6	0.16	48.63	
8	1.84	183.10	7	0.04	128.95	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW
9	2.41	182.33	8	0.57	1.36	
10	2.42	182.31	9	0.02	1.33	
11	2.44	182.28	10	0.02	1.58	
12	2.57	182.11	11	0.13	1.32	
13	2.59	182.09	12	0.01	1.33	
14	2.60	182.08	13	0.01	1.00	
15	3.28	181.14	14	0.69	1.37	
16	3.70	180.57	15	0.42	1.35	
17	4.06	180.09	16	0.36	1.35	
18	4.07	180.08	17	0.00	2.50	
19	4.13	180.00	18	0.06	1.27	
20	4.55	174.70	19	0.42	12.62	
21	4.79	174.50	20	0.24	0.83	

RE-NUMBERED VALUES FOR IDAM

IDAM(1) = 40

L=121	X(L)=	4.790	YD(L)=	192.00	K= 2	QDI(L)=	3000.0
L=120	X(L)=	4.763	YD(L)=	192.00	K= 2	QDI(L)=	3000.0
L=119	X(L)=	4.736	YD(L)=	192.01	K= 2	QDI(L)=	3000.0
L=118	X(L)=	4.709	YD(L)=	192.01	K= 2	QDI(L)=	3000.0
L=117	X(L)=	4.682	YD(L)=	192.02	K= 2	QDI(L)=	3000.0
L=116	X(L)=	4.656	YD(L)=	192.02	K= 2	QDI(L)=	3000.0
L=115	X(L)=	4.629	YD(L)=	192.03	K= 2	QDI(L)=	3000.0
L=114	X(L)=	4.602	YD(L)=	192.04	K= 2	QDI(L)=	3000.0
L=113	X(L)=	4.575	YD(L)=	192.04	K= 2	QDI(L)=	3000.0
L=112	X(L)=	4.548	YD(L)=	192.05	K= 2	QDI(L)=	3000.0
L=111	X(L)=	4.495	YD(L)=	192.06	K= 3	QDI(L)=	3000.0
L=110	X(L)=	4.443	YD(L)=	192.08	K= 3	QDI(L)=	3000.0
L=109	X(L)=	4.391	YD(L)=	192.10	K= 3	QDI(L)=	3000.0
L=108	X(L)=	4.338	YD(L)=	192.12	K= 3	QDI(L)=	3000.0
L=107	X(L)=	4.286	YD(L)=	192.14	K= 3	QDI(L)=	3000.0
L=106	X(L)=	4.233	YD(L)=	192.18	K= 3	QDI(L)=	3000.0
L=105	X(L)=	4.181	YD(L)=	192.22	K= 3	QDI(L)=	3000.0
L=104	X(L)=	4.128	YD(L)=	192.28	K= 3	QDI(L)=	3000.0
L=103	X(L)=	4.118	YD(L)=	192.28	K= 3	QDI(L)=	3000.0
L=102	X(L)=	4.107	YD(L)=	192.29	K= 2	QDI(L)=	3000.0
L=101	X(L)=	4.097	YD(L)=	192.29	K= 2	QDI(L)=	3000.0
L=100	X(L)=	4.086	YD(L)=	192.30	K= 2	QDI(L)=	3000.0
L= 99	X(L)=	4.076	YD(L)=	192.31	K= 2	QDI(L)=	3000.0
L= 98	X(L)=	4.065	YD(L)=	192.32	K= 2	QDI(L)=	3000.0
L= 97	X(L)=	4.061	YD(L)=	192.33	K= 1	QDI(L)=	3000.0
L= 96	X(L)=	4.010	YD(L)=	192.55	K= 3	QDI(L)=	3000.0
L= 95	X(L)=	3.959	YD(L)=	192.75	K= 3	QDI(L)=	3000.0
L= 94	X(L)=	3.908	YD(L)=	192.95	K= 3	QDI(L)=	3000.0
L= 93	X(L)=	3.858	YD(L)=	193.14	K= 3	QDI(L)=	3000.0
L= 92	X(L)=	3.807	YD(L)=	193.32	K= 3	QDI(L)=	3000.0
L= 91	X(L)=	3.756	YD(L)=	193.50	K= 3	QDI(L)=	3000.0
L= 90	X(L)=	3.705	YD(L)=	193.67	K= 3	QDI(L)=	3000.0

L= 89	X(L)=	3.652	YD(L)=	193.86	K= 3	QDI(L)=	3000.0
L= 88	X(L)=	[illegible]	YD(L)=	194		(L)=	300
L= 87	X(L)=	3.547	YD(L)=	194.20	K= 3	QDI(L)=	3000.0
L= 86	X(L)=	3.495	YD(L)=	194.36	K= 3	QDI(L)=	3000.0
L= 85	X(L)=	3.442	YD(L)=	194.50	K= 3	QDI(L)=	3000.0
L= 84	X(L)=	3.389	YD(L)=	194.63	K= 2	QDI(L)=	3000.0
L= 83	X(L)=	3.337	YD(L)=	194.74	K= 2	QDI(L)=	3000.0
L= 82	X(L)=	3.284	YD(L)=	194.85	K= 2	QDI(L)=	3000.0
L= 81	X(L)=	3.231	YD(L)=	194.95	K= 2	QDI(L)=	3000.0
L= 80	X(L)=	3.178	YD(L)=	195.04	K= 2	QDI(L)=	3000.0
L= 79	X(L)=	3.125	YD(L)=	195.13	K= 2	QDI(L)=	3000.0
L= 78	X(L)=	3.073	YD(L)=	195.22	K= 2	QDI(L)=	3000.0
L= 77	X(L)=	3.020	YD(L)=	195.30	K= 2	QDI(L)=	3000.0
L= 76	X(L)=	2.967	YD(L)=	195.38	K= 2	QDI(L)=	3000.0
L= 75	X(L)=	2.914	YD(L)=	195.46	K= 2	QDI(L)=	3000.0
L= 74	X(L)=	2.861	YD(L)=	195.53	K= 2	QDI(L)=	3000.0
L= 73	X(L)=	2.808	YD(L)=	195.61	K= 2	QDI(L)=	3000.0
L= 72	X(L)=	2.756	YD(L)=	195.68	K= 1	QDI(L)=	3000.0
L= 71	X(L)=	2.703	YD(L)=	195.75	K= 2	QDI(L)=	3000.0
L= 70	X(L)=	2.650	YD(L)=	195.81	K= 2	QDI(L)=	3000.0
L= 69	X(L)=	2.597	YD(L)=	195.88	K= 2	QDI(L)=	3000.0
L= 68	X(L)=	2.587	YD(L)=	195.89	K= 2	QDI(L)=	3000.0
L= 67	X(L)=	2.572	YD(L)=	195.94	K= 2	QDI(L)=	3000.0
L= 66	X(L)=	2.551	YD(L)=	195.96	K= 2	QDI(L)=	3000.0
L= 65	X(L)=	2.529	YD(L)=	195.97	K= 2	QDI(L)=	3000.0
L= 64	X(L)=	2.508	YD(L)=	195.99	K= 2	QDI(L)=	3000.0
L= 63	X(L)=	2.486	YD(L)=	196.01	K= 2	QDI(L)=	3000.0
L= 62	X(L)=	2.465	YD(L)=	196.03	K= 2	QDI(L)=	3000.0
L= 61	X(L)=	2.443	YD(L)=	196.05	K= 2	QDI(L)=	3000.0
L= 60	X(L)=	2.424	YD(L)=	196.08	K= 2	QDI(L)=	3000.0
L= 59	X(L)=	2.409	YD(L)=	196.12	K= 2	QDI(L)=	3000.0
L= 58	X(L)=	2.377	YD(L)=	196.16	K= 2	QDI(L)=	3000.0
L= 57	X(L)=	2.346	YD(L)=	196.20	K= 2	QDI(L)=	3000.0
L= 56	X(L)=	2.314	YD(L)=	196.25	K= 2	QDI(L)=	3000.0
L= 55	X(L)=	2.283	YD(L)=	196.29	K= 2	QDI(L)=	3000.0
L= 54	X(L)=	2.251	YD(L)=	196.33	K= 2	QDI(L)=	3000.0
L= 53	X(L)=	2.220	YD(L)=	196.37	K= 2	QDI(L)=	3000.0
L= 52	X(L)=	2.188	YD(L)=	196.41	K= 2	QDI(L)=	3000.0
L= 51	X(L)=	2.157	YD(L)=	196.45	K= 2	QDI(L)=	3000.0
L= 50	X(L)=	2.125	YD(L)=	196.50	K= 2	QDI(L)=	3000.0
L= 49	X(L)=	2.093	YD(L)=	196.54	K= 2	QDI(L)=	3000.0
L= 48	X(L)=	2.062	YD(L)=	196.58	K= 2	QDI(L)=	3000.0
L= 47	X(L)=	2.030	YD(L)=	196.62	K= 2	QDI(L)=	3000.0
L= 46	X(L)=	1.999	YD(L)=	196.66	K= 2	QDI(L)=	3000.0
L= 45	X(L)=	1.967	YD(L)=	196.71	K= 1	QDI(L)=	3000.0
L= 44	X(L)=	1.936	YD(L)=	196.75	K= 2	QDI(L)=	3000.0
L= 43	X(L)=	1.904	YD(L)=	196.80	K= 2	QDI(L)=	3000.0
L= 42	X(L)=	1.873	YD(L)=	196.84	K= 2	QDI(L)=	3000.0
L= 41	X(L)=	1.841	YD(L)=	196.88	K= 2	QDI(L)=	3000.0
L= 40	X(L)=	1.803	YD(L)=	216.00	K= 0	QDI(L)=	3000.0
L= 39	X(L)=	1.642	YD(L)=	216.02	K= 3	QDI(L)=	3000.0
L= 38	X(L)=	1.540	YD(L)=	216.04	K= 4	QDI(L)=	3000.0
L= 37	X(L)=	1.437	YD(L)=	216.09	K= 3	QDI(L)=	3000.0
L= 36	X(L)=	1.335	YD(L)=	216.15	K= 3	QDI(L)=	3000.0
L= 35	X(L)=	1.331	YD(L)=	216.16	K= 3	QDI(L)=	3000.0
L= 34	X(L)=	1.216	YD(L)=	216.33	K= 3	QDI(L)=	3000.0
L= 33	X(L)=	1.164	YD(L)=	216.38	K= 3	QDI(L)=	3000.0
L= 32	X(L)=	1.113	YD(L)=	216.43	K= 3	QDI(L)=	3000.0
L= 31	X(L)=	1.061	YD(L)=	216.47	K= 3	QDI(L)=	3000.0
L= 30	X(L)=	1.010	YD(L)=	216.52	K= 3	QDI(L)=	3000.0
L= 29	X(L)=	0.958	YD(L)=	216.56	K= 3	QDI(L)=	3000.0
L= 28	X(L)=	0.906	YD(L)=	216.60	K= 3	QDI(L)=	3000.0
L= 27	X(L)=	0.855	YD(L)=	216.64	K= 3	QDI(L)=	3000.0
L= 26	X(L)=	0.803	YD(L)=	216.68	K= 3	QDI(L)=	3000.0

L= 25	X(L)=	0.752	YD(L)=	216.71	K= 3	QDI(L)=	3000.0
= 24	X([illegible]	)	(L)=	216		(L)=	300
L= 23	X(L)=	0.649	YD(L)=	216.78	K= 3	QDI(L)=	3000.0
L= 22	X(L)=	0.597	YD(L)=	216.81	K= 3	QDI(L)=	3000.0
L= 21	X(L)=	0.545	YD(L)=	216.83	K= 3	QDI(L)=	3000.0
L= 20	X(L)=	0.494	YD(L)=	216.86	K= 3	QDI(L)=	3000.0
L= 19	X(L)=	0.442	YD(L)=	216.88	K= 3	QDI(L)=	3000.0
L= 18	X(L)=	0.391	YD(L)=	216.90	K= 3	QDI(L)=	3000.0
L= 17	X(L)=	0.339	YD(L)=	216.92	K= 3	QDI(L)=	3000.0
L= 16	X(L)=	0.318	YD(L)=	216.93	K= 3	QDI(L)=	3000.0
L= 15	X(L)=	0.297	YD(L)=	216.94	K= 3	QDI(L)=	3000.0
L= 14	X(L)=	0.275	YD(L)=	216.95	K= 3	QDI(L)=	3000.0
L= 13	X(L)=	0.254	YD(L)=	216.96	K= 3	QDI(L)=	3000.0
L= 12	X(L)=	0.233	YD(L)=	216.97	K= 3	QDI(L)=	3000.0
L= 11	X(L)=	0.212	YD(L)=	216.98	K= 3	QDI(L)=	3000.0
L= 10	X(L)=	0.191	YD(L)=	216.99	K= 3	QDI(L)=	3000.0
L= 9	X(L)=	0.169	YD(L)=	217.00	K= 3	QDI(L)=	3000.0
L= 8	X(L)=	0.148	YD(L)=	217.01	K= 3	QDI(L)=	3000.0
L= 7	X(L)=	0.127	YD(L)=	217.02	K= 3	QDI(L)=	3000.0
L= 6	X(L)=	0.106	YD(L)=	217.03	K= 3	QDI(L)=	3000.0
L= 5	X(L)=	0.085	YD(L)=	217.05	K= 3	QDI(L)=	3000.0
L= 4	X(L)=	0.064	YD(L)=	217.06	K= 3	QDI(L)=	3000.0
L= 3	X(L)=	0.042	YD(L)=	217.07	K= 3	QDI(L)=	3000.0
L= 2	X(L)=	0.021	YD(L)=	217.09	K= 3	QDI(L)=	3000.0
L= 1	X(L)=	0.000	YD(L)=	217.11	K= 3	QDI(L)=	3000.0

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

LS= 0 IM= 41 YD(IM)= 196.88 QDI(IM)= 3000.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
0.000	217.11	3000	0.085	1.74	240.00	0.00
0.021	217.09	3025	0.065	1.68	240.00	0.00
0.042	217.07	3052	0.080	1.62	240.00	0.00
0.064	217.06	3082	0.060	1.57	240.00	0.00
0.085	217.05	3115	0.055	1.52	240.00	0.00
0.106	217.03	3149	0.050	1.48	240.00	0.00
0.127	217.02	3186	0.075	1.44	240.00	0.00
0.148	217.01	3226	0.070	1.41	240.00	0.00
0.169	217.00	3267	0.035	1.38	240.00	0.00
0.191	216.99	3311	0.040	1.35	240.00	0.00
0.212	216.98	3357	0.000	1.32	240.00	0.00
0.233	216.97	3406	0.000	1.30	240.00	0.00
0.254	216.96	3457	0.000	1.28	240.00	0.00
0.275	216.95	3509	0.000	1.26	240.00	0.00
0.297	216.94	3565	0.000	1.24	240.00	0.00
0.318	216.93	3622	0.000	1.22	240.00	0.00
0.339	216.92	3683	0.000	1.21	240.00	0.00
0.391	216.90	3830	0.000	1.28	240.00	0.00
0.442	216.88	3973	0.000	1.35	240.00	0.00
0.494	216.86	4111	0.000	1.43	240.00	0.00
0.545	216.83	4244	0.000	1.52	240.00	0.00
0.597	216.81	4372	0.000	1.63	240.00	0.00
0.649	216.78	4495	0.000	1.74	240.00	0.00
0.700	216.75	4613	0.000	1.86	240.00	0.00
0.752	216.71	4726	0.000	2.00	240.00	0.00
0.803	216.68	4836	0.055	2.15	240.00	0.00
0.855	216.64	4944	0.000	2.31	240.00	0.00
0.906	216.60	5049	0.000	2.47	240.00	0.00
0.958	216.56	5151	0.000	2.63	240.00	0.00
1.010	216.52	5251	0.000	2.79	240.00	0.00
1.061	216.47	5354	0.000	2.98	240.00	0.00
1.113	216.43	5461	0.000	3.23	240.00	0.00
1.164	216.38	5570	0.050	3.49	240.00	0.00
1.216	216.34	5679	0.045	3.75	240.00	0.00
1.331	216.17	5896	0.040	6.44	230.00	0.00
1.335	216.17	5903	0.040	6.48	230.00	0.00
1.437	216.10	6146	0.025	5.66	230.00	0.00
1.540	216.05	6664	0.015	4.93	230.00	0.00
1.642	216.03	7660	0.005	4.23	230.00	0.00
1.803	216.00	10070	0.000	3.18	230.00	0.00
1.841	199.77	10070	0.195	5.27	210.00	0.00
1.873	199.69	9854	0.205	4.86	210.00	0.00
1.904	199.59	9583	0.215	4.60	210.00	0.00
1.936	199.50	9341	0.245	4.37	210.00	0.00
1.967	199.40	9030	0.260	4.21	210.00	0.00
1.999	199.30	8791	0.280	4.06	210.00	0.00
2.030	199.20	8526	0.305	3.95	210.00	0.00
2.062	199.11	8277	0.330	3.84	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
2.093	199.02	8073	0.365	3.75	210.00	0.00
2.125	198.94	7865	0.405	3.67	210.00	0.00
2.157	198.86	7672	0.470	3.58	210.00	0.00
2.188	198.79	7495	0.520	3.49	210.00	0.00
2.220	198.73	7324	0.550	3.40	210.00	0.00
2.251	198.67	7178	0.580	3.31	210.00	0.00
2.283	198.61	7052	0.600	3.25	210.00	0.00
2.314	198.56	6939	0.620	3.18	210.00	0.00
2.346	198.51	6823	0.635	3.11	210.00	0.00
2.377	198.45	6700	0.655	3.05	210.00	0.00
2.409	198.40	6576	0.665	3.00	210.00	0.00
2.424	198.32	6541	0.685	3.88	210.00	0.00
2.443	198.28	6509	0.695	3.88	210.00	0.00
2.465	198.27	6467	0.700	3.42	210.00	0.00
2.486	198.25	6414	0.705	3.04	210.00	0.00
2.508	198.23	6352	0.705	2.73	210.00	0.00
2.529	198.21	6283	0.710	2.46	210.00	0.00
2.551	198.20	6209	0.715	2.23	210.00	0.00
2.572	198.18	6132	0.720	2.04	210.00	0.00
2.587	198.09	6096	0.735	3.38	210.00	0.00
2.597	198.07	6083	0.740	3.37	210.00	0.00
2.650	197.99	6007	0.755	3.17	210.00	0.00
2.703	197.90	5922	0.770	3.01	210.00	0.00
2.756	197.81	5832	0.785	2.88	210.00	0.00
2.808	197.71	5738	0.800	2.77	210.00	0.00
2.861	197.62	5642	0.810	2.68	210.00	0.00
2.914	197.53	5541	0.825	2.60	210.00	0.00
2.967	197.44	5438	0.835	2.53	210.00	0.00
3.020	197.35	5333	0.845	2.46	210.00	0.00
3.073	197.25	5228	0.855	2.40	210.00	0.00
3.125	197.16	5125	0.865	2.35	210.00	0.00
3.178	197.06	5032	0.875	2.29	210.00	0.00
3.231	196.96	4962	0.885	2.24	210.00	0.00
3.284	196.85	4920	0.890	2.19	210.00	0.00
3.337	196.73	4896	0.895	2.27	210.00	0.00
3.389	196.60	4880	0.905	2.38	210.00	0.00
3.442	196.44	4870	0.910	2.51	210.00	0.00
3.495	196.27	4864	0.915	2.68	210.00	0.00
3.547	196.07	4860	0.920	2.91	210.00	0.00
3.600	195.85	4857	0.925	3.19	210.00	0.00
3.652	195.59	4855	0.930	3.51	210.00	0.00
3.705	195.31	4854	0.935	3.88	210.00	0.00
3.756	195.05	4853	0.940	3.94	210.00	0.00
3.807	194.78	4852	0.945	4.01	210.00	0.00
3.858	194.49	4851	0.950	4.10	210.00	0.00
3.908	194.19	4851	0.950	4.20	210.00	0.00
3.959	193.85	4851	0.960	4.31	210.00	0.00
4.010	193.48	4850	0.965	4.46	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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)
4.061	193.07	4850	0.980	4.63	210.00	0.00
4.065	193.04	4850	0.980	4.65	210.00	0.00
4.076	193.03	4850	0.980	4.42	210.00	0.00
4.086	193.02	4850	0.980	4.18	210.00	0.00
4.097	193.01	4850	0.980	3.91	210.00	0.00
4.107	193.01	4849	0.980	3.63	210.00	0.00
4.118	193.00	4849	0.980	3.34	210.00	0.00
4.128	193.00	4849	0.980	3.06	210.00	0.00
4.181	192.88	4849	0.985	2.82	210.00	0.00
4.233	192.80	4848	0.990	2.63	210.00	0.00
4.286	192.73	4848	0.990	2.49	210.00	0.00
4.338	192.68	4848	0.995	2.38	210.00	0.00
4.391	192.63	4848	0.995	2.31	210.00	0.00
4.443	192.59	4848	1.000	2.27	210.00	0.00
4.495	192.55	4848	1.000	2.25	210.00	0.00
4.548	192.52	4848	1.005	2.27	210.00	0.00
4.575	192.50	4848	1.005	2.26	210.00	0.00
4.602	192.49	4848	1.010	2.25	210.00	0.00
4.629	192.47	4848	1.010	2.24	210.00	0.00
4.656	192.46	4848	1.015	2.22	210.00	0.00
4.682	192.44	4848	1.015	2.21	210.00	0.00
4.709	192.43	4848	1.015	2.20	210.00	0.00
4.736	192.42	4848	1.020	2.19	210.00	0.00
4.763	192.41	4848	1.025	2.17	210.00	0.00
4.790	192.40	4848	1.020	2.16	210.00	0.00

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 41
BELOW LITTLEFIELD DAM AT MILE 1.84

GAGE ZERO = 183.10 MAX ELEVATION REACHED BY FLOOD WAVE = 199.77
FLOOD STAGE = 26.90
MAX STAGE = 16.67 AT TIME = 0.195 HOURS
MAX FLOW = 10070 AT TIME = 0.100 HOURS

HR	STAGE	FLOW	O	5000	10000	15000	20000	25000
0.00	13.8	3000	I	* I	I	I	I	I
0.05	14.3	4241	I	* I	I	I	I	I
0.10	16.3	10070	I	I	*	I	I	I
0.15	16.6	8416	I	I	* I	I	I	I
0.20	16.7	7442	I	I *	I	I	I	I
0.25	16.6	6814	I	I *	I	I	I	I
0.30	16.6	6383	I	I *	I	I	I	I
0.35	16.6	6072	I	I *	I	I	I	I
0.40	16.5	5835	I	I *	I	I	I	I
0.45	16.5	5645	I	I*	I	I	I	I
0.50	16.4	5483	I	I*	I	I	I	I
0.55	16.4	5340	I	I*	I	I	I	I
0.60	16.4	5210	I	*	I	I	I	I
0.65	16.3	5090	I	*	I	I	I	I
0.70	16.3	4978	I	*	I	I	I	I
0.75	16.3	4872	I	*	I	I	I	I
0.80	16.2	4773	I	*	I	I	I	I
0.85	16.2	4678	I	*I	I	I	I	I
0.90	16.1	4588	I	*I	I	I	I	I
0.95	16.1	4503	I	*I	I	I	I	I
1.00	16.0	4422	I	*I	I	I	I	I
1.05	16.0	4345	I	*I	I	I	I	I
1.10	15.9	4271	I	*I	I	I	I	I
1.15	15.9	4202	I	* I	I	I	I	I
1.20	15.8	4136	I	* I	I	I	I	I
1.25	15.8	4073	I	* I	I	I	I	I
1.30	15.7	4013	I	* I	I	I	I	I
1.35	15.7	3957	I	* I	I	I	I	I
1.40	15.6	3903	I	* I	I	I	I	I
1.45	15.6	3852	I	* I	I	I	I	I
1.50	15.5	3804	I	* I	I	I	I	I
1.55	15.4	3758	I	* I	I	I	I	I
1.60	15.4	3715	I	* I	I	I	I	I
1.65	15.3	3674	I	* I	I	I	I	I
1.70	15.3	3635	I	* I	I	I	I	I
1.75	15.2	3598	I	* I	I	I	I	I
1.80	15.2	3564	I	* I	I	I	I	I
1.85	15.1	3531	I	* I	I	I	I	I
1.90	15.1	3500	I	* I	I	I	I	I
1.95	15.0	3471	I	* I	I	I	I	I
2.00	15.0	3443	I	* I	I	I	I	I
2.05	14.9	3417	I	* I	I	I	I	I
2.10	14.9	3393	I	* I	I	I	I	I
2.15	14.8	3369	I	* I	I	I	I	I
2.20	14.8	3347	I	* I	I	I	I	I
2.25	14.8	3327	I	* I	I	I	I	I
2.30	14.7	3307	I	* I	I	I	I	I
2.35	14.7	3289	I	* I	I	I	I	I
2.40	14.6	3272	I	* I	I	I	I	I
2.45	14.6	3256	I	* I	I	I	I	I
2.50	14.6	3240	I	* I	I	I	I	I

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 121
BELOW LITTLEFIELD DAM AT MILE 4.79

GAGE ZERO = 174.50 MAX ELEVATION REACHED BY FLOOD WAVE = 192.40
FLOOD STAGE = 35.50
MAX STAGE = 17.90 AT TIME = 1.020 HOURS
MAX FLOW = 4848 AT TIME = 1.025 HOURS

HR	STAGE	FLOW	0	1000	2000	3000	4000	5000
0.0	17.5	3000	I	I	I	*	I	I
0.1	17.5	3000	I	I	I	*	I	I
0.2	17.5	3000	I	I	I	*	I	I
0.3	17.5	3069	I	I	I	I*	I	I
0.4	17.6	3575	I	I	I	I *	I	I
0.5	17.7	4075	I	I	I	I	I*	I
0.6	17.8	4417	I	I	I	I	I *	I
0.7	17.9	4631	I	I	I	I	I *	I
0.8	17.9	4757	I	I	I	I	I	* I
0.9	17.9	4823	I	I	I	I	I	* I
1.0	17.9	4847	I	I	I	I	I	* I
1.1	17.9	4840	I	I	I	I	I	* I
1.2	17.9	4810	I	I	I	I	I	* I
1.3	17.9	4762	I	I	I	I	I	* I
1.4	17.9	4701	I	I	I	I	I *	I
1.5	17.9	4630	I	I	I	I	I *	I
1.6	17.8	4552	I	I	I	I	I *	I
1.7	17.8	4471	I	I	I	I	I *	I
1.8	17.8	4387	I	I	I	I	I *	I
1.9	17.8	4302	I	I	I	I	I *	I
2.0	17.8	4218	I	I	I	I	I *	I
2.1	17.7	4135	I	I	I	I	I*	I
2.2	17.7	4055	I	I	I	I	I*	I
2.3	17.7	3978	I	I	I	I	*	I
2.4	17.7	3904	I	I	I	I	*I	I
2.5	17.7	3834	I	I	I	I	* I	I
2.6	17.7	3768	I	I	I	I	* I	I
2.7	17.7	3705	I	I	I	I	* I	I
2.8	17.6	3646	I	I	I	I	* I	I
2.9	17.6	3592	I	I	I	I	* I	I
3.0	17.6	3541	I	I	I	I	* I	I
3.1	17.6	3494	I	I	I	I	* I	I
3.2	17.6	3450	I	I	I	I	* I	I
3.3	17.6	3410	I	I	I	I	* I	I
3.4	17.6	3373	I	I	I	I	* I	I

DAMBRK RUN NO. 2

- DAMBRK -
DAMBREAK PROGRAM BY DANNY L. FREAD
HYDROLOGIC RESEARCH LABORATORY
W23. OFFICE OF HYDROLOGY
NOAA. NATIONAL WEATHER SERVICE
SILVER SPRING. MARYLAND 20910
VERSION: 07/18/84

PC implementation by:

HAESTAD METHODS
37 BROOKSIDE ROAD
WATERBURY. CONNECTICUT 06708
UNITED STATES OF AMERICA
203 755-1666

PC Version: 4.01.0 - May 1986

S/N: 50002205

DATE: 02/02/1988 TIME: 16:30:48.55

DATA FILE: LITTIN9.DAT

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

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

LITTLEFIELD DAM

ON

LITTLE ANDY RIVER

ANALYSIS BY

MORRISON-KNUDSEN ENGINEERS
50 WASHINGTON STREET - 9TH FLOOR
NORWALK. CONNECTICUT 06854

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 LITTLEFIELD 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	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	2
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IOPUT= 1 0 0 1 0 0 1 1 1 0 0 10

IDAM= 7

DAM NUMBER 1

LITTLEFIELD DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	216.00
SIDE SLOPE OF BREACH		Z	0.00

LEVA OF OM REAC		MIN	20
WIDTH OF BASE OF BREACH	FT	BB	175.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	0.10
ELEVATION OF WATER WHEN BREACHED	FT	HF	216.00
ELEVATION OF TOP OF DAM	FT	HD	216.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	0.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	0.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	0.00
DISCHARGE COEF. FOR GATE FLOW		CG	0.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	0.00
DISCHARGE THRU TURBINES	CFS	QT	3000.00

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 0.00 HRS.

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

INFLOW HYDROGRAPH TO LITTLEFIELD DAM

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3000.00 3000.00

TIME OF INFLOW HYDROGRAPH ORDINATES

0.0000 4.0000

CROSS-SECTIONAL PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	21
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	2
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	KCG	0

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

8 21

DOWNSTREAM FLOW PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	0.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	0.000
INITIAL SIZE OF TIME STEP	HR	DTHM	0.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	0.25
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	1.35
THETA WEIGHTING FACTOR		THETA	0.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	0.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

DOWNSTREAM BOUNDARY RATING TABLE

STAGE	DISCHARGE
174.50	0.00
192.00	195.00
192.00	600.00
192.00	3000.00
193.10	8100.00
196.60	16800.00
198.50	22100.00
200.60	28500.00

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 121 (MAXIMUM ALLOWABLE = 200

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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	0.00	204.20				
2	0.34	202.48	1	0.34	5.07	
3	1.22	198.00	2	0.88	5.11	
4	1.33	197.41	3	0.12	5.13	
5	1.34	197.39	4	0.00	5.00	
6	1.64	195.83	5	0.31	5.08	
7	1.80	188.00	6	0.16	48.63	
8	1.84	183.10	7	0.04	128.95	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW
9	2.41	182.33	8	0.57	1.36	
10	2.42	182.31	9	0.02	1.33	
11	2.44	182.28	10	0.02	1.58	
12	2.57	182.11	11	0.13	1.32	
13	2.59	182.09	12	0.01	1.33	
14	2.60	182.08	13	0.01	1.00	
15	3.28	181.14	14	0.69	1.37	
16	3.70	180.57	15	0.42	1.35	
17	4.06	180.09	16	0.36	1.35	
18	4.07	180.08	17	0.00	2.50	
19	4.13	180.00	18	0.06	1.27	
20	4.55	174.70	19	0.42	12.62	
21	4.79	174.50	20	0.24	0.83	

RE-NUMBERED VALUES FOR IDAM

IDAM(1) = 40

L=121	X(L)=	4.790	YD(L)=	192.00	K= 2	QDI(L)=	3000.0
L=120	X(L)=	4.763	YD(L)=	192.00	K= 2	QDI(L)=	3000.0
L=119	X(L)=	4.736	YD(L)=	192.01	K= 2	QDI(L)=	3000.0
L=118	X(L)=	4.709	YD(L)=	192.01	K= 2	QDI(L)=	3000.0
L=117	X(L)=	4.682	YD(L)=	192.02	K= 2	QDI(L)=	3000.0
L=116	X(L)=	4.656	YD(L)=	192.02	K= 2	QDI(L)=	3000.0
L=115	X(L)=	4.629	YD(L)=	192.03	K= 2	QDI(L)=	3000.0
L=114	X(L)=	4.602	YD(L)=	192.04	K= 2	QDI(L)=	3000.0
L=113	X(L)=	4.575	YD(L)=	192.04	K= 2	QDI(L)=	3000.0
L=112	X(L)=	4.548	YD(L)=	192.05	K= 2	QDI(L)=	3000.0
L=111	X(L)=	4.495	YD(L)=	192.06	K= 3	QDI(L)=	3000.0
L=110	X(L)=	4.443	YD(L)=	192.08	K= 3	QDI(L)=	3000.0
L=109	X(L)=	4.391	YD(L)=	192.10	K= 3	QDI(L)=	3000.0
L=108	X(L)=	4.338	YD(L)=	192.12	K= 3	QDI(L)=	3000.0
L=107	X(L)=	4.286	YD(L)=	192.14	K= 3	QDI(L)=	3000.0
L=106	X(L)=	4.233	YD(L)=	192.18	K= 3	QDI(L)=	3000.0
L=105	X(L)=	4.181	YD(L)=	192.22	K= 3	QDI(L)=	3000.0
L=104	X(L)=	4.128	YD(L)=	192.28	K= 3	QDI(L)=	3000.0
L=103	X(L)=	4.118	YD(L)=	192.28	K= 3	QDI(L)=	3000.0
L=102	X(L)=	4.107	YD(L)=	192.29	K= 2	QDI(L)=	3000.0
L=101	X(L)=	4.097	YD(L)=	192.29	K= 2	QDI(L)=	3000.0
L=100	X(L)=	4.086	YD(L)=	192.30	K= 2	QDI(L)=	3000.0
L= 99	X(L)=	4.076	YD(L)=	192.31	K= 2	QDI(L)=	3000.0
L= 98	X(L)=	4.065	YD(L)=	192.32	K= 2	QDI(L)=	3000.0
L= 97	X(L)=	4.061	YD(L)=	192.33	K= 1	QDI(L)=	3000.0
L= 96	X(L)=	4.010	YD(L)=	192.55	K= 3	QDI(L)=	3000.0
L= 95	X(L)=	3.959	YD(L)=	192.75	K= 3	QDI(L)=	3000.0
L= 94	X(L)=	3.908	YD(L)=	192.95	K= 3	QDI(L)=	3000.0
L= 93	X(L)=	3.858	YD(L)=	193.14	K= 3	QDI(L)=	3000.0
L= 92	X(L)=	3.807	YD(L)=	193.32	K= 3	QDI(L)=	3000.0
L= 91	X(L)=	3.756	YD(L)=	193.50	K= 3	QDI(L)=	3000.0
L= 90	X(L)=	3.705	YD(L)=	193.67	K= 3	QDI(L)=	3000.0

L= 89	X(L)=	3.652	YD(L)=	193.86	K= 3	QDI(L)=	3000.0
L= 88	X(L)=	3.600	YD(L)=	194.00	K= 3	QDI(L)=	3000.0
L= 87	X(L)=	3.547	YD(L)=	194.20	K= 3	QDI(L)=	3000.0
L= 86	X(L)=	3.495	YD(L)=	194.36	K= 3	QDI(L)=	3000.0
L= 85	X(L)=	3.442	YD(L)=	194.50	K= 3	QDI(L)=	3000.0
L= 84	X(L)=	3.389	YD(L)=	194.63	K= 2	QDI(L)=	3000.0
L= 83	X(L)=	3.337	YD(L)=	194.74	K= 2	QDI(L)=	3000.0
L= 82	X(L)=	3.284	YD(L)=	194.85	K= 2	QDI(L)=	3000.0
L= 81	X(L)=	3.231	YD(L)=	194.95	K= 2	QDI(L)=	3000.0
L= 80	X(L)=	3.178	YD(L)=	195.04	K= 2	QDI(L)=	3000.0
L= 79	X(L)=	3.125	YD(L)=	195.13	K= 2	QDI(L)=	3000.0
L= 78	X(L)=	3.073	YD(L)=	195.22	K= 2	QDI(L)=	3000.0
L= 77	X(L)=	3.020	YD(L)=	195.30	K= 2	QDI(L)=	3000.0
L= 76	X(L)=	2.967	YD(L)=	195.38	K= 2	QDI(L)=	3000.0
L= 75	X(L)=	2.914	YD(L)=	195.46	K= 2	QDI(L)=	3000.0
L= 74	X(L)=	2.861	YD(L)=	195.53	K= 2	QDI(L)=	3000.0
L= 73	X(L)=	2.808	YD(L)=	195.61	K= 2	QDI(L)=	3000.0
L= 72	X(L)=	2.756	YD(L)=	195.68	K= 1	QDI(L)=	3000.0
L= 71	X(L)=	2.703	YD(L)=	195.75	K= 2	QDI(L)=	3000.0
L= 70	X(L)=	2.650	YD(L)=	195.81	K= 2	QDI(L)=	3000.0
L= 69	X(L)=	2.597	YD(L)=	195.88	K= 2	QDI(L)=	3000.0
L= 68	X(L)=	2.587	YD(L)=	195.89	K= 2	QDI(L)=	3000.0
L= 67	X(L)=	2.572	YD(L)=	195.94	K= 2	QDI(L)=	3000.0
L= 66	X(L)=	2.551	YD(L)=	195.96	K= 2	QDI(L)=	3000.0
L= 65	X(L)=	2.529	YD(L)=	195.97	K= 2	QDI(L)=	3000.0
L= 64	X(L)=	2.508	YD(L)=	195.99	K= 2	QDI(L)=	3000.0
L= 63	X(L)=	2.486	YD(L)=	196.01	K= 2	QDI(L)=	3000.0
L= 62	X(L)=	2.465	YD(L)=	196.03	K= 2	QDI(L)=	3000.0
L= 61	X(L)=	2.443	YD(L)=	196.05	K= 2	QDI(L)=	3000.0
L= 60	X(L)=	2.424	YD(L)=	196.08	K= 2	QDI(L)=	3000.0
L= 59	X(L)=	2.409	YD(L)=	196.12	K= 2	QDI(L)=	3000.0
L= 58	X(L)=	2.377	YD(L)=	196.16	K= 2	QDI(L)=	3000.0
L= 57	X(L)=	2.346	YD(L)=	196.20	K= 2	QDI(L)=	3000.0
L= 56	X(L)=	2.314	YD(L)=	196.25	K= 2	QDI(L)=	3000.0
L= 55	X(L)=	2.283	YD(L)=	196.29	K= 2	QDI(L)=	3000.0
L= 54	X(L)=	2.251	YD(L)=	196.33	K= 2	QDI(L)=	3000.0
L= 53	X(L)=	2.220	YD(L)=	196.37	K= 2	QDI(L)=	3000.0
L= 52	X(L)=	2.188	YD(L)=	196.41	K= 2	QDI(L)=	3000.0
L= 51	X(L)=	2.157	YD(L)=	196.45	K= 2	QDI(L)=	3000.0
L= 50	X(L)=	2.125	YD(L)=	196.50	K= 2	QDI(L)=	3000.0
L= 49	X(L)=	2.093	YD(L)=	196.54	K= 2	QDI(L)=	3000.0
L= 48	X(L)=	2.062	YD(L)=	196.58	K= 2	QDI(L)=	3000.0
L= 47	X(L)=	2.030	YD(L)=	196.62	K= 2	QDI(L)=	3000.0
L= 46	X(L)=	1.999	YD(L)=	196.66	K= 2	QDI(L)=	3000.0
L= 45	X(L)=	1.967	YD(L)=	196.71	K= 1	QDI(L)=	3000.0
L= 44	X(L)=	1.936	YD(L)=	196.75	K= 2	QDI(L)=	3000.0
L= 43	X(L)=	1.904	YD(L)=	196.80	K= 2	QDI(L)=	3000.0
L= 42	X(L)=	1.873	YD(L)=	196.84	K= 2	QDI(L)=	3000.0
L= 41	X(L)=	1.841	YD(L)=	196.88	K= 2	QDI(L)=	3000.0
L= 40	X(L)=	1.803	YD(L)=	216.00	K= 0	QDI(L)=	3000.0
L= 39	X(L)=	1.642	YD(L)=	216.02	K= 3	QDI(L)=	3000.0
L= 38	X(L)=	1.540	YD(L)=	216.04	K= 4	QDI(L)=	3000.0
L= 37	X(L)=	1.437	YD(L)=	216.09	K= 3	QDI(L)=	3000.0
L= 36	X(L)=	1.335	YD(L)=	216.15	K= 3	QDI(L)=	3000.0
L= 35	X(L)=	1.331	YD(L)=	216.16	K= 3	QDI(L)=	3000.0
L= 34	X(L)=	1.216	YD(L)=	216.33	K= 3	QDI(L)=	3000.0
L= 33	X(L)=	1.164	YD(L)=	216.38	K= 3	QDI(L)=	3000.0
L= 32	X(L)=	1.113	YD(L)=	216.43	K= 3	QDI(L)=	3000.0
L= 31	X(L)=	1.061	YD(L)=	216.47	K= 3	QDI(L)=	3000.0
L= 30	X(L)=	1.010	YD(L)=	216.52	K= 3	QDI(L)=	3000.0
L= 29	X(L)=	0.958	YD(L)=	216.56	K= 3	QDI(L)=	3000.0
L= 28	X(L)=	0.906	YD(L)=	216.60	K= 3	QDI(L)=	3000.0
L= 27	X(L)=	0.855	YD(L)=	216.64	K= 3	QDI(L)=	3000.0
L= 26	X(L)=	0.803	YD(L)=	216.68	K= 3	QDI(L)=	3000.0

L= 24	X(L)=	0.670	YD(L)=	216.78	K= 3	QDI(L)=	3000.0
L= 23	X(L)=	0.649	YD(L)=	216.78	K= 3	QDI(L)=	3000.0
L= 22	X(L)=	0.597	YD(L)=	216.81	K= 3	QDI(L)=	3000.0
L= 21	X(L)=	0.545	YD(L)=	216.83	K= 3	QDI(L)=	3000.0
L= 20	X(L)=	0.494	YD(L)=	216.86	K= 3	QDI(L)=	3000.0
L= 19	X(L)=	0.442	YD(L)=	216.88	K= 3	QDI(L)=	3000.0
L= 18	X(L)=	0.391	YD(L)=	216.90	K= 3	QDI(L)=	3000.0
L= 17	X(L)=	0.339	YD(L)=	216.92	K= 3	QDI(L)=	3000.0
L= 16	X(L)=	0.318	YD(L)=	216.93	K= 3	QDI(L)=	3000.0
L= 15	X(L)=	0.297	YD(L)=	216.94	K= 3	QDI(L)=	3000.0
L= 14	X(L)=	0.275	YD(L)=	216.95	K= 3	QDI(L)=	3000.0
L= 13	X(L)=	0.254	YD(L)=	216.96	K= 3	QDI(L)=	3000.0
L= 12	X(L)=	0.233	YD(L)=	216.97	K= 3	QDI(L)=	3000.0
L= 11	X(L)=	0.212	YD(L)=	216.98	K= 3	QDI(L)=	3000.0
L= 10	X(L)=	0.191	YD(L)=	216.99	K= 3	QDI(L)=	3000.0
L= 9	X(L)=	0.169	YD(L)=	217.00	K= 3	QDI(L)=	3000.0
L= 8	X(L)=	0.148	YD(L)=	217.01	K= 3	QDI(L)=	3000.0
L= 7	X(L)=	0.127	YD(L)=	217.02	K= 3	QDI(L)=	3000.0
L= 6	X(L)=	0.106	YD(L)=	217.03	K= 3	QDI(L)=	3000.0
L= 5	X(L)=	0.085	YD(L)=	217.05	K= 3	QDI(L)=	3000.0
L= 4	X(L)=	0.064	YD(L)=	217.06	K= 3	QDI(L)=	3000.0
L= 3	X(L)=	0.042	YD(L)=	217.07	K= 3	QDI(L)=	3000.0
L= 2	X(L)=	0.021	YD(L)=	217.09	K= 3	QDI(L)=	3000.0
L= 1	X(L)=	0.000	YD(L)=	217.11	K= 3	QDI(L)=	3000.0

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

LS= 0 IM= 41 YD(IM)= 196.88 QDI(IM)= 3000.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
0.000	217.11	3000	0.085	1.74	240.00	0.00
0.021	217.09	3025	0.065	1.68	240.00	0.00
0.042	217.07	3053	0.080	1.62	240.00	0.00
0.064	217.06	3083	0.060	1.57	240.00	0.00
0.085	217.05	3116	0.055	1.53	240.00	0.00
0.106	217.03	3151	0.050	1.49	240.00	0.00
0.127	217.02	3189	0.075	1.45	240.00	0.00
0.148	217.01	3229	0.070	1.41	240.00	0.00
0.169	217.00	3273	0.035	1.38	240.00	0.00
0.191	216.99	3318	0.040	1.35	240.00	0.00
0.212	216.98	3367	0.000	1.33	240.00	0.00
0.233	216.97	3419	0.000	1.30	240.00	0.00
0.254	216.96	3474	0.000	1.28	240.00	0.00
0.275	216.95	3531	0.000	1.26	240.00	0.00
0.297	216.94	3592	0.000	1.24	240.00	0.00
0.318	216.93	3655	0.000	1.23	240.00	0.00
0.339	216.92	3721	0.000	1.21	240.00	0.00
0.391	216.90	3881	0.000	1.28	240.00	0.00
0.442	216.88	4038	0.000	1.36	240.00	0.00
0.494	216.86	4190	0.090	1.44	240.00	0.00
0.545	216.83	4337	0.085	1.53	240.00	0.00
0.597	216.81	4477	0.080	1.63	240.00	0.00
0.649	216.78	4611	0.000	1.75	240.00	0.00
0.700	216.75	4739	0.065	1.87	240.00	0.00
0.752	216.71	4861	0.060	2.01	240.00	0.00
0.803	216.68	4978	0.055	2.16	240.00	0.00
0.855	216.64	5091	0.000	2.32	240.00	0.00
0.906	216.60	5204	0.000	2.49	240.00	0.00
0.958	216.56	5319	0.000	2.65	240.00	0.00
1.010	216.52	5440	0.000	2.81	240.00	0.00
1.061	216.47	5570	0.000	3.06	240.00	0.00
1.113	216.43	5709	0.000	3.35	240.00	0.00
1.164	216.38	5852	0.020	3.65	240.00	0.00
1.216	216.34	5996	0.045	3.95	240.00	0.00
1.331	216.17	6294	0.030	7.03	230.00	0.00
1.335	216.17	6304	0.030	7.08	230.00	0.00
1.437	216.11	6731	0.025	6.56	230.00	0.00
1.540	216.07	7735	0.015	6.42	230.00	0.00
1.642	216.05	9743	0.005	7.35	230.00	0.00
1.803	216.00	14947	0.000	7.47	230.00	0.00
1.841	201.27	14947	0.100	6.58	210.00	0.00
1.873	201.11	14629	0.105	6.00	210.00	0.00
1.904	200.93	14217	0.105	5.59	210.00	0.00
1.936	200.75	13835	0.110	5.30	210.00	0.00
1.967	200.55	13397	0.115	5.07	210.00	0.00
1.999	200.36	12953	0.120	4.89	210.00	0.00
2.030	200.17	12499	0.125	4.75	210.00	0.00
2.062	199.99	12072	0.135	4.62	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
2.093	199.83	11630	0.145	4.51	210.00	0.00
2.125	199.67	11268	0.150	4.42	210.00	0.00
2.157	199.51	10885	0.160	4.33	210.00	0.00
2.188	199.37	10556	0.165	4.25	210.00	0.00
2.220	199.23	10230	0.175	4.16	210.00	0.00
2.251	199.11	9937	0.195	4.06	210.00	0.00
2.283	199.01	9686	0.200	3.95	210.00	0.00
2.314	198.91	9436	0.205	3.86	210.00	0.00
2.346	198.82	9211	0.220	3.77	210.00	0.00
2.377	198.73	8990	0.230	3.69	210.00	0.00
2.409	198.65	8787	0.240	3.61	210.00	0.00
2.424	198.51	8723	0.275	4.85	210.00	0.00
2.443	198.46	8659	0.510	4.85	210.00	0.00
2.465	198.45	8562	0.515	4.22	210.00	0.00
2.486	198.43	8436	0.520	3.71	210.00	0.00
2.508	198.41	8285	0.530	3.30	210.00	0.00
2.529	198.39	8097	0.535	2.94	210.00	0.00
2.551	198.37	7907	0.540	2.63	210.00	0.00
2.572	198.36	7726	0.550	2.37	210.00	0.00
2.587	198.26	7652	0.575	4.07	210.00	0.00
2.597	198.25	7625	0.580	4.07	210.00	0.00
2.650	198.16	7466	0.600	3.79	210.00	0.00
2.703	198.07	7282	0.620	3.57	210.00	0.00
2.756	197.98	7094	0.635	3.39	210.00	0.00
2.808	197.88	6908	0.650	3.24	210.00	0.00
2.861	197.78	6724	0.665	3.11	210.00	0.00
2.914	197.69	6540	0.680	3.00	210.00	0.00
2.967	197.60	6355	0.690	2.89	210.00	0.00
3.020	197.50	6169	0.700	2.80	210.00	0.00
3.073	197.41	5981	0.710	2.72	210.00	0.00
3.125	197.31	5790	0.720	2.64	210.00	0.00
3.178	197.21	5600	0.730	2.56	210.00	0.00
3.231	197.11	5411	0.735	2.48	210.00	0.00
3.284	197.01	5234	0.745	2.39	210.00	0.00
3.337	196.89	5096	0.750	2.46	210.00	0.00
3.389	196.75	5051	0.755	2.55	210.00	0.00
3.442	196.60	5036	0.760	2.66	210.00	0.00
3.495	196.42	5027	0.765	2.79	210.00	0.00
3.547	196.22	5021	0.775	2.97	210.00	0.00
3.600	195.99	5018	0.780	3.23	210.00	0.00
3.652	195.73	5015	0.785	3.57	210.00	0.00
3.705	195.44	5014	0.790	3.95	210.00	0.00
3.756	195.18	5013	0.790	4.02	210.00	0.00
3.807	194.90	5012	0.795	4.09	210.00	0.00
3.858	194.61	5011	0.800	4.18	210.00	0.00
3.908	194.29	5011	0.805	4.28	210.00	0.00
3.959	193.94	5010	0.810	4.41	210.00	0.00
4.010	193.56	5010	0.820	4.56	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
4.061	193.13	5009	0.835	4.75	210.00	0.00
4.065	193.10	5009	0.835	4.76	210.00	0.00
4.076	193.09	5009	0.835	4.53	210.00	0.00
4.086	193.08	5009	0.835	4.27	210.00	0.00
4.097	193.08	5009	0.835	4.00	210.00	0.00
4.107	193.07	5009	0.835	3.71	210.00	0.00
4.118	193.06	5009	0.840	3.41	210.00	0.00
4.128	193.06	5008	0.835	3.12	210.00	0.00
4.181	192.94	5008	0.840	2.88	210.00	0.00
4.233	192.85	5007	0.845	2.69	210.00	0.00
4.286	192.78	5007	0.850	2.55	210.00	0.00
4.338	192.73	5007	0.850	2.44	210.00	0.00
4.391	192.68	5006	0.855	2.37	210.00	0.00
4.443	192.63	5006	0.855	2.33	210.00	0.00
4.495	192.59	5006	0.860	2.32	210.00	0.00
4.548	192.56	5006	0.860	2.34	210.00	0.00
4.575	192.54	5006	0.860	2.32	210.00	0.00
4.602	192.53	5006	0.865	2.31	210.00	0.00
4.629	192.51	5006	0.865	2.30	210.00	0.00
4.656	192.50	5006	0.870	2.29	210.00	0.00
4.682	192.48	5006	0.870	2.28	210.00	0.00
4.709	192.47	5006	0.875	2.26	210.00	0.00
4.736	192.46	5006	0.875	2.25	210.00	0.00
4.763	192.44	5006	0.875	2.24	210.00	0.00
4.790	192.43	5006	0.875	2.22	210.00	0.00

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 41
BELOW LITTLEFIELD DAM AT MILE 1.84

GAGE ZERO = 183.10 MAX ELEVATION REACHED BY FLOOD WAVE = 201.27
FLOOD STAGE = 26.90
MAX STAGE = 18.17 AT TIME = 0.100 HOURS
MAX FLOW = 14948 AT TIME = 0.100 HOURS

HR	STAGE	FLOW	0	5000	10000	15000	20000	25000
0.00	13.8	3000	I	* I	I	I	I	I
0.05	15.7	8722	I	I	* I	I	I	I
0.10	18.2	14948	I	I	I	*	I	I
0.15	17.7	8905	I	I	* I	I	I	I
0.20	17.3	7037	I	I *	I	I	I	I
0.25	17.0	6322	I	I *	I	I	I	I
0.30	16.9	5961	I	I *	I	I	I	I
0.35	16.8	5735	I	I*	I	I	I	I
0.40	16.7	5564	I	I*	I	I	I	I
0.45	16.6	5417	I	I*	I	I	I	I
0.50	16.6	5283	I	I*	I	I	I	I
0.55	16.5	5158	I	*	I	I	I	I
0.60	16.5	5040	I	*	I	I	I	I
0.65	16.4	4928	I	*	I	I	I	I
0.70	16.4	4822	I	*	I	I	I	I
0.75	16.3	4721	I	*I	I	I	I	I
0.80	16.3	4626	I	*I	I	I	I	I
0.85	16.2	4535	I	*I	I	I	I	I
0.90	16.2	4449	I	*I	I	I	I	I
0.95	16.1	4368	I	*I	I	I	I	I
1.00	16.0	4290	I	*I	I	I	I	I
1.05	16.0	4217	I	* I	I	I	I	I
1.10	15.9	4149	I	* I	I	I	I	I
1.15	15.9	4085	I	* I	I	I	I	I
1.20	15.8	4023	I	* I	I	I	I	I
1.25	15.7	3964	I	* I	I	I	I	I
1.30	15.7	3908	I	* I	I	I	I	I
1.35	15.6	3855	I	* I	I	I	I	I
1.40	15.6	3806	I	* I	I	I	I	I
1.45	15.5	3759	I	* I	I	I	I	I
1.50	15.4	3714	I	* I	I	I	I	I
1.55	15.4	3672	I	* I	I	I	I	I
1.60	15.3	3632	I	* I	I	I	I	I
1.65	15.3	3595	I	* I	I	I	I	I
1.70	15.2	3560	I	* I	I	I	I	I
1.75	15.2	3526	I	* I	I	I	I	I
1.80	15.1	3495	I	* I	I	I	I	I
1.85	15.1	3465	I	* I	I	I	I	I
1.90	15.0	3437	I	* I	I	I	I	I
1.95	15.0	3411	I	* I	I	I	I	I
2.00	14.9	3386	I	* I	I	I	I	I
2.05	14.9	3363	I	* I	I	I	I	I
2.10	14.8	3341	I	* I	I	I	I	I
2.15	14.8	3320	I	* I	I	I	I	I
2.20	14.7	3301	I	* I	I	I	I	I
2.25	14.7	3283	I	* I	I	I	I	I
2.30	14.7	3268	I	* I	I	I	I	I
2.35	14.6	3265	I	* I	I	I	I	I
2.40	14.6	3263	I	* I	I	I	I	I
2.45	14.6	3261	I	* I	I	I	I	I
2.50	14.5	3259	I	* I	I	I	I	I

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 121
BELOW LITTLEFIELD DAM AT MILE 4.79

GAGE ZERO = 174.50 MAX ELEVATION REACHED BY FLOOD WAVE = 192.43
FLOOD STAGE = 35.50
MAX STAGE = 17.93 AT TIME = 0.875 HOURS
MAX FLOW = 5007 AT TIME = 0.880 HOURS

HR	STAGE	FLOW	O	2000	4000	6000	8000	10000
0.0	17.5	3000	I	I	* I	I	I	I
0.1	17.5	3000	I	I	* I	I	I	I
0.2	17.5	3000	I	I	* I	I	I	I
0.3	17.5	3206	I	I	* I	I	I	I
0.4	17.7	4019	I	I	*	I	I	I
0.5	17.8	4543	I	I	I *	I	I	I
0.6	17.9	4808	I	I	I *	I	I	I
0.7	17.9	4939	I	I	I *	I	I	I
0.8	17.9	4995	I	I	I *	I	I	I
0.9	17.9	5006	I	I	I *	I	I	I
1.0	17.9	4986	I	I	I *	I	I	I
1.1	17.9	4942	I	I	I *	I	I	I
1.2	17.9	4881	I	I	I *	I	I	I
1.3	17.9	4807	I	I	I *	I	I	I
1.4	17.9	4724	I	I	I *	I	I	I
1.5	17.9	4636	I	I	I *	I	I	I
1.6	17.8	4544	I	I	I *	I	I	I
1.7	17.8	4451	I	I	I *	I	I	I
1.8	17.8	4358	I	I	I *	I	I	I
1.9	17.8	4267	I	I	I*	I	I	I
2.0	17.8	4178	I	I	I*	I	I	I
2.1	17.7	4092	I	I	*	I	I	I
2.2	17.7	4009	I	I	*	I	I	I
2.3	17.7	3930	I	I	*	I	I	I
2.4	17.7	3856	I	I	*I	I	I	I
2.5	17.7	3786	I	I	*I	I	I	I
2.6	17.7	3721	I	I	*I	I	I	I
2.7	17.6	3663	I	I	* I	I	I	I
2.8	17.6	3612	I	I	* I	I	I	I
2.9	17.6	3567	I	I	* I	I	I	I
3.0	17.6	3527	I	I	* I	I	I	I
3.1	17.6	3492	I	I	* I	I	I	I
3.2	17.6	3461	I	I	* I	I	I	I
3.3	17.6	3434	I	I	* I	I	I	I
3.4	17.6	3410	I	I	* I	I	I	I

DAMBRK RUN NO. 3

- DAMBRK -
DAMBREAK PROGRAM BY DANNY L. FREAD
HYDROLOGIC RESEARCH LABORATORY
W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910
VERSION: 07/18/84

PC implementation by:

HAESTAD METHODS
37 BROOKSIDE ROAD
WATERBURY, CONNECTICUT 06708
UNITED STATES OF AMERICA
203 755-1666

PC Version: 4.01.0 - May 1986

S/N: 50002205

DATE: 02/02/1988 TIME: 13:48:28.17

DATA FILE: LITTIN10.DAT

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

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

LITTLEFIELD DAM

ON

LITTLE ANDY RIVER

ANALYSIS BY

MORRISON-KNUDSEN ENGINEERS
50 WASHINGTON STREET - 9TH FLOOR
NORWALK, CONNECTICUT 06854

BASED ON PROCEDURE DEVELOPED BY

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*** SUMMARY OF INPUT DATA ***
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INPUT CONTROL PARAMETERS FOR LITTLEFIELD 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	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	2
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IOPUT= 1 0 0 1 0 0 1 1 1 0 0 10

IDAM= 7

DAM NUMBER 1

LITTLEFIELD DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	216.95
SIDE SLOPE OF BREACH		Z	0.00

LEV N OF TOM REA		BMIN	20
WIDTH OF BASE OF BREACH	FT	BB	65.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	0.10
ELEVATION OF WATER WHEN BREACHED	FT	HF	216.95
ELEVATION OF TOP OF DAM	FT	HD	213.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	0.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	0.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	0.00
DISCHARGE COEF. FOR GATE FLOW		CG	0.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	1585.90
DISCHARGE THRU TURBINES	CFS	QT	0.00

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 0.00 HRS.

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

INFLOW HYDROGRAPH TO LITTLEFIELD DAM

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12450.00 12450.00

TIME OF INFLOW HYDROGRAPH ORDINATES

0.0000 4.0000

CROSS-SECTIONAL PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	21
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	2
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	KCG	0

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

8 21

DOWNSTREAM FLOW PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	0.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	0.000
INITIAL SIZE OF TIME STEP	HR	DTHM	0.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	0.25
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	1.35
THETA WEIGHTING FACTOR		THETA	0.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	0.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

DOWNSTREAM BOUNDARY RATING TABLE

STAGE	DISCHARGE
174.50	0.00
192.00	195.00
192.00	600.00
192.00	3000.00
193.10	8100.00
196.60	16800.00
198.50	22100.00
200.60	28500.00

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 121 (MAXIMUM ALLOWABLE = 200

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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	0.00	204.20				
2	0.34	202.48	1	0.34	5.07	
3	1.22	198.00	2	0.88	5.11	
4	1.33	197.41	3	0.12	5.13	
5	1.34	197.39	4	0.00	5.00	
6	1.64	195.83	5	0.31	5.08	
7	1.80	188.00	6	0.16	48.63	
8	1.84	183.10	7	0.04	128.95	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW
9	2.41	182.33	8	0.57	1.36	
10	2.42	182.31	9	0.02	1.33	
11	2.44	182.28	10	0.02	1.58	
12	2.57	182.11	11	0.13	1.32	
13	2.59	182.09	12	0.01	1.33	
14	2.60	182.08	13	0.01	1.00	
15	3.28	181.14	14	0.69	1.37	
16	3.70	180.57	15	0.42	1.35	
17	4.06	180.09	16	0.36	1.35	
18	4.07	180.08	17	0.00	2.50	
19	4.13	180.00	18	0.06	1.27	
20	4.55	174.70	19	0.42	12.62	
21	4.79	174.50	20	0.24	0.83	

RE-NUMBERED VALUES FOR IDAM

IDAM(1) = 40

L=121	X(L)=	4.790	YD(L)=	194.85	K= 2	QDI(L)=	12450.0
L=120	X(L)=	4.763	YD(L)=	194.90	K= 2	QDI(L)=	12450.0
L=119	X(L)=	4.736	YD(L)=	194.95	K= 2	QDI(L)=	12450.0
L=118	X(L)=	4.709	YD(L)=	195.00	K= 2	QDI(L)=	12450.0
L=117	X(L)=	4.682	YD(L)=	195.05	K= 2	QDI(L)=	12450.0
L=116	X(L)=	4.656	YD(L)=	195.10	K= 2	QDI(L)=	12450.0
L=115	X(L)=	4.629	YD(L)=	195.15	K= 2	QDI(L)=	12450.0
L=114	X(L)=	4.602	YD(L)=	195.21	K= 2	QDI(L)=	12450.0
L=113	X(L)=	4.575	YD(L)=	195.26	K= 2	QDI(L)=	12450.0
L=112	X(L)=	4.548	YD(L)=	195.32	K= 2	QDI(L)=	12450.0
L=111	X(L)=	4.495	YD(L)=	195.45	K= 3	QDI(L)=	12450.0
L=110	X(L)=	4.443	YD(L)=	195.58	K= 3	QDI(L)=	12450.0
L=109	X(L)=	4.391	YD(L)=	195.70	K= 3	QDI(L)=	12450.0
L=108	X(L)=	4.338	YD(L)=	195.83	K= 3	QDI(L)=	12450.0
L=107	X(L)=	4.286	YD(L)=	195.97	K= 3	QDI(L)=	12450.0
L=106	X(L)=	4.233	YD(L)=	196.12	K= 3	QDI(L)=	12450.0
L=105	X(L)=	4.181	YD(L)=	196.29	K= 3	QDI(L)=	12450.0
L=104	X(L)=	4.128	YD(L)=	196.48	K= 3	QDI(L)=	12450.0
L=103	X(L)=	4.118	YD(L)=	196.46	K= 3	QDI(L)=	12450.0
L=102	X(L)=	4.107	YD(L)=	196.44	K= 2	QDI(L)=	12450.0
L=101	X(L)=	4.097	YD(L)=	196.41	K= 2	QDI(L)=	12450.0
L=100	X(L)=	4.086	YD(L)=	196.35	K= 2	QDI(L)=	12450.0
L= 99	X(L)=	4.076	YD(L)=	196.27	K= 2	QDI(L)=	12450.0
L= 98	X(L)=	4.065	YD(L)=	196.16	K= 3	QDI(L)=	12450.0
L= 97	X(L)=	4.061	YD(L)=	196.25	K= 2	QDI(L)=	12450.0
L= 96	X(L)=	4.010	YD(L)=	197.23	K= 3	QDI(L)=	12450.0
L= 95	X(L)=	3.959	YD(L)=	198.03	K= 3	QDI(L)=	12450.0
L= 94	X(L)=	3.908	YD(L)=	198.75	K= 3	QDI(L)=	12450.0
L= 93	X(L)=	3.858	YD(L)=	199.41	K= 3	QDI(L)=	12450.0
L= 92	X(L)=	3.807	YD(L)=	200.04	K= 3	QDI(L)=	12450.0
L= 91	X(L)=	3.756	YD(L)=	200.63	K= 3	QDI(L)=	12450.0
L= 90	X(L)=	3.705	YD(L)=	201.22	K= 3	QDI(L)=	12450.0

L= 8	X(	00	D(L)	20	3	I(L	124
L= 87	X(L)=	3.547	YD(L)=	202.74	K= 3	QDI(L)=	12450.0
L= 86	X(L)=	3.495	YD(L)=	203.00	K= 3	QDI(L)=	12450.0
L= 85	X(L)=	3.442	YD(L)=	203.21	K= 3	QDI(L)=	12450.0
L= 84	X(L)=	3.389	YD(L)=	203.36	K= 3	QDI(L)=	12450.0
L= 83	X(L)=	3.337	YD(L)=	203.49	K= 2	QDI(L)=	12450.0
L= 82	X(L)=	3.284	YD(L)=	203.60	K= 2	QDI(L)=	12450.0
L= 81	X(L)=	3.231	YD(L)=	203.69	K= 2	QDI(L)=	12450.0
L= 80	X(L)=	3.178	YD(L)=	203.77	K= 2	QDI(L)=	12450.0
L= 79	X(L)=	3.125	YD(L)=	203.85	K= 2	QDI(L)=	12450.0
L= 78	X(L)=	3.073	YD(L)=	203.93	K= 2	QDI(L)=	12450.0
L= 77	X(L)=	3.020	YD(L)=	204.01	K= 2	QDI(L)=	12450.0
L= 76	X(L)=	2.967	YD(L)=	204.09	K= 2	QDI(L)=	12450.0
L= 75	X(L)=	2.914	YD(L)=	204.17	K= 2	QDI(L)=	12450.0
L= 74	X(L)=	2.861	YD(L)=	204.24	K= 2	QDI(L)=	12450.0
L= 73	X(L)=	2.808	YD(L)=	204.31	K= 2	QDI(L)=	12450.0
L= 72	X(L)=	2.756	YD(L)=	204.39	K= 2	QDI(L)=	12450.0
L= 71	X(L)=	2.703	YD(L)=	204.46	K= 2	QDI(L)=	12450.0
L= 70	X(L)=	2.650	YD(L)=	204.53	K= 2	QDI(L)=	12450.0
L= 69	X(L)=	2.597	YD(L)=	204.58	K= 2	QDI(L)=	12450.0
L= 68	X(L)=	2.587	YD(L)=	204.60	K= 2	QDI(L)=	12450.0
L= 67	X(L)=	2.572	YD(L)=	204.78	K= 3	QDI(L)=	12450.0
L= 66	X(L)=	2.551	YD(L)=	204.79	K= 2	QDI(L)=	12450.0
L= 65	X(L)=	2.529	YD(L)=	204.80	K= 2	QDI(L)=	12450.0
L= 64	X(L)=	2.508	YD(L)=	204.81	K= 2	QDI(L)=	12450.0
L= 63	X(L)=	2.486	YD(L)=	204.82	K= 2	QDI(L)=	12450.0
L= 62	X(L)=	2.465	YD(L)=	204.81	K= 2	QDI(L)=	12450.0
L= 61	X(L)=	2.443	YD(L)=	204.76	K= 2	QDI(L)=	12450.0
L= 60	X(L)=	2.424	YD(L)=	204.81	K= 2	QDI(L)=	12450.0
L= 59	X(L)=	2.409	YD(L)=	205.02	K= 3	QDI(L)=	12450.0
L= 58	X(L)=	2.377	YD(L)=	205.07	K= 2	QDI(L)=	12450.0
L= 57	X(L)=	2.346	YD(L)=	205.13	K= 2	QDI(L)=	12450.0
L= 56	X(L)=	2.314	YD(L)=	205.19	K= 2	QDI(L)=	12450.0
L= 55	X(L)=	2.283	YD(L)=	205.24	K= 2	QDI(L)=	12450.0
L= 54	X(L)=	2.251	YD(L)=	205.30	K= 2	QDI(L)=	12450.0
L= 53	X(L)=	2.220	YD(L)=	205.35	K= 2	QDI(L)=	12450.0
L= 52	X(L)=	2.188	YD(L)=	205.40	K= 2	QDI(L)=	12450.0
L= 51	X(L)=	2.157	YD(L)=	205.45	K= 2	QDI(L)=	12450.0
L= 50	X(L)=	2.125	YD(L)=	205.50	K= 2	QDI(L)=	12450.0
L= 49	X(L)=	2.093	YD(L)=	205.55	K= 2	QDI(L)=	12450.0
L= 48	X(L)=	2.062	YD(L)=	205.60	K= 2	QDI(L)=	12450.0
L= 47	X(L)=	2.030	YD(L)=	205.64	K= 2	QDI(L)=	12450.0
L= 46	X(L)=	1.999	YD(L)=	205.68	K= 1	QDI(L)=	12450.0
L= 45	X(L)=	1.967	YD(L)=	205.72	K= 1	QDI(L)=	12450.0
L= 44	X(L)=	1.936	YD(L)=	205.77	K= 2	QDI(L)=	12450.0
L= 43	X(L)=	1.904	YD(L)=	205.81	K= 2	QDI(L)=	12450.0
L= 42	X(L)=	1.873	YD(L)=	205.85	K= 2	QDI(L)=	12450.0
L= 41	X(L)=	1.841	YD(L)=	205.88	K= 2	QDI(L)=	12450.0
L= 40	X(L)=	1.803	YD(L)=	216.95	K= 0	QDI(L)=	12450.0
L= 39	X(L)=	1.642	YD(L)=	217.19	K= 4	QDI(L)=	12450.0
L= 38	X(L)=	1.540	YD(L)=	217.55	K= 4	QDI(L)=	12450.0
L= 37	X(L)=	1.437	YD(L)=	218.05	K= 2	QDI(L)=	12450.0
L= 36	X(L)=	1.335	YD(L)=	218.65	K= 2	QDI(L)=	12450.0
L= 35	X(L)=	1.331	YD(L)=	218.71	K= 2	QDI(L)=	12450.0
L= 34	X(L)=	1.216	YD(L)=	220.39	K= 3	QDI(L)=	12450.0
L= 33	X(L)=	1.164	YD(L)=	220.71	K= 3	QDI(L)=	12450.0
L= 32	X(L)=	1.113	YD(L)=	220.97	K= 2	QDI(L)=	12450.0
L= 31	X(L)=	1.061	YD(L)=	221.18	K= 2	QDI(L)=	12450.0
L= 30	X(L)=	1.010	YD(L)=	221.35	K= 3	QDI(L)=	12450.0
L= 29	X(L)=	0.958	YD(L)=	221.49	K= 3	QDI(L)=	12450.0
L= 28	X(L)=	0.906	YD(L)=	221.60	K= 3	QDI(L)=	12450.0
L= 27	X(L)=	0.855	YD(L)=	221.70	K= 3	QDI(L)=	12450.0
L= 26	X(L)=	0.803	YD(L)=	221.78	K= 3	QDI(L)=	12450.0

L= 23	X(L)=	0.649	YD(L)=	221.96	K= 3	QDI(L)=	12450.0
L= 22	X(L)=	0.597	YD(L)=	222.00	K= 3	QDI(L)=	12450.0
L= 21	X(L)=	0.545	YD(L)=	222.04	K= 3	QDI(L)=	12450.0
L= 20	X(L)=	0.494	YD(L)=	222.08	K= 3	QDI(L)=	12450.0
L= 19	X(L)=	0.442	YD(L)=	222.11	K= 3	QDI(L)=	12450.0
L= 18	X(L)=	0.391	YD(L)=	222.14	K= 3	QDI(L)=	12450.0
L= 17	X(L)=	0.339	YD(L)=	222.17	K= 3	QDI(L)=	12450.0
L= 16	X(L)=	0.318	YD(L)=	222.18	K= 3	QDI(L)=	12450.0
L= 15	X(L)=	0.297	YD(L)=	222.19	K= 3	QDI(L)=	12450.0
L= 14	X(L)=	0.275	YD(L)=	222.20	K= 3	QDI(L)=	12450.0
L= 13	X(L)=	0.254	YD(L)=	222.21	K= 3	QDI(L)=	12450.0
L= 12	X(L)=	0.233	YD(L)=	222.22	K= 3	QDI(L)=	12450.0
L= 11	X(L)=	0.212	YD(L)=	222.24	K= 3	QDI(L)=	12450.0
L= 10	X(L)=	0.191	YD(L)=	222.25	K= 3	QDI(L)=	12450.0
L= 9	X(L)=	0.169	YD(L)=	222.27	K= 3	QDI(L)=	12450.0
L= 8	X(L)=	0.148	YD(L)=	222.29	K= 3	QDI(L)=	12450.0
L= 7	X(L)=	0.127	YD(L)=	222.31	K= 3	QDI(L)=	12450.0
L= 6	X(L)=	0.106	YD(L)=	222.33	K= 3	QDI(L)=	12450.0
L= 5	X(L)=	0.085	YD(L)=	222.36	K= 3	QDI(L)=	12450.0
L= 4	X(L)=	0.064	YD(L)=	222.39	K= 3	QDI(L)=	12450.0
L= 3	X(L)=	0.042	YD(L)=	222.42	K= 3	QDI(L)=	12450.0
L= 2	X(L)=	0.021	YD(L)=	222.46	K= 2	QDI(L)=	12450.0
L= 1	X(L)=	0.000	YD(L)=	222.50	K= 2	QDI(L)=	12450.0

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

LS= 0 IM= 41 YD(IM)= 205.88 QDI(IM)= 12450.05

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
0.000	222.50	12450	0.130	2.33	240.00	0.00
0.021	222.46	12468	0.130	2.18	240.00	0.00
0.042	222.42	12487	0.125	2.06	240.00	0.00
0.064	222.39	12507	0.125	1.94	240.00	0.00
0.085	222.36	12528	0.120	1.84	240.00	0.00
0.106	222.33	12549	0.140	1.75	240.00	0.00
0.127	222.31	12570	0.125	1.66	240.00	0.00
0.148	222.29	12592	0.110	1.59	240.00	0.00
0.169	222.27	12614	0.110	1.52	240.00	0.00
0.191	222.25	12637	0.120	1.45	240.00	0.00
0.212	222.24	12660	0.095	1.39	240.00	0.00
0.233	222.22	12683	0.125	1.34	240.00	0.00
0.254	222.21	12707	0.000	1.29	240.00	0.00
0.275	222.20	12732	0.000	1.24	240.00	0.00
0.297	222.19	12757	0.000	1.20	240.00	0.00
0.318	222.18	12783	0.000	1.16	240.00	0.00
0.339	222.17	12810	0.000	1.12	240.00	0.00
0.391	222.14	12872	0.000	1.18	240.00	0.00
0.442	222.11	12931	0.000	1.24	240.00	0.00
0.494	222.08	12985	0.000	1.31	240.00	0.00
0.545	222.04	13034	0.000	1.38	240.00	0.00
0.597	222.00	13080	0.000	1.46	240.00	0.00
0.649	221.96	13123	0.000	1.56	240.00	0.00
0.700	221.91	13162	0.000	1.67	240.00	0.00
0.752	221.85	13198	0.000	1.79	240.00	0.00
0.803	221.78	13231	0.000	1.93	240.00	0.00
0.855	221.70	13260	0.040	2.10	240.00	0.00
0.906	221.60	13288	0.035	2.30	240.00	0.00
0.958	221.49	13312	0.030	2.53	240.00	0.00
1.010	221.35	13334	0.025	2.82	240.00	0.00
1.061	221.18	13355	0.020	3.17	240.00	0.00
1.113	220.97	13374	0.015	3.61	240.00	0.00
1.164	220.71	13392	0.010	4.18	240.00	0.00
1.216	220.39	13408	0.005	4.90	240.00	0.00
1.331	218.72	13438	0.035	9.98	230.00	0.00
1.335	218.66	13439	0.035	10.04	230.00	0.00
1.437	218.06	13478	0.025	8.14	230.00	0.00
1.540	217.56	13803	0.015	6.86	230.00	0.00
1.642	217.21	14401	0.005	5.95	230.00	0.00
1.803	216.95	15789	0.000	4.43	230.00	0.00
1.841	206.36	15789	0.100	4.51	210.00	0.00
1.873	206.30	15721	0.100	3.99	210.00	0.00
1.904	206.25	15661	0.105	3.60	210.00	0.00
1.936	206.20	15625	0.105	3.32	210.00	0.00
1.967	206.15	15554	0.110	3.10	210.00	0.00
1.999	206.09	15495	0.110	2.92	210.00	0.00
2.030	206.05	15428	0.115	2.79	210.00	0.00
2.062	205.99	15345	0.120	2.67	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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)
2.093	205.94	15274	0.120	2.59	210.00	0.00
2.125	205.89	15173	0.125	2.52	210.00	0.00
2.157	205.83	15088	0.125	2.47	210.00	0.00
2.188	205.77	14980	0.130	2.44	210.00	0.00
2.220	205.71	14891	0.135	2.41	210.00	0.00
2.251	205.66	14785	0.135	2.40	210.00	0.00
2.283	205.60	14703	0.140	2.38	210.00	0.00
2.314	205.53	14609	0.140	2.38	210.00	0.00
2.346	205.47	14529	0.145	2.38	210.00	0.00
2.377	205.41	14456	0.145	2.38	210.00	0.00
2.409	205.34	14406	0.920	2.39	210.00	0.00
2.424	205.12	14399	0.985	4.66	210.00	0.00
2.443	205.07	14394	1.005	4.68	210.00	0.00
2.465	205.13	14381	0.985	3.58	210.00	0.00
2.486	205.14	14359	0.980	2.90	210.00	0.00
2.508	205.13	14334	0.980	2.44	210.00	0.00
2.529	205.12	14296	0.990	2.11	210.00	0.00
2.551	205.11	14255	0.985	1.85	210.00	0.00
2.572	205.10	14225	0.995	1.65	210.00	0.00
2.587	204.92	14224	1.040	4.34	210.00	0.00
2.597	204.89	14223	1.045	4.35	210.00	0.00
2.650	204.85	14213	1.060	3.59	210.00	0.00
2.703	204.78	14195	1.065	3.10	210.00	0.00
2.756	204.71	14168	1.075	2.76	210.00	0.00
2.808	204.64	14127	1.100	2.52	210.00	0.00
2.861	204.57	14077	1.110	2.33	210.00	0.00
2.914	204.50	14020	1.130	2.19	210.00	0.00
2.967	204.43	13952	1.140	2.09	210.00	0.00
3.020	204.36	13872	1.155	2.00	210.00	0.00
3.073	204.29	13780	1.160	1.94	210.00	0.00
3.125	204.21	13680	1.175	1.90	210.00	0.00
3.178	204.13	13570	1.175	1.86	210.00	0.00
3.231	204.05	13452	1.185	1.84	210.00	0.00
3.284	203.97	13327	1.195	1.82	210.00	0.00
3.337	203.87	13205	1.200	1.99	210.00	0.00
3.389	203.75	13094	1.205	2.18	210.00	0.00
3.442	203.60	12992	1.215	2.43	210.00	0.00
3.495	203.41	12914	1.220	2.75	210.00	0.00
3.547	203.16	12910	1.230	3.17	210.00	0.00
3.600	202.82	12907	1.235	3.74	210.00	0.00
3.652	202.34	12906	1.240	4.56	210.00	0.00
3.705	201.64	12905	1.250	5.73	210.00	0.00
3.756	201.02	12905	1.260	5.98	210.00	0.00
3.807	200.38	12904	1.270	6.26	210.00	0.00
3.858	199.72	12904	1.280	6.57	210.00	0.00
3.908	199.02	12904	1.295	6.95	210.00	0.00
3.959	198.28	12904	1.300	7.39	210.00	0.00
4.010	197.44	12904	1.325	7.91	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
4.061	196.44	12903	1.365	8.61	210.00	0.00
4.065	196.35	12903	1.365	8.68	210.00	0.00
4.076	196.47	12903	1.370	7.81	210.00	0.00
4.086	196.56	12903	1.365	7.01	210.00	0.00
4.097	196.62	12903	1.360	6.27	210.00	0.00
4.107	196.66	12903	1.365	5.62	210.00	0.00
4.118	196.68	12903	1.355	5.04	210.00	0.00
4.128	196.69	12903	1.360	4.52	210.00	0.00
4.181	196.51	12902	1.365	4.42	210.00	0.00
4.233	196.34	12902	1.360	4.36	210.00	0.00
4.286	196.19	12902	1.365	4.33	210.00	0.00
4.338	196.05	12902	1.370	4.32	210.00	0.00
4.391	195.91	12901	1.375	4.36	210.00	0.00
4.443	195.78	12901	1.375	4.43	210.00	0.00
4.495	195.65	12901	1.380	4.54	210.00	0.00
4.548	195.52	12901	1.375	4.71	210.00	0.00
4.575	195.46	12901	1.380	4.72	210.00	0.00
4.602	195.40	12901	1.370	4.73	210.00	0.00
4.629	195.35	12901	1.370	4.74	210.00	0.00
4.656	195.29	12901	1.375	4.75	210.00	0.00
4.682	195.24	12901	1.370	4.76	210.00	0.00
4.709	195.18	12901	1.375	4.77	210.00	0.00
4.736	195.13	12901	1.380	4.77	210.00	0.00
4.763	195.08	12901	1.375	4.78	210.00	0.00
4.790	195.03	12901	1.380	4.78	210.00	0.00

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 41
BELOW LITTLEFIELD DAM AT MILE 1.84

GAGE ZERO = 183.10 MAX ELEVATION REACHED BY FLOOD WAVE = 206.36
FLOOD STAGE = 26.90
MAX STAGE = 23.26 AT TIME = 0.100 HOURS
MAX FLOW = 15789 AT TIME = 0.100 HOURS

HR	STAGE	FLOW	O	5000	10000	15000	20000	25000
0.00	22.8	12527	I	I	I	* I	I	I
0.01	22.9	12961	I	I	I	* I	I	I
0.02	22.9	13357	I	I	I	* I	I	I
0.03	23.0	13748	I	I	I	* I	I	I
0.04	23.0	14114	I	I	I	* I	I	I
0.05	23.0	14442	I	I	I	*I	I	I
0.06	23.1	14751	I	I	I	*	I	I
0.07	23.1	15020	I	I	I	*	I	I
0.08	23.2	15280	I	I	I	I*	I	I
0.09	23.2	15535	I	I	I	I*	I	I
0.10	23.3	15789	I	I	I	I *	I	I
0.11	23.2	15288	I	I	I	I*	I	I
0.12	23.2	14848	I	I	I	*	I	I
0.13	23.2	14493	I	I	I	*I	I	I
0.14	23.1	14212	I	I	I	* I	I	I
0.15	23.1	13993	I	I	I	* I	I	I
0.16	23.1	13840	I	I	I	* I	I	I
0.17	23.1	13738	I	I	I	* I	I	I
0.18	23.1	13666	I	I	I	* I	I	I
0.19	23.1	13613	I	I	I	* I	I	I
0.20	23.1	13571	I	I	I	* I	I	I
0.21	23.1	13539	I	I	I	* I	I	I
0.22	23.1	13513	I	I	I	* I	I	I
0.23	23.1	13493	I	I	I	* I	I	I
0.24	23.1	13476	I	I	I	* I	I	I
0.25	23.1	13462	I	I	I	* I	I	I
0.26	23.1	13450	I	I	I	* I	I	I
0.27	23.1	13439	I	I	I	* I	I	I
0.28	23.1	13430	I	I	I	* I	I	I
0.29	23.1	13421	I	I	I	* I	I	I
0.30	23.1	13413	I	I	I	* I	I	I
0.31	23.1	13405	I	I	I	* I	I	I
0.32	23.1	13398	I	I	I	* I	I	I
0.33	23.1	13391	I	I	I	* I	I	I
0.34	23.1	13383	I	I	I	* I	I	I
0.35	23.1	13376	I	I	I	* I	I	I
0.36	23.1	13368	I	I	I	* I	I	I
0.37	23.1	13360	I	I	I	* I	I	I
0.38	23.1	13352	I	I	I	* I	I	I
0.39	23.1	13344	I	I	I	* I	I	I
0.40	23.1	13335	I	I	I	* I	I	I
0.41	23.1	13327	I	I	I	* I	I	I
0.42	23.1	13318	I	I	I	* I	I	I
0.43	23.1	13310	I	I	I	* I	I	I
0.44	23.1	13301	I	I	I	* I	I	I
0.45	23.1	13293	I	I	I	* I	I	I
0.46	23.1	13285	I	I	I	* I	I	I
0.47	23.1	13277	I	I	I	* I	I	I
0.48	23.1	13269	I	I	I	* I	I	I
0.49	23.1	13261	I	I	I	* I	I	I
0.50	23.1	13254	I	I	I	* I	I	I

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 121
BELOW LITTLEFIELD DAM AT MILE 4.79

GAGE ZERO = 174.50 MAX ELEVATION REACHED BY FLOOD WAVE = 195.03
FLOOD STAGE = 35.50
MAX STAGE = 20.53 AT TIME = 1.380 HOURS
MAX FLOW = 12901 AT TIME = 1.380 HOURS

HR	STAGE	FLOW	0	5000	10000	15000	20000	25000
0.0	20.4	12450	I	I	I	* I	I	I
0.1	20.4	12450	I	I	I	* I	I	I
0.2	20.4	12450	I	I	I	* I	I	I
0.3	20.4	12513	I	I	I	* I	I	I
0.4	20.4	12613	I	I	I	* I	I	I
0.5	20.4	12688	I	I	I	* I	I	I
0.6	20.5	12746	I	I	I	* I	I	I
0.7	20.5	12790	I	I	I	* I	I	I
0.8	20.5	12825	I	I	I	* I	I	I
0.9	20.5	12852	I	I	I	* I	I	I
1.0	20.5	12872	I	I	I	* I	I	I
1.1	20.5	12886	I	I	I	* I	I	I
1.2	20.5	12895	I	I	I	* I	I	I
1.3	20.5	12900	I	I	I	* I	I	I
1.4	20.5	12901	I	I	I	* I	I	I
1.5	20.5	12899	I	I	I	* I	I	I
1.6	20.5	12895	I	I	I	* I	I	I
1.7	20.5	12888	I	I	I	* I	I	I
1.8	20.5	12880	I	I	I	* I	I	I
1.9	20.5	12870	I	I	I	* I	I	I
2.0	20.5	12858	I	I	I	* I	I	I
2.1	20.5	12846	I	I	I	* I	I	I
2.2	20.5	12833	I	I	I	* I	I	I
2.3	20.5	12820	I	I	I	* I	I	I
2.4	20.5	12806	I	I	I	* I	I	I
2.5	20.5	12793	I	I	I	* I	I	I
2.6	20.5	12779	I	I	I	* I	I	I
2.7	20.5	12765	I	I	I	* I	I	I
2.8	20.5	12751	I	I	I	* I	I	I
2.9	20.5	12738	I	I	I	* I	I	I
3.0	20.5	12725	I	I	I	* I	I	I
3.1	20.5	12712	I	I	I	* I	I	I
3.2	20.5	12699	I	I	I	* I	I	I
3.3	20.4	12687	I	I	I	* I	I	I
3.4	20.4	12675	I	I	I	* I	I	I

DAMBRK RUN NO. 4

- DAMBRK -
DAMBREAK PROGRAM BY DANNY L. FREAD
HYDROLOGIC RESEARCH LABORATORY
W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910
VERSION: 07/18/84

PC implementation by:

HAESTAD METHODS
37 BROOKSIDE ROAD
WATERBURY, CONNECTICUT 06708
UNITED STATES OF AMERICA
203 755-1666

PC Version: 4.01.0 - May 1986

S/N: 50002205

DATE: 02/02/1988 TIME: 17:31:07.15

DATA FILE: LITTIN10.DAT

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

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

LITTLEFIELD DAM

ON

LITTLE ANDY RIVER

ANALYSIS BY

MORRISON-KNUDSEN ENGINEERS
50 WASHINGTON STREET - 9TH FLOOR

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 LITTLEFIELD 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	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	2
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IOPUT= 1 0 0 1 0 0 1 1 1 0 0 10

IDAM= 7

DAM NUMBER 1

LITTLEFIELD DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	216.95

ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	200.00
WIDTH OF BASE OF BREACH	FT	BB	175.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	0.10
ELEVATION OF WATER WHEN BREACHED	FT	HF	216.95
ELEVATION OF TOP OF DAM	FT	HD	213.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	0.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	0.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	0.00
DISCHARGE COEF. FOR GATE FLOW		CG	0.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	1585.90
DISCHARGE THRU TURBINES	CFS	QT	0.00

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 0.00 HRS.

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

INFLOW HYDROGRAPH TO LITTLEFIELD DAM

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12450.00 12450.00

TIME OF INFLOW HYDROGRAPH ORDINATES

0.0000 4.0000

CROSS-SECTIONAL PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	21
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	2
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	KCG	0

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

8 21

DOWNSTREAM FLOW PARAMETERS FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	0.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	0.000
INITIAL SIZE OF TIME STEP	HR	DTHM	0.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	0.25
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	1.35
THETA WEIGHTING FACTOR		THETA	0.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	0.000
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	4.00

DOWNSTREAM BOUNDARY RATING TABLE

STAGE	DISCHARGE
174.50	0.00
192.00	195.00
192.00	600.00
192.00	3000.00
193.10	8100.00
196.60	16800.00
198.50	22100.00
200.60	28500.00

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 121 (MAXIMUM ALLOWABLE = 200

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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	0.00	204.20				
2	0.34	202.48	1	0.34	5.07	
3	1.22	198.00	2	0.88	5.11	
4	1.33	197.41	3	0.12	5.13	
5	1.34	197.39	4	0.00	5.00	
6	1.64	195.83	5	0.31	5.08	
7	1.80	188.00	6	0.16	48.63	
8	1.84	183.10	7	0.04	128.95	SLOPE GREATER THAN 50 FT/MI MAY CAUSE SUPERCRITICAL FLOW
9	2.41	182.33	8	0.57	1.36	
10	2.42	182.31	9	0.02	1.33	
11	2.44	182.28	10	0.02	1.58	
12	2.57	182.11	11	0.13	1.32	
13	2.59	182.09	12	0.01	1.33	
14	2.60	182.08	13	0.01	1.00	
15	3.28	181.14	14	0.69	1.37	
16	3.70	180.57	15	0.42	1.35	
17	4.06	180.09	16	0.36	1.35	
18	4.07	180.08	17	0.00	2.50	
19	4.13	180.00	18	0.06	1.27	
20	4.55	174.70	19	0.42	12.62	
21	4.79	174.50	20	0.24	0.83	

RE-NUMBERED VALUES FOR IDAM

IDAM(1) = 40

L=121	X(L)=	4.790	YD(L)=	194.85	K= 2	QDI(L)=	12450.0
L=120	X(L)=	4.763	YD(L)=	194.90	K= 2	QDI(L)=	12450.0
L=119	X(L)=	4.736	YD(L)=	194.95	K= 2	QDI(L)=	12450.0
L=118	X(L)=	4.709	YD(L)=	195.00	K= 2	QDI(L)=	12450.0
L=117	X(L)=	4.682	YD(L)=	195.05	K= 2	QDI(L)=	12450.0
L=116	X(L)=	4.656	YD(L)=	195.10	K= 2	QDI(L)=	12450.0
L=115	X(L)=	4.629	YD(L)=	195.15	K= 2	QDI(L)=	12450.0
L=114	X(L)=	4.602	YD(L)=	195.21	K= 2	QDI(L)=	12450.0
L=113	X(L)=	4.575	YD(L)=	195.26	K= 2	QDI(L)=	12450.0
L=112	X(L)=	4.548	YD(L)=	195.32	K= 2	QDI(L)=	12450.0
L=111	X(L)=	4.495	YD(L)=	195.45	K= 3	QDI(L)=	12450.0
L=110	X(L)=	4.443	YD(L)=	195.58	K= 3	QDI(L)=	12450.0
L=109	X(L)=	4.391	YD(L)=	195.70	K= 3	QDI(L)=	12450.0
L=108	X(L)=	4.338	YD(L)=	195.83	K= 3	QDI(L)=	12450.0
L=107	X(L)=	4.286	YD(L)=	195.97	K= 3	QDI(L)=	12450.0
L=106	X(L)=	4.233	YD(L)=	196.12	K= 3	QDI(L)=	12450.0
L=105	X(L)=	4.181	YD(L)=	196.29	K= 3	QDI(L)=	12450.0
L=104	X(L)=	4.128	YD(L)=	196.48	K= 3	QDI(L)=	12450.0
L=103	X(L)=	4.118	YD(L)=	196.46	K= 3	QDI(L)=	12450.0
L=102	X(L)=	4.107	YD(L)=	196.44	K= 2	QDI(L)=	12450.0
L=101	X(L)=	4.097	YD(L)=	196.41	K= 2	QDI(L)=	12450.0
L=100	X(L)=	4.086	YD(L)=	196.35	K= 2	QDI(L)=	12450.0
L= 99	X(L)=	4.076	YD(L)=	196.27	K= 2	QDI(L)=	12450.0
L= 98	X(L)=	4.065	YD(L)=	196.16	K= 3	QDI(L)=	12450.0
L= 97	X(L)=	4.061	YD(L)=	196.25	K= 2	QDI(L)=	12450.0
L= 96	X(L)=	4.010	YD(L)=	197.23	K= 3	QDI(L)=	12450.0
L= 95	X(L)=	3.959	YD(L)=	198.03	K= 3	QDI(L)=	12450.0
L= 94	X(L)=	3.908	YD(L)=	198.75	K= 3	QDI(L)=	12450.0
L= 93	X(L)=	3.858	YD(L)=	199.41	K= 3	QDI(L)=	12450.0
L= 92	X(L)=	3.807	YD(L)=	200.04	K= 3	QDI(L)=	12450.0
L= 91	X(L)=	3.756	YD(L)=	200.63	K= 3	QDI(L)=	12450.0

L= 89	X(L)=	3.652	YD(L)=	201.80	K= 3	QDI(L)= 12450.0
L= 88	X(L)=	3.600	YD(L)=	202.[illegible]	K= [illegible]	QDI(L)= 12450.0
L= 87	X(L)=	3.547	YD(L)=	202.74	K= 3	QDI(L)= 12450.0
L= 86	X(L)=	3.495	YD(L)=	203.00	K= 3	QDI(L)= 12450.0
L= 85	X(L)=	3.442	YD(L)=	203.21	K= 3	QDI(L)= 12450.0
L= 84	X(L)=	3.389	YD(L)=	203.36	K= 3	QDI(L)= 12450.0
L= 83	X(L)=	3.337	YD(L)=	203.49	K= 2	QDI(L)= 12450.0
L= 82	X(L)=	3.284	YD(L)=	203.60	K= 2	QDI(L)= 12450.0
L= 81	X(L)=	3.231	YD(L)=	203.69	K= 2	QDI(L)= 12450.0
L= 80	X(L)=	3.178	YD(L)=	203.77	K= 2	QDI(L)= 12450.0
L= 79	X(L)=	3.125	YD(L)=	203.85	K= 2	QDI(L)= 12450.0
L= 78	X(L)=	3.073	YD(L)=	203.93	K= 2	QDI(L)= 12450.0
L= 77	X(L)=	3.020	YD(L)=	204.01	K= 2	QDI(L)= 12450.0
L= 76	X(L)=	2.967	YD(L)=	204.09	K= 2	QDI(L)= 12450.0
L= 75	X(L)=	2.914	YD(L)=	204.17	K= 2	QDI(L)= 12450.0
L= 74	X(L)=	2.861	YD(L)=	204.24	K= 2	QDI(L)= 12450.0
L= 73	X(L)=	2.808	YD(L)=	204.31	K= 2	QDI(L)= 12450.0
L= 72	X(L)=	2.756	YD(L)=	204.39	K= 2	QDI(L)= 12450.0
L= 71	X(L)=	2.703	YD(L)=	204.46	K= 2	QDI(L)= 12450.0
L= 70	X(L)=	2.650	YD(L)=	204.53	K= 2	QDI(L)= 12450.0
L= 69	X(L)=	2.597	YD(L)=	204.58	K= 2	QDI(L)= 12450.0
L= 68	X(L)=	2.587	YD(L)=	204.60	K= 2	QDI(L)= 12450.0
L= 67	X(L)=	2.572	YD(L)=	204.78	K= 3	QDI(L)= 12450.0
L= 66	X(L)=	2.551	YD(L)=	204.79	K= 2	QDI(L)= 12450.0
L= 65	X(L)=	2.529	YD(L)=	204.80	K= 2	QDI(L)= 12450.0
L= 64	X(L)=	2.508	YD(L)=	204.81	K= 2	QDI(L)= 12450.0
L= 63	X(L)=	2.486	YD(L)=	204.82	K= 2	QDI(L)= 12450.0
L= 62	X(L)=	2.465	YD(L)=	204.81	K= 2	QDI(L)= 12450.0
L= 61	X(L)=	2.443	YD(L)=	204.76	K= 2	QDI(L)= 12450.0
L= 60	X(L)=	2.424	YD(L)=	204.81	K= 2	QDI(L)= 12450.0
L= 59	X(L)=	2.409	YD(L)=	205.02	K= 3	QDI(L)= 12450.0
L= 58	X(L)=	2.377	YD(L)=	205.07	K= 2	QDI(L)= 12450.0
L= 57	X(L)=	2.346	YD(L)=	205.13	K= 2	QDI(L)= 12450.0
L= 56	X(L)=	2.314	YD(L)=	205.19	K= 2	QDI(L)= 12450.0
L= 55	X(L)=	2.283	YD(L)=	205.24	K= 2	QDI(L)= 12450.0
L= 54	X(L)=	2.251	YD(L)=	205.30	K= 2	QDI(L)= 12450.0
L= 53	X(L)=	2.220	YD(L)=	205.35	K= 2	QDI(L)= 12450.0
L= 52	X(L)=	2.188	YD(L)=	205.40	K= 2	QDI(L)= 12450.0
L= 51	X(L)=	2.157	YD(L)=	205.45	K= 2	QDI(L)= 12450.0
L= 50	X(L)=	2.125	YD(L)=	205.50	K= 2	QDI(L)= 12450.0
L= 49	X(L)=	2.093	YD(L)=	205.55	K= 2	QDI(L)= 12450.0
L= 48	X(L)=	2.062	YD(L)=	205.60	K= 2	QDI(L)= 12450.0
L= 47	X(L)=	2.030	YD(L)=	205.64	K= 2	QDI(L)= 12450.0
L= 46	X(L)=	1.999	YD(L)=	205.68	K= 1	QDI(L)= 12450.0
L= 45	X(L)=	1.967	YD(L)=	205.72	K= 1	QDI(L)= 12450.0
L= 44	X(L)=	1.936	YD(L)=	205.77	K= 2	QDI(L)= 12450.0
L= 43	X(L)=	1.904	YD(L)=	205.81	K= 2	QDI(L)= 12450.0
L= 42	X(L)=	1.873	YD(L)=	205.85	K= 2	QDI(L)= 12450.0
L= 41	X(L)=	1.841	YD(L)=	205.88	K= 2	QDI(L)= 12450.0
L= 40	X(L)=	1.803	YD(L)=	216.95	K= 0	QDI(L)= 12450.0
L= 39	X(L)=	1.642	YD(L)=	217.19	K= 4	QDI(L)= 12450.0
L= 38	X(L)=	1.540	YD(L)=	217.55	K= 4	QDI(L)= 12450.0
L= 37	X(L)=	1.437	YD(L)=	218.05	K= 2	QDI(L)= 12450.0
L= 36	X(L)=	1.335	YD(L)=	218.65	K= 2	QDI(L)= 12450.0
L= 35	X(L)=	1.331	YD(L)=	218.71	K= 2	QDI(L)= 12450.0
L= 34	X(L)=	1.216	YD(L)=	220.39	K= 3	QDI(L)= 12450.0
L= 33	X(L)=	1.164	YD(L)=	220.71	K= 3	QDI(L)= 12450.0
L= 32	X(L)=	1.113	YD(L)=	220.97	K= 2	QDI(L)= 12450.0
L= 31	X(L)=	1.061	YD(L)=	221.18	K= 2	QDI(L)= 12450.0
L= 30	X(L)=	1.010	YD(L)=	221.35	K= 3	QDI(L)= 12450.0
L= 29	X(L)=	0.958	YD(L)=	221.49	K= 3	QDI(L)= 12450.0
L= 28	X(L)=	0.906	YD(L)=	221.60	K= 3	QDI(L)= 12450.0
L= 27	X(L)=	0.855	YD(L)=	221.70	K= 3	QDI(L)= 12450.0

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  = 25    X(            2     (L):    221               (L):    1245
L= 24    X(L)=      0.700    YD(L)=    221.91    K= 3    QDI(L)=    12450.0
L= 23    X(L)=      0.649    YD(L)=    221.96    K= 3    QDI(L)=    12450.0
L= 22    X(L)=      0.597    YD(L)=    222.00    K= 3    QDI(L)=    12450.0
L= 21    X(L)=      0.545    YD(L)=    222.04    K= 3    QDI(L)=    12450.0
L= 20    X(L)=      0.494    YD(L)=    222.08    K= 3    QDI(L)=    12450.0
L= 19    X(L)=      0.442    YD(L)=    222.11    K= 3    QDI(L)=    12450.0
L= 18    X(L)=      0.391    YD(L)=    222.14    K= 3    QDI(L)=    12450.0
L= 17    X(L)=      0.339    YD(L)=    222.17    K= 3    QDI(L)=    12450.0
L= 16    X(L)=      0.318    YD(L)=    222.18    K= 3    QDI(L)=    12450.0
L= 15    X(L)=      0.297    YD(L)=    222.19    K= 3    QDI(L)=    12450.0
L= 14    X(L)=      0.275    YD(L)=    222.20    K= 3    QDI(L)=    12450.0
L= 13    X(L)=      0.254    YD(L)=    222.21    K= 3    QDI(L)=    12450.0
L= 12    X(L)=      0.233    YD(L)=    222.22    K= 3    QDI(L)=    12450.0
L= 11    X(L)=      0.212    YD(L)=    222.24    K= 3    QDI(L)=    12450.0
L= 10    X(L)=      0.191    YD(L)=    222.25    K= 3    QDI(L)=    12450.0
L=  9    X(L)=      0.169    YD(L)=    222.27    K= 3    QDI(L)=    12450.0
L=  8    X(L)=      0.148    YD(L)=    222.29    K= 3    QDI(L)=    12450.0
L=  7    X(L)=      0.127    YD(L)=    222.31    K= 3    QDI(L)=    12450.0
L=  6    X(L)=      0.106    YD(L)=    222.33    K= 3    QDI(L)=    12450.0
L=  5    X(L)=      0.085    YD(L)=    222.36    K= 3    QDI(L)=    12450.0
L=  4    X(L)=      0.064    YD(L)=    222.39    K= 3    QDI(L)=    12450.0
L=  3    X(L)=      0.042    YD(L)=    222.42    K= 3    QDI(L)=    12450.0
L=  2    X(L)=      0.021    YD(L)=    222.46    K= 2    QDI(L)=    12450.0
L=  1    X(L)=      0.000    YD(L)=    222.50    K= 2    QDI(L)=    12450.0

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

LS= 0     IM= 41     YD(IM)=     205.88          QDI(IM)=  12450.05
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PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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)
0.000	222.50	12450	0.095	2.41	240.00	0.00
0.021	222.46	12473	0.095	2.26	240.00	0.00
0.042	222.42	12497	0.090	2.13	240.00	0.00
0.064	222.39	12523	0.090	2.01	240.00	0.00
0.085	222.36	12549	0.085	1.90	240.00	0.00
0.106	222.33	12576	0.105	1.81	240.00	0.00
0.127	222.31	12603	0.090	1.72	240.00	0.00
0.148	222.29	12631	0.110	1.64	240.00	0.00
0.169	222.27	12659	0.110	1.57	240.00	0.00
0.191	222.25	12688	0.080	1.50	240.00	0.00
0.212	222.24	12718	0.095	1.44	240.00	0.00
0.233	222.22	12749	0.000	1.39	240.00	0.00
0.254	222.21	12782	0.000	1.33	240.00	0.00
0.275	222.20	12817	0.000	1.29	240.00	0.00
0.297	222.19	12853	0.000	1.24	240.00	0.00
0.318	222.18	12891	0.000	1.20	240.00	0.00
0.339	222.17	12929	0.000	1.16	240.00	0.00
0.391	222.14	13022	0.000	1.22	240.00	0.00
0.442	222.11	13109	0.000	1.28	240.00	0.00
0.494	222.08	13191	0.000	1.35	240.00	0.00
0.545	222.04	13267	0.000	1.43	240.00	0.00
0.597	222.00	13336	0.000	1.52	240.00	0.00
0.649	221.96	13401	0.000	1.62	240.00	0.00
0.700	221.91	13459	0.000	1.73	240.00	0.00
0.752	221.85	13513	0.000	1.86	240.00	0.00
0.803	221.78	13563	0.000	2.01	240.00	0.00
0.855	221.70	13607	0.000	2.19	240.00	0.00
0.906	221.60	13648	0.000	2.40	240.00	0.00
0.958	221.49	13685	0.000	2.65	240.00	0.00
1.010	221.35	13719	0.000	2.95	240.00	0.00
1.061	221.18	13751	0.020	3.32	240.00	0.00
1.113	220.97	13779	0.015	3.78	240.00	0.00
1.164	220.71	13806	0.010	4.39	240.00	0.00
1.216	220.39	13832	0.005	5.15	240.00	0.00
1.331	218.72	13884	0.035	10.69	230.00	0.00
1.335	218.67	13885	0.010	10.77	230.00	0.00
1.437	218.08	14001	0.025	9.29	230.00	0.00
1.540	217.58	14640	0.015	8.73	230.00	0.00
1.642	217.24	16125	0.005	9.10	230.00	0.00
1.803	216.95	20565	0.000	8.57	230.00	0.00
1.841	207.02	20565	0.100	5.58	210.00	0.00
1.873	206.94	20456	0.100	4.93	210.00	0.00
1.904	206.87	20314	0.105	4.44	210.00	0.00
1.936	206.80	20166	0.105	4.07	210.00	0.00
1.967	206.73	20062	0.110	3.79	210.00	0.00
1.999	206.67	19894	0.110	3.56	210.00	0.00
2.030	206.60	19728	0.110	3.37	210.00	0.00
2.062	206.54	19568	0.115	3.23	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
2.093	206.47	19341	0.120	3.11	210.00	0.00
2.125	206.41	19168	0.120	3.01	210.00	0.00
2.157	206.35	18920	0.125	2.93	210.00	0.00
2.188	206.28	18693	0.125	2.86	210.00	0.00
2.220	206.21	18430	0.130	2.82	210.00	0.00
2.251	206.14	18201	0.130	2.78	210.00	0.00
2.283	206.08	17944	0.135	2.75	210.00	0.00
2.314	206.01	17722	0.140	2.72	210.00	0.00
2.346	205.94	17469	0.140	2.70	210.00	0.00
2.377	205.86	17281	0.140	2.68	210.00	0.00
2.409	205.77	17159	0.140	2.69	210.00	0.00
2.424	205.41	17134	0.145	5.43	210.00	0.00
2.443	205.33	17122	0.150	5.45	210.00	0.00
2.465	205.44	17102	0.155	4.13	210.00	0.00
2.486	205.48	17055	0.155	3.33	210.00	0.00
2.508	205.48	16974	0.155	2.78	210.00	0.00
2.529	205.47	16855	0.155	2.38	210.00	0.00
2.551	205.46	16749	0.155	2.08	210.00	0.00
2.572	205.45	16665	0.155	1.84	210.00	0.00
2.587	205.15	16651	0.155	4.98	210.00	0.00
2.597	205.11	16647	0.160	4.99	210.00	0.00
2.650	205.06	16636	0.870	4.10	210.00	0.00
2.703	204.99	16581	0.875	3.53	210.00	0.00
2.756	204.92	16521	0.900	3.14	210.00	0.00
2.808	204.85	16429	0.910	2.85	210.00	0.00
2.861	204.78	16309	0.925	2.63	210.00	0.00
2.914	204.72	16166	0.935	2.46	210.00	0.00
2.967	204.65	16009	0.950	2.33	210.00	0.00
3.020	204.58	15824	0.960	2.23	210.00	0.00
3.073	204.51	15612	0.970	2.14	210.00	0.00
3.125	204.44	15374	0.975	2.07	210.00	0.00
3.178	204.37	15116	0.985	2.02	210.00	0.00
3.231	204.29	14836	1.000	1.98	210.00	0.00
3.284	204.21	14539	1.000	1.94	210.00	0.00
3.337	204.11	14249	1.010	2.09	210.00	0.00
3.389	204.00	13983	1.015	2.27	210.00	0.00
3.442	203.85	13742	1.020	2.51	210.00	0.00
3.495	203.67	13527	1.025	2.81	210.00	0.00
3.547	203.42	13341	1.040	3.21	210.00	0.00
3.600	203.09	13231	1.045	3.77	210.00	0.00
3.652	202.62	13228	1.050	4.58	210.00	0.00
3.705	201.92	13227	1.060	5.76	210.00	0.00
3.756	201.27	13226	1.070	6.01	210.00	0.00
3.807	200.61	13225	1.080	6.30	210.00	0.00
3.858	199.93	13225	1.090	6.62	210.00	0.00
3.908	199.21	13225	1.095	7.01	210.00	0.00
3.959	198.45	13224	1.120	7.46	210.00	0.00
4.010	197.60	13224	1.140	8.00	210.00	0.00

PROFILE OF CRESTS AND TIMES FOR LITTLE ANDY RIVER
BELOW LITTLEFIELD 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) **********
4.061	196.57	13224	1.180	8.72	210.00	0.00
4.065	196.48	13224	1.180	8.79	210.00	0.00
4.076	196.61	13223	1.180	7.92	210.00	0.00
4.086	196.71	13223	1.175	7.10	210.00	0.00
4.097	196.77	13223	1.175	6.36	210.00	0.00
4.107	196.81	13223	1.170	5.69	210.00	0.00
4.118	196.83	13223	1.165	5.10	210.00	0.00
4.128	196.85	13223	1.170	4.57	210.00	0.00
4.181	196.66	13222	1.170	4.47	210.00	0.00
4.233	196.49	13221	1.175	4.40	210.00	0.00
4.286	196.34	13221	1.180	4.36	210.00	0.00
4.338	196.20	13220	1.180	4.36	210.00	0.00
4.391	196.06	13220	1.180	4.40	210.00	0.00
4.443	195.93	13219	1.185	4.48	210.00	0.00
4.495	195.80	13219	1.180	4.60	210.00	0.00
4.548	195.66	13219	1.185	4.77	210.00	0.00
4.575	195.60	13219	1.180	4.78	210.00	0.00
4.602	195.54	13219	1.185	4.80	210.00	0.00
4.629	195.48	13219	1.190	4.81	210.00	0.00
4.656	195.42	13219	1.185	4.82	210.00	0.00
4.682	195.37	13219	1.190	4.83	210.00	0.00
4.709	195.32	13219	1.190	4.84	210.00	0.00
4.736	195.26	13219	1.190	4.85	210.00	0.00
4.763	195.21	13219	1.190	4.86	210.00	0.00
4.790	195.16	13219	1.195	4.86	210.00	0.00

DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 41
BELOW LITTLEFIELD DAM AT MILE 1.84

GAGE ZERO = 183.10 MAX ELEVATION REACHED BY FLOOD WAVE = 207.02
FLOOD STAGE = 26.90
MAX STAGE = 23.92 AT TIME = 0.100 HOURS
MAX FLOW = 20566 AT TIME = 0.100 HOURS

HR	STAGE	FLOW	O	5000	10000	15000	20000	25000
0.00	22.8	12660	I	I	I	* I	I	I
0.01	23.0	13821	I	I	I	* I	I	I
0.02	23.1	14832	I	I	I	*	I	I
0.03	23.2	15789	I	I	I	I *	I	I
0.04	23.3	16638	I	I	I	I *	I	I
0.05	23.4	17348	I	I	I	I *	I	I
0.06	23.5	17979	I	I	I	I *	I	I
0.07	23.6	18541	I	I	I	I *	I	I
0.08	23.7	19276	I	I	I	I	*I	I
0.09	23.8	20111	I	I	I	I	*	I
0.10	23.9	20566	I	I	I	I	I*	I
0.11	23.8	18937	I	I	I	I	* I	I
0.12	23.7	17662	I	I	I	I *	I	I
0.13	23.6	16679	I	I	I	I *	I	I
0.14	23.6	15943	I	I	I	I *	I	I
0.15	23.5	15366	I	I	I	I*	I	I
0.16	23.5	14939	I	I	I	*	I	I
0.17	23.5	14638	I	I	I	*I	I	I
0.18	23.5	14425	I	I	I	*I	I	I
0.19	23.5	14276	I	I	I	*I	I	I
0.20	23.5	14175	I	I	I	* I	I	I
0.21	23.5	14106	I	I	I	* I	I	I
0.22	23.4	14052	I	I	I	* I	I	I
0.23	23.4	14007	I	I	I	* I	I	I
0.24	23.4	13973	I	I	I	* I	I	I
0.25	23.4	13948	I	I	I	* I	I	I
0.26	23.4	13927	I	I	I	* I	I	I
0.27	23.4	13906	I	I	I	* I	I	I
0.28	23.4	13887	I	I	I	* I	I	I
0.29	23.4	13870	I	I	I	* I	I	I
0.30	23.3	13854	I	I	I	* I	I	I
0.31	23.3	13840	I	I	I	* I	I	I
0.32	23.3	13827	I	I	I	* I	I	I
0.33	23.3	13813	I	I	I	* I	I	I
0.34	23.3	13800	I	I	I	* I	I	I
0.35	23.3	13787	I	I	I	* I	I	I
0.36	23.3	13774	I	I	I	* I	I	I
0.37	23.3	13761	I	I	I	* I	I	I
0.38	23.3	13748	I	I	I	* I	I	I
0.39	23.3	13734	I	I	I	* I	I	I
0.40	23.3	13722	I	I	I	* I	I	I
0.41	23.3	13709	I	I	I	* I	I	I
0.42	23.3	13696	I	I	I	* I	I	I
0.43	23.3	13684	I	I	I	* I	I	I
0.44	23.3	13671	I	I	I	* I	I	I
0.45	23.3	13659	I	I	I	* I	I	I
0.46	23.3	13647	I	I	I	* I	I	I
0.47	23.3	13636	I	I	I	* I	I	I
0.48	23.3	13624	I	I	I	* I	I	I
0.49	23.3	13613	I	I	I	* I	I	I
0.50	23.3	13602	I	I	I	* I	I	I

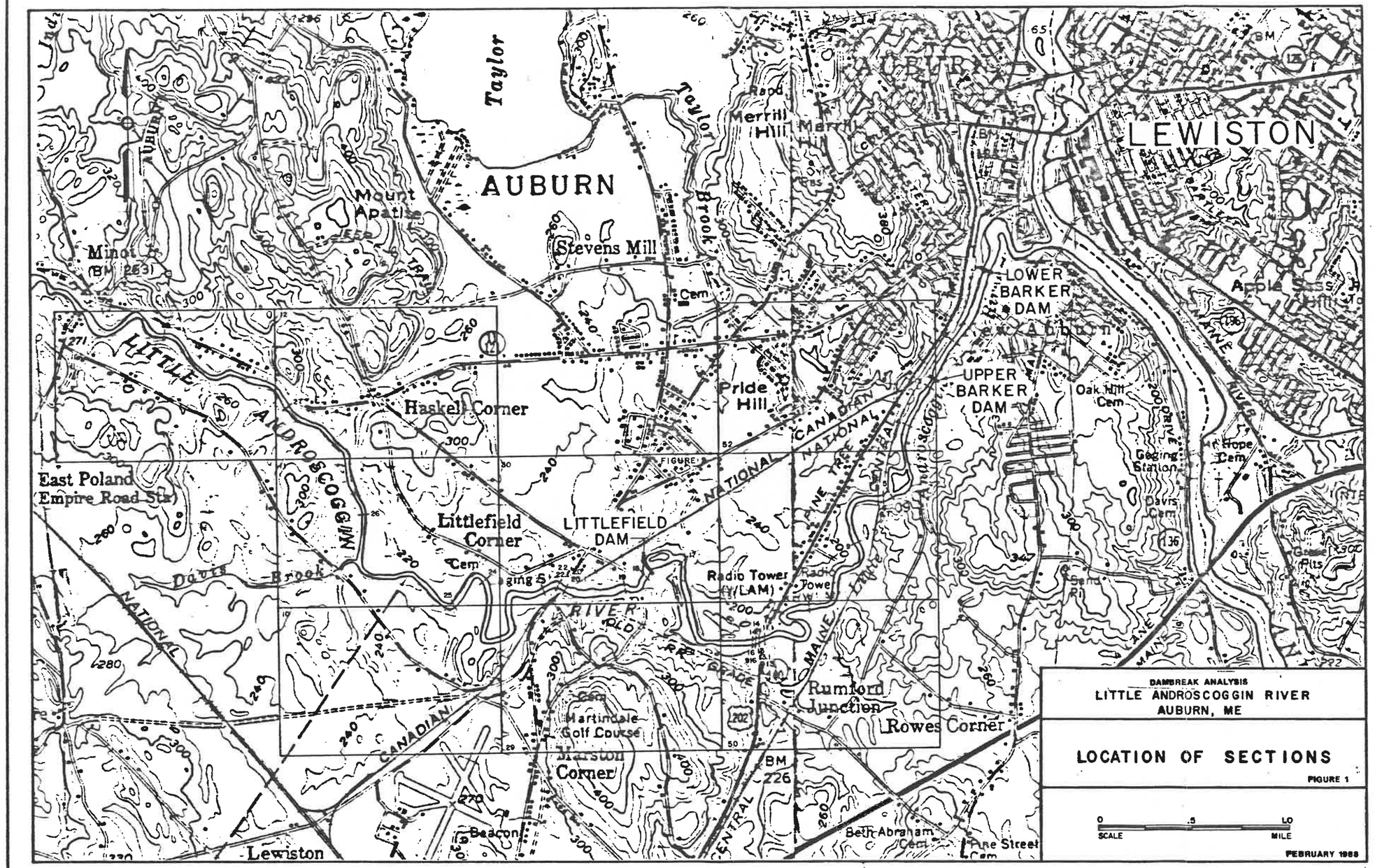
DISCHARGE HYDROGRAPH FOR LITTLE ANDY RIVER ... STATION NUMBER 121
BELOW LITTLEFIELD DAM AT MILE 4.79

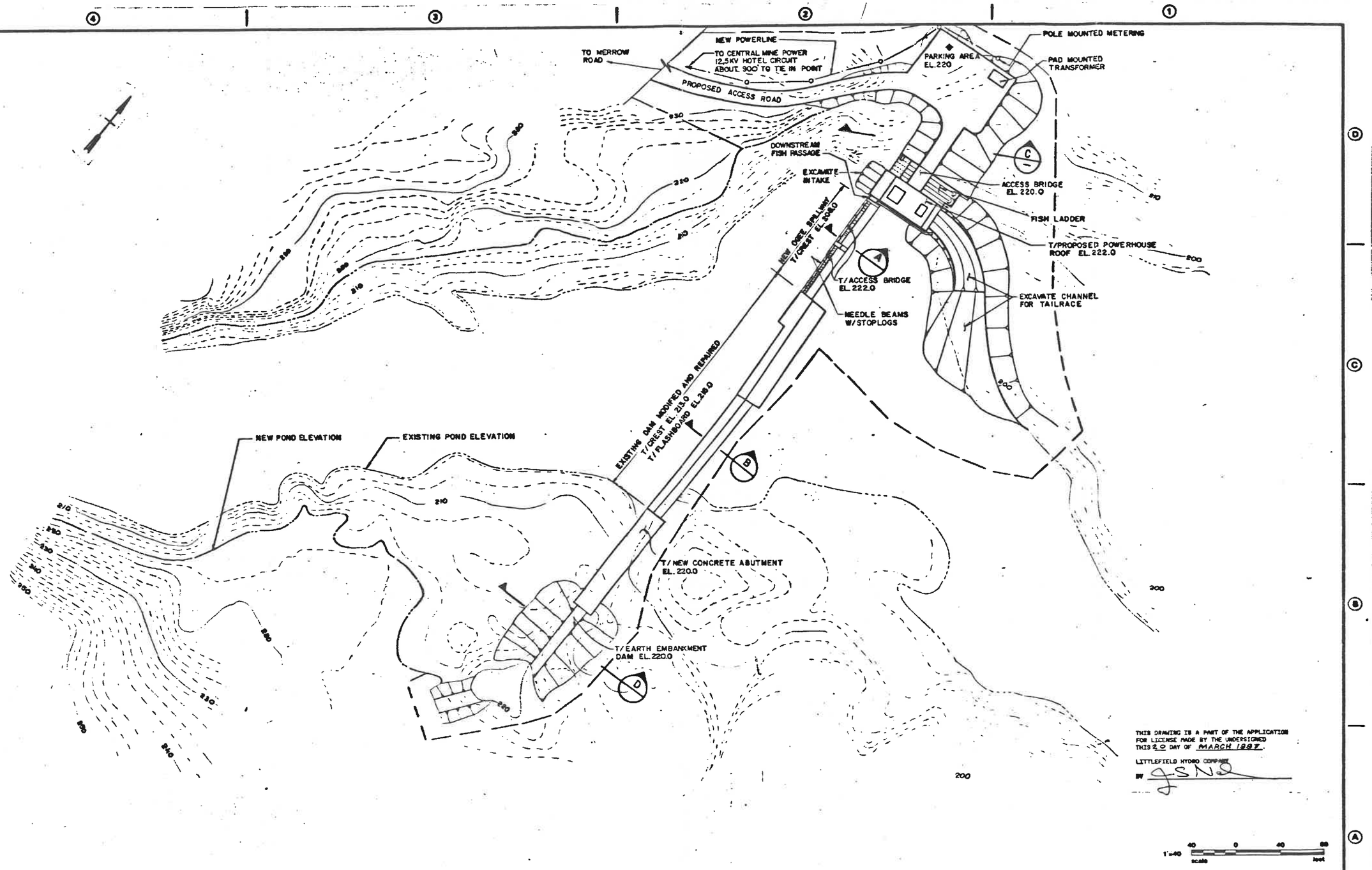
GAGE ZERO = 174.50 MAX ELEVATION REACHED BY FLOOD WAVE = 195.16
FLOOD STAGE = 35.50
MAX STAGE = 20.66 AT TIME = 1.195 HOURS
MAX FLOW = 13219 AT TIME = 1.195 HOURS

HR	STAGE	FLOW	0 5000 10000 15000 20000 25000
0.0	20.4	12450	I I I * I I I
0.1	20.4	12450	I I I * I I I
0.2	20.4	12450	I I I * I I I
0.3	20.4	12611	I I I * I I I
0.4	20.5	12830	I I I * I I I
0.5	20.6	12970	I I I * I I I
0.6	20.6	13059	I I I * I I I
0.7	20.6	13119	I I I * I I I
0.8	20.6	13160	I I I * I I I
0.9	20.6	13189	I I I * I I I
1.0	20.7	13207	I I I * I I I
1.1	20.7	13217	I I I * I I I
1.2	20.7	13219	I I I * I I I
1.3	20.7	13216	I I I * I I I
1.4	20.7	13208	I I I * I I I
1.5	20.7	13197	I I I * I I I
1.6	20.6	13182	I I I * I I I
1.7	20.6	13164	I I I * I I I
1.8	20.6	13144	I I I * I I I
1.9	20.6	13123	I I I * I I I
2.0	20.6	13100	I I I * I I I
2.1	20.6	13077	I I I * I I I
2.2	20.6	13053	I I I * I I I
2.3	20.6	13029	I I I * I I I
2.4	20.6	13005	I I I * I I I
2.5	20.6	12981	I I I * I I I
2.6	20.6	12957	I I I * I I I
2.7	20.5	12934	I I I * I I I
2.8	20.5	12911	I I I * I I I
2.9	20.5	12889	I I I * I I I
3.0	20.5	12868	I I I * I I I
3.1	20.5	12847	I I I * I I I
3.2	20.5	12826	I I I * I I I
3.3	20.5	12807	I I I * I I I
3.4	20.5	12788	I I I * I I I

APPENDICES B

SUPPORTING MATERIAL


AUBURN
LEWISTON
Taylor
Taylor Brook
Merrill Hill
Mount Apatite
Minot (BM 283)
Stevens Mill
Cem
LOWER BARKER DAM
UPPER BARKER DAM
Apple Hill
Oak Hill Cem
Hope Cem
Davis Cem
Pride Hill
Haskell Corner
LITTLE
ANDROSCOGGIN
RIVER
CANADIAN NATIONAL
PINE TREE CENTRAL MAINE
Maine
FIGURE
East Poland (Empire Road Sta)
Littlefield Corner
LITTLEFIELD DAM
Davis Brook
Radio Tower (LAM)
Martindale Golf Course
Marston Corner
BM 226
Rumford Junction
Rowes Corner
Beth Abraham Cem
Pine Street Cem
Beacon
Lewiston
DAMBREAK ANALYSIS
LITTLE ANDROSCOGGIN RIVER
AUBURN, ME
LOCATION OF SECTIONS
FIGURE 1
0 .5 1.0
SCALE MILE
FEBRUARY 1988



THIS DRAWING IS A PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 20 DAY OF MARCH 1987.

LITTLEFIELD HYDRO COMPANY

BY _____

NO.	DATE	REVISIONS	BY	CHK	APP'D.

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY
50 WASHINGTON STREET, NORWALK, CONNECTICUT 06854

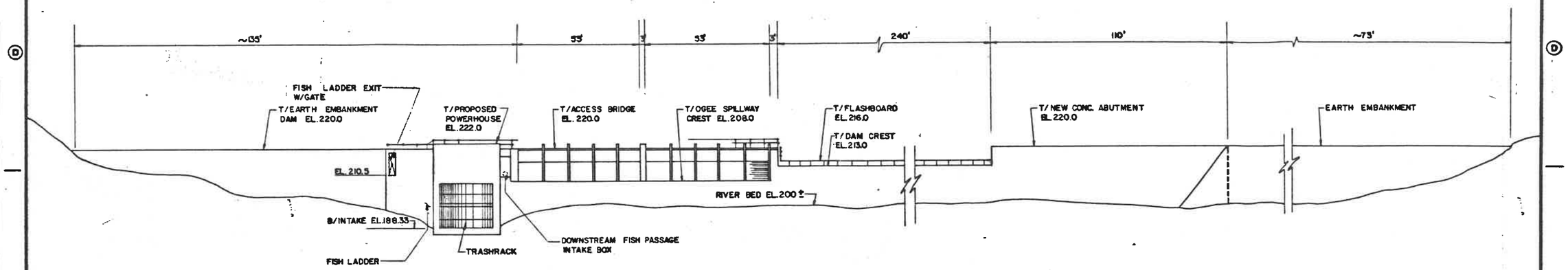
DESIGNED JPS | DRAWN SO | CHECKED JPS | RECOMMENDED
DATE MAY 5, 1986 | APPROVED

LITTLEFIELD HYDRO CO.

LITTLEFIELD HYDROELECTRIC PROJECT
DAMBREAK ANALYSIS
SITE PLAN

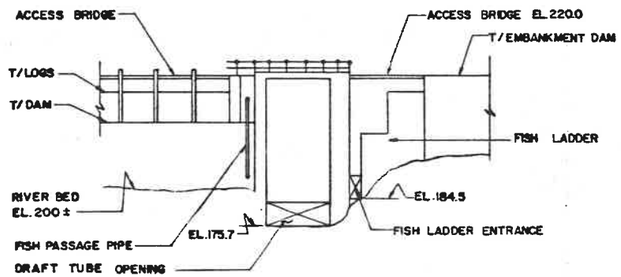
MKE NO. FIGURE 2
SHEET OF REV.

FERC NO. 6168-1



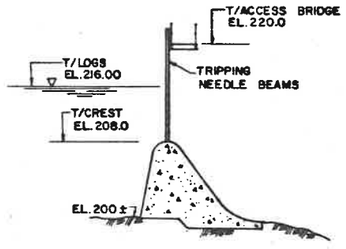
DAM ELEVATION – LOOKING DOWNSTREAM

1"=20' scale 20 0 20 40 feet



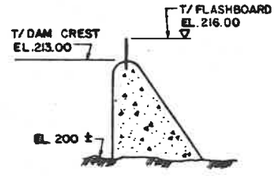
ELEVATION AT POWERHOUSE LOOKING UPSTREAM

1"=20' scale 20 0 20 40 feet



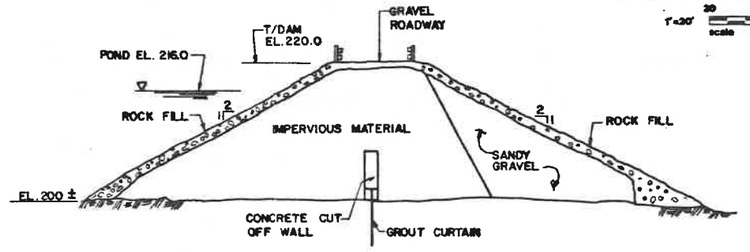
SECTION A

1"=10' scale 10 5 0 10 20 feet



SECTION B

1"=10' scale 10 5 0 10 20 feet



SECTION C

SECTION D (SIMILAR)

1"=10' scale 10 5 0 10 20 feet

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LITTLEFIELD HYDRO COMPANY

BY _____

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DESIGNED JPS | DRAWN SO | CHECKED JPS | RECOMMENDED

DATE MAY 5, 1986 | APPROVED

LITTLEFIELD HYDRO CO.

LITTLEFIELD HYDROELECTRIC PROJECT
DAMBREAK ANALYSIS
ELEVATION & SECTIONS

FIGURE 3
SHEET OF REV.

FERC NO. 2158-2

MATCH SHEET 31

MATCH SHEET 11

MATCH SHEET 51

MATCH SHEET 29

PARKING

WILSON ROAD

POLAND ROAD

SOUTH AVE

BRETTON AVE

RAILWAY

NATIONAL ELEVATOR

LITTLEFIELD DAM

RIVER

FLETCHER ROAD

HOTEL ROAD

CANADIAN

LITTLE ANDROSCOGGIN

GOLF COURSE

LITTLEFIED HYDRO PROJECT
DAMBREAK ANALYSIS
FIGURE 4 FEBRUARY 1988

COMPILED FROM PHOTOGRAPHS DATED 11-22-78
BY AERIAL SURVEY & PHOTO, INC.
SKOWHEGAN, MAINE

CONTROL BY SLF, INC.
SKOWHEGAN, MAINE

200 0 200 400 600 800
FEET

DATUM: U.S.G.S. MEAN SEA LEVEL
1000-FOOT GRID BASED UPON MAINE COORDINATE SYSTEM (WEST ZONE)
5 FOOT CONTOUR INTERVAL

TOPOGRAPHIC SURVEY

CITY OF AUBURN

ANDROSCOGGIN COUNTY, MAINE

PROPERTY MAP

CITY OF AUBURN

ANDROSCOGGIN COUNTY MAINE

1979

PHOTOREVISED AND DRAFTED BY AERIAL SURVEY & PHOTO, INC. SKOWHEGAN MAINE

MATCH SHEET 30 M 30

MATCH SHEET 10 M 10

MATCH SHEET 50 M 50

MATCH SHEET 28 M 28

SCALE 1" = 200'

LEGEND

PARCEL NUMBER 6

ADJACENT MAPS M 2

MATCH LINE

LITTLE ANDROSCOGGIN RIVER

ANDROSCOGGIN RIVER

RAILWAY

WEST TAMPA ROAD

BEECH ROAD

GOLF COURSE

LITTLEFIED HYDRO PROJECT DAMBREAK ANALYSIS FIGURE 5 FEBRUARY 1988

COMPILED FROM PHOTOGRAPHS DATED 11-22-78 BY AERIAL SURVEY & PHOTO, INC. SKOWHEGAN, MAINE

CONTROL BY SLF, INC. SKOWHEGAN, MAINE

200 0 200 400 600 800 FEET

DATUM: U.S.G.S. MEAN SEA LEVEL

1000-FOOT GRID BASED UPON MAINE COORDINATE SYSTEM (WEST ZONE)

5 FOOT CONTOUR INTERVAL

TOPOGRAPHIC SURVEY

CITY OF AUBURN

ANDROSCOGGIN COUNTY, MAINE

29

SHEET NO. 29

MATCH SHEET 53

MATCH SHEET 1:31

MATCH SHEET 71

MATCH SHEET 51

PROPERTY MAP
CITY OF AUBURN

ANDROSCOGGIN COUNTY MAINE

1979

PHOTOREVISED AND DRAFTED BY AERIAL SURVEY & PHOTO, INC. SKOWHEGAN MAINE

SCALE
1" = 200'

LEGEND
PARCEL NUMBER 5
ADJACENT MAPS M2
MATCH LINE
BLOCK NUMBER 2

LITTLEFIED HYDRO PROJECT
DAMBREAK ANALYSIS
FIGURE 8 FEBRUARY 1988

52

(70-1-92)

COMPILED FROM PHOTOGRAPHS DATED 11-22-78
BY: AERIAL SURVEY & PHOTO, INC.
SKOWHEGAN, MAINE

CONTROL BY: S.L.F., INC.
SKOWHEGAN, MAINE

200 0 200 400 600 800
FEET

DATUM: U.S.G.S. MEAN SEA LEVEL
1000-FOOT GRID BASED UPON MAINE COORDINATE SYSTEM (WEST ZONE)
5 FOOT CONTOUR INTERVAL

TOPOGRAPHIC SURVEY

CITY OF AUBURN

ANDROSCOGGIN COUNTY, MAINE
1979

SHEET NO. 52