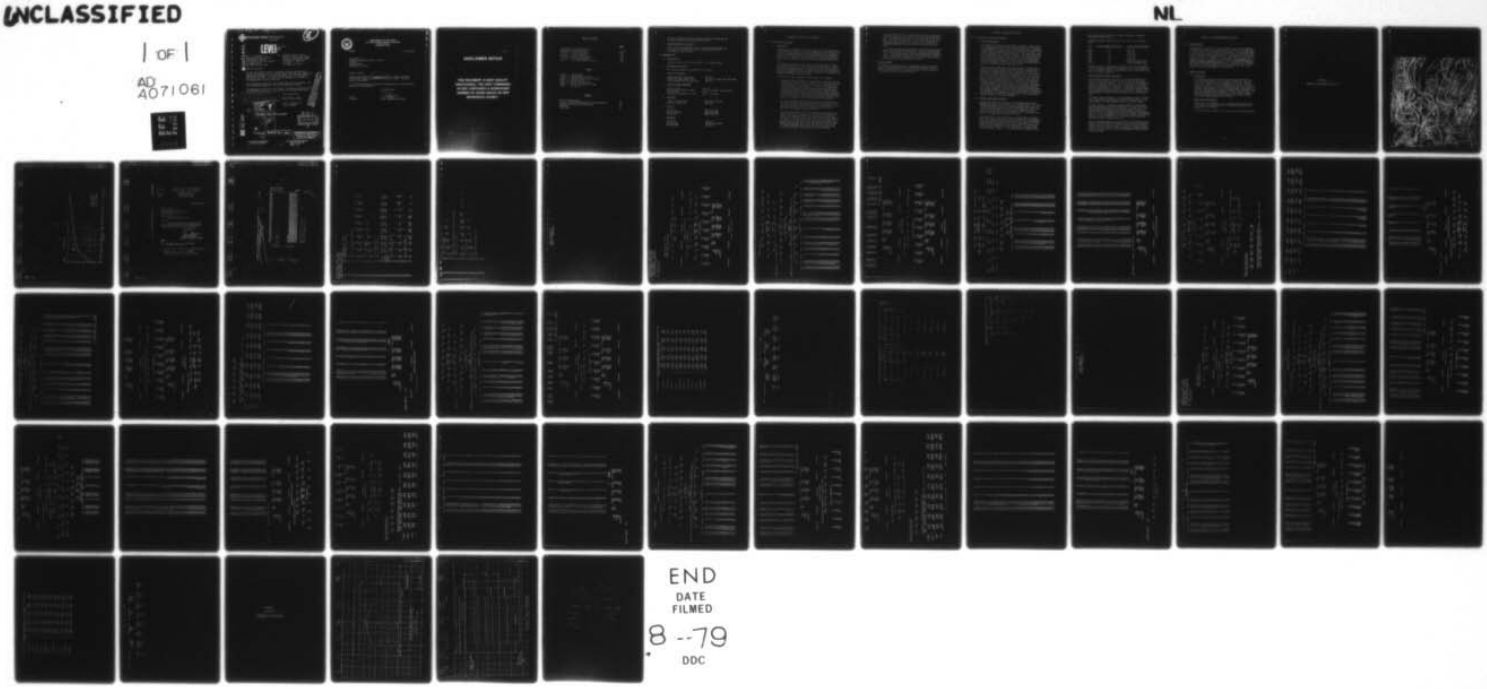
AD-A071 061 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. GRASSY SPRAIN RESERVOIR (NY 188), --ETC(U)
MAY 79 DACW51-78-C-0035

UNCLASSIFIED NL

1 OF 1
AD A071061



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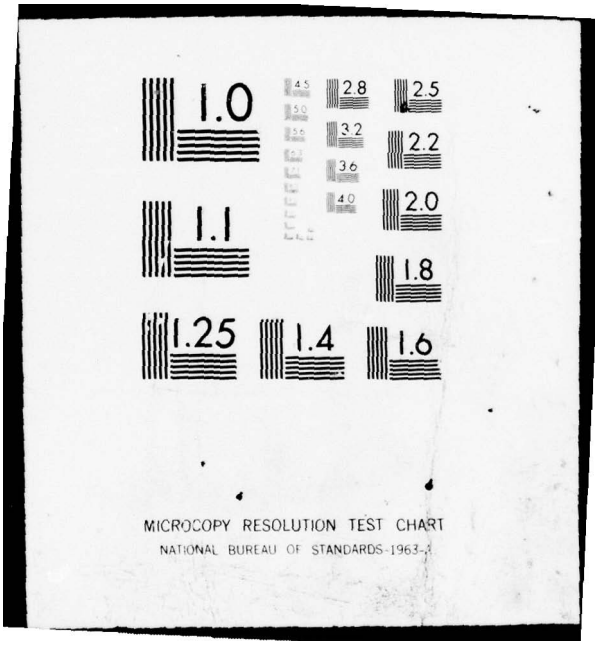
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(11) 2 May 79 (12) 61p

STETSON • DALE BANKERS TRUST BUILDING
UTICA • NEW YORK • 13501
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8

AD A071061

LEVEL III

May 2, 1979

Mr. P. A. Descenza
Chief, Engineering Division
Department of the Army
N.Y. District Corps of Engineers
26 Federal Plaza
New York, New York 10007

Re: Changes to Phase I Dam Inspection Report, Grassy Sprain Reservoir, Westchester County Inventory No. 118 dated July 1978
S-D Project No. 2210

Dear Mr. Descenza:

We have reviewed the District's hydrologic material and have incorporated the findings into our previous Phase I Dam Inspection Report for Grassy Sprain Reservoir in Westchester County, New York, Inventory No. 188, dated July 1978. Ten copies of these changes are enclosed, as instructed by Mr. Caspe of your staff.

The conclusions presented in the original report are still valid. The new information changes the technical findings only slightly.

We appreciate the District's assistance in refining this material with the information developed in study efforts on the Bronx River Basin.

Very truly yours,

Neal F Dunlevy

Neal F. Dunlevy, P.E.
Project Manager

NFD/c
Encl.

Contract DACW51-78-C-0035
(15)

THE STETSON PARTNERSHIP
ARCHITECTS & ENGINEERS

DALE ENGINEERING COMPANY
CONSULTING ENGINEERS
Utica, NY

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10007

NANEN-F

21 June 1979

Mr. Cundiff
Defense Documentation Center DDC/DDA
Building 5
Cameron Station
Alexandria, VA 22314

Dear Mr. Cundiff:

Attached are 8 copies of an addendum to "Phase I Inspection Report, Grassy Sprain Reservoir, Westchester County, New York". Your ADA number is ADA 064084.

It is requested that you include this addendum with the original report already in your possession.

Sincerely yours,

P. A. DeSCENZA
Chief, Engineering Division

8 Incl
As stated

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Section 1 - Project Information	1-4
Section 2 - Visual Inspection	5
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Section 4 - Structural Stability	8-9
Section 5 - Assessment/Remedial Measures	10

FIGURES

Figure 1 - Location Map
Figure 2 - Plan and Profile of Dam
Figure 3 - Plan and Section of Dam Outlets
Figure 4 - Sections of Dam
Figure 5 - Details and Core Wall
Figure 6 - Plan of Spillway and Bridge
Figure 7 - Geology Map

APPENDIX

Field Inspection Report	A
Previous Inspection Reports/Relevant Correspondence	B
Hydrologic and Hydraulic Computations	C
References	D
Survey Data	E

nal dam. No other data has been made available regarding the construction procedures for the reconstructed dam.

h. Normal Operational Procedures

Normal operation procedures include routinely checking drain control valves in the gate house and to allow excess flows to discharge over the spillway.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Grassy Sprain is 1.91 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed discharges:

Ungated spillway, top of dam	1600 cfs
Ungated spillway, design flood	950 cfs (1/2 PMF), 5052 cfs (PMF)
Gated drawdown, 48 inch pipe (max.)	440 cfs

c. Elevation (feet above MSL)

Crest of dam	134.39
Maximum pool - design discharge	133.90 (1/2 PMF), 135.00 (PMF)
Spillway Crest	129.39
Stream bed at centerline of dam	109 estimated

d. Reservoir

Length of maximum pool	9800 feet (1/2 PMF)
Length of normal pool	9800 feet

e. Storage

Top of dam	3550 acres feet
Design surcharge	3500 acres feet
Normal pool	2960 acres feet

f. Reservoir

Top of dam	150 acre
Maximum pool	150 acre (1/2 PMF)
Spillway pool	148 acre

SECTION 3 - HYDROLOGY AND HYDRAULICS

3.1 EVALUATION OF FEATURES

a. Design Data

No information was obtained relevant to hydrologic and hydraulic design features of the dam. For this investigation, the dam was evaluated for a Probable Maximum Flood (PMF) hydrograph using Probable Maximum Precipitation rainfall data obtained in Hydrometeorological Report No. 51. Both the PMF and 1/2 PMF were evaluated whereas the 1/2 PMF was assumed to be approximately the Standard Project Flood (SPF).

A hydrological analysis of this basin was made for flows at Central Ave. and the mouth where Sprain Brook meets the Bronx River. Additionally, an analysis was made for dam safety utilizing a recent version of HEC-1 called HECI-DB. The output using the dam overtopping option is included for the SPF and PMF in Appendix C. The map of the hydrologic sub-areas is also included.

A description of the hydrologic computer model is as follows:

1. A sub-area flood hydrograph is calculated for the area above the Jackson Ave. culverts on Sprain Brook. This is called sub-area 1 in the model. The capacity of the culvert which drains into the Grassy Sprain Brook Reservoir is 480 cfs. Any additional flow will be diverted to another culvert under Jackson Avenue which will flow along the N.Y. State Thruway, called sub-area 3 in the model. At the same time there will be backwater with an increase in discharge behind the culvert leading into the Reservoir up to 1500 cfs. At this flow, overtopping of Jackson Ave., will occur resulting in weir flow also into the Reservoir.

2. The (sub-area flood hydrograph for the) drainage area contributing runoff directly into the Grassy Sprain Brook Reservoir is now calculated (sub-area 2 for inflow into the Reservoir. With determined storage-outflow relationships developed for the Reservoir, the outflow can be calculated.

3. The diverted flow from sub-area 1 was channel-routed thru the reach along the N.Y. Thruway down to Central Ave. (Sub-area 3). Subarea 3's load hydrograph is computed and the routed flow, sub-area 3's flow and outflow from the Reservoir is all combined at a point just upstream from the Central Ave. crossing. The combined flow is then routed thru sub-area 4, the area between Central Ave. and the mouth. With the calculation of sub-area 4's flood hydrograph, the combined sub-area and routed flows represent the flow at the mouth of Grassy Sprain Brook.

For the SPF and PFM, the transposed drainage area for sub-areas above the Reservoir is the total drainage area above the Reservoir. The transposed drainage area for sub-areas 3 and 4 (parallel to or below the Reservoir) is the total drainage area of the Grassy Sprain Brook Basin. However, only the PMF has a transposed drainage area or Hop Brook factor applied to rainfall.

It is noted that the standard project flood at the Grassy Sprain Reservoir was developed as 1974 C.F.S., and was routed to 948 C.F.S. The standard project flood was contained within the reservoir. The Probable Maximum Flood was determined to be 5894 C.F.S. and was routed to 5052 CFS. During The Probable Maximum Flood, the dam was overtopped by 0.71 feet.

b. Experience Data

No information was obtained from knowledgeable people at the site relevant to performance of the spillway during extreme rainfall events - only that in the spring of each year the dam is spilling but, routinely, that is not significant.

SECTION 4 - STRUCTURAL STABILITY

4.1 Evaluation of Structural Stability

a. Visual Observations

The reservoir dam shows no misalignment, sloughing surface cracks or erosion which would indicate structural movement or distress of the embankment structure. Riprap on the upstream face is generally in good condition, although some pieces have been displaced. Riprapped slopes forming the reservoir sides in the area close to the dam's embankments are in similar condition. The downstream slope and area below the toe of slope is covered with a dense growth of various types and heights of vegetation, a condition which seriously hampers close examination of the slope. The accomplished inspection, however, indicates no sign of seepage through the embankment or below the toe of downstream slope.

The masonry (cut stone block) spillway structure is generally in good and serviceable condition but some reservoir seepage occurs through deteriorated masonry joints in the weir section of the spillway. Spillway water also seeps below the cut stone floor of the spillway channel, entering through open joints in this stone work. No significant stone work deterioration or erosion of supporting soil was observed because of this seepage flow, however. Dense foliage interfered with close inspection of the downstream discharge opening of the outlet pipe. Storm drainage from the northbound lane of the adjacent Sprain Brook Parkway is delivered via underground conduit for discharge on the parkway embankment slope close to where the dam's downstream easterly abutment meets the parkway embankment. Pooling of this discharge has resulted in the development of a swampy area some distance below the downstream toe of the dam but the condition apparently is not creating any harmful effects for the dam embankment.

b. Geology and Seismic Stability

Grassy Sprain Reservoir inundated a valley whose bedrock floor beneath the glacial and alluvial fill is Inwood Marble. The valley is along the eastern limb of a northward plunging anticline. As indicated on the cross section (Fig. 2) the west wall of the reservoir is Fordham Gneiss and the east wall, Manhattan Schist. Trend of the foliation of the metamorphic rocks is northeast with dips to the southeast in the reservoir area.

Bryn Mawr fault may be present about 0.7 miles south of the dam. This fault, which is not shown on the 1971 New York State Geologic Map, was encountered during construction of the Catskill aqueduct. A decaying shear zone about 50 feet thick was found at that time. Based upon the topography and geology the fault has been tentatively located in the area of the intersection of Grassy Sprain Road with Tuckahoe Road. Its probable trend is northwest, along

the valley from New York State Thruway Interchange 6 southeast along Grassy Sprain Brook.

Earthquakes known to have occurred in this region are tabulated below.

Date	Intensity-Modified Mercalli	Location Relative to Dam
1872	IV	4 mi. SE
1874	V	4 mi. SE
1916	IV	4 mi. NE
1926	V	5 mi. SW
1933	III	4 mi. NE
1938	III	9 mi. NE
1947	V	15 ENE Greenwich, Conn.
1950	IV	15 ENE Greenwich, Conn.

Although the area is designated as being in Zone 1 of the Seismic Probability Map, the New York State Geological Survey believes this area of Westchester should be upgraded to at least Zone 2 with possibility of Zone 3 potential.

c. Data Review and Stability Evaluation

Design drawings show that the dam at its present dimensions consists of a core wall of masonry at the end sections and a clay puddle for the center section. Earth fill upstream and downstream embankments adjoining the core wall are constructed to provide slopes of 2 horizontal on 1 vertical. Procedures for soil placement and compaction are not detailed. The design information does indicate the dam structure bears directly on rock. Visually, the dam embankment and related structure conform to the design drawings.

At present, the dam structure is in good condition with no indication of structural instability, significant deterioration, or ongoing seepage from past earthquake activity or other factors.

The dam's design is in general accordance with the construction professions past practice for structures of this type, and satisfactory performance typically has resulted. This site is in an area having a seismic Zone 1 designation (although a change in rating to Zone 2 is suggested) and convention assumes no earthquake hazard. It is anticipated that, properly maintained, this dam will continue to serve satisfactorily for future loading conditions which are similar to those of the past.

However, the downstream slope urgently needs to be cleared of the heavy foliage which could be responsible for permitting seepage to commence (roots of large trees), for hiding the presence of deep animal holes through which seepage could begin, and which tends to provide a general masking of possible embankment movement and developing seepage.

SECTION 5 - ASSESSMENT/REMEDIAL MEASURES

5.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, the earth embankmment of the Grassy Sprain Dam is so overgrown that it cannot be concluded that it is not unsafe for normal reservoir operation. The heavy brush growth on the downstream slope of the dam obstructs and has limited the extent of the inspection of the downstream face. The reservoir has only been traversed once on the embankment and once below the embankment toe. The ungated spillway is adequate, as determined by the Recommended Guidelines for Safety Inspection of Dams, to pass the design storm provided the flashboard structure has been removed. In addition, the flashboard structure could become clogged with debris which could lodge in the wooden framework which supports the flashboards.

5.2 REMEDIAL MEASURES

a. Alternatives

The downstream slope of the dam should be cleared of brush and trees and planted with a cover suitable for this use. This will allow close inspection of the downstream face for any signs of seepage or slouging. After the embankment is cleared, it should be inspected again and this report should be amended. Only a small portion of the downstream could be inspected and the embankment was only traversed once on the embankment and once below the toe. The framework supporting the flashboards on the principal spillway should be removed to preclude blockage of the spillway by waterborne debris during high periods of runoff.

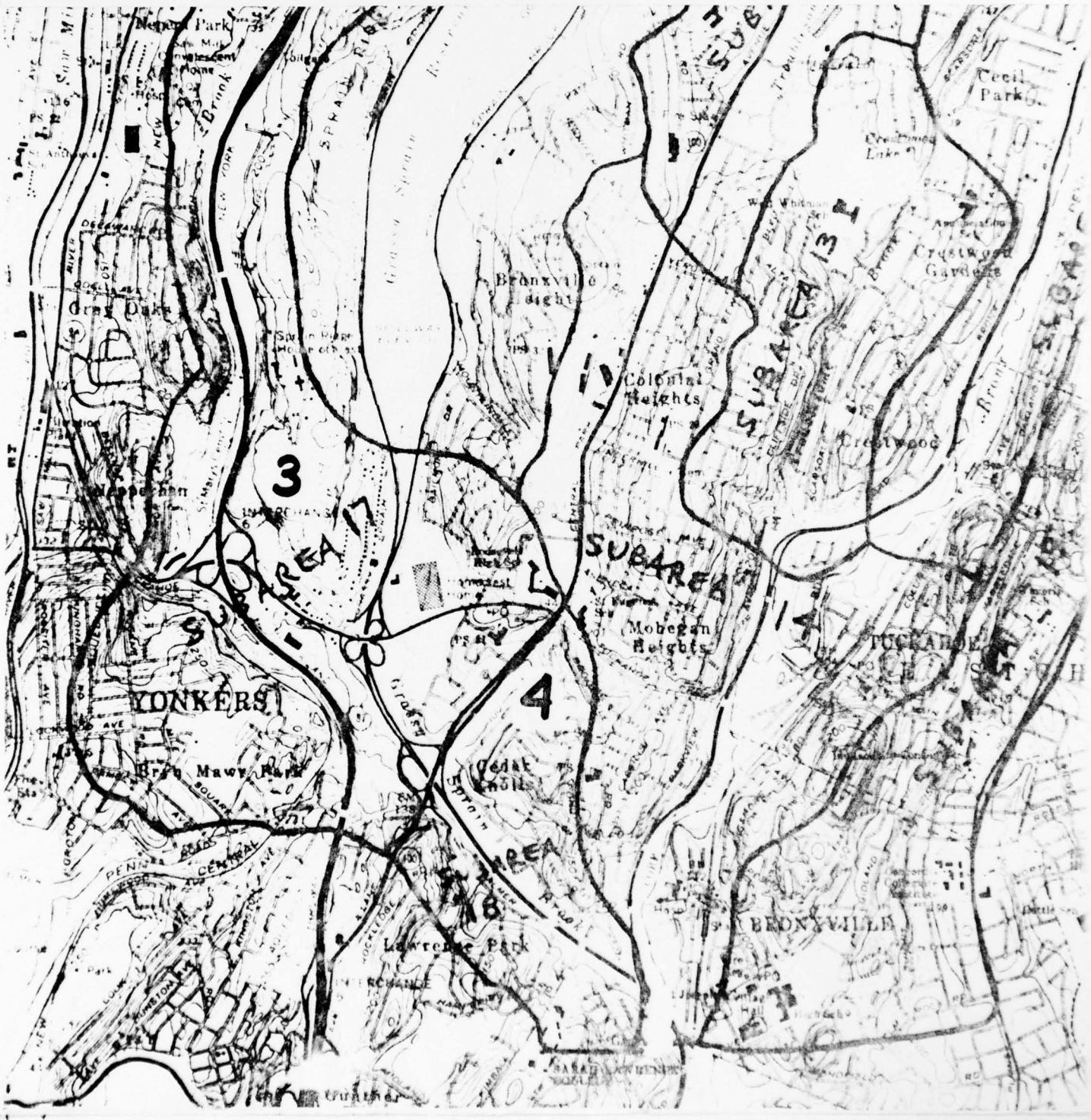
b. Operation and Maintenance

Normal operation procedures include routinely checking drain control valves in the gate house and to allow excess flows to discharge over the spillway.

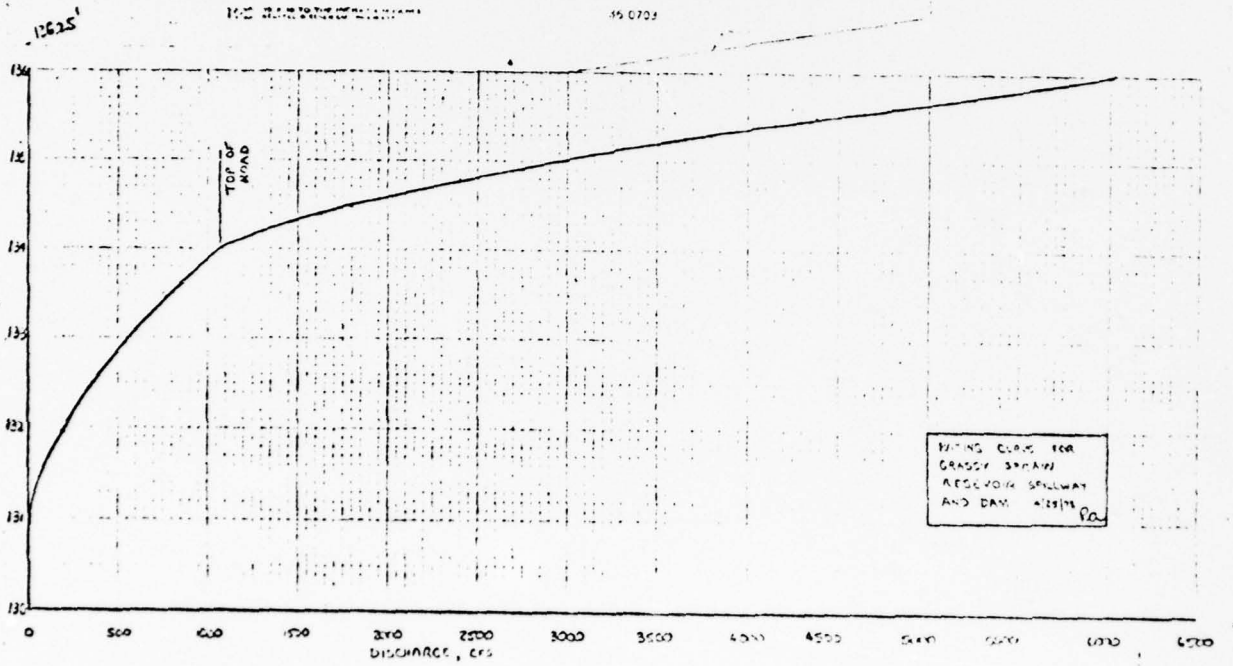
The dam embankment should be cut, cleared and routinely maintained.

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS


Nepera Park
Grey Oaks
Bronxville Heights
Colonial Heights
Crestwood Gardens
Cecil Park
Mapleham
YONKERS
Mobegan Heights
Cedar Knoll
Lawrence Park
BRONXVILLE
SUBAREA 1
SUBAREA 2
SUBAREA 3
SUBAREA 4
SUBAREA 5
SUBAREA 6
SUBAREA 7
SUBAREA 8
1
2
3
4

(Encl. 6)


1625'
TOP OF ROAD
136
135
134
133
132
131
130
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
DISCHARGE, CFS
RATING CURVE FOR GRASSY STREAM RESERVOIR SPILLWAY AND DAM 4/29/75

CITY OF YONKERS
DEPARTMENT OF PUBLIC WORKS
BUREAU OF WATER
WATER TREATMENT PLANT
1070 NEPPERHAN AVENUE
YONKERS, NEW YORK 10703

February 21, 1978

Mr. J. A. Weiss
Chief, Engineering Division
Department of the Army
New York District, Corps of Engineers
26 Federal Plaza
New York, New York 10007

Atten: Mr. Duncan Schweitzer
Project Manager, Civil Engineer

Dear Sir:

In reply to your letter of February 15, 1978, I am enclosing a chart showing the Elevation in Feet and its equivalent amount in Million Gallons in storage of the Grassy Sprain Reservoir, Yonkers, New York.

Very truly yours,

JAMES A. NEARY
Water Works Superintendent
914-963-2160 x242

JAN:DO
Enc.

cc: B. Bernstein, Act'g Comm. of Public Works
W. A. Malone, City Engineer

need: X-section of face of dam showing spillway + orifices.
: data on release of water to Saw Mill?
: datum of attached elevs. to a USGS datum.

(INCL 2)

GRASSY SPRAIN DATA

ELEVATION IN FEET		GALLONS	Acre Feet
20	[illegible]	46,000,000	141.18 acre-ft.
19.5		100,000,000	
19		145,000,000	
18.5		170,000,000	
18		200,000,000	
17.5		230,000,000	
17		245,000,000	
16.5		260,000,000	
16		280,000,000	
15.5		290,000,000	
15		310,000,000	
14.5		325,000,000	
14	[illegible]	350,000,000	1074.[illegible]
13.5		370,000,000	
13		390,000,000	
12.5		400,000,000	
12		420,000,000	
11.5		440,000,000	
11		460,000,000	
10.5		490,000,000	
10	[illegible]	520,000,000	[illegible]
9.5		530,000,000	[illegible]
9	[illegible]	545,000,000	[illegible]
8.5		580,000,000	[illegible]
8	[illegible]	600,000,000	1841.45
7.5		640,000,000	[illegible]
7	[illegible]	680,000,000	[illegible]
6.5		700,000,000	[illegible]
6	[illegible]	750,000,000	[illegible]
5.5		780,000,000	[illegible]
5	[illegible]	800,000,000	[illegible]
4.5		840,000,000	[illegible]
4	[illegible]	890,000,000	[illegible]
3.5		920,000,000	[illegible]
3	[illegible]	960,000,000	[illegible]
2.5		1,000,000,000	[illegible]
2	128.94'	1,040,000,000	[illegible]
1.5		1,080,000,000	3314.61
1	129.94'	1,120,000,000	[illegible]
0.5		1,160,000,000	[illegible]
0	130.94'	1,200,000,000	3682.90

Top of flashboard

1 acre-foot = 3.26×10^5 gallons.

148 ... × 43,560 cf/acre-ft = 325,830 gal/acre-ft

```
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  17 OCT 78
*****************************
    1                A1   GRASSY SPRAIN BROOK BASIN
    2                A2   HECIDB MODEL
    3                A3   PMF=DAM OVERTOPPING ANALYSIS
    4                B     70       1       0       0       0       0       0       0       0       0
    5                H1     5
    6                K      0       1       0       0       0       0       1
    7                K1   INPUT SFM OF AREA 1 INTO RESERVOIR
    8                M     -1       0    2,24
    9                N      0       0       0       0       0       0       0       0       0       0
   10                NQ     0       0       0       0       5      13      35      62      81      82
   11                NQ    69      54      41      31      25      23      25      30      34      35
   12                NQ    45      64      96     134     170     197     257     422     480     480
   13                NQ  1050    1779    2163    2011    1503     944     480     480     480     480
   14                NQ   480     369     271     197     143     104      77      55      38      19
   15                NQ    13       8       7       6       5       5       4       4       4       4
   16                K      0       1       0       0       0       0       1
   17                K1   COMPUTE SFM OF AREA 2
   18                M0     1       1    2,20       0    4,44       0
   19                P0     0    22,0     111     123     153     143       0       0
   20                T0  ,40    1,74    2,53    ,08
   21                N  3,45    ,625       0
   22                X      -       4       1
   23                K      2       1       0       0       0       0       1
   24                K1   COMBINE SUBAREAS 1 AND 2
   25                K0     1       3       0       0       0       0       1
   26                K1   ROUTE THRU GSB RESERVOIR
   27                Y0     0       0       0       1
   28                Y1     1       0       0       0       0       0    3680      -1
   29                Y6130,94  131,44  131,94  132,44  132,74  133,44   134,0  134,39   135,0   136,0
   30                Y5     0      55     190     340     460     770    1070    1600    3000    6000
   31                $S  3680    3840    4000    4150    4250    4460    4650    4790    5000    5380
   32                $E130,94  131,44  131,94  132,44  132,74  133,44   134,0  134,39   135,0   136,0
   33                $$130,94
   34                $D134,39    4,46     1,5     440
   35                K0     0       2       0       0       0       0       1
   36                K1   INPUT DIVERTED FLOW FROM AREA 1
   37                M0    -1       0    0,00
   38                NQ     0       0       0       0       0       0       0       0       0       0
   39                NQ     0       0       0       0       0       0       0       0       0       0
   40                NQ     0       0       0       0       0       0       0       0       0       0
   41                NQ     0       0       0       0       0       0       0       0     253     813
   42                NQ  1020    1020    1020    1020    1020    1020    1002     646     379     176
   43                NQ    17       0       0       0       0       0       0       0       0       0
   44                NQ     0       0       0       0       0       0       0       0       0       0
   45                KO     1       3       0       0       0       0       1
   46                K1   CHANNEL ROUTE THRU AREA 3
   47                Y0     0       0       0       1
   48                Y1     1       0       0       0       0       0      -1       0
   49                Y6   ,08     ,04     ,08    77,5    92,5   19600   ,0038
   50                Y7   100     100     213   83,56   264,2   84,39     282   77,02     300    77,5
```

```
Y7    10      .55      55.5      5.2       50        1
K0     0        3         0         0         0         0         1
K1    COMPUTE SPH FOR AREA 3
M0     1        1      2.09         0      7.01         0
P0     0     22.0       111       125       133       143         0         0
T0   .40     1.74      2.53       .68
A0  3.90     .625         0
X0     4        4         1                                                                                    :
K0     3        3         0         0         0         0         1
K1    COMBINE CHANNEL AND RESERVOIR ROUTED PLUS AREA 3 FLOWS
K0     1        4         0         0         0         0         1
K1    CHANNEL ROUTE THRU AREA 4
Y0     0        0         0         1
Y1     1        0         0         0         0         0        -1
Y6   .08      .08       .08        74        90      4400      .0016                                            :
Y7 171.2     87.5       220     80.48     223.5     80.39     257.5        74     307.5        74
Y7   352    85.42       380     85.48       423     85.6
K0     0        4         0         0         0         0         1
K1    COMPUTE SPH FOR AREA 4
M0     1        1       .48         0      7.01         0
P0     0     22.0       111       125       133       143         0         0
T0   .40     1.74      2.53       .68                                                                          :
A0  1.41     .625         0
X0     1        1         1
K0     2        5         0         0         0         0         1
K1    COMBINE ROUTED PLUS AREA 4 FLOWS
K0    99
A0
A0
A0
A0
A0
```

PREVIOUS SOURCE TREE STACK ALLOCATIONS

RUNOFF HYDROGRAPH AT 1
RUNOFF HYDROGRAPH AT 1
COMBINE 2 HYDROGRAPHS AT 1

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 17 OCT 78
****

RUN DATE= 78/11/03.
TIME= 09.12.40.

GRASSY SPRAIN BROOK BASIN
HEC1DB MODEL
PMF=DAM OVERTOPPING ANALYSIS

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
70	1	0	0	0	0	0	0	0	0
			JOPER	NRT	LROPT	TRACE			
			3	0	0	0			

****

SUB-AREA RUNOFF COMPUTATION

INPUT SEW OF AREA 1 INTO RESERVOIR

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNDA	ISAME	LOCAL
-1	0	2.24	0.00	2.24	0.00	0.000	0	0	0

INPUT HYDROGRAPH

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	5.	13.	35.	82.	81.	82.
69.	54.	41.	31.	25.	23.	25.	30.	34.	38.
45.	64.	96.	134.	170.	197.	257.	422.	460.	460.
1050.	1779.	2163.	2011.	1503.	944.	480.	480.	480.	480.
480.	369.	271.	197.	143.	104.	77.	55.	38.	19.
13.	8.	7.	6.	5.	5.	4.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2163.	1556.	632.	232.	16228.
CMS	61.	44.	18.	7.	460.
INCHES		6.38	10.49	11.23	11.23
MM		162.06	266.53	285.29	285.29
AC-FT		762.	1253.	1341.	1341.
THOUS CU M		940.	1545.	1654.	1654.

****

SUB-AREA RUNOFF COMPUTATION

COMPUTE SPM OF AREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.20	0.00	4.44	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	111.00	125.00	133.00	145.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LKOPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMA	RTIMP
0	.40	1.74	2.55	.68	0.00	1.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.48 CP= .63 NTAB 0

RECESSION DATA

STRTQ= 4.00 QRCSN= 4.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.96 AND R= 3.20 INTERVALS

UNIT HYDROGRAPH 20 END-OF-PERIOD ORDINATES, LAGE 3.48 HOURS, CP= .62 VOL= 1.00

34.	120.	211.	248.	215.	157.	116.	85.	62.	46.
33.	25.	18.	13.	10.	7.	5.	4.	3.	2.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	4.	1.02	12.00	36	.35	.20	.15	207.
1.01	2.00	2	.01	0.00	.01	4.	1.02	13.00	37	1.95	1.47	.48	270.
1.01	3.00	3	.01	0.00	.01	4.	1.02	14.00	38	2.34	1.82	.52	449.
1.01	4.00	4	.01	0.00	.01	4.	1.02	15.00	39	2.93	2.35	.58	789.
1.01	5.00	5	.01	0.00	.01	4.	1.02	16.00	40	7.42	6.39	1.04	1366.
1.01	6.00	6	.01	0.00	.01	4.	1.02	17.00	41	2.74	2.26	.48	2209.
1.01	7.00	7	.03	0.00	.03	4.	1.02	18.00	42	2.15	1.76	.39	2960.
1.01	8.00	8	.03	0.00	.03	4.	1.02	19.00	43	.18	.11	.07	3245.
1.01	9.00	9	.03	0.00	.03	4.	1.02	20.00	44	.18	.11	.07	3066.
1.01	10.00	10	.03	0.00	.03	4.	1.02	21.00	45	.18	.11	.07	2517.
1.01	11.00	11	.03	0.00	.03	4.	1.02	22.00	46	.18	.11	.07	1943.
1.01	12.00	12	.03	0.00	.03	4.	1.02	23.00	47	.18	.11	.07	1467.
1.01	13.00	13	.15	0.00	.15	4.	1.03	0.00	48	.18	.11	.07	1119.
1.01	14.00	14	.18	0.00	.18	4.	1.03	1.00	49	0.00	0.00	0.00	860.
1.01	15.00	15	.22	.02	.20	5.	1.03	2.00	50	0.00	0.00	0.00	659.
1.01	16.00	16	.56	.23	.33	15.	1.03	3.00	51	0.00	0.00	0.00	498.
1.01	17.00	17	.21	.06	.14	39.	1.03	4.00	52	0.00	0.00	0.00	370.
1.01	18.00	18	.16	.05	.11	67.	1.03	5.00	53	0.00	0.00	0.00	272.
1.01	19.00	19	.01	0.00	.01	85.	1.03	6.00	54	0.00	0.00	0.00	201.
1.01	20.00	20	.01	0.00	.01	83.	1.03	7.00	55	0.00	0.00	0.00	148.
1.01	21.00	21	.01	0.00	.01	68.	1.03	8.00	56	0.00	0.00	0.00	109.
1.01	22.00	22	.01	0.00	.01	53.	1.03	9.00	57	0.00	0.00	0.00	79.
1.01	23.00	23	.01	0.00	.01	40.	1.03	10.00	58	0.00	0.00	0.00	58.
1.02	0.00	24	.01	0.00	.01	30.	1.03	11.00	59	0.00	0.00	0.00	39.
1.02	1.00	25	.12	.03	.09	24.	1.03	12.00	60	0.00	0.00	0.00	20.
1.02	2.00	26	.12	.03	.08	25.	1.03	13.00	61	0.00	0.00	0.00	12.
1.02	3.00	27	.12	.04	.08	27.	1.03	14.00	62	0.00	0.00	0.00	7.

						2.	1	15	0	0.	0.	0.	0.	
1.02	5.00	29	.12	.04	.08	38.	1.03	16.00	64	0.00	0.00	0.00	0.	
1.02	6.00	30	.12	.04	.08	43.	1.03	17.00	65	0.00	0.00	0.00	5.	
1.02	7.00	31	.35	.19	.17	52.	1.03	18.00	66	0.00	0.00	0.00	5.	
1.02	8.00	32	.35	.19	.16	73.	1.03	19.00	67	0.00	0.00	0.00	4.	
1.02	9.00	33	.35	.19	.16	107.	1.03	20.00	68	0.00	0.00	0.00	4.	
1.02	10.00	34	.35	.19	.16	140.	1.03	21.00	69	0.00	0.00	0.00	4.	
1.02	11.00	35	.35	.20	.16	181.	1.03	22.00	70	0.00	0.00	0.00	4.	
									SUM	25.17	18.44	6.73	26334.	
										(639.)(	468.)(	171.)(	745.70)	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3295.	2619.	1051.	376.	26331.
CMS	93.	74.	30.	11.	746.
INCHES		11.07	17.77	18.56	18.56
MM		281.27	451.36	471.32	471.32
AC-FT		1299.	2084.	2176.	2176.
THOUS CU M		1602.	2571.	2684.	2684.

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COMBINE HYDROGRAPHS

COMBINE SUBAREAS 1 AND 2

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	2	0	0	0	0	1	0	0

SUM OF 2 HYDROGRAPHS AT 1

8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	10.	28.	74.	129.	166.	165.
137.	107.	81.	61.	49.	46.	52.	62.	72.	81.
97.	137.	203.	280.	351.	404.	527.	871.	1269.	1666.
3259.	4739.	5458.	5079.	4020.	2887.	1947.	1599.	1340.	1139.
978.	739.	543.	398.	291.	213.	156.	111.	77.	59.
25.	15.	13.	12.	10.	10.	8.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5458.	4155.	1682.	608.	42559.
CMS	155.	118.	48.	17.	1205.
INCHES		8.71	14.10	14.86	14.86
MM		221.13	358.11	377.47	377.47
AC-FT		2060.	3337.	3517.	3517.
THOUS CU M		2542.	4116.	4338.	4338.

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HYDROGRAPH ROUTING

- [illegible] THRU RSH RESERVOIR

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	3680.	-1

STAGE	130.94	131.44	131.94	132.44	132.74	133.44	134.00	134.59	135.00	136.00
FLOW	0.00	55.00	190.00	340.00	460.00	770.00	1070.00	1600.00	3000.00	6000.00
CAPACITY=	3680.	3840.	4000.	4150.	4250.	4460.	4650.	4790.	5000.	5380.
ELEVATION=	131.	131.	132.	132.	133.	133.	134.	134.	135.	136.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMAID
134.4	4.5	1.5	440.

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	8.	0.	3681.	130.9
1.01	2.00	2	2.00	8.	0.	3681.	130.9
1.01	3.00	3	3.00	8.	1.	3682.	130.9
1.01	4.00	4	4.00	8.	1.	3682.	130.9
1.01	5.00	5	5.00	8.	1.	3683.	130.9
1.01	6.00	6	6.00	8.	1.	3684.	131.0
1.01	7.00	7	7.00	8.	1.	3684.	131.0
1.01	8.00	8	8.00	8.	2.	3685.	131.0
1.01	9.00	9	9.00	8.	2.	3685.	131.0
1.01	10.00	10	10.00	8.	2.	3686.	131.0
1.01	11.00	11	11.00	8.	2.	3686.	131.0
1.01	12.00	12	12.00	8.	2.	3687.	131.0
1.01	13.00	13	13.00	8.	2.	3687.	131.0
1.01	14.00	14	14.00	8.	3.	3688.	131.0
1.01	15.00	15	15.00	10.	3.	3688.	131.0
1.01	16.00	16	16.00	28.	3.	3689.	131.0
1.01	17.00	17	17.00	74.	5.	3693.	131.0
1.01	18.00	18	18.00	129.	7.	3701.	131.0
1.01	19.00	19	19.00	166.	11.	3713.	131.0
1.01	20.00	20	20.00	165.	16.	3725.	131.1
1.01	21.00	21	21.00	137.	19.	3736.	131.1
1.01	22.00	22	22.00	107.	22.	3745.	131.1
1.01	23.00	23	23.00	81.	24.	3751.	131.2
1.02	0.00	24	24.00	61.	26.	3754.	131.2
1.02	1.00	25	25.00	49.	26.	3757.	131.2
1.02	2.00	26	26.00	46.	27.	3758.	131.2
1.02	3.00	27	27.00	52.	28.	3760.	131.2
1.02	4.00	28	28.00	62.	28.	3763.	131.2
1.02	5.00	29	29.00	72.	30.	3766.	131.2
1.02	6.00	30	30.00	81.	31.	3770.	131.2

1.01	7.00	31	31.00	87.	42.	3774.	127.3
1.02	8.00	32	32.00	157.	65.	3781.	127.5
1.02	9.00	33	33.00	203.	39.	3792.	127.8
1.02	10.00	34	34.00	280.	44.	3809.	128.3
1.02	11.00	35	35.00	351.	52.	3831.	129.0
1.02	12.00	36	36.00	404.	69.	3857.	129.9
1.02	13.00	37	37.00	527.	96.	3889.	131.0
1.02	14.00	38	38.00	871.	137.	3937.	132.7
1.02	15.00	39	39.00	1269.	201.	4011.	135.2
1.02	16.00	40	40.00	1866.	310.	4120.	138.8
1.02	17.00	41	41.00	3259.	529.	4297.	144.8
1.02	18.00	42	42.00	4739.	958.	4567.	153.9
1.02	19.00	43	43.00	5458.	2221.	4858.	163.7
1.02	20.00	44	44.00	5079.	4279.	5024.	169.3
1.02	21.00	45	45.00	4020.	4480.	5038.	169.8
1.02	22.00	46	46.00	2887.	3731.	4985.	168.0
1.02	23.00	47	47.00	1947.	2838.	4913.	165.6
1.03	0.00	48	48.00	1599.	2169.	4853.	163.6
1.03	1.00	49	49.00	1340.	1771.	4811.	162.2
1.03	2.00	50	50.00	1139.	1549.	4776.	161.0
1.03	3.00	51	51.00	978.	1416.	4741.	159.8
1.03	4.00	52	52.00	739.	1265.	4702.	158.5
1.03	5.00	53	53.00	543.	1096.	4657.	157.0
1.03	6.00	54	54.00	398.	1005.	4609.	155.3
1.03	7.00	55	55.00	291.	924.	4558.	153.7
1.03	8.00	56	56.00	213.	842.	4506.	151.9
1.03	9.00	57	57.00	156.	762.	4455.	150.2
1.03	10.00	58	58.00	111.	690.	4406.	148.5
1.03	11.00	59	59.00	77.	621.	4359.	147.0
1.03	12.00	60	60.00	59.	556.	4315.	145.5
1.03	13.00	61	61.00	25.	496.	4274.	144.1
1.03	14.00	62	62.00	15.	445.	4237.	142.8
1.03	15.00	63	63.00	13.	404.	4203.	141.7
1.03	16.00	64	64.00	12.	367.	4173.	140.7
1.03	17.00	65	65.00	10.	334.	4146.	139.8
1.03	18.00	66	66.00	10.	309.	4119.	138.8
1.03	19.00	67	67.00	8.	285.	4095.	138.1
1.03	20.00	68	68.00	8.	263.	4073.	137.3
1.03	21.00	69	69.00	8.	243.	4053.	136.7
1.03	22.00	70	70.00	8.	224.	4034.	136.0

PEAK OUTFLOW IS 4480. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4480.	3249.	1474.	547.	38282.
CMS	127.	92.	42.	15.	1084.
INCHES		6.81	12.35	13.37	13.37
MM		172.88	313.67	339.53	339.53
AC-FT		1611.	2923.	3164.	3164.
THOUS CU M		1987.	3605.	3902.	3902.

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SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDR	ICHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	0.00	0.00	0.00	0.00	0.000	0	0	0

INPUT HYDROGRAPH

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	253.	213.
1020.	1020.	1020.	1020.	1020.	1020.	1002.	646.	379.	178.
17.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1020.	1019.	392.	134.	9406.
CMS	29.	29.	11.	4.	266.
INCHES		.00	.00	.00	.00
MM		.00	.00	.00	.00
AC-FT		505.	777.	777.	777.
THOUS CU M		623.	959.	959.	959.

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU AREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

1

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	77.5	92.5	19600.	.00380

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00	100.00	213.00	83.56	264.20	84.39	282.00	77.62	300.00	77.50
316.00	84.53	336.50	85.29	500.00	100.00				

CRAC	00	[illegible]	4,81	6	35.	.13	0	77,8.	...81	167...
	172,56	223,84	280,17	341,55	407,97	479,43	555,94	637,50	724,10	815,74
OUTFLOW	0,00	25,13	88,66	185,90	317,40	484,72	689,81	934,74	1222,31	1590,95
	2143,36	2900,33	3564,50	4436,75	5419,17	6514,44	7725,46	9055,35	10507,27	12084,46
STAGE	77,50	78,29	79,08	79,87	80,66	81,45	82,24	83,03	83,82	84,61
	85,39	86,18	86,97	87,76	88,55	89,34	90,13	90,92	91,71	92,50
FLOW	0,00	25,13	88,66	185,90	317,40	484,72	689,81	934,74	1222,31	1590,95
	2143,36	2900,33	3564,50	4436,75	5419,17	6514,44	7725,46	9055,35	10507,27	12084,46

MO.DA	HR.MN	PERIOD	EOP STOR	AVG IN	EOP OUT	STAGE	AVG PUMP
1.01	1.00	1	0.	0.	0.	77.5	0.
1.01	2.00	2	0.	0.	0.	77.5	0.
1.01	3.00	3	0.	0.	0.	77.5	0.
1.01	4.00	4	0.	0.	0.	77.5	0.
1.01	5.00	5	0.	0.	0.	77.5	0.
1.01	6.00	6	0.	0.	0.	77.5	0.
1.01	7.00	7	0.	0.	0.	77.5	0.
1.01	8.00	8	0.	0.	0.	77.5	0.
1.01	9.00	9	0.	0.	0.	77.5	0.
1.01	10.00	10	0.	0.	0.	77.5	0.
1.01	11.00	11	0.	0.	0.	77.5	0.
1.01	12.00	12	0.	0.	0.	77.5	0.
1.01	13.00	13	0.	0.	0.	77.5	0.
1.01	14.00	14	0.	0.	0.	77.5	0.
1.01	15.00	15	0.	0.	0.	77.5	0.
1.01	16.00	16	0.	0.	0.	77.5	0.
1.01	17.00	17	0.	0.	0.	77.5	0.
1.01	18.00	18	0.	0.	0.	77.5	0.
1.01	19.00	19	0.	0.	0.	77.5	0.
1.01	20.00	20	0.	0.	0.	77.5	0.
1.01	21.00	21	0.	0.	0.	77.5	0.
1.01	22.00	22	0.	0.	0.	77.5	0.
1.01	23.00	23	0.	0.	0.	77.5	0.
1.02	0.00	24	0.	0.	0.	77.5	0.
1.02	1.00	25	0.	0.	0.	77.5	0.
1.02	2.00	26	0.	0.	0.	77.5	0.
1.02	3.00	27	0.	0.	0.	77.5	0.
1.02	4.00	28	0.	0.	0.	77.5	0.
1.02	5.00	29	0.	0.	0.	77.5	0.
1.02	6.00	30	0.	0.	0.	77.5	0.
1.02	7.00	31	0.	0.	0.	77.5	0.
1.02	8.00	32	0.	0.	0.	77.5	0.
1.02	9.00	33	0.	0.	0.	77.5	0.
1.02	10.00	34	0.	0.	0.	77.5	0.
1.02	11.00	35	0.	0.	0.	77.5	0.
1.02	12.00	36	0.	0.	0.	77.5	0.
1.02	13.00	37	0.	0.	0.	77.5	0.
1.02	14.00	38	0.	0.	0.	77.5	0.
1.02	15.00	39	9.	127.	42.	78.5	0.
1.02	16.00	40	37.	533.	337.	80.7	0.
1.02	17.00	41	67.	917.	771.	82.5	0.
1.02	18.00	42	79.	1020.	970.	83.1	0.
1.02	19.00	43	82.	1020.	1010.	83.2	0.
1.02	20.00	44	82.	1020.	1018.	83.3	0.
1.02	[illegible]	45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1	22		2.	1020	1	3.3	
1.02	23.00	47	82.	1011.	1013.	83.2	0.
1.03	0.00	48	73.	824.	861.	82.8	0.
1.03	1.00	49	55.	513.	588.	81.8	0.
1.03	2.00	50	39.	278.	360.	80.9	0.
1.03	3.00	51	24.	97.	184.	79.9	0.
1.03	4.00	52	14.	9.	83.	79.0	0.
1.03	5.00	53	9.	0.	45.	78.5	0.
1.03	6.00	54	6.	0.	24.	78.2	0.
1.03	7.00	55	4.	0.	17.	78.0	0.
1.03	8.00	56	3.	0.	12.	77.9	0.
1.03	9.00	57	2.	0.	9.	77.8	0.
1.03	10.00	58	2.	0.	6.	77.7	0.
1.03	11.00	59	1.	0.	5.	77.6	0.
1.03	12.00	60	1.	0.	3.	77.6	0.
1.03	13.00	61	1.	0.	2.	77.6	0.
1.03	14.00	62	0.	0.	2.	77.6	0.
1.03	15.00	63	0.	0.	1.	77.5	0.
1.03	16.00	64	0.	0.	1.	77.5	0.
1.03	17.00	65	0.	0.	1.	77.5	0.
1.03	18.00	66	0.	0.	0.	77.5	0.
1.03	19.00	67	0.	0.	0.	77.5	0.
1.03	20.00	68	0.	0.	0.	77.5	0.
1.03	21.00	69	0.	0.	0.	77.5	0.
1.03	22.00	70	0.	0.	0.	77.5	0.

SUM 9906.
(280.34)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1020.	999.	392.	134.	9906.
CMS	29.	28.	11.	4.	280.
INCHES		.00	.00	.00	.00
MM		.00	.00	.00	.00
AC-FT		496.	777.	777.	777.
THOUS CU M		611.	958.	959.	959.

MAXIMUM STAGE IS 83.3

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SUB-AREA RUNOFF COMPUTATION:

COMPUTE SFM FOR AREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.09	0.00	7.01	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	111.00	123.00	133.00	143.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0	.40	1.74	2.53	.68	0.00	1.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.90 CP= .63 NTA= 0

RECESSION DATA

STRTQ= 4.00 QRCSN= -1.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.53 AND R= 3.48 INTERVALS

UNIT HYDROGRAPH 21 END-OF-PERIOD ORDINATES, LAG= 5.86 HOURS, CP= .62 VOL= 1.00

25. 89. 164. 212. 206. 164. 123. 92. 69. 52.
39. 29. 22. 16. 12. 9. 7. 5. 4. 3.
2.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	4.	1.02	12.00	36	.35	.20	.15	184.
1.01	2.00	2	.01	0.00	.01	4.	1.02	13.00	37	1.95	1.47	.48	230.
1.01	3.00	3	.01	0.00	.01	4.	1.02	14.00	38	2.34	1.82	.52	374.
1.01	4.00	4	.01	0.00	.01	4.	1.02	15.00	39	2.93	2.35	.58	639.
1.01	5.00	5	.01	0.00	.01	4.	1.02	16.00	40	7.42	6.39	1.04	1125.
1.01	6.00	6	.01	0.00	.01	4.	1.02	17.00	41	4.74	2.26	.48	1809.
1.01	7.00	7	.03	0.00	.03	4.	1.02	18.00	42	2.15	1.76	.39	2490.
1.01	8.00	8	.03	0.00	.03	4.	1.02	19.00	43	.18	.11	.07	2911.
1.01	9.00	9	.03	0.00	.03	4.	1.02	20.00	44	.18	.11	.07	2806.
1.01	10.00	10	.03	0.00	.03	4.	1.02	21.00	45	.18	.11	.07	2510.
1.01	11.00	11	.03	0.00	.03	4.	1.02	22.00	46	.18	.11	.07	2010.
1.01	12.00	12	.03	0.00	.03	4.	1.02	23.00	47	.18	.11	.07	1503.
1.01	13.00	13	.15	0.00	.15	4.	1.03	0.00	48	.18	.11	.07	1208.
1.01	14.00	14	.18	0.00	.18	4.	1.03	1.00	49	0.00	0.00	0.00	940.
1.01	15.00	15	.22	.02	.20	5.	1.03	2.00	50	0.00	0.00	0.00	732.
1.01	16.00	16	.56	.23	.33	12.	1.03	3.00	51	0.00	0.00	0.00	565.
1.01	17.00	17	.21	.06	.14	30.	1.03	4.00	52	0.00	0.00	0.00	430.
1.01	18.00	18	.16	.05	.11	53.	1.03	5.00	53	0.00	0.00	0.00	324.
1.01	19.00	19	.01	0.00	.01	72.	1.03	6.00	54	0.00	0.00	0.00	243.
1.01	20.00	20	.01	0.00	.01	76.	1.03	7.00	55	0.00	0.00	0.00	183.
1.01	21.00	21	.01	0.00	.01	68.	1.03	8.00	56	0.00	0.00	0.00	130.
1.01	22.00	22	.01	0.00	.01	55.	1.03	9.00	57	0.00	0.00	0.00	104.
1.01	23.00	23	.01	0.00	.01	42.	1.03	10.00	58	0.00	0.00	0.00	78.
1.02	0.00	24	.01	0.00	.01	33.	1.03	11.00	59	0.00	0.00	0.00	55.
1.02	1.00	25	.12	.03	.09	26.	1.03	12.00	60	0.00	0.00	0.00	39.
1.02	2.00	26	.12	.03	.08	24.	1.03	13.00	61	0.00	0.00	0.00	20.
1.02	3.00	27	.12	.04	.08	25.	1.03	14.00	62	0.00	0.00	0.00	14.
1.02	4.00	28	.12	.04	.08	30.	1.03	15.00	63	0.00	0.00	0.00	7.
1.02	5.00	29	.12	.04	.08	35.	1.03	16.00	64	0.00	0.00	0.00	6.
1.02	6.00	30	.12	.04	.08	39.	1.03	17.00	65	0.00	0.00	0.00	6.
1.02	7.00	31	.35	.19	.17	47.	1.03	18.00	66	0.00	0.00	0.00	5.
1.02	8.00	32	.35	.19	.16	63.	1.03	19.00	67	0.00	0.00	0.00	5.
1.02	9.00	33	.35	.19	.16	90.	1.03	20.00	68	0.00	0.00	0.00	4.
1.02	10.00	34	.35	.19	.16	124.	1.03	21.00	69	0.00	0.00	0.00	4.
1.02	11.00	35	.35	.20	.16	157.	1.03	22.00	70	0.00	0.00	0.00	4.
									SUM	25.17	18.44	6.73	25015.
										(639.)	(468.)	(171.)	(708.35)

PEAK PEAKQ 24-HOUR 72-HOUR TOTAL VOLUME

S	11.	24	.	357.	010.
CMS	82.	68.	28.	10.	708.
INCHES		10.76	17.72	18.55	18.55
MM		273.20	450.00	471.24	471.24
AC-FT		1198.	1974.	2067.	2067.
THOUS CU M		1478.	2435.	2550.	2550.

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COMBINE HYDROGRAPHS

COMBINE CHANNEL AND RESERVOIR ROUTED PLUS AREA 3 FLOWS

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	3	0	0	0	0	1	0	0

SUM OF 3 HYDROGRAPHS AT 3

4.	4.	5.	5.	5.	5.	6.	6.	6.
6.	6.	6.	7.	7.	15.	34.	61.	83.
57.	77.	87.	98.	93.	91.	93.	96.	84.
79.	98.	129.	188.	209.	254.	332.	511.	862.
3109.	4398.	6142.	8185.	8009.	6766.	5413.	4239.	3249.
2165.	1778.	1463.	1272.	1124.	992.	875.	773.	681.
516.	459.	413.	374.	341.	314.	290.	267.	247.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8145.	6472.	2816.	1039.	72697.
CMS	232.	183.	80.	29.	2059.
INCHES		9.22	10.04	17.26	17.26
MM		234.19	407.53	438.41	438.41
AC-FT		3209.	5585.	6008.	6008.
THOUS CU M		3959.	6889.	7411.	7411.

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU AREA 4

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

COMPUTE NORM CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	ELMTH	SELI
.0800	.0400	.0800	74.0	90.0	4400.	.0010

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

171.20 87.50 220.00 86.46 223.50 86.39 257.50 74.00 307.50 74.00
352.00 85.42 380.00 85.48 423.00 85.60

STORAGE	0.00	4.49	9.46	14.90	20.82	27.21	34.08	41.43	49.25	57.54
	66.31	75.56	85.29	95.49	106.18	125.24	144.67	166.29	187.71	209.13
OUTFLOW	0.00	53.23	172.34	346.07	571.76	848.95	1178.15	1560.36	1996.09	2484.22
	3038.92	3647.64	4317.06	5048.88	5892.78	6925.07	8132.73	9471.99	10926.29	12493.42
STAGE	74.00	74.84	75.68	76.53	77.37	78.21	79.05	79.89	80.74	81.58
	82.42	83.26	84.11	84.95	85.79	86.63	87.47	88.32	89.16	90.00
FLOW	0.00	53.23	172.34	346.07	571.76	848.95	1178.15	1560.36	1996.09	2484.22
	3038.92	3647.64	4317.06	5048.88	5892.78	6925.07	8132.73	9471.99	10926.29	12493.42

MO.DA	HR.MN	PERIOD	EOP STOR	AVG IN	EOP OUT	STAGE	AVG PUMP
1.01	1.00	1	0.	4.	4.	74.1	0.
1.01	2.00	2	0.	4.	4.	74.1	0.
1.01	3.00	3	0.	5.	4.	74.1	0.
1.01	4.00	4	0.	5.	5.	74.1	0.
1.01	5.00	5	0.	5.	5.	74.1	0.
1.01	6.00	6	0.	5.	5.	74.1	0.
1.01	7.00	7	0.	5.	5.	74.1	0.
1.01	8.00	8	0.	6.	5.	74.1	0.
1.01	9.00	9	0.	6.	6.	74.1	0.
1.01	10.00	10	0.	6.	6.	74.1	0.
1.01	11.00	11	1.	6.	6.	74.1	0.
1.01	12.00	12	1.	6.	6.	74.1	0.
1.01	13.00	13	1.	6.	6.	74.1	0.
1.01	14.00	14	1.	7.	6.	74.1	0.
1.01	15.00	15	1.	7.	7.	74.1	0.
1.01	16.00	16	1.	11.	10.	74.2	0.
1.01	17.00	17	2.	25.	20.	74.3	0.
1.01	18.00	18	3.	48.	38.	74.6	0.
1.01	19.00	19	5.	72.	68.	74.9	0.
1.01	20.00	20	6.	88.	88.	75.1	0.
1.01	21.00	21	6.	90.	90.	75.1	0.
1.01	22.00	22	6.	82.	82.	75.0	0.
1.01	23.00	23	5.	72.	72.	75.0	0.
1.02	0.00	24	5.	62.	63.	74.9	0.
1.02	1.00	25	5.	58.	58.	74.9	0.
1.02	2.00	26	4.	52.	52.	74.8	0.
1.02	3.00	27	4.	52.	52.	74.8	0.
1.02	4.00	28	5.	55.	55.	74.9	0.
1.02	5.00	29	5.	61.	61.	74.9	0.
1.02	6.00	30	5.	67.	67.	74.9	0.
1.02	7.00	31	5.	75.	75.	75.0	0.
1.02	8.00	32	6.	89.	89.	75.1	0.
1.02	9.00	33	7.	113.	113.	75.3	0.

	10		8.	14		5.5	
1.02	11.00	35	10.	189.	191.	75.8	0.
1.02	12.00	36	11.	231.	257.	76.0	0.
1.02	13.00	37	13.	293.	501.	76.3	0.
1.02	14.00	38	17.	422.	445.	76.9	0.
1.02	15.00	39	25.	697.	762.	77.9	0.
1.02	16.00	40	41.	1326.	1517.	79.8	0.
1.02	17.00	41	63.	2439.	2823.	82.1	0.
1.02	18.00	42	83.	3754.	4188.	83.9	0.
1.02	19.00	43	107.	5270.	5790.	85.7	0.
1.02	20.00	44	139.	7103.	7758.	87.2	0.
1.02	21.00	45	147.	8097.	8245.	87.5	0.
1.02	22.00	46	127.	7368.	7014.	86.7	0.
1.02	23.00	47	105.	6090.	5668.	85.6	0.
1.03	0.00	48	87.	4826.	4412.	84.2	0.
1.03	1.00	49	73.	3769.	3462.	83.0	0.
1.03	2.00	50	62.	2970.	2746.	82.0	0.
1.03	3.00	51	54.	2403.	2254.	81.2	0.
1.03	4.00	52	47.	1971.	1855.	80.5	0.
1.03	5.00	53	41.	1621.	1529.	79.8	0.
1.03	6.00	54	37.	1368.	1309.	79.3	0.
1.03	7.00	55	34.	1198.	1158.	79.0	0.
1.03	8.00	56	31.	1058.	1025.	78.7	0.
1.03	9.00	57	28.	933.	903.	78.3	0.
1.03	10.00	58	26.	824.	799.	78.1	0.
1.03	11.00	59	24.	727.	706.	77.8	0.
1.03	12.00	60	22.	640.	621.	77.5	0.
1.03	13.00	61	20.	558.	542.	77.3	0.
1.03	14.00	62	18.	488.	476.	77.0	0.
1.03	15.00	63	17.	436.	426.	76.8	0.
1.03	16.00	64	16.	395.	386.	76.7	0.
1.03	17.00	65	15.	357.	351.	76.5	0.
1.03	18.00	66	14.	327.	324.	76.4	0.
1.03	19.00	67	13.	302.	299.	76.3	0.
1.03	20.00	68	13.	279.	276.	76.2	0.
1.03	21.00	69	12.	257.	255.	76.1	0.
1.03	22.00	70	11.	256.	255.	76.0	0.

SUM 72683.
(2058.15)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8245.	6466.	2815.	1037.	72503.
CMS	233.	183.	80.	29.	2055.
INCHES		9.21	10.04	17.23	17.23
MM		233.96	407.47	437.60	437.60
AC-FT		3206.	5584.	5997.	5997.
THOUS CU M		3955.	6888.	7397.	7397.

MAXIMUM STAGE IS 87.5

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SUB-AREA RUNOFF COMPUTATION

COMPUTE SEW FOR AREA 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.48	0.00	7.01	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	111.00	125.00	133.00	143.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LKRTI	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	.40	1.74	2.55	.85	0.00	1.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.41 CP= .63 NTA= 0

RECESSION DATA

STRTQ= 1.00 QRCSN= 1.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 1.57 AND R= 1.11 INTERVALS

UNIT HYDROGRAPH 7 END-OF-PERIOD ORDINATES, LAG= 1.40 HOURS, CP= .62 VOL= 1.00

87. 121. 76. 29. 11. 4. 2.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	1.	1.02	12.00	36	.35	.20	.15	61.
1.01	2.00	2	.01	0.00	.01	1.	1.02	13.00	37	1.95	1.47	.48	140.
1.01	3.00	3	.01	0.00	.01	1.	1.02	14.00	38	2.34	1.82	.52	324.
1.01	4.00	4	.01	0.00	.01	1.	1.02	15.00	39	2.93	2.35	.58	498.
1.01	5.00	5	.01	0.00	.01	1.	1.02	16.00	40	7.42	6.39	1.04	844.1
1.01	6.00	6	.01	0.00	.01	1.	1.02	17.00	41	2.74	2.26	.48	1173.
1.01	7.00	7	.03	0.00	.03	1.	1.02	18.00	42	2.15	1.76	.39	900.
1.01	8.00	8	.03	0.00	.03	1.	1.02	19.00	43	.18	.11	.07	611.
1.01	9.00	9	.03	0.00	.03	1.	1.02	20.00	44	.18	.11	.07	301.
1.01	10.00	10	.03	0.00	.03	1.	1.02	21.00	45	.18	.11	.07	134.
1.01	11.00	11	.03	0.00	.03	1.	1.02	22.00	46	.18	.11	.07	71.
1.01	12.00	12	.03	0.00	.03	1.	1.02	23.00	47	.18	.11	.07	45.
1.01	13.00	13	.15	0.00	.15	1.	1.03	0.00	48	.18	.11	.07	37.
1.01	14.00	14	.18	0.00	.18	1.	1.03	1.00	49	0.00	0.00	0.00	28.
1.01	15.00	15	.22	.02	.20	5.	1.03	2.00	50	0.00	0.00	0.00	14.
1.01	16.00	16	.56	.23	.33	19.	1.03	3.00	51	0.00	0.00	0.00	8.
1.01	17.00	17	.21	.06	.14	35.	1.03	4.00	52	0.00	0.00	0.00	3.
1.01	18.00	18	.16	.05	.11	30.	1.03	5.00	53	0.00	0.00	0.00	2.
1.01	19.00	19	.01	0.00	.01	19.	1.03	6.00	54	0.00	0.00	0.00	1.
1.01	20.00	20	.01	0.00	.01	9.	1.03	7.00	55	0.00	0.00	0.00	1.
1.01	21.00	21	.01	0.00	.01	4.	1.03	8.00	56	0.00	0.00	0.00	1.
1.01	22.00	22	.01	0.00	.01	2.	1.03	9.00	57	0.00	0.00	0.00	1.
1.01	23.00	23	.01	0.00	.01	1.	1.03	10.00	58	0.00	0.00	0.00	1.
1.02	0.00	24	.01	0.00	.01	1.	1.03	11.00	59	0.00	0.00	0.00	1.
1.02	1.00	25	.12	.03	.09	3.	1.03	12.00	60	0.00	0.00	0.00	1.
1.02	2.00	26	.12	.03	.08	7.	1.03	13.00	61	0.00	0.00	0.00	1.
1.02	3.00	27	.12	.04	.08	10.	1.03	14.00	62	0.00	0.00	0.00	1.
1.02	4.00	28	.12	.04	.08	11.	1.03	15.00	63	0.00	0.00	0.00	1.
1.02	5.00	29	.12	.04	.08	12.	1.03	16.00	64	0.00	0.00	0.00	1.
1.02	6.00	30	.12	.04	.08	13.	1.03	17.00	65	0.00	0.00	0.00	1.

2		1	5			35.			16		5	0	0	.
1.02	8.00	32	.35	.19	.16	41.	1.03	19.00	67	0.00	0.00	0.00		1.
1.02	9.00	33	.35	.19	.16	55.	1.03	20.00	68	0.00	0.00	0.00		1.
1.02	10.00	34	.35	.19	.16	58.	1.03	21.00	69	0.00	0.00	0.00		1.
1.02	11.00	35	.35	.20	.16	60.	1.03	22.00	70	0.00	0.00	0.00		1.

SUM	25.17	18.44	6.73	5761.
	(639.)(	468.)(	171.)(	163.13)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1173.	743.	233.	82.	5759.
CMS	33.	21.	7.	2.	163.
INCHES		14.40	18.03	18.80	18.80
MM		365.80	458.08	472.48	472.48
AC-FT		388.	461.	476.	476.
THOUS CU M		454.	569.	587.	587.

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COMBINE HYDROGRAPHS

COMBINE ROUTED PLUS AREA 4 FLOWS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	2	0	0	0	0	1	0	0

SUM OF 2 HYDROGRAPHS AT 6

5.	5.	5.	6.	6.	8.	6.	7.	7.	
7.	7.	7.	7.	9.	29.	54.	88.	83.	97.
94.	84.	73.	84.	59.	59.	82.	88.	73.	80.
97.	130.	166.	206.	251.	298.	447.	769.	1200.	2411.
5996.	5156.	6401.	8059.	8379.	7085.	5753.	4449.	3489.	2761.
2200.	1858.	1530.	1310.	1159.	1026.	904.	800.	707.	622.
543.	477.	427.	387.	352.	325.	300.	277.	256.	236.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8379.	6743.	3026.	1119.	78322.
CMS	237.	191.	86.	32.	2218.
INCHES		8.95	16.06	17.32	17.32
MM		227.29	407.96	439.99	439.99
AC-FT		3344.	6002.	6473.	6473.
THOUS CU M		4125.	7403.	7984.	7984.

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RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	1	2104.	1530.	636.	232.	2.24
	(	61.25)(	43.50)(	17.89)(	6.56)(	5.80)
HYDROGRAPH AT	1	3295.	2619.	1051.	370.	2.20
	(	93.31)(	74.16)(	29.75)(	10.65)(	5.70)
2-COMBINED	1	5458.	4155.	1682.	600.	4.44
	(	154.56)(	117.66)(	47.64)(	17.22)(	11.50)
ROUTED TO	3	4480.	3249.	1474.	547.	4.44
	(	126.85)(	91.99)(	41.73)(	15.49)(	11.50)
HYDROGRAPH AT	2	1020.	1019.	392.	134.	0.00
	(	28.88)(	28.84)(	11.10)(	3.80)(	0.00)
ROUTED TO	3	1020.	999.	392.	134.	0.00
	(	28.88)(	28.30)(	11.09)(	3.80)(	0.00)
HYDROGRAPH AT	3	2911.	2417.	995.	357.	2.09
	(	82.43)(	68.43)(	28.18)(	10.12)(	5.41)
3-COMBINED	3	8185.	6472.	2810.	1039.	6.53
	(	231.76)(	183.27)(	79.73)(	29.41)(	16.91)
ROUTED TO	4	8245.	6466.	2815.	1037.	6.53
	(	233.46)(	183.09)(	79.72)(	29.35)(	16.91)
HYDROGRAPH AT	4	1173.	743.	233.	82.	.48
	(	33.22)(	21.03)(	6.59)(	2.33)(	1.24)
2-COMBINED	6	8379.	6743.	3026.	1119.	7.01
	(	237.27)(	190.95)(	85.68)(	31.68)(	18.16)

SUMMARY DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	130.94	130.94	134.39
STORAGE	3680.	3680.	4790.
OUTFLOW	0.	0.	1600.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.00	135.10	.71	5038.	4460.	7.00	45.00	0.00

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   GET,GSBSPF
C>CMEDIT,GSBSPF
E>W 80
E>P *

A1    GRASSY SFRAIN BROOK BASIN
A2    HEC1DB MODEL
A3    SPF-DAM OVERTOPPING ANALYSIS
B0     98        1
B1      3
K       0        1        0        0        0        0        1
K1    INFUT SFH OF AREA 1 INTO RESERVOIR
M      -1        0     2.24
N       4        4        4        4        4        4        4        4        4        4
N0      4        4        4        4        4        4        4        4        4        4
N0      4        4        4        4        4        4        4        4        4        4
N0      4        4        4        4        4        4        4        4  [illegible]      17
N0     40       67       84       82       65       53       40       30       24       20
N0     18       18       18       18       21       31       49       72       94      110
N0    140      213      249      480      480      480      480      480      480      480
N0    480      480      419      326      251      188      138      101       74       55
N0     41       30       21       12        9        9       13       21       22       44
N0     50       47       29       31       24       18       15       12
K       0        1        0        0        0        0        1
K1    COMPUTE SFH OF AREA 2
M0      1        1     2.20        0     4.44        1
P0   10.4
T0    .42     1.74     2.52      .68
W    3.46     .625        0
X       4        4        1
K       2        1        0        0        0        0        1
K1    COMBINE SUBAREAS 1 AND 2
K0      1        3        0        0        0        0        1
K1    ROUTE THRU GSB RESERVOIR
Y0      0        0        0        1
Y1      1        0        0        0        0        0     3680       -1
Y4130.94   131.44   131.94   132.44   132.74   133.44    134.0   134.39    135.0    136.0
Y5      0       55      190      340      440      770     1070     1600     3000     6000
$5   3600     3840     4000     4100 [illegible]    4400 [illegible] [illegible]    5000     5200
$E130.94   131.44   131.94   132.44   132.74   133.44    134.0   134.39    135.0    136.0
$$130.94
$D134.39     4.46      1.5      440
K0      0        2        0        0        0        0        1
K1    INPUT DIVERTED FLOW FROM AREA 1
M0     -1        0     0.00
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0      105      449      777      949      884      667      429
N0    224       71        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0        0        0
N0      0        0        0        0        0        0        0        0
K0      1        3        0        0        0        0        1
K1    CHANNEL ROUTE THRU AREA 3
Y0      0        0        0        1
Y1      1        0        0        0        0        0       -1        0
[illegible]
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Y6   .08      .04      .08    [illegible]
Y7   1ØØ      1ØØ      213    83.56    264.2    84.39    282   77.62     3ØØ    77.5
Y7   316    84.53    336.5    85.29     5ØØ      1ØØ
KØ     Ø        3        Ø        Ø        Ø        Ø        1
K1    COMPUTE SFH FOR AREA 3
MØ     1        1     2.Ø9         Ø     7.Ø1        1
PØ  1Ø.4
TØ   .42     1.74     2.53      .68
WØ  3.9Ø     .625        Ø
XØ     4        4        1
KØ     3        3        Ø        Ø        Ø        Ø        1
K1    COMBINE CHANNEL AND RESERVOIR ROUTED PLUS AREA 3 FLOWS
KØ     1        4        Ø        Ø        Ø        Ø        1
K1    CHANNEL ROUTE THRU AREA 4
YØ     Ø        Ø        Ø        1
Y1     1        Ø        Ø        Ø        Ø        Ø       -1
Y6   .08      .04      .08       74       90     44ØØ    .ØØ14
Y7 171.2     87.5      22Ø    86.46    223.5    86.39    257.5      74   3Ø7.5      74
Y7   352    85.42      38Ø    85.48      42Ø     85.6
KØ     Ø        4        Ø        Ø        Ø        Ø        1
K1    COMPUTE SFH FOR AREA 4
MØ     1        1      .48         Ø     7.Ø1        1
PØ  1Ø.4
TØ   .42     1.74     2.53      .68
WØ  1.41     .625        Ø
XØ     1        1        1
KØ     2        6        Ø        Ø        Ø        Ø        1
K1    COMBINE ROUTED PLUS AREA 4 FLOWS
KØ    99
AØ
AØ
AØ
AØ
AØ
EOI.
EXQ
```

EVII : SE CE THEA TAL ALCL .ONS

RUNOFF HYDROGRAPH AT 1
RUNOFF HYDROGRAPH AT 1
COMBINE 2 HYDROGRAPHS AT 1

HEC-1 FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 17 OCT 78

RUN DATE= 78/11/03.
TIME= 08.45.11.

GRASSY SPRAIN BROOK BASIN
HEC1DB MODEL
SPF-DAM OVERTOPPING ANALYSIS

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
98	1	0	0	0	0	0	0	0	0

JOPER	NAT	LROPT	TRACE
3	0	0	0

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SUB-AREA RUNOFF COMPUTATION

INPUT SFM OF AREA 1 INTO RESERVOIR

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISAME	LOCAL
-1	0	2.24	0.00	2.24	0.00	0.000	0	0

INPUT HYDROGRAPH

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	6.	17.
40.	67.	84.	82.	68.	53.	40.	30.	24.	20.
18.	18.	18.	18.	21.	31.	49.	72.	94.	110.
140.	213.	349.	480.	480.	480.	480.	480.	480.	480.
480.	480.	419.	326.	251.	188.	138.	101.	74.	55.
81.	30.	21.	12.	9.	9.	13.	21.	32.	44.
50.	47.	39.	31.	24.	18.	15.	12.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	480.	480.	287.	112.	8166.
CMS	14.	14.	8.	3.	231.
INCHES		1.99	4.77	5.58	5.65
MM		50.63	121.22	141.80	143.56
AC-FT		238.	570.	667.	675.
THOUS CU M		294.	703.	822.	832.

SUB-AREA RUNOFF COMPUTATION

COMPUTE SFM OF AREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.20	0.00	0.46	1.00	0.000	0	0	0

PRECIP DATA

SPFE	PRS	R6	R12	R24	R48	R72	R96
10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LOSS DATA

LRDPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0.	.42	1.74	2.53	.68	0.00	1.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.46 CP= .63 NTA= 0

RECESSION DATA

STRTQ= -4.00 QRCSN= -4.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.98 AND R= 3.26 INTERVALS

UNIT HYDROGRAPH 20 END-OF-PERIOD ORDINATES, LAG= 3.46 HOURS, CP= .62 VOL= 1.00

34.	120.	211.	248.	215.	157.	116.	85.	62.	46.
33.	25.	18.	13.	10.	7.	5.	4.	3.	2.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.00	0.00	.00	4.	1.03	2.00	50	.07	.01	.06	19.
1.01	2.00	2	.00	0.00	.00	4.	1.03	3.00	51	.07	.01	.06	18.
1.01	3.00	3	.00	0.00	.00	4.	1.03	4.00	52	.07	.01	.06	19.
1.01	4.00	4	.00	0.00	.00	4.	1.03	5.00	53	.07	.01	.06	20.
1.01	5.00	5	.00	0.00	.00	4.	1.03	6.00	54	.07	.01	.06	21.
1.01	6.00	6	.00	0.00	.00	4.	1.03	7.00	55	.24	.11	.13	25.
1.01	7.00	7	.01	0.00	.01	4.	1.03	8.00	56	.24	.11	.13	37.
1.01	8.00	8	.01	0.00	.01	4.	1.03	9.00	57	.24	.11	.13	56.
1.01	9.00	9	.01	0.00	.01	4.	1.03	10.00	58	.24	.11	.13	82.
1.01	10.00	10	.01	0.00	.01	4.	1.03	11.00	59	.24	.11	.13	103.
1.01	11.00	11	.01	0.00	.01	4.	1.03	12.00	60	.24	.12	.12	119.
1.01	12.00	12	.01	0.00	.01	4.	1.03	13.00	61	.96	.64	.32	149.
1.01	13.00	13	.03	0.00	.03	4.	1.03	14.00	62	1.15	.80	.35	227.
1.01	14.00	14	.03	0.00	.03	4.	1.03	15.00	63	1.44	1.05	.39	373.
1.01	15.00	15	.04	0.00	.04	4.	1.03	16.00	64	3.64	2.93	.71	635.
1.01	16.00	16	.11	0.00	.11	4.	1.03	17.00	65	1.34	1.00	.34	1004.
1.01	17.00	17	.04	0.00	.04	4.	1.03	18.00	66	1.05	.78	.28	1343.
1.01	18.00	18	.03	0.00	.03	4.	1.03	19.00	67	.14	.07	.07	1494.
1.01	19.00	19	.00	0.00	.00	4.	1.03	20.00	68	.14	.07	.07	1391.
1.01	20.00	20	.00	0.00	.00	4.	1.03	21.00	69	.14	.07	.07	1140.
1.01	21.00	21	.00	0.00	.00	4.	1.03	22.00	70	.14	.07	.07	892.
1.01	22.00	22	.00	0.00	.00	4.	1.03	23.00	71	.14	.07	.07	684.
1.01	23.00	23	.00	0.00	.00	4.	1.04	0.00	72	.14	.08	.07	531.
1.02	0.00	24	.00	0.00	.00	4.	1.04	1.00	73	.00	0.00	.00	410.
1.02	1.00	25	.01	0.00	.01	4.	1.04	2.00	74	.00	0.00	.00	325.

2	0	26	1	0		4.								
1.02	3.00	27	.01	0.00	.01	4.	1.04	4.00	76	.00	0.00	.00	186.	
1.02	4.00	28	.01	0.00	.01	4.	1.04	5.00	77	.00	0.00	.00	157.	
1.02	5.00	29	.01	0.00	.01	4.	1.04	6.00	78	.00	0.00	.00	102.	
1.02	6.00	30	.01	0.00	.01	4.	1.04	7.00	79	.01	0.00	.01	76.	
1.02	7.00	31	.03	0.00	.03	4.	1.04	8.00	80	.01	0.00	.01	56.	
1.02	8.00	32	.03	0.00	.03	4.	1.04	9.00	81	.01	0.00	.01	41.	
1.02	9.00	33	.03	0.00	.03	4.	1.04	10.00	82	.01	0.00	.01	30.	
1.02	10.00	34	.03	0.00	.03	4.	1.04	11.00	83	.01	0.00	.01	22.	
1.02	11.00	35	.03	0.00	.03	4.	1.04	12.00	84	.01	0.00	.01	15.	
1.02	12.00	36	.03	0.00	.03	4.	1.04	13.00	85	.05	.02	.03	9.	
1.02	13.00	37	.13	0.00	.13	4.	1.04	14.00	86	.06	.02	.04	4.	
1.02	14.00	38	.15	.01	.14	4.	1.04	15.00	87	.07	.03	.04	15.	
1.02	15.00	39	.19	.04	.15	6.	1.04	16.00	88	.18	.11	.08	21.	
1.02	16.00	40	.48	.21	.27	18.	1.04	17.00	89	.07	.03	.04	34.	
1.02	17.00	41	.18	.05	.12	41.	1.04	18.00	90	.05	.02	.03	46.	
1.02	18.00	42	.14	.04	.10	67.	1.04	19.00	91	.01	0.00	.01	51.	
1.02	19.00	43	.02	0.00	.02	82.	1.04	20.00	92	.01	0.00	.01	47.	
1.02	20.00	44	.02	0.00	.02	78.	1.04	21.00	93	.01	0.00	.01	38.	
1.02	21.00	45	.02	0.00	.02	64.	1.04	22.00	94	.01	0.00	.01	30.	
1.02	22.00	46	.02	0.00	.02	49.	1.04	23.00	95	.01	0.00	.01	23.	
1.02	23.00	47	.02	0.00	.02	37.	1.05	0.00	96	.01	0.00	.01	18.	
1.03	0.00	48	.02	0.00	.02	26.	1.05	1.00	97	0.00	0.00	0.00	14.	
1.03	1.00	49	.07	.01	.06	22.	1.05	2.00	98	0.00	0.00	0.00	12.	
									SUM	14.92	8.97	5.95	13052.	
										(379.)(	228.)(	151.)(	369.59)	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1494.	1190.	490.	180.	13046.
CMS	42.	34.	14.	5.	369.
INCHES		5.03	8.30	9.12	9.19
MM		127.66	210.71	231.76	233.55
AC-FT		590.	973.	1070.	1078.
THOUS CU M		726.	1200.	1320.	1330.

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COMBINE HYDROGRAPHS

COMBINE SUBAREAS 1 AND 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	2	0	0	0	0	1	0	0

SUM OF 2 HYDROGRAPHS AT 1

8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	12.	35.
81.	134.	166.	160.	132.	102.	77.	58.	46.	39.
36.	37.	38.	39.	46.	68.	107.	154.	197.	229.
289.	440.	722.	1115.	1484.	1823.	1974.	1871.	1626.	1372.
1104.	1011.	835.	651.	500.	374.	275.	203.	150.	111.
82.	61.	43.	25.	18.	14.	20.	42.	66.	90.

111. 44. 77 41. 47. 38 29. 24.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1974.	1670.	778.	292.	21214.
CMS	56.	47.	22.	8.	601.
INCHES		3.50	6.52	7.34	7.41
MM		88.90	165.56	186.38	188.15
AC-FT		828.	1543.	1737.	1753.
THOUS CU M		1022.	1903.	2142.	2163.

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HYDROGRAPH ROUTING

ROUTE THRU GSM RESERVOIR

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	3000.	-1

STAGE	130.94	131.44	131.94	132.44	132.74	133.44	134.00	134.39	135.00	136.00
FLOW	0.00	55.00	190.00	340.00	480.00	770.00	1070.00	1600.00	3000.00	6000.00
CAPACITY=	3680.	3840.	4000.	4150.	4250.	4460.	4650.	4790.	5000.	5380.
ELEVATION=	131.	131.	132.	132.	133.	133.	134.	134.	135.	136.

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
136.4	4.5	1.5	440.

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	8.	0.	3681.	130.9
1.01	2.00	2	2.00	8.	0.	3681.	130.9
1.01	3.00	3	3.00	8.	1.	3682.	130.9
1.01	4.00	4	4.00	8.	1.	3682.	130.9
1.01	5.00	5	5.00	8.	1.	3683.	130.9
1.01	6.00	6	6.00	8.	1.	3684.	131.0
1.01	7.00	7	7.00	8.	1.	3684.	131.0
1.01	8.00	8	8.00	8.	2.	3685.	131.0
1.01	9.00	9	9.00	8.	2.	3685.	131.0
1.01	10.00	10	10.00	8.	2.	3686.	131.0
1.01	11.00	11	11.00	8.	2.	3686.	131.0

1.01	.00	12	.00		.	3687.	131.
1.01	13.00	13	13.00	8.	2.	3687.	131.0
1.01	14.00	14	14.00	8.	3.	3688.	131.0
1.01	15.00	15	15.00	8.	3.	3688.	131.0
1.01	16.00	16	16.00	8.	3.	3689.	131.0
1.01	17.00	17	17.00	8.	3.	3689.	131.0
1.01	18.00	18	18.00	8.	3.	3689.	131.0
1.01	19.00	19	19.00	8.	3.	3690.	131.0
1.01	20.00	20	20.00	8.	3.	3690.	131.0
1.01	21.00	21	21.00	8.	4.	3690.	131.0
1.01	22.00	22	22.00	8.	4.	3691.	131.0
1.01	23.00	23	23.00	8.	4.	3691.	131.0
1.02	0.00	24	24.00	8.	4.	3692.	131.0
1.02	1.00	25	25.00	8.	4.	3692.	131.0
1.02	2.00	26	26.00	8.	4.	3692.	131.0
1.02	3.00	27	27.00	8.	4.	3692.	131.0
1.02	4.00	28	28.00	8.	4.	3693.	131.0
1.02	5.00	29	29.00	8.	4.	3693.	131.0
1.02	6.00	30	30.00	8.	5.	3693.	131.0
1.02	7.00	31	31.00	8.	5.	3694.	131.0
1.02	8.00	32	32.00	8.	5.	3694.	131.0
1.02	9.00	33	33.00	8.	5.	3694.	131.0
1.02	10.00	34	34.00	8.	5.	3694.	131.0
1.02	11.00	35	35.00	8.	5.	3695.	131.0
1.02	12.00	36	36.00	8.	5.	3695.	131.0
1.02	13.00	37	37.00	8.	5.	3695.	131.0
1.02	14.00	38	38.00	8.	5.	3695.	131.0
1.02	15.00	39	39.00	12.	5.	3696.	131.0
1.02	16.00	40	40.00	35.	6.	3697.	131.0
1.02	17.00	41	41.00	81.	7.	3702.	131.0
1.02	18.00	42	42.00	154.	10.	3710.	131.0
1.02	19.00	43	43.00	166.	14.	3721.	131.1
1.02	20.00	44	44.00	160.	18.	3733.	131.1
1.02	21.00	45	45.00	132.	22.	3744.	131.1
1.02	22.00	46	46.00	102.	25.	3751.	131.2
1.02	23.00	47	47.00	77.	26.	3757.	131.2
1.03	0.00	48	48.00	56.	27.	3760.	131.2
1.03	1.00	49	49.00	46.	28.	3762.	131.2
1.03	2.00	50	50.00	39.	29.	3763.	131.2
1.03	3.00	51	51.00	36.	29.	3764.	131.2
1.03	4.00	52	52.00	37.	29.	3765.	131.2
1.03	5.00	53	53.00	38.	29.	3765.	131.2
1.03	6.00	54	54.00	39.	30.	3766.	131.2
1.03	7.00	55	55.00	46.	30.	3767.	131.2
1.03	8.00	56	56.00	68.	31.	3769.	131.2
1.03	9.00	57	57.00	107.	32.	3774.	131.2
1.03	10.00	58	58.00	154.	35.	3782.	131.3
1.03	11.00	59	59.00	197.	39.	3793.	131.3
1.03	12.00	60	60.00	229.	44.	3807.	131.3
1.03	13.00	61	61.00	289.	50.	3825.	131.4
1.03	14.00	62	62.00	440.	64.	3850.	131.5
1.03	15.00	63	63.00	722.	99.	3892.	131.6
1.03	16.00	64	64.00	1119.	154.	3957.	131.8
1.03	17.00	65	65.00	1484.	238.	4048.	132.1
1.03	18.00	66	66.00	1823.	353.	4161.	132.5
1.03	19.00	67	67.00	1974.	507.	4282.	132.8
1.03	20.00	68	68.00	1871.	670.	4392.	133.2
1.03	21.00	69	69.00	1626.	796.	4476.	133.5
1.03	22.00	70	70.00	1372.	882.	4531.	133.6
1.03	23.00	71	71.00	1164.	929.	4561.	133.7

1.04	.00	72	72.00	10	.	5736.	13
1.04	1.00	73	73.00	835.	945.	4571.	133.8
1.04	2.00	74	74.00	651.	920.	4535.	133.7
1.04	3.00	75	75.00	500.	878.	4528.	133.6
1.04	4.00	76	76.00	374.	824.	4494.	133.5
1.04	5.00	77	77.00	275.	763.	4455.	133.4
1.04	6.00	78	78.00	203.	703.	4415.	133.3
1.04	7.00	79	79.00	150.	642.	4374.	133.2
1.04	8.00	80	80.00	111.	584.	4334.	133.0
1.04	9.00	81	81.00	82.	528.	4296.	132.9
1.04	10.00	82	82.00	60.	475.	4260.	132.8
1.04	11.00	83	83.00	43.	432.	4227.	132.7
1.04	12.00	84	84.00	25.	395.	4196.	132.6
1.04	13.00	85	85.00	18.	359.	4166.	132.5
1.04	14.00	86	86.00	18.	329.	4139.	132.4
1.04	15.00	87	87.00	20.	305.	4115.	132.3
1.04	16.00	88	88.00	42.	283.	4095.	132.3
1.04	17.00	89	89.00	66.	265.	4075.	132.2
1.04	18.00	90	90.00	90.	250.	4060.	132.1
1.04	19.00	91	91.00	101.	238.	4048.	132.1
1.04	20.00	92	92.00	94.	227.	4037.	132.1
1.04	21.00	93	93.00	77.	216.	4026.	132.0
1.04	22.00	94	94.00	61.	204.	4014.	132.0
1.04	23.00	95	95.00	47.	192.	4002.	131.9
1.05	0.00	96	96.00	38.	182.	3990.	131.9
1.05	1.00	97	97.00	29.	172.	3978.	131.9
1.05	2.00	98	98.00	24.	162.	3967.	131.8

PEAK OUTFLOW IS 948. AT TIME 72.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	948.	912.	613.	246.	17750.
CMS	27.	26.	17.	7.	503.
INCHES		1.91	5.13	6.18	6.20
MM		48.54	130.40	156.89	157.43
AC-FT		452.	1215.	1462.	1467.
THOUS CU M		558.	1499.	1803.	1809.

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SUB-AREA RUNOFF COMPUTATION

INPUT DIVERTED FLOW FROM AREA 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	0.00	0.00	0.00	0.00	0.000	0	0	0

INPUT HYDROGRAPH

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.		0.	0.		0.			0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	105.	449.	777.	949.	884.	667.	429.
224.	71.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	949.	674.	190.	63.	4555.
CMS	27.	19.	5.	2.	129.
INCHES		.00	.00	.00	.00
MM		.00	.00	.00	.00
AC-FT		334.	378.	378.	378.
THOUS CU M		412.	464.	464.	464.

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU AREA 3

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

CLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	STOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

1
NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELEVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	77.5	92.5	19600.	.00380

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

	100.00	100.00	213.00	83.56	264.20	84.39	282.00	77.62	300.00	77.50
	316.00	84.53	336.50	85.29	500.00	100.00				
1										
STORAGE	0.00	6.49	14.84	24.56	35.66	48.13	61.98	77.20	94.81	127.99
	172.56	223.84	280.17	341.55	407.97	479.43	555.94	637.50	724.10	815.74
OUTFLOW	0.00	25.13	88.66	185.90	317.40	484.72	689.81	934.74	1222.31	1596.95
	2143.36	2800.33	3564.50	4436.75	5419.17	6514.44	7725.46	9055.35	10507.27	12084.46
STAGE	77.50	78.29	79.08	79.87	80.66	81.45	82.24	83.03	83.82	84.61
	85.39	86.18	86.97	87.76	88.55	89.34	90.13	90.92	91.71	92.50
ELOW	0.00	25.13	88.66	185.90	317.40	484.72	689.81	934.74	1222.31	1596.95

.50 280 64. 4 75 5419 .42 77 . 6 355. .27 .2064.

0

MO.DA	HR.MN	PERIOD	EOP STOR	AVG IN	EOP OUT	STAGE	AVG PUMP
1.01	1.00	1	0.	0.	0.	77.5	0.
1.01	2.00	2	0.	0.	0.	77.5	0.
1.01	3.00	3	0.	0.	0.	77.5	0.
1.01	4.00	4	0.	0.	0.	77.5	0.
1.01	5.00	5	0.	0.	0.	77.5	0.
1.01	6.00	6	0.	0.	0.	77.5	0.
1.01	7.00	7	0.	0.	0.	77.5	0.
1.01	8.00	8	0.	0.	0.	77.5	0.
1.01	9.00	9	0.	0.	0.	77.5	0.
1.01	10.00	10	0.	0.	0.	77.5	0.
1.01	11.00	11	0.	0.	0.	77.5	0.
1.01	12.00	12	0.	0.	0.	77.5	0.
1.01	13.00	13	0.	0.	0.	77.5	0.
1.01	14.00	14	0.	0.	0.	77.5	0.
1.01	15.00	15	0.	0.	0.	77.5	0.
1.01	16.00	16	0.	0.	0.	77.5	0.
1.01	17.00	17	0.	0.	0.	77.5	0.
1.01	18.00	18	0.	0.	0.	77.5	0.
1.01	19.00	19	0.	0.	0.	77.5	0.
1.01	20.00	20	0.	0.	0.	77.5	0.
1.01	21.00	21	0.	0.	0.	77.5	0.
1.01	22.00	22	0.	0.	0.	77.5	0.
1.01	23.00	23	0.	0.	0.	77.5	0.
1.02	0.00	24	0.	0.	0.	77.5	0.
1.02	1.00	25	0.	0.	0.	77.5	0.
1.02	2.00	26	0.	0.	0.	77.5	0.
1.02	3.00	27	0.	0.	0.	77.5	0.
1.02	4.00	28	0.	0.	0.	77.5	0.
1.02	5.00	29	0.	0.	0.	77.5	0.
1.02	6.00	30	0.	0.	0.	77.5	0.
1.02	7.00	31	0.	0.	0.	77.5	0.
1.02	8.00	32	0.	0.	0.	77.5	0.
1.02	9.00	33	0.	0.	0.	77.5	0.
1.02	10.00	34	0.	0.	0.	77.5	0.
1.02	11.00	35	0.	0.	0.	77.5	0.
1.02	12.00	36	0.	0.	0.	77.5	0.
1.02	13.00	37	0.	0.	0.	77.5	0.
1.02	14.00	38	0.	0.	0.	77.5	0.
1.02	15.00	39	0.	0.	0.	77.5	0.
1.02	16.00	40	0.	0.	0.	77.5	0.
1.02	17.00	41	0.	0.	0.	77.5	0.
1.02	18.00	42	0.	0.	0.	77.5	0.
1.02	19.00	43	0.	0.	0.	77.5	0.
1.02	20.00	44	0.	0.	0.	77.5	0.
1.02	21.00	45	0.	0.	0.	77.5	0.
1.02	22.00	46	0.	0.	0.	77.5	0.
1.02	23.00	47	0.	0.	0.	77.5	0.
1.03	0.00	48	0.	0.	0.	77.5	0.
1.03	1.00	49	0.	0.	0.	77.5	0.
1.03	2.00	50	0.	0.	0.	77.5	0.
1.03	3.00	51	0.	0.	0.	77.5	0.
1.03	4.00	52	0.	0.	0.	77.5	0.
1.03	5.00	53	0.	0.	0.	77.5	0.
1.03	6.00	54	0.	0.	0.	77.5	0.
1.03	7.00	55	0.	0.	0.	77.5	0.

1.03	8.00	56	0.	0.	0.	77.5	0.
1.03	9.00	57	0.	0.	0.	77.5	0.
1.03	10.00	58	0.	0.	0.	77.5	0.
1.03	11.00	59	0.	0.	0.	77.5	0.
1.03	12.00	60	0.	0.	0.	77.5	0.
1.03	13.00	61	0.	0.	0.	77.5	0.
1.03	14.00	62	0.	0.	0.	77.5	0.
1.03	15.00	63	0.	0.	0.	77.5	0.
1.03	16.00	64	4.	53.	14.	78.0	0.
1.03	17.00	65	20.	277.	142.	79.5	0.
1.03	18.00	66	46.	613.	457.	81.3	0.
1.03	19.00	67	67.	863.	767.	82.5	0.
1.03	20.00	68	74.	917.	866.	82.9	0.
1.03	21.00	69	69.	776.	798.	82.6	0.
1.03	22.00	70	56.	548.	603.	81.9	0.
1.03	23.00	71	42.	327.	399.	81.0	0.
1.04	0.00	72	28.	148.	227.	80.1	0.
1.04	1.00	73	17.	36.	110.	79.3	0.
1.04	2.00	74	10.	0.	54.	78.6	0.
1.04	3.00	75	7.	0.	28.	78.3	0.
1.04	4.00	76	5.	0.	19.	78.1	0.
1.04	5.00	77	4.	0.	14.	77.9	0.
1.04	6.00	78	3.	0.	10.	77.8	0.
1.04	7.00	79	2.	0.	7.	77.7	0.
1.04	8.00	80	1.	0.	5.	77.7	0.
1.04	9.00	81	1.	0.	4.	77.6	0.
1.04	10.00	82	1.	0.	3.	77.6	0.
1.04	11.00	83	1.	0.	2.	77.6	0.
1.04	12.00	84	0.	0.	1.	77.5	0.
1.04	13.00	85	0.	0.	1.	77.5	0.
1.04	14.00	86	0.	0.	1.	77.5	0.
1.04	15.00	87	0.	0.	1.	77.5	0.
1.04	16.00	88	0.	0.	0.	77.5	0.
1.04	17.00	89	0.	0.	0.	77.5	0.
1.04	18.00	90	0.	0.	0.	77.5	0.
1.04	19.00	91	0.	0.	0.	77.5	0.
1.04	20.00	92	0.	0.	0.	77.5	0.
1.04	21.00	93	0.	0.	0.	77.5	0.
1.04	22.00	94	0.	0.	0.	77.5	0.
1.04	23.00	95	0.	0.	0.	77.5	0.
1.05	0.00	96	0.	0.	0.	77.5	0.
1.05	1.00	97	0.	0.	0.	77.5	0.
1.05	2.00	98	0.	0.	0.	77.5	0.
				SUM	4555.		
					(128.98)		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	886.	633.	190.	63.	4555.
CMS	25.	18.	5.	2.	129.
INCHES		.00	.00	.00	.00
MM		.00	.00	.00	.00
AC-FT		314.	376.	376.	376.
THOUS CU M		387.	464.	464.	464.

MAXIMUM STAGE IS 82.9

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SUB-AREA RUNOFF COMPUTATION:

COMPUTE SFM FOR AREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.09	0.00	7.01	1.00	0.000	0	0	0

PRECIP DATA

SPFE	PAS	R6	R12	R24	R48	R72	R96
10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	.42	1.74	2.53	.68	0.00	1.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.90 CP= .65 NTA= 0

RECESSION DATA

STRTQ= 4.00 QRCSN= 4.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.53 AND R= 3.48 INTERVALS

UNIT HYDROGRAPH 21 END-OF-PERIOD ORDINATES, LAG= 5.66 HOURS, CP= .62 VOL= 1.00

65. 89. 164. 212. 208. 164. 123. 92. 69. 52.
39. 29. 22. 16. 12. 9. 7. 5. 4. 3.
2.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.00	0.00	.00	4.	1.03	2.00	50	.07	.01	.06	20.
1.01	2.00	2	.00	0.00	.00	4.	1.03	3.00	51	.07	.01	.06	19.
1.01	3.00	3	.00	0.00	.00	4.	1.03	4.00	52	.07	.01	.06	19.
1.01	4.00	4	.00	0.00	.00	4.	1.03	5.00	53	.07	.01	.06	19.
1.01	5.00	5	.00	0.00	.00	4.	1.03	6.00	54	.07	.01	.06	20.
1.01	6.00	6	.00	0.00	.00	4.	1.03	7.00	55	.24	.11	.13	23.
1.01	7.00	7	.01	0.00	.01	4.	1.03	8.00	56	.24	.11	.13	32.
1.01	8.00	8	.01	0.00	.01	4.	1.03	9.00	57	.24	.11	.13	46.
1.01	9.00	9	.01	0.00	.01	4.	1.03	10.00	58	.24	.11	.13	69.
1.01	10.00	10	.01	0.00	.01	4.	1.03	11.00	59	.24	.11	.13	89.
1.01	11.00	11	.01	0.00	.01	4.	1.03	12.00	60	.24	.12	.12	105.
1.01	12.00	12	.01	0.00	.01	4.	1.03	13.00	61	.95	.64	.31	131.
1.01	13.00	13	.03	0.00	.03	4.	1.03	14.00	62	1.14	.80	.35	191.
1.01	14.00	14	.03	0.00	.03	4.	1.03	15.00	63	1.43	1.04	.39	305.
1.01	15.00	15	.04	0.00	.04	4.	1.03	16.00	64	3.63	2.92	.71	516.
1.01	16.00	16	.11	0.00	.11	4.	1.03	17.00	65	1.34	1.00	.34	821.
1.01	17.00	17	.04	0.00	.04	4.	1.03	18.00	66	1.05	.77	.28	1120.
1.01	18.00	18	.03	0.00	.03	4.	1.03	19.00	67	.14	.07	.07	1310.
1.01	19.00	19	.00	0.00	.00	4.	1.03	20.00	68	.14	.07	.07	1305.
1.01	20.00	20	.00	0.00	.00	4.	1.03	21.00	69	.14	.07	.07	1137.
1.01	21.00	21	.00	0.00	.00	4.	1.03	22.00	70	.14	.07	.07	919.
1.01	22.00	22	.00	0.00	.00	4.	1.03	23.00	71	.14	.07	.07	721.
1.01	23.00	23	.00	0.00	.00	4.	1.04	0.00	72	.14	.07	.07	570.

1.02	1.00	25	.01	0.00	.01	4.	1.04	2.00	74	.00	0.00	.00	355.
1.02	2.00	26	.01	0.00	.01	4.	1.04	3.00	75	.00	0.00	.00	278.
1.02	3.00	27	.01	0.00	.01	4.	1.04	4.00	76	.00	0.00	.00	213.
1.02	4.00	28	.01	0.00	.01	4.	1.04	5.00	77	.00	0.00	.00	161.
1.02	5.00	29	.01	0.00	.01	4.	1.04	6.00	78	.00	0.00	.00	121.
1.02	6.00	30	.01	0.00	.01	4.	1.04	7.00	79	.01	0.00	.01	92.
1.02	7.00	31	.03	0.00	.03	4.	1.04	8.00	80	.01	0.00	.01	70.
1.02	8.00	32	.03	0.00	.03	4.	1.04	9.00	81	.01	0.00	.01	55.
1.02	9.00	33	.03	0.00	.03	4.	1.04	10.00	82	.01	0.00	.01	40.
1.02	10.00	34	.03	0.00	.03	4.	1.04	11.00	83	.01	0.00	.01	29.
1.02	11.00	35	.03	0.00	.03	4.	1.04	12.00	84	.01	0.00	.01	21.
1.02	12.00	36	.03	0.00	.03	4.	1.04	13.00	85	.05	.02	.03	15.
1.02	13.00	37	.13	0.00	.13	4.	1.04	14.00	86	.06	.02	.04	11.
1.02	14.00	38	.15	.01	.14	4.	1.04	15.00	87	.07	.03	.04	12.
1.02	15.00	39	.19	.04	.15	8.	1.04	16.00	88	.18	.11	.08	18.
1.02	16.00	40	.48	.21	.27	14.	1.04	17.00	89	.07	.03	.04	28.
1.02	17.00	41	.18	.05	.12	32.	1.04	18.00	90	.05	.02	.03	39.
1.02	18.00	42	.14	.04	.10	54.	1.04	19.00	91	.01	0.00	.01	48.
1.02	19.00	43	.02	0.00	.02	70.	1.04	20.00	92	.01	0.00	.01	45.
1.02	20.00	44	.02	0.00	.02	72.	1.04	21.00	93	.01	0.00	.01	39.
1.02	21.00	45	.02	0.00	.02	65.	1.04	22.00	94	.01	0.00	.01	31.
1.02	22.00	46	.02	0.00	.02	51.	1.04	23.00	95	.01	0.00	.01	25.
1.02	23.00	47	.02	0.00	.02	39.	1.05	0.00	96	.01	0.00	.01	19.
1.03	0.00	48	.02	0.00	.02	31.	1.05	1.00	97	0.00	0.00	0.00	16.
1.03	1.00	49	.07	.01	.06	24.	1.05	2.00	98	0.00	0.00	0.00	13.
									SUM	14.88	8.94	5.94	12301.
										(378.)(	227.)(	151.)(	350.02)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1310.	1096.	403.	170.	12350.
CMS	37.	31.	11.	5.	350.
INCHES		4.88	8.24	9.09	9.16
MM		123.86	209.21	230.81	232.70
AC-FT		543.	918.	1012.	1021.
THOUS CU M		670.	1132.	1249.	1259.

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COMBINE HYDROGRAPHS

COMBINE CHANNEL AND RESERVOIR ROUTED PLUS AREA 3 FLOWS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	3	0	0	0	0	1	0	0

SUM OF 3 HYDROGRAPHS AT 3

4.	4.	5.	5.	5.	5.	5.	6.	6.	6.
6.	6.	6.	7.	7.	7.	7.	7.	7.	7.
8.	8.	8.	8.	8.	8.	8.	8.	8.	9.
9.	9.	9.	9.	9.	9.	9.	10.	11.	20.
40.	64.	84.	91.	85.	75.	66.	58.	52.	49.
48.	48.	49.	50.	53.	63.	80.	104.	128.	149.
181.	255.	404.	445.	1201.	1936.	2590.	2861.	2730.	2403.

2	1.	150	1	84.	105		34.	74	.
564.	518.	484.	418.	373.	341.	317.	302.	244.	240.
284.	272.	255.	235.	217.	201.	187.	175.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2561.	2412.	1229.	479.	34654.
CMS	81.	68.	35.	14.	981.
INCHES		3.44	7.00	8.19	8.23
MM		87.27	177.89	208.02	208.99
AC-FT		1196.	2438.	2851.	2804.
THOUS CU M		1475.	3007.	3516.	3533.

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU AREA 4

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

1

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	74.0	90.0	4400.	.00140

1

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

171.20 87.50 220.00 86.46 223.50 86.39 257.50 74.00 307.50 74.00
352.00 85.42 380.00 85.48 423.00 85.60

STORAGE	0.00	4.89	9.46	14.90	20.82	27.21	34.08	41.43	49.25	57.54
	66.31	75.56	85.29	95.49	106.18	125.24	144.87	166.29	187.71	209.13
OUTFLOW	0.00	53.23	172.34	346.07	571.76	848.95	1178.15	1560.36	1996.89	2489.22
	3038.92	3647.64	4317.06	5048.88	5892.78	6925.67	8132.73	9471.99	10926.29	12493.42
STAGE	74.00	74.84	75.68	76.53	77.37	78.21	79.05	79.89	80.74	81.58
	82.42	83.26	84.11	84.95	85.79	86.63	87.47	88.32	89.16	90.00
FLOW	0.00	53.23	172.34	346.07	571.76	848.95	1178.15	1560.36	1996.89	2489.22
	3038.92	3647.64	4317.06	5048.88	5892.78	6925.67	8132.73	9471.99	10926.29	12493.42

0

AC.DA	HR.MN	PERIOD	EOP STOR	AVG IN	EOP OUT	STAGE	AVG PUMP

1.01	1.00	1	0.	4.	4.	74.1	0.
1.01	2.00	2	0.	4.	4.	74.1	0.
1.01	3.00	3	0.	5.	4.	74.1	0.
1.01	4.00	4	0.	5.	5.	74.1	0.
1.01	5.00	5	0.	5.	5.	74.1	0.
1.01	6.00	6	0.	5.	5.	74.1	0.
1.01	7.00	7	0.	5.	5.	74.1	0.
1.01	8.00	8	0.	6.	5.	74.1	0.
1.01	9.00	9	0.	6.	6.	74.1	0.
1.01	10.00	10	0.	6.	6.	74.1	0.
1.01	11.00	11	1.	6.	6.	74.1	0.
1.01	12.00	12	1.	6.	6.	74.1	0.
1.01	13.00	13	1.	6.	6.	74.1	0.
1.01	14.00	14	1.	7.	6.	74.1	0.
1.01	15.00	15	1.	7.	7.	74.1	0.
1.01	16.00	16	1.	7.	7.	74.1	0.
1.01	17.00	17	1.	7.	7.	74.1	0.
1.01	18.00	18	1.	7.	7.	74.1	0.
1.01	19.00	19	1.	7.	7.	74.1	0.
1.01	20.00	20	1.	7.	7.	74.1	0.
1.01	21.00	21	1.	8.	7.	74.1	0.
1.01	22.00	22	1.	8.	8.	74.1	0.
1.01	23.00	23	1.	8.	8.	74.1	0.
1.02	0.00	24	1.	8.	8.	74.1	0.
1.02	1.00	25	1.	8.	8.	74.1	0.
1.02	2.00	26	1.	8.	8.	74.1	0.
1.02	3.00	27	1.	8.	8.	74.1	0.
1.02	4.00	28	1.	8.	8.	74.1	0.
1.02	5.00	29	1.	8.	8.	74.1	0.
1.02	6.00	30	1.	9.	8.	74.1	0.
1.02	7.00	31	1.	9.	9.	74.1	0.
1.02	8.00	32	1.	9.	9.	74.1	0.
1.02	9.00	33	1.	9.	9.	74.1	0.
1.02	10.00	34	1.	9.	9.	74.1	0.
1.02	11.00	35	1.	9.	9.	74.1	0.
1.02	12.00	36	1.	9.	9.	74.1	0.
1.02	13.00	37	1.	9.	9.	74.1	0.
1.02	14.00	38	1.	9.	9.	74.1	0.
1.02	15.00	39	1.	10.	10.	74.2	0.
1.02	16.00	40	1.	16.	14.	74.2	0.
1.02	17.00	41	2.	30.	24.	74.4	0.
1.02	18.00	42	4.	52.	42.	74.7	0.
1.02	19.00	43	5.	74.	69.	75.0	0.
1.02	20.00	44	6.	88.	87.	75.1	0.
1.02	21.00	45	6.	88.	88.	75.1	0.
1.02	22.00	46	6.	80.	80.	75.0	0.
1.02	23.00	47	5.	71.	71.	75.0	0.
1.03	0.00	48	5.	62.	62.	74.9	0.
1.03	1.00	49	5.	55.	55.	74.9	0.
1.03	2.00	50	4.	51.	52.	74.8	0.
1.03	3.00	51	4.	48.	49.	74.8	0.
1.03	4.00	52	4.	48.	48.	74.8	0.
1.03	5.00	53	4.	48.	48.	74.8	0.
1.03	6.00	54	4.	49.	49.	74.8	0.
1.03	7.00	55	4.	51.	50.	74.8	0.
1.03	8.00	56	5.	58.	56.	74.9	0.
1.03	9.00	57	5.	71.	71.	75.0	0.
1.03	10.00	58	6.	92.	92.	75.1	0.
1.03	11.00	59	7.	116.	115.	75.3	0.

1	12		8.	158		3.4		
1.03	13.00	61	9.	165.	165.	75.6	0.	
1.03	14.00	62	11.	218.	224.	75.9	0.	
1.03	15.00	63	15.	329.	344.	76.5	0.	
1.03	16.00	64	21.	544.	540.	77.4	0.	
1.03	17.00	65	31.	943.	1050.	78.7	0.	
1.03	18.00	66	45.	1509.	1759.	80.3	0.	
1.03	19.00	67	57.	2203.	2471.	81.5	0.	
1.03	20.00	68	63.	2726.	2838.	82.1	0.	
1.03	21.00	69	62.	2796.	2777.	82.0	0.	
1.03	22.00	70	57.	2567.	2474.	81.6	0.	
1.03	23.00	71	51.	2226.	2122.	81.0	0.	
1.04	0.00	72	46.	1895.	1805.	80.4	0.	
1.04	1.00	73	41.	1622.	1551.	79.9	0.	
1.04	2.00	74	38.	1416.	1367.	79.5	0.	
1.04	3.00	75	35.	1256.	1216.	79.1	0.	
1.04	4.00	76	32.	1120.	1067.	78.8	0.	
1.04	5.00	77	30.	997.	967.	78.5	0.	
1.04	6.00	78	27.	886.	860.	78.2	0.	
1.04	7.00	79	25.	788.	767.	78.0	0.	
1.04	8.00	80	23.	700.	681.	77.7	0.	
1.04	9.00	81	22.	621.	604.	77.5	0.	
1.04	10.00	82	20.	551.	537.	77.2	0.	
1.04	11.00	83	18.	491.	480.	77.0	0.	
1.04	12.00	84	17.	441.	432.	76.8	0.	
1.04	13.00	85	16.	395.	387.	76.7	0.	
1.04	14.00	86	15.	357.	350.	76.5	0.	
1.04	15.00	87	14.	329.	326.	76.4	0.	
1.04	16.00	88	14.	310.	307.	76.3	0.	
1.04	17.00	89	13.	298.	297.	76.3	0.	
1.04	18.00	90	13.	292.	291.	76.3	0.	
1.04	19.00	91	13.	287.	286.	76.2	0.	
1.04	20.00	92	13.	278.	277.	76.2	0.	
1.04	21.00	93	12.	263.	261.	76.1	0.	
1.04	22.00	94	12.	245.	243.	76.0	0.	
1.04	23.00	95	11.	226.	224.	75.9	0.	
1.05	0.00	96	11.	209.	207.	75.9	0.	
1.05	1.00	97	10.	194.	192.	75.8	0.	
1.05	2.00	98	10.	181.	179.	75.7	0.	

SUM 34033.
(960.71)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2838.	2410.	1229.	478.	34542.
CMS	80.	68.	35.	14.	978.
INCHES		3.43	7.01	8.16	8.20
MM		87.22	177.93	207.36	208.31
AC-FT		1195.	2438.	2842.	2855.
THOUS CU M		1474.	3008.	3505.	3521.

MAXIMUM STAGE IS 82.1

0 .42 1.74 2.53 .68 0.00 1.00 0.00 0.00 0.00 0.00

UNIT HYDROGRAPH DATA

UNIT HYDROGRAPH 7 END-OF-PERIOD ORDINATES, LAG= 1.40 HOURS, CP= .62 VOL= 1.00

67. 121. 70. 29. 11. 4. 4.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.00	0.00	.00	1.	1.03	2.00	50	.07	.01	.06	3.
1.01	2.00	2	.00	0.00	.00	1.	1.03	3.00	51	.07	.01	.06	4.
1.01	3.00	3	.00	0.00	.00	1.	1.03	4.00	52	.07	.01	.06	5.
1.01	4.00	4	.00	0.00	.00	1.	1.03	5.00	53	.07	.01	.06	5.
1.01	5.00	5	.00	0.00	.00	1.	1.03	6.00	54	.07	.01	.06	5.
1.01	6.00	6	.00	0.00	.00	1.	1.03	7.00	55	.24	.11	.13	12.
1.01	7.00	7	.01	0.00	.01	1.	1.03	8.00	56	.24	.11	.13	23.
1.01	8.00	8	.01	0.00	.01	1.	1.03	9.00	57	.24	.11	.13	30.
1.01	9.00	9	.01	0.00	.01	1.	1.03	10.00	58	.24	.11	.13	33.
1.01	10.00	10	.01	0.00	.01	1.	1.03	11.00	59	.24	.11	.13	35.
1.01	11.00	11	.01	0.00	.01	1.	1.03	12.00	60	.24	.12	.12	36.
1.01	12.00	12	.01	0.00	.01	1.	1.03	13.00	61	.95	.64	.31	71.
1.01	13.00	13	.03	0.00	.03	1.	1.03	14.00	62	1.14	.80	.35	146.
1.01	14.00	14	.03	0.00	.03	1.	1.03	15.00	63	1.43	1.04	.39	221.
1.01	15.00	15	.04	0.00	.04	1.	1.03	16.00	64	3.63	2.92	.71	402.
1.01	16.00	16	.11	0.00	.11	1.	1.03	17.00	65	1.34	1.00	.34	531.
1.01	17.00	17	.04	0.00	.04	1.	1.03	18.00	66	1.05	.77	.28	436.
1.01	18.00	18	.03	0.00	.03	1.	1.03	19.00	67	.14	.07	.07	274.
1.01	19.00	19	.00	0.00	.00	1.	1.03	20.00	68	.14	.07	.07	139.
1.01	20.00	20	.00	0.00	.00	1.	1.03	21.00	69	.14	.07	.07	67.
1.01	21.00	21	.00	0.00	.00	1.	1.03	22.00	70	.14	.07	.07	40.
1.01	22.00	22	.00	0.00	.00	1.	1.03	23.00	71	.14	.07	.07	28.
1.01	23.00	23	.00	0.00	.00	1.	1.04	0.00	72	.14	.06	.07	25.
1.02	0.00	24	.00	0.00	.00	1.	1.04	1.00	73	.00	0.00	.00	19.
1.02	1.00	25	.01	0.00	.01	1.	1.04	2.00	74	.00	0.00	.00	10.
1.02	2.00	26	.01	0.00	.01	1.	1.04	3.00	75	.00	0.00	.00	4.
1.02	3.00	27	.01	0.00	.01	1.	1.04	4.00	76	.00	0.00	.00	2.
1.02	4.00	28	.01	0.00	.01	1.	1.04	5.00	77	.00	0.00	.00	1.
1.02	5.00	29	.01	0.00	.01	1.	1.04	6.00	78	.00	0.00	.00	1.

[illegible]	[illegible]	30	1	0	1	1.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.
1.02	7.00	31	.03	0.00	.03	1.	1.04	8.00	80	.01	0.00	.01	1.
1.02	8.00	32	.03	0.00	.03	1.	1.04	9.00	81	.01	0.00	.01	1.
1.02	9.00	33	.03	0.00	.03	1.	1.04	10.00	82	.01	0.00	.01	1.
1.02	10.00	34	.03	0.00	.03	1.	1.04	11.00	83	.01	0.00	.01	1.
1.02	11.00	35	.03	0.00	.03	1.	1.04	12.00	84	.01	0.00	.01	1.
1.02	12.00	36	.03	0.00	.03	1.	1.04	13.00	85	.05	.02	.03	2.
1.02	13.00	37	.13	0.00	.13	1.	1.04	14.00	86	.06	.02	.04	5.
1.02	14.00	38	.15	.01	.14	2.	1.04	15.00	87	.07	.03	.04	7.
1.02	15.00	39	.19	.04	.15	5.	1.04	16.00	88	.18	.11	.06	14.
1.02	16.00	40	.48	.21	.27	20.	1.04	17.00	89	.07	.03	.04	14.
1.02	17.00	41	.18	.05	.12	33.	1.04	18.00	90	.05	.02	.03	15.
1.02	18.00	42	.14	.04	.10	27.	1.04	19.00	91	.01	0.00	.01	9.
1.02	19.00	43	.02	0.00	.02	10.	1.04	20.00	92	.01	0.00	.01	5.
1.02	20.00	44	.02	0.00	.02	8.	1.04	21.00	93	.01	0.00	.01	4.
1.02	21.00	45	.02	0.00	.02	4.	1.04	22.00	94	.01	0.00	.01	2.
1.02	22.00	46	.02	0.00	.02	2.	1.04	23.00	95	.01	0.00	.01	1.
1.02	23.00	47	.02	0.00	.02	1.	1.05	0.00	96	.01	0.00	.01	1.
1.03	0.00	48	.02	0.00	.02	1.	1.05	1.00	97	0.00	0.00	0.00	1.
1.03	1.00	49	.07	.01	.06	2.	1.05	2.00	98	0.00	0.00	0.00	1.
									SUM	14.88	8.94	5.94	2850.
										(378.)	(227.)	(151.)	(80.67)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	531.	334.	108.	34.	2855.
CMS	15.	9.	3.	1.	81.
INCHES		0.48	0.39	0.14	9.22
MM		104.53	213.02	252.21	234.26
AC-FT		100.	215.	234.	236.
THOUS CU M		204.	265.	289.	291.

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COMBINE HYDROGRAPHS

COMBINE ROUTED PLUS AREA 4 FLOWS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	2	0	0	0	0	1	0	0

SUM OF 2 HYDROGRAPHS AT 6

5.	5.	5.	6.	6.	6.	6.	6.	7.	7.
7.	7.	7.	7.	8.	8.	8.	8.	8.	8.
8.	9.	9.	9.	9.	9.	9.	9.	9.	9.
10.	10.	10.	10.	10.	10.	10.	11.	15.	34.
57.	70.	85.	95.	92.	82.	72.	63.	57.	55.
54.	53.	53.	54.	62.	79.	102.	125.	150.	174.
236.	370.	564.	992.	1581.	2195.	2745.	2977.	2844.	2513.
2150.	1828.	1570.	1377.	1220.	1090.	969.	861.	768.	682.
605.	538.	481.	433.	389.	355.	333.	321.	316.	306.
295.	281.	264.	244.	225.	208.	193.	180.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2977.	2500.	1322.	517.	57597.

CMS	84.	[illegible]	[illegible].	15.	1054.
INCHES		3.37	7.02	8.23	8.27
MM		85.62	178.27	209.06	210.08
AC-FT		1260.	2623.	3076.	3091.
THOUS CU M		1554.	3235.	3794.	3812.

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RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	1	480.	480.	287.	112.	2.24
	(	13.59)(	13.59)(	8.14)(	3.17)(	5.80)
HYDROGRAPH AT	1	1494.	1190.	490.	186.	2.20
	(	42.32)(	33.71)(	13.89)(	5.09)(	5.70)
2-COMBINED	1	1974.	1670.	778.	292.	4.44
	(	55.91)(	47.30)(	22.02)(	8.26)(	11.50)
ROUTED TO	3	948.	912.	813.	248.	4.44
	(	26.84)(	25.83)(	17.35)(	6.98)(	11.50)
HYDROGRAPH AT	2	949.	874.	190.	83.	0.00
	(	26.87)(	19.06)(	5.37)(	1.79)(	0.00)
ROUTED TO	3	886.	833.	190.	83.	0.00
	(	25.10)(	17.91)(	5.37)(	1.79)(	0.00)
HYDROGRAPH AT	3	1316.	1096.	403.	170.	2.09
	(	37.25)(	31.02)(	15.10)(	4.82)(	5.41)
3-COMBINED	3	2861.	2412.	1229.	479.	6.53
	(	81.03)(	68.30)(	34.80)(	13.57)(	16.91)
ROUTED TO	4	2838.	2410.	1229.	478.	6.53
	(	80.37)(	68.25)(	34.81)(	13.52)(	16.91)
HYDROGRAPH AT	4	531.	334.	108.	39.	.48
	(	15.03)(	9.46)(	3.06)(	1.11)(	1.24)
2-COMBINED	6	2977.	2540.	1322.	517.	7.01
	(	84.31)(	71.93)(	37.44)(	14.64)(	18.16)

PLAN 1 .....

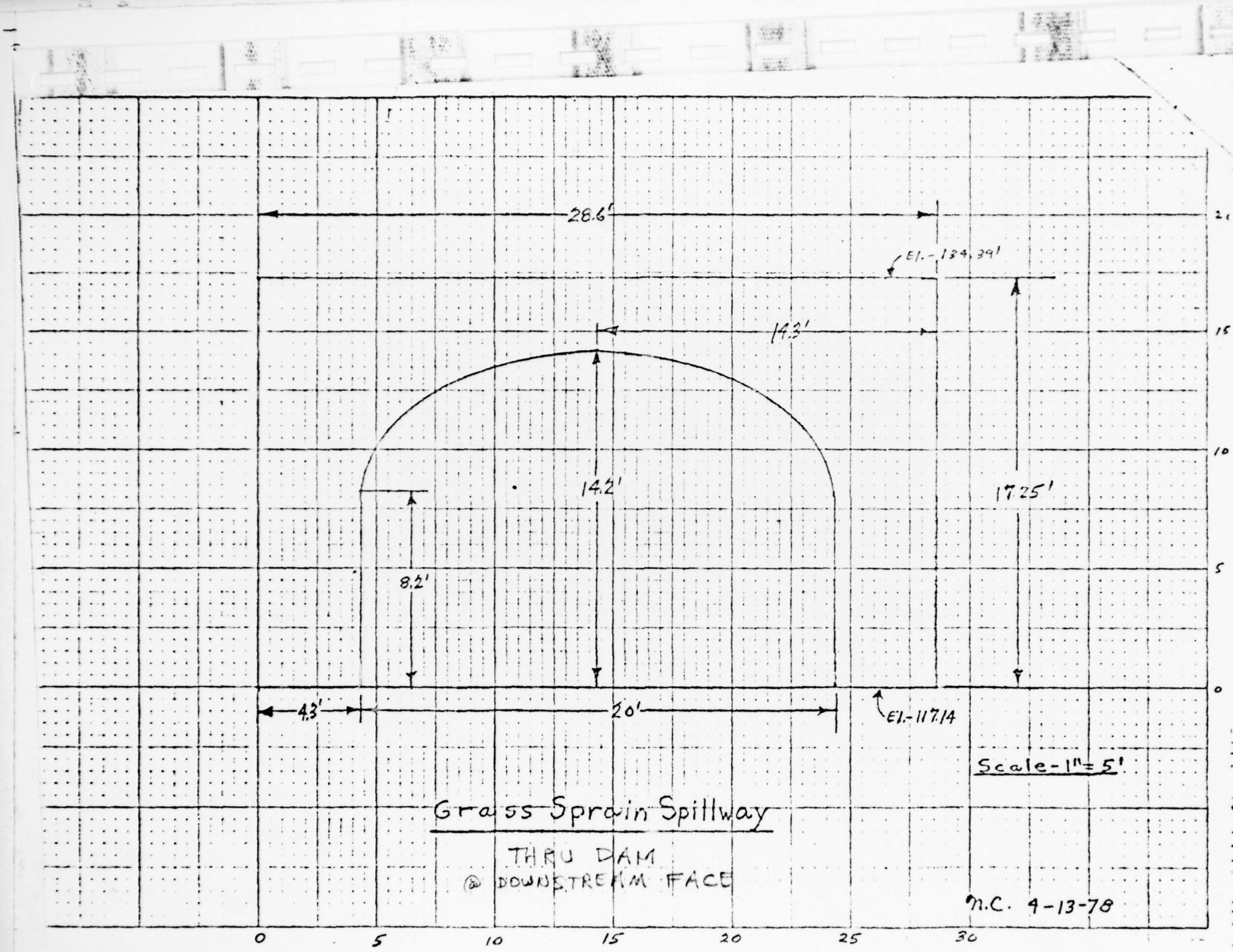
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	130.94	130.94	134.39
STORAGE	3680.	3680.	8790.
OUTFLOW	0.	0.	1000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.00	133.77	0.00	6573.	968.	0.00	72.00	0.00

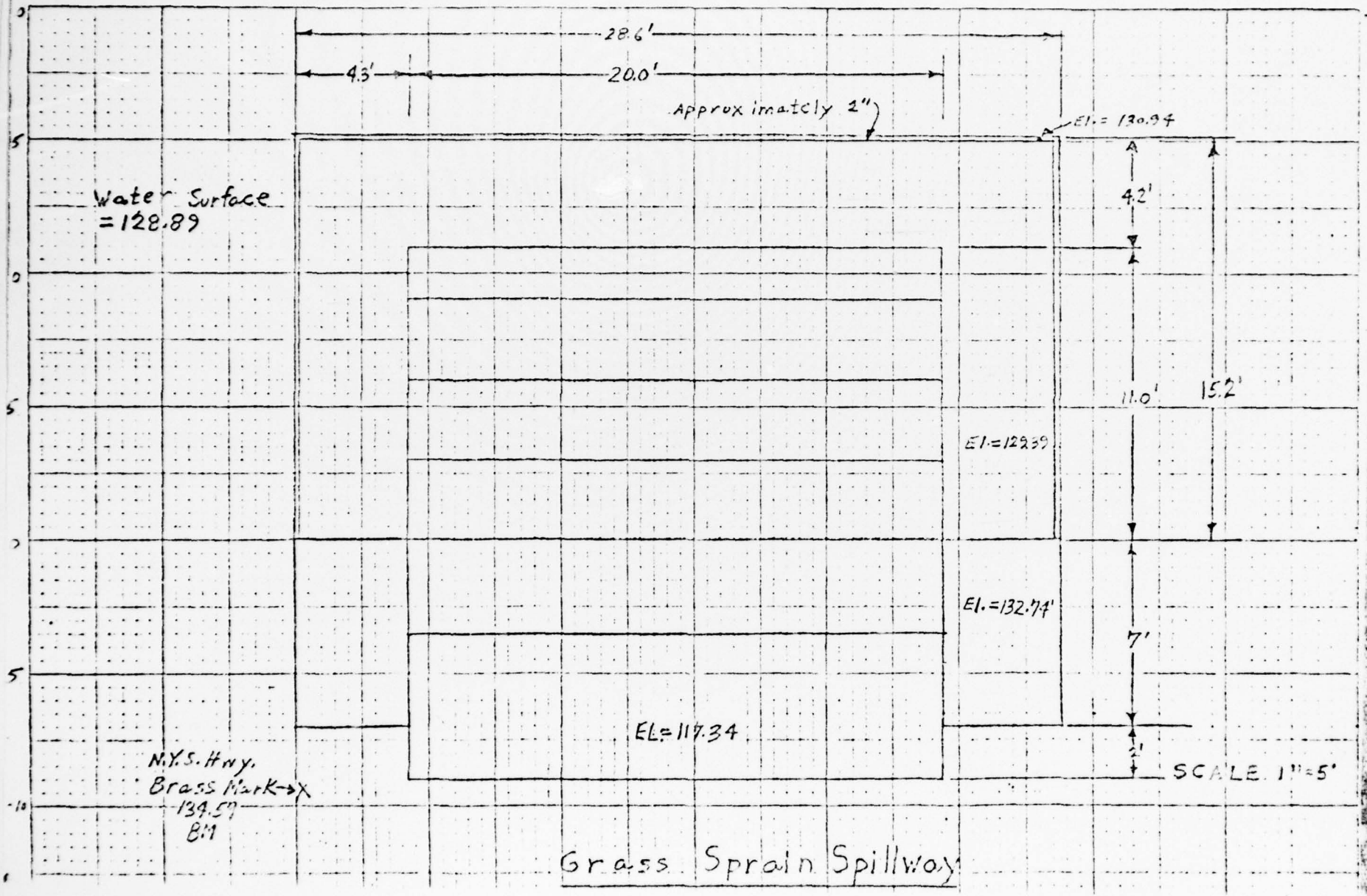
APPENDIX E

SURVEY DATA

Prepared by U. S. Army Corps
of Engineers, New York District


28.6'
El.-134.39'
14.2'
14.2'
17.25'
8.2'
4.3'
20'
El.-117.14
Scale-1"=5'
Grass Sprain Spillway
THRU DAM
@ DOWNSTREAM FACE
M.C. 4-13-78
0
5
10
15
20
25
30
15
10
5
0

46 0782



SPILLWAY [illegible] 129.37'

CREST of dam [illegible] 134.37'

TOP of FLASHBOARDS 130.94'

YONKERS ELEV = U.S.G.S. ELEV. − 3.24'

	[illegible]	U.S.G.S. ELEV.
STREET LINE ELEV.	131.03'	134.27'
TOP of FLASH.	127.7[illegible]'	130.94'
BOTTOM of SPILLWAY	113.79'	117.03'