#4715

HYDROLOGICAL STUDY

EAST MOUNTAIN DEVELOPMENT
PLAT J
PROVO UTAH

March 28, 2001

PRELIMINARY

Prepared By:
Sowby & Berg Consultants, LC
45 North 490 West
American Fork, Utah 84003

Prepared For:
Mr. Richard Morley
East Mountain Development Co.
2272 South Mountain View Parkway
Provo, Utah 84606

March 21, 2001

Hydrological Study
Plat J, East Mountain Development
Provo, Utah

1.0 Introduction

This document reports the finding of a hydrological study for Plat J of the East Mountain Development. This development and the surrounding hillside area is located near the intersection of Mountain View Parkway and Alaska Avenue. Figure No. 1 titled Vicinity Map, in Appendix "A" shows the location of the site along with surrounding roads and landmarks.

2.0 Purpose of Study

The purpose of this hydrological and debris study was to quantify the following.

(1) The potential amount of storm runoff from the hillside drainages that may influence the development.

(2) The potential amount of rock debris delivered from these hillside drainages that may influence the development.

(3) Proposed risk-reducing measures for storm runoff and debris flows.

3.0 Project Site

The project site consists of two hillside drainages. The average slope of the hillside is very steep, above 60 percent slope. The area of study is slightly larger than 50 acres. One drainage is about 3 times larger than the other drainage. See Figure No. 2 titled Drainage Areas in Appendix "A" for the boundaries of each drainage area.

The soil type of this site has been classified by the Soil Conservation Service as Group B. Group B soils are defined as having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderate deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmissions. See Appendix "A" Figure No. 3 titled Soil Groupings taken from the Provo City Storm Drain Master Plan. This soil grouping agrees with the soil characteristics determined by the geotechnical study performed by Earthtec Testing & Engineering.

Earthtec Testing & Engineering in a letter dated March 01, 2001, in Appendix "E", gave project site information on the total volume of existing debris contained in the drainage basin 1 and no large debris deposits in drainage basin 2. The two (2) debris flow deposits were observed and an estimate of their volumes were 1,100 cubic yards and 3,900 cubic yards respectively. The remainder of the drainage channel has been estimated with having a volume of debris ranging between 900 and 1,700 cubic yards. The total volume of Existing debris deposits in the drainage basin has been estimated between 5,900 and 6,700 cubic yards.

Earthtec Testing & Engineering in a letter dated March 12, 2001, in Appendix "E", gave additional information on areas covered by bedrock outcrops, areas of dense vegetation, and existing debris flow deposits locations in the drainage basin and deposit gradations.

Earthtec Testing & Engineering in a letter dated March 19, 2001, in Appendix "E" gave additional information about the drainage channel and the exposure the drainage channel has to potential debris that could be transported by the storm runoff.

4.0 Storm Runoff Model

The SCS Type II storm runoff curve number method TR-55 was used for evaluation of the hydrology for this project. The parameters used in the HEC-1 model that were selected are curve number, rainfall depth, basin area, and lag time.

4.1 Curve Number

A curve number of 48 was selected based upon Hydrologic Soils Group B and a Land Use Description of Oak-aspen in fair condition. Refer to Appendix "B" to Table 2-2d. - Runoff curve numbers for arid and semiarid rangelands.

4.2 Rainfall Depth

The design rainfall depth for a 24 hour time period was used in the HEC-1 model with return period 100 years.. The design rainfall depth was taken from the Provo City Storm Drain Master Plan and is reproduced in Table No. 1 below.

Table No. 1

Rainfall Depths for Provo Areas Above 5000 Feet Elevation	
24 Hour Storm Duration	
Return Period	**Inches**
2 - year	1.94
5 - year	2.50
10 - year	2.84
25 - year	3.31
50 - year	3.63
100 - year	**3.94**

4.3 Basin Subareas & Lag Times

The drainage basin areas and subareas were designated and shown in Figure B-1 in Appendix "B". The computed lag time for each subarea is given in Table No. 2 below. For complete computations of time of concentration and lag time for each subarea see Appendix "B".

Table No. 2

Drainage Basin Information		
Basin 1	**Total Area (mi^2)**	**Lag Time (hr)**
Subarea 1	0.02148	0.093
Subarea 2	0.01422	0.074
Subarea 3	0.00622	0.051
Subarea 4	0.01301	0.052
Subarea 5	0.00508	0.042

Basin 2	Total Area (mi^2)	Lag Time (hr)
Subarea 6	0.00384	0.042
Subarea 7	0.00464	0.038
Subarea 8	0.00422	0.035
Subarea 9	0.00334	0.047
Subarea 10	0.00298	0.043

4.4 Basin Subarea Waterways

The existing runoff channel was investigated by Earthtec Engineering and Testing and was determined to mostly "V" shaped in cross-section with the side slopes varying from 25% to 35%. A sketch of the cross section can be found in Appendix "E". Based upon the subareas of the basin the runoff channel was divided into these reaches. For each of these reaches the percent slope and the length were found for input into the runoff model. These reach lengths and slopes are shown in Table No. 3 below.

Table No. 3

Drainage Reach Information		
Basin 1	**Length (ft)**	**Percent Slope**
Reach 1	1150	69%
Reach 2	540	62%
Reach 3	300	38%
Basin 2	**Length (ft)**	**Percent Slope**
Reach 4	750	69%
Reach 5	640	64%
Reach 6	300	31%

Drainage reach 1 collects the runoff generated from subarea 1, the west facing slope of Basin 1. Drainage reach 2 collects the runoff generated from subarea 2 and subarea 3. This runoff is combined with the runoff in reach 1. The final drainage reach in Basin 1 is reach 3, which collects the runoff generated from subarea 4 and subarea 5. This runoff is combined with the runoff in reach 2. The discharge of runoff from reach 3 will be routed through a storm detention pond to reduce the risk of flooding for the proposed subdivision. Refer to the Routing Diagram for Basin 1 in Appendix "B".

Drainage reach 4 collects the runoff generated from subarea 6, the west facing slope of Basin 2. Drainage reach 5 collects the runoff generated from subarea 7 and subarea 8. This runoff is combined with the runoff in reach 4. The final drainage reach in Basin 2 is reach 6, which collects the runoff generated from subarea 9 and subarea 10. This runoff is combined with the runoff in reach 5. The discharge of runoff from reach 6 will be routed through a storm detention pond to reduce the risk of flooding for the proposed subdivision. Refer to the Routing Diagram for Basin 2 in Appendix "B".

4.5 Storm Runoff Model Results

With the above parameters input into the HEC-1 model, the peak flow rate, the amount of storm runoff, the runoff depths and the hydrograph for each drainage reach were computed. The complete model with input and output information along with the hydrographs for each drainage reach are in Appendix "B". Table No. 4 presents the HEC-1 output summary for the 100 year 24 hour design storm.

Table No. 4

HEC-1 OUTPUT SUMMARY ***Design Storm of 100 year 24 hour***			
BASIN 1			
Reach	Peak Flow q_{peak} cfs	Collection Subarea Runoff inches	Collection Subarea Runoff Volume Q_V ac-ft
1	1.87	0.25	0.286
2	3.54	0.25	0.559
3	5.17	0.25	0.800
BASIN 2			
4	0.38	0.25	0.051
5	1.26	0.25	0.169
6	1.64	0.25	0.253

5.0 Storm Debris Production Model

The Modified Uniform Soil Loss Equation (M.U.S.L.E.) was used to predict the amount of storm debris produced. The M.U.S.L.E. model was chosen over the U.S.L.E. model because its allows the analysis of individual storm events. This advantage of the M.U.S.L.E. allowed the 100 year 24 hour design storm to be modeled to determine the amount of new debris generated. The parameters required by the M.U.S.L.E. are storm runoff, peak flow rate, soil erodibility factor, cover factor, length slope factor, and sediment delivery ratio.

5.1 Storm Runoff (Q_v) & Peak Flow (q_{peak})

The storm runoff (Q_V) in acre feet and the peak runoff (q_{peak}) in cubic feet per second were taken from Table No. 4 Hec-1 Output Summary.

5.2 Soil Erodibility Factor (K)

The soil erodibility factor (K) is controlled by the natural soils in the area. A gradation of the soil was performed by Earthtec Testing & Engineering. With the soil gradation of an on-site test pit (see geotechnical report for test pit location), the soil erodibility factor (K) of 0.08 was found by using the nomograph for determining soil erodibility factor (K). See Figure No. 4 titled Soil Erodibility Factor in Appendix "C". Figure No. 4 also contains the soil gradation of the test pit taken from the geotechnical report.

5.3 Cover Factor (VM)

The cover factor (VM) accounts for the vegetation of the site and their erosion control properties. The standing vegetation influences the cover factor (VM) in proportion of the aerial density and type of root system. This site has the forb type root system, which consists mostly of weeds and trees. A conservative estimate of the amount and height of the vegetation on site was used in determining the cover factor (VM). With the estimations of percent of ground cover of herbaceous plants of 50 percent, with 25 percent of the plants over 2 feet in height, a VM factor of 0.10 was determined. See Figure No. 5 titled Cover Factor in Appendix "C" for the chart used to determine this factor.

5.4 Length Slope Factor (LS)

The length slope factor (LS) relates the topography of the site to the amount of debris produced. The large length slope factors of 119.67 for area 1 and 86.79 for area 2 for this site are in relationship with the steepness of the terrain. The calculation of the length slope factors for both drainage areas are contained in Appendix "C ".

5.5 Sediment Delivery Ratio (SDR)

The sediment delivery ratio relates the amount of debris that is delivered out of the drainage to the amount of debris produced in the drainage. The ratio was given the maximum value of 0.50 which means that half the debris produced is delivered out of the basin. This value was chosen based upon the amount of older debris deposits in the existing channels that have not exited the basins.

5.6 Storm Debris Production Model Results

With the above parameters input into the M.U.S.L.E. model the amounts of debris produced by the design storm and delivered out of the drainage basins were computed. The complete model with input and output information is given in Appendix "C". Table No. 5 presents the M.U.S.L.E. results summary for the 100 year 24 hour design storm.

Table No. 5

M.U.S.L.E. SUMMARY *Design Storm of 100 year 24 hour*					
BASIN 1			**BASIN 2**		
Yield tons	Volume* cubic yards	Volume acre feet	Yield tons	Volume* cubic yards	Volume acre feet
80	59	0.037	20	15	0.009

* Assumed debris density of 100 lbs per cubic foot

6.0 Existing Debris Deposits - Incipient Motion Model

A field study was performed on the drainage basins to determine the amount and location of existing debris. Earthtec Testing & Engineering performed this study and reports that there is a considerable amount of debris that has deposited in the bottom of the basin. ETE states in the letter dated March 01, 2001, in Appendix "E", that for Basin 1" the combined volume of two older debris flow deposits and debris in the drainage channel is between 5,900 and 6,700 cubic yards. The majority of this existing debris in contained in two previous debris flow deposits. The remaining debris ranging in volume between 900 and 1,700 cubic yards consists of course graded material in the drainage channel. This course graded material ranges from pebbles to cobbles with a few boulders." The volume of debris in Basin 2 is approximately 3 times smaller than Basin 1 based upon area of each drainage basin. Based on these finding, an incipient motion model was performed to determine the grain size of debris material that the storm runoff would be able to start in motion and deliver out of the basin. The Shield's Equation was used to model these forces. The Shied's Equation relates the critical shear stress caused by the flow of water on the particle that the particle needs to experience to overcome both its own weight and frictional forces of its surroundings. If the critical shear is met or exceeded the particle will move and continue to move until the shear stress in no longer large enough in magnitude to continue motion. The required information to input into this model are the drainage channel characteristics, a debris sample distribution, and the flow in the channel.

6.1 Drainage Channel Characteristics

A standard cross section for the ravine was established by Earthtec Testing & Engineering. The channel was characterized as triangular shaped with side slopes ranging from 25% to 35%. For this model a cross section having the side slopes of 1.4:1 was used with a Mannings resistance of n=0.040 for mountain streams with gravel, cobble and few boulders in the channel. The drainage channel was broken into three channel reaches that correspond to the same reaches in the storm runoff model. Refer to Table No. 3 for the drainage reach slope information.

6.2 Debris Sample Distribution

Based upon the findings of Earthtec Testing & Engineering, a debris sample distribution was calculated. This distribution was based upon the report from ETE dated March 12, 2001, in Appendix "E". In this report a sample gradation of the existing debris flow deposits in the ravine were given as approximately:

25% fines (silts and clays)

15% sands

60% gravels (50% pebbles, 30% cobbles, 20% boulders)

This gradation was used to calculate a size distribution of the debris deposits. This calculation is contained in Appendix "D". This size distribution was used in the model to determine the critical grain size that the storm runoff flow could displace from the channel and deliver out of the basin.

6.3 Drainage Channel Flows

Using the hydrographs generated from the storm runoff model for the individual reaches in each basin; a range of 4 to 5 different flows that the existing debris experience during the design storm was determined. From these ranges an average flow and time of flow was computed. Refer to the individual hydrographs in Appendix "D" that show the flow ranges, average flows and flow times. These average flows were then used in the model to determine the grain size that could move during the influence of that flow. The time of flow was used to check to see if the debris would be delivered out of the basin or redeposited in the basin.

6.4 Existing Debris Deposits - Incipient Model Results

With the above parameters input into the Shield's Equation/Incipient Motion model the maximum grain size of material that could be delivered out of each drainage reach by the design storm was computed. The depth of flow for each flow range was also found to determine the amount of exposure to the storm runoff the existing debris experiences. The complete model for each reach with the maximum grain size for each average flow is given in Appendix "D". Table No. 6 presents the results summary for the 100-year, 24-hour design storm. The range of grain sizes of the channel reaches for Basin 1 is 0 mm to 312 mm which constitutes 73 percent size fraction of the existing debris in the channel. The range of grain sizes of the channel reaches for Basin 2 is 0 mm to 183 mm which constitutes 68 percent size fraction of the existing debris in the channel.

Table No. 6

INCIPIENT MOTION SUMMARY ***Design Storm of 100 year 24 hour***			
Channel Reach	Minimum Grain Size (mm)	Maximum Grain Size (mm)	Percent of Sample
BASIN 1			
1	0	303	73
2	0	366	75
3	0	269	72
AVERAGE	0	312	73
BASIN 2			
4	0	164	68
5	0	238	70
6	0	148	67
AVERAGE	0	183	68

Based on the findings, the size of particle that could be delivered out of the basin is all of the debris classes smaller than boulders, which consist of cobbles, pebbles, sands, slits and clays.

6.5 Existing Debris Deposits - Exposure to Channel Flow

The incipient motion model also provided the depth of flow in each drainage reach that corresponded to the storm runoff flow. These depths were given to Earthtec Engineering & Testing to determine that amount of exposure to the flow that the existing debris deposits would experience. Table No. 7 gives these drainage reach maximum flows and depths.

Table No. 7

Drainage Reach Flows & Depths		
Basin 1	**Max. Flow (cfs)**	**Depth of Flow (ft)**
Reach 1	1.44	0.350
Reach 2	3.02	0.471
Reach 3	3.84	0.565
Basin 2	**Max. Flow (cfs)**	**Depth of Flow (ft)**
Reach 4	0.28	0.189
Reach 5	0.91	0.298
Reach 6	1.22	0.382

Earthtec Engineering & Testing provided an additional letter dated March 19, 2001, in Appendix "E", that gave an estimation of the exposure to a maximum depth of flow of one half (½) foot. Based on their findings, the storm runoff was determined to affect the existing debris flow deposits only in several small areas that are near the ravine channel. These areas consists of less than one-third ($^1/_3$) of the edge of the toe of each of the deposits. Based upon an addendum letter dated March 22, 2001, in Appendix "E", this volume of affected debris material was estimated as 128 cubic feet for deposit 1 and 40 cubic feet for deposit 2. These estimates did not include additional exposed material due to sloughing or undercutting. To account for these other parameters, a debris exposure of four (4) percent of the total debris flow was used. This produced a debris production from the existing debris flow deposits of more than 25 times the ETE estimates. An additional gradation of the channel debris is also given in which the channel was found to be composed of course graded material. This gradation consists of 5% fines, 25 % sands, 35% pebbles, 24% cobbles and 11% boulders. This gradation was used in determining the amount of debris that could be transported.

6.6 Existing Debris Deposits - Design Totals

Based upon the findings of the grain size available for transport from the incipient motion model and the exposure of the debris to the flow in the channel a debris-flow design for the existing debris deposits in each drainage basin was calculated. These calculations were based upon the percentage of each grain size of the debris deposits, the total volume of debris deposits, the percentage of each grain size category that could be delivered by the 100-year, 24-hour storm event, and the percentage of exposure to the storm runoff that occurs to the debris deposits. These calculation is shown below in Table No. 8 for drainage basin 1 and Table No. 9 for drainage basin 2.

Table No. 8

BASIN 1

DEBRIS DESIGN FLOW CALCULATIONS

EXISTING DEBRIS FLOW DEPOSIT 1 — VOLUME 3900 CY

GRADATION	TOTAL VOLUME		DELIVERABLE		EXPOSURE	
	%	CY	%	CY	%	CY
FINES	25%	975	100%	975	4%	39
SANDS	15%	585	100%	585	4%	23
PEBBLES	30%	1170	100%	1170	4%	47
COBBLES	18%	702	100%	702	4%	28
BOULDERS	12%	468	2%	7	4%	0
	100%	3900		3439		138

EXISTING DEBRIS FLOW DEPOSIT 2 — VOLUME 1100 CY

GRADATION	TOTAL VOLUME		DELIVERABLE		EXPOSURE	
	%	CY	%	CY	%	CY
FINES	25%	275	100%	275	4%	11
SANDS	15%	165	100%	165	4%	7
PEBBLES	30%	330	100%	330	4%	13
COBBLES	18%	198	100%	198	4%	8
BOULDERS	12%	132	2%	2	4%	0
	100%	1100		970		39

EXISTING CHANNEL DEBRIS DEPOSITS — VOLUME 1300 CY

GRADATION	TOTAL VOLUME		DELIVERABLE		EXPOSURE	
	%	CY	%	CY	%	CY
FINES	5%	65	100%	65	100%	65
SANDS	25%	325	100%	325	100%	325
PEBBLES	35%	455	100%	455	100%	455
COBBLES	24%	318	100%	318	100%	318
BOULDERS	11%	137	2%	2	100%	2
	100%	1300		1166		1166

EXISTING DEBRIS DESIGN FLOW TOTAL = 1342 cubic yard; 0.83 ac-ft

Table No. 9

BASIN 2

DEBRIS DESIGN FLOW CALCULATIONS

EXISTING CHANNEL DEBRIS DEPOSITS — VOLUME 450 CY

GRADATION	TOTAL VOLUME		DELIVERABLE		EXPOSURE	
	%	CY	%	CY	%	CY
FINES	5%	23	100%	23	100%	23
SANDS	25%	113	100%	113	100%	113
PEBBLES	35%	158	100%	158	100%	158
COBBLES	24%	110	62%	68	100%	68
BOULDERS	11%	47	0%	0	100%	0
	100%	450		361		361

EXISTING DEBRIS DESIGN FLOW TOTAL = 361 cubic yard; 0.22 ac-ft

7.0 Total Design-Flow Debris Volumes

The total debris flow design volume was predicted by combining the results of the two debris model studies. The M.U.S.L.E. predicted totals of storm created debris totals of 59 cubic yards of material for basin 1 and 15 cubic yards of material for basin 2 was added to the predicted totals from the incipient motion model of 1342 cubic yards of material for basin 1 and 361 cubic yards of material for basin 2. The total debris flow design volume for basin 1 is 1,401 cubic yards or 0.868 ac-ft. The total debris flow design volume for basin 2 is 376 cubic yards or 0.233 ac-ft. Table No. 10 contains the summary of these design flow calculations.

Table No. 10

Total Design-Flow Debris Volumes		
Basin 1	***Debris Volume (cubic yards)***	***Debris Volume (ac-ft)***
M.U.S.L.E.	***59***	***0.037***
Incipient Motion	***1,342***	***0.832***
Total	***1,401***	***0.868***
Basin 2	***Debris Volume (cubic yards)***	***Debris Volume (ac-ft)***
M.U.S.L.E.	***15***	***0.009***
Incipient Motion	***361***	***0.223***
Total	***376***	***0.233***

8.0 Recommended Debris Flow and Storm Runoff Mitigation

The mitigation of the debris flow and storm runoff hazards will be accomplished by the construction of detention/retention basins located at the mouth of the drainage basins.

8.1 Storm Detention and Debris Retention Basin Design

With the predicted quantities of storm runoff and debris delivered out of the drainage basins, the storm detention and debris retention basins could be designed to the following criteria:

(1) Detain the storm runoff of the 100-year, 24-hour storm event and limit the peak flow rate from the detention basin to less than existing conditions.

(2) Retain all of the debris delivered by the 100-year, 24-hour storm event from the drainage area.

(3) Locate the storm detention basin outlet above the level of debris storage to avoid blockage of the outlet.

(4) Design the outlet piping to connect to the existing subdivision storm drain system

8.2 Drainage Basin for Area 1

The storm detention basin for area 1 was designed to the above criteria. A proposed preliminary storm basin grading plan, cross section and basin rating table can be found in the plan titled East Mountain Plat J - Proposed Debris & Storm Drainage Basin For Area 1 sheet 1 in Appendix "F". The storm detention basin consists of an earthen berm at the mouth of the drainage with fill slopes of 4:1. The berm is at elevation 4810, is 12 feet wide, and includes a keyway at depth.

The basin has a depth of 14 feet and has a volume of 1.329 acre feet at full capacity, with 0.868 acre feet of debris retention and 0.461 acre feet of storm water detention. The centerline of the 15" diameter basin outlet is at elevation 4808.00. The drainage basin was modeled in HEC-1with the debris retention removed to determine if the storm water storage and outlet system was adequate to handle the 100 year 24 hour design storm. The basin was found to have the capacity to handle to design storm with a peak stage of 4808.38 feet and a peak flow of 3.00 cfs. This pond has a freeboard of over 1.5 feet with a capacity of 0.34 ac-ft that acts as a factor of safety in containing debris-flows. See Appendix "C" for the HEC-1 model for basin 1 with pond 1 output.

8.3 Drainage Basin for Area 2

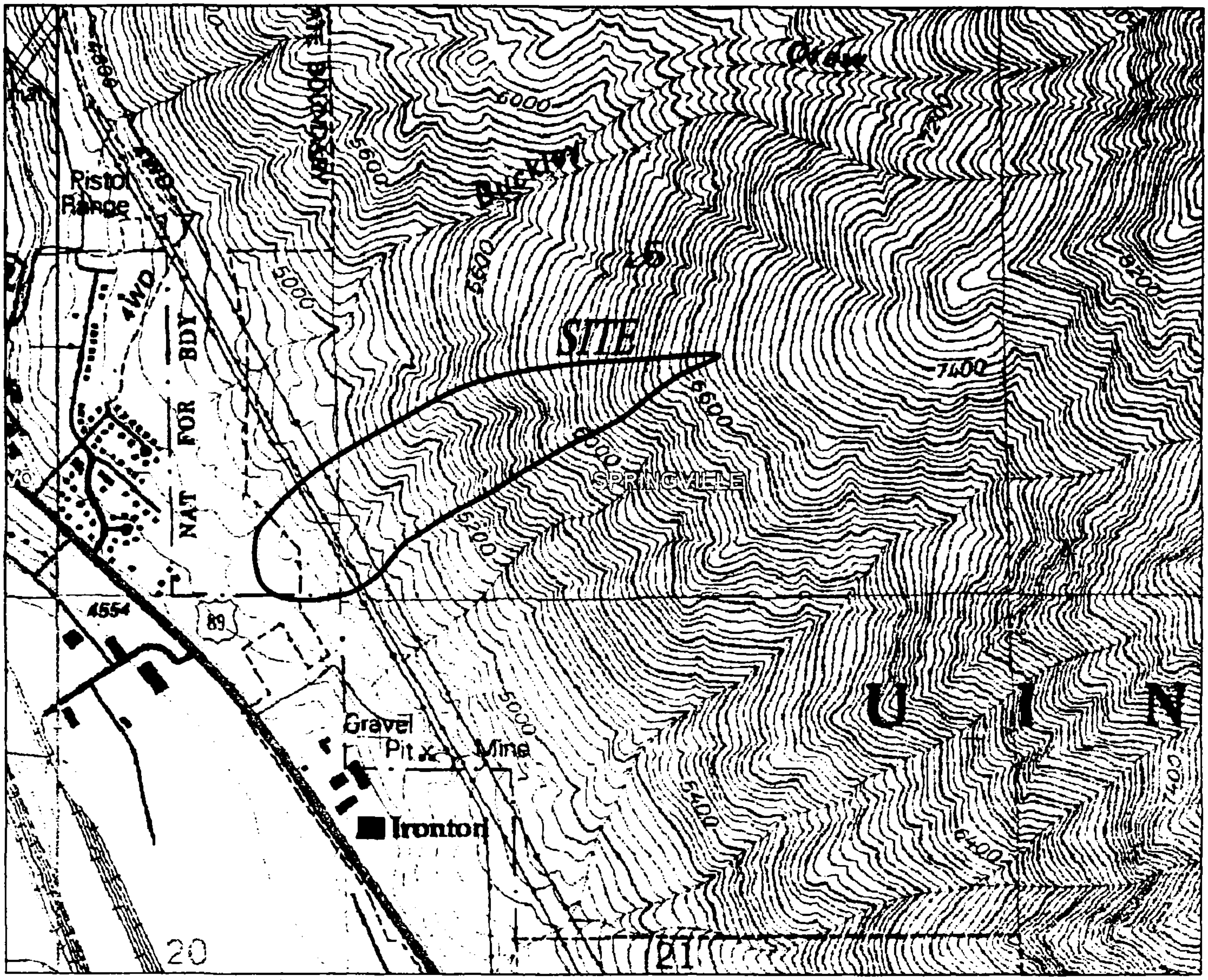
The drainage basin for area 2 was designed to the above criteria. A proposed storm basin grading plan, cross section and basin rating table can be found in the plan titled East Mountain Plat J - Proposed Debris & Storm Drainage Basin For Area 2 sheet 2 in Appendix "F". The basin has been designed with fill slopes of 2:1. The berm is at elevation 4781 , is 6 feet wide and includes a keyway at depth. The cut slopes are 2:1. The basin has a depth of 9 feet and has a volume of 0.329 acre feet at full capacity, with 0.233 acre feet of debris retention and 0.096 acre feet of storm water detention. The centerline of the 15" diameter basin outlet is at elevation 4778.50. The storm detention basin was modeled in HEC-1 with the debris retention removed to determine if the storm water detention and outlet system was adequate to handle the 100 year 24 hour design storm. The basin was found to have the capacity to handle the design storm with a peak stage of 4799.93 feet and a peak flow of 2.00 cfs. This pond has a freeboard of 1 foot with a capacity of 0.080 ac-ft that acts as a factor of safety in containing debris-flows See Appendix "C" for HEC-1 model for basin 2 with pond 2 output.

8.4 Outlet Piping

The outlet piping for both drainage basins in 15 inches in diameter. The outlet piping will be directed to the existing storm drain system at the intersection of Alaska Ave & Mountain View Parkway. The piping will be placed along lot lines in the public utility easements and along roadways where possible. A concept outlet piping system is shown in the plan titled East Mountain Plat J - Proposed Debris & Storm Drainage Basins Piping Plan sheet 3 in Appendix "F".

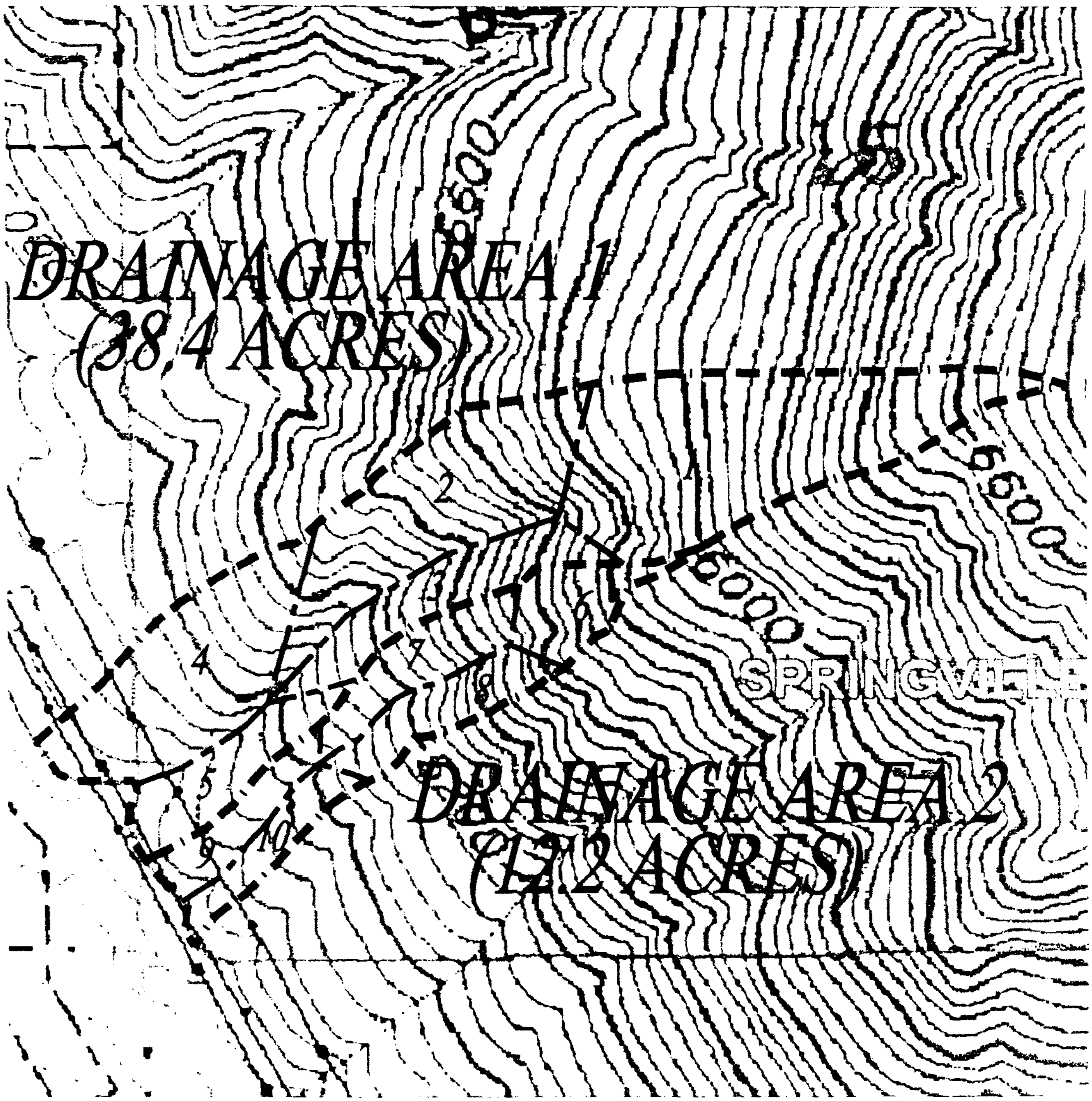
Appendix “A”

Project Site



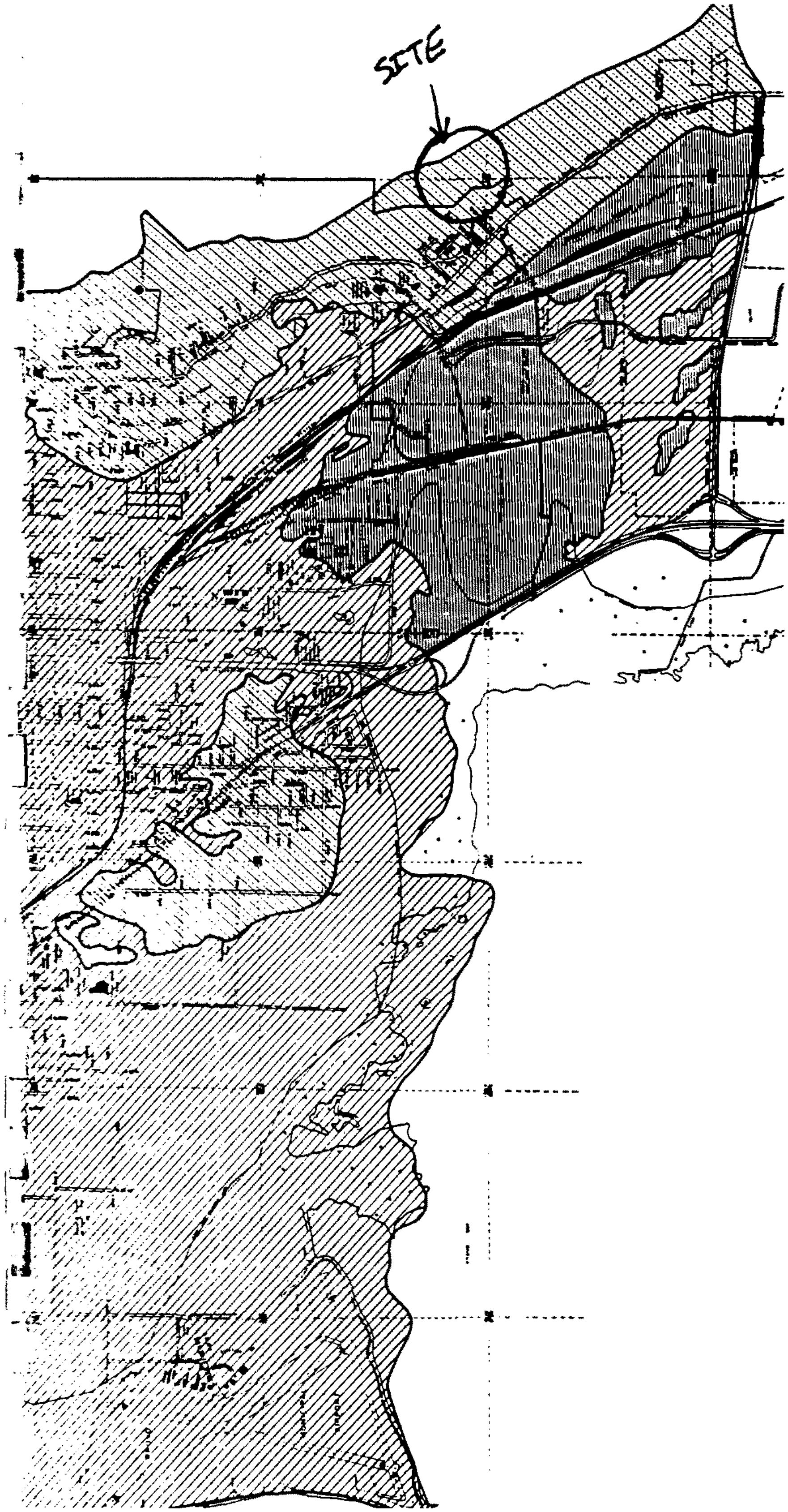
VICINITY MAP

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	VICINITY MAP	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	Figure 1



DRAINAGE SUBAREAS

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	SUBAREAS	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	Figure 2



LEGEND

- HYDROLOGIC SOIL GROUP A
- HYDROLOGIC SOIL GROUP B
- HYDROLOGIC SOIL GROUP C
- HYDROLOGIC SOIL GROUP D

0' 2000' 4000'
SCALE

PROVO CITY
STORM DRAINAGE MASTER PLAN
HYDROLOGIC SOIL GROUPINGS

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	SOIL GROUPINGS	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	Figure 3

Appendix "B"

Storm Runoff Model

HEC-1

ROUTING DIAGRAM

BASIN 1

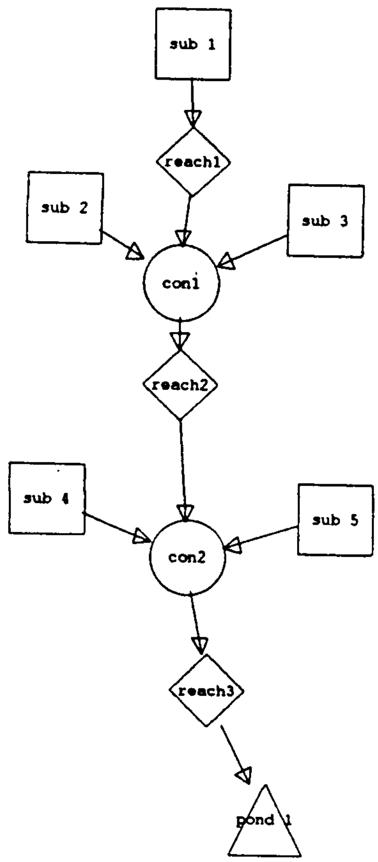


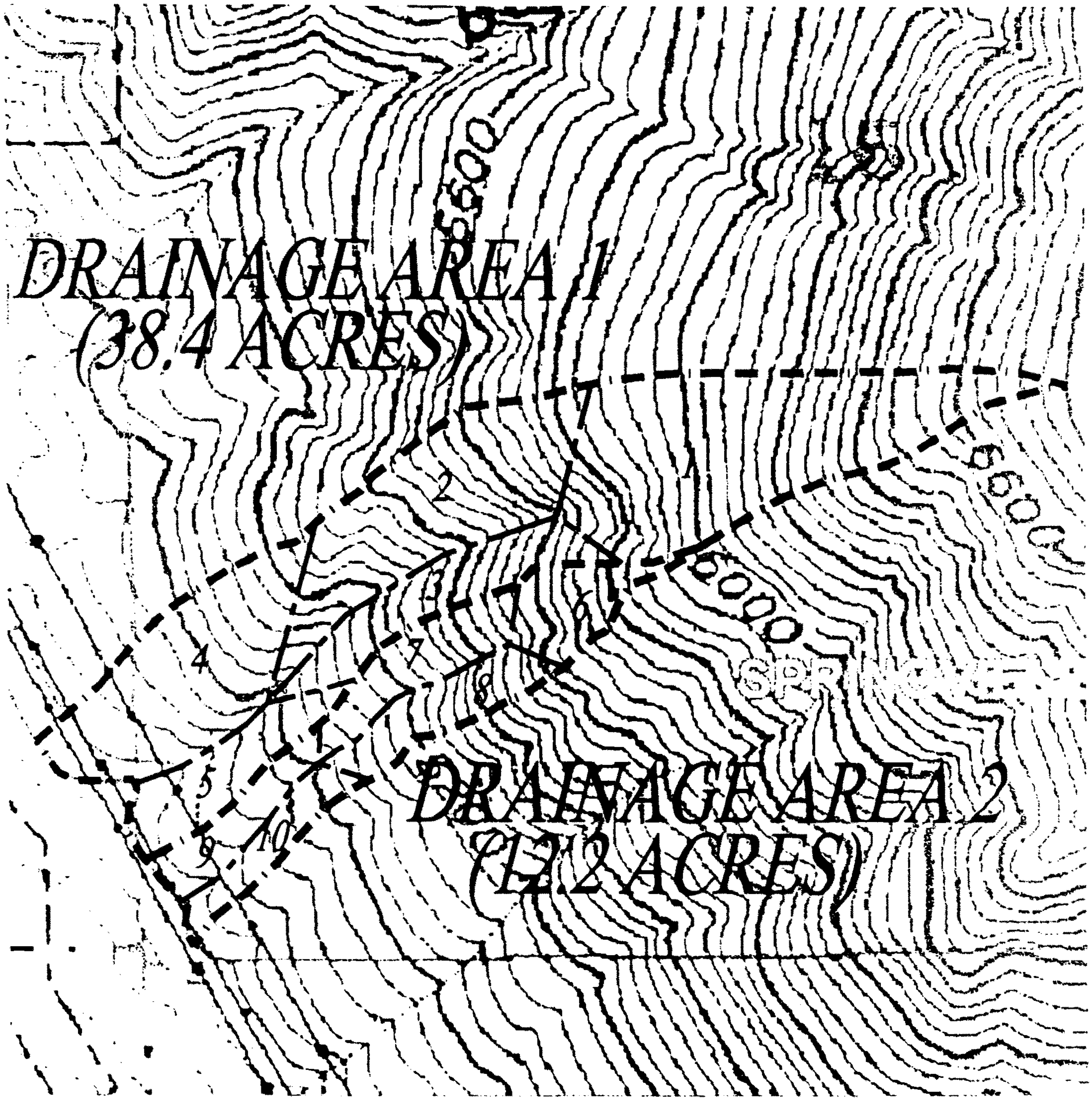
Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.



DRAINAGE SUBAREAS

NORTH

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	SUBAREAS	SOWBY & BERG CONSULTANTS 45 N 490 W AMERICAN FORK UT PHONE (801) 492 1277	B-1

TIME OF CONCENTRATION CALCULATIONS

SUBAREA	Total Area s.f.	Total Area MI^2	OVERLAND FLOW CONDITIONS				FLOW CONDITIONS				TOTAL	TLag
			Length	% slope	Vel	TC'	Length	% slope	Vel	TC"	TC	
BASIN 1												
1	598772	0.02148	300	33.33%	1.45	0.057	1474	70.56%	4.20	0.097	0.155	0.093
2	396400	0.01422	300	60.00%	2.00	0.042	1225	57.14%	4.20	0.081	0.123	0.074
3	173428	0.00622	300	66.67%	2.20	0.038	710	59.15%	4.20	0.047	0.085	0.051
4	362833	0.01301	300	53.33%	1.90	0.044	640	50.00%	4.20	0.042	0.086	0.052
5	141654	0.00508	300	46.67%	1.75	0.048	350	45.71%	4.20	0.023	0.071	0.042

```
□HEC1 S/N: 1343001909        HMVersion: 6.33     Data File: C:\windows\TEMP\~vbh0F61.TMP

*****************************************                                                     ***************************************
*                                       *                                                     *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                     *   U.S. ARMY CORPS OF ENGINEERS      *
*              MAY   1991               *                                                     *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.0.1E             *                                                     *        609 SECOND STREET            *
*                                       *                                                     *      DAVIS, CALIFORNIA 95616        *
*  RUN DATE  03/27/2001  TIME  11:59:21 *                                                     *          (916) 756-1104             *
*                                       *                                                     *                                     *
*****************************************                                                     ***************************************


                                                       X     X  XXXXXXX   XXXXX          X
                                                       X     X  X        X     X        XX
                                                       X     X  X        X               X
                                                       XXXXXXX  XXXX     X       XXXXX   X
                                                       X     X  X        X               X
                                                       X     X  X        X     X         X
                                                       X     X  XXXXXXX   XXXXX         XXX


                                                   ::::::::::::::::::::::::::::::::::::::::::
                                                   ::::::::::::::::::::::::::::::::::::::::::
                                                   :::                                    :::
                                                   :::  Full Microcomputer Implementation :::
                                                   :::                by                  :::
                                                   :::        Haestad Methods, Inc.       :::
                                                   :::                                    :::
                                                   ::::::::::::::::::::::::::::::::::::::::::
                                                   ::::::::::::::::::::::::::::::::::::::::::

                                         37 Brookside Road * Waterbury, Connecticut  06708 * (203) 755-1666


                  THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

                  THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
                  THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
                  NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
                  DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
                  KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

ID  M-13 CONSTRUCTION
IT        3 27JUL00         0            28JUL00         0
IO        0         0

KK  sub 1
KM  west1
KO                                            22
BA  .02148
PB    3.94
IN        6 27JUL00         0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS                48
UD    .053

KK  reach1
KM
KO                                            22
RD    1150      .69    .020                 TRAP         0    1.42

KK  sub 2
KM  south 1
KO                                            22
BA  .01422
PB    3.94
IN        6 27JUL00         0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
```

```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
            PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
            PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
            PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
            PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
            PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
            PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
            PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
            PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
            PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
            PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
            PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
            PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
            PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
            PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
            PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
            PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
            PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
            PC  1.0000 1.00000 1.00000 1.00000 1.00000
            LS              48
            UD    .042

            KK  sub 3
            KM  AREA 1
            KO                                            22
            BA  .00622
            PB    3.94
            IN       6 27JUL00        0
            PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
            PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
            PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
            PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
            PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
            PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
            PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
            PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
            PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
            PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
            PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
            PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
            PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
            PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
            PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
            PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
            PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
            PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
            PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
            PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
            PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
            PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
            PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
            PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
            PC  1.0000 1.00000 1.00000 1.00000 1.00000
            LS              48
            UD    .033
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK   con1
KM
KO                                     22
HC      3

KK  reach2
KM
KO                                     22
RD     540     .62    .020           TRAP       0    1.42

KK   sub 4
KM  AREA 1
KO                                     22
BA  .01301
PB    3.94
IN       6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS               48
UD    .036

KK   sub 5
KM  AREA 1
KO                                     22
BA  .00508
PB    3.94
IN       6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
```

```
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 158            PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
 159            PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
 160            PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
 161            PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
 162            PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
 163            PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
 164            PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
 165            PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
 166            PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
 167            PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
 168            PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
 169            PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
 170            PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
 171            PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
 172            PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
 173            PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
 174            PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
 175            PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
 176            PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
 177            PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
 178            PC  1.0000 1.00000 1.00000 1.00000 1.00000
 179            LS              48
 180            UD   0.034

 181            KK  con2
 182            KM
 183            KO                                      22
 184            HC       3

 185            KK  reach3
 186            KM  TO POND
 187            KO                                      22
 188            RD     300     .38    .020            TRAP       0    1.42

 189            KK  pond 1
 190            KM
 191            KO                                      22
 192            RS             STOR
 193            SA       0   0.052   0.437
 194            SE  4807.6    4808    4810
 195            SL    4808    1.23      .6      .5
 196            SS  4809.5       9     2.8     1.5
 197            ZZ
```

```
HEC1 S/N: 1343001909        HMVersion: 6.33    Data File: C:\windows\TEMP\~vbh0F61.TMP
```

```
*****************************************                          *****************************************
*                                       *                          *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                          *   U.S. ARMY CORPS OF ENGINEERS        *
*             MAY   1991                *                          *   HYDROLOGIC ENGINEERING CENTER       *
*          VERSION 4.0.1E               *                          *        609 SECOND STREET              *
*                                       *                          *     DAVIS, CALIFORNIA 95616           *
*  RUN DATE  03/27/2001  TIME  11:59:21 *                          *         (916) 756-1104                *
*                                       *                          *                                       *
*****************************************                          *****************************************
```

```
  3 IO          OUTPUT CONTROL VARIABLES


                      IPRNT            0  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN            3  MINUTES IN COMPUTATION INTERVAL
                      IDATE      27JUL 0  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ          481  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      28JUL 0  ENDING DATE
                     NDTIME         0000  ENDING TIME
                      ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL    0.05 HOURS
                       TOTAL TIME BASE   24.00 HOURS

       ENGLISH UNITS
            DRAINAGE AREA           SQUARE MILES
            PRECIPITATION DEPTH     INCHES
            LENGTH, ELEVATION       FEET
            FLOW                    CUBIC FEET PER SECOND
            STORAGE VOLUME          ACRE-FEET
            SURFACE AREA            ACRES
            TEMPERATURE             DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 37 KK     *   reach1   *
           *            *
           **************


 39 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            0  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          481  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        0.050  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

 40 RD          MUSKINGUM-CUNGE CHANNEL ROUTING
                          L        1150.  CHANNEL LENGTH
                          S       0.6900  SLOPE
                          N        0.020  CHANNEL ROUGHNESS COEFFICIENT
```

SHAP AP NEL PE
WD 0.00 BOTTOM WIDTH OR DIAMETER
Z 1.42 SIDE SLOPE

***

COMPUTED MUSKINGUM-CUNGE PARAMETERS

ELEMENT	ALPHA	COMPUTATION TIME STEP M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	30.37	1.33	0.60	287.50	1.87	723.60	0.25	16.97
INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL								
MAIN	30.37	1.33	3.00		1.84	723.00	0.25	

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2849E+00 EXCESS=0.0000E+00 OUTFLOW=0.2844E+00 BASIN STORAGE=0.5100E-03 PERCENT ERROR= 0.0

****

HYDROGRAPH AT STATION reach1

****

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
27 JUL 0000	1	0.	*	27 JUL 0603	122	0.	*	27 JUL 1206	243	1.	*	27 JUL 1809	364	0.
27 JUL 0003	2	0.	*	27 JUL 0606	123	0.	*	27 JUL 1209	244	1.	*	27 JUL 1812	365	0.
27 JUL 0006	3	0.	*	27 JUL 0609	124	0.	*	27 JUL 1212	245	1.	*	27 JUL 1815	366	0.
27 JUL 0009	4	0.	*	27 JUL 0612	125	0.	*	27 JUL 1215	246	1.	*	27 JUL 1818	367	0.
27 JUL 0012	5	0.	*	27 JUL 0615	126	0.	*	27 JUL 1218	247	1.	*	27 JUL 1821	368	0.
27 JUL 0015	6	0.	*	27 JUL 0618	127	0.	*	27 JUL 1221	248	1.	*	27 JUL 1824	369	0.
27 JUL 0018	7	0.	*	27 JUL 0621	128	0.	*	27 JUL 1224	249	1.	*	27 JUL 1827	370	0.
27 JUL 0021	8	0.	*	27 JUL 0624	129	0.	*	27 JUL 1227	250	1.	*	27 JUL 1830	371	0.
27 JUL 0024	9	0.	*	27 JUL 0627	130	0.	*	27 JUL 1230	251	1.	*	27 JUL 1833	372	0.
27 JUL 0027	10	0.	*	27 JUL 0630	131	0.	*	27 JUL 1233	252	1.	*	27 JUL 1836	373	0.
27 JUL 0030	11	0.	*	27 JUL 0633	132	0.	*	27 JUL 1236	253	1.	*	27 JUL 1839	374	0.
27 JUL 0033	12	0.	*	27 JUL 0636	133	0.	*	27 JUL 1239	254	1.	*	27 JUL 1842	375	0.
27 JUL 0036	13	0.	*	27 JUL 0639	134	0.	*	27 JUL 1242	255	1.	*	27 JUL 1845	376	0.
27 JUL 0039	14	0.	*	27 JUL 0642	135	0.	*	27 JUL 1245	256	1.	*	27 JUL 1848	377	0.
27 JUL 0042	15	0.	*	27 JUL 0645	136	0.	*	27 JUL 1248	257	1.	*	27 JUL 1851	378	0.
27 JUL 0045	16	0.	*	27 JUL 0648	137	0.	*	27 JUL 1251	258	1.	*	27 JUL 1854	379	0.
27 JUL 0048	17	0.	*	27 JUL 0651	138	0.	*	27 JUL 1254	259	1.	*	27 JUL 1857	380	0.
27 JUL 0051	18	0.	*	27 JUL 0654	139	0.	*	27 JUL 1257	260	1.	*	27 JUL 1900	381	0.
27 JUL 0054	19	0.	*	27 JUL 0657	140	0.	*	27 JUL 1300	261	1.	*	27 JUL 1903	382	0.
27 JUL 0057	20	0.	*	27 JUL 0700	141	0.	*	27 JUL 1303	262	0.	*	27 JUL 1906	383	0.
27 JUL 0100	21	0.	*	27 JUL 0703	142	0.	*	27 JUL 1306	263	0.	*	27 JUL 1909	384	0.
27 JUL 0103	22	0.	*	27 JUL 0706	143	0.	*	27 JUL 1309	264	0.	*	27 JUL 1912	385	0.
27 JUL 0106	23	0.	*	27 JUL 0709	144	0.	*	27 JUL 1312	265	0.	*	27 JUL 1915	386	0.
27 JUL 0109	24	0.	*	27 JUL 0712	145	0.	*	27 JUL 1315	266	0.	*	27 JUL 1918	387	0.
27 JUL 0112	25	0.	*	27 JUL 0715	146	0.	*	27 JUL 1318	267	0.	*	27 JUL 1921	388	0.
27 JUL 0115	26	0.	*	27 JUL 0718	147	0.	*	27 JUL 1321	268	0.	*	27 JUL 1924	389	0.
27 JUL 0118	27	0.	*	27 JUL 0721	148	0.	*	27 JUL 1324	269	0.	*	27 JUL 1927	390	0.

2 L 0	28			JUL										
JL 0	29		*	JUL [illegible]7				27 1330	71	0.		JUL	39[illegible]	
27 JUL 0127	30	0.	*	27 JUL 0730	151	0.	*	27 JUL 1333	272	0.	*	27 JUL 1936	393	0.
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	0.	*	27 JUL 1939	394	0.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	0.	*	27 JUL 1942	395	0.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	0.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	0.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	0.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	0.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	0.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	0.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	0.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	0.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	0.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	0.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	0.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	0.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	0.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	0.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	0.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	0.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	0.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	0.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	0.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	0.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	0.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	0.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	0.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	0.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	0.	*	27 JUL 2057	420	0.
27 JUL 0251	58	0.	*	27 JUL 0854	179	0.	*	27 JUL 1457	300	0.	*	27 JUL 2100	421	0.
27 JUL 0254	59	0.	*	27 JUL 0857	180	0.	*	27 JUL 1500	301	0.	*	27 JUL 2103	422	0.
27 JUL 0257	60	0.	*	27 JUL 0900	181	0.	*	27 JUL 1503	302	0.	*	27 JUL 2106	423	0.
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	0.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	0.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	0.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	0.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	0.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	0.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	0.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	0.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	0.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	0.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	0.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	0.	*	27 JUL 2142	435	0.
27 JUL 0336	73	0.	*	27 JUL 0939	194	0.	*	27 JUL 1542	315	0.	*	27 JUL 2145	436	0.
27 JUL 0339	74	0.	*	27 JUL 0942	195	0.	*	27 JUL 1545	316	0.	*	27 JUL 2148	437	0.
27 JUL 0342	75	0.	*	27 JUL 0945	196	0.	*	27 JUL 1548	317	0.	*	27 JUL 2151	438	0.
27 JUL 0345	76	0.	*	27 JUL 0948	197	0.	*	27 JUL 1551	318	0.	*	27 JUL 2154	439	0.
27 JUL 0348	77	0.	*	27 JUL 0951	198	0.	*	27 JUL 1554	319	0.	*	27 JUL 2157	440	0.
27 JUL 0351	78	0.	*	27 JUL 0954	199	0.	*	27 JUL 1557	320	0.	*	27 JUL 2200	441	0.
27 JUL 0354	79	0.	*	27 JUL 0957	200	0.	*	27 JUL 1600	321	0.	*	27 JUL 2203	442	0.
27 JUL 0357	80	0.	*	27 JUL 1000	201	0.	*	27 JUL 1603	322	0.	*	27 JUL 2206	443	0.
27 JUL 0400	81	0.	*	27 JUL 1003	202	0.	*	27 JUL 1606	323	0.	*	27 JUL 2209	444	0.
27 JUL 0403	82	0.	*	27 JUL 1006	203	0.	*	27 JUL 1609	324	0.	*	27 JUL 2212	445	0.
27 JUL 0406	83	0.	*	27 JUL 1009	204	0.	*	27 JUL 1612	325	0.	*	27 JUL 2215	446	0.
27 JUL 0409	84	0.	*	27 JUL 1012	205	0.	*	27 JUL 1615	326	0.	*	27 JUL 2218	447	0.
27 JUL 0412	85	0.	*	27 JUL 1015	206	0.	*	27 JUL 1618	327	0.	*	27 JUL 2221	448	0.
27 JUL 0415	86	0.	*	27 JUL 1018	207	0.	*	27 JUL 1621	328	0.	*	27 JUL 2224	449	0.
27 JUL 0418	87	0.	*	27 JUL 1021	208	0.	*	27 JUL 1624	329	0.	*	27 JUL 2227	450	0.

2 L 0	88		*				*				*
2 JL 0	89		*	JUL 7		.		27 1630	1	0.		L	451	
27 JUL 0427	90	0.	*	27 JUL 1030	211	0.	*	27 JUL 1633	332	0.	*	27 JUL 2236	453	0.
27 JUL 0430	91	0.	*	27 JUL 1033	212	0.	*	27 JUL 1636	333	0.	*	27 JUL 2239	454	0.
27 JUL 0433	92	0.	*	27 JUL 1036	213	0.	*	27 JUL 1639	334	0.	*	27 JUL 2242	455	0.
27 JUL 0436	93	0.	*	27 JUL 1039	214	0.	*	27 JUL 1642	335	0.	*	27 JUL 2245	456	0.
27 JUL 0439	94	0.	*	27 JUL 1042	215	0.	*	27 JUL 1645	336	0.	*	27 JUL 2248	457	0.
27 JUL 0442	95	0.	*	27 JUL 1045	216	0.	*	27 JUL 1648	337	0.	*	27 JUL 2251	458	0.
27 JUL 0445	96	0.	*	27 JUL 1048	217	0.	*	27 JUL 1651	338	0.	*	27 JUL 2254	459	0.
27 JUL 0448	97	0.	*	27 JUL 1051	218	0.	*	27 JUL 1654	339	0.	*	27 JUL 2257	460	0.
27 JUL 0451	98	0.	*	27 JUL 1054	219	0.	*	27 JUL 1657	340	0.	*	27 JUL 2300	461	0.
27 JUL 0454	99	0.	*	27 JUL 1057	220	0.	*	27 JUL 1700	341	0.	*	27 JUL 2303	462	0.
27 JUL 0457	100	0.	*	27 JUL 1100	221	0.	*	27 JUL 1703	342	0.	*	27 JUL 2306	463	0.
27 JUL 0500	101	0.	*	27 JUL 1103	222	0.	*	27 JUL 1706	343	0.	*	27 JUL 2309	464	0.
27 JUL 0503	102	0.	*	27 JUL 1106	223	0.	*	27 JUL 1709	344	0.	*	27 JUL 2312	465	0.
27 JUL 0506	103	0.	*	27 JUL 1109	224	0.	*	27 JUL 1712	345	0.	*	27 JUL 2315	466	0.
27 JUL 0509	104	0.	*	27 JUL 1112	225	0.	*	27 JUL 1715	346	0.	*	27 JUL 2318	467	0.
27 JUL 0512	105	0.	*	27 JUL 1115	226	0.	*	27 JUL 1718	347	0.	*	27 JUL 2321	468	0.
27 JUL 0515	106	0.	*	27 JUL 1118	227	0.	*	27 JUL 1721	348	0.	*	27 JUL 2324	469	0.
27 JUL 0518	107	0.	*	27 JUL 1121	228	0.	*	27 JUL 1724	349	0.	*	27 JUL 2327	470	0.
27 JUL 0521	108	0.	*	27 JUL 1124	229	0.	*	27 JUL 1727	350	0.	*	27 JUL 2330	471	0.
27 JUL 0524	109	0.	*	27 JUL 1127	230	0.	*	27 JUL 1730	351	0.	*	27 JUL 2333	472	0.
27 JUL 0527	110	0.	*	27 JUL 1130	231	0.	*	27 JUL 1733	352	0.	*	27 JUL 2336	473	0.
27 JUL 0530	111	0.	*	27 JUL 1133	232	0.	*	27 JUL 1736	353	0.	*	27 JUL 2339	474	0.
27 JUL 0533	112	0.	*	27 JUL 1136	233	0.	*	27 JUL 1739	354	0.	*	27 JUL 2342	475	0.
27 JUL 0536	113	0.	*	27 JUL 1139	234	0.	*	27 JUL 1742	355	0.	*	27 JUL 2345	476	0.
27 JUL 0539	114	0.	*	27 JUL 1142	235	0.	*	27 JUL 1745	356	0.	*	27 JUL 2348	477	0.
27 JUL 0542	115	0.	*	27 JUL 1145	236	0.	*	27 JUL 1748	357	0.	*	27 JUL 2351	478	0.
27 JUL 0545	116	0.	*	27 JUL 1148	237	0.	*	27 JUL 1751	358	0.	*	27 JUL 2354	479	0.
27 JUL 0548	117	0.	*	27 JUL 1151	238	0.	*	27 JUL 1754	359	0.	*	27 JUL 2357	480	0.
27 JUL 0551	118	0.	*	27 JUL 1154	239	0.	*	27 JUL 1757	360	0.	*	28 JUL 0000	481	0.
27 JUL 0554	119	0.	*	27 JUL 1157	240	0.	*	27 JUL 1800	361	0.	*			
27 JUL 0557	120	0.	*	27 JUL 1200	241	1.	*	27 JUL 1803	362	0.	*			
27 JUL 0600	121	0.	*	27 JUL 1203	242	2.	*	27 JUL 1806	363	0.	*			
			*				*				*			

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)					
		(CFS)				
2.	12.05		0.	0.	0.	0.
		(INCHES)	0.171	0.248	0.248	0.248
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.02 SQ MI

*** ***

```
          **************
          *            *
111 KK    *   reach2   *
          *            *
          **************
```

113 OU CO[illegible] VA[illegible]LES
IPRN[illegible] 0 [illegible]T C[illegible]OL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
IPNCH 0 PUNCH COMPUTED HYDROGRAPH
IOUT 22 SAVE HYDROGRAPH ON THIS UNIT
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED
ISAV2 481 LAST ORDINATE PUNCHED OR SAVED
TIMINT 0.050 TIME INTERVAL IN HOURS

HYDROGRAPH ROUTING DATA

114 RD *MUSKINGUM-CUNGE CHANNEL ROUTING*
L 540. CHANNEL LENGTH
S 0.6200 SLOPE
N 0.020 CHANNEL ROUGHNESS COEFFICIENT
CA 0.00 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 0.00 BOTTOM WIDTH OR DIAMETER
Z 1.42 SIDE SLOPE

***

COMPUTED MUSKINGUM-CUNGE PARAMETERS

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
			COMPUTATION TIME STEP					
MAIN	28.79	1.33	0.45	270.00	3.54	720.90	0.25	19.05
			INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL					
MAIN	28.79	1.33	3.00		3.46	723.00	0.25	

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5560E+00 EXCESS=0.0000E+00 OUTFLOW=0.5556E+00 BASIN STORAGE=0.4116E-03 PERCENT ERROR= 0.0

****

HYDROGRAPH AT STATION reach2

****

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
27 JUL 0000	1	0.	*	27 JUL 0603	122	0.	*	27 JUL 1206	243	3.	*	27 JUL 1809	364	0.
27 JUL 0003	2	0.	*	27 JUL 0606	123	0.	*	27 JUL 1209	244	2.	*	27 JUL 1812	365	0.
27 JUL 0006	3	0.	*	27 JUL 0609	124	0.	*	27 JUL 1212	245	2.	*	27 JUL 1815	366	0.
27 JUL 0009	4	0.	*	27 JUL 0612	125	0.	*	27 JUL 1215	246	2.	*	27 JUL 1818	367	0.
27 JUL 0012	5	0.	*	27 JUL 0615	126	0.	*	27 JUL 1218	247	2.	*	27 JUL 1821	368	0.
27 JUL 0015	6	0.	*	27 JUL 0618	127	0.	*	27 JUL 1221	248	2.	*	27 JUL 1824	369	0.
27 JUL 0018	7	0.	*	27 JUL 0621	128	0.	*	27 JUL 1224	249	2.	*	27 JUL 1827	370	0.
27 JUL 0021	8	0.	*	27 JUL 0624	129	0.	*	27 JUL 1227	250	1.	*	27 JUL 1830	371	0.
27 JUL 0024	9	0.	*	27 JUL 0627	130	0.	*	27 JUL 1230	251	1.	*	27 JUL 1833	372	0.
27 JUL 0027	10	0.	*	27 JUL 0630	131	0.	*	27 JUL 1233	252	1.	*	27 JUL 1836	373	0.
27 JUL 0030	11	0.	*	27 JUL 0633	132	0.	*	27 JUL 1236	253	1.	*	27 JUL 1839	374	0.
27 JUL 0033	12	0.	*	27 JUL 0636	133	0.	*	27 JUL 1239	254	1.	*	27 JUL 1842	375	0.

[illegible] JUL 0[illegible]	14	[illegible]	*	[illegible] JU[illegible] [illegible]42	[illegible]	[illegible].	[illegible]	27 [illegible] 124[illegible]	[illegible]56	1.	[illegible]	[illegible]	[illegible]	[illegible]
27 JUL 0042	15	0.	*	27 JUL 0645	136	0.	*	27 JUL 1248	257	1.	*	27 JUL 1851	378	0.
27 JUL 0045	16	0.	*	27 JUL 0648	137	0.	*	27 JUL 1251	258	1.	*	27 JUL 1854	379	0.
27 JUL 0048	17	0.	*	27 JUL 0651	138	0.	*	27 JUL 1254	259	1.	*	27 JUL 1857	380	0.
27 JUL 0051	18	0.	*	27 JUL 0654	139	0.	*	27 JUL 1257	260	1.	*	27 JUL 1900	381	0.
27 JUL 0054	19	0.	*	27 JUL 0657	140	0.	*	27 JUL 1300	261	1.	*	27 JUL 1903	382	0.
27 JUL 0057	20	0.	*	27 JUL 0700	141	0.	*	27 JUL 1303	262	1.	*	27 JUL 1906	383	0.
27 JUL 0100	21	0.	*	27 JUL 0703	142	0.	*	27 JUL 1306	263	1.	*	27 JUL 1909	384	0.
27 JUL 0103	22	0.	*	27 JUL 0706	143	0.	*	27 JUL 1309	264	1.	*	27 JUL 1912	385	0.
27 JUL 0106	23	0.	*	27 JUL 0709	144	0.	*	27 JUL 1312	265	1.	*	27 JUL 1915	386	0.
27 JUL 0109	24	0.	*	27 JUL 0712	145	0.	*	27 JUL 1315	266	1.	*	27 JUL 1918	387	0.
27 JUL 0112	25	0.	*	27 JUL 0715	146	0.	*	27 JUL 1318	267	1.	*	27 JUL 1921	388	0.
27 JUL 0115	26	0.	*	27 JUL 0718	147	0.	*	27 JUL 1321	268	1.	*	27 JUL 1924	389	0.
27 JUL 0118	27	0.	*	27 JUL 0721	148	0.	*	27 JUL 1324	269	1.	*	27 JUL 1927	390	0.
27 JUL 0121	28	0.	*	27 JUL 0724	149	0.	*	27 JUL 1327	270	1.	*	27 JUL 1930	391	0.
27 JUL 0124	29	0.	*	27 JUL 0727	150	0.	*	27 JUL 1330	271	1.	*	27 JUL 1933	392	0.
27 JUL 0127	30	0.	*	27 JUL 0730	151	0.	*	27 JUL 1333	272	1.	*	27 JUL 1936	393	0.
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	1.	*	27 JUL 1939	394	0.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	1.	*	27 JUL 1942	395	0.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	1.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	1.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	1.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	1.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	1.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	1.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	1.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	1.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	1.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	1.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	1.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	1.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	1.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	1.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	1.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	1.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	1.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	1.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	1.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	1.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	1.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	1.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	1.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	1.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	1.	*	27 JUL 2057	420	0.
27 JUL 0251	58	0.	*	27 JUL 0854	179	0.	*	27 JUL 1457	300	1.	*	27 JUL 2100	421	0.
27 JUL 0254	59	0.	*	27 JUL 0857	180	0.	*	27 JUL 1500	301	1.	*	27 JUL 2103	422	0.
27 JUL 0257	60	0.	*	27 JUL 0900	181	0.	*	27 JUL 1503	302	1.	*	27 JUL 2106	423	0.
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	1.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	1.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	1.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	1.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	1.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	1.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	1.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	1.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	1.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	1.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	1.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	1.	*	27 JUL 2142	435	0.

[illegible]	[illegible]		[illegible]						[illegible]	[illegible]	
[illegible] JUL 0[illegible]	74	[illegible]	[illegible] JUL [illegible]12	[illegible]	[illegible]	27 [illegible] 154[illegible]	[illegible]6	1.	[illegible]	[illegible]	[illegible]
27 JUL 0342	75	0.	27 JUL 0945	196	0.	27 JUL 1548	317	1.	27 JUL 2151	438	0.
27 JUL 0345	76	0.	27 JUL 0948	197	0.	27 JUL 1551	318	1.	27 JUL 2154	439	0.
27 JUL 0348	77	0.	27 JUL 0951	198	0.	27 JUL 1554	319	1.	27 JUL 2157	440	0.
27 JUL 0351	78	0.	27 JUL 0954	199	0.	27 JUL 1557	320	1.	27 JUL 2200	441	0.
27 JUL 0354	79	0.	27 JUL 0957	200	0.	27 JUL 1600	321	1.	27 JUL 2203	442	0.
27 JUL 0357	80	0.	27 JUL 1000	201	0.	27 JUL 1603	322	1.	27 JUL 2206	443	0.
27 JUL 0400	81	0.	27 JUL 1003	202	0.	27 JUL 1606	323	0.	27 JUL 2209	444	0.
27 JUL 0403	82	0.	27 JUL 1006	203	0.	27 JUL 1609	324	0.	27 JUL 2212	445	0.
27 JUL 0406	83	0.	27 JUL 1009	204	0.	27 JUL 1612	325	0.	27 JUL 2215	446	0.
27 JUL 0409	84	0.	27 JUL 1012	205	0.	27 JUL 1615	326	0.	27 JUL 2218	447	0.
27 JUL 0412	85	0.	27 JUL 1015	206	0.	27 JUL 1618	327	0.	27 JUL 2221	448	0.
27 JUL 0415	86	0.	27 JUL 1018	207	0.	27 JUL 1621	328	0.	27 JUL 2224	449	0.
27 JUL 0418	87	0.	27 JUL 1021	208	0.	27 JUL 1624	329	0.	27 JUL 2227	450	0.
27 JUL 0421	88	0.	27 JUL 1024	209	0.	27 JUL 1627	330	0.	27 JUL 2230	451	0.
27 JUL 0424	89	0.	27 JUL 1027	210	0.	27 JUL 1630	331	0.	27 JUL 2233	452	0.
27 JUL 0427	90	0.	27 JUL 1030	211	0.	27 JUL 1633	332	0.	27 JUL 2236	453	0.
27 JUL 0430	91	0.	27 JUL 1033	212	0.	27 JUL 1636	333	0.	27 JUL 2239	454	0.
27 JUL 0433	92	0.	27 JUL 1036	213	0.	27 JUL 1639	334	0.	27 JUL 2242	455	0.
27 JUL 0436	93	0.	27 JUL 1039	214	0.	27 JUL 1642	335	0.	27 JUL 2245	456	0.
27 JUL 0439	94	0.	27 JUL 1042	215	0.	27 JUL 1645	336	0.	27 JUL 2248	457	0.
27 JUL 0442	95	0.	27 JUL 1045	216	0.	27 JUL 1648	337	0.	27 JUL 2251	458	0.
27 JUL 0445	96	0.	27 JUL 1048	217	0.	27 JUL 1651	338	0.	27 JUL 2254	459	0.
27 JUL 0448	97	0.	27 JUL 1051	218	0.	27 JUL 1654	339	0.	27 JUL 2257	460	0.
27 JUL 0451	98	0.	27 JUL 1054	219	0.	27 JUL 1657	340	0.	27 JUL 2300	461	0.
27 JUL 0454	99	0.	27 JUL 1057	220	0.	27 JUL 1700	341	0.	27 JUL 2303	462	0.
27 JUL 0457	100	0.	27 JUL 1100	221	0.	27 JUL 1703	342	0.	27 JUL 2306	463	0.
27 JUL 0500	101	0.	27 JUL 1103	222	0.	27 JUL 1706	343	0.	27 JUL 2309	464	0.
27 JUL 0503	102	0.	27 JUL 1106	223	0.	27 JUL 1709	344	0.	27 JUL 2312	465	0.
27 JUL 0506	103	0.	27 JUL 1109	224	0.	27 JUL 1712	345	0.	27 JUL 2315	466	0.
27 JUL 0509	104	0.	27 JUL 1112	225	0.	27 JUL 1715	346	0.	27 JUL 2318	467	0.
27 JUL 0512	105	0.	27 JUL 1115	226	0.	27 JUL 1718	347	0.	27 JUL 2321	468	0.
27 JUL 0515	106	0.	27 JUL 1118	227	0.	27 JUL 1721	348	0.	27 JUL 2324	469	0.
27 JUL 0518	107	0.	27 JUL 1121	228	0.	27 JUL 1724	349	0.	27 JUL 2327	470	0.
27 JUL 0521	108	0.	27 JUL 1124	229	0.	27 JUL 1727	350	0.	27 JUL 2330	471	0.
27 JUL 0524	109	0.	27 JUL 1127	230	0.	27 JUL 1730	351	0.	27 JUL 2333	472	0.
27 JUL 0527	110	0.	27 JUL 1130	231	0.	27 JUL 1733	352	0.	27 JUL 2336	473	0.
27 JUL 0530	111	0.	27 JUL 1133	232	0.	27 JUL 1736	353	0.	27 JUL 2339	474	0.
27 JUL 0533	112	0.	27 JUL 1136	233	0.	27 JUL 1739	354	0.	27 JUL 2342	475	0.
27 JUL 0536	113	0.	27 JUL 1139	234	0.	27 JUL 1742	355	0.	27 JUL 2345	476	0.
27 JUL 0539	114	0.	27 JUL 1142	235	0.	27 JUL 1745	356	0.	27 JUL 2348	477	0.
27 JUL 0542	115	0.	27 JUL 1145	236	0.	27 JUL 1748	357	0.	27 JUL 2351	478	0.
27 JUL 0545	116	0.	27 JUL 1148	237	0.	27 JUL 1751	358	0.	27 JUL 2354	479	0.
27 JUL 0548	117	0.	27 JUL 1151	238	0.	27 JUL 1754	359	0.	27 JUL 2357	480	0.
27 JUL 0551	118	0.	27 JUL 1154	239	0.	27 JUL 1757	360	0.	28 JUL 0000	481	0.
27 JUL 0554	119	0.	27 JUL 1157	240	1.	27 JUL 1800	361	0.			
27 JUL 0557	120	0.	27 JUL 1200	241	3.	27 JUL 1803	362	0.			
27 JUL 0600	121	0.	27 JUL 1203	242	3.	27 JUL 1806	363	0.			

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)	(CFS)				
3.	12.05		1.	0.	0.	0.
		(INCHES)	0.171	0.249	0.249	0.249

```
                    CUMULATIVE AREA =     0.04 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


         **************
 185 KK  *    reach3  *
         *            *
         **************
                  TO POND

 187 KO      OUTPUT CONTROL VARIABLES
                   IPRNT          0  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE
                   IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                    IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                   ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                   ISAV2        481  LAST ORDINATE PUNCHED OR SAVED
                  TIMINT      0.050  TIME INTERVAL IN HOURS


             HYDROGRAPH ROUTING DATA

 188 RD      MUSKINGUM-CUNGE CHANNEL ROUTING
                       L       300.  CHANNEL LENGTH
                       S     0.3800  SLOPE
                       N      0.020  CHANNEL ROUGHNESS COEFFICIENT
                      CA       0.00  CONTRIBUTING AREA
                   SHAPE       TRAP  CHANNEL SHAPE
                      WD       0.00  BOTTOM WIDTH OR DIAMETER
                       Z       1.42  SIDE SLOPE

                                                        ***
                             COMPUTED MUSKINGUM-CUNGE PARAMETERS
                                    COMPUTATION TIME STEP
                 ELEMENT    ALPHA      M        DT        DX       PEAK    TIME TO    VOLUME   MAXIMUM
                                                                            PEAK               CELERITY
                                               (MIN)     (FT)     (CFS)    (MIN)      (IN)     (FPS)

                  MAIN      22.54     1.33      0.29    150.00     5.17    720.54     0.25     17.48

                                      INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                  MAIN      22.54     1.33      3.00               4.87    720.00     0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7959E+00 EXCESS=0.0000E+00 OUTFLOW=0.7956E+00 BASIN STORAGE=0.3595E-03 PERCENT ERROR=   0.0


*****************************************************************************************************************************

                                          HYDROGRAPH AT STATION    reach3

*****************************************************************************************************************************
```

D N HI	ORD	FI	*	MON N	(	W	*	DA HRMN	D	FLOW	*	N HI	ORD	F
27 JUL 0000	1	0.	*	27 JUL 0603	122	0.	*	27 JUL 1206	243	4.	*	27 JUL 1809	364	1.
27 JUL 0003	2	0.	*	27 JUL 0606	123	0.	*	27 JUL 1209	244	3.	*	27 JUL 1812	365	1.
27 JUL 0006	3	0.	*	27 JUL 0609	124	0.	*	27 JUL 1212	245	3.	*	27 JUL 1815	366	1.
27 JUL 0009	4	0.	*	27 JUL 0612	125	0.	*	27 JUL 1215	246	2.	*	27 JUL 1818	367	1.
27 JUL 0012	5	0.	*	27 JUL 0615	126	0.	*	27 JUL 1218	247	2.	*	27 JUL 1821	368	1.
27 JUL 0015	6	0.	*	27 JUL 0618	127	0.	*	27 JUL 1221	248	2.	*	27 JUL 1824	369	1.
27 JUL 0018	7	0.	*	27 JUL 0621	128	0.	*	27 JUL 1224	249	2.	*	27 JUL 1827	370	1.
27 JUL 0021	8	0.	*	27 JUL 0624	129	0.	*	27 JUL 1227	250	2.	*	27 JUL 1830	371	1.
27 JUL 0024	9	0.	*	27 JUL 0627	130	0.	*	27 JUL 1230	251	2.	*	27 JUL 1833	372	1.
27 JUL 0027	10	0.	*	27 JUL 0630	131	0.	*	27 JUL 1233	252	2.	*	27 JUL 1836	373	1.
27 JUL 0030	11	0.	*	27 JUL 0633	132	0.	*	27 JUL 1236	253	2.	*	27 JUL 1839	374	1.
27 JUL 0033	12	0.	*	27 JUL 0636	133	0.	*	27 JUL 1239	254	2.	*	27 JUL 1842	375	1.
27 JUL 0036	13	0.	*	27 JUL 0639	134	0.	*	27 JUL 1242	255	2.	*	27 JUL 1845	376	1.
27 JUL 0039	14	0.	*	27 JUL 0642	135	0.	*	27 JUL 1245	256	2.	*	27 JUL 1848	377	1.
27 JUL 0042	15	0.	*	27 JUL 0645	136	0.	*	27 JUL 1248	257	2.	*	27 JUL 1851	378	1.
27 JUL 0045	16	0.	*	27 JUL 0648	137	0.	*	27 JUL 1251	258	1.	*	27 JUL 1854	379	1.
27 JUL 0048	17	0.	*	27 JUL 0651	138	0.	*	27 JUL 1254	259	1.	*	27 JUL 1857	380	1.
27 JUL 0051	18	0.	*	27 JUL 0654	139	0.	*	27 JUL 1257	260	1.	*	27 JUL 1900	381	1.
27 JUL 0054	19	0.	*	27 JUL 0657	140	0.	*	27 JUL 1300	261	1.	*	27 JUL 1903	382	1.
27 JUL 0057	20	0.	*	27 JUL 0700	141	0.	*	27 JUL 1303	262	1.	*	27 JUL 1906	383	1.
27 JUL 0100	21	0.	*	27 JUL 0703	142	0.	*	27 JUL 1306	263	1.	*	27 JUL 1909	384	1.
27 JUL 0103	22	0.	*	27 JUL 0706	143	0.	*	27 JUL 1309	264	1.	*	27 JUL 1912	385	1.
27 JUL 0106	23	0.	*	27 JUL 0709	144	0.	*	27 JUL 1312	265	1.	*	27 JUL 1915	386	1.
27 JUL 0109	24	0.	*	27 JUL 0712	145	0.	*	27 JUL 1315	266	1.	*	27 JUL 1918	387	1.
27 JUL 0112	25	0.	*	27 JUL 0715	146	0.	*	27 JUL 1318	267	1.	*	27 JUL 1921	388	1.
27 JUL 0115	26	0.	*	27 JUL 0718	147	0.	*	27 JUL 1321	268	1.	*	27 JUL 1924	389	1.
27 JUL 0118	27	0.	*	27 JUL 0721	148	0.	*	27 JUL 1324	269	1.	*	27 JUL 1927	390	1.
27 JUL 0121	28	0.	*	27 JUL 0724	149	0.	*	27 JUL 1327	270	1.	*	27 JUL 1930	391	1.
27 JUL 0124	29	0.	*	27 JUL 0727	150	0.	*	27 JUL 1330	271	1.	*	27 JUL 1933	392	1.
27 JUL 0127	30	0.	*	27 JUL 0730	151	0.	*	27 JUL 1333	272	1.	*	27 JUL 1936	393	1.
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	1.	*	27 JUL 1939	394	1.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	1.	*	27 JUL 1942	395	1.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	1.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	1.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	1.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	1.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	1.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	1.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	1.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	1.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	1.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	1.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	1.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	1.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	1.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	1.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	1.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	1.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	1.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	1.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	1.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	1.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	1.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	1.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	1.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	1.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	1.	*	27 JUL 2057	420	0.

2[illegible]	[illegible]													
[illegible]JL 0[illegible]	59		*	JU[illegible] [illegible]7		[illegible]		27 [illegible] 150[illegible]	[illegible]1	1[illegible]		[illegible]	421	
27 JUL 0257	60	0.	*	27 JUL 0900	181	0.	*	27 JUL 1503	302	1.	*	27 JUL 2106	423	0.
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	1.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	1.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	1.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	1.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	1.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	1.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	1.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	1.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	1.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	1.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	1.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	1.	*	27 JUL 2142	435	0.
27 JUL 0336	73	0.	*	27 JUL 0939	194	0.	*	27 JUL 1542	315	1.	*	27 JUL 2145	436	0.
27 JUL 0339	74	0.	*	27 JUL 0942	195	0.	*	27 JUL 1545	316	1.	*	27 JUL 2148	437	0.
27 JUL 0342	75	0.	*	27 JUL 0945	196	0.	*	27 JUL 1548	317	1.	*	27 JUL 2151	438	0.
27 JUL 0345	76	0.	*	27 JUL 0948	197	0.	*	27 JUL 1551	318	1.	*	27 JUL 2154	439	0.
27 JUL 0348	77	0.	*	27 JUL 0951	198	0.	*	27 JUL 1554	319	1.	*	27 JUL 2157	440	0.
27 JUL 0351	78	0.	*	27 JUL 0954	199	0.	*	27 JUL 1557	320	1.	*	27 JUL 2200	441	0.
27 JUL 0354	79	0.	*	27 JUL 0957	200	0.	*	27 JUL 1600	321	1.	*	27 JUL 2203	442	0.
27 JUL 0357	80	0.	*	27 JUL 1000	201	0.	*	27 JUL 1603	322	1.	*	27 JUL 2206	443	0.
27 JUL 0400	81	0.	*	27 JUL 1003	202	0.	*	27 JUL 1606	323	1.	*	27 JUL 2209	444	0.
27 JUL 0403	82	0.	*	27 JUL 1006	203	0.	*	27 JUL 1609	324	1.	*	27 JUL 2212	445	0.
27 JUL 0406	83	0.	*	27 JUL 1009	204	0.	*	27 JUL 1612	325	1.	*	27 JUL 2215	446	0.
27 JUL 0409	84	0.	*	27 JUL 1012	205	0.	*	27 JUL 1615	326	1.	*	27 JUL 2218	447	0.
27 JUL 0412	85	0.	*	27 JUL 1015	206	0.	*	27 JUL 1618	327	1.	*	27 JUL 2221	448	0.
27 JUL 0415	86	0.	*	27 JUL 1018	207	0.	*	27 JUL 1621	328	1.	*	27 JUL 2224	449	0.
27 JUL 0418	87	0.	*	27 JUL 1021	208	0.	*	27 JUL 1624	329	1.	*	27 JUL 2227	450	0.
27 JUL 0421	88	0.	*	27 JUL 1024	209	0.	*	27 JUL 1627	330	1.	*	27 JUL 2230	451	0.
27 JUL 0424	89	0.	*	27 JUL 1027	210	0.	*	27 JUL 1630	331	1.	*	27 JUL 2233	452	0.
27 JUL 0427	90	0.	*	27 JUL 1030	211	0.	*	27 JUL 1633	332	1.	*	27 JUL 2236	453	0.
27 JUL 0430	91	0.	*	27 JUL 1033	212	0.	*	27 JUL 1636	333	1.	*	27 JUL 2239	454	0.
27 JUL 0433	92	0.	*	27 JUL 1036	213	0.	*	27 JUL 1639	334	1.	*	27 JUL 2242	455	0.
27 JUL 0436	93	0.	*	27 JUL 1039	214	0.	*	27 JUL 1642	335	1.	*	27 JUL 2245	456	0.
27 JUL 0439	94	0.	*	27 JUL 1042	215	0.	*	27 JUL 1645	336	1.	*	27 JUL 2248	457	0.
27 JUL 0442	95	0.	*	27 JUL 1045	216	0.	*	27 JUL 1648	337	1.	*	27 JUL 2251	458	0.
27 JUL 0445	96	0.	*	27 JUL 1048	217	0.	*	27 JUL 1651	338	1.	*	27 JUL 2254	459	0.
27 JUL 0448	97	0.	*	27 JUL 1051	218	0.	*	27 JUL 1654	339	1.	*	27 JUL 2257	460	0.
27 JUL 0451	98	0.	*	27 JUL 1054	219	0.	*	27 JUL 1657	340	1.	*	27 JUL 2300	461	0.
27 JUL 0454	99	0.	*	27 JUL 1057	220	0.	*	27 JUL 1700	341	1.	*	27 JUL 2303	462	0.
27 JUL 0457	100	0.	*	27 JUL 1100	221	0.	*	27 JUL 1703	342	1.	*	27 JUL 2306	463	0.
27 JUL 0500	101	0.	*	27 JUL 1103	222	0.	*	27 JUL 1706	343	1.	*	27 JUL 2309	464	0.
27 JUL 0503	102	0.	*	27 JUL 1106	223	0.	*	27 JUL 1709	344	1.	*	27 JUL 2312	465	0.
27 JUL 0506	103	0.	*	27 JUL 1109	224	0.	*	27 JUL 1712	345	1.	*	27 JUL 2315	466	0.
27 JUL 0509	104	0.	*	27 JUL 1112	225	0.	*	27 JUL 1715	346	1.	*	27 JUL 2318	467	0.
27 JUL 0512	105	0.	*	27 JUL 1115	226	0.	*	27 JUL 1718	347	1.	*	27 JUL 2321	468	0.
27 JUL 0515	106	0.	*	27 JUL 1118	227	0.	*	27 JUL 1721	348	1.	*	27 JUL 2324	469	0.
27 JUL 0518	107	0.	*	27 JUL 1121	228	0.	*	27 JUL 1724	349	1.	*	27 JUL 2327	470	0.
27 JUL 0521	108	0.	*	27 JUL 1124	229	0.	*	27 JUL 1727	350	1.	*	27 JUL 2330	471	0.
27 JUL 0524	109	0.	*	27 JUL 1127	230	0.	*	27 JUL 1730	351	1.	*	27 JUL 2333	472	0.
27 JUL 0527	110	0.	*	27 JUL 1130	231	0.	*	27 JUL 1733	352	1.	*	27 JUL 2336	473	0.
27 JUL 0530	111	0.	*	27 JUL 1133	232	0.	*	27 JUL 1736	353	1.	*	27 JUL 2339	474	0.
27 JUL 0533	112	0.	*	27 JUL 1136	233	0.	*	27 JUL 1739	354	1.	*	27 JUL 2342	475	0.
27 JUL 0536	113	0.	*	27 JUL 1139	234	0.	*	27 JUL 1742	355	1.	*	27 JUL 2345	476	0.
27 JUL 0539	114	0.	*	27 JUL 1142	235	0.	*	27 JUL 1745	356	1.	*	27 JUL 2348	477	0.
27 JUL 0542	115	0.	*	27 JUL 1145	236	0.	*	27 JUL 1748	357	1.	*	27 JUL 2351	478	0.
27 JUL 0545	116	0.	*	27 JUL 1148	237	0.	*	27 JUL 1751	358	1.	*	27 JUL 2354	479	0.
27 JUL 0548	117	0.	*	27 JUL 1151	238	0.	*	27 JUL 1754	359	1.	*	27 JUL 2357	480	0.

```
  2     L 0:     11.
  2     L 0!     119                  *       JUL    7                            27     .800    1          1.
 27 JUL 0557  120          0.    *  27 JUL 1200  241          5.    *  27 JUL 1803  362          1.   *
 27 JUL 0600  121          0.    *  27 JUL 1203  242          5.    *  27 JUL 1806  363          1.   *
                                 *                                  *                                 *
*****************************************************************************************************************

 PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR      24.00-HR

   (CFS)       (HR)
                          (CFS)

      5.      12.00                 1.          0.          0.           0.
                       (INCHES)   0.171       0.249       0.249        0.249
                        (AC-FT)     1.          1.          1.           1.

                        CUMULATIVE AREA =     0.06 SQ MI



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 189 KK   *   pond 1   *
          *            *
          **************


 191 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           0  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         481  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.050  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

 192 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC        0.00  INITIAL CONDITION
                           X        0.00 WORKING R AND D COEFFICIENT

 193 SA                 AREA         0.0         0.1         0.4

 194 SE          ELEVATION     4807.60    4808.00    4810.00

 195 SL          LOW-LEVEL OUTLET
                       ELEVL     4808.00  ELEVATION AT CENTER OF OUTLET
                       CAREA        1.23  CROSS-SECTIONAL AREA
                        COQL        0.60  COEFFICIENT
                        EXPL        0.50  EXPONENT OF HEAD
```

CR[illegible]	4[illegible]50	[illegible]LWA[illegible] [illegible]EST [illegible]ATI[illegible]
SPWID	9.00	SPILLWAY WIDTH
COQW	2.80	WEIR COEFFICIENT
EXPW	1.50	EXPONENT OF HEAD

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.01	0.43
ELEVATION	4807.60	4808.00	4810.00

COMPUTED OUTFLOW-ELEVATION DATA

OUTFLOW	0.00	0.00	4.53	4.79	5.08	5.40	5.77	6.19	6.68	7.25
ELEVATION	4807.60	4808.00	4808.59	4808.66	4808.74	4808.83	4808.95	4809.09	4809.27	4809.50
OUTFLOW	7.34	7.52	7.83	8.33	9.04	10.01	11.28	12.89	14.88	17.28
ELEVATION	4809.52	4809.54	4809.57	4809.60	4809.65	4809.70	4809.76	4809.83	4809.91	4810.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.01	0.06	0.07	0.08	0.09	0.11	0.14	0.19	0.25
OUTFLOW	0.00	0.00	4.53	4.79	5.08	5.40	5.77	6.19	6.68	7.25
ELEVATION	4807.60	4808.00	4808.59	4808.66	4808.74	4808.83	4808.95	4809.09	4809.27	4809.50
STORAGE	0.25	0.26	0.27	0.28	0.30	0.32	0.34	0.36	0.40	0.43
OUTFLOW	7.34	7.52	7.83	8.33	9.04	10.01	11.28	12.89	14.88	17.28
ELEVATION	4809.52	4809.54	4809.57	4809.60	4809.65	4809.70	4809.76	4809.83	4809.91	4810.00

****

HYDROGRAPH AT STATION pond 1

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
27	JUL	0000	1	0.	0.0	4807.6	*	27	JUL	0803	162	0.	0.0	4807.6	*	27	JUL	1606	323	1.	0.0	4808.1
27	JUL	0003	2	0.	0.0	4807.6	*	27	JUL	0806	163	0.	0.0	4807.6	*	27	JUL	1609	324	1.	0.0	4808.1
27	JUL	0006	3	0.	0.0	4807.6	*	27	JUL	0809	164	0.	0.0	4807.6	*	27	JUL	1612	325	1.	0.0	4808.1
27	JUL	0009	4	0.	0.0	4807.6	*	27	JUL	0812	165	0.	0.0	4807.6	*	27	JUL	1615	326	1.	0.0	4808.1
27	JUL	0012	5	0.	0.0	4807.6	*	27	JUL	0815	166	0.	0.0	4807.6	*	27	JUL	1618	327	1.	0.0	4808.1
27	JUL	0015	6	0.	0.0	4807.6	*	27	JUL	0818	167	0.	0.0	4807.6	*	27	JUL	1621	328	1.	0.0	4808.1
27	JUL	0018	7	0.	0.0	4807.6	*	27	JUL	0821	168	0.	0.0	4807.6	*	27	JUL	1624	329	1.	0.0	4808.1
27	JUL	0021	8	0.	0.0	4807.6	*	27	JUL	0824	169	0.	0.0	4807.6	*	27	JUL	1627	330	1.	0.0	4808.1
27	JUL	0024	9	0.	0.0	4807.6	*	27	JUL	0827	170	0.	0.0	4807.6	*	27	JUL	1630	331	1.	0.0	4808.1
27	JUL	0027	10	0.	0.0	4807.6	*	27	JUL	0830	171	0.	0.0	4807.6	*	27	JUL	1633	332	1.	0.0	4808.1
27	JUL	0030	11	0.	0.0	4807.6	*	27	JUL	0833	172	0.	0.0	4807.6	*	27	JUL	1636	333	1.	0.0	4808.1
27	JUL	0033	12	0.	0.0	4807.6	*	27	JUL	0836	173	0.	0.0	4807.6	*	27	JUL	1639	334	1.	0.0	4808.1
27	JUL	0036	13	0.	0.0	4807.6	*	27	JUL	0839	174	0.	0.0	4807.6	*	27	JUL	1642	335	1.	0.0	4808.1
27	JUL	0039	14	0.	0.0	4807.6	*	27	JUL	0842	175	0.	0.0	4807.6	*	27	JUL	1645	336	1.	0.0	4808.1
27	JUL	0042	15	0.	0.0	4807.6	*	27	JUL	0845	176	0.	0.0	4807.6	*	27	JUL	1648	337	1.	0.0	4808.1
27	JUL	0045	16	0.	0.0	4807.6	*	27	JUL	0848	177	0.	0.0	4807.6	*	27	JUL	1651	338	1.	0.0	4808.1
27	JUL	0048	17	0.	0.0	4807.6	*	27	JUL	0851	178	0.	0.0	4807.6	*	27	JUL	1654	339	1.	0.0	4808.1
27	JUL	0051	18	0.	0.0	4807.6	*	27	JUL	0854	179	0.	0.0	4807.6	*	27	JUL	1657	340	1.	0.0	4808.1
27	JUL	0054	19	0.	0.0	4807.6	*	27	JUL	0857	180	0.	0.0	4807.6	*	27	JUL	1700	341	1.	0.0	4808.1
27	JUL	0057	20	0.	0.0	4807.6	*	27	JUL	0900	181	0.	0.0	4807.6	*	27	JUL	1703	342	1.	0.0	4808.1

27 [illegible] 010[illegible]	[illegible]	0.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27 [illegible] 010[illegible]	[illegible]	0.	0.0	[illegible]07.6	[illegible]7 JU[illegible] [illegible]06	[illegible]	[illegible]	0	[illegible].6	[illegible]JUL [illegible]	[illegible]3[illegible]	[illegible]	[illegible]
27 JUL 0106	23	0.	0.0	4807.6 *	27 JUL 0909	184	0.	0.0	4807.6 *	27 JUL 1712	345	1.	0.0	4808.1
27 JUL 0109	24	0.	0.0	4807.6 *	27 JUL 0912	185	0.	0.0	4807.6 *	27 JUL 1715	346	1.	0.0	4808.1
27 JUL 0112	25	0.	0.0	4807.6 *	27 JUL 0915	186	0.	0.0	4807.6 *	27 JUL 1718	347	1.	0.0	4808.1
27 JUL 0115	26	0.	0.0	4807.6 *	27 JUL 0918	187	0.	0.0	4807.6 *	27 JUL 1721	348	1.	0.0	4808.1
27 JUL 0118	27	0.	0.0	4807.6 *	27 JUL 0921	188	0.	0.0	4807.6 *	27 JUL 1724	349	1.	0.0	4808.1
27 JUL 0121	28	0.	0.0	4807.6 *	27 JUL 0924	189	0.	0.0	4807.6 *	27 JUL 1727	350	1.	0.0	4808.1
27 JUL 0124	29	0.	0.0	4807.6 *	27 JUL 0927	190	0.	0.0	4807.6 *	27 JUL 1730	351	1.	0.0	4808.1
27 JUL 0127	30	0.	0.0	4807.6 *	27 JUL 0930	191	0.	0.0	4807.6 *	27 JUL 1733	352	1.	0.0	4808.1
27 JUL 0130	31	0.	0.0	4807.6 *	27 JUL 0933	192	0.	0.0	4807.6 *	27 JUL 1736	353	1.	0.0	4808.1
27 JUL 0133	32	0.	0.0	4807.6 *	27 JUL 0936	193	0.	0.0	4807.6 *	27 JUL 1739	354	1.	0.0	4808.1
27 JUL 0136	33	0.	0.0	4807.6 *	27 JUL 0939	194	0.	0.0	4807.6 *	27 JUL 1742	355	1.	0.0	4808.1
27 JUL 0139	34	0.	0.0	4807.6 *	27 JUL 0942	195	0.	0.0	4807.6 *	27 JUL 1745	356	1.	0.0	4808.1
27 JUL 0142	35	0.	0.0	4807.6 *	27 JUL 0945	196	0.	0.0	4807.6 *	27 JUL 1748	357	1.	0.0	4808.1
27 JUL 0145	36	0.	0.0	4807.6 *	27 JUL 0948	197	0.	0.0	4807.6 *	27 JUL 1751	358	1.	0.0	4808.1
27 JUL 0148	37	0.	0.0	4807.6 *	27 JUL 0951	198	0.	0.0	4807.6 *	27 JUL 1754	359	1.	0.0	4808.1
27 JUL 0151	38	0.	0.0	4807.6 *	27 JUL 0954	199	0.	0.0	4807.6 *	27 JUL 1757	360	1.	0.0	4808.1
27 JUL 0154	39	0.	0.0	4807.6 *	27 JUL 0957	200	0.	0.0	4807.6 *	27 JUL 1800	361	1.	0.0	4808.1
27 JUL 0157	40	0.	0.0	4807.6 *	27 JUL 1000	201	0.	0.0	4807.6 *	27 JUL 1803	362	1.	0.0	4808.1
27 JUL 0200	41	0.	0.0	4807.6 *	27 JUL 1003	202	0.	0.0	4807.6 *	27 JUL 1806	363	1.	0.0	4808.1
27 JUL 0203	42	0.	0.0	4807.6 *	27 JUL 1006	203	0.	0.0	4807.6 *	27 JUL 1809	364	1.	0.0	4808.1
27 JUL 0206	43	0.	0.0	4807.6 *	27 JUL 1009	204	0.	0.0	4807.6 *	27 JUL 1812	365	1.	0.0	4808.1
27 JUL 0209	44	0.	0.0	4807.6 *	27 JUL 1012	205	0.	0.0	4807.6 *	27 JUL 1815	366	1.	0.0	4808.1
27 JUL 0212	45	0.	0.0	4807.6 *	27 JUL 1015	206	0.	0.0	4807.6 *	27 JUL 1818	367	1.	0.0	4808.1
27 JUL 0215	46	0.	0.0	4807.6 *	27 JUL 1018	207	0.	0.0	4807.6 *	27 JUL 1821	368	1.	0.0	4808.1
27 JUL 0218	47	0.	0.0	4807.6 *	27 JUL 1021	208	0.	0.0	4807.6 *	27 JUL 1824	369	1.	0.0	4808.1
27 JUL 0221	48	0.	0.0	4807.6 *	27 JUL 1024	209	0.	0.0	4807.6 *	27 JUL 1827	370	1.	0.0	4808.1
27 JUL 0224	49	0.	0.0	4807.6 *	27 JUL 1027	210	0.	0.0	4807.6 *	27 JUL 1830	371	1.	0.0	4808.1
27 JUL 0227	50	0.	0.0	4807.6 *	27 JUL 1030	211	0.	0.0	4807.6 *	27 JUL 1833	372	1.	0.0	4808.1
27 JUL 0230	51	0.	0.0	4807.6 *	27 JUL 1033	212	0.	0.0	4807.6 *	27 JUL 1836	373	1.	0.0	4808.1
27 JUL 0233	52	0.	0.0	4807.6 *	27 JUL 1036	213	0.	0.0	4807.6 *	27 JUL 1839	374	1.	0.0	4808.1
27 JUL 0236	53	0.	0.0	4807.6 *	27 JUL 1039	214	0.	0.0	4807.6 *	27 JUL 1842	375	1.	0.0	4808.1
27 JUL 0239	54	0.	0.0	4807.6 *	27 JUL 1042	215	0.	0.0	4807.6 *	27 JUL 1845	376	1.	0.0	4808.1
27 JUL 0242	55	0.	0.0	4807.6 *	27 JUL 1045	216	0.	0.0	4807.6 *	27 JUL 1848	377	1.	0.0	4808.1
27 JUL 0245	56	0.	0.0	4807.6 *	27 JUL 1048	217	0.	0.0	4807.6 *	27 JUL 1851	378	1.	0.0	4808.1
27 JUL 0248	57	0.	0.0	4807.6 *	27 JUL 1051	218	0.	0.0	4807.6 *	27 JUL 1854	379	1.	0.0	4808.1
27 JUL 0251	58	0.	0.0	4807.6 *	27 JUL 1054	219	0.	0.0	4807.6 *	27 JUL 1857	380	1.	0.0	4808.1
27 JUL 0254	59	0.	0.0	4807.6 *	27 JUL 1057	220	0.	0.0	4807.6 *	27 JUL 1900	381	1.	0.0	4808.1
27 JUL 0257	60	0.	0.0	4807.6 *	27 JUL 1100	221	0.	0.0	4807.6 *	27 JUL 1903	382	1.	0.0	4808.1
27 JUL 0300	61	0.	0.0	4807.6 *	27 JUL 1103	222	0.	0.0	4807.6 *	27 JUL 1906	383	1.	0.0	4808.1
27 JUL 0303	62	0.	0.0	4807.6 *	27 JUL 1106	223	0.	0.0	4807.6 *	27 JUL 1909	384	1.	0.0	4808.1
27 JUL 0306	63	0.	0.0	4807.6 *	27 JUL 1109	224	0.	0.0	4807.6 *	27 JUL 1912	385	1.	0.0	4808.1
27 JUL 0309	64	0.	0.0	4807.6 *	27 JUL 1112	225	0.	0.0	4807.6 *	27 JUL 1915	386	1.	0.0	4808.1
27 JUL 0312	65	0.	0.0	4807.6 *	27 JUL 1115	226	0.	0.0	4807.6 *	27 JUL 1918	387	1.	0.0	4808.1
27 JUL 0315	66	0.	0.0	4807.6 *	27 JUL 1118	227	0.	0.0	4807.6 *	27 JUL 1921	388	1.	0.0	4808.1
27 JUL 0318	67	0.	0.0	4807.6 *	27 JUL 1121	228	0.	0.0	4807.6 *	27 JUL 1924	389	1.	0.0	4808.1
27 JUL 0321	68	0.	0.0	4807.6 *	27 JUL 1124	229	0.	0.0	4807.6 *	27 JUL 1927	390	1.	0.0	4808.1
27 JUL 0324	69	0.	0.0	4807.6 *	27 JUL 1127	230	0.	0.0	4807.6 *	27 JUL 1930	391	1.	0.0	4808.1
27 JUL 0327	70	0.	0.0	4807.6 *	27 JUL 1130	231	0.	0.0	4807.6 *	27 JUL 1933	392	1.	0.0	4808.1
27 JUL 0330	71	0.	0.0	4807.6 *	27 JUL 1133	232	0.	0.0	4807.6 *	27 JUL 1936	393	1.	0.0	4808.1
27 JUL 0333	72	0.	0.0	4807.6 *	27 JUL 1136	233	0.	0.0	4807.6 *	27 JUL 1939	394	1.	0.0	4808.1
27 JUL 0336	73	0.	0.0	4807.6 *	27 JUL 1139	234	0.	0.0	4807.6 *	27 JUL 1942	395	1.	0.0	4808.1
27 JUL 0339	74	0.	0.0	4807.6 *	27 JUL 1142	235	0.	0.0	4807.6 *	27 JUL 1945	396	1.	0.0	4808.1
27 JUL 0342	75	0.	0.0	4807.6 *	27 JUL 1145	236	0.	0.0	4807.6 *	27 JUL 1948	397	1.	0.0	4808.1
27 JUL 0345	76	0.	0.0	4807.6 *	27 JUL 1148	237	0.	0.0	4807.6 *	27 JUL 1951	398	1.	0.0	4808.1
27 JUL 0348	77	0.	0.0	4807.6 *	27 JUL 1151	238	0.	0.0	4807.6 *	27 JUL 1954	399	0.	0.0	4808.1
27 JUL 0351	78	0.	0.0	4807.6 *	27 JUL 1154	239	0.	0.0	4807.6 *	27 JUL 1957	400	0.	0.0	4808.1
27 JUL 0354	79	0.	0.0	4807.6 *	27 JUL 1157	240	0.	0.0	4807.8 *	27 JUL 2000	401	0.	0.0	4808.1
27 JUL 0357	80	0.	0.0	4807.6 *	27 JUL 1200	241	1.	0.0	4808.1 *	27 JUL 2003	402	0.	0.0	4808.1

27 [illegible]	[illegible]	0.	[illegible]	[illegible]			[illegible]									
27 [illegible]	[illegible]	0.	0.0	[illegible]07.6		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27 JUL 0406	83	0.	0.0	4807.6	*	27 JUL 1209	244	3.	0.0	4808.4	*	27 JUL 2012	405	0.	0.0	4808.1
27 JUL 0409	84	0.	0.0	4807.6	*	27 JUL 1212	245	3.	0.0	4808.4	*	27 JUL 2015	406	0.	0.0	4808.1
27 JUL 0412	85	0.	0.0	4807.6	*	27 JUL 1215	246	3.	0.0	4808.4	*	27 JUL 2018	407	0.	0.0	4808.1
27 JUL 0415	86	0.	0.0	4807.6	*	27 JUL 1218	247	3.	0.0	4808.3	*	27 JUL 2021	408	0.	0.0	4808.1
27 JUL 0418	87	0.	0.0	4807.6	*	27 JUL 1221	248	3.	0.0	4808.3	*	27 JUL 2024	409	0.	0.0	4808.1
27 JUL 0421	88	0.	0.0	4807.6	*	27 JUL 1224	249	2.	0.0	4808.3	*	27 JUL 2027	410	0.	0.0	4808.1
27 JUL 0424	89	0.	0.0	4807.6	*	27 JUL 1227	250	2.	0.0	4808.3	*	27 JUL 2030	411	0.	0.0	4808.1
27 JUL 0427	90	0.	0.0	4807.6	*	27 JUL 1230	251	2.	0.0	4808.3	*	27 JUL 2033	412	0.	0.0	4808.1
27 JUL 0430	91	0.	0.0	4807.6	*	27 JUL 1233	252	2.	0.0	4808.3	*	27 JUL 2036	413	0.	0.0	4808.1
27 JUL 0433	92	0.	0.0	4807.6	*	27 JUL 1236	253	2.	0.0	4808.3	*	27 JUL 2039	414	0.	0.0	4808.1
27 JUL 0436	93	0.	0.0	4807.6	*	27 JUL 1239	254	2.	0.0	4808.2	*	27 JUL 2042	415	0.	0.0	4808.1
27 JUL 0439	94	0.	0.0	4807.6	*	27 JUL 1242	255	2.	0.0	4808.2	*	27 JUL 2045	416	0.	0.0	4808.1
27 JUL 0442	95	0.	0.0	4807.6	*	27 JUL 1245	256	2.	0.0	4808.2	*	27 JUL 2048	417	0.	0.0	4808.1
27 JUL 0445	96	0.	0.0	4807.6	*	27 JUL 1248	257	2.	0.0	4808.2	*	27 JUL 2051	418	0.	0.0	4808.1
27 JUL 0448	97	0.	0.0	4807.6	*	27 JUL 1251	258	2.	0.0	4808.2	*	27 JUL 2054	419	0.	0.0	4808.1
27 JUL 0451	98	0.	0.0	4807.6	*	27 JUL 1254	259	2.	0.0	4808.2	*	27 JUL 2057	420	0.	0.0	4808.1
27 JUL 0454	99	0.	0.0	4807.6	*	27 JUL 1257	260	2.	0.0	4808.2	*	27 JUL 2100	421	0.	0.0	4808.1
27 JUL 0457	100	0.	0.0	4807.6	*	27 JUL 1300	261	2.	0.0	4808.2	*	27 JUL 2103	422	0.	0.0	4808.1
27 JUL 0500	101	0.	0.0	4807.6	*	27 JUL 1303	262	1.	0.0	4808.2	*	27 JUL 2106	423	0.	0.0	4808.1
27 JUL 0503	102	0.	0.0	4807.6	*	27 JUL 1306	263	1.	0.0	4808.2	*	27 JUL 2109	424	0.	0.0	4808.1
27 JUL 0506	103	0.	0.0	4807.6	*	27 JUL 1309	264	1.	0.0	4808.2	*	27 JUL 2112	425	0.	0.0	4808.1
27 JUL 0509	104	0.	0.0	4807.6	*	27 JUL 1312	265	1.	0.0	4808.2	*	27 JUL 2115	426	0.	0.0	4808.1
27 JUL 0512	105	0.	0.0	4807.6	*	27 JUL 1315	266	1.	0.0	4808.2	*	27 JUL 2118	427	0.	0.0	4808.1
27 JUL 0515	106	0.	0.0	4807.6	*	27 JUL 1318	267	1.	0.0	4808.2	*	27 JUL 2121	428	0.	0.0	4808.1
27 JUL 0518	107	0.	0.0	4807.6	*	27 JUL 1321	268	1.	0.0	4808.2	*	27 JUL 2124	429	0.	0.0	4808.1
27 JUL 0521	108	0.	0.0	4807.6	*	27 JUL 1324	269	1.	0.0	4808.2	*	27 JUL 2127	430	0.	0.0	4808.1
27 JUL 0524	109	0.	0.0	4807.6	*	27 JUL 1327	270	1.	0.0	4808.2	*	27 JUL 2130	431	0.	0.0	4808.1
27 JUL 0527	110	0.	0.0	4807.6	*	27 JUL 1330	271	1.	0.0	4808.2	*	27 JUL 2133	432	0.	0.0	4808.1
27 JUL 0530	111	0.	0.0	4807.6	*	27 JUL 1333	272	1.	0.0	4808.2	*	27 JUL 2136	433	0.	0.0	4808.1
27 JUL 0533	112	0.	0.0	4807.6	*	27 JUL 1336	273	1.	0.0	4808.2	*	27 JUL 2139	434	0.	0.0	4808.1
27 JUL 0536	113	0.	0.0	4807.6	*	27 JUL 1339	274	1.	0.0	4808.2	*	27 JUL 2142	435	0.	0.0	4808.1
27 JUL 0539	114	0.	0.0	4807.6	*	27 JUL 1342	275	1.	0.0	4808.1	*	27 JUL 2145	436	0.	0.0	4808.1
27 JUL 0542	115	0.	0.0	4807.6	*	27 JUL 1345	276	1.	0.0	4808.1	*	27 JUL 2148	437	0.	0.0	4808.1
27 JUL 0545	116	0.	0.0	4807.6	*	27 JUL 1348	277	1.	0.0	4808.1	*	27 JUL 2151	438	0.	0.0	4808.1
27 JUL 0548	117	0.	0.0	4807.6	*	27 JUL 1351	278	1.	0.0	4808.1	*	27 JUL 2154	439	0.	0.0	4808.1
27 JUL 0551	118	0.	0.0	4807.6	*	27 JUL 1354	279	1.	0.0	4808.1	*	27 JUL 2157	440	0.	0.0	4808.1
27 JUL 0554	119	0.	0.0	4807.6	*	27 JUL 1357	280	1.	0.0	4808.1	*	27 JUL 2200	441	0.	0.0	4808.1
27 JUL 0557	120	0.	0.0	4807.6	*	27 JUL 1400	281	1.	0.0	4808.1	*	27 JUL 2203	442	0.	0.0	4808.1
27 JUL 0600	121	0.	0.0	4807.6	*	27 JUL 1403	282	1.	0.0	4808.1	*	27 JUL 2206	443	0.	0.0	4808.1
27 JUL 0603	122	0.	0.0	4807.6	*	27 JUL 1406	283	1.	0.0	4808.1	*	27 JUL 2209	444	0.	0.0	4808.1
27 JUL 0606	123	0.	0.0	4807.6	*	27 JUL 1409	284	1.	0.0	4808.1	*	27 JUL 2212	445	0.	0.0	4808.1
27 JUL 0609	124	0.	0.0	4807.6	*	27 JUL 1412	285	1.	0.0	4808.1	*	27 JUL 2215	446	0.	0.0	4808.1
27 JUL 0612	125	0.	0.0	4807.6	*	27 JUL 1415	286	1.	0.0	4808.1	*	27 JUL 2218	447	0.	0.0	4808.1
27 JUL 0615	126	0.	0.0	4807.6	*	27 JUL 1418	287	1.	0.0	4808.1	*	27 JUL 2221	448	0.	0.0	4808.1
27 JUL 0618	127	0.	0.0	4807.6	*	27 JUL 1421	288	1.	0.0	4808.1	*	27 JUL 2224	449	0.	0.0	4808.1
27 JUL 0621	128	0.	0.0	4807.6	*	27 JUL 1424	289	1.	0.0	4808.1	*	27 JUL 2227	450	0.	0.0	4808.1
27 JUL 0624	129	0.	0.0	4807.6	*	27 JUL 1427	290	1.	0.0	4808.1	*	27 JUL 2230	451	0.	0.0	4808.1
27 JUL 0627	130	0.	0.0	4807.6	*	27 JUL 1430	291	1.	0.0	4808.1	*	27 JUL 2233	452	0.	0.0	4808.1
27 JUL 0630	131	0.	0.0	4807.6	*	27 JUL 1433	292	1.	0.0	4808.1	*	27 JUL 2236	453	0.	0.0	4808.1
27 JUL 0633	132	0.	0.0	4807.6	*	27 JUL 1436	293	1.	0.0	4808.1	*	27 JUL 2239	454	0.	0.0	4808.1
27 JUL 0636	133	0.	0.0	4807.6	*	27 JUL 1439	294	1.	0.0	4808.1	*	27 JUL 2242	455	0.	0.0	4808.1
27 JUL 0639	134	0.	0.0	4807.6	*	27 JUL 1442	295	1.	0.0	4808.1	*	27 JUL 2245	456	0.	0.0	4808.1
27 JUL 0642	135	0.	0.0	4807.6	*	27 JUL 1445	296	1.	0.0	4808.1	*	27 JUL 2248	457	0.	0.0	4808.1
27 JUL 0645	136	0.	0.0	4807.6	*	27 JUL 1448	297	1.	0.0	4808.1	*	27 JUL 2251	458	0.	0.0	4808.1
27 JUL 0648	137	0.	0.0	4807.6	*	27 JUL 1451	298	1.	0.0	4808.1	*	27 JUL 2254	459	0.	0.0	4808.1
27 JUL 0651	138	0.	0.0	4807.6	*	27 JUL 1454	299	1.	0.0	4808.1	*	27 JUL 2257	460	0.	0.0	4808.1
27 JUL 0654	139	0.	0.0	4807.6	*	27 JUL 1457	300	1.	0.0	4808.1	*	27 JUL 2300	461	0.	0.0	4808.1
27 JUL 0657	140	0.	0.0	4807.6	*	27 JUL 1500	301	1.	0.0	4808.1	*	27 JUL 2303	462	0.	0.0	4808.1

27		070[illegible]		[illegible]																		
27		070[illegible]		[illegible].	0.0	[illegible]7.6		[illegible]7	JU[illegible]	[illegible]06			0	[illegible].1			[illegible]	[illegible]				
27	JUL	0706	143	0.	0.0	4807.6	*	27	JUL	1509	304	1.	0.0	4808.1	*	27	JUL	2312	465	0.	0.0	4808.1
27	JUL	0709	144	0.	0.0	4807.6	*	27	JUL	1512	305	1.	0.0	4808.1	*	27	JUL	2315	466	0.	0.0	4808.1
27	JUL	0712	145	0.	0.0	4807.6	*	27	JUL	1515	306	1.	0.0	4808.1	*	27	JUL	2318	467	0.	0.0	4808.1
27	JUL	0715	146	0.	0.0	4807.6	*	27	JUL	1518	307	1.	0.0	4808.1	*	27	JUL	2321	468	0.	0.0	4808.1
27	JUL	0718	147	0.	0.0	4807.6	*	27	JUL	1521	308	1.	0.0	4808.1	*	27	JUL	2324	469	0.	0.0	4808.1
27	JUL	0721	148	0.	0.0	4807.6	*	27	JUL	1524	309	1.	0.0	4808.1	*	27	JUL	2327	470	0.	0.0	4808.1
27	JUL	0724	149	0.	0.0	4807.6	*	27	JUL	1527	310	1.	0.0	4808.1	*	27	JUL	2330	471	0.	0.0	4808.1
27	JUL	0727	150	0.	0.0	4807.6	*	27	JUL	1530	311	1.	0.0	4808.1	*	27	JUL	2333	472	0.	0.0	4808.1
27	JUL	0730	151	0.	0.0	4807.6	*	27	JUL	1533	312	1.	0.0	4808.1	*	27	JUL	2336	473	0.	0.0	4808.1
27	JUL	0733	152	0.	0.0	4807.6	*	27	JUL	1536	313	1.	0.0	4808.1	*	27	JUL	2339	474	0.	0.0	4808.1
27	JUL	0736	153	0.	0.0	4807.6	*	27	JUL	1539	314	1.	0.0	4808.1	*	27	JUL	2342	475	0.	0.0	4808.1
27	JUL	0739	154	0.	0.0	4807.6	*	27	JUL	1542	315	1.	0.0	4808.1	*	27	JUL	2345	476	0.	0.0	4808.1
27	JUL	0742	155	0.	0.0	4807.6	*	27	JUL	1545	316	1.	0.0	4808.1	*	27	JUL	2348	477	0.	0.0	4808.1
27	JUL	0745	156	0.	0.0	4807.6	*	27	JUL	1548	317	1.	0.0	4808.1	*	27	JUL	2351	478	0.	0.0	4808.1
27	JUL	0748	157	0.	0.0	4807.6	*	27	JUL	1551	318	1.	0.0	4808.1	*	27	JUL	2354	479	0.	0.0	4808.1
27	JUL	0751	158	0.	0.0	4807.6	*	27	JUL	1554	319	1.	0.0	4808.1	*	27	JUL	2357	480	0.	0.0	4808.1
27	JUL	0754	159	0.	0.0	4807.6	*	27	JUL	1557	320	1.	0.0	4808.1	*	28	JUL	0000	481	0.	0.0	4808.1
27	JUL	0757	160	0.	0.0	4807.6	*	27	JUL	1600	321	1.	0.0	4808.1	*							
27	JUL	0800	161	0.	0.0	4807.6	*	27	JUL	1603	322	1.	0.0	4808.1	*							
							*								*							

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)					
		(CFS)				
3.	12.15		1.	0.	0.	0.
		(INCHES)	0.168	0.245	0.245	0.245
		(AC-FT)	1.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
0.	12.15	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
4808.38	12.15	4808.11	4807.85	4807.85	4807.86

CUMULATIVE AREA = 0.06 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			

HY[illegible]RAPH

	sub 1	2.	12.05	0.	0.	0.	0.02
ROUTED TO							
	reach1	2.	12.05	0.	0.	0.	0.02
HYDROGRAPH AT	con1	3.	12.00	1.	0.	0.	0.04
ROUTED TO	sub 2	1.	12.00	0.	0.	0.	0.01
HYDROGRAPH AT	reach2	3.	12.05	1.	0.	0.	0.04
HYDROGRAPH AT	sub 3	1.	12.00	0.	0.	0.	0.01
3 COMBINED AT	sub 4	1.	12.00	0.	0.	0.	0.01
HYDROGRAPH AT							
	sub 5	1.	12.00	0.	0.	0.	0.01
3 COMBINED AT							
	con2	5.	12.00	1.	0.	0.	0.06
ROUTED TO							
	reach3	5.	12.00	1.	0.	0.	0.06
ROUTED TO							
	pond 1	3.	12.15	1.	0.	0.	0.06

4808.38 12.15

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
reach1	MANE	0.60	1.87	723.60	0.25	3.00	1.84	723.00	0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2849E+00 EXCESS=0.0000E+00 OUTFLOW=0.2844E+00 BASIN STORAGE=0.5100E-03 PERCENT ERROR= 0.0

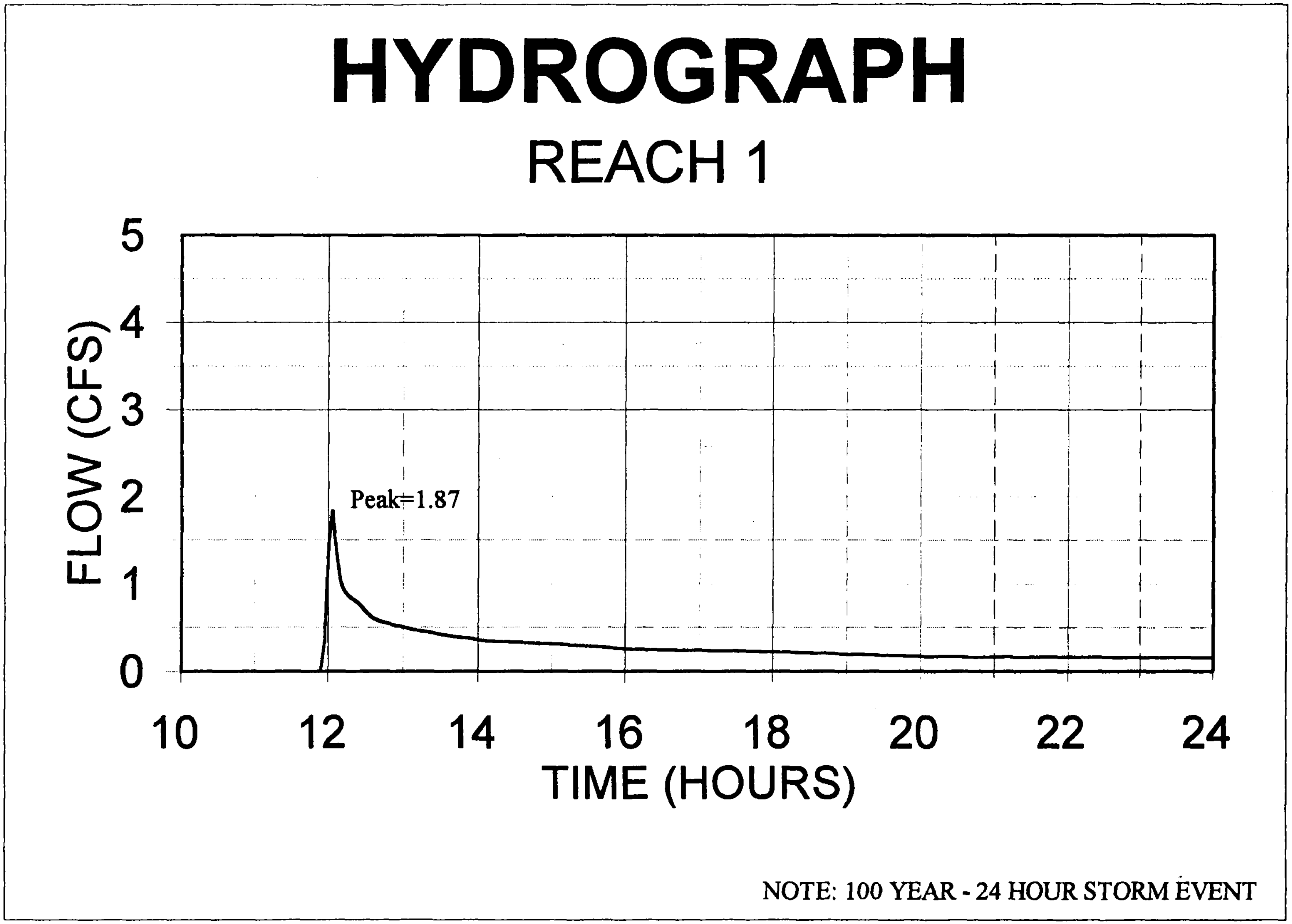
reach2	MANE	0.45	3.54	720.90	0.25	3.00	3.46	723.00	0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5560E+00 EXCESS=0.0000E+00 OUTFLOW=0.5556E+00 BASIN STORAGE=0.4116E-03 PERCENT ERROR= 0.0

reach3	MANE	0.29	5.17	720.54	0.25	3.00	4.87	720.00	0.25

:ONT TY ; .RY ; FT) FLOW /959 EXC 0.0 +00 'LOW: 756E BASI 'ORA(35;

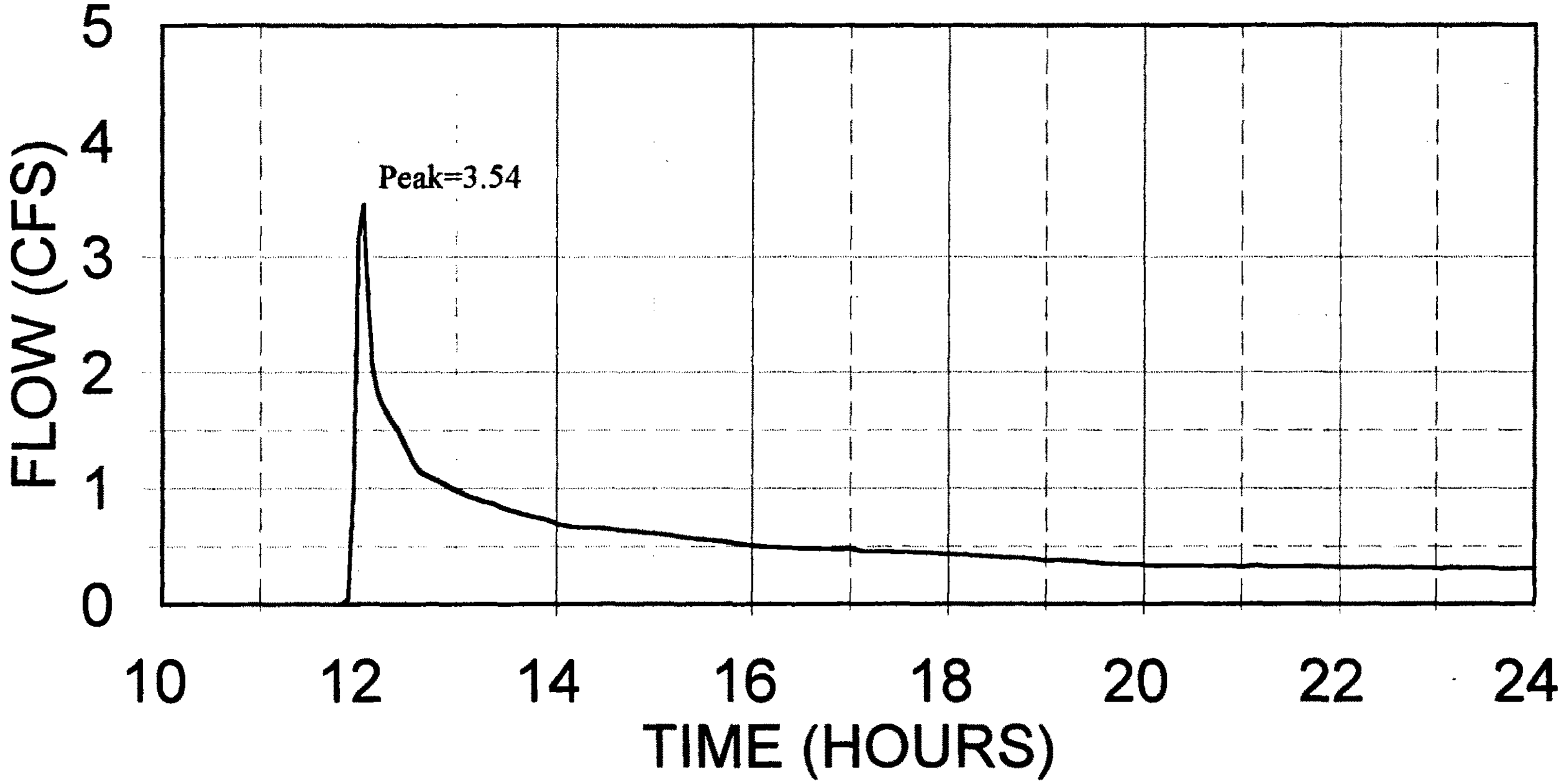
*** NORMAL END OF HEC-1 ***



HYDROGRAPH
REACH 1
FLOW (CFS)
5
4
3
2
1
0
Peak=1.87
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT

HYDROGRAPH

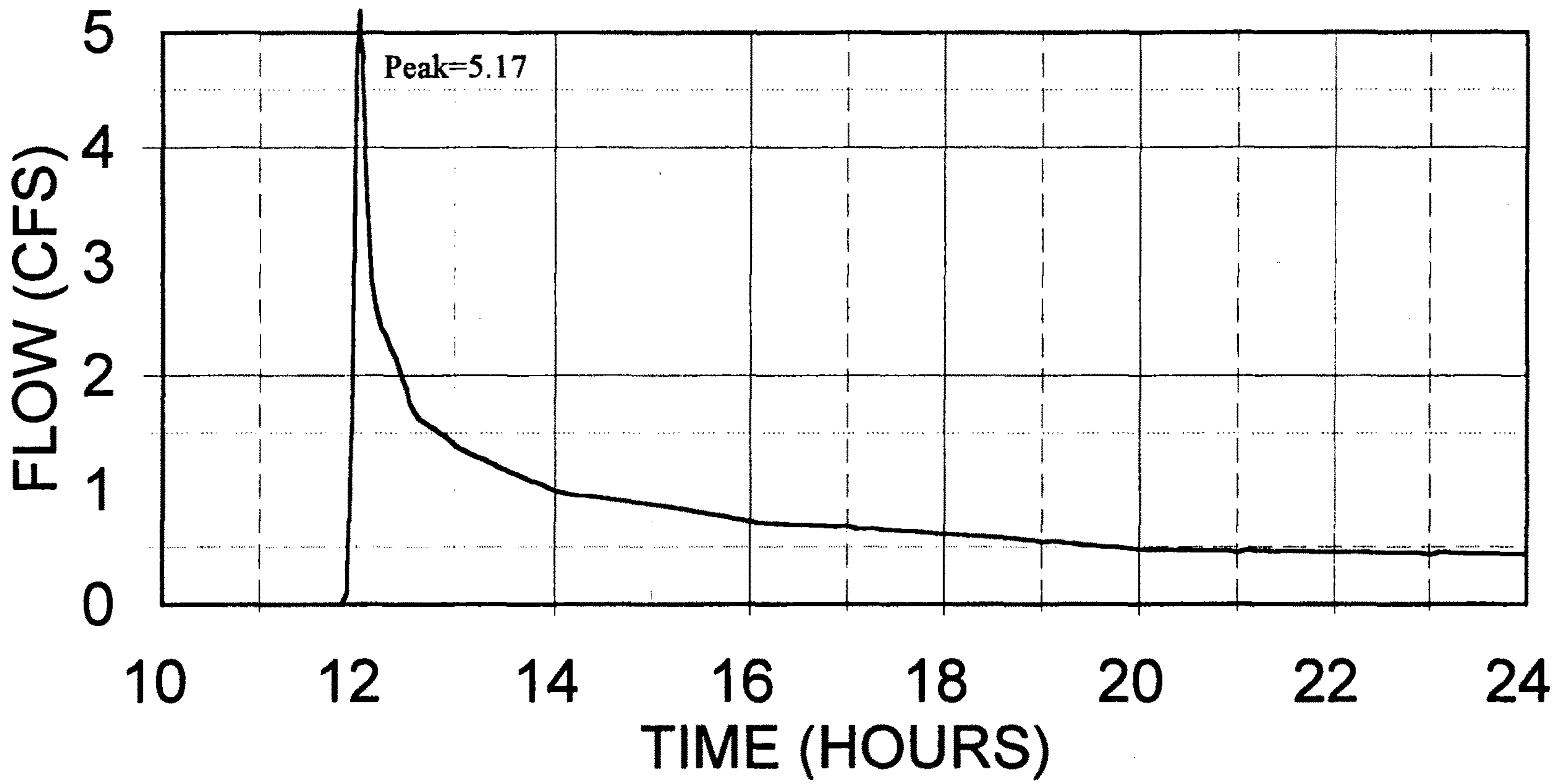
REACH 2



NOTE: 100 YEAR - 24 HOUR STORM EVENT

HYDROGRAPH

REACH 3



NOTE: 100 YEAR - 24 HOUR STORM EVENT

HEC-1

ROUTING DIAGRAM

BASIN 2

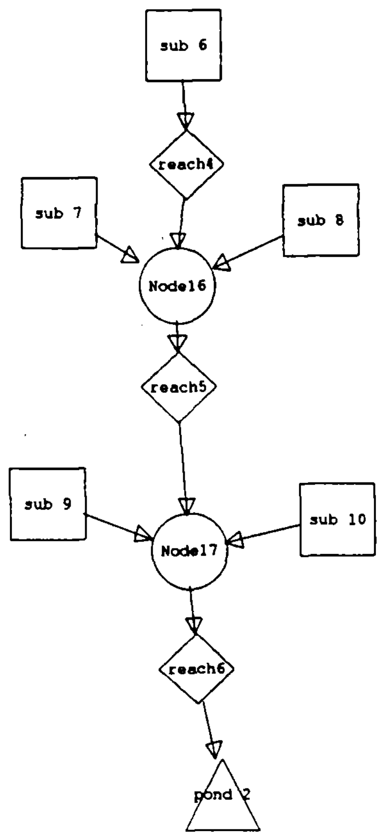


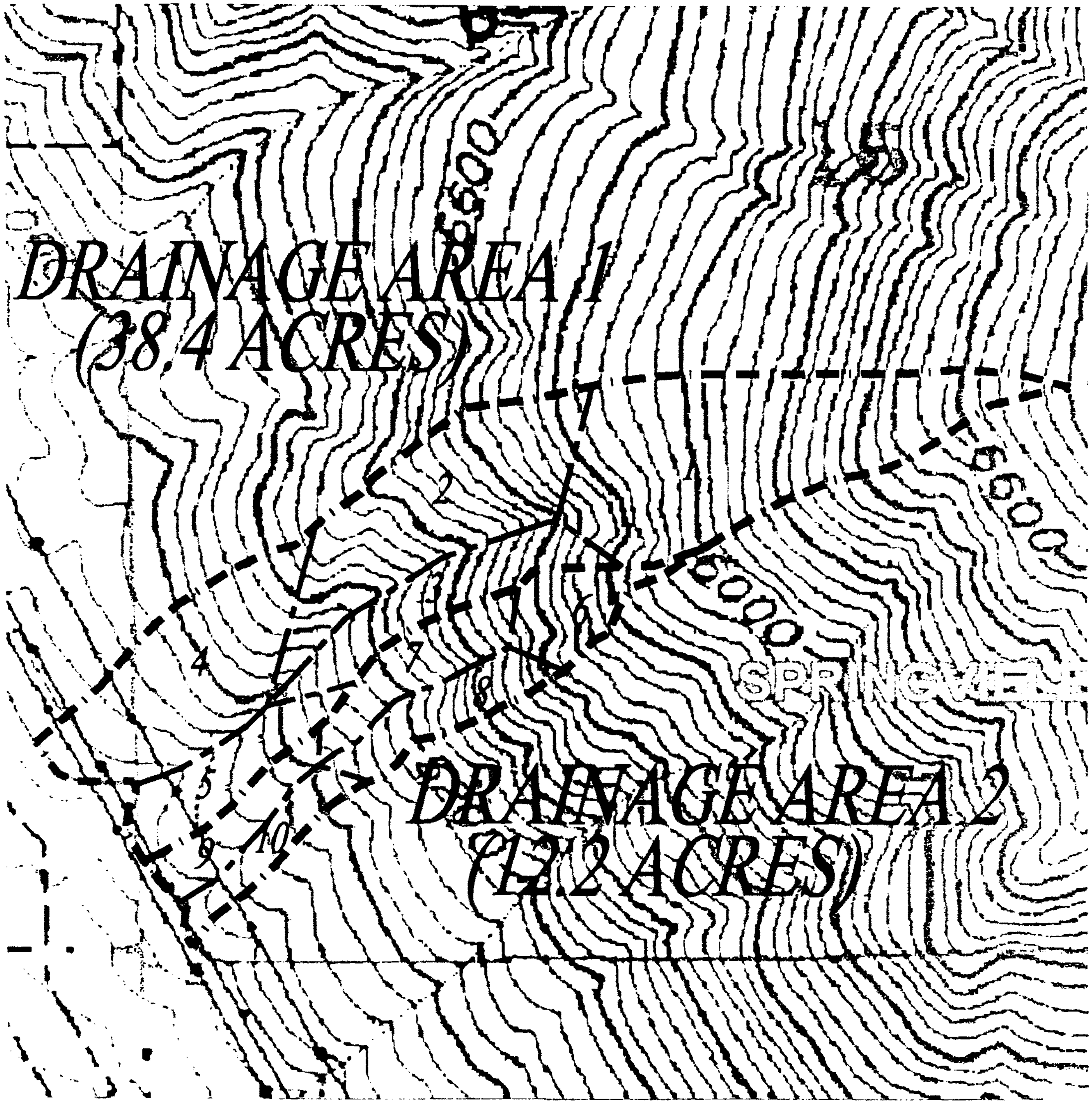
Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1] Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2] *Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3] Curve numbers for group A have been developed only for desert shrub.



DRAINAGE SUBAREAS

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	SUBAREAS	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE (801) 492 1277	Figure B-1

TIME OF CONCENTRATION CALCULATIONS

SUBAREA	Total Area s.f.	Total Area MI²	OVERLAND FLOW CONDITIONS				FLOW CONDITIONS				TOTAL TC	TLag
			Length	% slope	Vel	TC'	Length	% slope	Vel	TC"		
BASIN 2												
6	107032	0.00384	300	60.00%	2.00	0.042	430	74.42%	4.20	0.028	0.070	0.042
7	129289	0.00464	300	66.67%	2.20	0.038	380	63.16%	4.20	0.025	0.063	0.038
8	117739	0.00422	300	80.00%	2.40	0.035	360	88.89%	4.20	0.024	0.059	0.035
9	93086	0.00334	300	33.33%	1.45	0.057	310	32.26%	4.20	0.021	0.078	0.047
10	83201	0.00298	300	40.00%	1.60	0.052	300	36.67%	4.30	0.019	0.071	0.043

```
HEC1 S/N: 1343001909        HMVersion: 6.33    Data File: C:\windows\TEMP\~vbh0514.TMP

 *****************************************                           ****************************************
 *                                       *                           *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                           *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY   1991               *                           *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E              *                           *         609 SECOND STREET            *
 *                                       *                           *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE  03/27/2001  TIME  15:49:13 *                           *          (916) 756-1104              *
 *                                       *                           *                                      *
 *****************************************                           ****************************************


                                  X     X  XXXXXXX   XXXXX         X
                                  X     X  X        X     X       XX
                                  X     X  X        X              X
                                  XXXXXXX  XXXX     X     XXXXX    X
                                  X     X  X        X              X
                                  X     X  X        X     X        X
                                  X     X  XXXXXXX   XXXXX        XXX


                              ::::::::::::::::::::::::::::::::::::::::::
                              ::::::::::::::::::::::::::::::::::::::::::
                              :::                                    :::
                              :::  Full Microcomputer Implementation :::
                              :::                 by                 :::
                              :::        Haestad Methods, Inc.       :::
                              :::                                    :::
                              ::::::::::::::::::::::::::::::::::::::::::
                              ::::::::::::::::::::::::::::::::::::::::::

                        37 Brookside Road * Waterbury, Connecticut  06708 * (203) 755-1666


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

ID  M-13 CONSTRUCTION
IT      3 27JUL00       0          28JUL00       0
IO      0       0

KK  sub 6
KM  west
KO                                       22
BA  .00384
PB    3.94
IN      6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS                 48
UD    .042

KK  reach4
KM
KO                                       22
RD     750     .64     .02             TRAP       0     1.4

KK  sub 7
KM  south
KO                                       22
BA  .00464
PB    3.94
IN      6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS              48
UD    .038

KK  sub 8
KM  north
KO                                          22
BA  .00422
PB    3.94
IN       6 27JUL00        0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS              48
UD    .035
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  Node16
KM
KO                                    22
HC       3

KK  reach5
KM
KO                                    22
RD     640   .3125     .02          TRAP       0     1.4

KK  sub 9
KM  south
KO                                    22
BA  .00334
PB    3.94
IN       6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
PC  1.0000 1.00000 1.00000 1.00000 1.00000
LS              48
UD    .047

KK  sub 10
KM  north
KO                                    22
BA  .00298
PB    3.94
IN       6 27JUL00       0
PC  0.0000 0.00101 0.00202 0.00305 0.00408 0.00513 0.00618 0.00725 0.00832 0.00941
PC  0.0105 0.01161 0.01272 0.01385 0.01498 0.01613 0.01728 0.01845 0.01962 0.02081
PC  0.0220 0.02321 0.02442 0.02565 0.02688 0.02813 0.02938 0.03065 0.03192 0.03321
PC  0.0345 0.03581 0.03712 0.03845 0.03978 0.04113 0.04248 0.04385 0.04522 0.04661
```

```
    LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     158           PC  0.0480 0.04941 0.05084 0.05229 0.05376 0.05525 0.05676 0.05829 0.05984 0.06141
     159           PC  0.0630 0.06461 0.06624 0.06789 0.06956 0.07125 0.07296 0.07469 0.07644 0.07821
     160           PC  0.0800 0.08181 0.08364 0.08549 0.08736 0.08925 0.09116 0.09309 0.09504 0.09701
     161           PC  0.0990 0.10101 0.10304 0.10509 0.10716 0.10925 0.11136 0.11349 0.11564 0.11781
     162           PC  0.1200 0.12225 0.12460 0.12705 0.12960 0.13225 0.13500 0.13785 0.14080 0.14385
     163           PC  0.1470 0.15020 0.15340 0.15660 0.15980 0.16300 0.16628 0.16972 0.17332 0.17708
     164           PC  0.1810 0.18512 0.18948 0.19408 0.19892 0.20400 0.20940 0.21520 0.22140 0.22800
     165           PC  0.2350 0.24268 0.25132 0.26092 0.27148 0.28300 0.30684 0.35436 0.43079 0.56786
     166           PC  0.6630 0.68196 0.69864 0.71304 0.72516 0.73500 0.74344 0.75136 0.75876 0.76564
     167           PC  0.7720 0.77796 0.78364 0.78904 0.79416 0.79900 0.80360 0.80800 0.81220 0.81620
     168           PC  0.8200 0.82367 0.82726 0.83079 0.83424 0.83763 0.84094 0.84419 0.84736 0.85047
     169           PC  0.8535 0.85647 0.85936 0.86219 0.86494 0.86763 0.87024 0.87279 0.87526 0.87767
     170           PC  0.8800 0.88229 0.88455 0.88679 0.88900 0.89119 0.89335 0.89549 0.89760 0.89969
     171           PC  0.9018 0.90379 0.90580 0.90779 0.90975 0.91169 0.91360 0.91549 0.91735 0.91919
     172           PC  0.9210 0.92279 0.92455 0.92629 0.92800 0.92969 0.93135 0.93299 0.93460 0.93619
     173           PC  0.9377 0.93929 0.94080 0.94229 0.94375 0.94519 0.94660 0.94799 0.94935 0.95069
     174           PC  0.9520 0.95330 0.95459 0.95588 0.95716 0.95844 0.95971 0.96098 0.96224 0.96350
     175           PC  0.9647 0.96600 0.96724 0.96848 0.96971 0.97094 0.97216 0.97338 0.97459 0.97580
     176           PC  0.9770 0.97820 0.97939 0.98058 0.98176 0.98294 0.98411 0.98528 0.98644 0.98760
     177           PC  0.9887 0.98990 0.99104 0.99218 0.99331 0.99444 0.99556 0.99668 0.99779 0.99890
     178           PC  1.0000 1.00000 1.00000 1.00000 1.00000
     179           LS               48
     180           UD    .043

     181           KK  Node17
     182           KM
     183           KO                                       22
     184           HC       3

     185           KK  reach6
     186           KM
     187           KO                                       22
     188           RD     300   .3125     .02             TRAP       0     1.4

     189           KK  pond 2
     190           KM
     191           KO                                       22
     192           RS             STOR
     193           SA       0    .016
     194           SE  4779.7 4780.05
     195           SL  4779.8    1.23      .6      .5
     196           SS    4780       9     2.8     1.5
     197           ZZ

HEC1 S/N: 1343001909        HMVersion: 6.33    Data File: C:\windows\TEMP\~vbh0514.TMP

*****************************************                                                ***************************************
*                                       *                                                *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                *   U.S. ARMY CORPS OF ENGINEERS      *
*             MAY   1991                *                                                *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.0.1E              *                                                *        609 SECOND STREET            *
*                                       *                                                *     DAVIS, CALIFORNIA 95616         *
*  RUN DATE  03/27/2001  TIME  15:49:13 *                                                *         (916) 756-1104              *
*                                       *                                                *                                     *
*****************************************                                                ***************************************
```

```
  3 IO          OUTPUT CONTROL VARIABLES



                      IPRNT            0  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN            3  MINUTES IN COMPUTATION INTERVAL
                      IDATE      27JUL 0  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ          481  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      28JUL 0  ENDING DATE
                     NDTIME         0000  ENDING TIME
                     ICENT            19  CENTURY MARK

                COMPUTATION INTERVAL    0.05 HOURS
                     TOTAL TIME BASE   24.00 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** 


          **************
          *            *
 37 KK    *   reach4   *
          *            *
          **************


 39 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            0  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          481  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        0.050  TIME INTERVAL IN HOURS

              HYDROGRAPH ROUTING DATA

 40 RD          MUSKINGUM-CUNGE CHANNEL ROUTING
                          L         750.  CHANNEL LENGTH
                          S       0.6400  SLOPE
                          N        0.020  CHANNEL ROUGHNESS COEFFICIENT
                         CA         0.00  CONTRIBUTING AREA
```

V .00 OM I OR METr
Z 1.40 SIDE SLOPE

***

COMPUTED MUSKINGUM-CUNGE PARAMETERS
COMPUTATION TIME STEP

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	29.30	1.33	0.45	150.00	0.38	721.35	0.25	11.07

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	29.30	1.33	3.00		0.34	723.00	0.25	

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5096E-01 EXCESS=0.0000E+00 OUTFLOW=0.5088E-01 BASIN STORAGE=0.9390E-04 PERCENT ERROR= 0.0

****

HYDROGRAPH AT STATION reach4

****

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
27 JUL 0000	1	0.	27 JUL 0603	122	0.	27 JUL 1206	243	0.	27 JUL 1809	364	0.
27 JUL 0003	2	0.	27 JUL 0606	123	0.	27 JUL 1209	244	0.	27 JUL 1812	365	0.
27 JUL 0006	3	0.	27 JUL 0609	124	0.	27 JUL 1212	245	0.	27 JUL 1815	366	0.
27 JUL 0009	4	0.	27 JUL 0612	125	0.	27 JUL 1215	246	0.	27 JUL 1818	367	0.
27 JUL 0012	5	0.	27 JUL 0615	126	0.	27 JUL 1218	247	0.	27 JUL 1821	368	0.
27 JUL 0015	6	0.	27 JUL 0618	127	0.	27 JUL 1221	248	0.	27 JUL 1824	369	0.
27 JUL 0018	7	0.	27 JUL 0621	128	0.	27 JUL 1224	249	0.	27 JUL 1827	370	0.
27 JUL 0021	8	0.	27 JUL 0624	129	0.	27 JUL 1227	250	0.	27 JUL 1830	371	0.
27 JUL 0024	9	0.	27 JUL 0627	130	0.	27 JUL 1230	251	0.	27 JUL 1833	372	0.
27 JUL 0027	10	0.	27 JUL 0630	131	0.	27 JUL 1233	252	0.	27 JUL 1836	373	0.
27 JUL 0030	11	0.	27 JUL 0633	132	0.	27 JUL 1236	253	0.	27 JUL 1839	374	0.
27 JUL 0033	12	0.	27 JUL 0636	133	0.	27 JUL 1239	254	0.	27 JUL 1842	375	0.
27 JUL 0036	13	0.	27 JUL 0639	134	0.	27 JUL 1242	255	0.	27 JUL 1845	376	0.
27 JUL 0039	14	0.	27 JUL 0642	135	0.	27 JUL 1245	256	0.	27 JUL 1848	377	0.
27 JUL 0042	15	0.	27 JUL 0645	136	0.	27 JUL 1248	257	0.	27 JUL 1851	378	0.
27 JUL 0045	16	0.	27 JUL 0648	137	0.	27 JUL 1251	258	0.	27 JUL 1854	379	0.
27 JUL 0048	17	0.	27 JUL 0651	138	0.	27 JUL 1254	259	0.	27 JUL 1857	380	0.
27 JUL 0051	18	0.	27 JUL 0654	139	0.	27 JUL 1257	260	0.	27 JUL 1900	381	0.
27 JUL 0054	19	0.	27 JUL 0657	140	0.	27 JUL 1300	261	0.	27 JUL 1903	382	0.
27 JUL 0057	20	0.	27 JUL 0700	141	0.	27 JUL 1303	262	0.	27 JUL 1906	383	0.
27 JUL 0100	21	0.	27 JUL 0703	142	0.	27 JUL 1306	263	0.	27 JUL 1909	384	0.
27 JUL 0103	22	0.	27 JUL 0706	143	0.	27 JUL 1309	264	0.	27 JUL 1912	385	0.
27 JUL 0106	23	0.	27 JUL 0709	144	0.	27 JUL 1312	265	0.	27 JUL 1915	386	0.
27 JUL 0109	24	0.	27 JUL 0712	145	0.	27 JUL 1315	266	0.	27 JUL 1918	387	0.
27 JUL 0112	25	0.	27 JUL 0715	146	0.	27 JUL 1318	267	0.	27 JUL 1921	388	0.
27 JUL 0115	26	0.	27 JUL 0718	147	0.	27 JUL 1321	268	0.	27 JUL 1924	389	0.
27 JUL 0118	27	0.	27 JUL 0721	148	0.	27 JUL 1324	269	0.	27 JUL 1927	390	0.
27 JUL 0121	28	0.	27 JUL 0724	149	0.	27 JUL 1327	270	0.	27 JUL 1930	391	0.

[illegible] UL [illegible]	2													
[illegible] UL [illegible]	3[illegible]	[illegible]	*	[illegible] 7 JU [illegible] 30		0.		27 [illegible] 133	[illegible] 72	0	*	[illegible] JUL [illegible]	39[illegible]	
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	0.	*	27 JUL 1939	394	0.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	0.	*	27 JUL 1942	395	0.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	0.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	0.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	0.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	0.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	0.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	0.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	0.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	0.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	0.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	0.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	0.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	0.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	0.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	0.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	0.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	0.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	0.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	0.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	0.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	0.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	0.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	0.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	0.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	0.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	0.	*	27 JUL 2057	420	0.
27 JUL 0251	58	0.	*	27 JUL 0854	179	0.	*	27 JUL 1457	300	0.	*	27 JUL 2100	421	0.
27 JUL 0254	59	0.	*	27 JUL 0857	180	0.	*	27 JUL 1500	301	0.	*	27 JUL 2103	422	0.
27 JUL 0257	60	0.	*	27 JUL 0900	181	0.	*	27 JUL 1503	302	0.	*	27 JUL 2106	423	0.
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	0.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	0.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	0.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	0.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	0.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	0.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	0.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	0.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	0.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	0.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	0.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	0.	*	27 JUL 2142	435	0.
27 JUL 0336	73	0.	*	27 JUL 0939	194	0.	*	27 JUL 1542	315	0.	*	27 JUL 2145	436	0.
27 JUL 0339	74	0.	*	27 JUL 0942	195	0.	*	27 JUL 1545	316	0.	*	27 JUL 2148	437	0.
27 JUL 0342	75	0.	*	27 JUL 0945	196	0.	*	27 JUL 1548	317	0.	*	27 JUL 2151	438	0.
27 JUL 0345	76	0.	*	27 JUL 0948	197	0.	*	27 JUL 1551	318	0.	*	27 JUL 2154	439	0.
27 JUL 0348	77	0.	*	27 JUL 0951	198	0.	*	27 JUL 1554	319	0.	*	27 JUL 2157	440	0.
27 JUL 0351	78	0.	*	27 JUL 0954	199	0.	*	27 JUL 1557	320	0.	*	27 JUL 2200	441	0.
27 JUL 0354	79	0.	*	27 JUL 0957	200	0.	*	27 JUL 1600	321	0.	*	27 JUL 2203	442	0.
27 JUL 0357	80	0.	*	27 JUL 1000	201	0.	*	27 JUL 1603	322	0.	*	27 JUL 2206	443	0.
27 JUL 0400	81	0.	*	27 JUL 1003	202	0.	*	27 JUL 1606	323	0.	*	27 JUL 2209	444	0.
27 JUL 0403	82	0.	*	27 JUL 1006	203	0.	*	27 JUL 1609	324	0.	*	27 JUL 2212	445	0.
27 JUL 0406	83	0.	*	27 JUL 1009	204	0.	*	27 JUL 1612	325	0.	*	27 JUL 2215	446	0.
27 JUL 0409	84	0.	*	27 JUL 1012	205	0.	*	27 JUL 1615	326	0.	*	27 JUL 2218	447	0.
27 JUL 0412	85	0.	*	27 JUL 1015	206	0.	*	27 JUL 1618	327	0.	*	27 JUL 2221	448	0.
27 JUL 0415	86	0.	*	27 JUL 1018	207	0.	*	27 JUL 1621	328	0.	*	27 JUL 2224	449	0.
27 JUL 0418	87	0.	*	27 JUL 1021	208	0.	*	27 JUL 1624	329	0.	*	27 JUL 2227	450	0.
27 JUL 0421	88	0.	*	27 JUL 1024	209	0.	*	27 JUL 1627	330	0.	*	27 JUL 2230	451	0.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27 [illegible]	90	[illegible]	[illegible] JUL [illegible]	[illegible]	[illegible]	27 [illegible] 1633	[illegible]	0.	[illegible]	[illegible]	[illegible]
27 JUL 0430	91	0.	27 JUL 1033	212	0.	27 JUL 1636	333	0.	27 JUL 2239	454	0.
27 JUL 0433	92	0.	27 JUL 1036	213	0.	27 JUL 1639	334	0.	27 JUL 2242	455	0.
27 JUL 0436	93	0.	27 JUL 1039	214	0.	27 JUL 1642	335	0.	27 JUL 2245	456	0.
27 JUL 0439	94	0.	27 JUL 1042	215	0.	27 JUL 1645	336	0.	27 JUL 2248	457	0.
27 JUL 0442	95	0.	27 JUL 1045	216	0.	27 JUL 1648	337	0.	27 JUL 2251	458	0.
27 JUL 0445	96	0.	27 JUL 1048	217	0.	27 JUL 1651	338	0.	27 JUL 2254	459	0.
27 JUL 0448	97	0.	27 JUL 1051	218	0.	27 JUL 1654	339	0.	27 JUL 2257	460	0.
27 JUL 0451	98	0.	27 JUL 1054	219	0.	27 JUL 1657	340	0.	27 JUL 2300	461	0.
27 JUL 0454	99	0.	27 JUL 1057	220	0.	27 JUL 1700	341	0.	27 JUL 2303	462	0.
27 JUL 0457	100	0.	27 JUL 1100	221	0.	27 JUL 1703	342	0.	27 JUL 2306	463	0.
27 JUL 0500	101	0.	27 JUL 1103	222	0.	27 JUL 1706	343	0.	27 JUL 2309	464	0.
27 JUL 0503	102	0.	27 JUL 1106	223	0.	27 JUL 1709	344	0.	27 JUL 2312	465	0.
27 JUL 0506	103	0.	27 JUL 1109	224	0.	27 JUL 1712	345	0.	27 JUL 2315	466	0.
27 JUL 0509	104	0.	27 JUL 1112	225	0.	27 JUL 1715	346	0.	27 JUL 2318	467	0.
27 JUL 0512	105	0.	27 JUL 1115	226	0.	27 JUL 1718	347	0.	27 JUL 2321	468	0.
27 JUL 0515	106	0.	27 JUL 1118	227	0.	27 JUL 1721	348	0.	27 JUL 2324	469	0.
27 JUL 0518	107	0.	27 JUL 1121	228	0.	27 JUL 1724	349	0.	27 JUL 2327	470	0.
27 JUL 0521	108	0.	27 JUL 1124	229	0.	27 JUL 1727	350	0.	27 JUL 2330	471	0.
27 JUL 0524	109	0.	27 JUL 1127	230	0.	27 JUL 1730	351	0.	27 JUL 2333	472	0.
27 JUL 0527	110	0.	27 JUL 1130	231	0.	27 JUL 1733	352	0.	27 JUL 2336	473	0.
27 JUL 0530	111	0.	27 JUL 1133	232	0.	27 JUL 1736	353	0.	27 JUL 2339	474	0.
27 JUL 0533	112	0.	27 JUL 1136	233	0.	27 JUL 1739	354	0.	27 JUL 2342	475	0.
27 JUL 0536	113	0.	27 JUL 1139	234	0.	27 JUL 1742	355	0.	27 JUL 2345	476	0.
27 JUL 0539	114	0.	27 JUL 1142	235	0.	27 JUL 1745	356	0.	27 JUL 2348	477	0.
27 JUL 0542	115	0.	27 JUL 1145	236	0.	27 JUL 1748	357	0.	27 JUL 2351	478	0.
27 JUL 0545	116	0.	27 JUL 1148	237	0.	27 JUL 1751	358	0.	27 JUL 2354	479	0.
27 JUL 0548	117	0.	27 JUL 1151	238	0.	27 JUL 1754	359	0.	27 JUL 2357	480	0.
27 JUL 0551	118	0.	27 JUL 1154	239	0.	27 JUL 1757	360	0.	28 JUL 0000	481	0.
27 JUL 0554	119	0.	27 JUL 1157	240	0.	27 JUL 1800	361	0.			
27 JUL 0557	120	0.	27 JUL 1200	241	0.	27 JUL 1803	362	0.			
27 JUL 0600	121	0.	27 JUL 1203	242	0.	27 JUL 1806	363	0.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.00-HR
0.	12.05	(CFS)	0.	0.	0.	0.
		(INCHES)	0.171	0.249	0.249	0.249
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

111 KK   reach5

113 KO   OUTPUT CONTROL VARIABLES

IPRNT   0 PRINT CONTROL

QSC.	0.	ROGR PLO LE
IPNCH	0	PUNCH COMPUTED HYDROGRAPH
IOUT	22	SAVE HYDROGRAPH ON THIS UNIT
ISAV1	1	FIRST ORDINATE PUNCHED OR SAVED
ISAV2	481	LAST ORDINATE PUNCHED OR SAVED
TIMINT	0.050	TIME INTERVAL IN HOURS

HYDROGRAPH ROUTING DATA

114 RD MUSKINGUM-CUNGE CHANNEL ROUTING

L	640.	CHANNEL LENGTH
S	0.3125	SLOPE
N	0.020	CHANNEL ROUGHNESS COEFFICIENT
CA	0.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	0.00	BOTTOM WIDTH OR DIAMETER
Z	1.40	SIDE SLOPE

***

COMPUTED MUSKINGUM-CUNGE PARAMETERS

ELEMENT	ALPHA	M	COMPUTATION TIME STEP DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	20.47	1.33	0.60	213.33	1.26	721.20	0.25	11.42

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	20.47	1.33	3.00		1.10	723.00	0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1685E+00 EXCESS=0.0000E+00 OUTFLOW=0.1683E+00 BASIN STORAGE=0.2571E-03 PERCENT ERROR= 0.0

****

HYDROGRAPH AT STATION reach5

****

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
27 JUL 0000	1	0.	27 JUL 0603	122	0.	27 JUL 1206	243	1.	27 JUL 1809	364	0.
27 JUL 0003	2	0.	27 JUL 0606	123	0.	27 JUL 1209	244	1.	27 JUL 1812	365	0.
27 JUL 0006	3	0.	27 JUL 0609	124	0.	27 JUL 1212	245	1.	27 JUL 1815	366	0.
27 JUL 0009	4	0.	27 JUL 0612	125	0.	27 JUL 1215	246	1.	27 JUL 1818	367	0.
27 JUL 0012	5	0.	27 JUL 0615	126	0.	27 JUL 1218	247	0.	27 JUL 1821	368	0.
27 JUL 0015	6	0.	27 JUL 0618	127	0.	27 JUL 1221	248	0.	27 JUL 1824	369	0.
27 JUL 0018	7	0.	27 JUL 0621	128	0.	27 JUL 1224	249	0.	27 JUL 1827	370	0.
27 JUL 0021	8	0.	27 JUL 0624	129	0.	27 JUL 1227	250	0.	27 JUL 1830	371	0.
27 JUL 0024	9	0.	27 JUL 0627	130	0.	27 JUL 1230	251	0.	27 JUL 1833	372	0.
27 JUL 0027	10	0.	27 JUL 0630	131	0.	27 JUL 1233	252	0.	27 JUL 1836	373	0.
27 JUL 0030	11	0.	27 JUL 0633	132	0.	27 JUL 1236	253	0.	27 JUL 1839	374	0.
27 JUL 0033	12	0.	27 JUL 0636	133	0.	27 JUL 1239	254	0.	27 JUL 1842	375	0.
27 JUL 0036	13	0.	27 JUL 0639	134	0.	27 JUL 1242	255	0.	27 JUL 1845	376	0.

[illegible]	[illegible]													
[illegible]	15	[illegible]	*	[illegible] JUL [illegible]15	[illegible]	[illegible]		27 [illegible] 124[illegible]	[illegible]7	0.		[illegible]	[illegible]	
27 JUL 0045	16	0.	*	27 JUL 0648	137	0.		27 JUL 1251	258	0.		27 JUL 1854	379	0.
27 JUL 0048	17	0.	*	27 JUL 0651	138	0.	*	27 JUL 1254	259	0.	*	27 JUL 1857	380	0.
27 JUL 0051	18	0.	*	27 JUL 0654	139	0.	*	27 JUL 1257	260	0.	*	27 JUL 1900	381	0.
27 JUL 0054	19	0.	*	27 JUL 0657	140	0.	*	27 JUL 1300	261	0.	*	27 JUL 1903	382	0.
27 JUL 0057	20	0.	*	27 JUL 0700	141	0.	*	27 JUL 1303	262	0.	*	27 JUL 1906	383	0.
27 JUL 0100	21	0.	*	27 JUL 0703	142	0.	*	27 JUL 1306	263	0.	*	27 JUL 1909	384	0.
27 JUL 0103	22	0.	*	27 JUL 0706	143	0.	*	27 JUL 1309	264	0.	*	27 JUL 1912	385	0.
27 JUL 0106	23	0.	*	27 JUL 0709	144	0.	*	27 JUL 1312	265	0.	*	27 JUL 1915	386	0.
27 JUL 0109	24	0.	*	27 JUL 0712	145	0.	*	27 JUL 1315	266	0.	*	27 JUL 1918	387	0.
27 JUL 0112	25	0.	*	27 JUL 0715	146	0.	*	27 JUL 1318	267	0.	*	27 JUL 1921	388	0.
27 JUL 0115	26	0.	*	27 JUL 0718	147	0.	*	27 JUL 1321	268	0.	*	27 JUL 1924	389	0.
27 JUL 0118	27	0.	*	27 JUL 0721	148	0.	*	27 JUL 1324	269	0.	*	27 JUL 1927	390	0.
27 JUL 0121	28	0.	*	27 JUL 0724	149	0.	*	27 JUL 1327	270	0.	*	27 JUL 1930	391	0.
27 JUL 0124	29	0.	*	27 JUL 0727	150	0.	*	27 JUL 1330	271	0.	*	27 JUL 1933	392	0.
27 JUL 0127	30	0.	*	27 JUL 0730	151	0.	*	27 JUL 1333	272	0.	*	27 JUL 1936	393	0.
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	0.	*	27 JUL 1939	394	0.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	0.	*	27 JUL 1942	395	0.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	0.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	0.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	0.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	0.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	0.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	0.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	0.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	0.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	0.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	0.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	0.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	0.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	0.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	0.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	0.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	0.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	0.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	0.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	0.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	0.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	0.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	0.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	0.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	0.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	0.	*	27 JUL 2057	420	0.
27 JUL 0251	58	0.	*	27 JUL 0854	179	0.	*	27 JUL 1457	300	0.	*	27 JUL 2100	421	0.
27 JUL 0254	59	0.	*	27 JUL 0857	180	0.	*	27 JUL 1500	301	0.	*	27 JUL 2103	422	0.
27 JUL 0257	60	0.	*	27 JUL 0900	181	0.	*	27 JUL 1503	302	0.	*	27 JUL 2106	423	0.
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	0.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	0.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	0.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	0.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	0.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	0.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	0.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	0.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	0.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	0.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	0.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	0.	*	27 JUL 2142	435	0.
27 JUL 0336	73	0.	*	27 JUL 0939	194	0.	*	27 JUL 1542	315	0.	*	27 JUL 2145	436	0.

[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
2[illegible] L 0[illegible]	75	[illegible]	*	[illegible] JUL [illegible]	[illegible]5	[illegible]	[illegible]	[illegible]27 [illegible] 154[illegible]	[illegible]7	0[illegible]	[illegible]	[illegible] L [illegible]	[illegible]	[illegible]
27 JUL 0345	76	0.	*	27 JUL 0948	197	0.	*	27 JUL 1551	318	0.	*	27 JUL 2154	439	0.
27 JUL 0348	77	0.	*	27 JUL 0951	198	0.	*	27 JUL 1554	319	0.	*	27 JUL 2157	440	0.
27 JUL 0351	78	0.	*	27 JUL 0954	199	0.	*	27 JUL 1557	320	0.	*	27 JUL 2200	441	0.
27 JUL 0354	79	0.	*	27 JUL 0957	200	0.	*	27 JUL 1600	321	0.	*	27 JUL 2203	442	0.
27 JUL 0357	80	0.	*	27 JUL 1000	201	0.	*	27 JUL 1603	322	0.	*	27 JUL 2206	443	0.
27 JUL 0400	81	0.	*	27 JUL 1003	202	0.	*	27 JUL 1606	323	0.	*	27 JUL 2209	444	0.
27 JUL 0403	82	0.	*	27 JUL 1006	203	0.	*	27 JUL 1609	324	0.	*	27 JUL 2212	445	0.
27 JUL 0406	83	0.	*	27 JUL 1009	204	0.	*	27 JUL 1612	325	0.	*	27 JUL 2215	446	0.
27 JUL 0409	84	0.	*	27 JUL 1012	205	0.	*	27 JUL 1615	326	0.	*	27 JUL 2218	447	0.
27 JUL 0412	85	0.	*	27 JUL 1015	206	0.	*	27 JUL 1618	327	0.	*	27 JUL 2221	448	0.
27 JUL 0415	86	0.	*	27 JUL 1018	207	0.	*	27 JUL 1621	328	0.	*	27 JUL 2224	449	0.
27 JUL 0418	87	0.	*	27 JUL 1021	208	0.	*	27 JUL 1624	329	0.	*	27 JUL 2227	450	0.
27 JUL 0421	88	0.	*	27 JUL 1024	209	0.	*	27 JUL 1627	330	0.	*	27 JUL 2230	451	0.
27 JUL 0424	89	0.	*	27 JUL 1027	210	0.	*	27 JUL 1630	331	0.	*	27 JUL 2233	452	0.
27 JUL 0427	90	0.	*	27 JUL 1030	211	0.	*	27 JUL 1633	332	0.	*	27 JUL 2236	453	0.
27 JUL 0430	91	0.	*	27 JUL 1033	212	0.	*	27 JUL 1636	333	0.	*	27 JUL 2239	454	0.
27 JUL 0433	92	0.	*	27 JUL 1036	213	0.	*	27 JUL 1639	334	0.	*	27 JUL 2242	455	0.
27 JUL 0436	93	0.	*	27 JUL 1039	214	0.	*	27 JUL 1642	335	0.	*	27 JUL 2245	456	0.
27 JUL 0439	94	0.	*	27 JUL 1042	215	0.	*	27 JUL 1645	336	0.	*	27 JUL 2248	457	0.
27 JUL 0442	95	0.	*	27 JUL 1045	216	0.	*	27 JUL 1648	337	0.	*	27 JUL 2251	458	0.
27 JUL 0445	96	0.	*	27 JUL 1048	217	0.	*	27 JUL 1651	338	0.	*	27 JUL 2254	459	0.
27 JUL 0448	97	0.	*	27 JUL 1051	218	0.	*	27 JUL 1654	339	0.	*	27 JUL 2257	460	0.
27 JUL 0451	98	0.	*	27 JUL 1054	219	0.	*	27 JUL 1657	340	0.	*	27 JUL 2300	461	0.
27 JUL 0454	99	0.	*	27 JUL 1057	220	0.	*	27 JUL 1700	341	0.	*	27 JUL 2303	462	0.
27 JUL 0457	100	0.	*	27 JUL 1100	221	0.	*	27 JUL 1703	342	0.	*	27 JUL 2306	463	0.
27 JUL 0500	101	0.	*	27 JUL 1103	222	0.	*	27 JUL 1706	343	0.	*	27 JUL 2309	464	0.
27 JUL 0503	102	0.	*	27 JUL 1106	223	0.	*	27 JUL 1709	344	0.	*	27 JUL 2312	465	0.
27 JUL 0506	103	0.	*	27 JUL 1109	224	0.	*	27 JUL 1712	345	0.	*	27 JUL 2315	466	0.
27 JUL 0509	104	0.	*	27 JUL 1112	225	0.	*	27 JUL 1715	346	0.	*	27 JUL 2318	467	0.
27 JUL 0512	105	0.	*	27 JUL 1115	226	0.	*	27 JUL 1718	347	0.	*	27 JUL 2321	468	0.
27 JUL 0515	106	0.	*	27 JUL 1118	227	0.	*	27 JUL 1721	348	0.	*	27 JUL 2324	469	0.
27 JUL 0518	107	0.	*	27 JUL 1121	228	0.	*	27 JUL 1724	349	0.	*	27 JUL 2327	470	0.
27 JUL 0521	108	0.	*	27 JUL 1124	229	0.	*	27 JUL 1727	350	0.	*	27 JUL 2330	471	0.
27 JUL 0524	109	0.	*	27 JUL 1127	230	0.	*	27 JUL 1730	351	0.	*	27 JUL 2333	472	0.
27 JUL 0527	110	0.	*	27 JUL 1130	231	0.	*	27 JUL 1733	352	0.	*	27 JUL 2336	473	0.
27 JUL 0530	111	0.	*	27 JUL 1133	232	0.	*	27 JUL 1736	353	0.	*	27 JUL 2339	474	0.
27 JUL 0533	112	0.	*	27 JUL 1136	233	0.	*	27 JUL 1739	354	0.	*	27 JUL 2342	475	0.
27 JUL 0536	113	0.	*	27 JUL 1139	234	0.	*	27 JUL 1742	355	0.	*	27 JUL 2345	476	0.
27 JUL 0539	114	0.	*	27 JUL 1142	235	0.	*	27 JUL 1745	356	0.	*	27 JUL 2348	477	0.
27 JUL 0542	115	0.	*	27 JUL 1145	236	0.	*	27 JUL 1748	357	0.	*	27 JUL 2351	478	0.
27 JUL 0545	116	0.	*	27 JUL 1148	237	0.	*	27 JUL 1751	358	0.	*	27 JUL 2354	479	0.
27 JUL 0548	117	0.	*	27 JUL 1151	238	0.	*	27 JUL 1754	359	0.	*	27 JUL 2357	480	0.
27 JUL 0551	118	0.	*	27 JUL 1154	239	0.	*	27 JUL 1757	360	0.	*	28 JUL 0000	481	0.
27 JUL 0554	119	0.	*	27 JUL 1157	240	0.	*	27 JUL 1800	361	0.	*			
27 JUL 0557	120	0.	*	27 JUL 1200	241	1.	*	27 JUL 1803	362	0.	*			
27 JUL 0600	121	0.	*	27 JUL 1203	242	1.	*	27 JUL 1806	363	0.	*			
			*				*				*			

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)					
		(CFS)				
1.	12.05		0.	0.	0.	0.
		(INCHES)	0.171	0.249	0.249	0.249
		(AC-FT)	0.	0.	0.	0.

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
185 KK       *   reach6   *
             *            *
             **************


187 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          0  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        481  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT      0.050  TIME INTERVAL IN HOURS


              HYDROGRAPH ROUTING DATA

188 RD          MUSKINGUM-CUNGE CHANNEL ROUTING
                          L         300.  CHANNEL LENGTH
                          S       0.3125  SLOPE
                          N        0.020  CHANNEL ROUGHNESS COEFFICIENT
                         CA         0.00  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD         0.00  BOTTOM WIDTH OR DIAMETER
                          Z         1.40  SIDE SLOPE

                                                              ***
                                   COMPUTED MUSKINGUM-CUNGE PARAMETERS
                                          COMPUTATION TIME STEP
                ELEMENT    ALPHA        M         DT        DX        PEAK    TIME TO     VOLUME    MAXIMUM
                                                                               PEAK                 CELERITY
                                                 (MIN)      (FT)      (CFS)    (MIN)       (IN)      (FPS)

                 MAIN      20.47       1.33       0.41     150.00      1.64    720.75      0.25      12.20

                                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL


                 MAIN      20.47       1.33       3.00                 1.63    723.00      0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2523E+00 EXCESS=0.0000E+00 OUTFLOW=0.2521E+00 BASIN STORAGE=0.1632E-03 PERCENT ERROR=   0.0


*****************************************************************************************************************************

                                                       HYDROGRAPH AT STATION   reach6

*****************************************************************************************************************************
                              *                              *                              *
```

27 JUL 0000	1	0.	*	27 JUL 0603	122	0.	*	27 JUL 1206	243	1.	*	27 JUL 1809	364	0.
27 JUL 0003	2	0.	*	27 JUL 0606	123	0.	*	27 JUL 1209	244	1.	*	27 JUL 1812	365	0.
27 JUL 0006	3	0.	*	27 JUL 0609	124	0.	*	27 JUL 1212	245	1.	*	27 JUL 1815	366	0.
27 JUL 0009	4	0.	*	27 JUL 0612	125	0.	*	27 JUL 1215	246	1.	*	27 JUL 1818	367	0.
27 JUL 0012	5	0.	*	27 JUL 0615	126	0.	*	27 JUL 1218	247	1.	*	27 JUL 1821	368	0.
27 JUL 0015	6	0.	*	27 JUL 0618	127	0.	*	27 JUL 1221	248	1.	*	27 JUL 1824	369	0.
27 JUL 0018	7	0.	*	27 JUL 0621	128	0.	*	27 JUL 1224	249	1.	*	27 JUL 1827	370	0.
27 JUL 0021	8	0.	*	27 JUL 0624	129	0.	*	27 JUL 1227	250	1.	*	27 JUL 1830	371	0.
27 JUL 0024	9	0.	*	27 JUL 0627	130	0.	*	27 JUL 1230	251	1.	*	27 JUL 1833	372	0.
27 JUL 0027	10	0.	*	27 JUL 0630	131	0.	*	27 JUL 1233	252	1.	*	27 JUL 1836	373	0.
27 JUL 0030	11	0.	*	27 JUL 0633	132	0.	*	27 JUL 1236	253	1.	*	27 JUL 1839	374	0.
27 JUL 0033	12	0.	*	27 JUL 0636	133	0.	*	27 JUL 1239	254	1.	*	27 JUL 1842	375	0.
27 JUL 0036	13	0.	*	27 JUL 0639	134	0.	*	27 JUL 1242	255	1.	*	27 JUL 1845	376	0.
27 JUL 0039	14	0.	*	27 JUL 0642	135	0.	*	27 JUL 1245	256	0.	*	27 JUL 1848	377	0.
27 JUL 0042	15	0.	*	27 JUL 0645	136	0.	*	27 JUL 1248	257	0.	*	27 JUL 1851	378	0.
27 JUL 0045	16	0.	*	27 JUL 0648	137	0.	*	27 JUL 1251	258	0.	*	27 JUL 1854	379	0.
27 JUL 0048	17	0.	*	27 JUL 0651	138	0.	*	27 JUL 1254	259	0.	*	27 JUL 1857	380	0.
27 JUL 0051	18	0.	*	27 JUL 0654	139	0.	*	27 JUL 1257	260	0.	*	27 JUL 1900	381	0.
27 JUL 0054	19	0.	*	27 JUL 0657	140	0.	*	27 JUL 1300	261	0.	*	27 JUL 1903	382	0.
27 JUL 0057	20	0.	*	27 JUL 0700	141	0.	*	27 JUL 1303	262	0.	*	27 JUL 1906	383	0.
27 JUL 0100	21	0.	*	27 JUL 0703	142	0.	*	27 JUL 1306	263	0.	*	27 JUL 1909	384	0.
27 JUL 0103	22	0.	*	27 JUL 0706	143	0.	*	27 JUL 1309	264	0.	*	27 JUL 1912	385	0.
27 JUL 0106	23	0.	*	27 JUL 0709	144	0.	*	27 JUL 1312	265	0.	*	27 JUL 1915	386	0.
27 JUL 0109	24	0.	*	27 JUL 0712	145	0.	*	27 JUL 1315	266	0.	*	27 JUL 1918	387	0.
27 JUL 0112	25	0.	*	27 JUL 0715	146	0.	*	27 JUL 1318	267	0.	*	27 JUL 1921	388	0.
27 JUL 0115	26	0.	*	27 JUL 0718	147	0.	*	27 JUL 1321	268	0.	*	27 JUL 1924	389	0.
27 JUL 0118	27	0.	*	27 JUL 0721	148	0.	*	27 JUL 1324	269	0.	*	27 JUL 1927	390	0.
27 JUL 0121	28	0.	*	27 JUL 0724	149	0.	*	27 JUL 1327	270	0.	*	27 JUL 1930	391	0.
27 JUL 0124	29	0.	*	27 JUL 0727	150	0.	*	27 JUL 1330	271	0.	*	27 JUL 1933	392	0.
27 JUL 0127	30	0.	*	27 JUL 0730	151	0.	*	27 JUL 1333	272	0.	*	27 JUL 1936	393	0.
27 JUL 0130	31	0.	*	27 JUL 0733	152	0.	*	27 JUL 1336	273	0.	*	27 JUL 1939	394	0.
27 JUL 0133	32	0.	*	27 JUL 0736	153	0.	*	27 JUL 1339	274	0.	*	27 JUL 1942	395	0.
27 JUL 0136	33	0.	*	27 JUL 0739	154	0.	*	27 JUL 1342	275	0.	*	27 JUL 1945	396	0.
27 JUL 0139	34	0.	*	27 JUL 0742	155	0.	*	27 JUL 1345	276	0.	*	27 JUL 1948	397	0.
27 JUL 0142	35	0.	*	27 JUL 0745	156	0.	*	27 JUL 1348	277	0.	*	27 JUL 1951	398	0.
27 JUL 0145	36	0.	*	27 JUL 0748	157	0.	*	27 JUL 1351	278	0.	*	27 JUL 1954	399	0.
27 JUL 0148	37	0.	*	27 JUL 0751	158	0.	*	27 JUL 1354	279	0.	*	27 JUL 1957	400	0.
27 JUL 0151	38	0.	*	27 JUL 0754	159	0.	*	27 JUL 1357	280	0.	*	27 JUL 2000	401	0.
27 JUL 0154	39	0.	*	27 JUL 0757	160	0.	*	27 JUL 1400	281	0.	*	27 JUL 2003	402	0.
27 JUL 0157	40	0.	*	27 JUL 0800	161	0.	*	27 JUL 1403	282	0.	*	27 JUL 2006	403	0.
27 JUL 0200	41	0.	*	27 JUL 0803	162	0.	*	27 JUL 1406	283	0.	*	27 JUL 2009	404	0.
27 JUL 0203	42	0.	*	27 JUL 0806	163	0.	*	27 JUL 1409	284	0.	*	27 JUL 2012	405	0.
27 JUL 0206	43	0.	*	27 JUL 0809	164	0.	*	27 JUL 1412	285	0.	*	27 JUL 2015	406	0.
27 JUL 0209	44	0.	*	27 JUL 0812	165	0.	*	27 JUL 1415	286	0.	*	27 JUL 2018	407	0.
27 JUL 0212	45	0.	*	27 JUL 0815	166	0.	*	27 JUL 1418	287	0.	*	27 JUL 2021	408	0.
27 JUL 0215	46	0.	*	27 JUL 0818	167	0.	*	27 JUL 1421	288	0.	*	27 JUL 2024	409	0.
27 JUL 0218	47	0.	*	27 JUL 0821	168	0.	*	27 JUL 1424	289	0.	*	27 JUL 2027	410	0.
27 JUL 0221	48	0.	*	27 JUL 0824	169	0.	*	27 JUL 1427	290	0.	*	27 JUL 2030	411	0.
27 JUL 0224	49	0.	*	27 JUL 0827	170	0.	*	27 JUL 1430	291	0.	*	27 JUL 2033	412	0.
27 JUL 0227	50	0.	*	27 JUL 0830	171	0.	*	27 JUL 1433	292	0.	*	27 JUL 2036	413	0.
27 JUL 0230	51	0.	*	27 JUL 0833	172	0.	*	27 JUL 1436	293	0.	*	27 JUL 2039	414	0.
27 JUL 0233	52	0.	*	27 JUL 0836	173	0.	*	27 JUL 1439	294	0.	*	27 JUL 2042	415	0.
27 JUL 0236	53	0.	*	27 JUL 0839	174	0.	*	27 JUL 1442	295	0.	*	27 JUL 2045	416	0.
27 JUL 0239	54	0.	*	27 JUL 0842	175	0.	*	27 JUL 1445	296	0.	*	27 JUL 2048	417	0.
27 JUL 0242	55	0.	*	27 JUL 0845	176	0.	*	27 JUL 1448	297	0.	*	27 JUL 2051	418	0.
27 JUL 0245	56	0.	*	27 JUL 0848	177	0.	*	27 JUL 1451	298	0.	*	27 JUL 2054	419	0.
27 JUL 0248	57	0.	*	27 JUL 0851	178	0.	*	27 JUL 1454	299	0.	*	27 JUL 2057	420	0.
27 JUL 0251	58	0.	*	27 JUL 0854	179	0.	*	27 JUL 1457	300	0.	*	27 JUL 2100	421	0.

2[illegible] JUL 0[illegible]	60	[illegible]	*	[illegible] JUL [illegible]00	[illegible]	[illegible]	[illegible]	27 150[illegible]	[illegible]02	0.	*	[illegible]	42[illegible]	[illegible]
27 JUL 0300	61	0.	*	27 JUL 0903	182	0.	*	27 JUL 1506	303	0.	*	27 JUL 2109	424	0.
27 JUL 0303	62	0.	*	27 JUL 0906	183	0.	*	27 JUL 1509	304	0.	*	27 JUL 2112	425	0.
27 JUL 0306	63	0.	*	27 JUL 0909	184	0.	*	27 JUL 1512	305	0.	*	27 JUL 2115	426	0.
27 JUL 0309	64	0.	*	27 JUL 0912	185	0.	*	27 JUL 1515	306	0.	*	27 JUL 2118	427	0.
27 JUL 0312	65	0.	*	27 JUL 0915	186	0.	*	27 JUL 1518	307	0.	*	27 JUL 2121	428	0.
27 JUL 0315	66	0.	*	27 JUL 0918	187	0.	*	27 JUL 1521	308	0.	*	27 JUL 2124	429	0.
27 JUL 0318	67	0.	*	27 JUL 0921	188	0.	*	27 JUL 1524	309	0.	*	27 JUL 2127	430	0.
27 JUL 0321	68	0.	*	27 JUL 0924	189	0.	*	27 JUL 1527	310	0.	*	27 JUL 2130	431	0.
27 JUL 0324	69	0.	*	27 JUL 0927	190	0.	*	27 JUL 1530	311	0.	*	27 JUL 2133	432	0.
27 JUL 0327	70	0.	*	27 JUL 0930	191	0.	*	27 JUL 1533	312	0.	*	27 JUL 2136	433	0.
27 JUL 0330	71	0.	*	27 JUL 0933	192	0.	*	27 JUL 1536	313	0.	*	27 JUL 2139	434	0.
27 JUL 0333	72	0.	*	27 JUL 0936	193	0.	*	27 JUL 1539	314	0.	*	27 JUL 2142	435	0.
27 JUL 0336	73	0.	*	27 JUL 0939	194	0.	*	27 JUL 1542	315	0.	*	27 JUL 2145	436	0.
27 JUL 0339	74	0.	*	27 JUL 0942	195	0.	*	27 JUL 1545	316	0.	*	27 JUL 2148	437	0.
27 JUL 0342	75	0.	*	27 JUL 0945	196	0.	*	27 JUL 1548	317	0.	*	27 JUL 2151	438	0.
27 JUL 0345	76	0.	*	27 JUL 0948	197	0.	*	27 JUL 1551	318	0.	*	27 JUL 2154	439	0.
27 JUL 0348	77	0.	*	27 JUL 0951	198	0.	*	27 JUL 1554	319	0.	*	27 JUL 2157	440	0.
27 JUL 0351	78	0.	*	27 JUL 0954	199	0.	*	27 JUL 1557	320	0.	*	27 JUL 2200	441	0.
27 JUL 0354	79	0.	*	27 JUL 0957	200	0.	*	27 JUL 1600	321	0.	*	27 JUL 2203	442	0.
27 JUL 0357	80	0.	*	27 JUL 1000	201	0.	*	27 JUL 1603	322	0.	*	27 JUL 2206	443	0.
27 JUL 0400	81	0.	*	27 JUL 1003	202	0.	*	27 JUL 1606	323	0.	*	27 JUL 2209	444	0.
27 JUL 0403	82	0.	*	27 JUL 1006	203	0.	*	27 JUL 1609	324	0.	*	27 JUL 2212	445	0.
27 JUL 0406	83	0.	*	27 JUL 1009	204	0.	*	27 JUL 1612	325	0.	*	27 JUL 2215	446	0.
27 JUL 0409	84	0.	*	27 JUL 1012	205	0.	*	27 JUL 1615	326	0.	*	27 JUL 2218	447	0.
27 JUL 0412	85	0.	*	27 JUL 1015	206	0.	*	27 JUL 1618	327	0.	*	27 JUL 2221	448	0.
27 JUL 0415	86	0.	*	27 JUL 1018	207	0.	*	27 JUL 1621	328	0.	*	27 JUL 2224	449	0.
27 JUL 0418	87	0.	*	27 JUL 1021	208	0.	*	27 JUL 1624	329	0.	*	27 JUL 2227	450	0.
27 JUL 0421	88	0.	*	27 JUL 1024	209	0.	*	27 JUL 1627	330	0.	*	27 JUL 2230	451	0.
27 JUL 0424	89	0.	*	27 JUL 1027	210	0.	*	27 JUL 1630	331	0.	*	27 JUL 2233	452	0.
27 JUL 0427	90	0.	*	27 JUL 1030	211	0.	*	27 JUL 1633	332	0.	*	27 JUL 2236	453	0.
27 JUL 0430	91	0.	*	27 JUL 1033	212	0.	*	27 JUL 1636	333	0.	*	27 JUL 2239	454	0.
27 JUL 0433	92	0.	*	27 JUL 1036	213	0.	*	27 JUL 1639	334	0.	*	27 JUL 2242	455	0.
27 JUL 0436	93	0.	*	27 JUL 1039	214	0.	*	27 JUL 1642	335	0.	*	27 JUL 2245	456	0.
27 JUL 0439	94	0.	*	27 JUL 1042	215	0.	*	27 JUL 1645	336	0.	*	27 JUL 2248	457	0.
27 JUL 0442	95	0.	*	27 JUL 1045	216	0.	*	27 JUL 1648	337	0.	*	27 JUL 2251	458	0.
27 JUL 0445	96	0.	*	27 JUL 1048	217	0.	*	27 JUL 1651	338	0.	*	27 JUL 2254	459	0.
27 JUL 0448	97	0.	*	27 JUL 1051	218	0.	*	27 JUL 1654	339	0.	*	27 JUL 2257	460	0.
27 JUL 0451	98	0.	*	27 JUL 1054	219	0.	*	27 JUL 1657	340	0.	*	27 JUL 2300	461	0.
27 JUL 0454	99	0.	*	27 JUL 1057	220	0.	*	27 JUL 1700	341	0.	*	27 JUL 2303	462	0.
27 JUL 0457	100	0.	*	27 JUL 1100	221	0.	*	27 JUL 1703	342	0.	*	27 JUL 2306	463	0.
27 JUL 0500	101	0.	*	27 JUL 1103	222	0.	*	27 JUL 1706	343	0.	*	27 JUL 2309	464	0.
27 JUL 0503	102	0.	*	27 JUL 1106	223	0.	*	27 JUL 1709	344	0.	*	27 JUL 2312	465	0.
27 JUL 0506	103	0.	*	27 JUL 1109	224	0.	*	27 JUL 1712	345	0.	*	27 JUL 2315	466	0.
27 JUL 0509	104	0.	*	27 JUL 1112	225	0.	*	27 JUL 1715	346	0.	*	27 JUL 2318	467	0.
27 JUL 0512	105	0.	*	27 JUL 1115	226	0.	*	27 JUL 1718	347	0.	*	27 JUL 2321	468	0.
27 JUL 0515	106	0.	*	27 JUL 1118	227	0.	*	27 JUL 1721	348	0.	*	27 JUL 2324	469	0.
27 JUL 0518	107	0.	*	27 JUL 1121	228	0.	*	27 JUL 1724	349	0.	*	27 JUL 2327	470	0.
27 JUL 0521	108	0.	*	27 JUL 1124	229	0.	*	27 JUL 1727	350	0.	*	27 JUL 2330	471	0.
27 JUL 0524	109	0.	*	27 JUL 1127	230	0.	*	27 JUL 1730	351	0.	*	27 JUL 2333	472	0.
27 JUL 0527	110	0.	*	27 JUL 1130	231	0.	*	27 JUL 1733	352	0.	*	27 JUL 2336	473	0.
27 JUL 0530	111	0.	*	27 JUL 1133	232	0.	*	27 JUL 1736	353	0.	*	27 JUL 2339	474	0.
27 JUL 0533	112	0.	*	27 JUL 1136	233	0.	*	27 JUL 1739	354	0.	*	27 JUL 2342	475	0.
27 JUL 0536	113	0.	*	27 JUL 1139	234	0.	*	27 JUL 1742	355	0.	*	27 JUL 2345	476	0.
27 JUL 0539	114	0.	*	27 JUL 1142	235	0.	*	27 JUL 1745	356	0.	*	27 JUL 2348	477	0.
27 JUL 0542	115	0.	*	27 JUL 1145	236	0.	*	27 JUL 1748	357	0.	*	27 JUL 2351	478	0.
27 JUL 0545	116	0.	*	27 JUL 1148	237	0.	*	27 JUL 1751	358	0.	*	27 JUL 2354	479	0.
27 JUL 0548	117	0.	*	27 JUL 1151	238	0.	*	27 JUL 1754	359	0.	*	27 JUL 2357	480	0.
27 JUL 0551	118	0.	*	27 JUL 1154	239	0.	*	27 JUL 1757	360	0.	*	28 JUL 0000	481	0.

```
 2    L 0     11
 2    L 05    120                *    JUL   0                       27     1805   2          0.
27 JUL 0600   121          0.    *  27 JUL 1203  242               *27 JUL 1806  363          0.
                                 *                                 *
*******************************************************************************************************************************
```

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)					
		(CFS)				
2.	12.05		0.	0.	0.	0.
		(INCHES)	0.171	0.249	0.249	0.249
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.02 SQ MI

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
189 KK      *   pond 2   *
            *            *
            **************

191 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           0  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         481  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.050  TIME INTERVAL IN HOURS

               HYDROGRAPH ROUTING DATA

192 RS           STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC        0.00  INITIAL CONDITION
                           X        0.00 WORKING R AND D COEFFICIENT

193 SA                AREA         0.0        0.0

194 SE           ELEVATION     4779.70    4780.05

195 SL           LOW-LEVEL OUTLET
                       ELEVL     4779.80  ELEVATION AT CENTER OF OUTLET
                       CAREA        1.23  CROSS-SECTIONAL AREA
                        COQL        0.60  COEFFICIENT
                        EXPL        0.50  EXPONENT OF HEAD
```

```
196            SI    AY
                 CRE      4[illegible]00  [illegible]LWA[illegible] EST [illegible]ATI
               SPWID          9.00  SPILLWAY WIDTH
                COQW          2.80  WEIR COEFFICIENT
                EXPW          1.50  EXPONENT OF HEAD
```

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.00
ELEVATION	4779.70	4780.05

COMPUTED OUTFLOW-ELEVATION DATA

OUTFLOW	0.00	0.00	3.99	3.72	3.49	3.28	3.09	2.93	2.78	2.65
ELEVATION	4779.70	4779.80	4780.25	4780.20	4780.15	4780.11	4780.07	4780.04	4780.02	4780.00
OUTFLOW	3.00	3.02	3.04	3.07	3.10	3.12	3.15	3.18	3.21	3.24
ELEVATION	4780.03	4780.03	4780.04	4780.04	4780.04	4780.04	4780.04	4780.05	4780.05	4780.05

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.00	0.00	0.01
OUTFLOW	0.00	0.00	3.24	7.24
ELEVATION	4779.70	4779.80	4780.05	4780.25

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 7.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

****

HYDROGRAPH AT STATION pond 2

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
27	JUL	0000	1	0.	0.0	4779.7	*	27	JUL	0803	162	0.	0.0	4779.7	*	27	JUL	1606	323	0.	0.0	4779.8
27	JUL	0003	2	0.	0.0	4779.7	*	27	JUL	0806	163	0.	0.0	4779.7	*	27	JUL	1609	324	0.	0.0	4779.8
27	JUL	0006	3	0.	0.0	4779.7	*	27	JUL	0809	164	0.	0.0	4779.7	*	27	JUL	1612	325	0.	0.0	4779.8
27	JUL	0009	4	0.	0.0	4779.7	*	27	JUL	0812	165	0.	0.0	4779.7	*	27	JUL	1615	326	0.	0.0	4779.8
27	JUL	0012	5	0.	0.0	4779.7	*	27	JUL	0815	166	0.	0.0	4779.7	*	27	JUL	1618	327	0.	0.0	4779.8
27	JUL	0015	6	0.	0.0	4779.7	*	27	JUL	0818	167	0.	0.0	4779.7	*	27	JUL	1621	328	0.	0.0	4779.8
27	JUL	0018	7	0.	0.0	4779.7	*	27	JUL	0821	168	0.	0.0	4779.7	*	27	JUL	1624	329	0.	0.0	4779.8
27	JUL	0021	8	0.	0.0	4779.7	*	27	JUL	0824	169	0.	0.0	4779.7	*	27	JUL	1627	330	0.	0.0	4779.8
27	JUL	0024	9	0.	0.0	4779.7	*	27	JUL	0827	170	0.	0.0	4779.7	*	27	JUL	1630	331	0.	0.0	4779.8
27	JUL	0027	10	0.	0.0	4779.7	*	27	JUL	0830	171	0.	0.0	4779.7	*	27	JUL	1633	332	0.	0.0	4779.8
27	JUL	0030	11	0.	0.0	4779.7	*	27	JUL	0833	172	0.	0.0	4779.7	*	27	JUL	1636	333	0.	0.0	4779.8
27	JUL	0033	12	0.	0.0	4779.7	*	27	JUL	0836	173	0.	0.0	4779.7	*	27	JUL	1639	334	0.	0.0	4779.8
27	JUL	0036	13	0.	0.0	4779.7	*	27	JUL	0839	174	0.	0.0	4779.7	*	27	JUL	1642	335	0.	0.0	4779.8
27	JUL	0039	14	0.	0.0	4779.7	*	27	JUL	0842	175	0.	0.0	4779.7	*	27	JUL	1645	336	0.	0.0	4779.8
27	JUL	0042	15	0.	0.0	4779.7	*	27	JUL	0845	176	0.	0.0	4779.7	*	27	JUL	1648	337	0.	0.0	4779.8
27	JUL	0045	16	0.	0.0	4779.7	*	27	JUL	0848	177	0.	0.0	4779.7	*	27	JUL	1651	338	0.	0.0	4779.8
27	JUL	0048	17	0.	0.0	4779.7	*	27	JUL	0851	178	0.	0.0	4779.7	*	27	JUL	1654	339	0.	0.0	4779.8
27	JUL	0051	18	0.	0.0	4779.7	*	27	JUL	0854	179	0.	0.0	4779.7	*	27	JUL	1657	340	0.	0.0	4779.8
27	JUL	0054	19	0.	0.0	4779.7	*	27	JUL	0857	180	0.	0.0	4779.7	*	27	JUL	1700	341	0.	0.0	4779.8
27	JUL	0057	20	0.	0.0	4779.7	*	27	JUL	0900	181	0.	0.0	4779.7	*	27	JUL	1703	342	0.	0.0	4779.8
27	JUL	0100	21	0.	0.0	4779.7	*	27	JUL	0903	182	0.	0.0	4779.7	*	27	JUL	1706	343	0.	0.0	4779.8
27	JUL	0103	22	0.	0.0	4779.7	*	27	JUL	0906	183	0.	0.0	4779.7	*	27	JUL	1709	344	0.	0.0	4779.8

27 [illegible] 010[illegible]	3	0.	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27 [illegible] 010[illegible]	4	0.	0.0	[illegible]79.		27 [illegible] [illegible]912	[illegible]	[illegible]	[illegible].0	[illegible].7		[illegible] JUL [illegible]5	3[illegible]	[illegible]	[illegible]	4[illegible]
27 JUL 0112	25	0.	0.0	4779.7	*	27 JUL 0915	186	0.	0.0	4779.7	*	27 JUL 1718	347	0.	0.0	4779.8
27 JUL 0115	26	0.	0.0	4779.7	*	27 JUL 0918	187	0.	0.0	4779.7	*	27 JUL 1721	348	0.	0.0	4779.8
27 JUL 0118	27	0.	0.0	4779.7	*	27 JUL 0921	188	0.	0.0	4779.7	*	27 JUL 1724	349	0.	0.0	4779.8
27 JUL 0121	28	0.	0.0	4779.7	*	27 JUL 0924	189	0.	0.0	4779.7	*	27 JUL 1727	350	0.	0.0	4779.8
27 JUL 0124	29	0.	0.0	4779.7	*	27 JUL 0927	190	0.	0.0	4779.7	*	27 JUL 1730	351	0.	0.0	4779.8
27 JUL 0127	30	0.	0.0	4779.7	*	27 JUL 0930	191	0.	0.0	4779.7	*	27 JUL 1733	352	0.	0.0	4779.8
27 JUL 0130	31	0.	0.0	4779.7	*	27 JUL 0933	192	0.	0.0	4779.7	*	27 JUL 1736	353	0.	0.0	4779.8
27 JUL 0133	32	0.	0.0	4779.7	*	27 JUL 0936	193	0.	0.0	4779.7	*	27 JUL 1739	354	0.	0.0	4779.8
27 JUL 0136	33	0.	0.0	4779.7	*	27 JUL 0939	194	0.	0.0	4779.7	*	27 JUL 1742	355	0.	0.0	4779.8
27 JUL 0139	34	0.	0.0	4779.7	*	27 JUL 0942	195	0.	0.0	4779.7	*	27 JUL 1745	356	0.	0.0	4779.8
27 JUL 0142	35	0.	0.0	4779.7	*	27 JUL 0945	196	0.	0.0	4779.7	*	27 JUL 1748	357	0.	0.0	4779.8
27 JUL 0145	36	0.	0.0	4779.7	*	27 JUL 0948	197	0.	0.0	4779.7	*	27 JUL 1751	358	0.	0.0	4779.8
27 JUL 0148	37	0.	0.0	4779.7	*	27 JUL 0951	198	0.	0.0	4779.7	*	27 JUL 1754	359	0.	0.0	4779.8
27 JUL 0151	38	0.	0.0	4779.7	*	27 JUL 0954	199	0.	0.0	4779.7	*	27 JUL 1757	360	0.	0.0	4779.8
27 JUL 0154	39	0.	0.0	4779.7	*	27 JUL 0957	200	0.	0.0	4779.7	*	27 JUL 1800	361	0.	0.0	4779.8
27 JUL 0157	40	0.	0.0	4779.7	*	27 JUL 1000	201	0.	0.0	4779.7	*	27 JUL 1803	362	0.	0.0	4779.8
27 JUL 0200	41	0.	0.0	4779.7	*	27 JUL 1003	202	0.	0.0	4779.7	*	27 JUL 1806	363	0.	0.0	4779.8
27 JUL 0203	42	0.	0.0	4779.7	*	27 JUL 1006	203	0.	0.0	4779.7	*	27 JUL 1809	364	0.	0.0	4779.8
27 JUL 0206	43	0.	0.0	4779.7	*	27 JUL 1009	204	0.	0.0	4779.7	*	27 JUL 1812	365	0.	0.0	4779.8
27 JUL 0209	44	0.	0.0	4779.7	*	27 JUL 1012	205	0.	0.0	4779.7	*	27 JUL 1815	366	0.	0.0	4779.8
27 JUL 0212	45	0.	0.0	4779.7	*	27 JUL 1015	206	0.	0.0	4779.7	*	27 JUL 1818	367	0.	0.0	4779.8
27 JUL 0215	46	0.	0.0	4779.7	*	27 JUL 1018	207	0.	0.0	4779.7	*	27 JUL 1821	368	0.	0.0	4779.8
27 JUL 0218	47	0.	0.0	4779.7	*	27 JUL 1021	208	0.	0.0	4779.7	*	27 JUL 1824	369	0.	0.0	4779.8
27 JUL 0221	48	0.	0.0	4779.7	*	27 JUL 1024	209	0.	0.0	4779.7	*	27 JUL 1827	370	0.	0.0	4779.8
27 JUL 0224	49	0.	0.0	4779.7	*	27 JUL 1027	210	0.	0.0	4779.7	*	27 JUL 1830	371	0.	0.0	4779.8
27 JUL 0227	50	0.	0.0	4779.7	*	27 JUL 1030	211	0.	0.0	4779.7	*	27 JUL 1833	372	0.	0.0	4779.8
27 JUL 0230	51	0.	0.0	4779.7	*	27 JUL 1033	212	0.	0.0	4779.7	*	27 JUL 1836	373	0.	0.0	4779.8
27 JUL 0233	52	0.	0.0	4779.7	*	27 JUL 1036	213	0.	0.0	4779.7	*	27 JUL 1839	374	0.	0.0	4779.8
27 JUL 0236	53	0.	0.0	4779.7	*	27 JUL 1039	214	0.	0.0	4779.7	*	27 JUL 1842	375	0.	0.0	4779.8
27 JUL 0239	54	0.	0.0	4779.7	*	27 JUL 1042	215	0.	0.0	4779.7	*	27 JUL 1845	376	0.	0.0	4779.8
27 JUL 0242	55	0.	0.0	4779.7	*	27 JUL 1045	216	0.	0.0	4779.7	*	27 JUL 1848	377	0.	0.0	4779.8
27 JUL 0245	56	0.	0.0	4779.7	*	27 JUL 1048	217	0.	0.0	4779.7	*	27 JUL 1851	378	0.	0.0	4779.8
27 JUL 0248	57	0.	0.0	4779.7	*	27 JUL 1051	218	0.	0.0	4779.7	*	27 JUL 1854	379	0.	0.0	4779.8
27 JUL 0251	58	0.	0.0	4779.7	*	27 JUL 1054	219	0.	0.0	4779.7	*	27 JUL 1857	380	0.	0.0	4779.8
27 JUL 0254	59	0.	0.0	4779.7	*	27 JUL 1057	220	0.	0.0	4779.7	*	27 JUL 1900	381	0.	0.0	4779.8
27 JUL 0257	60	0.	0.0	4779.7	*	27 JUL 1100	221	0.	0.0	4779.7	*	27 JUL 1903	382	0.	0.0	4779.8
27 JUL 0300	61	0.	0.0	4779.7	*	27 JUL 1103	222	0.	0.0	4779.7	*	27 JUL 1906	383	0.	0.0	4779.8
27 JUL 0303	62	0.	0.0	4779.7	*	27 JUL 1106	223	0.	0.0	4779.7	*	27 JUL 1909	384	0.	0.0	4779.8
27 JUL 0306	63	0.	0.0	4779.7	*	27 JUL 1109	224	0.	0.0	4779.7	*	27 JUL 1912	385	0.	0.0	4779.8
27 JUL 0309	64	0.	0.0	4779.7	*	27 JUL 1112	225	0.	0.0	4779.7	*	27 JUL 1915	386	0.	0.0	4779.8
27 JUL 0312	65	0.	0.0	4779.7	*	27 JUL 1115	226	0.	0.0	4779.7	*	27 JUL 1918	387	0.	0.0	4779.8
27 JUL 0315	66	0.	0.0	4779.7	*	27 JUL 1118	227	0.	0.0	4779.7	*	27 JUL 1921	388	0.	0.0	4779.8
27 JUL 0318	67	0.	0.0	4779.7	*	27 JUL 1121	228	0.	0.0	4779.7	*	27 JUL 1924	389	0.	0.0	4779.8
27 JUL 0321	68	0.	0.0	4779.7	*	27 JUL 1124	229	0.	0.0	4779.7	*	27 JUL 1927	390	0.	0.0	4779.8
27 JUL 0324	69	0.	0.0	4779.7	*	27 JUL 1127	230	0.	0.0	4779.7	*	27 JUL 1930	391	0.	0.0	4779.8
27 JUL 0327	70	0.	0.0	4779.7	*	27 JUL 1130	231	0.	0.0	4779.7	*	27 JUL 1933	392	0.	0.0	4779.8
27 JUL 0330	71	0.	0.0	4779.7	*	27 JUL 1133	232	0.	0.0	4779.7	*	27 JUL 1936	393	0.	0.0	4779.8
27 JUL 0333	72	0.	0.0	4779.7	*	27 JUL 1136	233	0.	0.0	4779.7	*	27 JUL 1939	394	0.	0.0	4779.8
27 JUL 0336	73	0.	0.0	4779.7	*	27 JUL 1139	234	0.	0.0	4779.7	*	27 JUL 1942	395	0.	0.0	4779.8
27 JUL 0339	74	0.	0.0	4779.7	*	27 JUL 1142	235	0.	0.0	4779.7	*	27 JUL 1945	396	0.	0.0	4779.8
27 JUL 0342	75	0.	0.0	4779.7	*	27 JUL 1145	236	0.	0.0	4779.7	*	27 JUL 1948	397	0.	0.0	4779.8
27 JUL 0345	76	0.	0.0	4779.7	*	27 JUL 1148	237	0.	0.0	4779.7	*	27 JUL 1951	398	0.	0.0	4779.8
27 JUL 0348	77	0.	0.0	4779.7	*	27 JUL 1151	238	0.	0.0	4779.7	*	27 JUL 1954	399	0.	0.0	4779.8
27 JUL 0351	78	0.	0.0	4779.7	*	27 JUL 1154	239	0.	0.0	4779.8	*	27 JUL 1957	400	0.	0.0	4779.8
27 JUL 0354	79	0.	0.0	4779.7	*	27 JUL 1157	240	0.	0.0	4779.8	*	27 JUL 2000	401	0.	0.0	4779.8
27 JUL 0357	80	0.	0.0	4779.7	*	27 JUL 1200	241	1.	0.0	4779.9	*	27 JUL 2003	402	0.	0.0	4779.8
27 JUL 0400	81	0.	0.0	4779.7	*	27 JUL 1203	242	2.	0.0	4779.9	*	27 JUL 2006	403	0.	0.0	4779.8
27 JUL 0403	82	0.	0.0	4779.7	*	27 JUL 1206	243	1.	0.0	4779.9	*	27 JUL 2009	404	0.	0.0	4779.8

27 [illegible]	040[illegible]	3	0.	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27 [illegible]	040[illegible]	[illegible]4	0.	0.0	[illegible]79.7	[illegible]	27 J[illegible]	[illegible]212	[illegible]	[illegible]	[illegible].0	[illegible].9	[illegible]	[illegible] JUL	[illegible]5	4[illegible]	[illegible]	[illegible]	4[illegible]
27 JUL	0412	85	0.	0.0	4779.7	*	27 JUL	1215	246	1.	0.0	4779.9	*	27 JUL	2018	407	0.	0.0	4779.8
27 JUL	0415	86	0.	0.0	4779.7	*	27 JUL	1218	247	1.	0.0	4779.9	*	27 JUL	2021	408	0.	0.0	4779.8
27 JUL	0418	87	0.	0.0	4779.7	*	27 JUL	1221	248	1.	0.0	4779.9	*	27 JUL	2024	409	0.	0.0	4779.8
27 JUL	0421	88	0.	0.0	4779.7	*	27 JUL	1224	249	1.	0.0	4779.9	*	27 JUL	2027	410	0.	0.0	4779.8
27 JUL	0424	89	0.	0.0	4779.7	*	27 JUL	1227	250	1.	0.0	4779.8	*	27 JUL	2030	411	0.	0.0	4779.8
27 JUL	0427	90	0.	0.0	4779.7	*	27 JUL	1230	251	1.	0.0	4779.8	*	27 JUL	2033	412	0.	0.0	4779.8
27 JUL	0430	91	0.	0.0	4779.7	*	27 JUL	1233	252	1.	0.0	4779.8	*	27 JUL	2036	413	0.	0.0	4779.8
27 JUL	0433	92	0.	0.0	4779.7	*	27 JUL	1236	253	1.	0.0	4779.8	*	27 JUL	2039	414	0.	0.0	4779.8
27 JUL	0436	93	0.	0.0	4779.7	*	27 JUL	1239	254	1.	0.0	4779.8	*	27 JUL	2042	415	0.	0.0	4779.8
27 JUL	0439	94	0.	0.0	4779.7	*	27 JUL	1242	255	1.	0.0	4779.8	*	27 JUL	2045	416	0.	0.0	4779.8
27 JUL	0442	95	0.	0.0	4779.7	*	27 JUL	1245	256	0.	0.0	4779.8	*	27 JUL	2048	417	0.	0.0	4779.8
27 JUL	0445	96	0.	0.0	4779.7	*	27 JUL	1248	257	0.	0.0	4779.8	*	27 JUL	2051	418	0.	0.0	4779.8
27 JUL	0448	97	0.	0.0	4779.7	*	27 JUL	1251	258	0.	0.0	4779.8	*	27 JUL	2054	419	0.	0.0	4779.8
27 JUL	0451	98	0.	0.0	4779.7	*	27 JUL	1254	259	0.	0.0	4779.8	*	27 JUL	2057	420	0.	0.0	4779.8
27 JUL	0454	99	0.	0.0	4779.7	*	27 JUL	1257	260	0.	0.0	4779.8	*	27 JUL	2100	421	0.	0.0	4779.8
27 JUL	0457	100	0.	0.0	4779.7	*	27 JUL	1300	261	0.	0.0	4779.8	*	27 JUL	2103	422	0.	0.0	4779.8
27 JUL	0500	101	0.	0.0	4779.7	*	27 JUL	1303	262	0.	0.0	4779.8	*	27 JUL	2106	423	0.	0.0	4779.8
27 JUL	0503	102	0.	0.0	4779.7	*	27 JUL	1306	263	0.	0.0	4779.8	*	27 JUL	2109	424	0.	0.0	4779.8
27 JUL	0506	103	0.	0.0	4779.7	*	27 JUL	1309	264	0.	0.0	4779.8	*	27 JUL	2112	425	0.	0.0	4779.8
27 JUL	0509	104	0.	0.0	4779.7	*	27 JUL	1312	265	0.	0.0	4779.8	*	27 JUL	2115	426	0.	0.0	4779.8
27 JUL	0512	105	0.	0.0	4779.7	*	27 JUL	1315	266	0.	0.0	4779.8	*	27 JUL	2118	427	0.	0.0	4779.8
27 JUL	0515	106	0.	0.0	4779.7	*	27 JUL	1318	267	0.	0.0	4779.8	*	27 JUL	2121	428	0.	0.0	4779.8
27 JUL	0518	107	0.	0.0	4779.7	*	27 JUL	1321	268	0.	0.0	4779.8	*	27 JUL	2124	429	0.	0.0	4779.8
27 JUL	0521	108	0.	0.0	4779.7	*	27 JUL	1324	269	0.	0.0	4779.8	*	27 JUL	2127	430	0.	0.0	4779.8
27 JUL	0524	109	0.	0.0	4779.7	*	27 JUL	1327	270	0.	0.0	4779.8	*	27 JUL	2130	431	0.	0.0	4779.8
27 JUL	0527	110	0.	0.0	4779.7	*	27 JUL	1330	271	0.	0.0	4779.8	*	27 JUL	2133	432	0.	0.0	4779.8
27 JUL	0530	111	0.	0.0	4779.7	*	27 JUL	1333	272	0.	0.0	4779.8	*	27 JUL	2136	433	0.	0.0	4779.8
27 JUL	0533	112	0.	0.0	4779.7	*	27 JUL	1336	273	0.	0.0	4779.8	*	27 JUL	2139	434	0.	0.0	4779.8
27 JUL	0536	113	0.	0.0	4779.7	*	27 JUL	1339	274	0.	0.0	4779.8	*	27 JUL	2142	435	0.	0.0	4779.8
27 JUL	0539	114	0.	0.0	4779.7	*	27 JUL	1342	275	0.	0.0	4779.8	*	27 JUL	2145	436	0.	0.0	4779.8
27 JUL	0542	115	0.	0.0	4779.7	*	27 JUL	1345	276	0.	0.0	4779.8	*	27 JUL	2148	437	0.	0.0	4779.8
27 JUL	0545	116	0.	0.0	4779.7	*	27 JUL	1348	277	0.	0.0	4779.8	*	27 JUL	2151	438	0.	0.0	4779.8
27 JUL	0548	117	0.	0.0	4779.7	*	27 JUL	1351	278	0.	0.0	4779.8	*	27 JUL	2154	439	0.	0.0	4779.8
27 JUL	0551	118	0.	0.0	4779.7	*	27 JUL	1354	279	0.	0.0	4779.8	*	27 JUL	2157	440	0.	0.0	4779.8
27 JUL	0554	119	0.	0.0	4779.7	*	27 JUL	1357	280	0.	0.0	4779.8	*	27 JUL	2200	441	0.	0.0	4779.8
27 JUL	0557	120	0.	0.0	4779.7	*	27 JUL	1400	281	0.	0.0	4779.8	*	27 JUL	2203	442	0.	0.0	4779.8
27 JUL	0600	121	0.	0.0	4779.7	*	27 JUL	1403	282	0.	0.0	4779.8	*	27 JUL	2206	443	0.	0.0	4779.8
27 JUL	0603	122	0.	0.0	4779.7	*	27 JUL	1406	283	0.	0.0	4779.8	*	27 JUL	2209	444	0.	0.0	4779.8
27 JUL	0606	123	0.	0.0	4779.7	*	27 JUL	1409	284	0.	0.0	4779.8	*	27 JUL	2212	445	0.	0.0	4779.8
27 JUL	0609	124	0.	0.0	4779.7	*	27 JUL	1412	285	0.	0.0	4779.8	*	27 JUL	2215	446	0.	0.0	4779.8
27 JUL	0612	125	0.	0.0	4779.7	*	27 JUL	1415	286	0.	0.0	4779.8	*	27 JUL	2218	447	0.	0.0	4779.8
27 JUL	0615	126	0.	0.0	4779.7	*	27 JUL	1418	287	0.	0.0	4779.8	*	27 JUL	2221	448	0.	0.0	4779.8
27 JUL	0618	127	0.	0.0	4779.7	*	27 JUL	1421	288	0.	0.0	4779.8	*	27 JUL	2224	449	0.	0.0	4779.8
27 JUL	0621	128	0.	0.0	4779.7	*	27 JUL	1424	289	0.	0.0	4779.8	*	27 JUL	2227	450	0.	0.0	4779.8
27 JUL	0624	129	0.	0.0	4779.7	*	27 JUL	1427	290	0.	0.0	4779.8	*	27 JUL	2230	451	0.	0.0	4779.8
27 JUL	0627	130	0.	0.0	4779.7	*	27 JUL	1430	291	0.	0.0	4779.8	*	27 JUL	2233	452	0.	0.0	4779.8
27 JUL	0630	131	0.	0.0	4779.7	*	27 JUL	1433	292	0.	0.0	4779.8	*	27 JUL	2236	453	0.	0.0	4779.8
27 JUL	0633	132	0.	0.0	4779.7	*	27 JUL	1436	293	0.	0.0	4779.8	*	27 JUL	2239	454	0.	0.0	4779.8
27 JUL	0636	133	0.	0.0	4779.7	*	27 JUL	1439	294	0.	0.0	4779.8	*	27 JUL	2242	455	0.	0.0	4779.8
27 JUL	0639	134	0.	0.0	4779.7	*	27 JUL	1442	295	0.	0.0	4779.8	*	27 JUL	2245	456	0.	0.0	4779.8
27 JUL	0642	135	0.	0.0	4779.7	*	27 JUL	1445	296	0.	0.0	4779.8	*	27 JUL	2248	457	0.	0.0	4779.8
27 JUL	0645	136	0.	0.0	4779.7	*	27 JUL	1448	297	0.	0.0	4779.8	*	27 JUL	2251	458	0.	0.0	4779.8
27 JUL	0648	137	0.	0.0	4779.7	*	27 JUL	1451	298	0.	0.0	4779.8	*	27 JUL	2254	459	0.	0.0	4779.8
27 JUL	0651	138	0.	0.0	4779.7	*	27 JUL	1454	299	0.	0.0	4779.8	*	27 JUL	2257	460	0.	0.0	4779.8
27 JUL	0654	139	0.	0.0	4779.7	*	27 JUL	1457	300	0.	0.0	4779.8	*	27 JUL	2300	461	0.	0.0	4779.8
27 JUL	0657	140	0.	0.0	4779.7	*	27 JUL	1500	301	0.	0.0	4779.8	*	27 JUL	2303	462	0.	0.0	4779.8
27 JUL	0700	141	0.	0.0	4779.7	*	27 JUL	1503	302	0.	0.0	4779.8	*	27 JUL	2306	463	0.	0.0	4779.8
27 JUL	0703	142	0.	0.0	4779.7	*	27 JUL	1506	303	0.	0.0	4779.8	*	27 JUL	2309	464	0.	0.0	4779.8

[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
27 [illegible] 070[illegible] [illegible]4	0.	0.0	[illegible]79.[illegible]	[illegible]	[illegible]7 [illegible] [illegible]512	[illegible]	[illegible].0	[illegible].8	[illegible]	[illegible] JUL [illegible]6 4[illegible]	[illegible]	[illegible]	[illegible]
27 JUL 0712 145	0.	0.0	4779.7	*	27 JUL 1515 306	0.	0.0	4779.8	*	27 JUL 2318 467	0.	0.0	4779.8
27 JUL 0715 146	0.	0.0	4779.7	*	27 JUL 1518 307	0.	0.0	4779.8	*	27 JUL 2321 468	0.	0.0	4779.8
27 JUL 0718 147	0.	0.0	4779.7	*	27 JUL 1521 308	0.	0.0	4779.8	*	27 JUL 2324 469	0.	0.0	4779.8
27 JUL 0721 148	0.	0.0	4779.7	*	27 JUL 1524 309	0.	0.0	4779.8	*	27 JUL 2327 470	0.	0.0	4779.8
27 JUL 0724 149	0.	0.0	4779.7	*	27 JUL 1527 310	0.	0.0	4779.8	*	27 JUL 2330 471	0.	0.0	4779.8
27 JUL 0727 150	0.	0.0	4779.7	*	27 JUL 1530 311	0.	0.0	4779.8	*	27 JUL 2333 472	0.	0.0	4779.8
27 JUL 0730 151	0.	0.0	4779.7	*	27 JUL 1533 312	0.	0.0	4779.8	*	27 JUL 2336 473	0.	0.0	4779.8
27 JUL 0733 152	0.	0.0	4779.7	*	27 JUL 1536 313	0.	0.0	4779.8	*	27 JUL 2339 474	0.	0.0	4779.8
27 JUL 0736 153	0.	0.0	4779.7	*	27 JUL 1539 314	0.	0.0	4779.8	*	27 JUL 2342 475	0.	0.0	4779.8
27 JUL 0739 154	0.	0.0	4779.7	*	27 JUL 1542 315	0.	0.0	4779.8	*	27 JUL 2345 476	0.	0.0	4779.8
27 JUL 0742 155	0.	0.0	4779.7	*	27 JUL 1545 316	0.	0.0	4779.8	*	27 JUL 2348 477	0.	0.0	4779.8
27 JUL 0745 156	0.	0.0	4779.7	*	27 JUL 1548 317	0.	0.0	4779.8	*	27 JUL 2351 478	0.	0.0	4779.8
27 JUL 0748 157	0.	0.0	4779.7	*	27 JUL 1551 318	0.	0.0	4779.8	*	27 JUL 2354 479	0.	0.0	4779.8
27 JUL 0751 158	0.	0.0	4779.7	*	27 JUL 1554 319	0.	0.0	4779.8	*	27 JUL 2357 480	0.	0.0	4779.8
27 JUL 0754 159	0.	0.0	4779.7	*	27 JUL 1557 320	0.	0.0	4779.8	*	28 JUL 0000 481	0.	0.0	4779.8
27 JUL 0757 160	0.	0.0	4779.7	*	27 JUL 1600 321	0.	0.0	4779.8	*				
27 JUL 0800 161	0.	0.0	4779.7	*	27 JUL 1603 322	0.	0.0	4779.8	*				
				*					*				

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
(CFS)	(HR)					
		(CFS)				
2.	12.05		0.	0.	0.	0.
		(INCHES)	0.171	0.249	0.249	0.249
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
(AC-FT)	(HR)				
0.	0.05	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
(FEET)	(HR)				
4779.93	12.05	4779.83	4779.76	4779.76	4779.76

CUMULATIVE AREA = 0.02 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT									
	sub 6	0.	12.00	0.	0.	0.	0.00		

RO… TO

	reach4	0.	12.05	0.	0.	0.	0.00
HYDROGRAPH AT							
	sub 7	0.	12.00	0.	0.	0.	0.00
HYDROGRAPH AT	reach5	1.	12.05	0.	0.	0.	0.01
HYDROGRAPH AT	sub 8	0.	12.00	0.	0.	0.	0.00
3 COMBINED AT	sub 9	0.	12.00	0.	0.	0.	0.00
HYDROGRAPH AT	Node16	1.	12.00	0.	0.	0.	0.01
ROUTED TO	sub 10	0.	12.00	0.	0.	0.	0.00
3 COMBINED AT							
	Node17	2.	12.05	0.	0.	0.	0.02
ROUTED TO							
	reach6	2.	12.05	0.	0.	0.	0.02
ROUTED TO							
	pond 2	2.	12.05	0.	0.	0.	0.02

4779.93 12.05

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
reach4	MANE	0.45	0.38	721.35	0.25	3.00	0.34	723.00	0.25

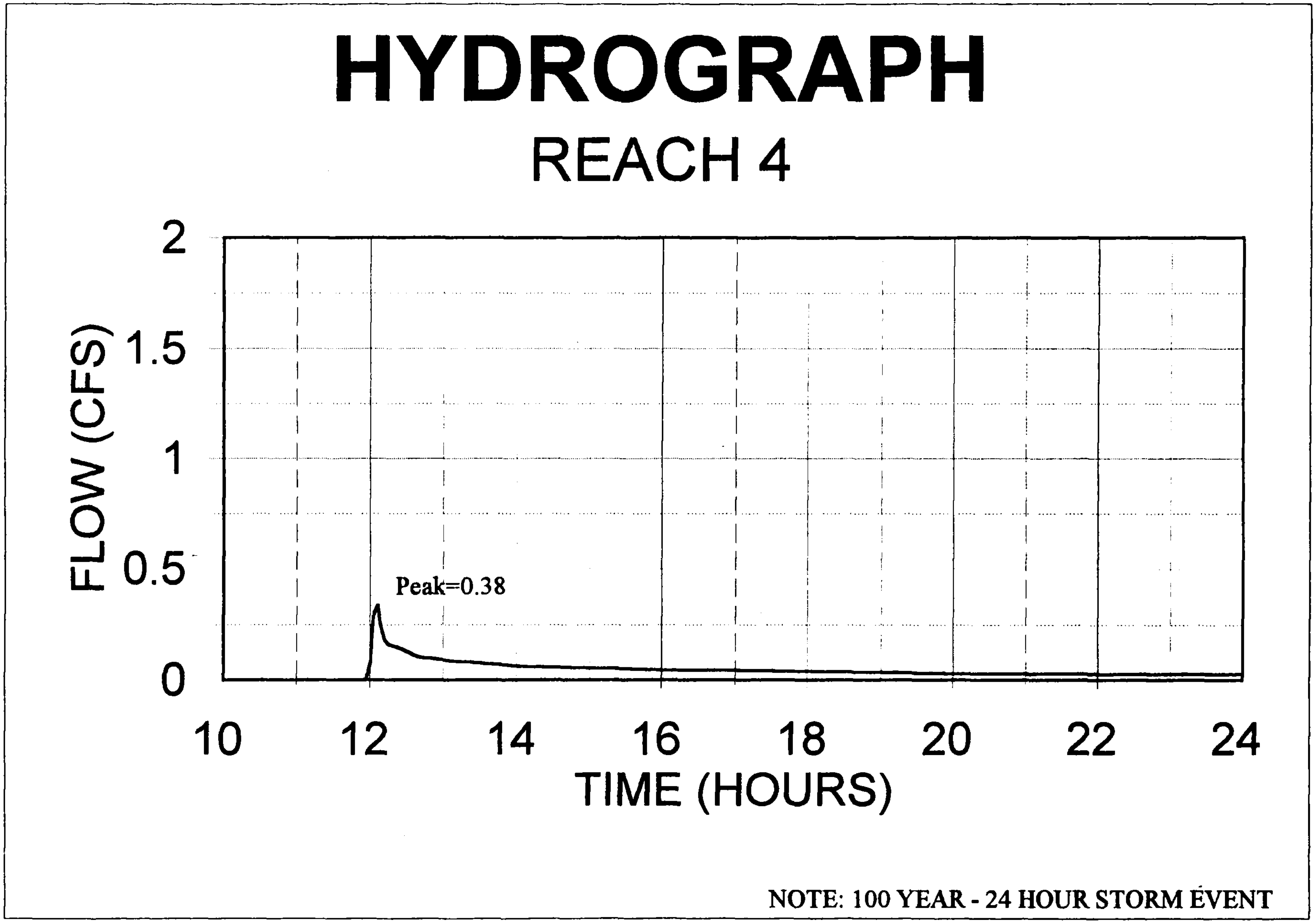
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5096E-01 EXCESS=0.0000E+00 OUTFLOW=0.5088E-01 BASIN STORAGE=0.9390E-04 PERCENT ERROR= 0.0

reach5	MANE	0.60	1.26	721.20	0.25	3.00	1.10	723.00	0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1685E+00 EXCESS=0.0000E+00 OUTFLOW=0.1683E+00 BASIN STORAGE=0.2571E-03 PERCENT ERROR= 0.0

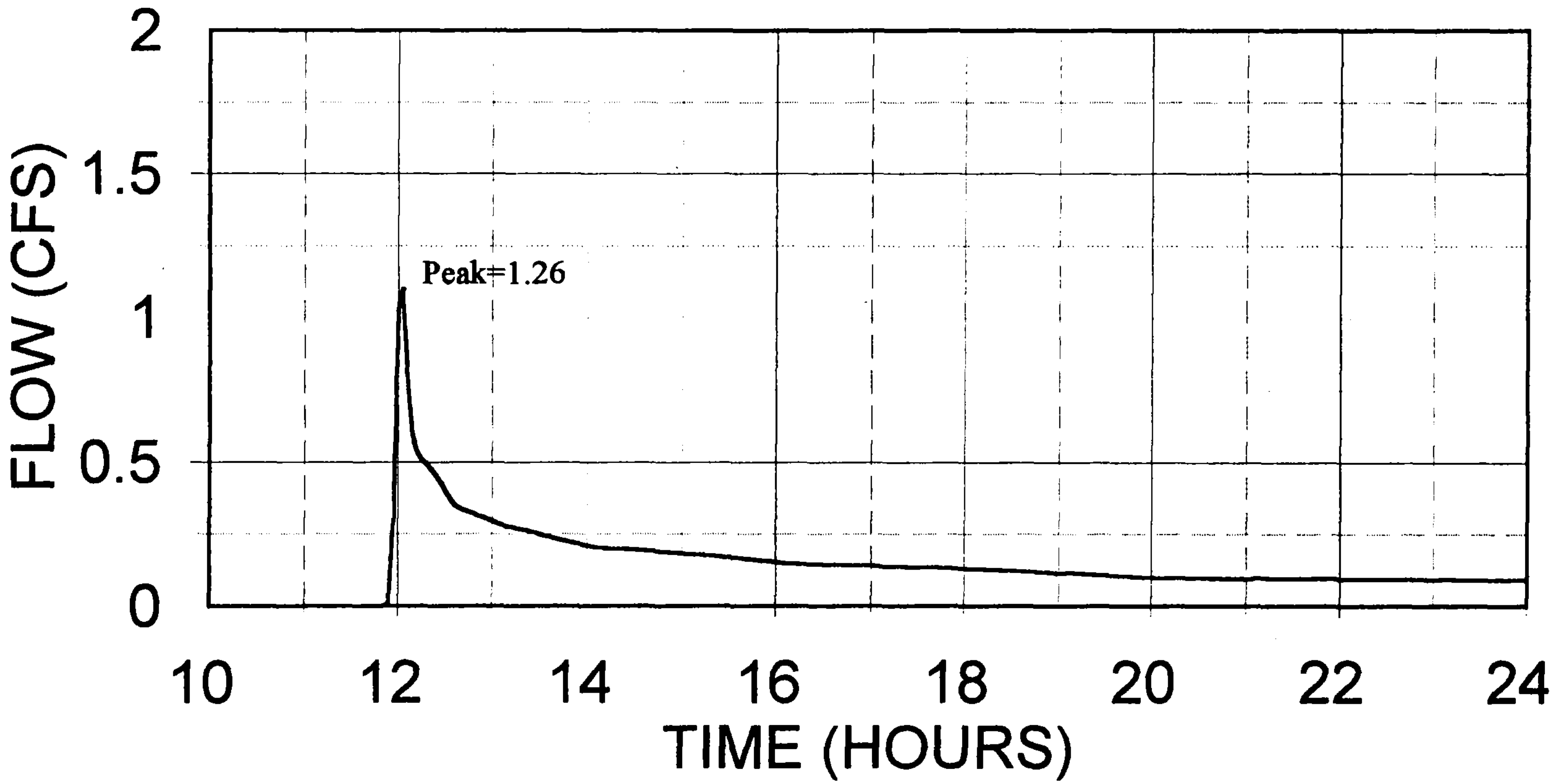
reach6	MANE	0.41	1.64	720.75	0.25	3.00	1.63	723.00	0.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2523E+00 EXCESS=0.0000E+00 OUTFLOW=0.2521E+00 BASIN STORAGE=0.1632E-03 PERCENT ERROR= 0.0

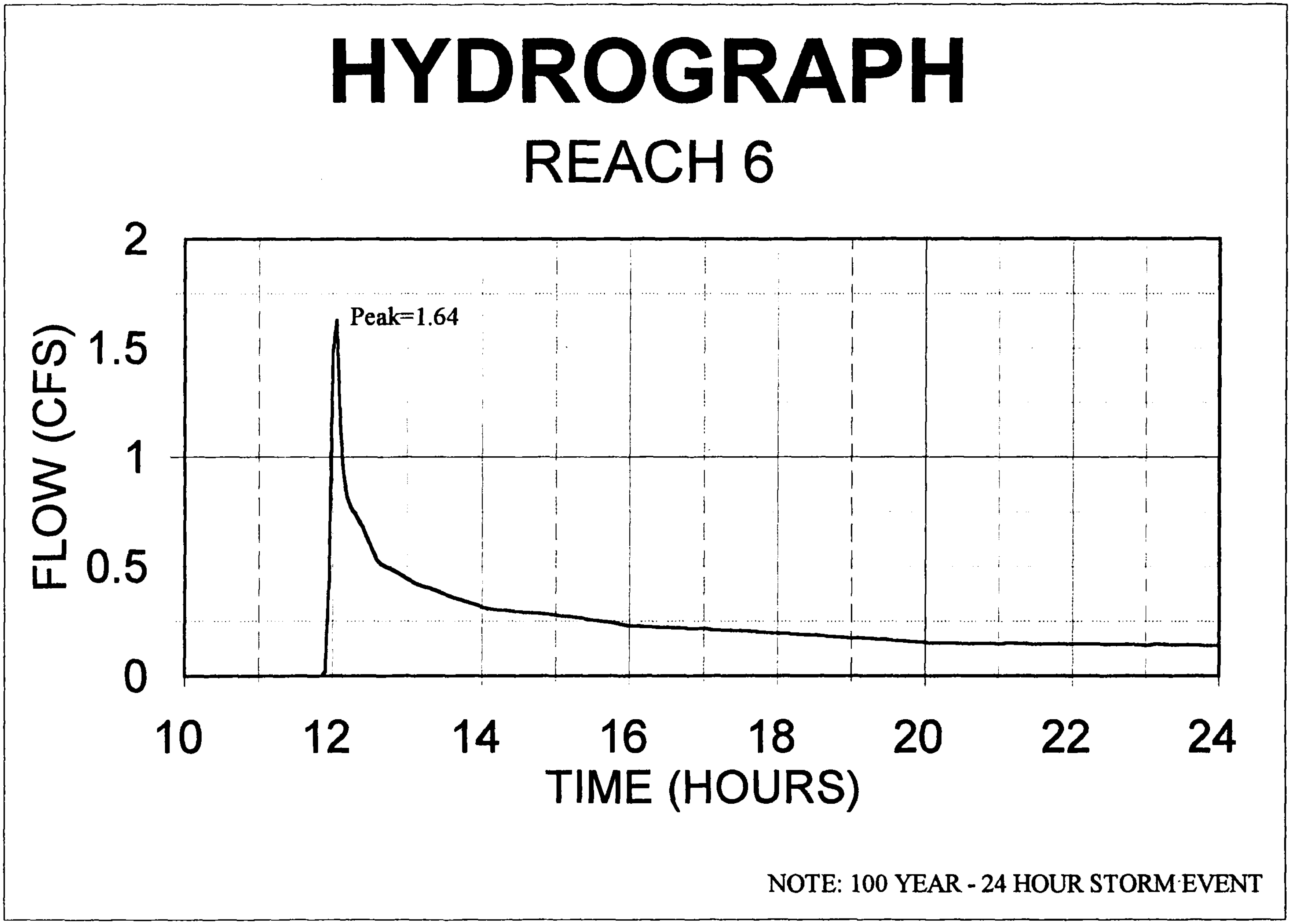

HYDROGRAPH
REACH 4
FLOW (CFS)
2
1.5
1
0.5
0
Peak=0.38
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT

HYDROGRAPH

REACH 5



NOTE: 100 YEAR - 24 HOUR STORM


HYDROGRAPH
REACH 6
FLOW (CFS)
2
1.5
1
0.5
0
Peak=1.64
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT

Appendix "C"

M.U.S.L.E.

Debris Production Model

PROVO, UTAH

EAST MOUNTAIN DEVELOPMENT
2272 South Mountain View Parkway
Provo, Utah 84606

SOIL ERODIBILITY FACTOR

SOWBY & BERG CONSULTANTS
45 N. 490 W. AMERICAN FORK UT 84003
PHONE: (801) 492-1277

Figure 4

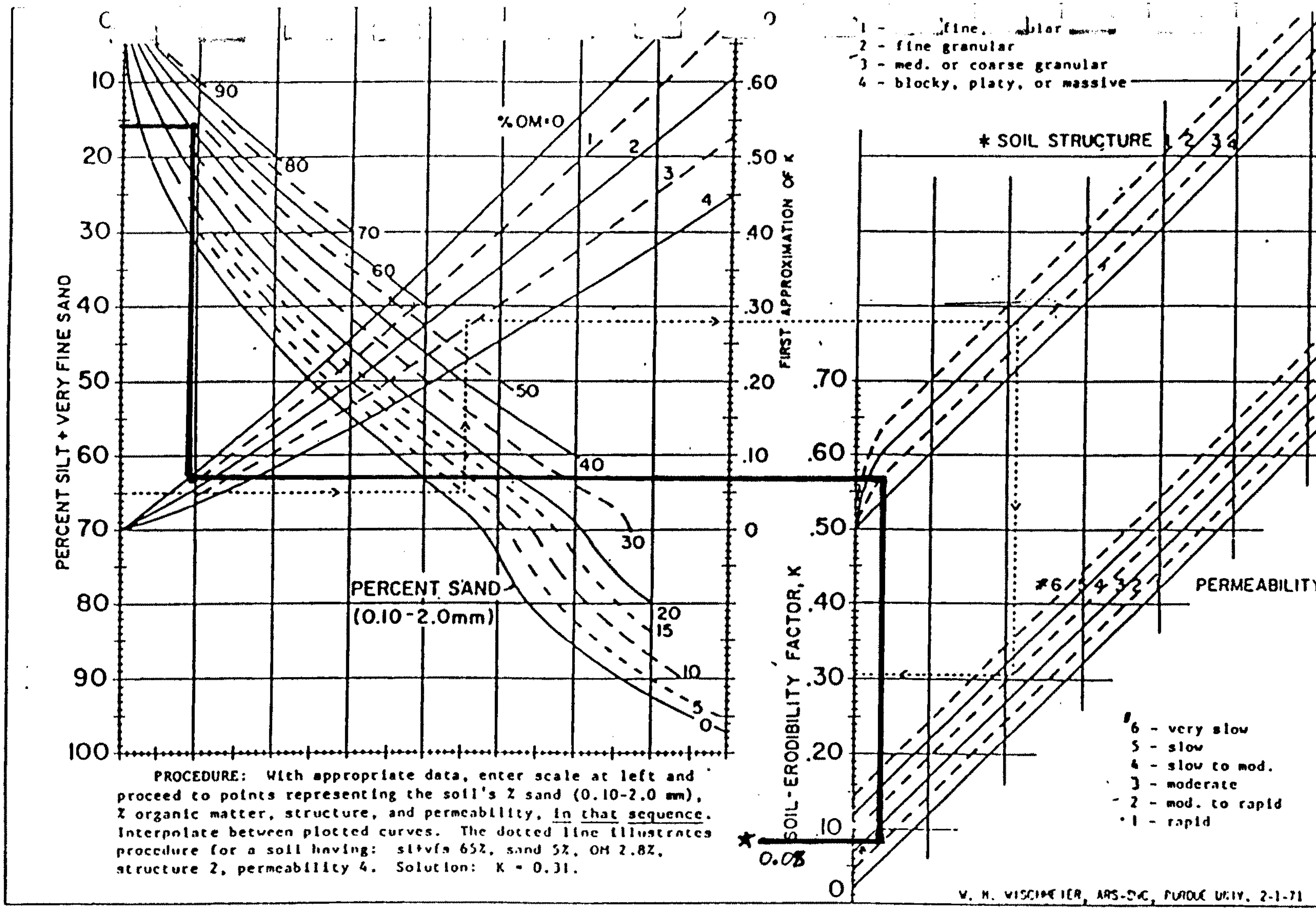


Figure 2-2. Nomograph for determining soil erodibility factor K.

TEST HOLE NO	DEPTH (ft)	ATTERBERG LIMITS		GRADATION			MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	CBR	CLASSIFICATION USCS
		LIQUID LIMIT	PLASTICITY INDEX	GRAVEL (%)	SAND (%)	SILT/CLAY (%)				
TP-1	4	---	---	44	40	16	---	---	---	GM

Job No 00E-034

Earthtec Testing & Engineering, P C

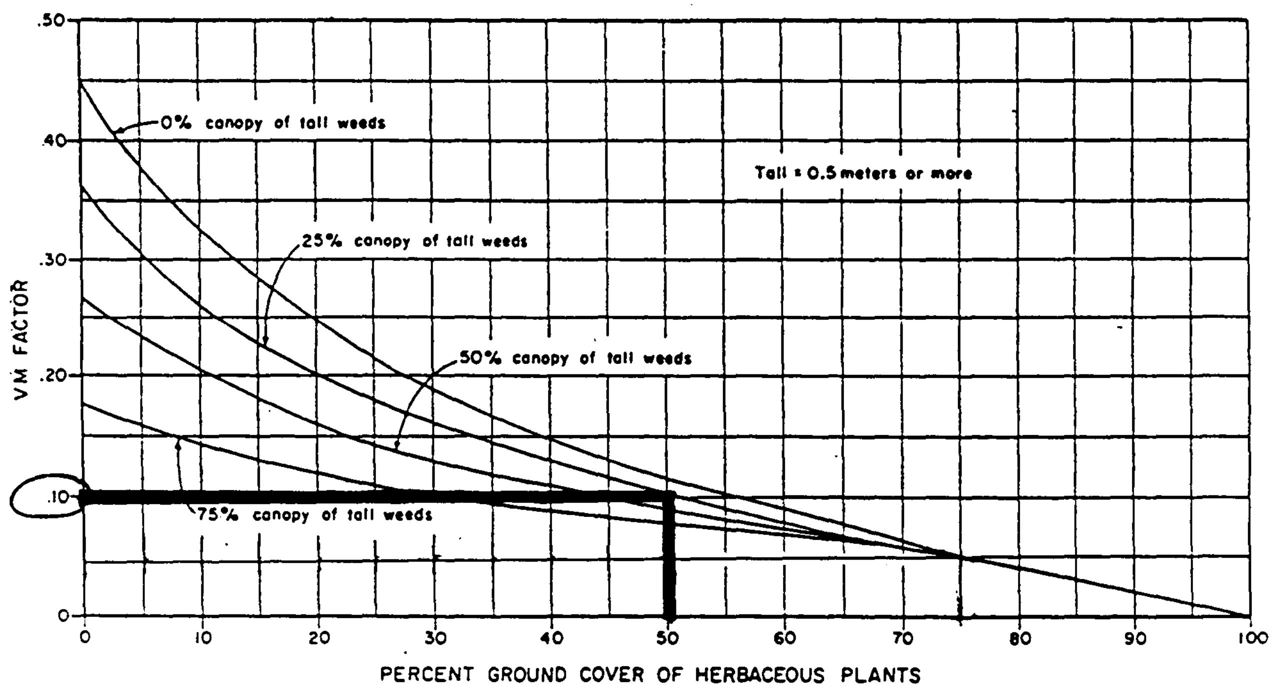


Figure 2-9. Relationship between forb density and VM factor.

PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	COVER FACTOR	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	Figure 5

ROJECT: M-13 CONSTRUCTION
E: AUGUST 7, 2000

LENGTH SLOPE FACTOR CALCULATIONS

AREA 1

m 0.5 all slopes greater than 5%
contour interval 40 ft

	slope %	θ_{angle} °	λ_j	$\Sigma\lambda_j$	$\Sigma\lambda_{j-1}$	S_j	$\Sigma\lambda_j S_j$	$\Sigma\lambda_{j-1} S_j$	$(\Sigma\lambda_j S_j)$ - $(\Sigma\lambda_{j-1} S_j)$	$\Sigma(\Sigma\lambda_j S_j)$ - $(\Sigma\lambda_{j-1} S_j)$	LS
1	46.69%	25.03	85.68	85.68	0.00	13.62	10801.81	0.00	10801.81	10801.81	*14.80*
2	55.46%	29.01	72.13	157.81	85.68	17.56	34809.00	13925.44	20883.56	31685.36	*23.56*
3	52.97%	27.91	75.51	233.32	157.81	16.44	58579.73	32585.26	25994.47	57679.83	*29.01*
4	60.00%	30.96	66.67	299.99	233.32	19.61	101890.30	69887.68	32002.62	89682.46	*35.09*
5	61.42%	31.56	65.13	365.12	299.99	20.25	141264.99	105206.18	36058.80	125741.26	*40.42*
6	77.18%	37.66	51.83	416.95	365.12	27.11	230797.69	189129.35	41668.34	167409.60	*47.12*
7	44.64%	24.05	89.61	506.56	416.95	12.72	144995.63	108276.58	36719.05	204128.65	*47.29*
8	53.02%	27.93	75.45	582.01	506.56	16.46	231055.99	187615.15	43440.84	247569.49	*49.92*
9	75.26%	36.96	53.15	635.16	582.01	26.30	421072.75	369341.49	51731.26	299300.75	*55.30*
10	103.39%	45.95	38.69	673.85	635.16	36.92	645807.06	590993.43	54813.63	354114.38	*61.68*
11	57.38%	29.85	69.71	743.56	673.85	18.43	373658.85	322363.67	51295.18	405409.56	*63.99*
12	79.21%	38.38	50.5	794.06	743.56	27.95	625394.97	566693.76	58701.21	464110.77	*68.60*
13	73.13%	36.18	54.7	848.76	794.06	25.40	628040.40	568316.42	59723.98	523834.75	*72.43*
14	70.35%	35.13	56.86	905.62	848.76	24.20	659568.70	598436.93	61131.77	584966.52	*75.81*
15	77.90%	37.92	51.35	956.97	905.62	27.41	811392.20	746968.61	64423.59	649390.11	*79.64*
16	46.78%	25.07	85.51	1042.48	956.97	13.66	459820.44	404421.43	55399.01	704789.12	*79.35*
17	65.54%	33.24	61.03	1103.51	1042.48	22.09	809789.21	743548.28	66240.93	771030.05	*82.00*
18	60.75%	31.28	65.84	1169.35	1103.51	19.95	797746.86	731328.89	66417.96	837448.01	*84.05*
19	58.52%	30.34	68.35	1237.70	1169.35	18.94	824918.42	757538.48	67379.95	904827.96	*85.80*
20	74.96%	36.86	53.36	1291.06	1237.70	26.18	1214454.99	1139947.56	74507.44	979335.40	*89.03*
21	61.82%	31.73	64.7	1355.76	1291.06	20.43	1019924.93	947793.27	72131.66	1051467.05	*91.02*
22	67.80%	34.14	59	1414.76	1355.76	23.09	1228521.20	1152478.21	76042.99	1127510.05	*93.53*
23	78.14%	38.00	51.19	1465.95	1414.76	27.51	1544036.17	1463871.28	80164.89	1207674.93	*96.69*
24	59.20%	30.62	67.57	1533.52	1465.95	19.25	1155992.12	1080436.99	75555.13	1283230.06	*98.21*
25	107.73%	47.13	37.13	1570.65	1533.52	38.32	2385170.57	2301094.64	84075.93	1367306.00	*102.17*
26	93.39%	43.04	42.83	1613.48	1570.65	33.45	2168178.04	2082421.74	85756.30	1453062.29	*105.69*
27	72.60%	35.98	55.1	1668.58	1613.48	25.17	1715638.64	1631363.15	84275.49	1537337.78	*108.13*
28	79.84%	38.60	50.1	1718.68	1668.58	28.21	2009906.10	1922665.72	87240.38	1624578.16	*110.94*
29	91.39%	42.42	43.77	1762.45	1718.68	32.72	2420718.75	2331104.06	89614.69	1714192.85	*114.15*
30	116.31%	49.31	34.39	1796.84	1762.45	40.89	3114646.67	3025658.32	88988.34	1803181.19	*117.78*
31	66.17%	33.49	60.45	1857.29	1796.84	22.37	1790485.11	1703786.78	86698.33	1889879.52	*119.42*
32	68.50%	34.41	58.39	1915.68	1857.29	23.40	1961783.50	1872777.61	89005.88	1978885.40	*121.24*
33	77.78%	37.87	51.43	1967.11	1915.68	27.36	2386872.03	2293879.57	92992.46	2071877.86	*123.61*
34	57.01%	29.69	70.16	2037.27	1967.11	18.26	1679330.85	1593332.26	85998.59	2157876.44	*124.31*
35	60.11%	31.01	66.55	2103.82	2037.27	19.66	1896982.89	1807687.81	89295.08	2247171.52	*125.36*
36	56.42%	29.43	70.9	2174.72	2103.82	17.99	1824834.12	1736325.88	88508.24	2335679.76	*126.05*
37	60.39%	31.13	66.24	2240.96	2174.72	19.79	2098895.37	2006525.37	92370.00	2428049.76	*127.16*
38	60.04%	30.98	66.62	2307.58	2240.96	19.63	2175989.64	2082441.60	93548.04	2521597.80	*128.25*
39	63.75%	32.52	62.75	2370.33	2307.58	21.29	2457037.84	2360118.31	96919.53	2618517.33	*129.65*
40	52.60%	27.74	76.05	2446.38	2370.33	16.27	1968327.12	1877260.83	91066.28	2709583.61	*129.99*
41	35.82%	19.71	111.67	2558.05	2446.38	8.99	1162986.68	1087669.81	75316.87	2784900.49	*127.77*
42	45.81%	24.61	87.32	2645.37	2558.05	13.23	1800394.68	1711991.60	88403.08	2873303.57	*127.48*
43	50.03%	26.58	79.95	2725.32	2645.37	15.11	2150124.00	2056207.26	93916.74	2967220.31	*127.78*
44	41.40%	22.49	96.62	2821.94	2725.32	11.31	1696060.38	1609703.54	86356.83	3053577.14	*127.00*
45	52.33%	27.62	76.44	2898.38	2821.94	16.15	2519421.87	2420413.53	99008.34	3152585.48	*127.66*
46	38.57%	21.09	103.71	3002.09	2898.38	10.12	1664239.28	1578749.38	85489.90	3238075.39	*126.59*
47	39.78%	21.69	100.56	3102.65	3002.09	10.62	1836146.65	1747606.88	88539.77	3326615.15	*125.84*
48	37.81%	20.71	105.79	3208.44	3102.65	9.80	1781516.23	1694135.25	87380.97	3413996.13	*124.88*
49	33.47%	18.51	119.5	3327.94	3208.44	8.06	1546688.15	1464132.60	82555.55	3496551.68	*123.31*
50	23.86%	13.42	167.64	3495.58	3327.94	4.62	954918.11	887054.89	67863.22	3564414.90	*119.67*

$$LS = \Sigma\{(\Sigma\lambda j\ Sj) - (\Sigma\lambda j\text{-}1\ Sj)\} / \{\Sigma\lambda j * 72.6^{m}\}$$

'ROJECT: M-13 CONSTRUCTION
TE: AUGUST 7, 2000

LENGTH SLOPE FACTOR CALCULATIONS

AREA 2

m 0.5 all slopes greater than 5%
contour interval 40 ft

	slope %	Θ_{angle} °	λ_j	$\Sigma\lambda_j$	$\Sigma\lambda_{j-1}$	S_j	$\Sigma\lambda_j S_j$	$\Sigma\lambda_{j-1} S_j$	$(\Sigma\lambda_j S_j) - (\Sigma\lambda_{j-1} S_j)$	$\Sigma(\Sigma\lambda_j S_j) - (\Sigma\lambda_{j-1} S_j)$	LS
1	55.36%	28.97	72.26	72.26	0.00	17.51	10757.70	0.00	10757.70	10757.70	***17.47***
2	62.68%	32.08	63.82	136.08	72.26	20.81	33039.47	12784.64	20254.83	31012.53	***26.75***
3	56.24%	29.35	71.13	207.21	136.08	17.91	53424.32	28432.46	24991.86	56004.39	***31.72***
4	61.35%	31.53	65.2	272.41	207.21	20.22	90903.35	60306.12	30597.23	86601.62	***37.31***
5	66.73%	33.72	59.94	332.35	272.41	22.62	137040.80	101692.97	35347.83	121949.45	***43.06***
6	99.08%	44.74	40.37	372.72	332.35	35.47	255234.96	214911.49	40323.47	162272.92	***51.10***
7	56.51%	29.47	70.79	443.51	372.72	18.03	168433.76	129762.16	38671.60	200944.52	***53.17***
8	75.82%	37.17	52.76	496.27	443.51	26.54	293401.07	247879.03	45522.04	246466.56	***58.29***
9	80.26%	38.75	49.84	546.11	496.27	28.38	362170.88	313740.34	48430.54	294897.10	***63.38***
10	83.86%	39.98	47.7	593.81	546.11	29.83	431589.98	380645.13	50944.84	345841.94	***68.35***
11	62.13%	31.85	64.38	658.19	593.81	20.57	347329.06	297636.00	49693.06	395535.00	***70.53***
12	92.10%	42.65	43.43	701.62	658.19	32.98	612944.19	556922.69	56021.50	451556.50	***75.53***
13	80.43%	38.81	49.73	751.35	701.62	28.45	585952.02	528751.44	57200.58	508757.08	***79.47***
14	85.98%	40.69	46.52	797.87	751.35	30.66	691033.72	631487.08	59546.64	568303.72	***83.59***
15	83.52%	39.87	47.89	845.76	797.87	29.69	730371.71	669223.89	61147.82	629451.54	***87.35***
16	76.72%	37.49	52.14	897.90	845.76	26.92	724216.58	662059.80	62156.78	691608.32	***90.40***
17	110.80%	47.93	36.1	934.00	897.90	39.27	1120883.83	1056531.01	64352.82	755961.14	***94.99***
18	72.24%	35.84	55.37	989.37	934.00	25.02	778597.59	714159.58	64438.02	820399.16	***97.32***
19	77.91%	37.92	51.34	1040.71	989.37	27.41	920402.11	853141.60	67260.51	887659.67	***100.10***
20	65.14%	33.08	61.41	1102.12	1040.71	21.91	801672.04	735610.65	66061.40	953721.07	***101.56***
21	44.47%	23.98	89.94	1192.06	1102.12	12.65	520474.39	462695.76	57778.63	1011499.70	***99.59***
22	51.24%	27.13	78.07	1270.13	1192.06	15.65	708590.47	644273.43	64317.04	1075816.74	***99.41***
23	43.23%	23.38	92.53	1362.66	1270.13	12.10	608810.75	547864.69	60946.06	1136762.80	***97.91***
24	60.86%	31.32	65.73	1428.39	1362.66	20.00	1079475.68	1005828.47	73647.21	1210410.01	***99.45***
25	55.07%	28.84	72.63	1501.02	1428.39	17.39	1011064.24	938575.54	72488.70	1282898.71	***100.31***
26	35.00%	19.29	114.28	1615.30	1501.02	8.66	562238.88	503640.68	58598.20	1341496.91	***97.47***
27	29.65%	16.51	134.91	1750.21	1615.30	6.61	483903.74	429045.68	54858.07	1396354.98	***93.63***
28	32.88%	18.20	121.65	1871.86	1750.21	7.83	633820.34	573048.48	60771.86	1457126.83	***91.36***
29	26.75%	14.98	149.54	2021.40	1871.86	5.58	507031.54	451821.23	55210.31	1512337.15	***87.81***
30	34.79%	19.18	114.98	2136.38	2021.40	8.58	846790.87	779357.65	67433.22	1579770.37	***86.79***

$$LS = \Sigma\{(\Sigma\lambda j\ Sj) - (\Sigma\lambda j\text{-}1\ Sj)\} / \{\Sigma\lambda j * 72.6^{m}\}$$

SLOPE LENGTH FACTOR

$$LS = \left(\frac{\lambda}{72.6}\right)^m \left(\frac{430 \sin^2\theta + 30 \sin\theta + 0.43}{6.613}\right)$$

λ - slope length (ft)

θ - slope angle (deg)

$deg = \tan^{-1}(\%\ slope / 100)$

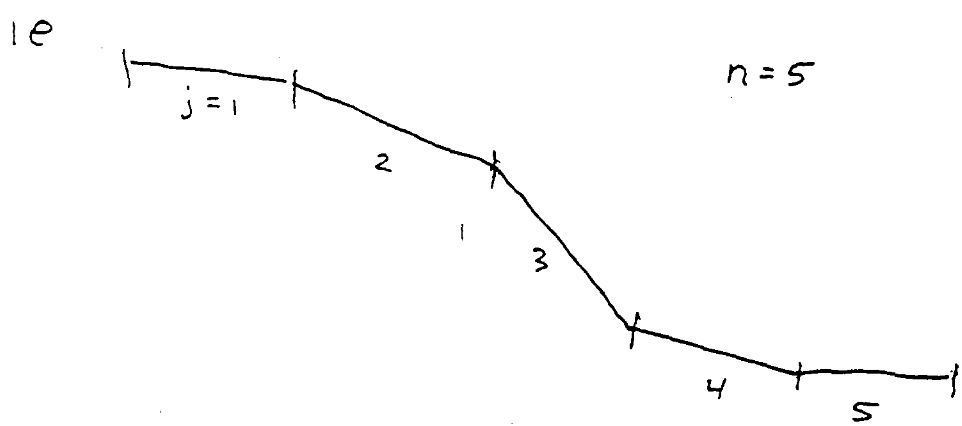
$m = .3$ for $\theta \leq 3\%$

$m = .4$ for $\theta = 4\%$

$m = .5$ for $\theta \geq 5\%$

Note: λ_j should all be about same lengths

$$LS = \frac{\sum_{j=1}^{n} \left[S_j (\lambda_j)^{1+m_j} - S_j (\lambda_{j-1})^{1+m_j} \right]}{\sum_{j=1}^{n} \left[\lambda_{\theta_j} \cdot 72.6^{m_j} \right]}$$



$$S_j = \frac{.43 + 30 \sin\theta_j + 430 \sin^2\theta_j}{6.613}$$

PROJECT: M-13 CONSTRUCTION
DATE: AUGUST 7, 2000
REVISED: MARCH 19, 2001

M.U.S.L.E. CALCULATIONS

BASIN 1

a= 95 density 100 lbs/cf
b= 0.56

STORM EVENT	Storm Probability	Q_v * Event	q_{peak}	adjustable Erodibility Factor	Slope Factor	adjustable Cover Factor	Sediment Delivery Ratio	Yield	Yield	volume (100 lbs/cf)	volume	volume
years	event / year	acre-ft	cfs	K	LS	CP	SDR	tons	lbs	cubic feet	acre-feet	cubic yards
2	0.5	0.00	0.00	0.08	119.67	0.08	0.5	0	0	0	0.000	0
5	0.2	0.03	0.05	0.08	119.67	0.08	0.5	1	1934	19	0.000	1
10	0.1	0.12	0.50	0.08	119.67	0.08	0.5	8	15391	154	0.004	6
25	0.04	0.35	1.00	0.08	119.67	0.08	0.5	20	40139	401	0.009	15
50	0.02	0.55	1.00	0.08	119.67	0.08	0.5	26	52258	523	0.012	19
100	0.01	0.79	5.17	0.08	119.67	0.08	0.5	80	160432	1604	0.037	59

PROJECT: M-13 CONSTRUCTION
ATE: AUGUST 7, 2000
EVISED: MARCH 19, 2001

M.U.S.L.E. CALCULATIONS

BASIN 2

a= 95 density 100 lbs/cf
b= 0.56

STORM EVENT	Storm Probability	Q_v * Event	q_{peak}	Erodibility Factor	Slope Factor	Cover Factor	Sediment Delivery Ratio	Yield	Yield	volume (100 lbs/cf)	volume	volume
years	event / year	acre-ft	cfs	K	LS	CP	SDR	tons	lbs	cubic feet	acre-feet	cubic yards
2	0.5	0.00	0.00	0.08	86.79	0.1	0.5	0	0	0	0.000	0
5	0.2	0.01	0.02	0.08	86.79	0.1	0.5	0	484	5	0.000	0
10	0.1	0.04	0.25	0.08	86.79	0.1	0.5	2	4973	50	0.001	2
25	0.04	0.11	0.50	0.08	86.79	0.1	0.5	6	12970	130	0.003	5
50	0.02	0.17	1.00	0.08	86.79	0.1	0.5	12	24813	248	0.006	9
100	0.01	0.25	1.64	0.08	86.79	0.1	0.5	20	40087	401	0.009	15

22-144 200 SHEETS

MUSLE

$$Y_s = a\left[Q * q_p\right]^{\beta} \overline{K}\ \overline{LS}\ \overline{CP}\ S\overline{DR}$$

Y_s - total tons per the event

Q - storm runoff (acre-ft)

q_p - peak runoff (cfs)

$$a\left[Q * q_p\right]^{\beta} / Area \approx \overline{R}$$

$a = 95$, $\beta = .56$ } typical rain storm

Annual Yield for total area =

$$= \frac{Q_A\left(.01\,Y_{s_{100}} + .01\,Y_{s_{50}} + .02\,Y_{s_{25}} + .06\,Y_{s_{10}} + .4\,Y_{s_2}\right)}{.01\,Q_{V_{100}} + .01\,Q_{V_{50}} + .02\,Q_{V_{25}} + .06\,Q_{V_{10}} + .4\,Q_{V_2}}$$

Q_A - average annual water yield (acre-ft)

Y_s - yield for 100, 50, 25, 10, + 2 yr storms

Q_V - water yield for storm (acre-ft)

Appendix "D"

INCIPIENT MOTION

Debris Production Model

Table 2.3.1 Manning's roughness coefficients for various boundaries

RIGID BOUNDARY CHANNELS	MANNING'S n
Very smooth concrete and planed timber	0.011
Smooth concrete	0.012
Ordinary concrete lining	0.013
Wood	0.014
Vitrified clay	0.015
Shot concrete, untrowelled, and earth channels in best condition	0.017
Straight unlined earth canals in good condition	0.020
Mountain streams with rocky beds	0.040 - 0.050
MINOR STREAMS (top width at flood stage > 100 ft)	
Streams on Plain	
1. Clean, straight, full stage, no rifts or deep pools	0.025-0.033
2. Same as above, but more stones and weeds	0.030-0.040
3. Clean, winding, some pools and shoals	0.033-0.045
4. Same as above, but some weeds and stones	0.035-0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040-0.055
6. Same as 4, but more stones	0.045-0.060
7. Sluggish reaches, weedy, deep pools	0.050-0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbush	0.075-0.150
Mountain Streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages	
1. Bottom: gravels, cobbles and few boulders	0.030-0.050
2. Bottom: cobbles with large boulders	0.040-0.070
FLOOD PLAINS	
Pasture, No Brush	
1. Short Grass	0.025-0.035
2. High Grass	0.030-0.050
Cultivated Areas	
1. No Crop	0.020-0.040
2. Mature Row Crops	0.025-0.045
3. Mature Field Crops	0.030-0.050
Brush	
1. Scattered brush, heavy weeds	0.035-0.070
2. Light brush and trees in winter	0.035-0.060
3. Light brush and trees in summer	0.040-0.080
4. Medium to dense brush in winter	0.045-0.110
5. Medium to dense brush in summer	0.070-0.160

GIVEN

Debris Analysis

Sample	% retained
Boulder	12
Cobble	18
Pebbles	30
Sands	15
Silt/Clay	25
specific gravity	2.65

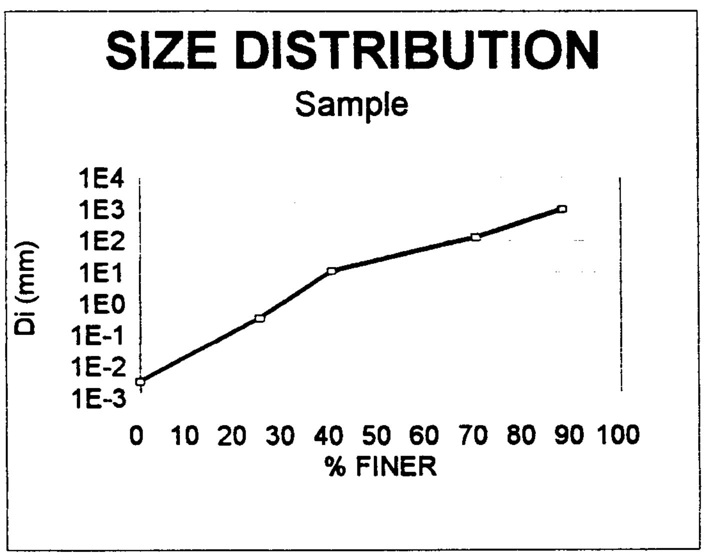
FIND

(a) Plot of size distribution for sample
(b) D_m
(c) D_{16}
(d) D_{35}
(e) D_{50}
(f) D_{65}
(g) D_{84}
(h) D_G
(i) G
(j) õ

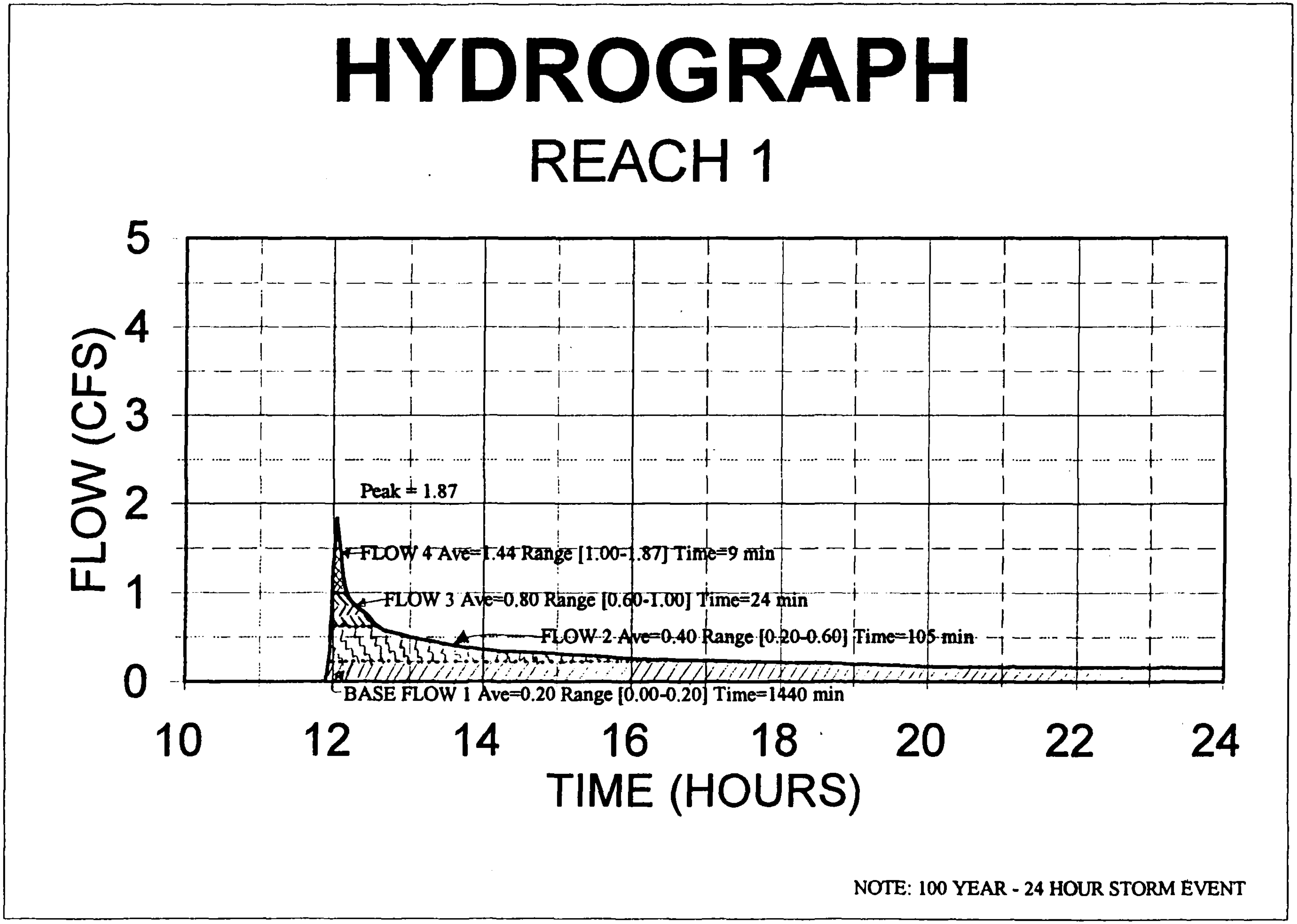
Sol^n

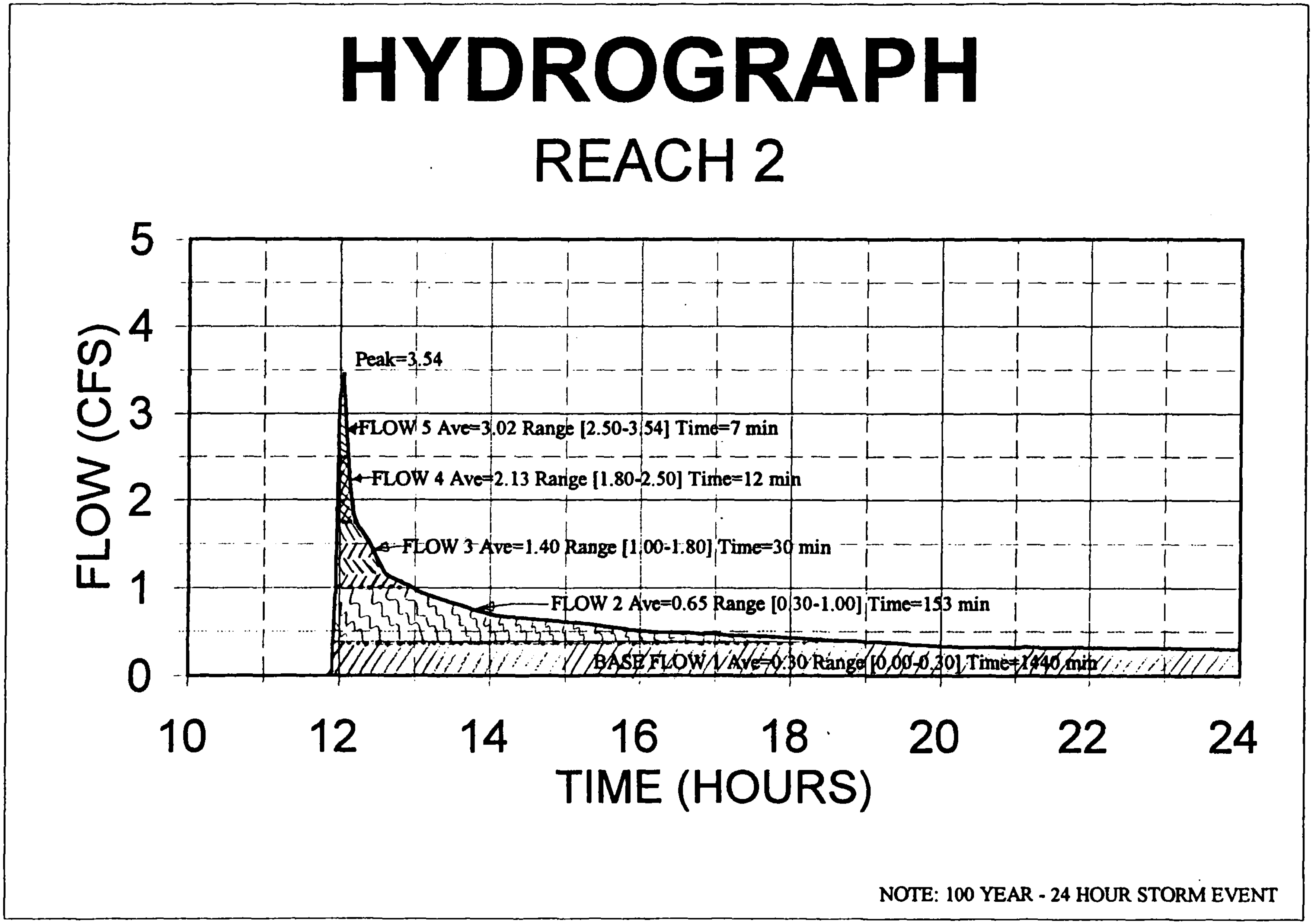
DEBRIS FLOW SAMPLE

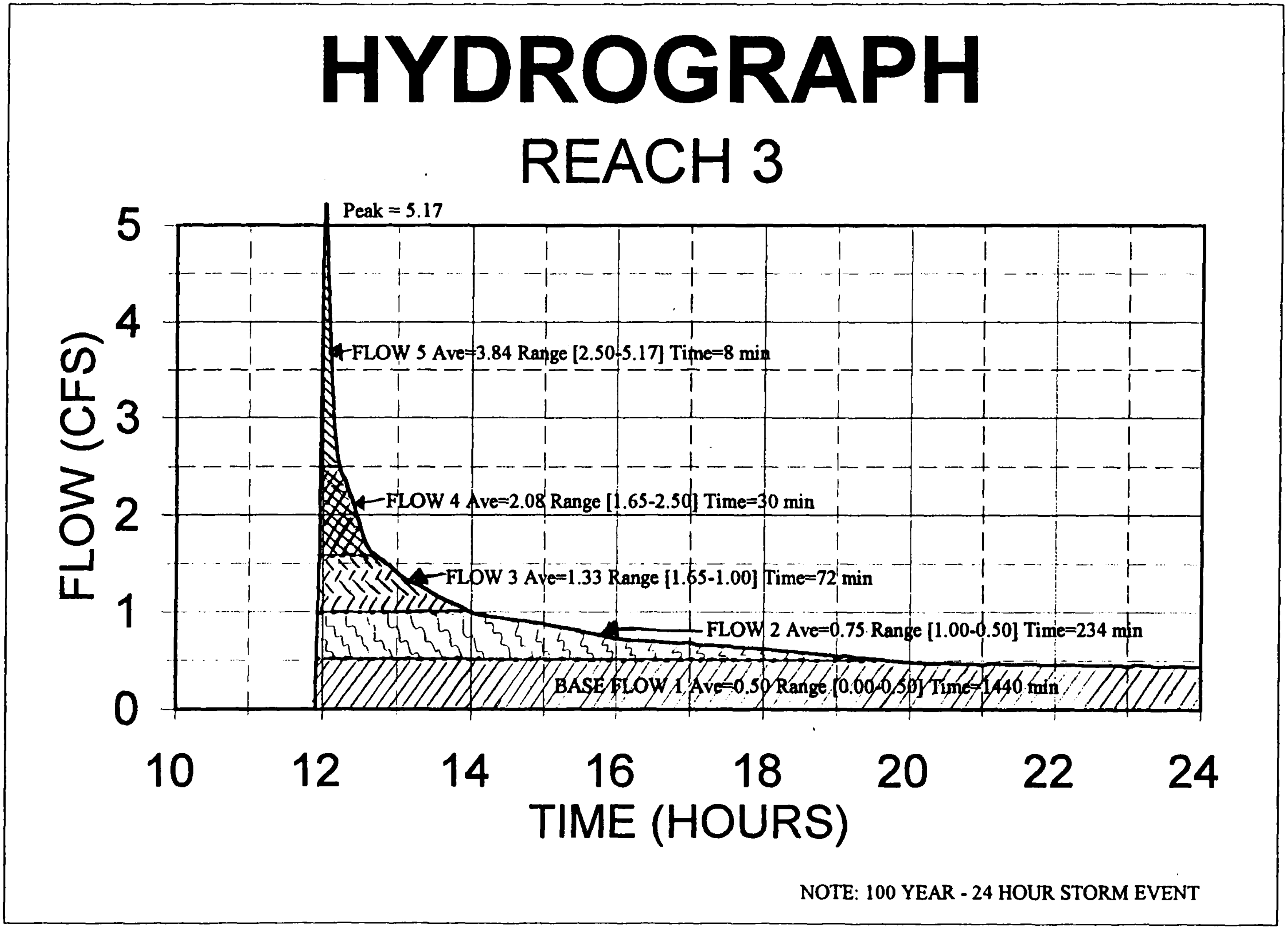
Sample	range (mm)		D_i (mm)	Pi % retained	% finer	$P_i \times D_i$
				0	100	0.00
Boulder	4000	254	1007.97	12	88	12095.62
Cobble	254	63.5	127.00	18	70	2286.00
Pebbles	63.5	2.03	11.35	30	40	340.61
Sands	2.03	0.062	0.35	15	25	5.32
Silt/Clay	0.062	0.0002	0.00	25	0	0.09
				100		14727.64

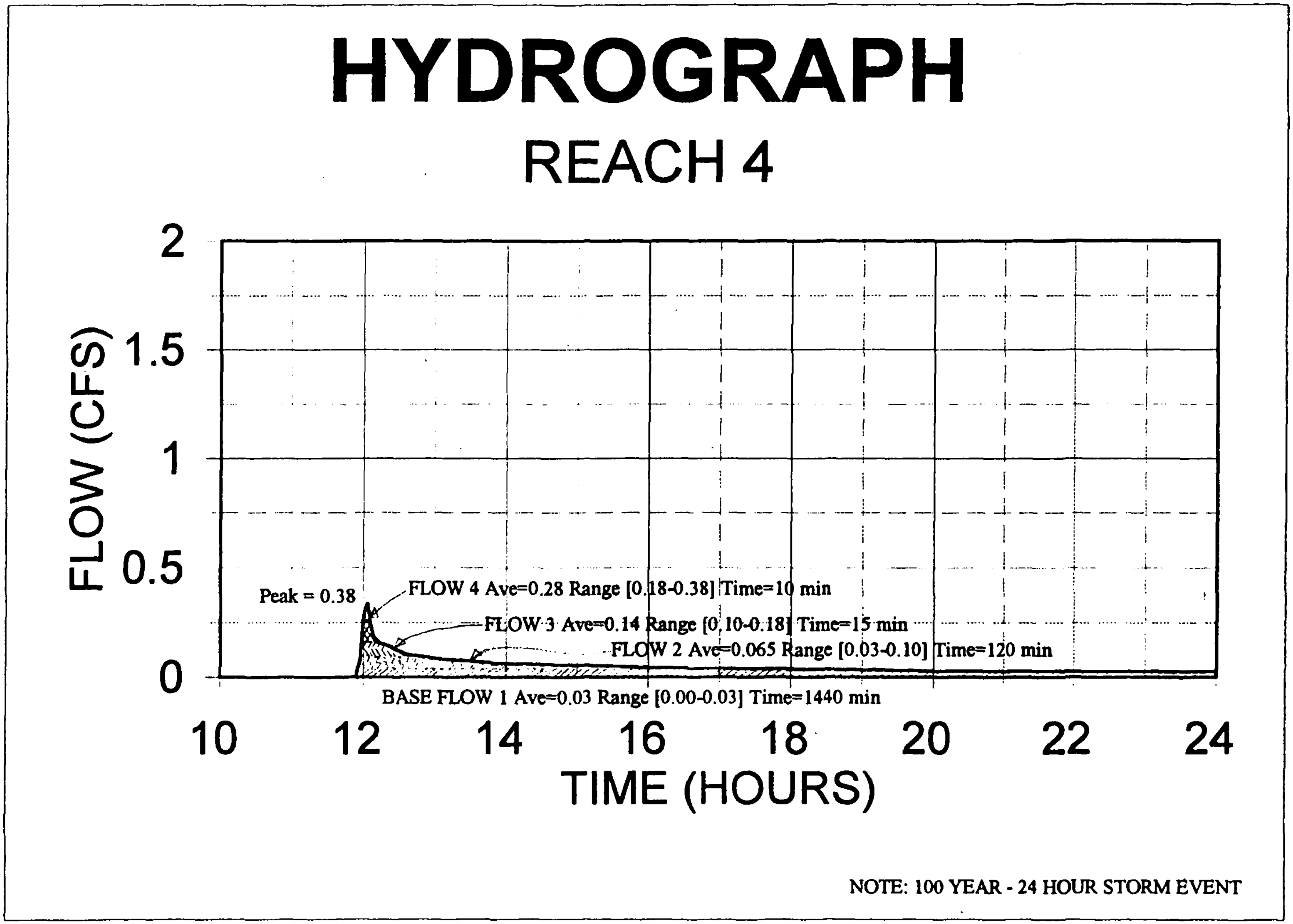


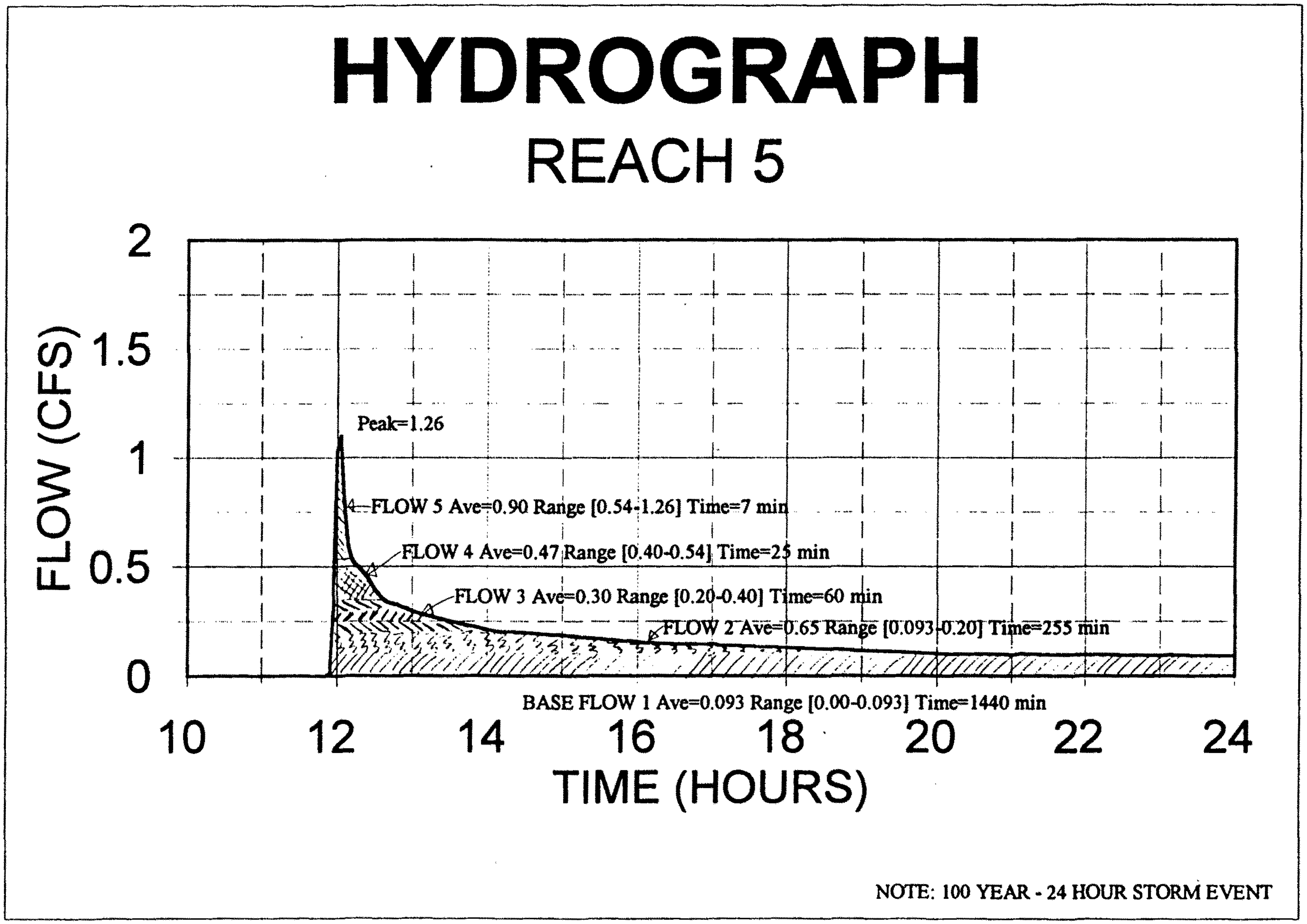
(b) D_m 147.28 mm
(c) D_{16} 0.06 mm
(d) D_{35} 2.75 mm
(e) D_{50} 26.00 mm
(f) D_{65} 90.00 mm
(g) D_{84} 615.00 mm
(h) D_G 6.07 mm
(i) G 228.49
(j) $õ_g$ 101.24


HYDROGRAPH
REACH 1
FLOW (CFS)
5
4
3
2
1
0
Peak = 1.87
FLOW 4 Ave=1.44 Range [1.00-1.87] Time=9 min
FLOW 3 Ave=0.80 Range [0.60-1.00] Time=24 min
FLOW 2 Ave=0.40 Range [0.20-0.60] Time=105 min
BASE FLOW 1 Ave=0.20 Range [0.00-0.20] Time=1440 min
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT


HYDROGRAPH
REACH 2
Peak=3.54
FLOW 5 Ave=3.02 Range [2.50-3.54] Time=7 min
FLOW 4 Ave=2.13 Range [1.80-2.50] Time=12 min
FLOW 3 Ave=1.40 Range [1.00-1.80] Time=30 min
FLOW 2 Ave=0.65 Range [0.30-1.00] Time=153 min
BASE FLOW 1 Ave=0.30 Range [0.00-0.30] Time=1440 min
FLOW (CFS)
TIME (HOURS)
0
1
2
3
4
5
10
12
14
16
18
20
22
24
NOTE: 100 YEAR - 24 HOUR STORM EVENT

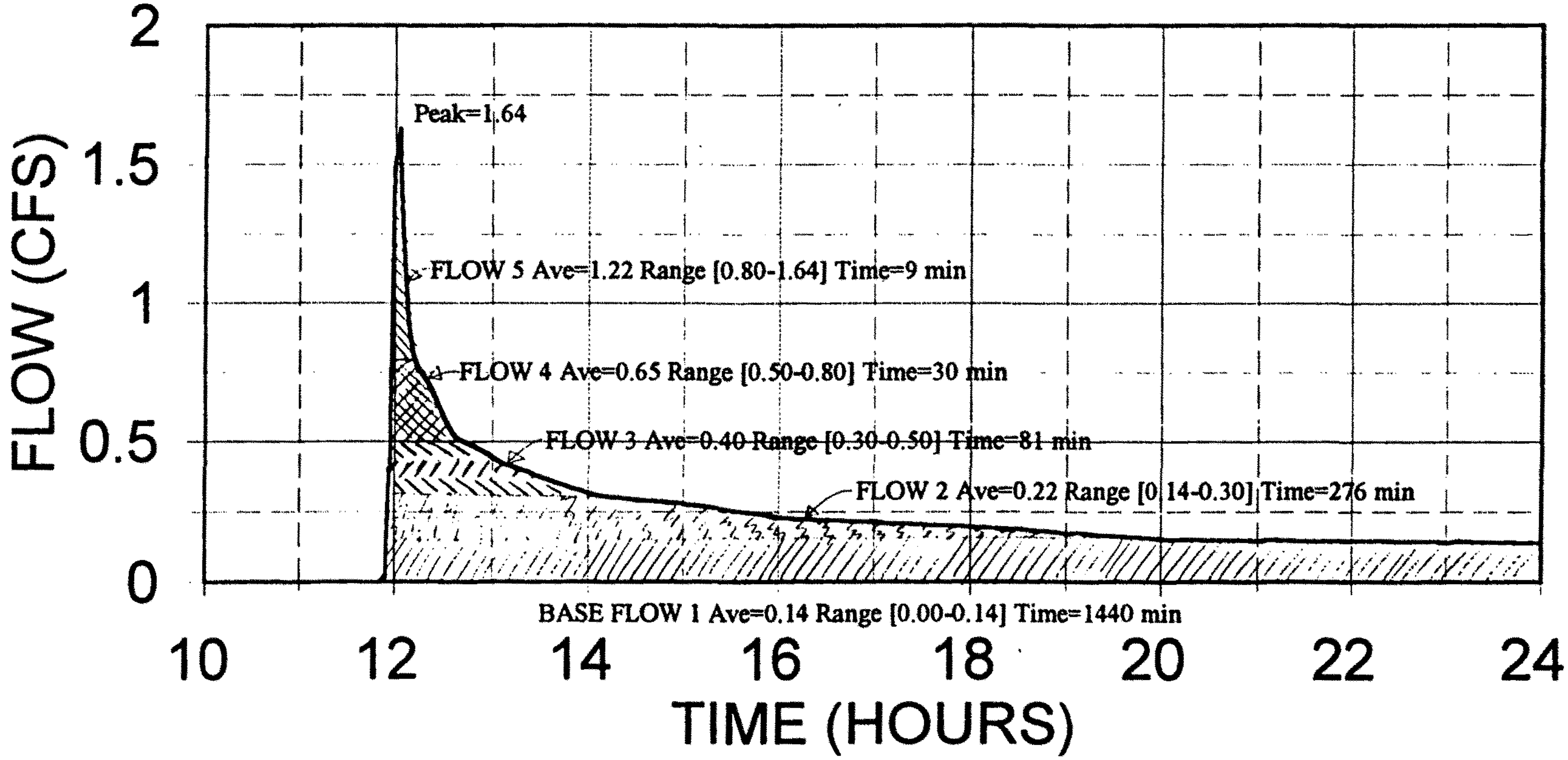

HYDROGRAPH
REACH 3
Peak = 5.17
FLOW 5 Ave=3.84 Range [2.50-5.17] Time=8 min
FLOW 4 Ave=2.08 Range [1.65-2.50] Time=30 min
FLOW 3 Ave=1.33 Range [1.65-1.00] Time=72 min
FLOW 2 Ave=0.75 Range [1.00-0.50] Time=234 min
BASE FLOW 1 Ave=0.50 Range [0.00-0.50] Time=1440 min
FLOW (CFS)
TIME (HOURS)
0
1
2
3
4
5
10
12
14
16
18
20
22
24
NOTE: 100 YEAR - 24 HOUR STORM EVENT


HYDROGRAPH
REACH 4
FLOW (CFS)
2
1.5
1
0.5
0
Peak = 0.38
FLOW 4 Ave=0.28 Range [0.18-0.38] Time=10 min
FLOW 3 Ave=0.14 Range [0.10-0.18] Time=15 min
FLOW 2 Ave=0.065 Range [0.03-0.10] Time=120 min
BASE FLOW 1 Ave=0.03 Range [0.00-0.03] Time=1440 min
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT


HYDROGRAPH
REACH 5
FLOW (CFS)
2
1.5
1
0.5
0
Peak=1.26
FLOW 5 Ave=0.90 Range [0.54-1.26] Time=7 min
FLOW 4 Ave=0.47 Range [0.40-0.54] Time=25 min
FLOW 3 Ave=0.30 Range [0.20-0.40] Time=60 min
FLOW 2 Ave=0.65 Range [0.093-0.20] Time=255 min
BASE FLOW 1 Ave=0.093 Range [0.00-0.093] Time=1440 min
10
12
14
16
18
20
22
24
TIME (HOURS)
NOTE: 100 YEAR - 24 HOUR STORM EVENT

HYDROGRAPH

REACH 6



NOTE: 100 YEAR - 24 HOUR STORM EVENT

INCIPIENT MOTION — M-13 CONSTRUCTION

GIVEN:

A trapezoidal channel

b=	0	ft	
m=	1.4		
S_o=	0.69		
n=	0.04		
D_{50}=	26	mm =	0.09 ft
v=	1.20E-05	ft^2/s	
Length of reach	1150	ft	
g=	32.2		
Ø=	35	°	
S_g=	2.65		
$\acute{Y}_w$=	62.4	lbs/ft^3	

FIND:

(a) D_S Shield's Eqn. @ incipient motion

Sol^n

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

SHEILDS EQN: $T_c = 0.06(\acute{Y}_w(S_g - 1))D_{50}$

NORMAL SHEAR: $To = \acute{Y}RS$

$(gRS_f)^{.5}$

MANNINGS: $Q = C_u A^{(5/3)} S_o^{(1/2)} / n\, P^{(2/3)}$

Area: $bY + mY^2$

Perimeter: $b + 2Y(m^2+1)^{.5}$

REACH 1

FLOW 1 *AVERAGE FLOW = 0.20 CFS FOR 1440 MINUTES*

D_s %	Grain Size ft	Grain Size mm	FLOW Y ft	Q cfs	T_o lbs/ft^2	$T_o/(Y_s-Y)*D_s$	SHEAR T_c lbs/ft^2	V* fps	$V*D_s/v$	Max Travel Path ft
D_{16}	0.0002	0.0600	0.168	0.20	2.9430	145.2079	0.0012	1.2323	20.22	106475
D_{35}	0.0090	2.75	0.168	0.20	2.9430	3.1682	0.0557	1.2323	926.55	106475
D_{50}	0.0853	26.00	0.168	0.20	2.9430	0.3351	0.5270	1.2323	8760.13	106475
D_{65}	0.2953	90.00	0.168	0.20	2.9430	0.0968	1.8241	1.2323	30323.51	106475
D_m	0.4832	147.28	0.168	0.20	2.9430	0.0592	2.9850	1.2323	49622.74	
D_{84}	2.0177	615.00	0.168	0.20	2.9430	0.0142	12.4646	1.2323	207210.67	
D_{67}	**0.4764**	**145.21**	0.168	0.20	2.9430	0.0600	2.9430	1.2323	48924.61	106475

FLOW 2 *AVERAGE FLOW = 0.40 CFS FOR 105 MINUTES*

D_s %	Grain Size ft	Grain Size mm	FLOW Y ft	Q cfs	T_o lbs/ft^2	$T_o/(Y_s-Y)*D_s$	SHEAR T_c lbs/ft^2	V* ft/sec	$V*D_s/v$	Max Travel Path ft
D_{16}	0.0002	0.0600	0.216	0.40	3.7839	186.6959	0.0012	1.3974	22.92	8803
D_{35}	0.0090	2.75	0.216	0.40	3.7839	4.0734	0.0557	1.3974	1050.61	8803
D_{50}	0.0853	26.00	0.216	0.40	3.7839	0.4308	0.5270	1.3974	9933.05	8803
D_{65}	0.2953	90.00	0.216	0.40	3.7839	0.1245	1.8241	1.3974	34383.63	8803
D_m	0.4832	147.28	0.216	0.40	3.7839	0.0761	2.9850	1.3974	56266.90	
D_{84}	2.0177	615.00	0.216	0.40	3.7839	0.0182	12.4646	1.3974	234954.82	
D_{68}	**0.6125**	**186.70**	0.216	0.40	3.7839	0.0600	3.7839	1.3974	71325.37	8803

FLOW 3 *AVERAGE FLOW = 0.80 CFS FOR 24 MINUTES*

)s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	$V*D_s/v$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.280	0.80	4.9051	242.0132	0.0012	1.5910	26.10	2291
D_{35}	0.0090	2.75	0.280	0.80	4.9051	5.2803	0.0557	1.5910	1196.17	2291
D_{50}	0.0853	26.00	0.280	0.80	4.9051	0.5585	0.5270	1.5910	11309.27	2291
D_{65}	0.2953	90.00	0.280	0.80	4.9051	0.1613	1.8241	1.5910	39147.49	2291
D_m	0.4832	147.28	0.280	0.80	4.9051	0.0986	2.9850	1.5910	64062.69	2291
D_{84}	2.0177	615.00	0.280	0.80	4.9051	0.0236	12.4646	1.5910	267507.83	
D_{70}	**0.7940**	**242.01**	0.280	0.80	4.9051	0.0600	4.9051	1.5910	105268.99	2291

FLOW 4 *AVERAGE FLOW = 1.44 CFS FOR 9 MINUTES*

)s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	$V*D_s/v$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.350	1.44	6.1313	302.5165	0.0012	1.7787	29.18	961
D_{35}	0.0090	2.75	0.350	1.44	6.1313	6.6004	0.0557	1.7787	1337.36	961
D_{50}	0.0853	26.00	0.350	1.44	6.1313	0.6981	0.5270	1.7787	12644.15	961
D_{65}	0.2953	90.00	0.350	1.44	6.1313	0.2017	1.8241	1.7787	43768.22	961
D_m	0.4832	147.28	0.350	1.44	6.1313	0.1232	2.9850	1.7787	71624.26	961
D_{84}	2.0177	615.00	0.350	1.44	6.1313	0.0295	12.4646	1.7787	299082.84	
D_{73}	**0.9925**	**302.52**	0.350	1.44	6.1313	0.0600	6.1313	1.7787	147117.89	961

INCIPIENT MOTION

M-13 CONSTRUCTION

GIVEN:

A trapezoidal channel

b=	0	ft		
m=	1.4			
S_o=	0.62			
n=	0.04			
D_{50}=	26	mm	=	0.09 ft
v=	1.20E-05	ft²/s		
Length of reach	540	ft		
g=	32.2			
Ø=	35	°		
S_g=	2.65			
$Ý_w$=	62.4	lbs/ft³		

FIND:

(a) Ds Shield's Eqn. @ incipient motion

Solⁿ

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

SHEILDS EQN: $T_c=0.06(Ý_w(S_g-1))D_{50}$

NORMAL SHEAR: $To=ÝRS$

V^*: $(gRS_f)^{.5}$

MANNINGS: $Q=C_u A^{(5/3)} S_o^{(1/2)}/ n P^{(2/3)}$

Area: $bY+mY^2$

Perimeter: $b + 2Y(m^2+1)^{.5}$

REACH 2

FLOW 1 *AVERAGE FLOW = 0.30 CFS FOR 1440 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	fps		ft
D_{16}	0.0002	0.0600	0.198	0.30	3.1167	153.7761	0.0012	1.2682	20.80	109571
D_{35}	0.0090	2.75	0.198	0.30	3.1167	3.3551	0.0557	1.2682	953.50	109571
D_{50}	0.0853	26.00	0.198	0.30	3.1167	0.3549	0.5270	1.2682	9014.87	109571
D_{65}	0.2953	90.00	0.198	0.30	3.1167	0.1025	1.8241	1.2682	31205.33	109571
D_m	0.4832	147.28	0.198	0.30	3.1167	0.0626	2.9850	1.2682	51065.79	
D_{84}	2.0177	615.00	0.198	0.30	3.1167	0.0150	12.4646	1.2682	213236.42	
D_{67}	**0.5045**	**153.78**	0.198	0.30	3.1167	0.0600	3.1167	1.2682	53318.15	109571

FLOW 2 *AVERAGE FLOW = 0.65 CFS FOR 153 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.265	0.65	4.1713	205.8114	0.0012	1.4671	24.07	13468
D_{35}	0.0090	2.75	0.265	0.65	4.1713	4.4904	0.0557	1.4671	1103.09	13468
D_{50}	0.0853	26.00	0.265	0.65	4.1713	0.4749	0.5270	1.4671	10429.17	13468
D_{65}	0.2953	90.00	0.265	0.65	4.1713	0.1372	1.8241	1.4671	36100.99	13468
D_m	0.4832	147.28	0.265	0.65	4.1713	0.0838	2.9850	1.4671	59077.26	13468
D_{84}	2.0177	615.00	0.265	0.65	4.1713	0.0201	12.4646	1.4671	246690.10	

D_{69}	**0.6752**	**205.81**	0.265	0.65	4.1713	0.0600	4.1713	1.4671	82555.52	13468

FLOW 3 *AVERAGE FLOW = 1.40 CFS FOR 30 MINUTES*

			FLOW				SHEAR			Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.353	1.40	5.5565	274.1564	0.0012	1.6933	27.78	3048
D_{35}	0.0090	2.75	0.353	1.40	5.5565	5.9816	0.0557	1.6933	1273.13	3048
D_{50}	0.0853	26.00	0.353	1.40	5.5565	0.6327	0.5270	1.6933	12036.89	3048
D_{65}	0.2953	90.00	0.353	1.40	5.5565	0.1828	1.8241	1.6933	41666.16	3048
D_m	0.4832	147.28	0.353	1.40	5.5565	0.1117	2.9850	1.6933	68184.36	3048
D_{84}	2.0177	615.00	0.353	1.40	5.5565	0.0267	12.4646	1.6933	284718.79	
D_{72}	**0.8995**	**274.16**	0.353	1.40	5.5565	0.0600	5.5565	1.6933	126922.72	3048

FLOW 4 *AVERAGE FLOW = 2.13 CFS FOR 12 MINUTES*

			FLOW				SHEAR			Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.413	2.13	6.5010	320.7552	0.0012	1.8316	30.05	1319
D_{35}	0.0090	2.75	0.413	2.13	6.5010	6.9983	0.0557	1.8316	1377.09	1319
D_{50}	0.0853	26.00	0.413	2.13	6.5010	0.7402	0.5270	1.8316	13019.73	1319
D_{65}	0.2953	90.00	0.413	2.13	6.5010	0.2138	1.8241	1.8316	45068.30	1319
D_m	0.4832	147.28	0.413	2.13	6.5010	0.1307	2.9850	1.8316	73751.77	1319
D_{84}	2.0177	615.00	0.413	2.13	6.5010	0.0313	12.4646	1.8316	307966.73	
D_{73}	**1.0523**	**320.76**	0.413	2.13	6.5010	0.0600	6.5010	1.8316	160621.02	1319

FLOW 5 *AVERAGE FLOW = 3.02 CFS FOR 7 MINUTES*

			FLOW				SHEAR			Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.471	3.02	7.4139	365.8007	0.0012	1.9560	32.09	822
D_{35}	0.0090	2.75	0.471	3.02	7.4139	7.9811	0.0557	1.9560	1470.61	822
D_{50}	0.0853	26.00	0.471	3.02	7.4139	0.8442	0.5270	1.9560	13903.93	822
D_{65}	0.2953	90.00	0.471	3.02	7.4139	0.2439	1.8241	1.9560	48128.98	822
D_m	0.4832	147.28	0.471	3.02	7.4139	0.1490	2.9850	1.9560	78760.40	822
D_{84}	2.0177	615.00	0.471	3.02	7.4139	0.0357	12.4646	1.9560	328881.34	
D_{75}	**1.2001**	**365.80**	0.471	3.02	7.4139	0.0600	7.4139	1.9560	195617.93	822

INCIPIENT MOTION

M-13 CONSTRUCTION

GIVEN:

A trapezoidal channel

FIND:

(a) D_S Shield's Eqn. @ incipient motion

b=	0	ft		
m=	1.4			
S_o=	0.38			
n=	0.04			
D_{50}=	26	mm	=	0.09 ft
v=	1.20E-05	ft^2/s		
Length of reach	300	ft		
g=	32.2			
Ø=	35	°		
S_g=	2.65			
Ý$_w$=	62.4	lbs/ft^3		

Sol^{n}

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

SHEILDS EQN: $T_c = 0.06(Ý_w(S_g - 1))D_{50}$

NORMAL SHEAR: $T_o = ÝRS$

: $(gRS_f)^{.5}$

MANNINGS: $Q = C_u A^{(5/3)} S_o^{(1/2)} / n P^{(2/3)}$

Area: $bY + mY^2$

Perimeter: $b + 2Y(m^2+1)^{.5}$

REACH 3

FLOW 1 *AVERAGE FLOW = 0.50 CFS FOR 1440 MINUTES*

D_s	Grain Size	Grain Size	Y	FLOW Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	$V*D_s/v$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	fps		ft
D_{16}	0.0002	0.0600	0.263	0.50	2.5373	125.1905	0.0012	1.1443	18.77	98864
D_{35}	0.0090	2.75	0.263	0.50	2.5373	2.7314	0.0557	1.1443	860.32	98864
D_{50}	0.0853	26.00	0.263	0.50	2.5373	0.2889	0.5270	1.1443	8133.94	98864
D_{65}	0.2953	90.00	0.263	0.50	2.5373	0.0835	1.8241	1.1443	28155.94	98864
D_m	0.4832	147.28	0.263	0.50	2.5373	0.0510	2.9850	1.1443	46075.63	
D_{84}	2.0177	615.00	0.263	0.50	2.5373	0.0122	12.4646	1.1443	192398.91	
D_{66}	**0.4107**	**125.19**	0.263	0.50	2.5373	0.0600	2.5373	1.1443	39165.06	98864

FLOW 2 *AVERAGE FLOW = 0.75 CFS FOR 234 MINUTES*

D_s	Grain Size	Grain Size	Y	FLOW Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	$V*D_s/v$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.306	0.75	2.9522	145.6589	0.0012	1.2343	20.25	17329
D_{35}	0.0090	2.75	0.306	0.75	2.9522	3.1780	0.0557	1.2343	927.99	17329
D_{50}	0.0853	26.00	0.306	0.75	2.9522	0.3361	0.5270	1.2343	8773.72	17329
D_{65}	0.2953	90.00	0.306	0.75	2.9522	0.0971	1.8241	1.2343	30370.56	17329
D_m	0.4832	147.28	0.306	0.75	2.9522	0.0593	2.9850	1.2343	49699.74	
D_{84}	2.0177	615.00	0.306	0.75	2.9522	0.0142	12.4646	1.2343	207532.18	
D_{67}	**0.4779**	**145.66**	0.306	0.75	2.9522	0.0600	2.9522	1.2343	49152.69	17329

FLOW 3 *AVERAGE FLOW = 1.33 CFS FOR 72 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	FLOW Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.380	1.33	3.6661	180.8836	0.0012	1.3754	22.56	5942
D_{35}	0.0090	2.75	0.380	1.33	3.6661	3.9466	0.0557	1.3754	1034.13	5942
D_{50}	0.0853	26.00	0.380	1.33	3.6661	0.4174	0.5270	1.3754	9777.21	5942
D_{85}	0.2953	90.00	0.380	1.33	3.6661	0.1206	1.8241	1.3754	33844.17	5942
D_m	0.4832	147.28	0.380	1.33	3.6661	0.0737	2.9850	1.3754	55384.11	
D_{84}	2.0177	615.00	0.380	1.33	3.6661	0.0176	12.4646	1.3754	231268.53	
D_{68}	**0.5935**	**180.88**	0.380	1.33	3.6661	0.0600	3.6661	1.3754	68020.62	5942

FLOW 4 *AVERAGE FLOW = 2.08 CFS FOR 30 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	FLOW Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.449	2.08	4.3318	213.7282	0.0012	1.4951	24.53	2691
D_{35}	0.0090	2.75	0.449	2.08	4.3318	4.6632	0.0557	1.4951	1124.10	2691
D_{50}	0.0853	26.00	0.449	2.08	4.3318	0.4932	0.5270	1.4951	10627.87	2691
D_{85}	0.2953	90.00	0.449	2.08	4.3318	0.1425	1.8241	1.4951	36788.77	2691
D_m	0.4832	147.28	0.449	2.08	4.3318	0.0871	2.9850	1.4951	60202.78	2691
D_{84}	2.0177	615.00	0.449	2.08	4.3318	0.0209	12.4646	1.4951	251389.95	
D_{70}	**0.7012**	**213.73**	0.449	2.08	4.3318	0.0600	4.3318	1.4951	87364.44	2691

FLOW 5 *AVERAGE FLOW = 3.84 CFS FOR 8 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	FLOW Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.565	3.84	5.4509	268.9453	0.0012	1.6771	27.51	805
D_{35}	0.0090	2.75	0.565	3.84	5.4509	5.8679	0.0557	1.6771	1260.98	805
D_{50}	0.0853	26.00	0.565	3.84	5.4509	0.6206	0.5270	1.6771	11921.95	805
D_{85}	0.2953	90.00	0.565	3.84	5.4509	0.1793	1.8241	1.6771	41268.28	805
D_m	0.4832	147.28	0.565	3.84	5.4509	0.1096	2.9850	1.6771	67533.24	805
D_{84}	2.0177	615.00	0.565	3.84	5.4509	0.0262	12.4646	1.6771	281999.90	
D_{72}	**0.8824**	**268.95**	0.565	3.84	5.4509	0.0600	5.4509	1.6771	123321.23	805

INCIPIENT MOTION

M-13 CONSTRUCTION

GIVEN:

A trapezoidal channel

FIND:

(a) Ds Shield's Eqn. @ incipient motion

b=	0	ft		
m=	1.4			
S_o=	0.69			
n=	0.04			
D_{50}=	26	mm	=	0.085 ft
v=	1.20E-05	ft^2/s		
Length of reach	750	ft		
g=	32.2			
Ø=	35	°		
S_g=	2.65			
$Ý_w$=	62.4	lbs/ft^3		

Sol^n

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

SHEILDS EQN: $T_c = 0.06(Ý_w(S_g - 1))D_{50}$

NORMAL SHEAR: $To = ÝRS$

$(gRS_f)^{.5}$

MANNINGS: $Q = C_u A^{(5/3)} S_o^{(1/2)} / n P^{(2/3)}$

Area: $bY + mY^2$

Perimeter: $b + 2Y(m^2+1)^{.5}$

REACH 4

FLOW 1 *AVERAGE FLOW = 0.03 CFS FOR 1440 MINUTES*

Ds	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	V*Ds/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	fps		ft
D_{16}	0.0002	0.0600	0.082	0.030	1.4365	70.8753	0.0012	0.8610	14.12	74387
D_{35}	0.0090	2.75	0.082	0.030	1.4365	1.5464	0.0557	0.8610	647.32	74387
D_{50}	0.0853	26.00	0.082	0.030	1.4365	0.1636	0.5270	0.8610	6120.16	74387
D_{65}	0.2953	90.00	0.082	0.030	1.4365	0.0473	1.8241	0.8610	21185.16	
D_m	0.4832	147.28	0.082	0.030	1.4365	0.0289	2.9850	0.8610	34668.34	
D_{84}	2.0177	615.00	0.082	0.030	1.4365	0.0069	12.4646	0.8610	144765.28	
D60	**0.2325**	**70.88**	0.082	0.030	1.4365	0.0600	1.4365	0.8610	16683.39	74387

FLOW 2 *AVERAGE FLOW = 0.065 CFS FOR 120 MINUTES*

Ds	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V*	V*Ds/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.110	0.065	1.9182	94.6445	0.0012	0.9949	16.32	7163
D_{35}	0.0090	2.75	0.110	0.065	1.9182	2.0650	0.0557	0.9949	748.04	7163
D_{50}	0.0853	26.00	0.110	0.065	1.9182	0.2184	0.5270	0.9949	7072.33	7163
D_{65}	0.2953	90.00	0.110	0.065	1.9182	0.0631	1.8241	0.9949	24481.16	
D_m	0.4832	147.28	0.110	0.065	1.9182	0.0386	2.9850	0.9949	40062.05	
D_{84}	2.0177	615.00	0.110	0.065	1.9182	0.0092	12.4646	0.9949	167287.90	
D65	**0.3105**	**94.64**	0.110	0.065	1.9182	0.0600	1.9182	0.9949	25744.51	7163

LOW 3 *AVERAGE FLOW = 0.14 CFS FOR 15 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.146	0.140	2.5576	126.1926	0.0012	1.1488	18.85	1034
D_{35}	0.0090	2.75	0.146	0.140	2.5576	2.7533	0.0557	1.1488	863.76	1034
D_{50}	0.0853	26.00	0.146	0.140	2.5576	0.2912	0.5270	1.1488	8166.43	1034
D_{65}	0.2953	90.00	0.146	0.140	2.5576	0.0841	1.8241	1.1488	28268.40	1034
D_m	0.4832	147.28	0.146	0.140	2.5576	0.0514	2.9850	1.1488	46259.67	
D_{84}	2.0177	615.00	0.146	0.140	2.5576	0.0123	12.4646	1.1488	193167.43	
D66	**0.4140**	**126.19**	0.146	0.140	2.5576	0.0600	2.5576	1.1488	39636.26	1034

LOW 4 *AVERAGE FLOW = 0.28 CFS FOR 10 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.189	0.280	3.3162	163.6182	0.0012	1.3081	21.46	785
D_{35}	0.0090	2.75	0.189	0.280	3.3162	3.5699	0.0557	1.3081	983.54	785
D_{50}	0.0853	26.00	0.189	0.280	3.3162	0.3776	0.5270	1.3081	9298.89	785
D_{65}	0.2953	90.00	0.189	0.280	3.3162	0.1091	1.8241	1.3081	32188.46	785
D_m	0.4832	147.28	0.189	0.280	3.3162	0.0667	2.9850	1.3081	52674.62	
D_{84}	2.0177	615.00	0.189	0.280	3.3162	0.0160	12.4646	1.3081	219954.47	
D68	**0.5368**	**163.62**	0.189	0.280	3.3162	0.0600	3.3162	1.3081	58517.98	785

INCIPIENT MOTION

M-13 CONSTRUCTION

GIVEN:

FIND:

A trapezoidal channel

(a) D_S Shield's Eqn. @ incipient motion

b=	0	ft		
m=	1.4			
S_o=	0.64			
n=	0.04			
D_{50}=	26	mm	=	0.085 ft
v=	1.20E-05	ft²/s		
Length of reach	640	ft		
g=	32.2			
Ø=	35	°		
S_g=	2.65			
Ýw=	62.4	lbs/ft³		

Soln

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

MANNINGS: $Q = C_u A^{(5/3)} S_o^{(1/2)} / n\, P^{(2/3)}$

SHEILDS EQN: $T_c = 0.06(\acute{Y}_w(S_g - 1))D_{50}$

Area: $bY + mY^2$

NORMAL SHEAR: $To = \acute{Y}RS$

Perimeter: $b + 2Y(m^2+1)^{.5}$

V:* $(gRS_f)^{.5}$

REACH 5

FLOW 1 *AVERAGE FLOW = 0.093 CFS FOR 1440 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)^*D_s$	SHEAR T_c	V*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	fps		ft
D_{16}	0.0002	0.0600	0.127	0.093	2.0636	101.8159	0.0012	1.0319	16.93	89158
D_{35}	0.0090	2.75	0.127	0.093	2.0636	2.2214	0.0557	1.0319	775.86	89158
D_{50}	0.0853	26.00	0.127	0.093	2.0636	0.2350	0.5270	1.0319	7335.39	89158
D_{65}	0.2953	90.00	0.127	0.093	2.0636	0.0679	1.8241	1.0319	25391.72	89158
D_m	0.4832	147.28	0.127	0.093	2.0636	0.0415	2.9850	1.0319	41552.14	
D_{84}	2.0177	615.00	0.127	0.093	2.0636	0.0099	12.4646	1.0319	173510.11	
D_{65}	**0.3340**	**101.82**	0.127	0.093	2.0636	0.0600	2.0636	1.0319	28725.35	89158

FLOW 2 *AVERAGE FLOW = 0.15 CFS FOR 255 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)^*D_s$	SHEAR T_c	V*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.152	0.150	2.4698	121.8584	0.0012	1.1289	18.52	17273
D_{35}	0.0090	2.75	0.152	0.150	2.4698	2.6587	0.0557	1.1289	848.79	17273
D_{50}	0.0853	26.00	0.152	0.150	2.4698	0.2812	0.5270	1.1289	8024.96	17273
D_{65}	0.2953	90.00	0.152	0.150	2.4698	0.0812	1.8241	1.1289	27778.71	17273
D_m	0.4832	147.28	0.152	0.150	2.4698	0.0496	2.9850	1.1289	45458.32	
D_{84}	2.0177	615.00	0.152	0.150	2.4698	0.0119	12.4646	1.1289	189821.20	
D_{66}	**0.3998**	**121.86**	0.152	0.150	2.4698	0.0600	2.4698	1.1289	37611.89	17273

FLOW 3 *AVERAGE FLOW = 0.30 CFS FOR 60 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.197	0.300	3.2010	157.9349	0.0012	1.2852	21.08	4627
D_{35}	0.0090	2.75	0.197	0.300	3.2010	3.4459	0.0557	1.2852	966.30	4627
D_{50}	0.0853	26.00	0.197	0.300	3.2010	0.3645	0.5270	1.2852	9135.96	4627
D_{65}	0.2953	90.00	0.197	0.300	3.2010	0.1053	1.8241	1.2852	31624.48	4627
D_m	0.4832	147.28	0.197	0.300	3.2010	0.0643	2.9850	1.2852	51751.71	
D_{84}	2.0177	615.00	0.197	0.300	3.2010	0.0154	12.4646	1.2852	216100.63	
D_{67}	**0.5182**	**157.93**	0.197	0.300	3.2010	0.0600	3.2010	1.2852	55495.67	4627

FLOW 4 *AVERAGE FLOW = 0.47 CFS FOR 25 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.219	0.400	3.5649	175.8930	0.0012	1.3563	22.25	2034
D_{35}	0.0090	2.75	0.219	0.400	3.5649	3.8377	0.0557	1.3563	1019.76	2034
D_{50}	0.0853	26.00	0.219	0.400	3.5649	0.4059	0.5270	1.3563	9641.39	2034
D_{65}	0.2953	90.00	0.219	0.400	3.5649	0.1173	1.8241	1.3563	33374.03	2034
D_m	0.4832	147.28	0.219	0.400	3.5649	0.0717	2.9850	1.3563	54614.74	
D_{84}	2.0177	615.00	0.219	0.400	3.5649	0.0172	12.4646	1.3563	228055.86	
D_{68}	**0.5771**	**175.89**	0.219	0.400	3.5649	0.0600	3.5649	1.3563	65225.09	2034

FLOW 5 *AVERAGE FLOW = 0.90 CFS FOR 7 MINUTES*

D_s	Grain Size	Grain Size	FLOW Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	SHEAR T_c	V^*	V^*D_s/v	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.298	0.901	4.8340	238.5058	0.0012	1.5794	25.91	663
D_{35}	0.0090	2.75	0.298	0.901	4.8340	5.2038	0.0557	1.5794	1187.47	663
D_{50}	0.0853	26.00	0.298	0.901	4.8340	0.5504	0.5270	1.5794	11227.02	663
D_{65}	0.2953	90.00	0.298	0.901	4.8340	0.1590	1.8241	1.5794	38862.77	663
D_m	0.4832	147.28	0.298	0.901	4.8340	0.0972	2.9850	1.5794	63596.77	663
D_{84}	2.0177	615.00	0.298	0.901	4.8340	0.0233	12.4646	1.5794	265562.29	
D_{70}	**0.7825**	**238.51**	0.298	0.901	4.8340	0.0600	4.8340	1.5794	102988.85	663

INCIPIENT MOTION

M-13 CONSTRUCTION

GIVEN:

FIND:

A trapezoidal channel

(a) D_S Shield's Eqn. @ incipient motion

b=	0	ft
m=	1.4	
S_o=	0.31	
n=	0.04	
D_{50}=	26	mm = 0.085 ft
ν=	1.20E-05	ft^2/s
Length of reach	540	ft
g=	32.2	
Ø=	35	°
S_g=	2.65	
$\acute{Y}_w$=	62.4	lbs/ft^3

Soln

NEEDED EQUATIONS

INCIPIENT MOTION: $T_o = T_c$

SHEILDS EQN: $T_c = 0.06(\acute{Y}_w(S_g - 1))D_{50}$

NORMAL SHEAR: $To = \acute{Y}RS$

V:* $(gRS_f)^{.5}$

MANNINGS: $Q = C_u A^{(5/3)} S_o^{(1/2)} / n\ P^{(2/3)}$

Area: $bY + mY^2$

Perimeter: $b + 2Y(m^2+1)^{.5}$

REACH 6

FLOW 1 *AVERAGE FLOW = 0.14 CFS FOR 1440 MINUTES*

D_s	Grain Size	Grain Size	Y (FLOW)	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c (SHEAR)	V*	$V*D_s/\nu$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	fps		ft
D_{16}	0.0002	0.0600	0.170	0.140	1.3340	65.8208	0.0012	0.8297	13.61	71686
D_{35}	0.0090	2.75	0.170	0.140	1.3340	1.4361	0.0557	0.8297	623.82	71686
D_{50}	0.0853	26.00	0.170	0.140	1.3340	0.1519	0.5270	0.8297	5897.89	71686
D_{65}	0.2953	90.00	0.170	0.140	1.3340	0.0439	1.8241	0.8297	20415.78	71686
D_m	0.4832	147.28	0.170	0.140	1.3340	0.0268	2.9850	0.8297	33409.29	
D_{84}	2.0177	615.00	0.170	0.140	1.3340	0.0064	12.4646	0.8297	139507.85	
D_{59}	**0.2159**	**65.82**	0.170	0.140	1.3340	0.0600	1.3340	0.8297	14930.93	71686

FLOW 2 *AVERAGE FLOW = 0.22 CFS FOR 276 MINUTES*

D_s	Grain Size	Grain Size	Y (FLOW)	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c (SHEAR)	V*	$V*D_s/\nu$	Max Travel Path
%	ft	mm	ft	cfs	lbs/ft^2		lbs/ft^2	ft/sec		ft
D_{16}	0.0002	0.0600	0.201	0.220	1.5820	78.0530	0.0012	0.9035	14.82	14962
D_{35}	0.0090	2.75	0.201	0.220	1.5820	1.7030	0.0557	0.9035	679.31	14962
D_{50}	0.0853	26.00	0.201	0.220	1.5820	0.1801	0.5270	0.9035	6422.59	14962
D_{65}	0.2953	90.00	0.201	0.220	1.5820	0.0520	1.8241	0.9035	22232.03	14962
D_m	0.4832	147.28	0.201	0.220	1.5820	0.0318	2.9850	0.9035	36381.49	14962
D_{84}	2.0177	615.00	0.201	0.220	1.5820	0.0076	12.4646	0.9035	151918.90	
D_{62}	**0.2561**	**78.05**	0.201	0.220	1.5820	0.0600	1.5820	0.9035	19280.86	14962

FLOW 3 *AVERAGE FLOW = 0.40 CFS FOR 81 MINUTES*

			FLOW		SHEAR					Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.251	0.400	1.9778	97.5857	0.0012	1.0103	16.57	4910
D_{35}	0.0090	2.75	0.251	0.400	1.9778	2.1291	0.0557	1.0103	759.57	4910
D_{50}	0.0853	26.00	0.251	0.400	1.9778	0.2252	0.5270	1.0103	7181.39	4910
D_{65}	0.2953	90.00	0.251	0.400	1.9778	0.0651	1.8241	1.0103	24858.64	4910
D_m	0.4832	147.28	0.251	0.400	1.9778	0.0398	2.9850	1.0103	40679.79	4910
D_{84}	2.0177	615.00	0.251	0.400	1.9778	0.0095	12.4646	1.0103	169867.39	
D_{65}	**0.3202**	**97.59**	0.251	0.400	1.9778	0.0600	1.9778	1.0103	26953.86	4910

FLOW 4 *AVERAGE FLOW = 0.65 CFS FOR 30 MINUTES*

			FLOW		SHEAR					Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.302	0.650	2.3729	117.0795	0.0012	1.1066	18.15	1992
D_{35}	0.0090	2.75	0.302	0.650	2.3729	2.5545	0.0557	1.1066	831.98	1992
D_{50}	0.0853	26.00	0.302	0.650	2.3729	0.2702	0.5270	1.1066	7866.03	1992
D_{65}	0.2953	90.00	0.302	0.650	2.3729	0.0781	1.8241	1.1066	27228.57	1992
D_m	0.4832	147.28	0.302	0.650	2.3729	0.0477	2.9850	1.1066	44558.04	1992
D_{84}	2.0177	615.00	0.302	0.650	2.3729	0.0114	12.4646	1.1066	186061.90	
D_{66}	**0.3841**	**117.08**	0.302	0.650	2.3729	0.0600	2.3729	1.1066	35421.20	1992

FLOW 5 *AVERAGE FLOW = 1.22 CFS FOR 9 MINUTES*

			FLOW		SHEAR					Max Travel
D_s	Grain Size	Grain Size	Y	Q	T_o	$T_o/(Y_s-Y)*D_s$	T_c	V^*	V^*D_s/v	Path
%	ft	mm	ft	cfs	lbs/ft²		lbs/ft²	ft/sec		ft
D_{16}	0.0002	0.0600	0.382	1.222	3.0065	148.3396	0.0012	1.2456	20.43	673
D_{35}	0.0090	2.75	0.382	1.222	3.0065	3.2365	0.0557	1.2456	936.49	673
D_{50}	0.0853	26.00	0.382	1.222	3.0065	0.3423	0.5270	1.2456	8854.09	673
D_{65}	0.2953	90.00	0.382	1.222	3.0065	0.0989	1.8241	1.2456	30648.76	673
D_m	0.4832	147.28	0.382	1.222	3.0065	0.0604	2.9850	1.2456	50154.99	673
D_{84}	2.0177	615.00	0.382	1.222	3.0065	0.0145	12.4646	1.2456	209433.17	
D_{67}	**0.4867**	**148.34**	0.382	1.222	3.0065	0.0600	3.0065	1.2456	50515.81	673

Appendix "E"

EARTHTEC TESTING & ENGINEERING

Letters

Earthtec Testing & Engineering, P.C.

133 North 1330 West
Orem, Utah - 84057
Phone (801) 225-5711
Fax (801) 225-3363

1596 West 2650 South #108
Ogden, Utah - 84401
Phone (801) 399-9516
Fax (801) 399-9842

March 1, 2001

Mr. Mike Morley
M-13 Construction
775 West 1200 North, Suite 100
Springville, Utah 84663

Subject: Debris Flow Hazard Study
Plat "J", East Mountain Development
Provo, Utah
Job No. 00E-034

Dear Mr. Morley:

At your request, Earthtec Testing and Engineering, P.C., has completed additional site investigation to aid in assessing the debris flow hazard which poses a threat to the proposed Plat "J" of the East Mountain Subdivision in Southeast Provo, Utah. Based on previous findings from an exploration trench, test pits, and several bore holes completed at the site, it has been determined that debris flows have affected the site in the past. The debris flow deposits observed on the site have originated in a ravine which drains a limited area of the steep mountain slopes of the Wasatch Range to the east of the proposed development. In order to estimate the volume of potential debris flow material which currently exists in the ravine and the surrounding drainage area, an inspection was made of the ravine and the slopes which drain into the ravine. This inspection focused on estimating the volume of loose or easily erodible debris, soil, and rock material in the ravine bottom. This material could be eroded and washed down the ravine in the form of a debris flow during a locally intense precipitation event or from above normal snow melt runoff. During the inspection, some of the physical characteristics of the ravine and surrounding slopes were observed and/or measured for the purpose of providing additional data for modeling the debris flow potential in the ravine. The following paragraphs present the findings of our inspection.

The total surface area of the ravine and surrounding slopes which are anticipated to contribute to drainage onto the site were observed. The US Geological Survey (USGS) "Springville" 7.5 minute topographic map was used in our estimates. Based on our observations in the field, it appeared that approximately one-third of the total drainage area consists of exposed bedrock outcrops which are unlikely to contribute to the volume of potential debris flow material in the ravine. The north-facing slopes along the south side of the ravine and the west facing slopes at the head of the ravine were observed to be moderately to heavily vegetated with scrub oak brush, sage brush, and native grasses. Numerous outcrops of predominantly erosion-resistant quartzite were observed on these slopes. The south-facing slopes along the north side of the ravine were observed to be moderately vegetated with the same types of plants. The bedrock outcrops observed on these slopes are predominantly massive limestones. Slope angles along the ravine were measured and generally ranged from 30° to 35° from horizontal on the south and north-facing slopes along the sides of the ravine. The west-facing slopes at the head of the ravine have slope angles which range from 35° to near 45° from horizontal. No water was observed in the ravine at the time of the inspection and no springs were observed on the slopes surrounding the ravine.

Two debris flow deposits were observed in the bottom of the ravine up-slope from the site during the inspection. The surface dimensions of these two deposits were measured and used to estimate the approximate volume of material in each deposit. One deposit appears to consist of approximately 1,100 cubic yards of material and the other contains approximately 3,900 cubic yards of material. The remainder of the material observed in the bottom of the ravine consisted of loose alluvial and colluvial gravels, ranging from pebbles to boulders in size, and a minor amount of loose or erodible soil. Based on the measured length of the ravine taken from the USGS topographic map and the estimated width and depth of these alluvial and colluvial deposits, it appears that the volume of this material ranges between 900 and 1,700 cubic yards for the length of the ravine. This volume added to the volume of material contained in the two older debris flow deposits gives a total volume of potential debris flow material currently in the bottom of the ravine of between 5,900 and 6,700 cubic yards. This volume does not include any material from the surrounding slopes which may be eroded and add to the volume of a debris flow during such an event.

The findings and data presented in this letter are largely estimations based on our observations and existing topographic maps of the area and are subject to some degree of variation. It is our understanding that Mr. Ken Berg of Sowby and Berg Consultants is in the process of evaluating the debris flow hazard at the site using computer modeling techniques which require a number of parameters based on site characteristics and precipitation data. The findings and data presented herein are intended to aid in the completion of the computer models which will provide a more complete analysis of the debris flow hazard and aid in any mitigation activities which may be required at the site.

We appreciate the opportunity to be of service on this project. If we can answer further questions or be of additional service, please call.

Sincerely,
Earthtec Testing and Engineering, P.C.

RC/fcv

Mark Larsen,
Staff Geologist

Reviewed by:

Rick L. Chesnut, P.E.
Project Engineer

cc: Ken Berg

Earthtec Testing & Engineering, P.C.

133 North 1330 West
Orem, Utah - 84057
Phone (801) 225-5711
Fax (801) 225-3363

1596 West 2650 South #108
Ogden, Utah - 84401
Phone (801) 399-9516
Fax (801) 399-9842

March 12, 2001

Mr. Mike Morley
M-13 Construction
775 West 1200 North, Suite 100
Springville, Utah 84663

Subject: Addendum to Debris Flow Hazard Study
Plat "J", East Mountain Development
Provo, Utah
Job No. 00E-034

Dear Mr. Morley:

At the request of Sowby & Berg Consultants, Earthtec Testing and Engineering, P.C., is providing additional information to aid in the evaluation of the debris flow hazard potential for the proposed Plat "J" of the East Mountain Subdivision in Southeast Provo, Utah. The additional information provided in this letter and attached figures consists of three maps showing the approximate areas covered by bedrock outcrops, vegetation, and existing debris flow deposits in the potential debris flow drainages to the east of the site. This information was requested by Sowby & Berg Consultants to further aid in modeling the potential debris flow hazard at the site.

The three maps of the area, which were completed over enlarged copies of the USGS "Springville" 7.5 minute Quadrangle during a site visit and with the aid of aerial photographs, are attached here as Figures 1 through 3. Figure No. 1 shows the approximate locations and extent of the bedrock outcrops in the drainage area to the east of the site. The areas not composed of bedrock outcrops were covered by loose, gravelly topsoil or loose gravels, cobbles, and boulders in the form of slope talus and colluvial or alluvial deposits on the slopes and in the bottom of the ravine. Figure No. 2 shows the areas of the drainage covered by heavy vegetation in the form of thick patches of scrub oak with a few scattered juniper trees. The remainder of the surface area was observed to be moderately to sparsely vegetated with grasses and sage brush. Figure No. 3 shows the approximate location of the two existing debris flow deposits in the bottom of the ravine. Based on surface observations and shallow probing with a hand pick, the gradation (percent of gravels, sands, and fines) of these deposits appeared to be similar to the debris flow deposits observed in the trench and test pits excavated on the proposed development. We estimate the gradation of the debris flow deposits in the ravine to be approximately 60% gravels, 25% fines (silt and clay), and 15% sands. The sizes of the gravel components can be broken down to approximately 50% pebble sized fragments, 30% cobble sized fragments, and 20% boulder sized fragments.

We appreciate the opportunity to be of further service on this project. If we can answer any questions or be of additional service, please call.

Sincerely,
Earthtec Testing and Engineering, P.C.

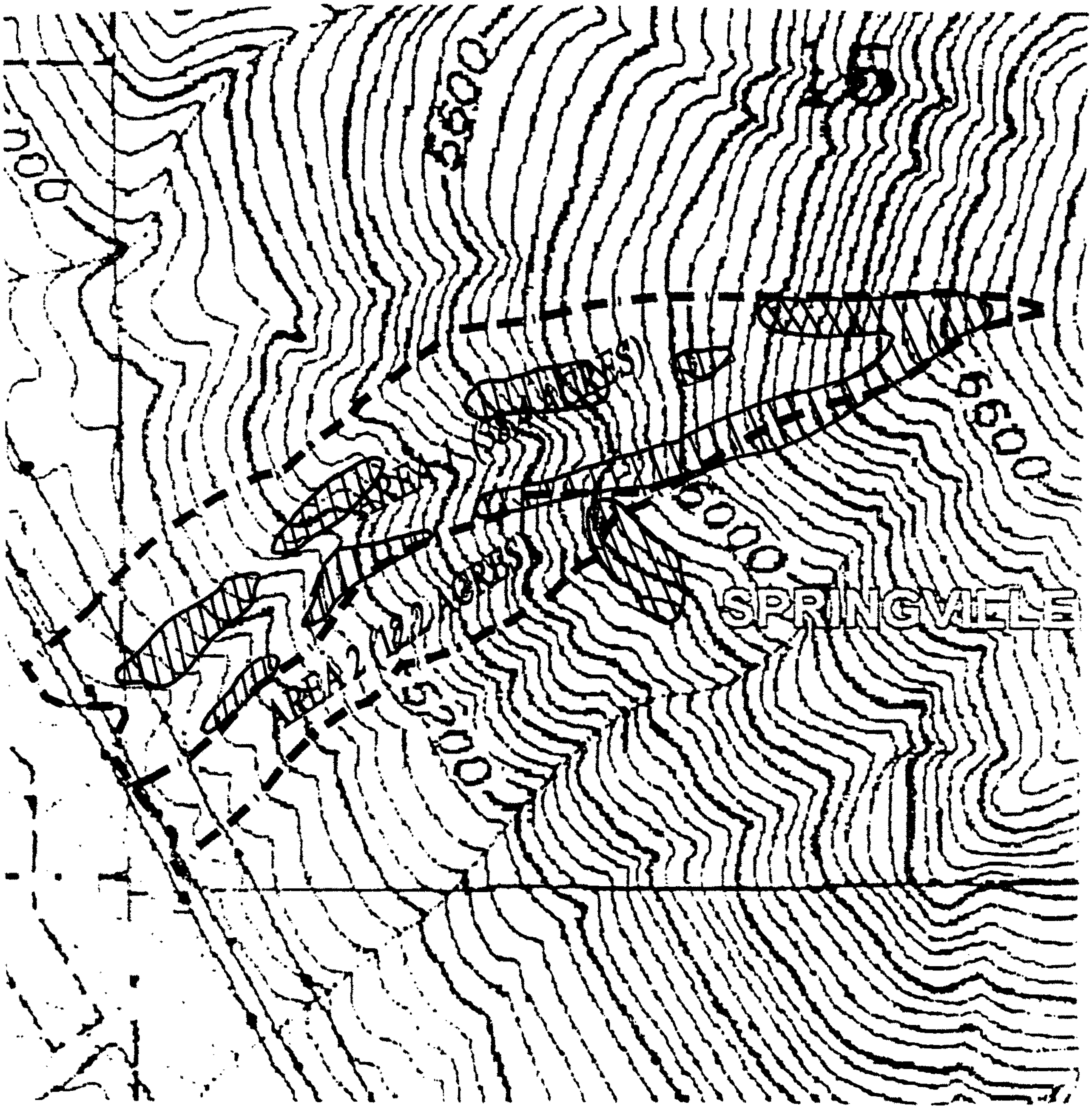
Mark Larsen,
Staff Geologist

Reviewed by:

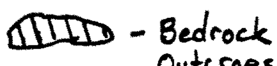
Rick L. Chesnut, P.E.
Project Engineer

cc: Ken Berg

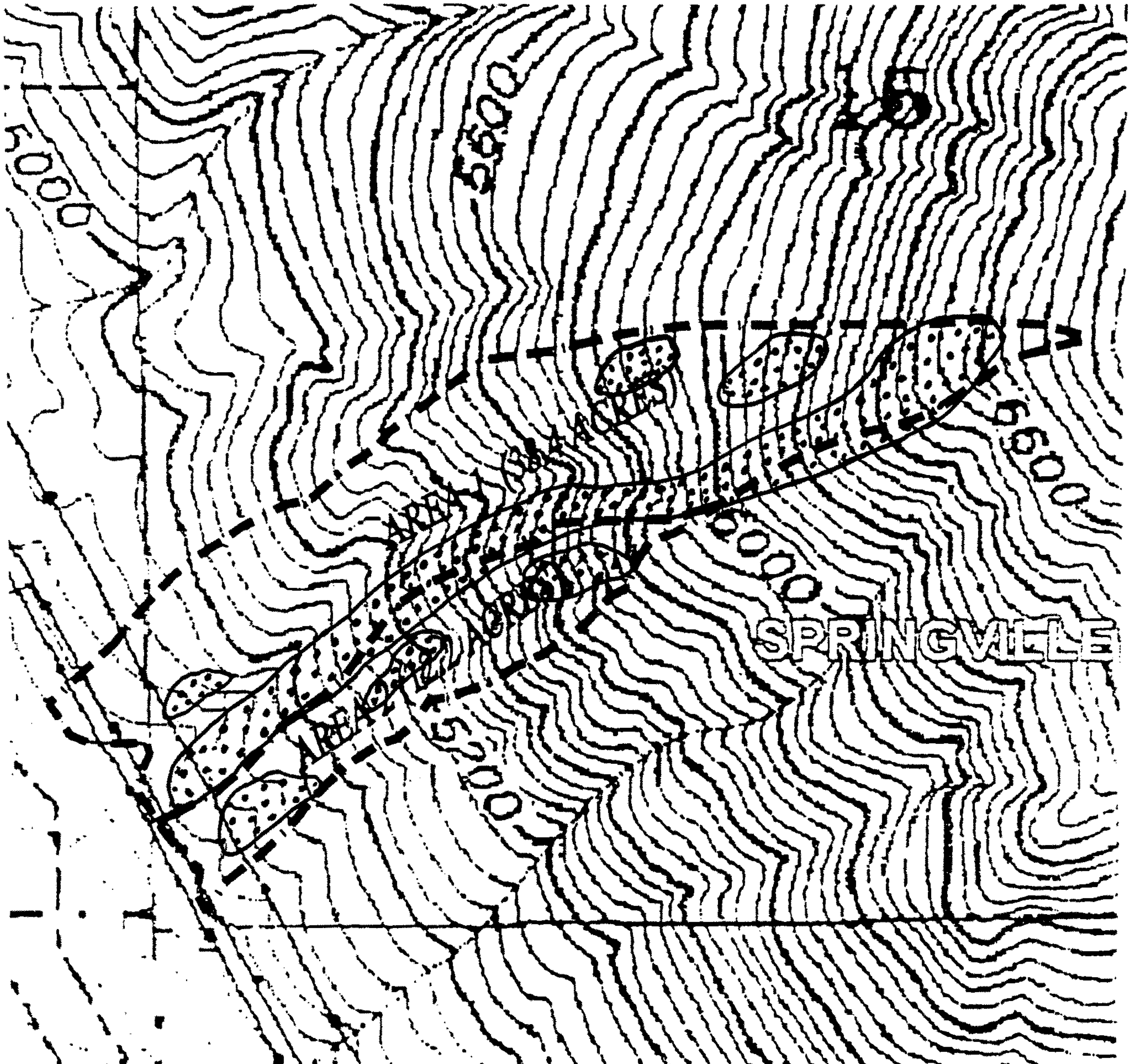
BEDROCK OUTCROPS *Earthtec Testing &Engineering, P.C.*



DRAINAGE AREAS



Job No. 00E-034 Figure No. 1



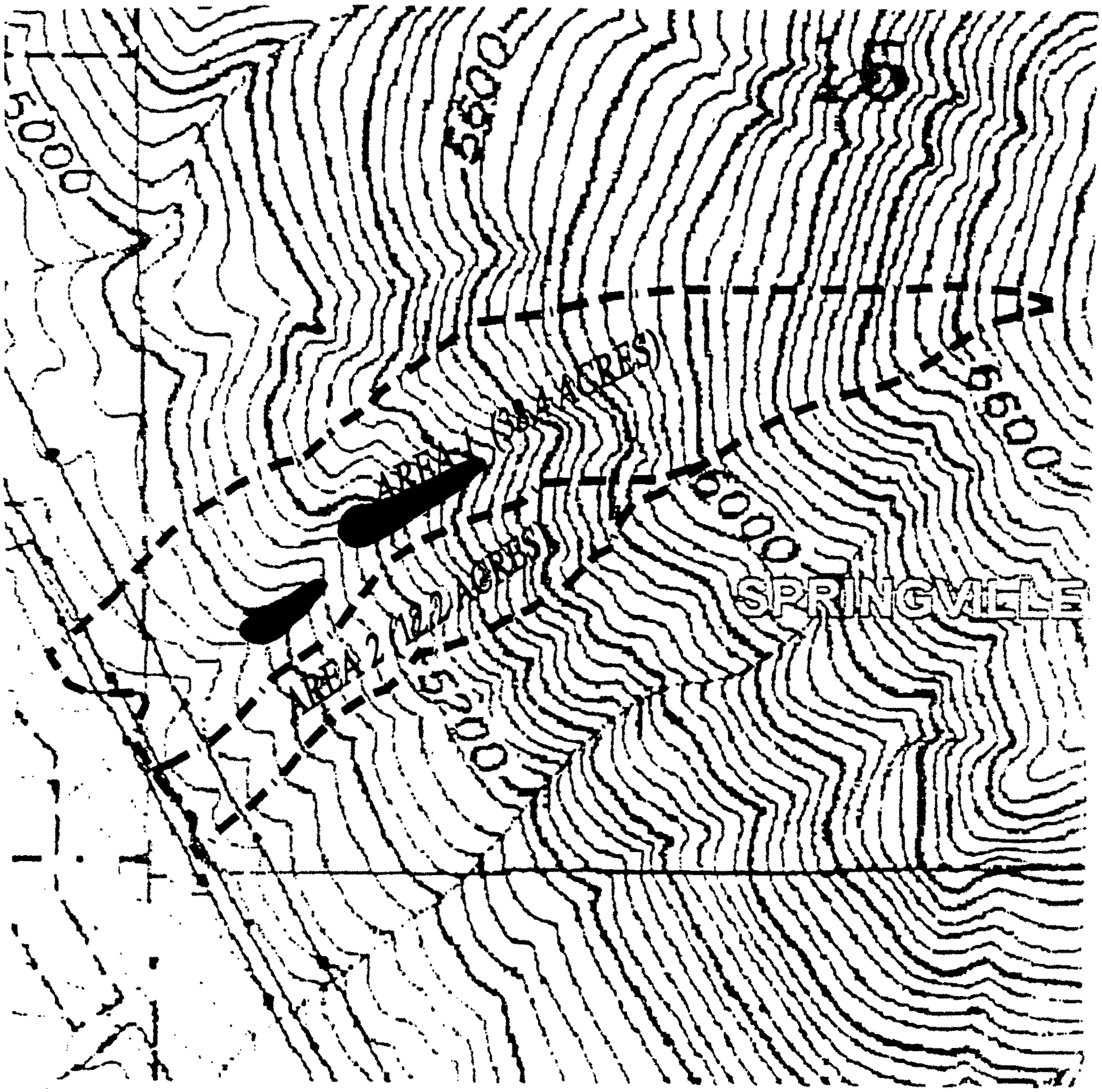
- Areas of Dense Vegetation

DRAINAGE AREAS

NORTH

EXISTING DEBRIS FLOW DEPOSITS

Earthtec Testing &Engineering, P.C.



DRAINAGE AREAS

Job No. 00E-034

Figure No. 3

Earthtec Testing & Engineering, P.C.

133 North 1330 West
Orem, Utah - 84057
Phone (801) 225-5711
Fax (801) 225-3363

1596 West 2650 South #108
Ogden, Utah - 84401
Phone (801) 399-9516
Fax (801) 399-9842

March 19, 2001

Mr. Mike Morley
M-13 Construction
775 West 1200 North, Suite 100
Springville, Utah 84663

Subject: Addendum to Debris Flow Hazard Study
Plat "J", East Mountain Development
Provo, Utah
Job No. 00E-034

Dear Mr. Morley:

At the request of Sowby & Berg Consultants, Earthtec Testing and Engineering, P.C., is providing additional information to aid in the evaluation of the debris flow hazard potential for the proposed Plat "J" of the East Mountain Subdivision in Southeast Provo, Utah. Sowby & Berg Consultants have requested an estimation of the area of the existing debris flow deposits in the ravine which would be affected by a stream of water ½ foot deep. They have also requested additional information on the characteristics of the materials observed in the bottom of the ravine.

The two debris flow deposits observed in the ravine have been eroded and cut by occasional run-off stream flow in the ravine over time. The ravine channel has formed along the north edges of both of the debris flow deposits so that the deposits lie on the south side of the ravine. The gradients of the sides of the ravine along the length of both debris flow deposits are slightly less than the gradients measured over the rest of the ravine. The gradients of the sides of the ravine measured along the debris flow deposits are between 20% and 25%. Based on our observations of the ravine and the debris flow deposits, we estimate that a stream of water 6 inches deep flowing in the ravine would only affect the northern edge of each deposit adjacent to the ravine channel and potentially one-third of the edge of the toe of each deposit closest to the ravine channel. In addition, further erosion along the edges and toes of the debris flow deposits may result in sloughing or raveling of the deposits into the ravine bottom.

The materials observed in the ravine bottom over the majority of the length of the ravine are generally gravels ranging from pebbles to cobbles in size with a few boulders. The fines content in the surface materials along the ravine channel was observed to be low. Sand was observed in some areas between the gravels, but overall the ravine bed was observed to contain course graded materials.

We appreciate the opportunity to be of further service on this project. If we can answer any questions or be of additional service, please call.

Sincerely,
Earthtec Testing and Engineering, P.C.

Mark Larsen,
Staff Geologist

Reviewed by:

Rick L. Chesnut, P.E.
Project Engineer

cc: Ken Berg

Earthtec Testing & Engineering, P.C.

133 North 1330 West
Orem, Utah - 84057
Phone (801) 225-5711
Fax (801) 225-3363

1596 West 2650 South #108
Ogden, Utah - 84401
Phone (801) 399-9516
Fax (801) 399-9842

March 22, 2001

Mr. Mike Morley
M-13 Construction
775 West 1200 North, Suite 100
Springville, Utah 84663

Subject: Addendum to Debris Flow Hazard Study
Plat "J", East Mountain Development
Provo, Utah
Job No. 00E-034

Dear Mr. Morley:

At the request of Sowby & Berg Consultants, Earthtec Testing and Engineering, P.C., is providing additional information to aid in the evaluation of the debris flow hazard potential for the proposed Plat "J" of the East Mountain Subdivision in Southeast Provo, Utah. Sowby & Berg Consultants have requested a generalized sketch and cross section of the two debris flow deposits in the ravine to the east of the site showing an estimation of the volume of material in each deposit that would be affected by a stream of water 0.5 feet deep flowing in the ravine channel. A generalized map view of the debris flow deposits and ravine channel is attached as Figure No. 1, and a generalized cross section representing the approximate dimensions of both deposits is attached as Figure No. 2. It should be noted that these representations and the calculations used to determine the approximated volume of each deposit affected by the stream flow are highly generalized and simplified based on our limited field observations. In addition, an estimation of the gradation of the materials in the ravine channel was requested.

Using the dimensions shown on Figures 1 and 2, we estimate the minimum volume of debris flow deposit material which could be affected by a stream 0.5 feet deep in the ravine to be approximately 128 cubic feet for Debris Flow Deposit #1, and 40 cubic feet for Debris Flow deposit #2. These estimates take into account the material along the edge of the length of each deposit as well as the material along approximately one-third of the width of the toe of each deposit. These estimates do no account for any additional sloughing or undercutting which would likely add to the volumes above.

The material observed on the bottom of the ravine channel is estimated to be approximately 70% gravels, 25% sands, and 5% fines (silts and clays). The gravel component can be approximately graded as 50% pebble sized rocks, 35% cobble sized rocks, and 15% boulder sized rocks. Again, these are only estimates based on our limited field observations. If a more accurate gradation of the materials is required, samples would need to be obtained and analyzed in our laboratory.

We appreciate the opportunity to be of further service on this project. If we can answer any questions or be of additional service, please call.

Sincerely,
Earthtec Testing and Engineering, P.C.

Mark Larsen,
Staff Geologist

Reviewed by:

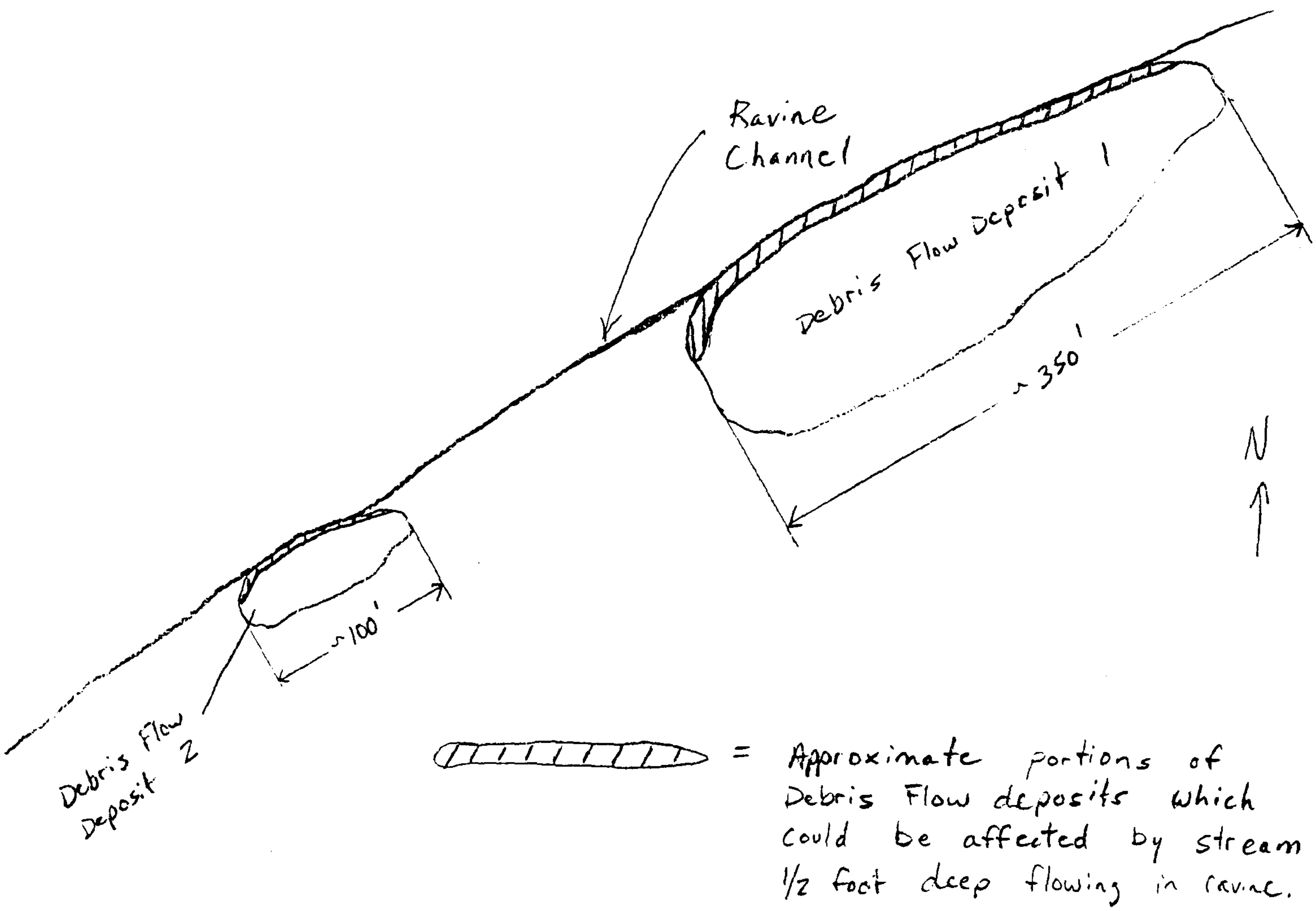
Rick L. Chesnut, P.E.
Project Engineer

cc: Ken Berg

-East Mtn., Plat "J"

Figure No. 1

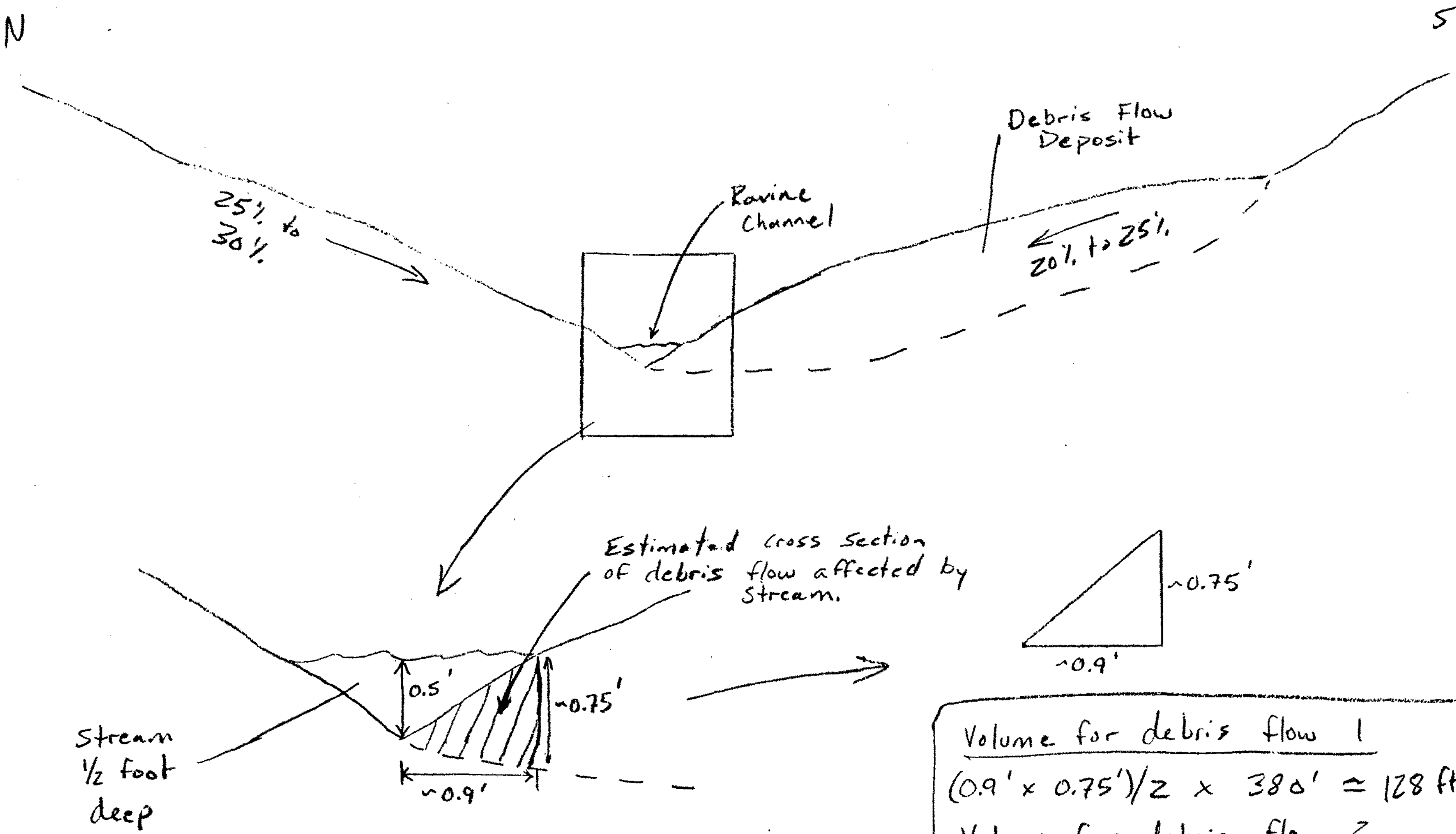
Generalized Map View of Debris Flow Deposits an Ravine Channel



East Mtn., Plat "J"

Figure No. 2

Generalized Cross Section of Ravine and Debris Flow Deposits



Volume for debris flow 1

$(0.9' \times 0.75')/2 \times 380' \simeq 128\ ft^3$

Volume for debris flow 2

$(0.9' \times 0.75')/2 \times 117' \simeq 40\ ft^3$

Lengths of Debris flows used in calculations include the length of the deposit + 1/3 the toe width.

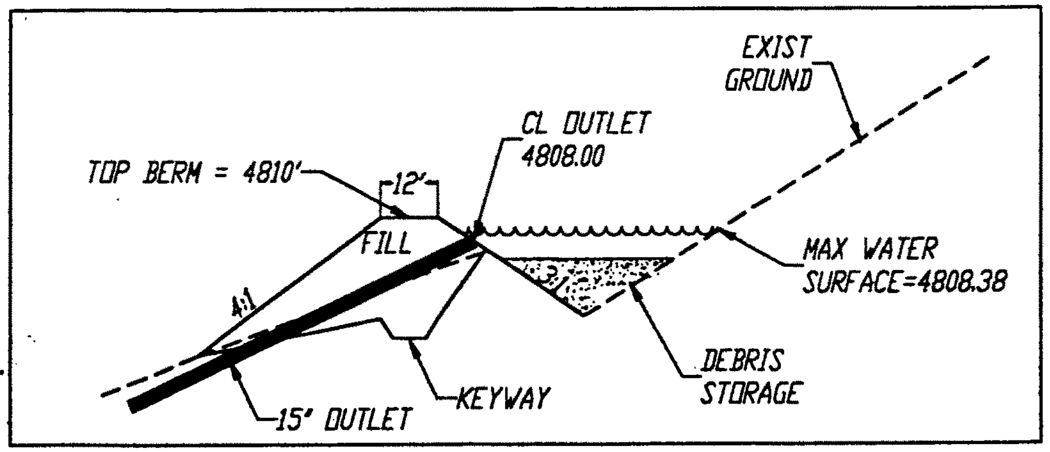
Appendix "F"

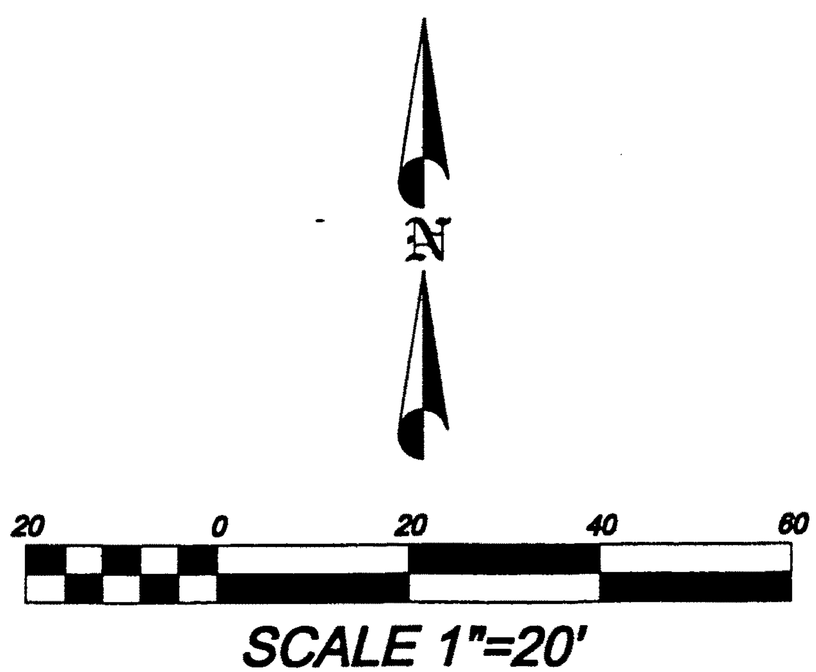
Debris & Storm Drainage Basin Plans

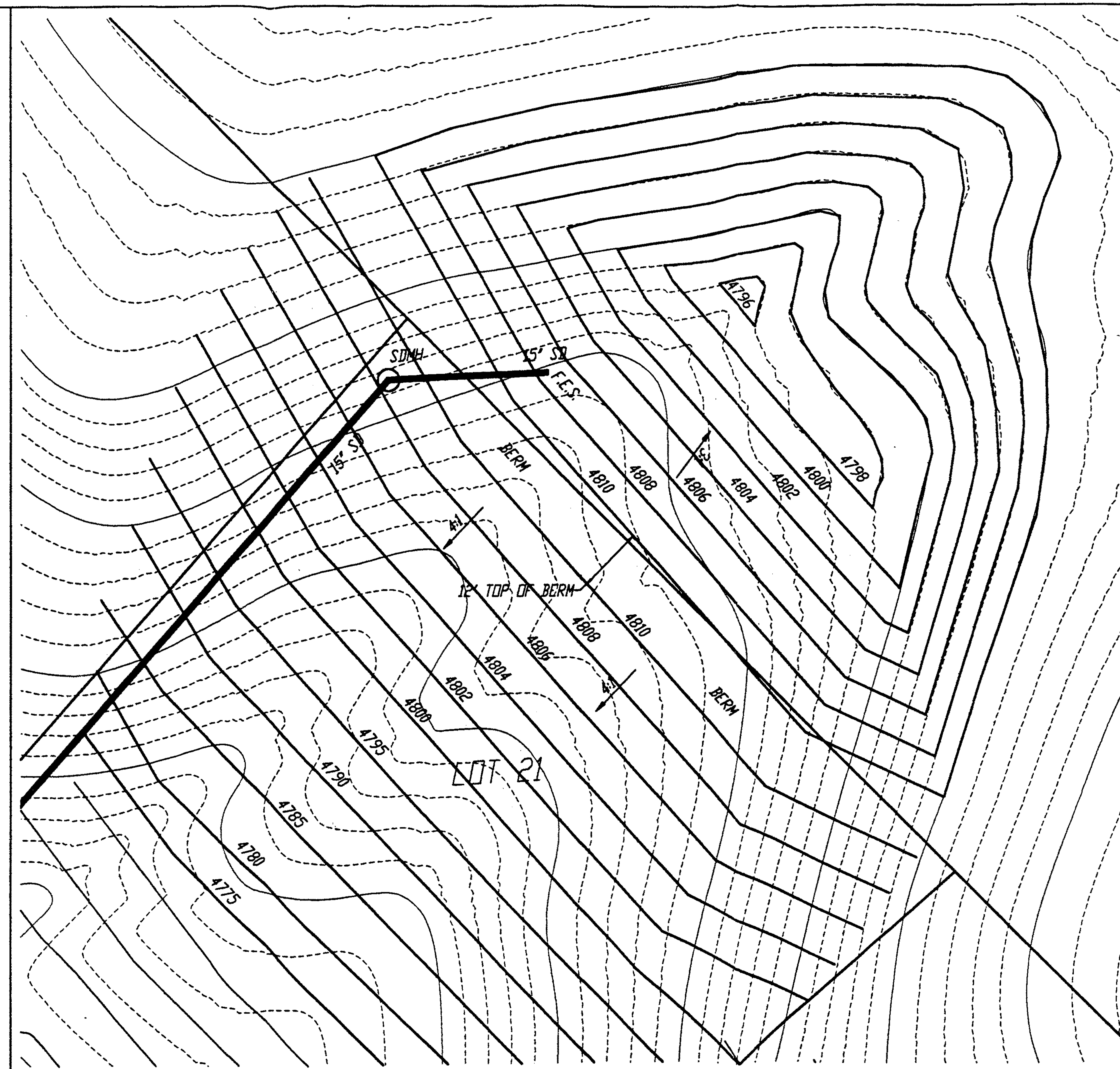
BASIN RATING TABLE

ELEV	AC-FT
4810.00	1.329
4808.00	0.908
4806.00	0.584
4804.00	0.342
4802.00	0.174
4800.00	0.068
4798.00	0.015
4796.00	0.000

TOP OF BERM = 4810
15' OUTLET = 4808.00
DEBRIS STORAGE = 0.868 ac-ft





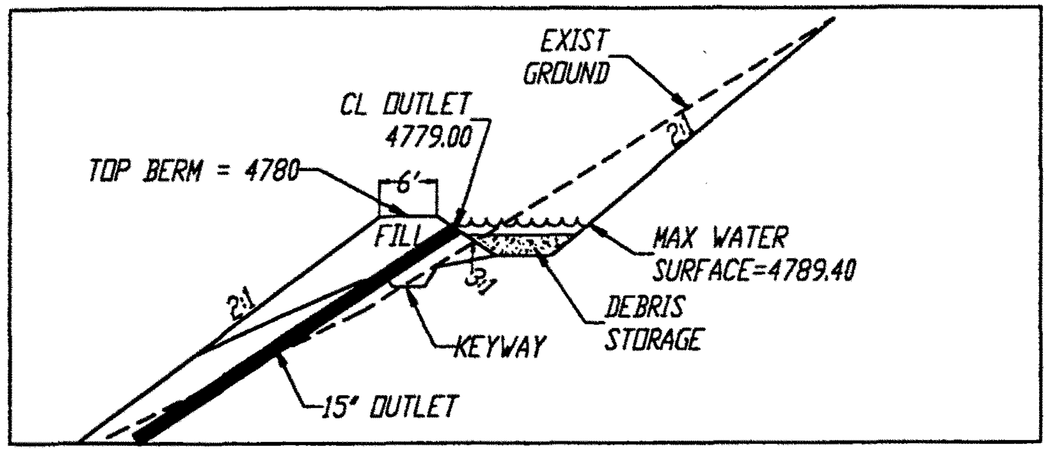


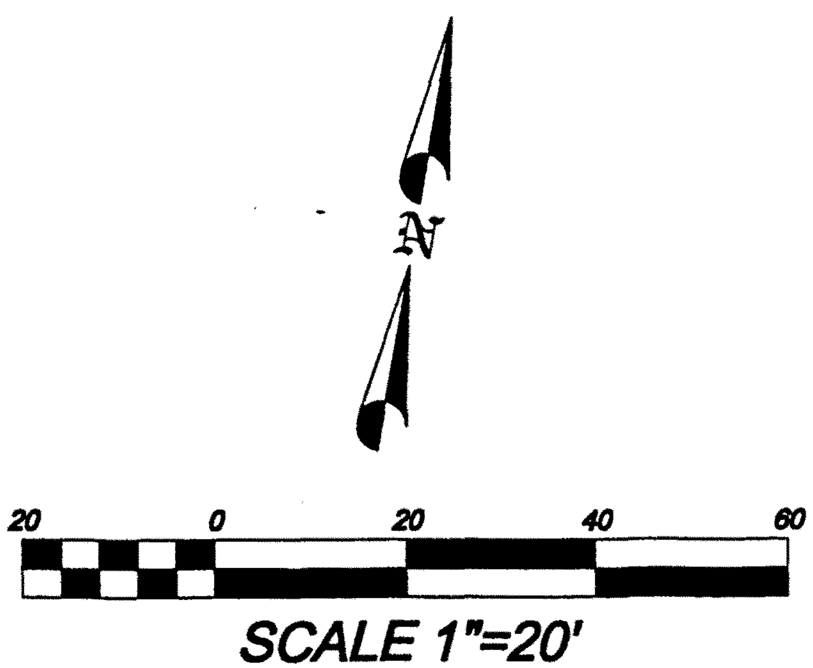
PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	EAST MOUNTAIN PLAT J - PROPOSED DEBRIS & STORM DRAINAGE BASIN FOR AREA 1	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	SHEET 1

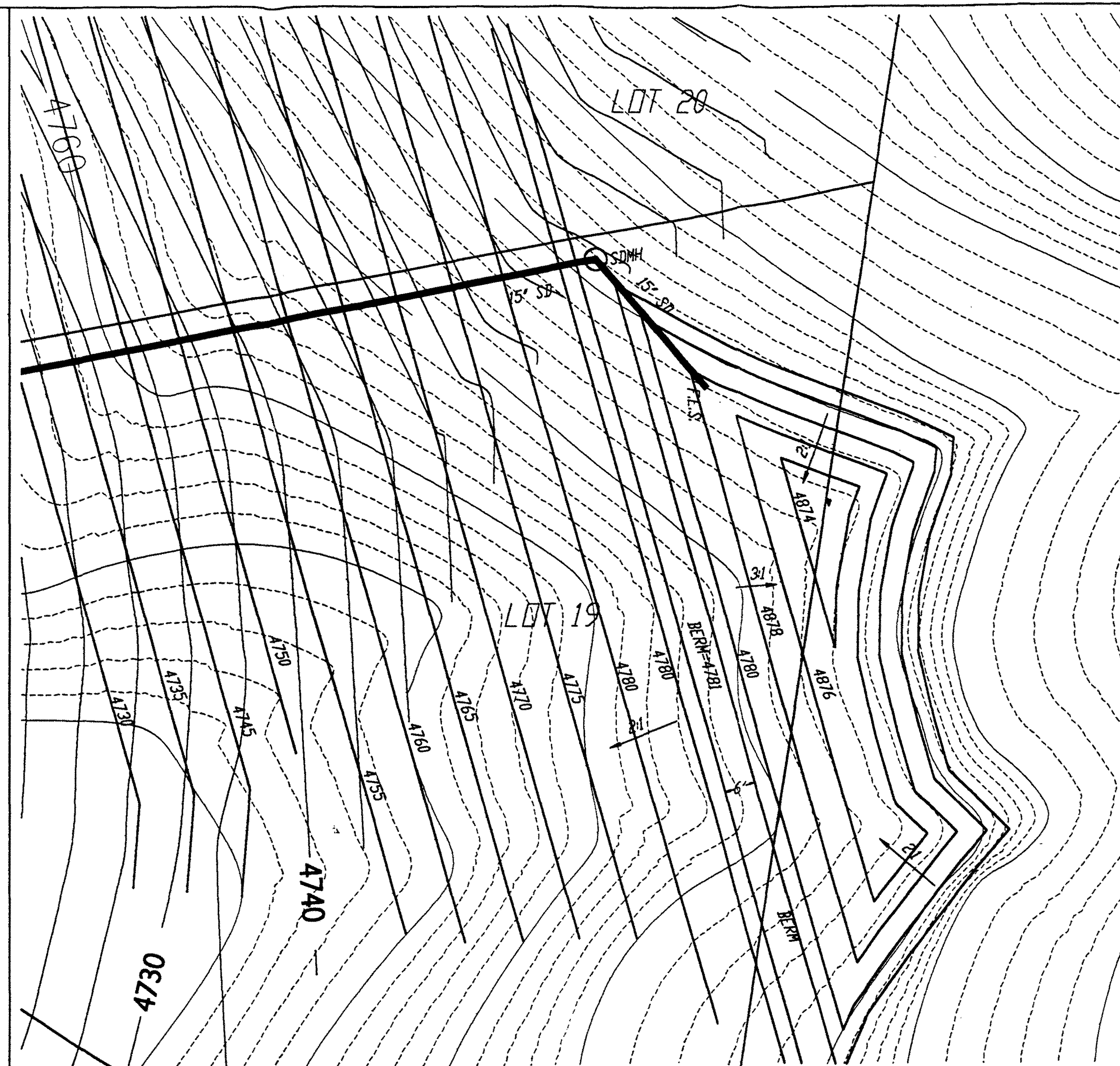
BASIN RATING TABLE

ELEV	AC-FT
4781.00	0.329
4780.00	0.236
4778.00	0.106
4776.00	0.032
4774.00	0.004
4772.00	0.000

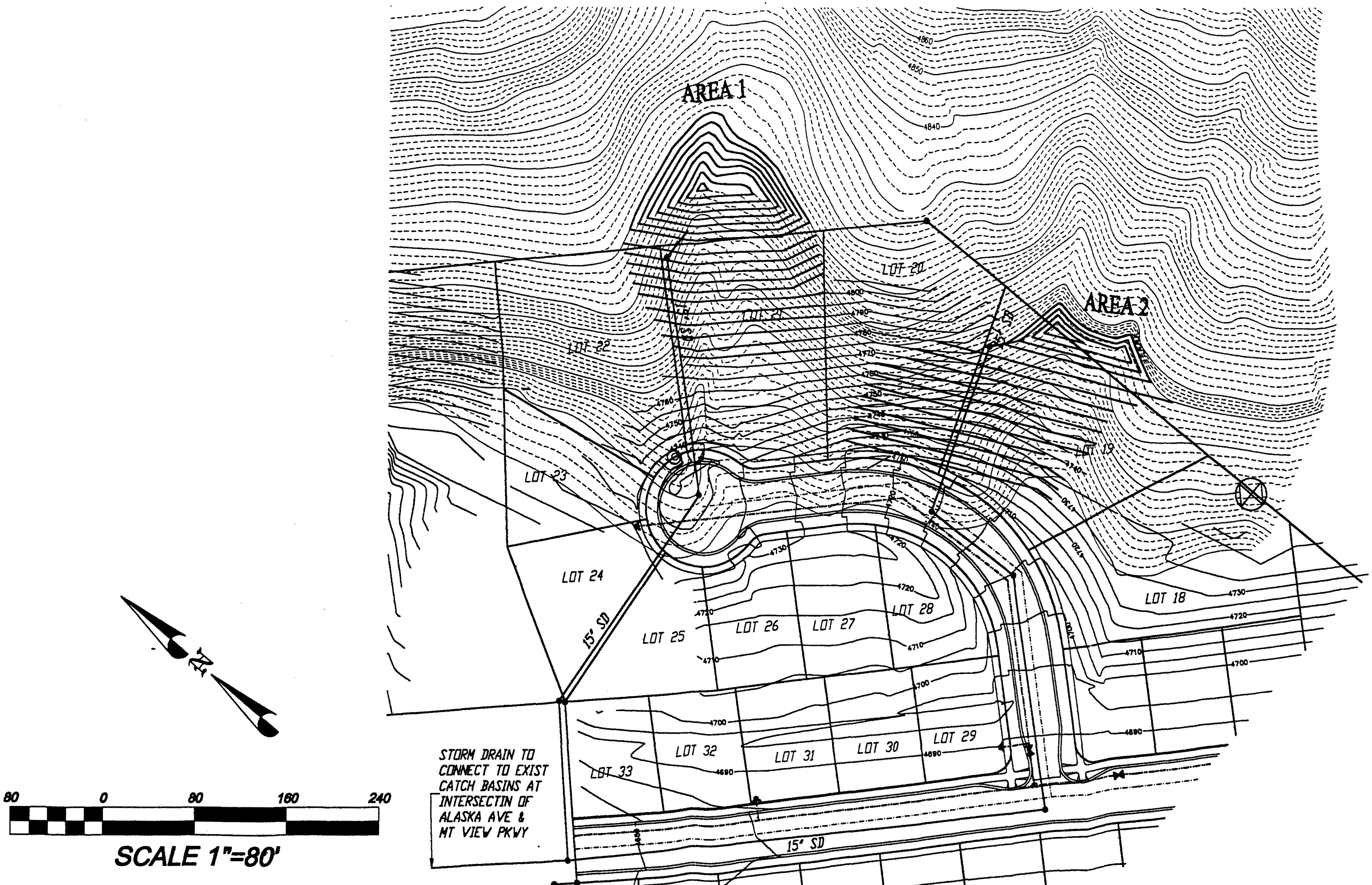
TOP OF BERM = 4781.00
15" OUTLET = 4779.00
DEBRIS STORAGE = 0.233 ac-ft







PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	EAST MOUNTAIN PLAT J - PROPOSED DEBRIS & STORM DRAINAGE BASIN FOR AREA 2	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE: (801) 492-1277	SHEET 2



PROVO, UTAH	EAST MOUNTAIN DEVELOPMENT 2272 South Mountain View Parkway Provo, Utah 84606	EAST MOUNTAIN PLAT J - PROPOSED DEBRIS & STORM DRAINAGE BASINS PIPING PLAN	SOWBY & BERG CONSULTANTS 45 N. 490 W. AMERICAN FORK, UT 84003 PHONE (801) 492-1277	SHEET 3