94242

Erosion and Sediment Control Plan
Proposed Supervalu Parking Expansion
Portland, Maine

General

This plan has been developed to provide a strategy for dealing with soil erosion and sedimentation during and after the construction of the proposed Supervalu Parking Expansion being developed off Milliken Street within the Riverside Industrial Park in Portland. This plan is based on the Standards and Specifications for Erosion Prevention as contained in the Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices (dated March 1991).

The site currently consists of a distribution center with associated impervious parking for employees and tractor trailers. The developed portion of the site is primarily flat with steeper wooded slopes along the sides of the building.

Construction Phase

In order to protect the soil, water, wetland, and wildlife resources of this development and adjacent lands, only those areas necessary to construct the parking area, utilities, and stormwater management structures will be disturbed.

Equipment anticipated to be used for construction includes backhoe(s), truck(s), loader(s), bulldozer(s), cement trucks, asphalt paver, and roller. The following actions will be taken:

1. Those areas undergoing actual construction will be left in an untreated or unvegetated condition for a maximum of 14 days from final grading of the loam. Loam will be stockpiled for future use and protected from erosion losses by mulch and filter fabric barriers. The location of such stockpiles shall be determined by the contractor at the time of construction.

2. Prior to clearing and grubbing, filter fabric fencing will be staked across the slope(s), on the contour, at or just below the limits of clearing or grubbing, and/or just above any adjacent property line or wetland to protect against construction related erosion

3. All silt fencing will be inspected, replaced and/or repaired weekly, as well as immediately following any significant rainfall or snow melt. Sediment will be removed and returned to the site when it reaches 1/3 the fence height.

4. Any fill used on the site will meet MDOT Standard 703.18 for common borrow and MDOT Standard 703.06(b) for subbase aggregate.

5. If final seeding of the disturbed areas is not completed by September 15th of the year of the construction, then on that date these areas will be graded and smoothed, then prepared to be seeded to a winter cover crop of Rye at the rate of 112 lbs./acre or 3 lbs./1000 sq. ft. The Rye seeding will be preceded by an application of 3 tons of lime and 1,000 lbs. per acre of 10-10-10 fertilizer or its equivalent. If the Rye seeding cannot be completed by October 1st, then on that date, hay mulch will be applied at the rate of 2 tons per acre to provide winter protection. If Rye does not make adequate growth by December 1st, then on that date, hay mulch will be applied at the rates specified under Vegetation Plan #4.

6. During the construction phase, intercepted sediment will be returned to the site and regraded onto open areas. Post seeding sediment, if any, will be hauled to a disposal area approved by the City of Portland.

Vegetation Plan

Revegetation measures will commence immediately upon completion of construction except as noted under paragraph 6 above. All disturbed areas not otherwise stabilized will be graded, smoothed, and prepared for final seeding as follows:

1. Four inches of loam will be spread over disturbed areas and smoothed to a uniform surface.

2. In lieu of soil tests, agricultural limestone will be spread at the rate of three tons per acre. 10-20-20 fertilizer will follow at the rate of 800 lbs. per acre. These two soil amendments will be incorporated into the soil prior to seeding.

3. Following seed bed preparation, any sediment-stormwater detention structures, swale areas, fill areas, and back slopes will be seeded to a mixture of 35% Creeping Red Fescue, 6% Red Top, 24% Kentucky Bluegrass, 10% Perennial Ryegrass, 20% Annual Ryegrass, and 5% White Dutch Clover. The lawn areas will be seeded to a premium turf mixture of bluegrass and/or Fescue with a seeding rate of 2-3 lbs. per 1,000 square feet.

   * Lawn quality sod may be substituted for seed only.

4. Hay mulch at the rate of 100 lbs. per 1,000 square feet or a hydro-application of asphalt, wood, or paper fiber will be applied following seeding. A suitable binder, such as Curasol or Terratack, will be used on hay mulch for wind control. At a minimum, the soil must be covered.

5. All filter fabric barriers will remain in place until seedings have become 75% established and then removed within 10 days.

Monitoring

Maintenance measures will be applied as needed during the entire construction cycle. Weekly and after each rainfall, a visual inspection will be made of all installed erosion control measures and repairs will be made as needed to insure their continuing function as designed. Following the final seedings, the site will be inspected every fifteen days until the seedings have been established. Established means a minimum of 75% of area vegetated with vigorous growth. Reseeding will be carried out, with follow-up inspections, in the event of any failures. All erosion control measures will be removed within 10 days when vegetation is adequately established.

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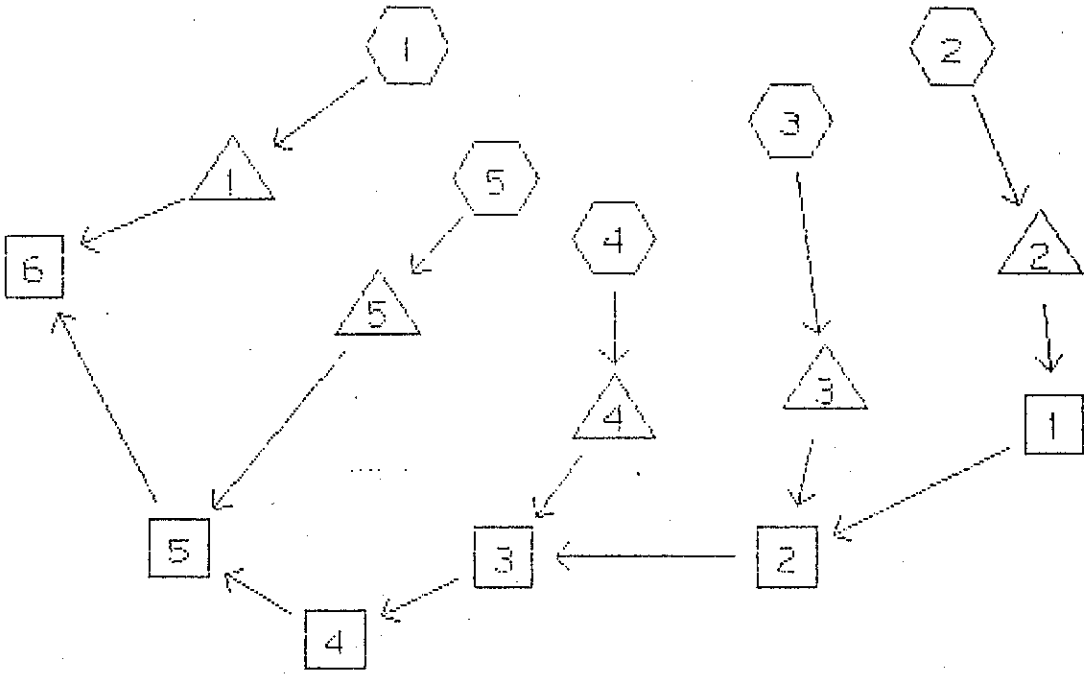
AWL/SMF:dlf/jc
April 17, 1995

2 yr. Present

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 3.0 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--			WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	14.30	24.0	100%76	-	-	76	-	10.0	12.32	1.10
2	10.94	101.4	100%78	-	-	78	-	3.9	13.38	.91
3	.56	20.2	100%82	-	-	82	-	.6	12.24	.06
4	2.26	19.6	100%74	-	-	74	-	1.5	12.25	.15
5	2.40	15.2	100%75	-	-	75	-	1.9	12.20	.17

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	4.0	2.0	.33	.33	.040	185	.0200	2.3	1.3	3.9
2	-	4.0	2.0	.33	.33	.040	480	.0200	2.3	3.5	3.9
3	-	4.0	2.0	.33	.33	.040	190	.0200	2.3	1.4	4.2
4	-	4.0	2.0	.33	.33	.040	260	.0200	2.3	1.9	4.2
5	-	4.0	2.0	.33	.33	.040	400	.0200	2.4	2.8	4.4
6	-	4.0	2.0	.33	.33	.040	400	.0200	3.3	2.0	13.7

POND ROUTING BY STOR-IND METHOD

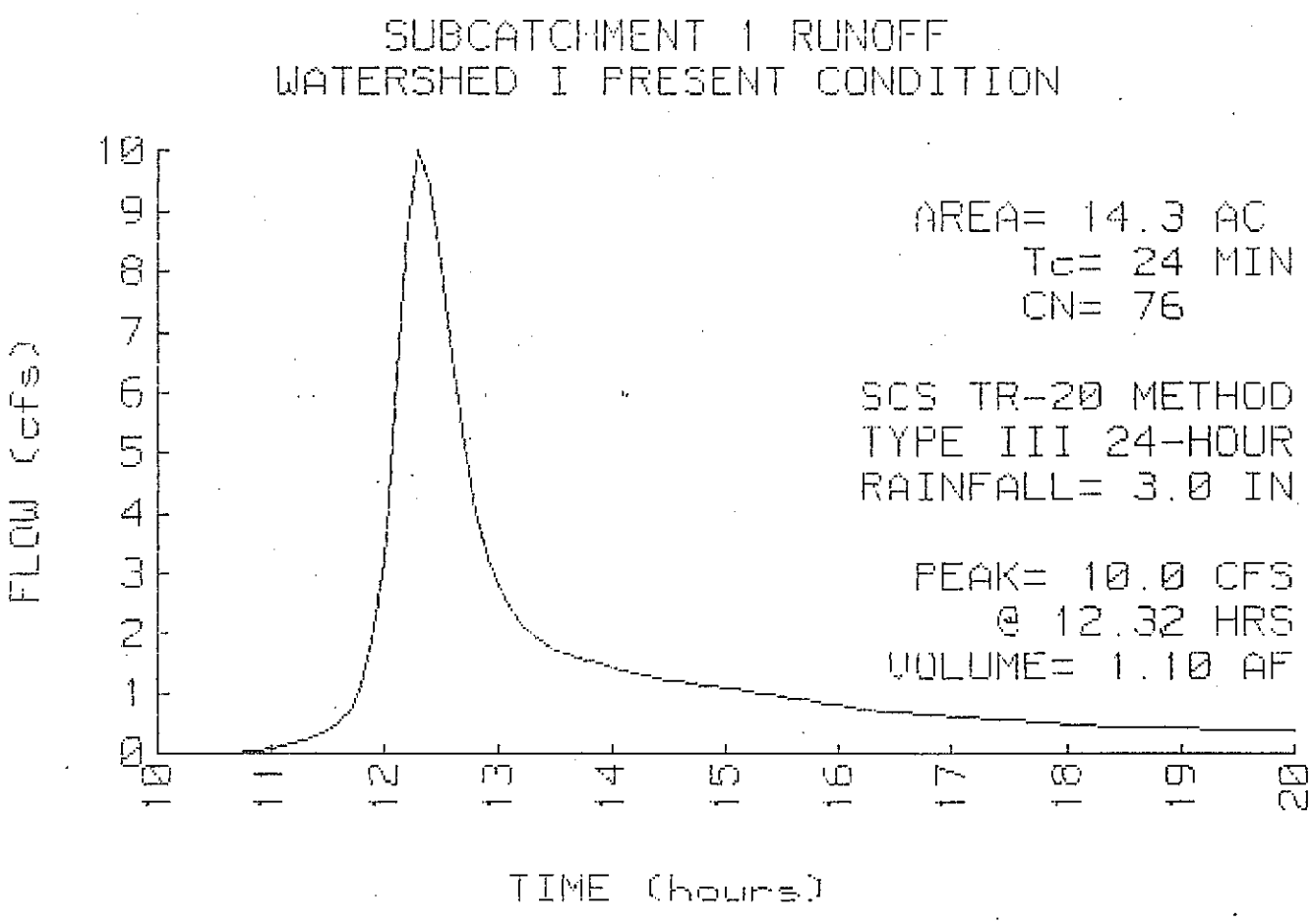
POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	1	38.6	52.0	40.2	0.00	10.0	9.9	1	1.3
2	1	49.5	60.0	50.4	.03	3.9	3.9	1	5.0
3	1	63.0	67.0	63.4	0.00	.6	.6	0	0.0
4	1	52.0	56.0	52.6	0.00	1.5	1.5	0	0.0
5	1	47.0	51.0	47.7	0.00	1.9	1.9	0	0.0

SUBCATCHMENT 1 WATERSHED I PRESENT CONDITION

ACRES	CN	
14.30	76	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 10.0 CFS @ 12.32 HRS
VOLUME= 1.10 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL85-EL80	20.0
Grass: Dense n=.24 L=175' P2=3 in s=.0286 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL80-EL72	1.0
Short Grass Pasture Kv=7 L=115' s=.0696 '/' V=1.85 fps		
DIRECT ENTRY	EL72-EL40	3.0
	Total Length= 290 ft Total Tc=	24.0

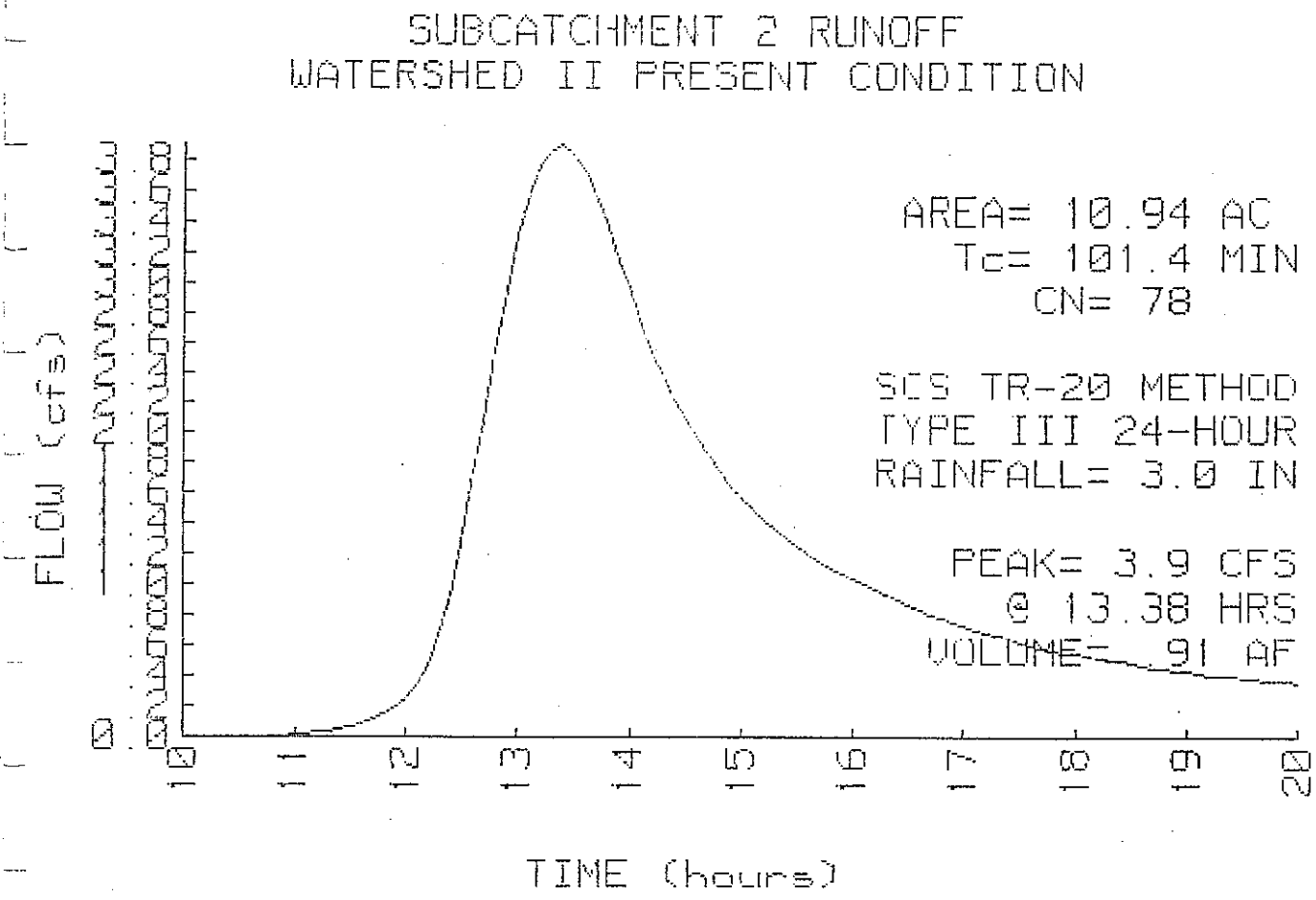


SUBCATCHMENT 2 WATERSHED II PRESENT CONDITION

ACRES	CN	
10.94	78	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 3.9 CFS @ 13.38 HRS
VOLUME= .91 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL80-EL78	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL78-EL70	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	EL70-EL49.5	3.0
	Total Length= 645 ft Total Tc=	101.4



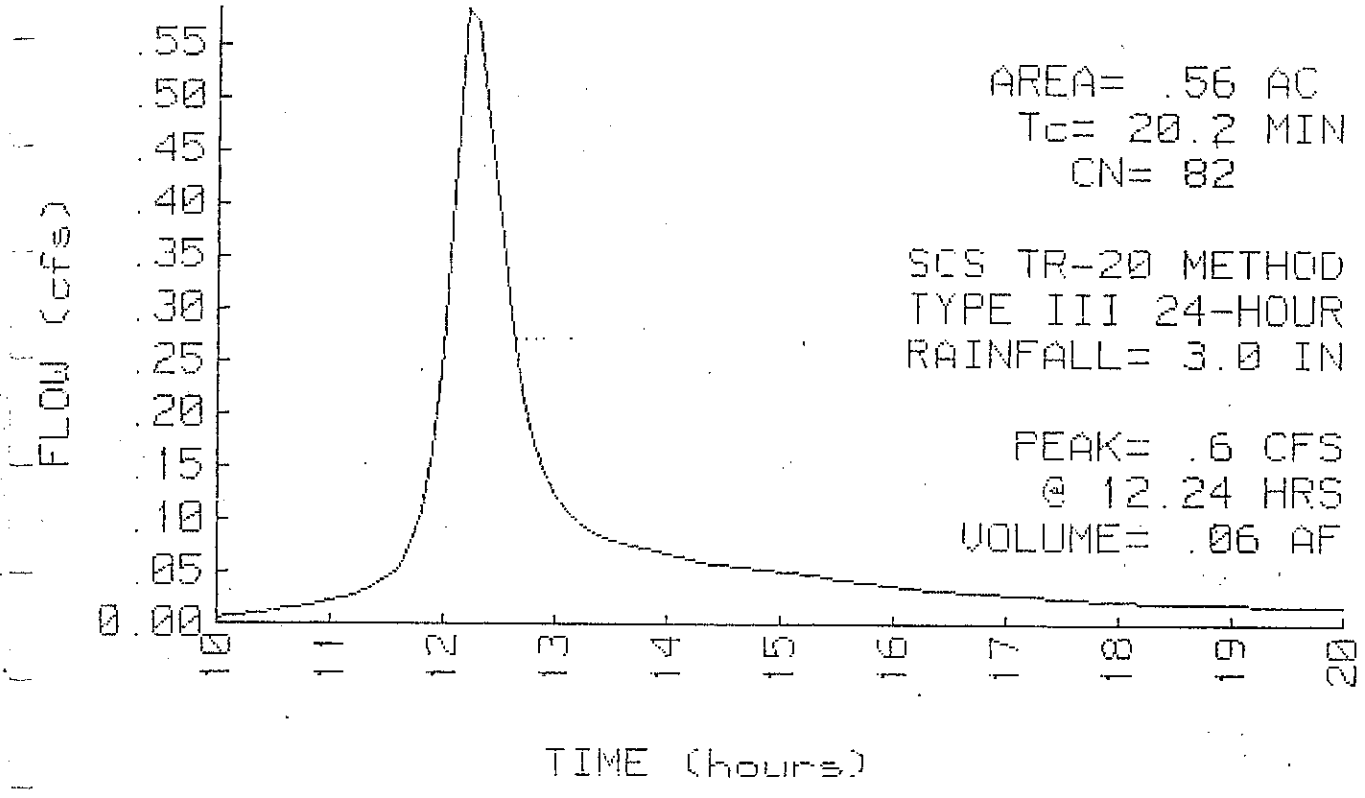
SUBCATCHMENT 3 WATERSHED III PRESENT CONDITION

ACRES	CN	
.56	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .6 CFS @ 12.24 HRS
VOLUME= .06 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL74.3-EL72	19.1
Grass: Dense n=.24 L=130' P2=3 in s=.0177 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL67	1.1
Short Grass Pasture Kv=7 L=100' s=.05 '/' V=1.57 fps		
	Total Length= 230 ft	Total Tc= 20.2

SUBCATCHMENT 3 RUNOFF
WATERSHED III PRESENT CONDITION

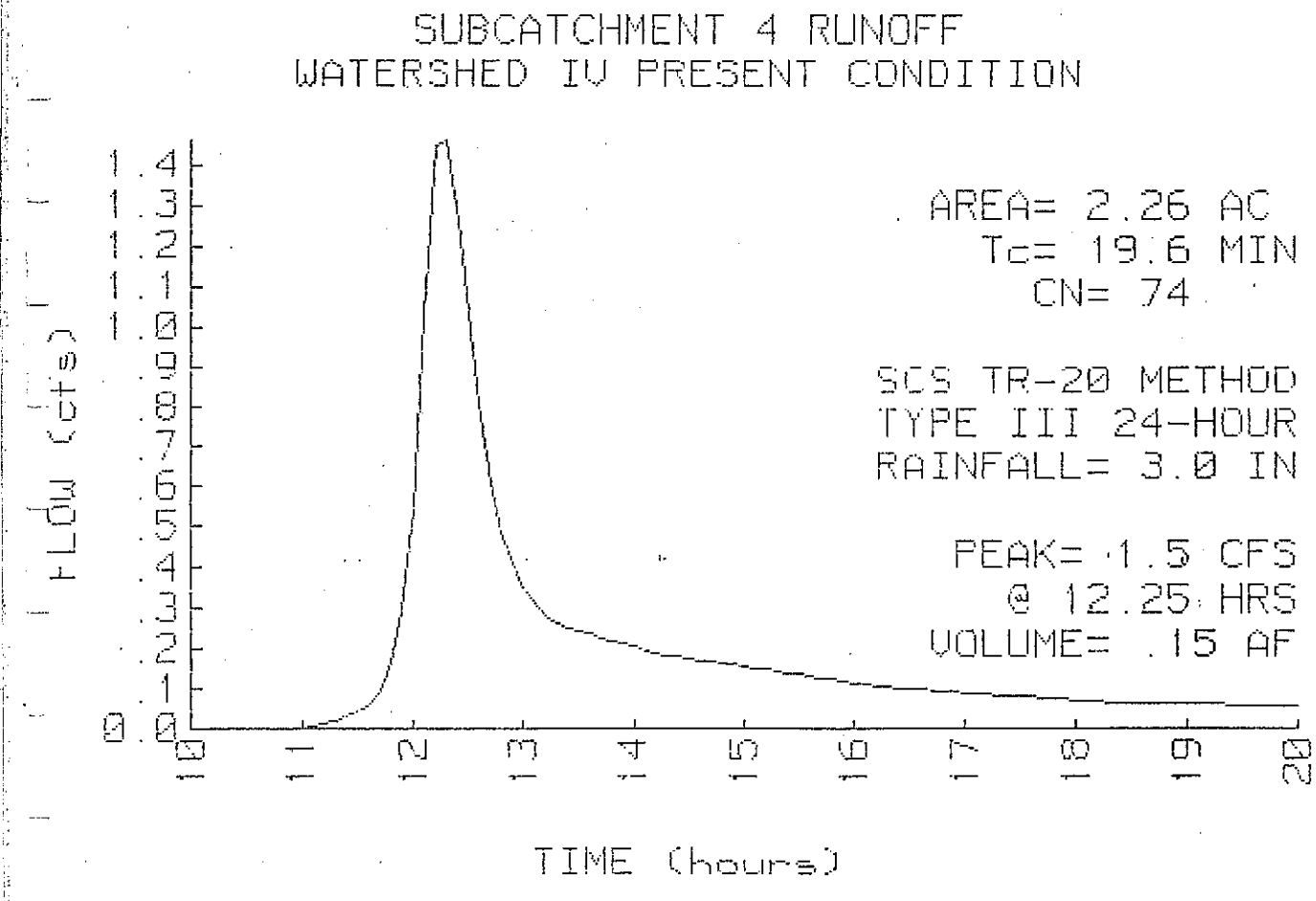


SUBCATCHMENT 4 WATERSHED IV PRESENT CONDITION

ACRES	CN	
2.26	74	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.5 CFS @ 12.25 HRS
VOLUME= .15 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.3-EL75.1	.5
Smooth surfaces n=.011 L=20' P2=3 in s=.01 '/'		
TR-55 SHEET FLOW	EL75.1-EL72	16.2
Grass: Dense n=.24 L=125' P2=3 in s=.0248 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL56	2.9
Short Grass Pasture Kv=7 L=290' s=.0552 '/' V=1.64 fps		
	Total Length= 435 ft Total Tc=	19.6



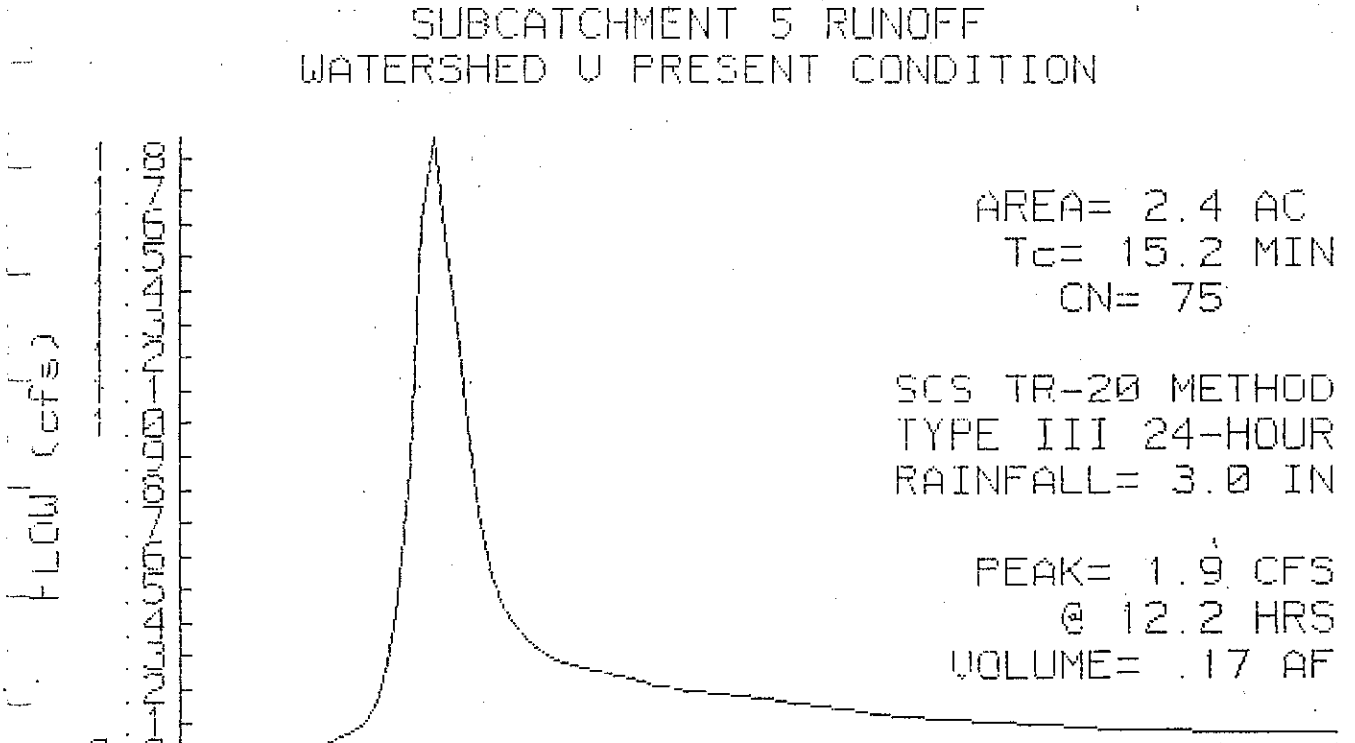
SUBCATCHMENT 5 WATERSHED V PRESENT CONDITION

ACRES	CN	
2.40	75	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.9 CFS @ 12.20 HRS
VOLUME= .17 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.8-EL75.1	1.5
Smooth surfaces n=.011 L=80' P2=3 in s=.0088 '/'		
TR-55 SHEET FLOW	EL75.1-EL73	9.4
Grass: Dense n=.24 L=70' P2=3 in s=.03 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL73-EL56	3.7
Short Grass Pasture Kv=7 L=345' s=.0493 '/' V=1.55 fps		
DIRECT ENTRY	EL56-EL51	.6
	Total Length= 495 ft Total Tc=	15.2

SUBCATCHMENT 5 RUNOFF
WATERSHED V PRESENT CONDITION



REACH 1

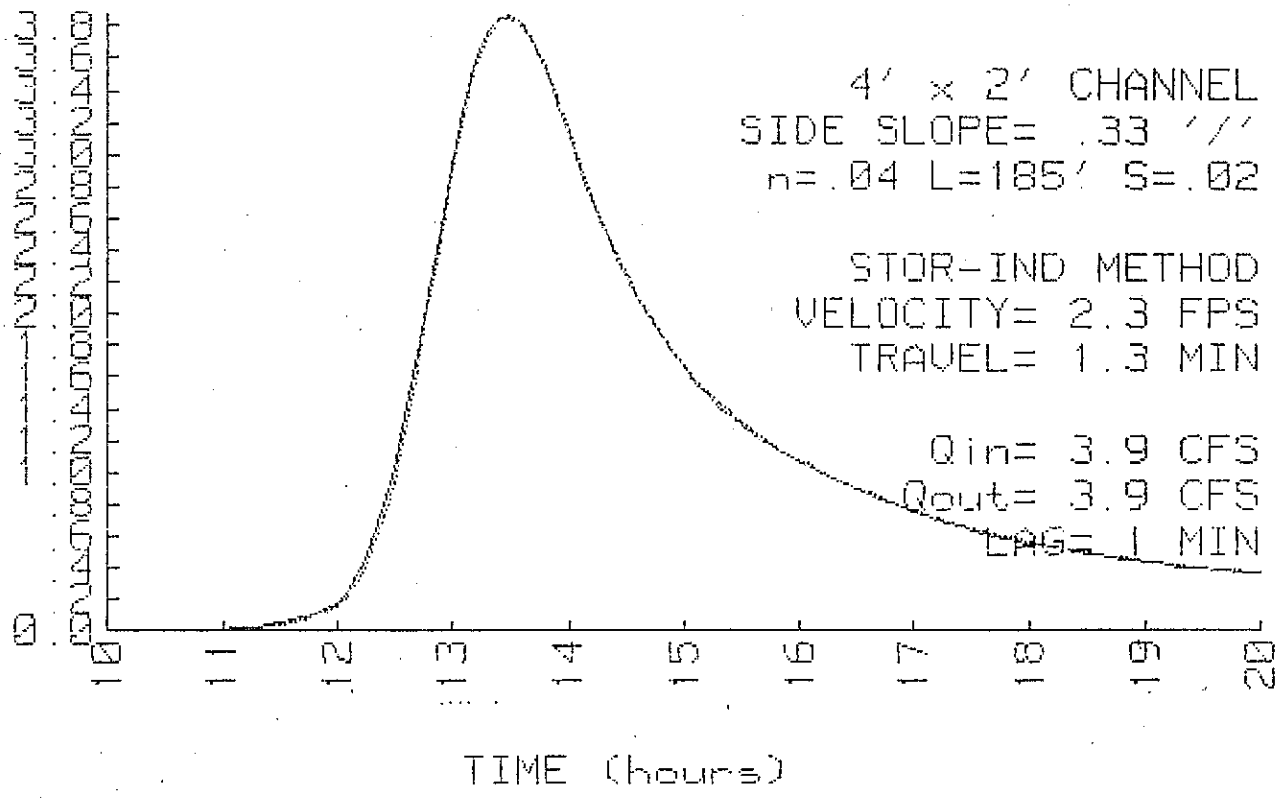
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .33 FT
PEAK VELOCITY= 2.3 FPS
TRAVEL TIME = 1.3 MIN
Qin = 3.9 CFS @ 13.46 HRS
Qout= 3.9 CFS @ 13.48 HRS
ATTEN= 0 % LAG= 1.0 MIN
IN/OUT= .90 / .90 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

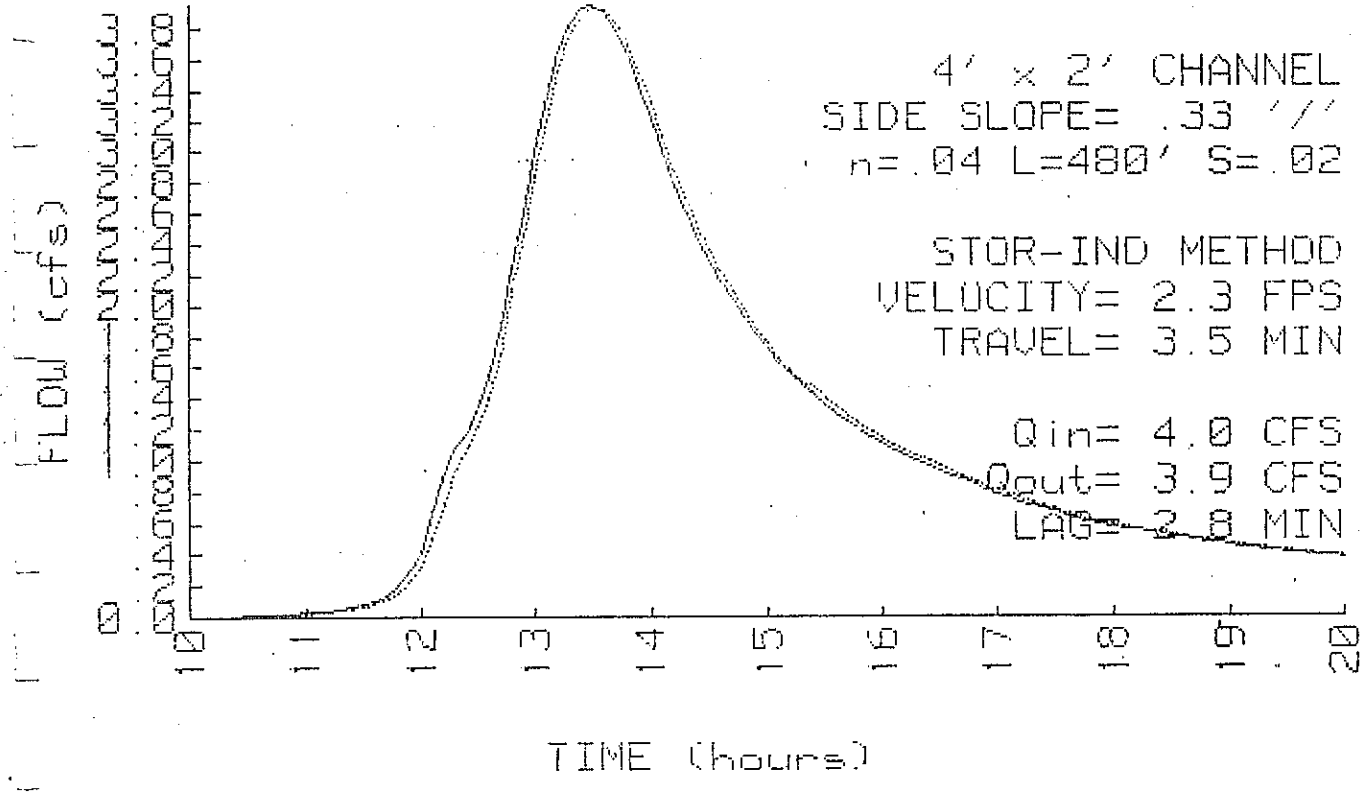
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 2

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .34 FT
PEAK VELOCITY= 2.3 FPS
TRAVEL TIME = 3.5 MIN
Qin = 4.0 CFS @ 13.47 HRS
Qout= 3.9 CFS @ 13.52 HRS
ATTEN= 0 % LAG= 2.8 MIN
IN/OUT= .96 / .96 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

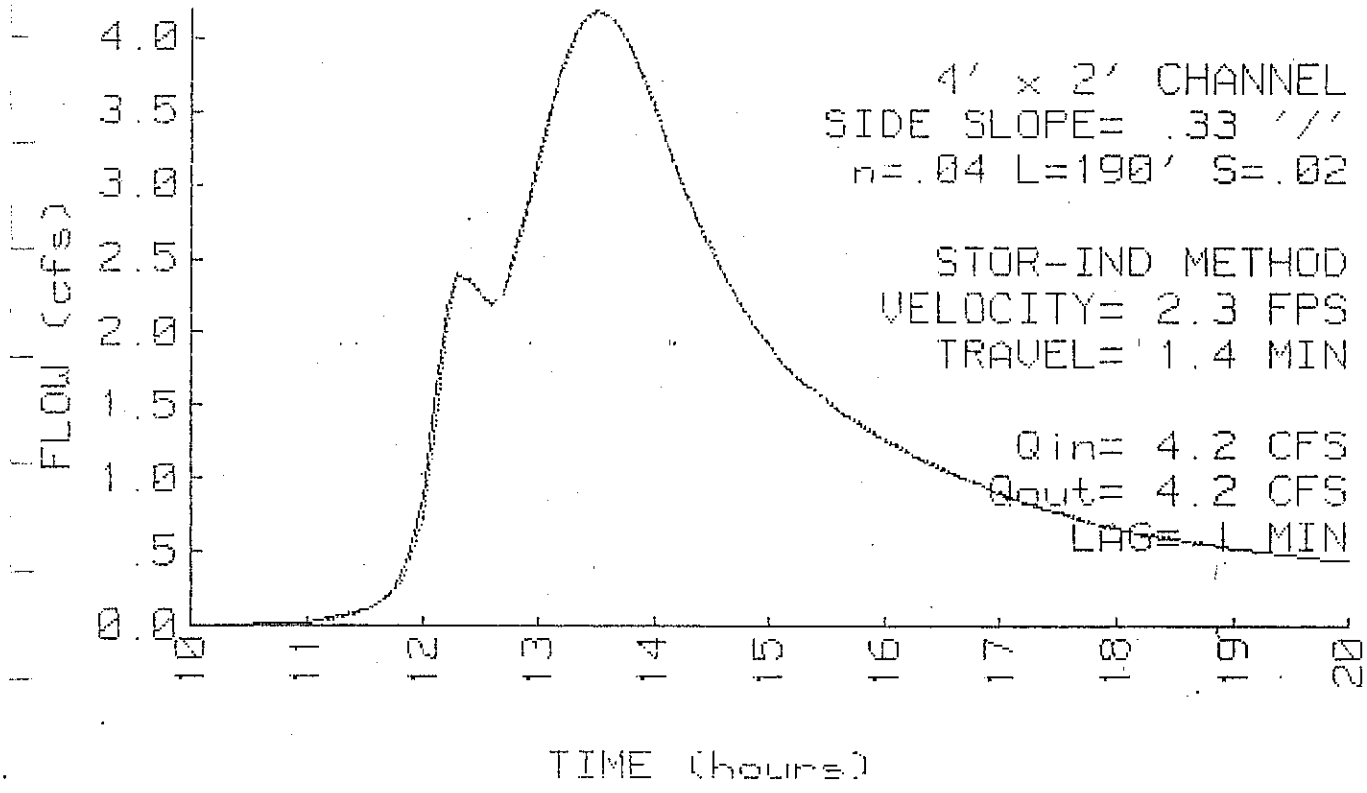
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT.
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .85 FT
PEAK VELOCITY= 2.3 FPS
TRAVEL TIME = 1.4 MIN
Qin = 4.2 CFS @ 13.51 HRS
Qout= 4.2 CFS @ 13.52 HRS
ATTEN= 0 % LAG= 1.0 MIN
IN/OUT= 1.11 / 1.11 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

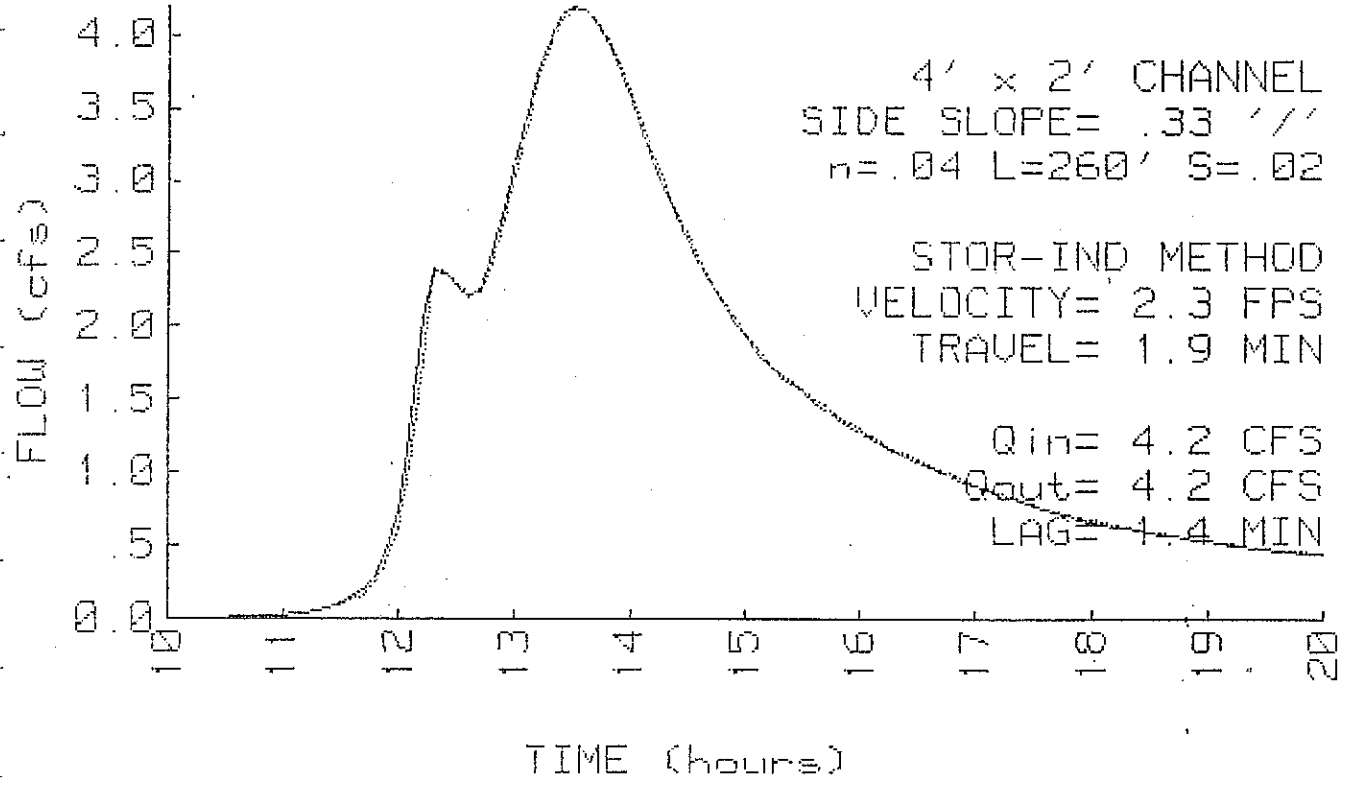
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 260 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .35 FT
PEAK VELOCITY= 2.3 FPS
TRAVEL TIME = 1.9 MIN
Qin = 4.2 CFS @ 13.52 HRS
Qout= 4.2 CFS @ 13.55 HRS
ATTEN= 0 % LAG= 1.4 MIN
IN/OUT= 1.11 / 1.11 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

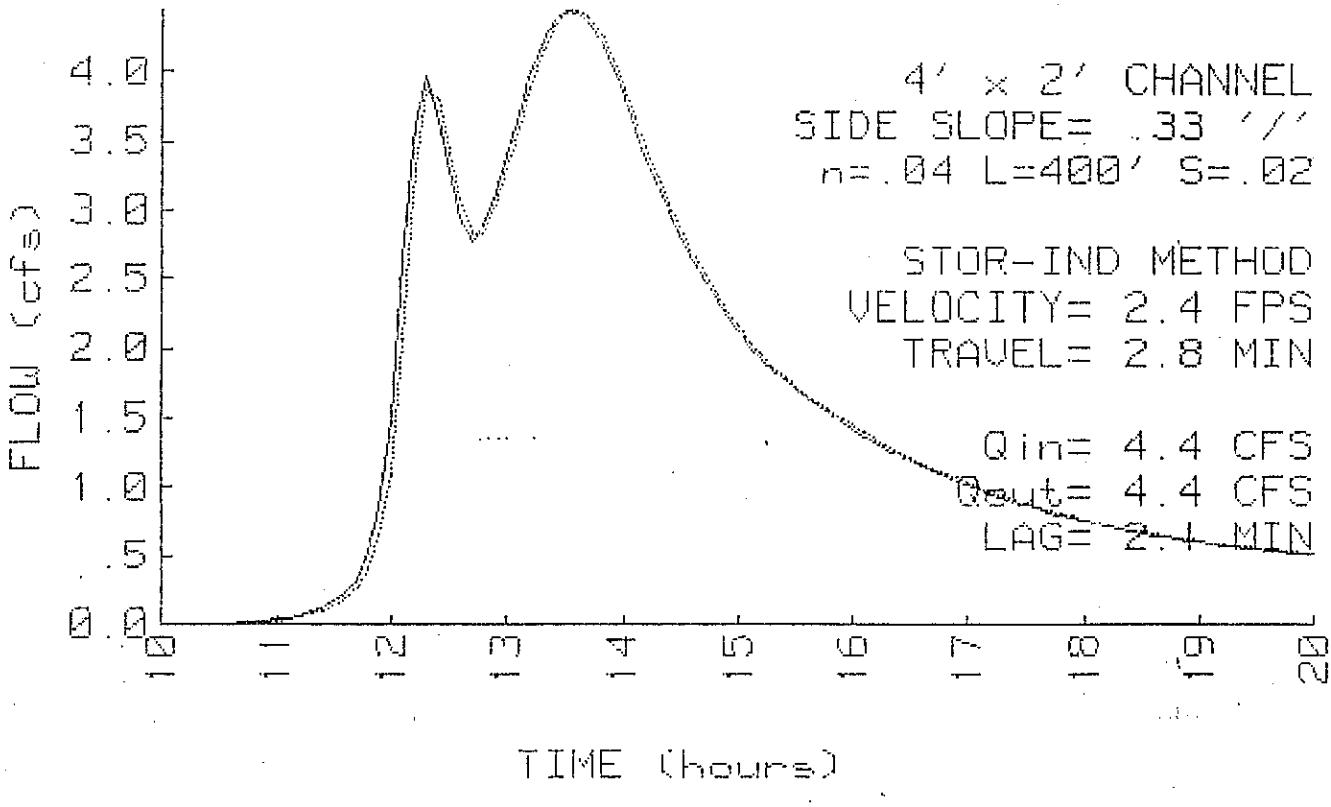
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 5

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .36 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 2.8 MIN
Qin = 4.4 CFS @ 13.54 HRS
Qout= 4.4 CFS @ 13.57 HRS
ATTEN= 0 % LAG= 2.1 MIN
IN/OUT= 1.28 / 1.28 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



REACH 6

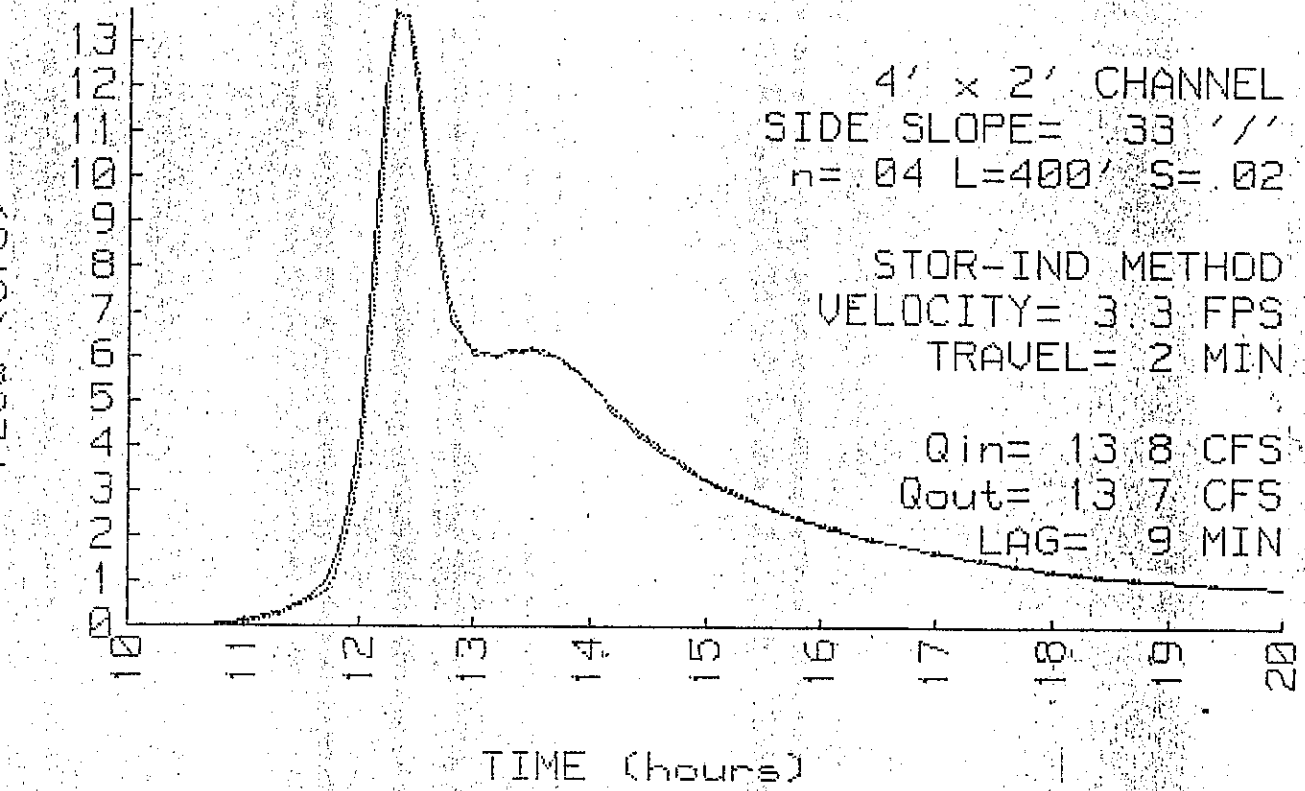
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .67 FT
PEAK VELOCITY= 3.3 FPS
TRAVEL TIME = 2.0 MIN
Qin = 13.8 CFS @ 12.34 HRS
Qout= 13.7 CFS @ 12.35 HRS
ATTEN= 1 % LAG= .9 MIN
IN/OUT= 2.38 / 2.38 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1 POND 1

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19363	31221	69439
52.0	26031	45394	114833

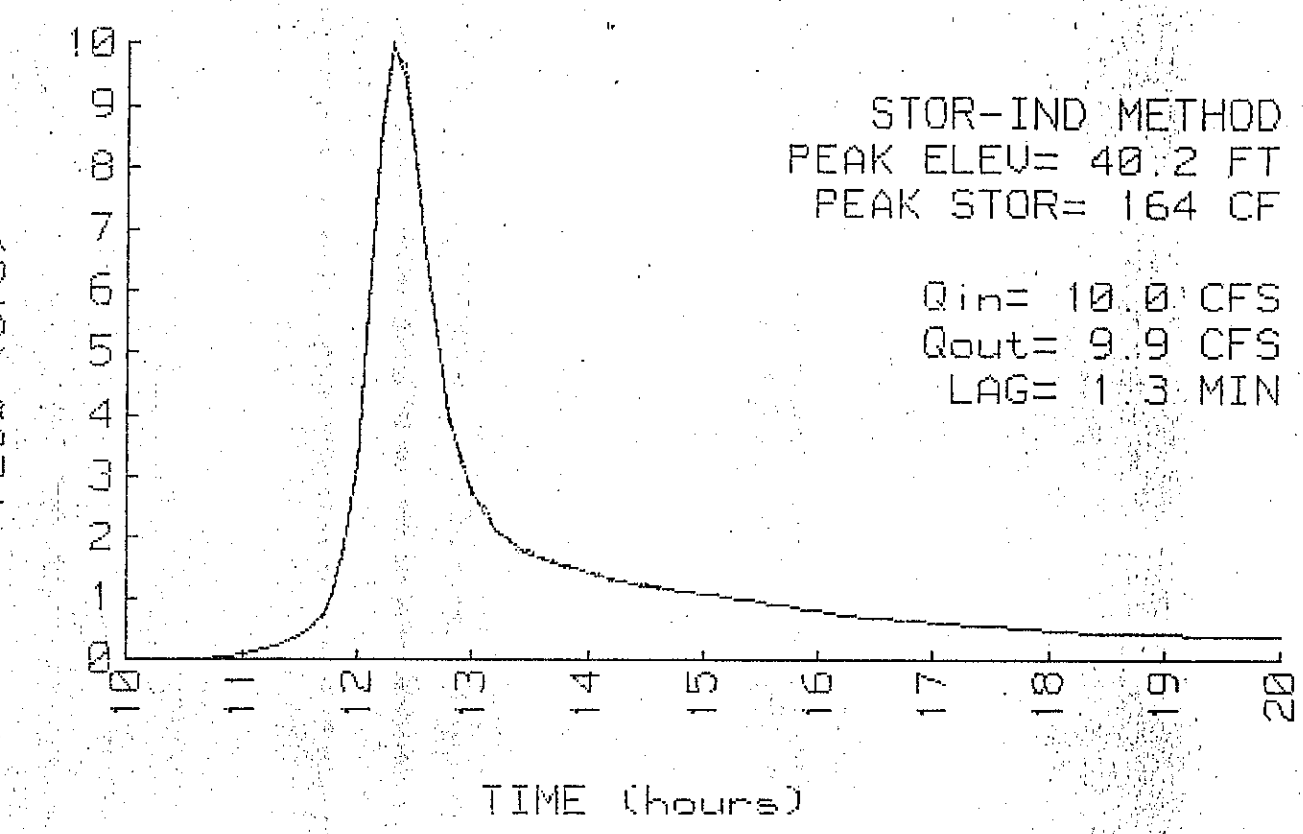
STOR-IND METHOD
PEAK ELEVATION= 40.2 FT
PEAK STORAGE = 164 CF
Qin = 10.0 CFS @ 12.32 HRS
Qout= 9.9 CFS @ 12.34 HRS
ATTEN= 1 % LAG= 1.3 MIN
IN/OUT= 1.10 / 1.10 AF

INVERT (FT) OUTLET DEVICES
38.6 24" CULVERT
n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.8	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		

POND 1 INFLOW & OUTFLOW
POND 1



POND 2 POND 2

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1228	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

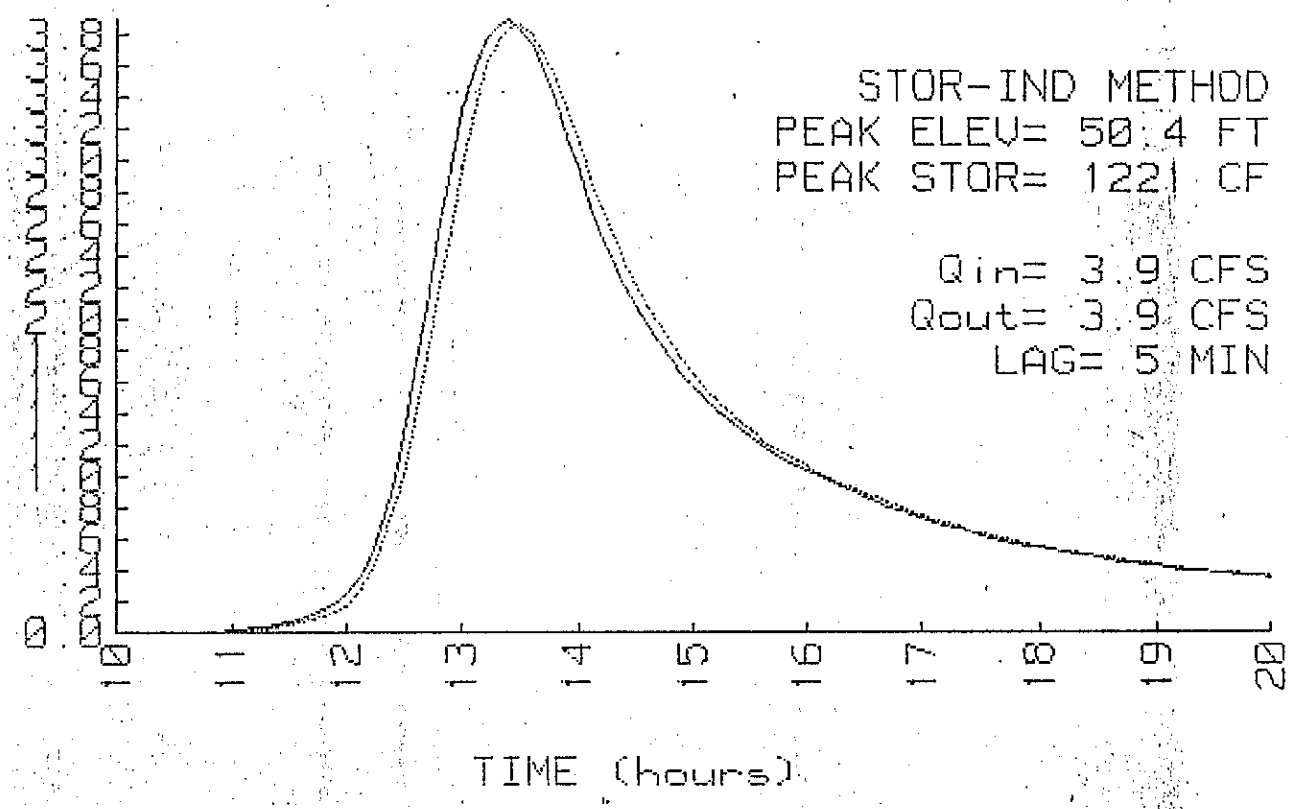
STOR-IND METHOD
PEAK ELEVATION= 50.4 FT
PEAK STORAGE = 1221 CF
Qin = 3.9 CFS @ 13.38 HRS
Qout= 3.9 CFS @ 13.46 HRS
ATTEN= 1 % LAG= 5.0 MIN
IN/OUT= .91 / .90 AF

INVERT (FT) OUTLET DEVICES
49.5 24" CULVERT
n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.3	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						

POND 2 INFLOW & OUTFLOW
POND 2



POND 3 POND 3

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

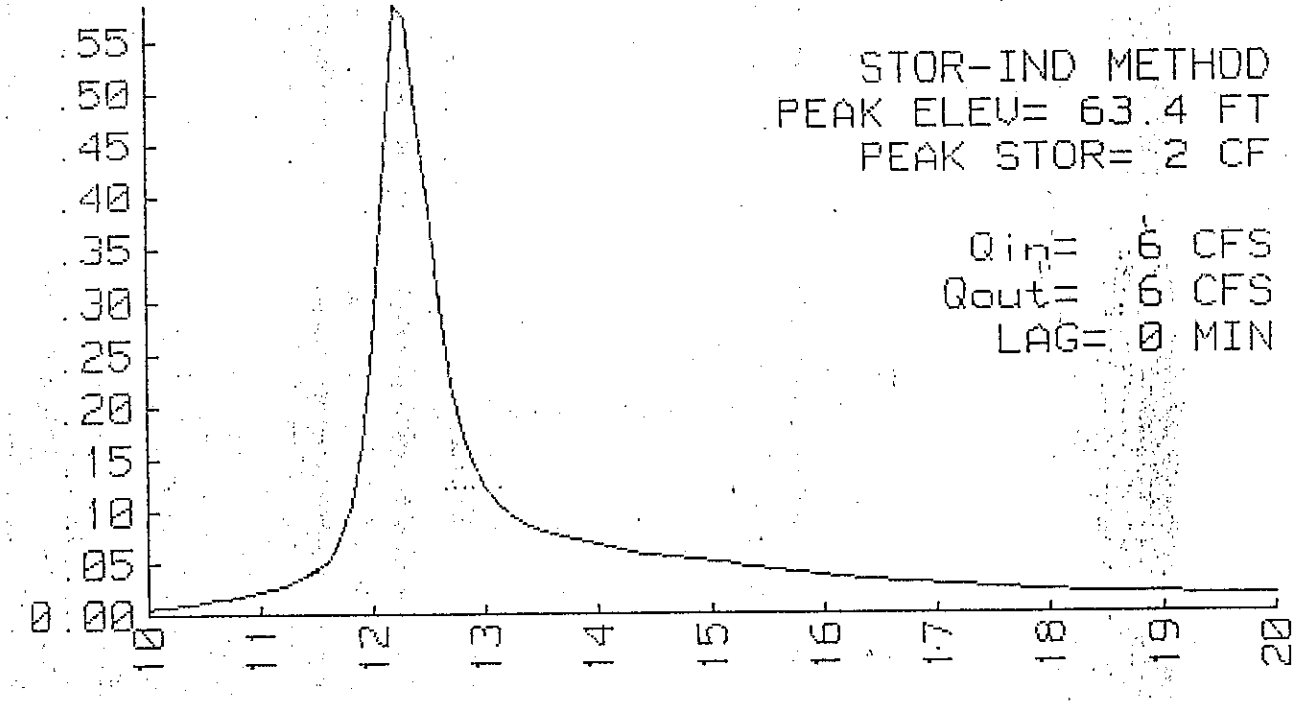
STOR-IND METHOD
PEAK ELEVATION= 63.4 FT
PEAK STORAGE = 2 CF
Qin = .6 CFS @ 12.24 HRS
Qout= .6 CFS @ 12.24 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .06 / .06 AF

INVERT (FT) OUTLET DEVICES
63.0 12" CULVERT
n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 OND 4

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

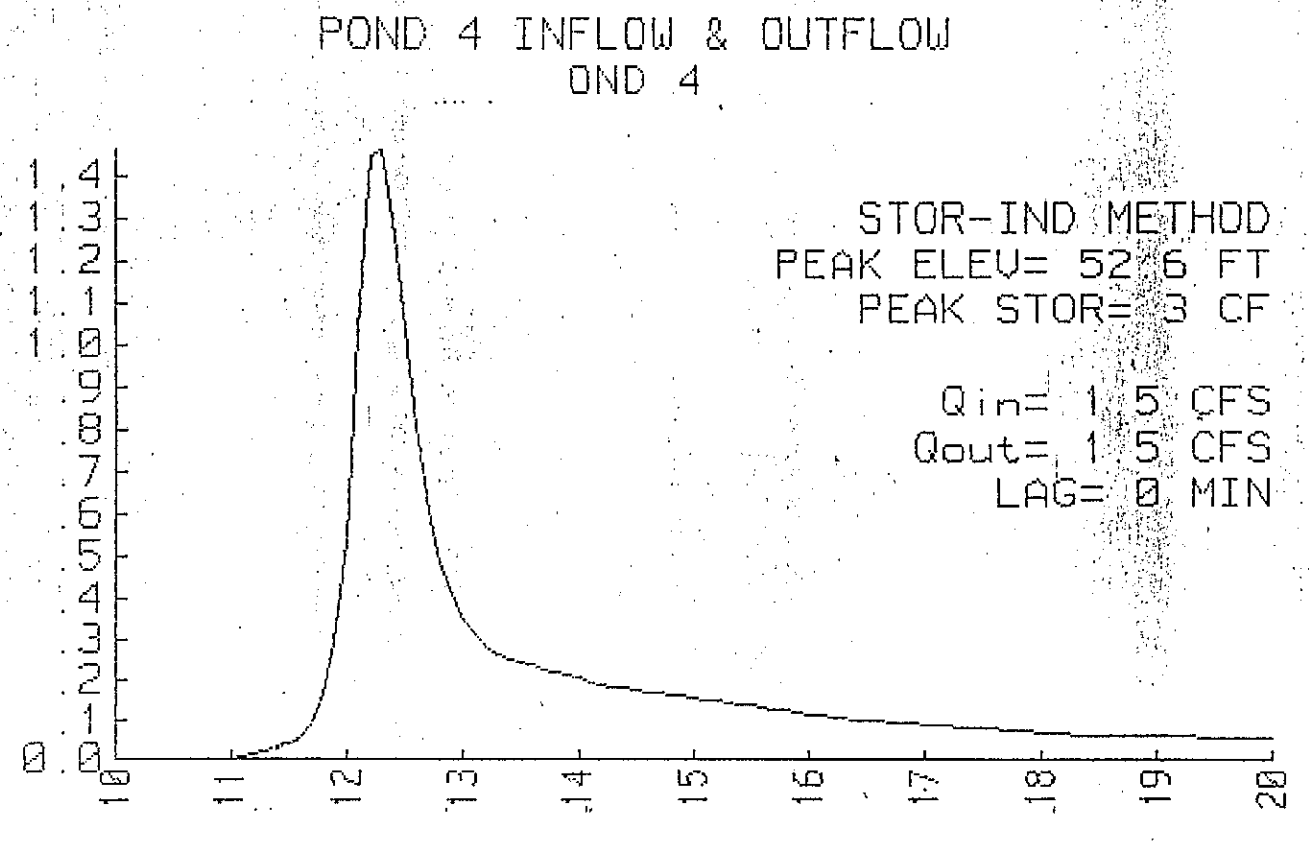
STOR-IND METHOD
PEAK ELEVATION= 52.6 FT
PEAK STORAGE = 3 CF
Qin = 1.5 CFS @ 12.25 HRS
Qout= 1.5 CFS @ 12.25 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .15 / .15 AF

INVERT (FT)	OUTLET DEVICES
52.0	12" CULVERT

n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									



POND 5 POND 5

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

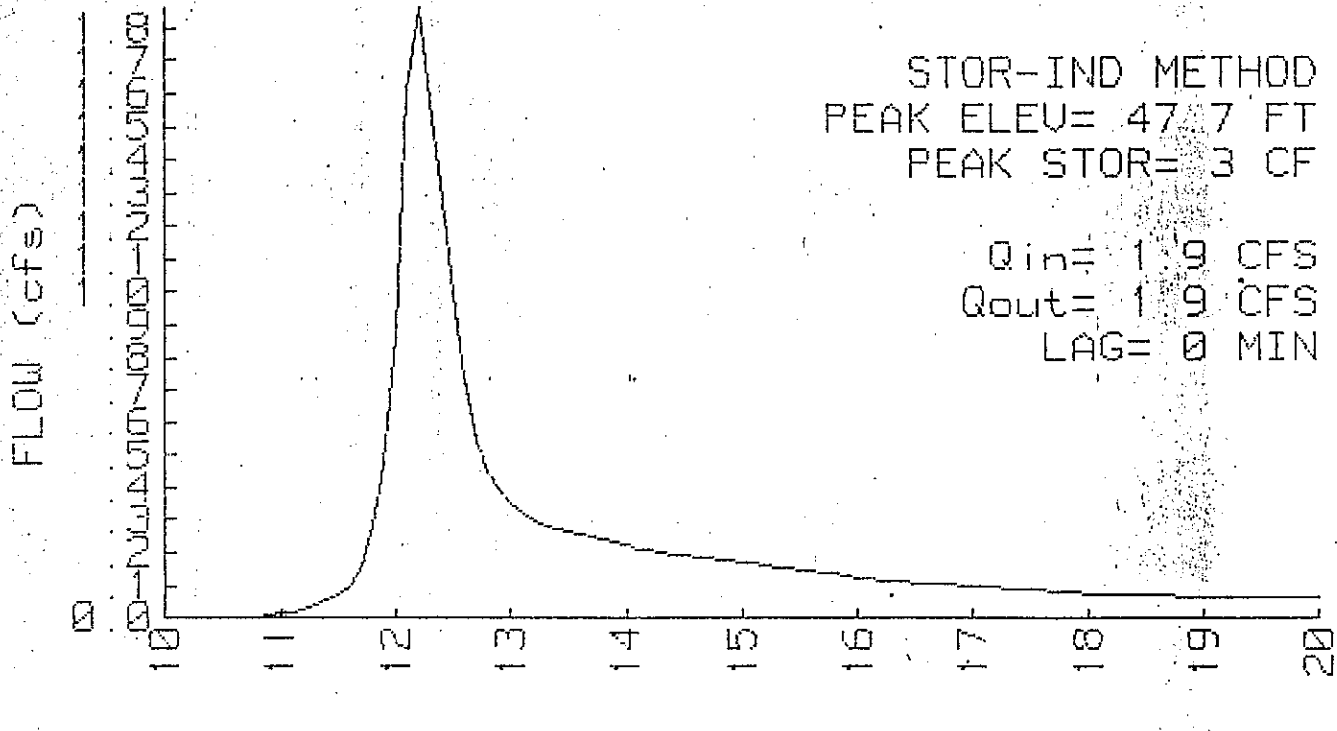
STOR-IND METHOD
PEAK ELEVATION= 47.7 FT
PEAK STORAGE = 3 CF
Qin = 1.9 CFS @ 12.20 HRS
Qout= 1.9 CFS @ 12.20 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .17 / .17 AF

INVERT (FT) OUTLET DEVICES
47.0 12" CULVERT
n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

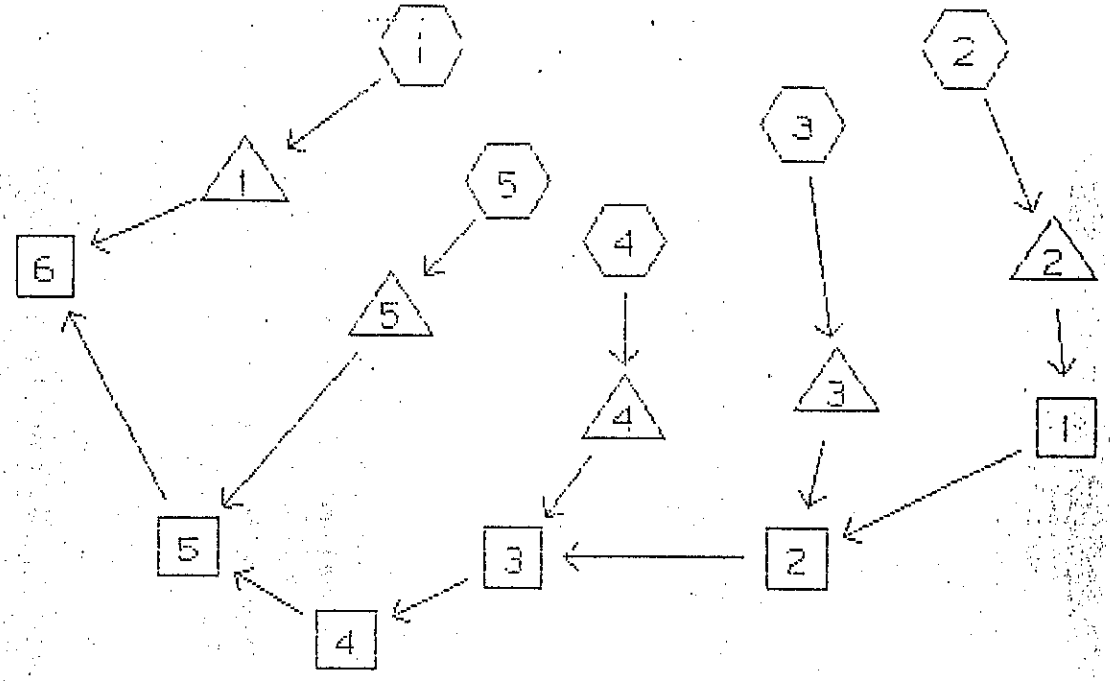
FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 5 INFLOW & OUTFLOW
POND 5



10yr Present

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 4.7 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--	WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	14.30	24.0	100%76 - - -	76	-	23.6	12.30	2.51
2	10.94	101.4	100%78 - - -	78	-	8.8	13.33	2.01
3	.56	20.2	100%82 - - -	82	-	1.2	12.23	.12
4	2.26	19.6	100%74 - - -	74	-	3.8	12.24	.37
5	2.40	15.2	100%75 - - -	75	-	4.5	12.18	.41

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	4.0	2.0	.33	.33	.040	185	.0200	2.9	1.1	8.8
2	-	4.0	2.0	.33	.33	.040	480	.0200	2.9	2.7	8.9
3	-	4.0	2.0	.33	.33	.040	190	.0200	3.0	1.1	9.4
4	-	4.0	2.0	.33	.33	.040	260	.0200	3.0	1.5	9.4
5	-	4.0	2.0	.33	.33	.040	400	.0200	3.0	2.2	10.1
6	-	4.0	2.0	.33	.33	.040	400	.0200	4.2	1.6	32.3

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	1	38.6	52.0	42.3	.04	23.6	22.2	6	4.4
2	1	49.5	60.0	51.0	.06	8.8	8.8	0	3.9
3	1	63.0	67.0	63.6	0.00	1.2	1.2	0	0.0
4	1	52.0	56.0	53.5	0.00	3.8	3.8	0	.1
5	1	47.0	51.0	49.0	0.00	4.5	4.5	0	.1

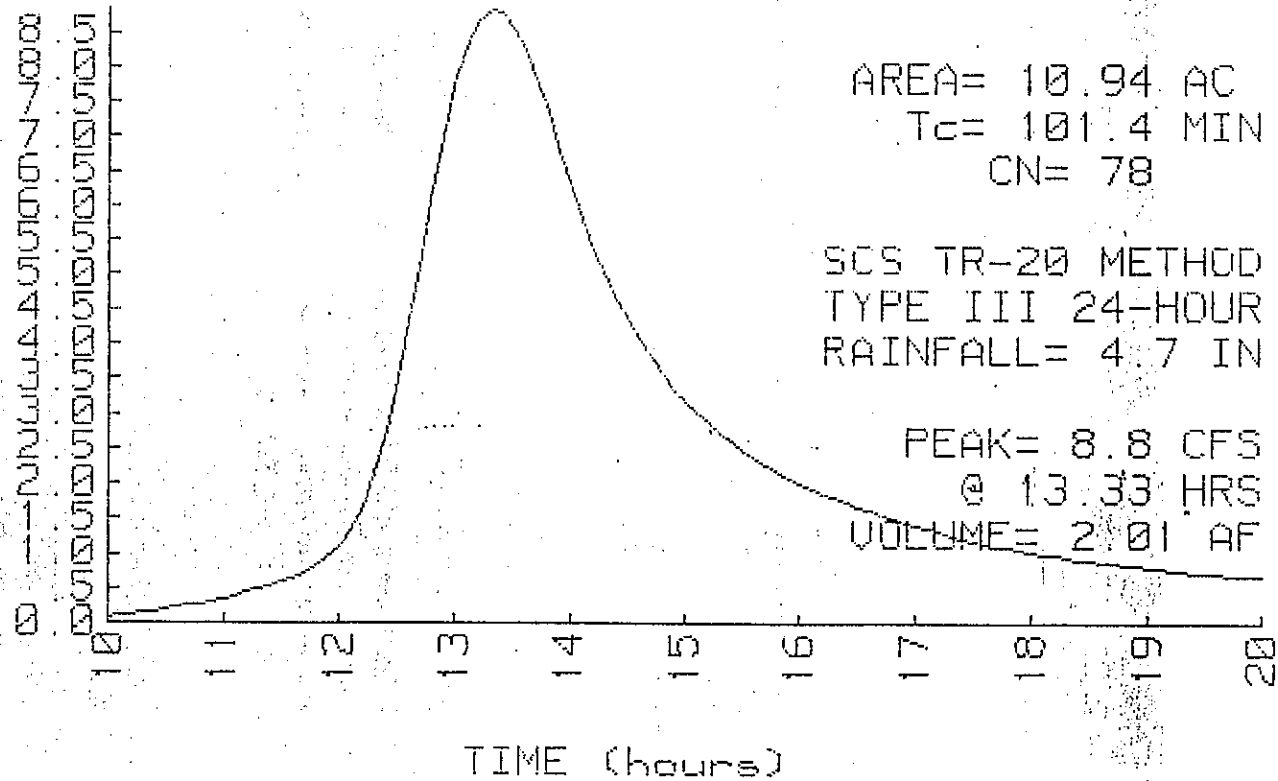
SUBCATCHMENT 2 WATERSHED II PRESENT CONDITION

ACRES	CN	
10.94	78	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 8.8 CFS @ 13.33 HRS
VOLUME= 2.01 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL80-EL78	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL78-EL70	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	EL70-EL49.5	3.0
	Total Length= 645 ft Total Tc=	101.4

SUBCATCHMENT 2 RUNOFF
WATERSHED II PRESENT CONDITION

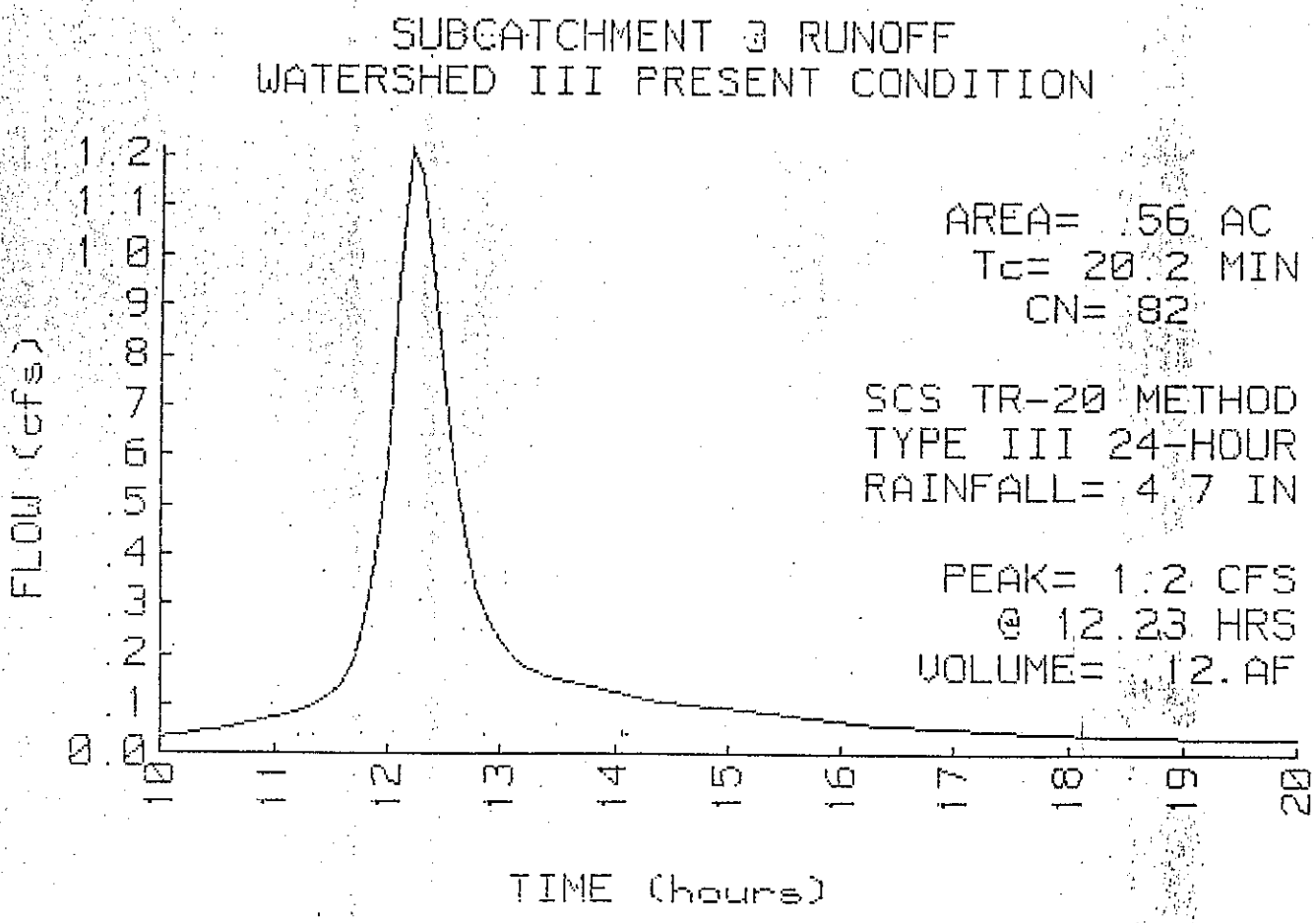


SUBCATCHMENT 3 WATERSHED III PRESENT CONDITION

ACRES	CN	
.56	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 1.2 CFS @ 12.23 HRS
VOLUME= .12 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL74.3-EL72	19.1
Grass: Dense n=.24 L=130' P2=3 in s=.0177 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL67	1.1
Short Grass Pasture Kv=7 L=100' s=.05 '/' V=1.57 fps		
	Total Length= 230 ft	Total Tc= 20.2



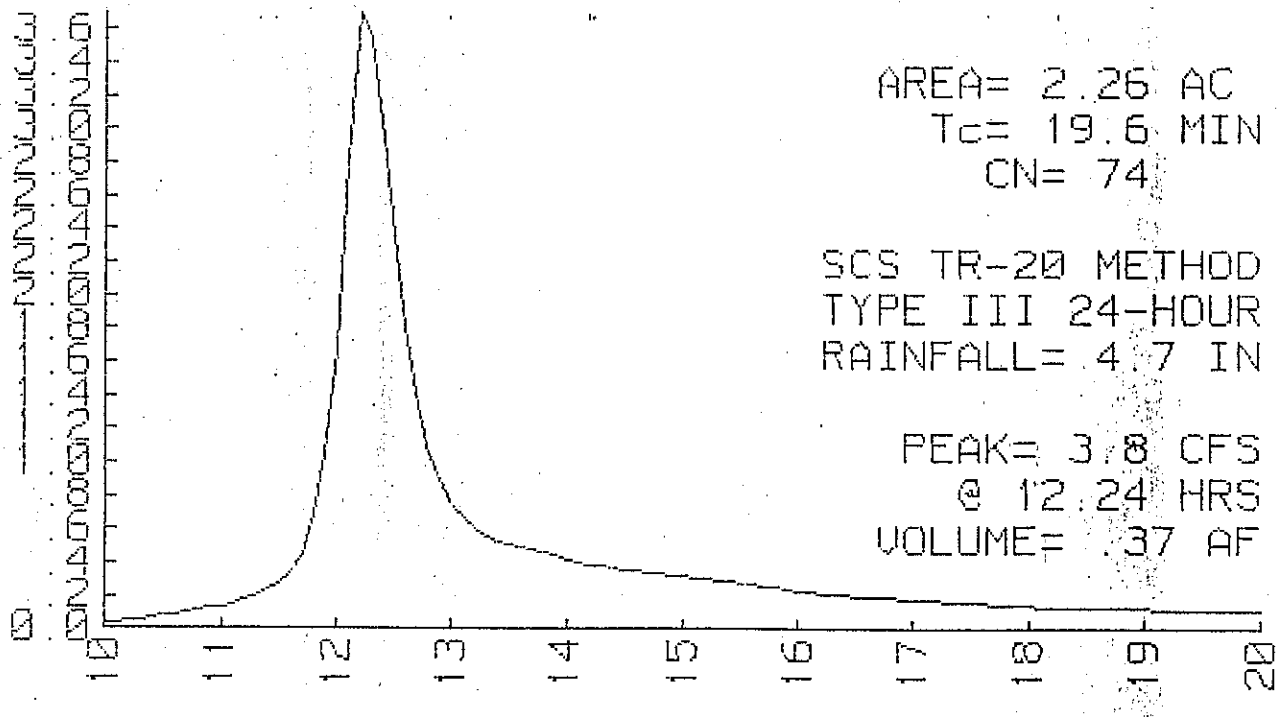
SUBCATCHMENT 4 WATERSHED IV PRESENT CONDITION

ACRES	CN	
2.26	74	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 3.8 CFS @ 12.24 HRS
VOLUME= .37 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.3-EL75.1	.5
Smooth surfaces n=.011 L=20' P2=3 in s=.01 '/'		
TR-55 SHEET FLOW	EL75.1-EL72	16.2
Grass: Dense n=.24 L=125' P2=3 in s=.0248 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL56	2.9
Short Grass Pasture Kv=7 L=290' s=.0552 '/' V=1.64 fps		
	Total Length= 435 ft	Total Tc= 19.6

SUBCATCHMENT 4 RUNOFF
WATERSHED IV PRESENT CONDITION

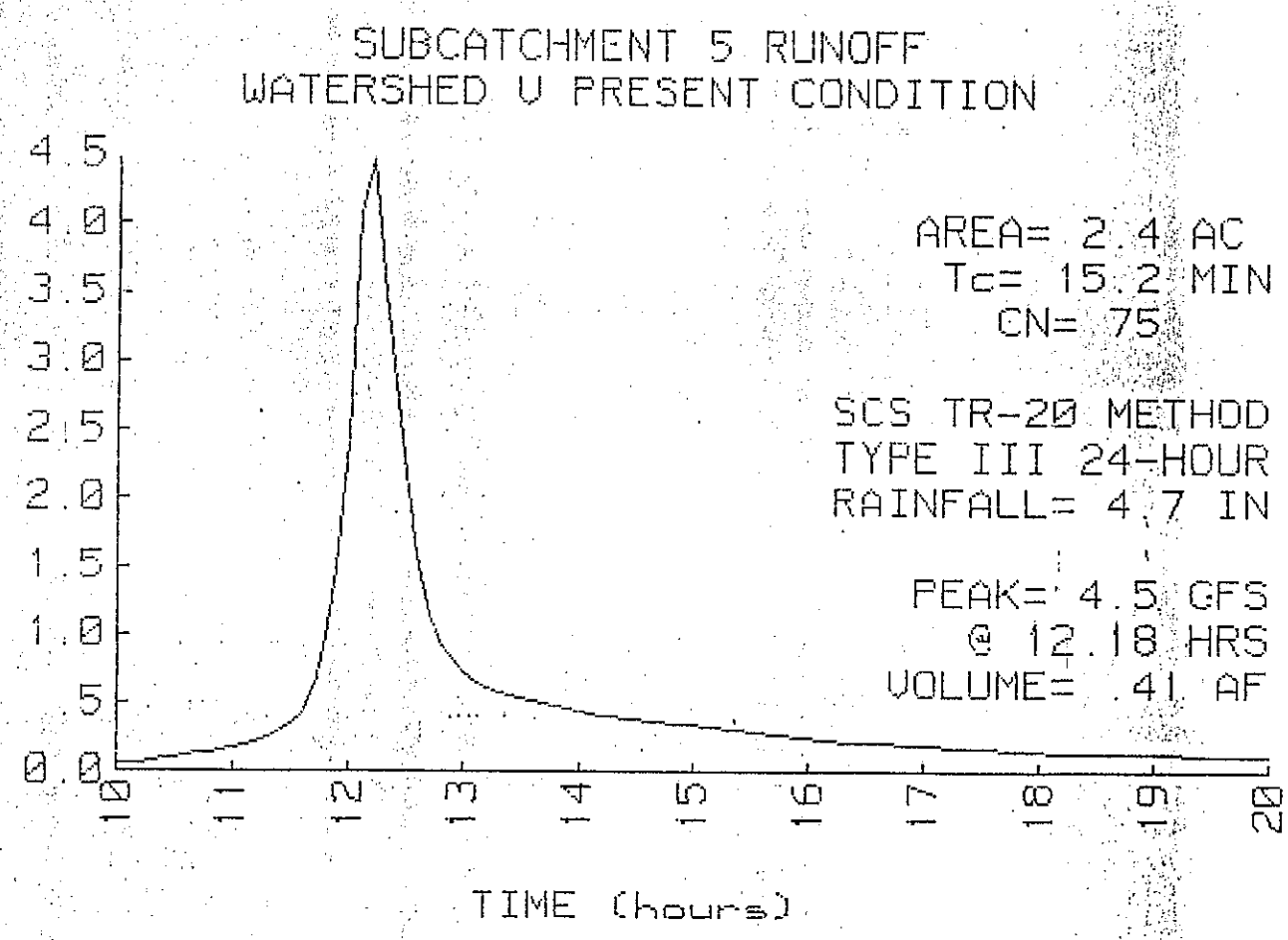


SUBCATCHMENT 5 WATERSHED V PRESENT CONDITION

ACRES	CN	
2.40	75	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 4.5 CFS @ 12.18 HRS
VOLUME= .41 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.8-EL75.1	1.5
Smooth surfaces n=.011 L=90' P2=3 in s=.0088 '/'		
TR-55 SHEET FLOW	EL75.1-EL73	9.4
Grass: Dense n=.24 L=70' P2=3 in s=.03 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL73-EL56	3.7
Short Grass Pasture Kv=7 L=345' s=.0493 '/' V=1.55 fps		
DIRECT ENTRY	EL56-EL51	.6
	Total Length= 495 ft Total Tc=	15.2



REACH 1

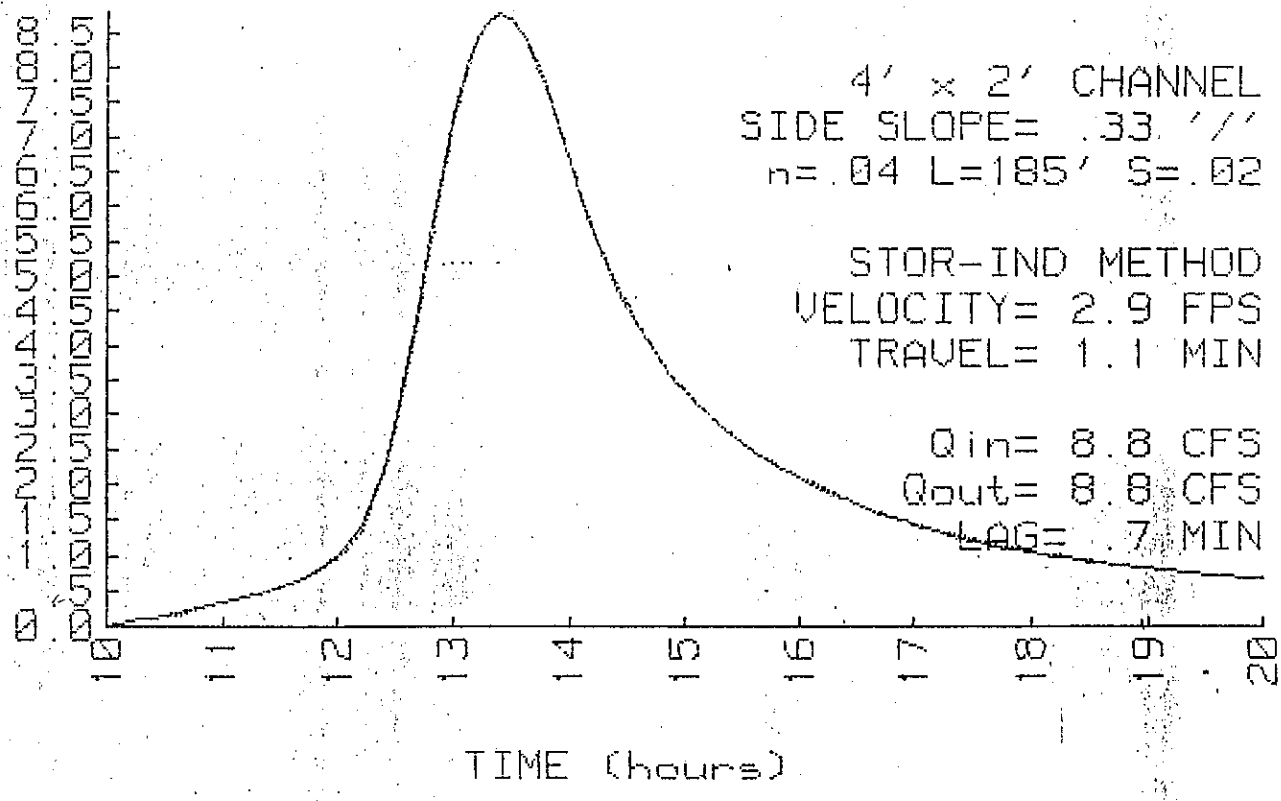
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .53 FT
PEAK VELOCITY= 2.9 FPS
TRAVEL TIME = 1.1 MIN
Qin = 8.8 CFS @ 13.39 HRS
Qout= 8.8 CFS @ 13.40 HRS
ATTEN= 0 % LAG= .7 MIN
IN/OUT= 2.01 / 2.00 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

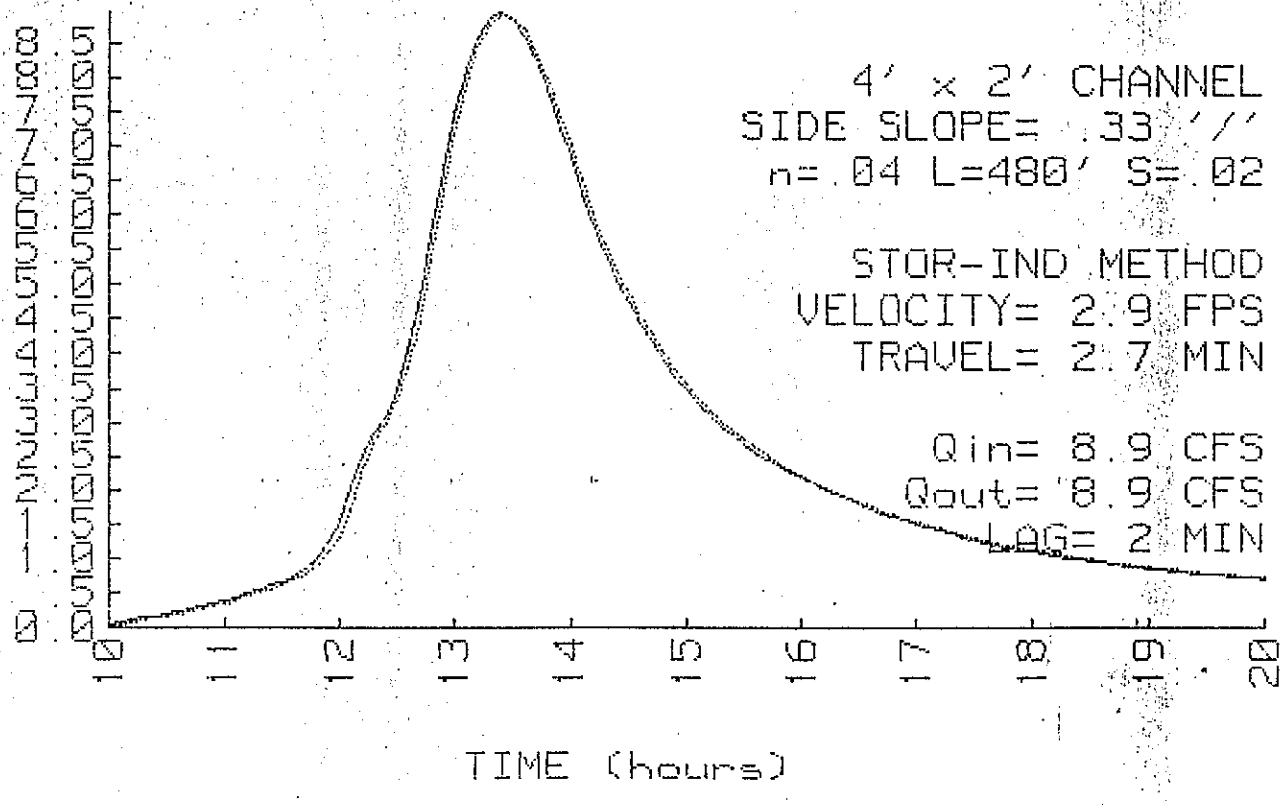
DEPTH (FT)	END AREA (SQ-FT)	DISCH. (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 2

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .54 FT
PEAK VELOCITY= 2.9 FPS
TRAVEL TIME = 2.7 MIN
Qin = 8.9 CFS @ 13.40 HRS
Qout= 8.9 CFS @ 13.43 HRS
ATTEN= 0 % LAG= 2.0 MIN
IN/OUT= 2.12 / 2.12 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

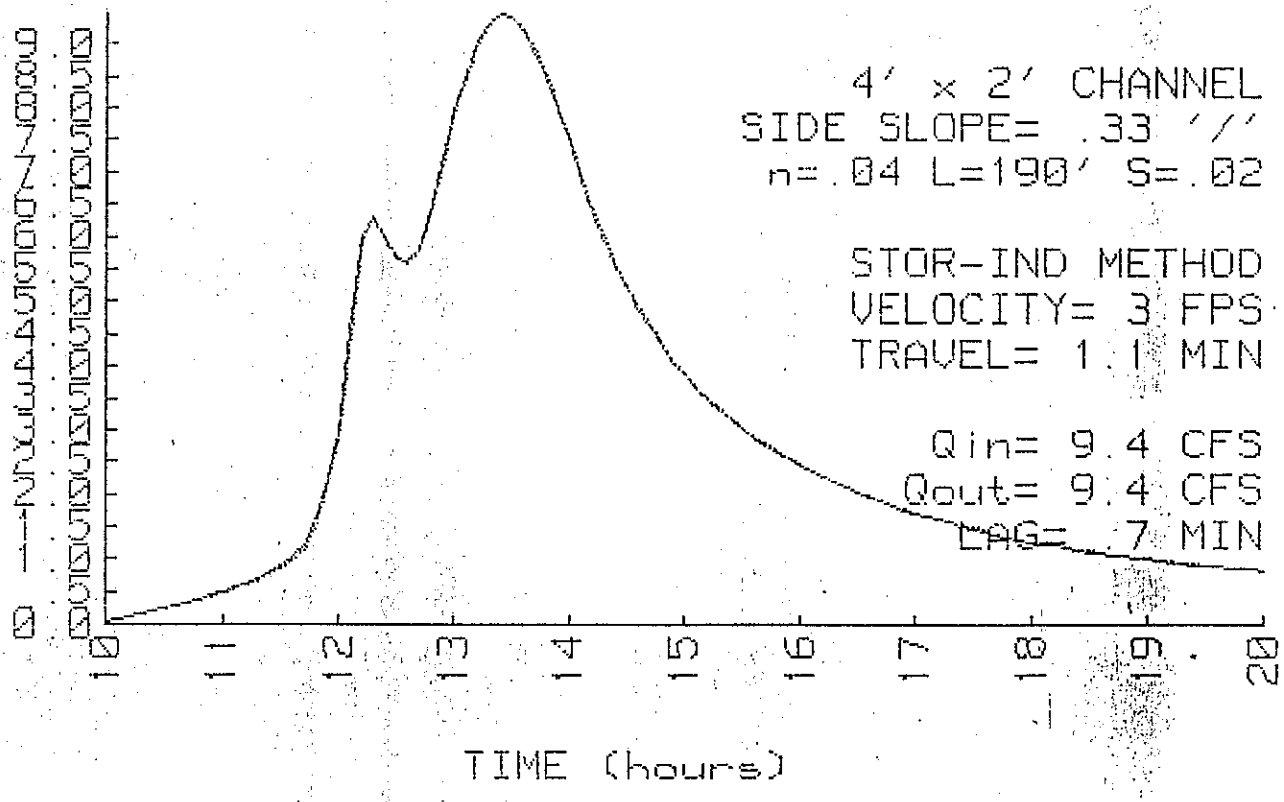
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .55 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 1.1 MIN
Qin = 9.4 CFS @ 13.42 HRS
Qout= 9.4 CFS @ 13.43 HRS
ATTEN= 0 % LAG= .7 MIN
IN/OUT= 2.49 / 2.48 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

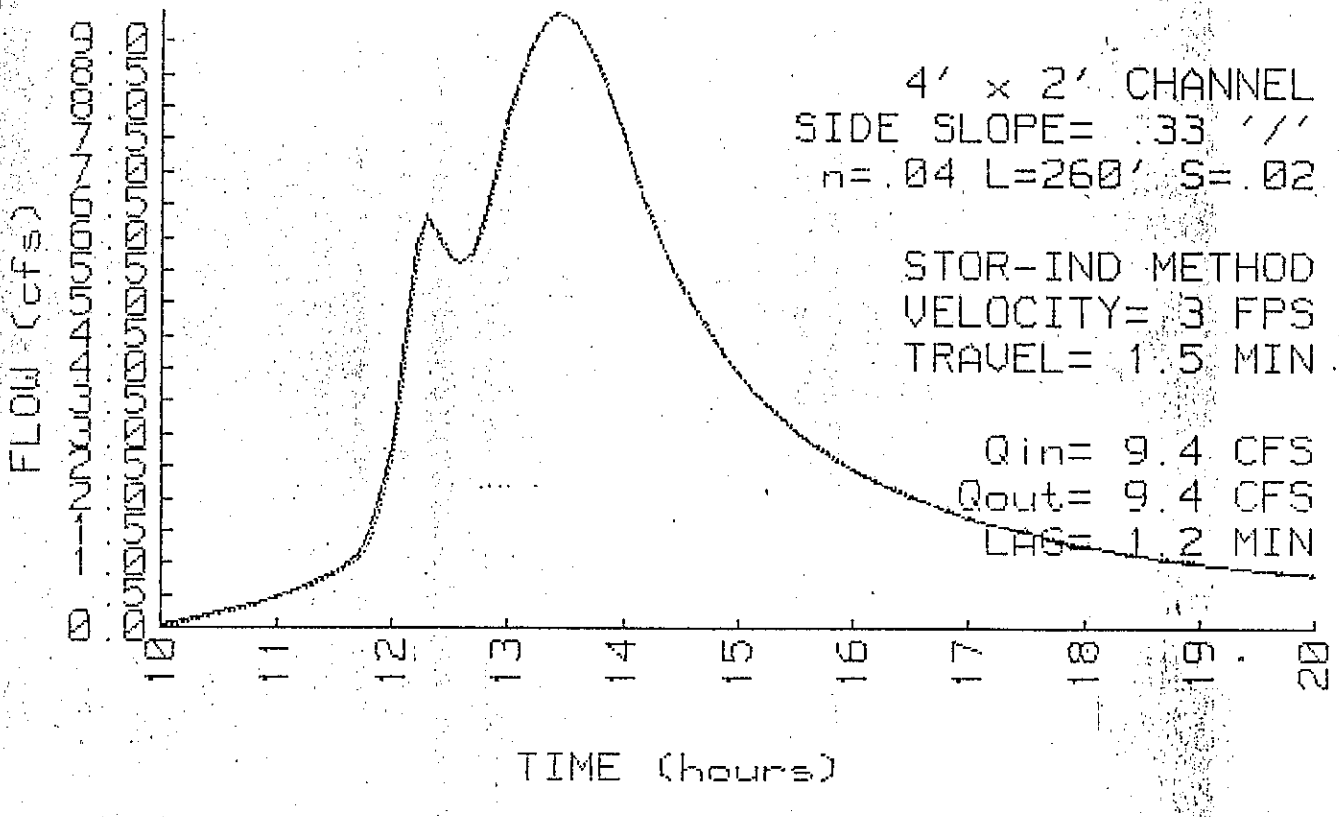
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 260 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .55 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 1.5 MIN
Qin = 9.4 CFS @ 13.43 HRS
Qout= 9.4 CFS @ 13.45 HRS
ATTEN= 0 % LAG= 1.2 MIN
IN/OUT= 2.48 / 2.48 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

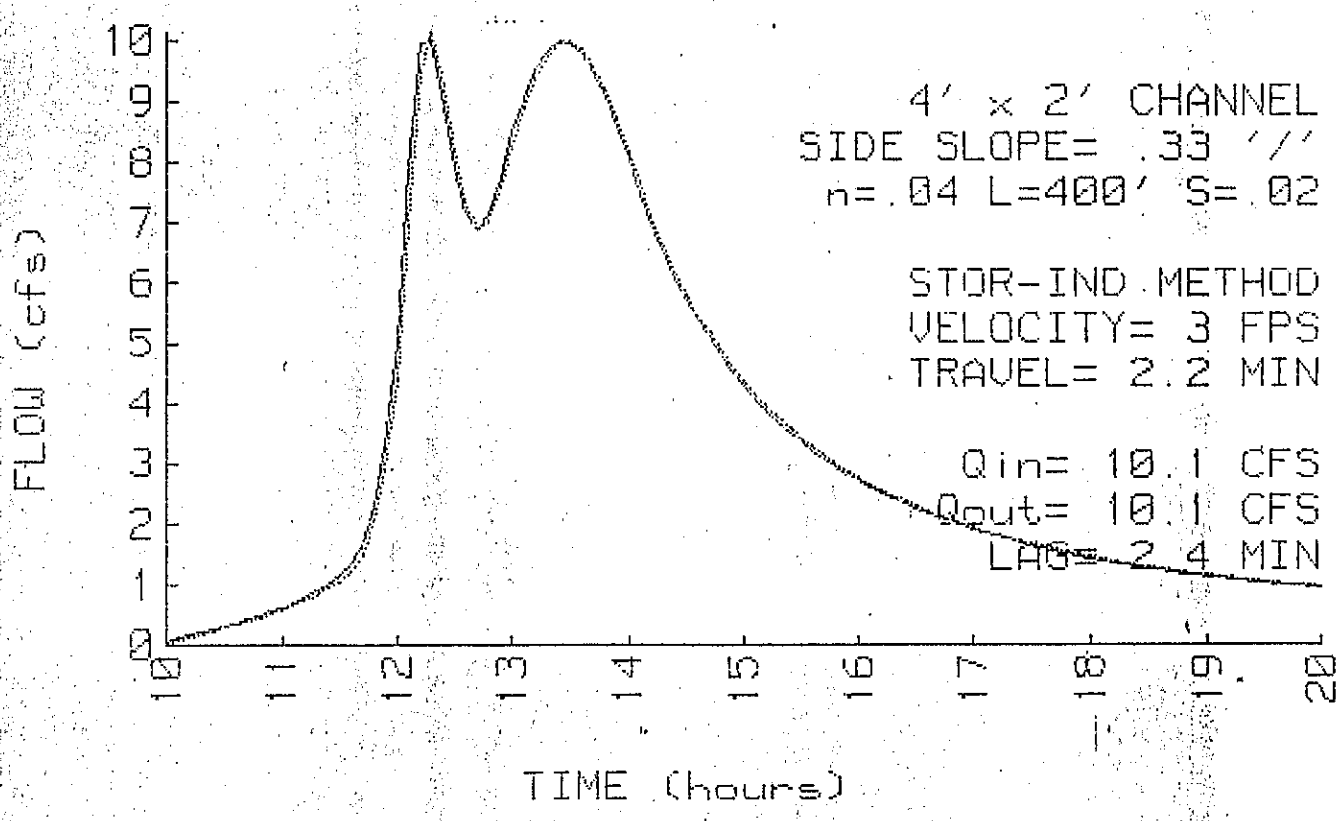
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 5

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .58 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 2.2 MIN
Qin = 10.1 CFS @ 12.25 HRS
Qout= 10.1 CFS @ 12.29 HRS
ATTEN= 0 % LAG= 2.4 MIN
IN/OUT= 2.89 / 2.88 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



REACH 6

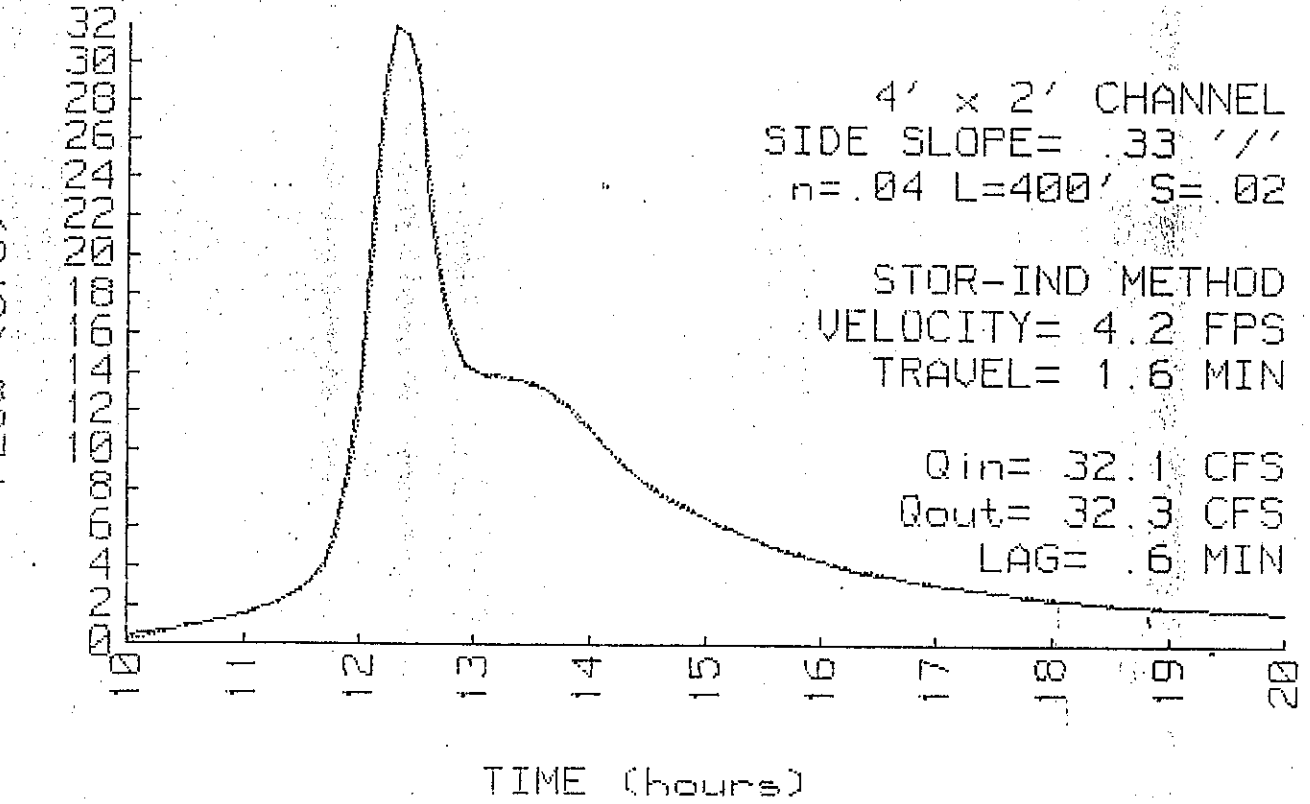
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.04 FT
PEAK VELOCITY= 4.2 FPS
TRAVEL TIME = 1.6 MIN
Qin = 32.1 CFS @ 12.33 HRS
Qout= 32.3 CFS @ 12.35 HRS
ATTEN= 0 % LAG= .6 MIN
IN/OUT= 5.39 / 5.38 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1 POND 1

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19863	31221	69439
52.0	26031	45394	114833

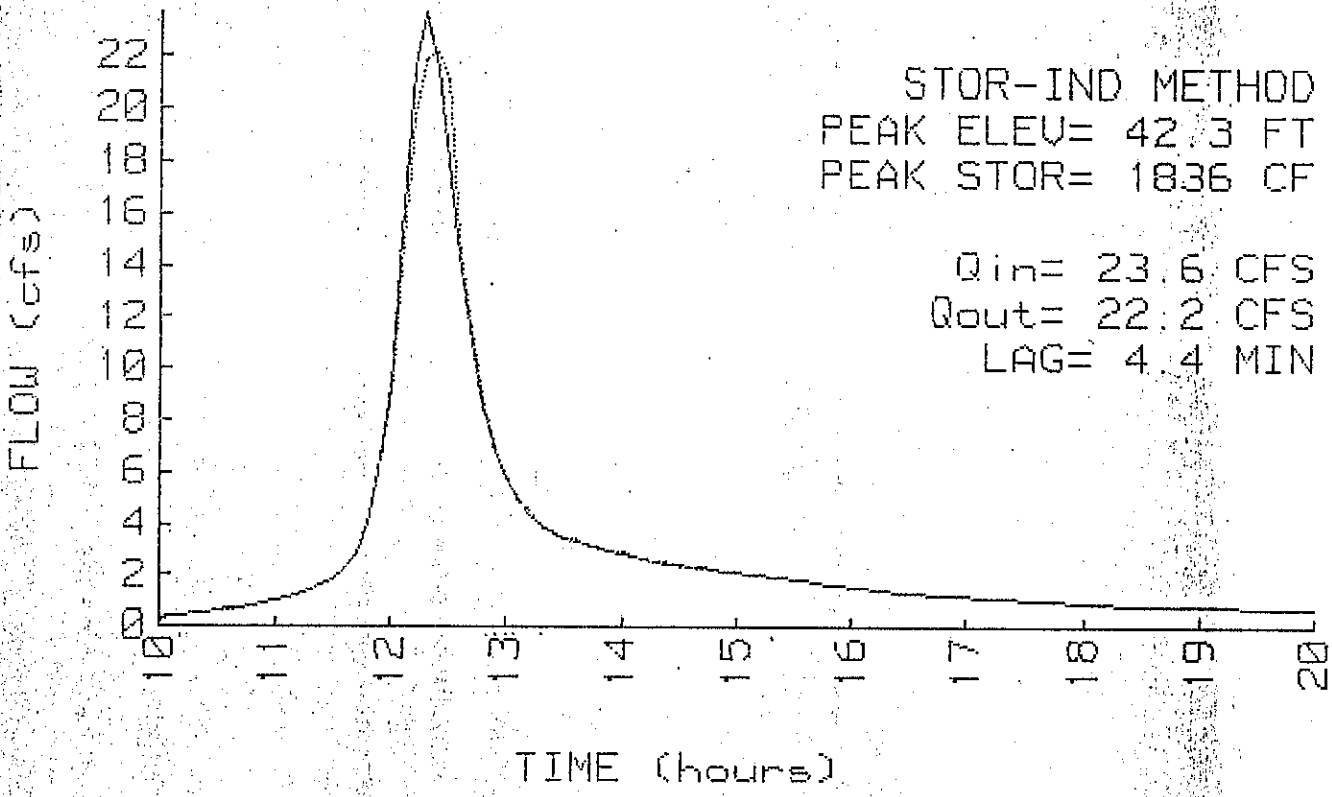
STOR-IND METHOD
PEAK ELEVATION= 42.3 FT
PEAK STORAGE = 1836 CF
Qin = 23.6 CFS @ 12.30 HRS
Qout= 22.2 CFS @ 12.37 HRS
ATTEN= 6 % LAG= 4.4 MIN
IN/OUT= 2.51 / 2.51 AF

INVERT (FT) OUTLET DEVICES
38.6 24" CULVERT
n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.9	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		

POND 1 INFLOW & OUTFLOW
POND 1



POND 2 POND 2

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1229	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

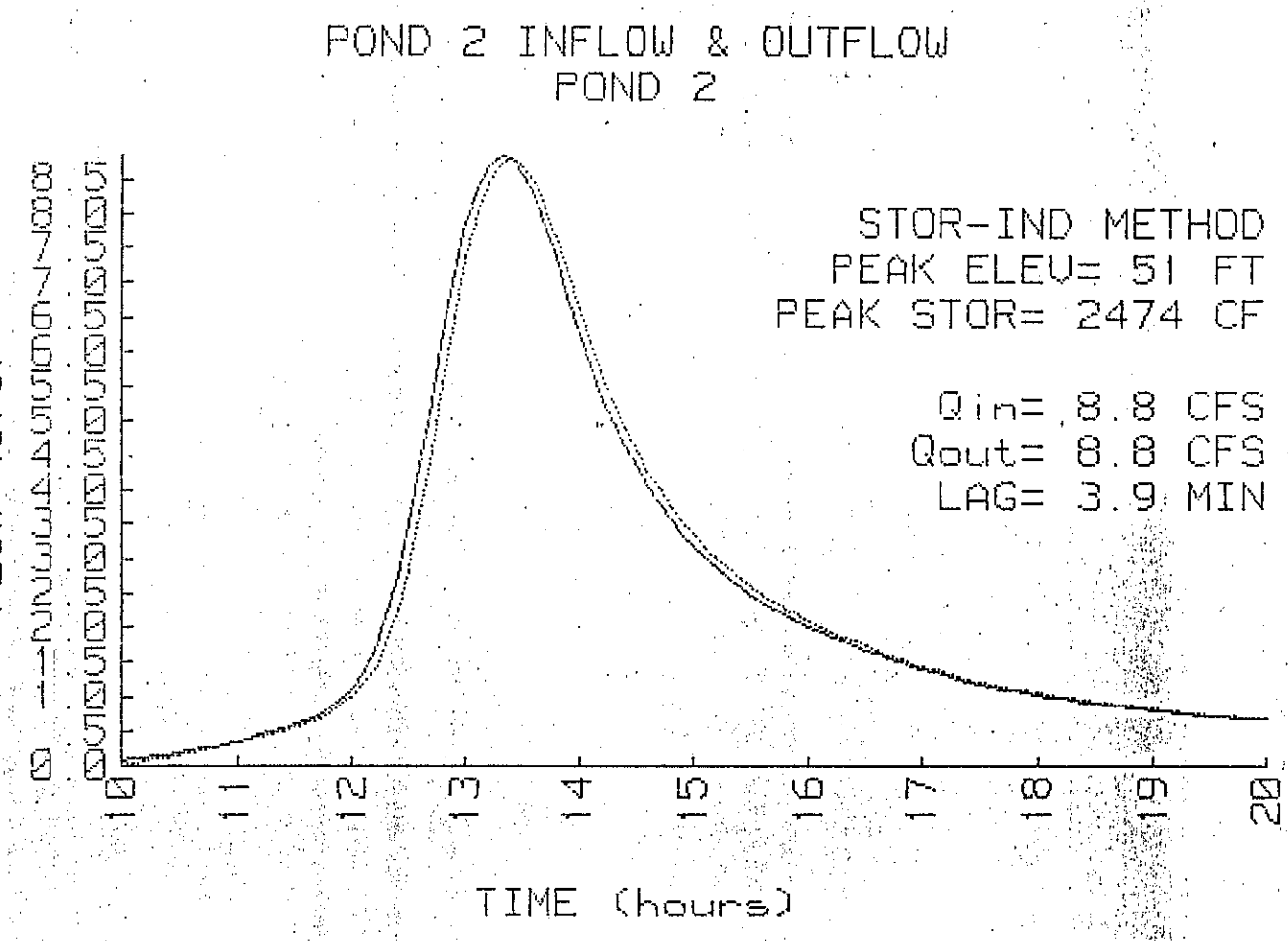
STOR-IND METHOD
PEAK ELEVATION= 51.0 FT
PEAK STORAGE = 2474 CF
Qin = 8.8 CFS @ 13.33 HRS
Qout= 8.8 CFS @ 13.99 HRS
ATTEN= 0 % LAG= 3.9 MIN
IN/OUT= 2.01 / 2.01 AF

INVERT (FT) OUTLET DEVICES

49.5 24" CULVERT
n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.8	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						


POND 2 INFLOW & OUTFLOW
POND 2
STOR-IND METHOD
PEAK ELEV= 51 FT
PEAK STOR= 2474 CF
Qin= 8.8 CFS
Qout= 8.8 CFS
LAG= 3.9 MIN
FLOW (cfs)
0
10
11
12
13
14
15
16
17
18
19
20
TIME (hours)

POND 3 POND 3

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

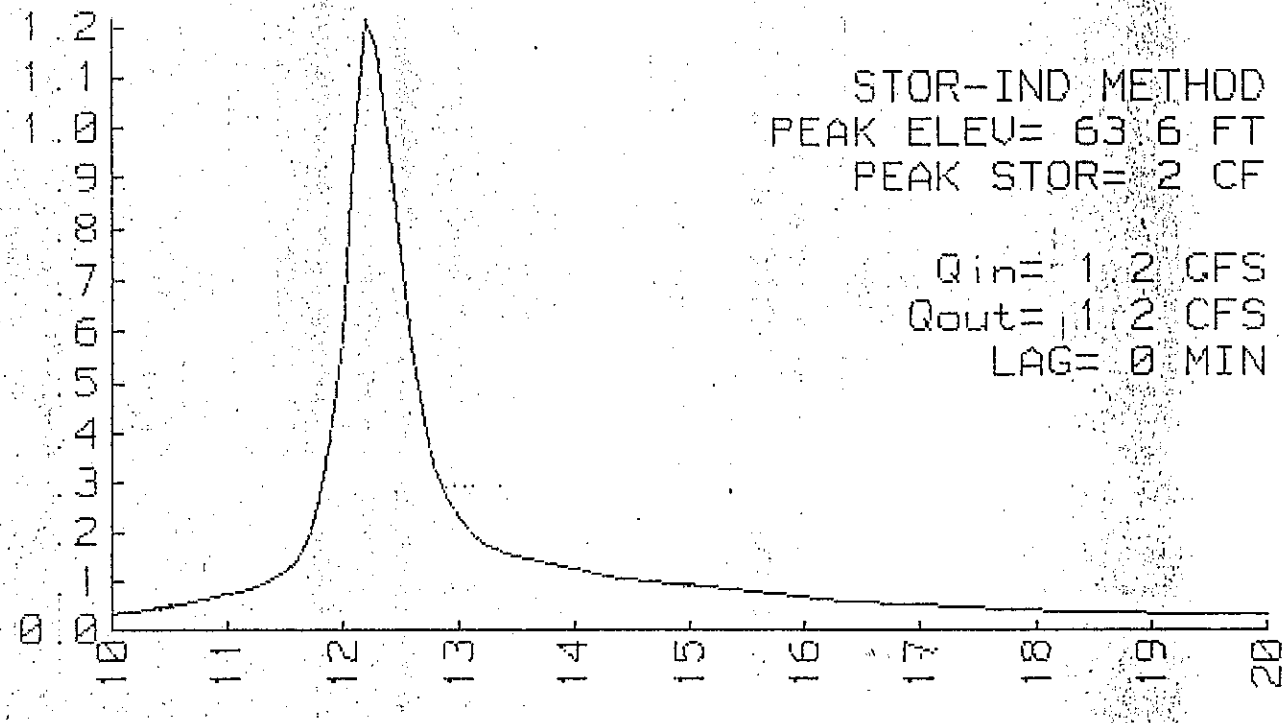
STOR-IND METHOD
PEAK ELEVATION= 63.6 FT
PEAK STORAGE = 2 CF
Qin = 1.2 CFS @ 12.23 HRS
Qout= 1.2 CFS @ 12.23 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .12 / .12 AF

INVERT (FT)	OUTLET DEVICES
63.0	12" CULVERT n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 OND 4

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

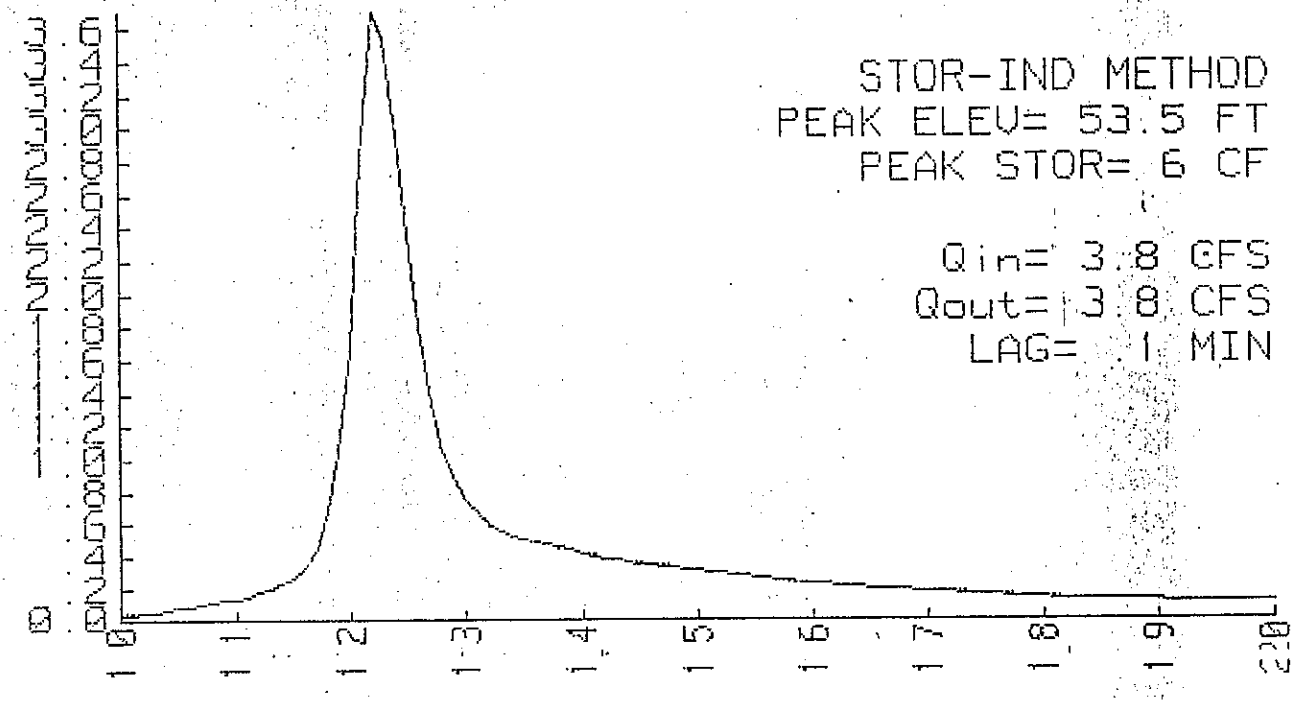
STOR-IND METHOD
PEAK ELEVATION= 53.5 FT
PEAK STORAGE = 6 CF
Qin = 3.8 CFS @ 12.24 HRS
Qout= 3.8 CFS @ 12.24 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .37 / .37 AF

INVERT (FT)	OUTLET DEVICES
52.0	12" CULVERT n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									

POND 4 INFLOW & OUTFLOW
OND 4



POND 5 POND 5

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

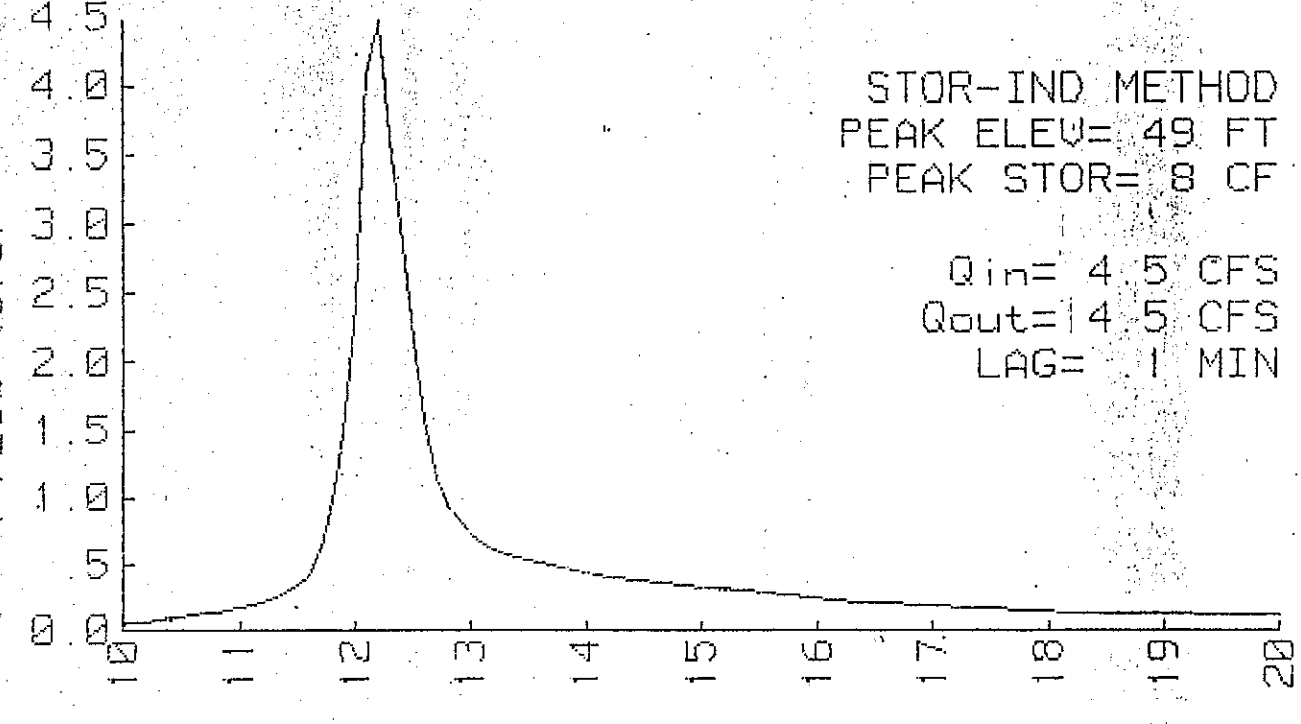
STOR-IND METHOD
PEAK ELEVATION= 49.0 FT
PEAK STORAGE = 8 CF
Qin = 4.5 CFS @ 12.18 HRS
Qout= 4.5 CFS @ 12.18 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .41 / .41 AF

INVERT (FT)	OUTLET DEVICES
47.0	12" CULVERT n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

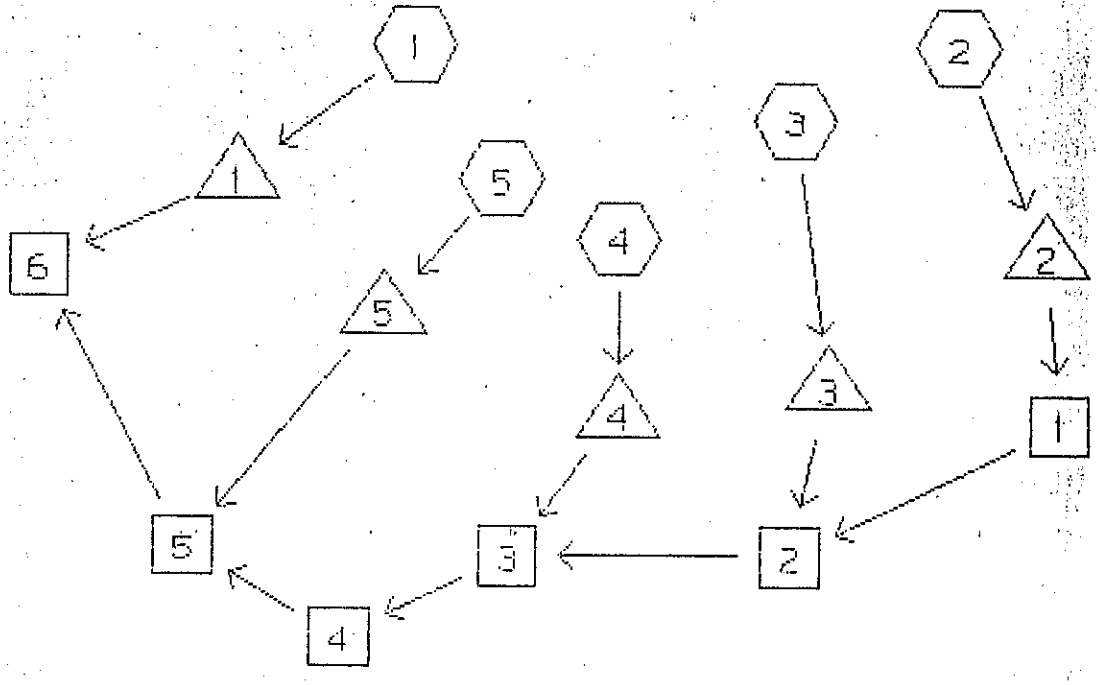
FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 5 INFLOW & OUTFLOW
POND 5



25yr Present

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 5.5 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--	WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	14.30	24.0	100%76 - - -	76	-	30.6	12.30	3.23
2	10.94	101.4	100%78 - - -	78	-	11.3	13.31	2.58
3	.56	20.2	100%82 - - -	82	-	1.5	12.23	.15
4	2.26	19.6	100%74 - - -	74	-	4.9	12.23	.48
5	2.40	15.2	100%75 - - -	75	-	5.8	12.18	.53

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	4.0	2.0	.33	.33	.040	185	.0200	3.1	1.0	11.3
2	-	4.0	2.0	.33	.33	.040	480	.0200	3.1	2.5	11.4
3	-	4.0	2.0	.33	.33	.040	190	.0200	3.2	1.0	12.1
4	-	4.0	2.0	.33	.33	.040	260	.0200	3.2	1.4	12.1
5	-	4.0	2.0	.33	.33	.040	400	.0200	3.3	2.0	13.3
6	-	4.0	2.0	.33	.33	.040	400	.0200	4.4	1.5	39.1

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	1	38.6	52.0	43.5	.12	30.6	27.0	12	7.4
2	1	49.5	60.0	51.3	.07	11.3	11.3	0	3.9
3	1	63.0	67.0	63.7	0.00	1.5	1.5	0	0.0
4	1	52.0	56.0	54.3	0.00	4.9	4.9	0	.1
5	1	47.0	51.0	50.1	0.00	5.8	5.8	0	.1

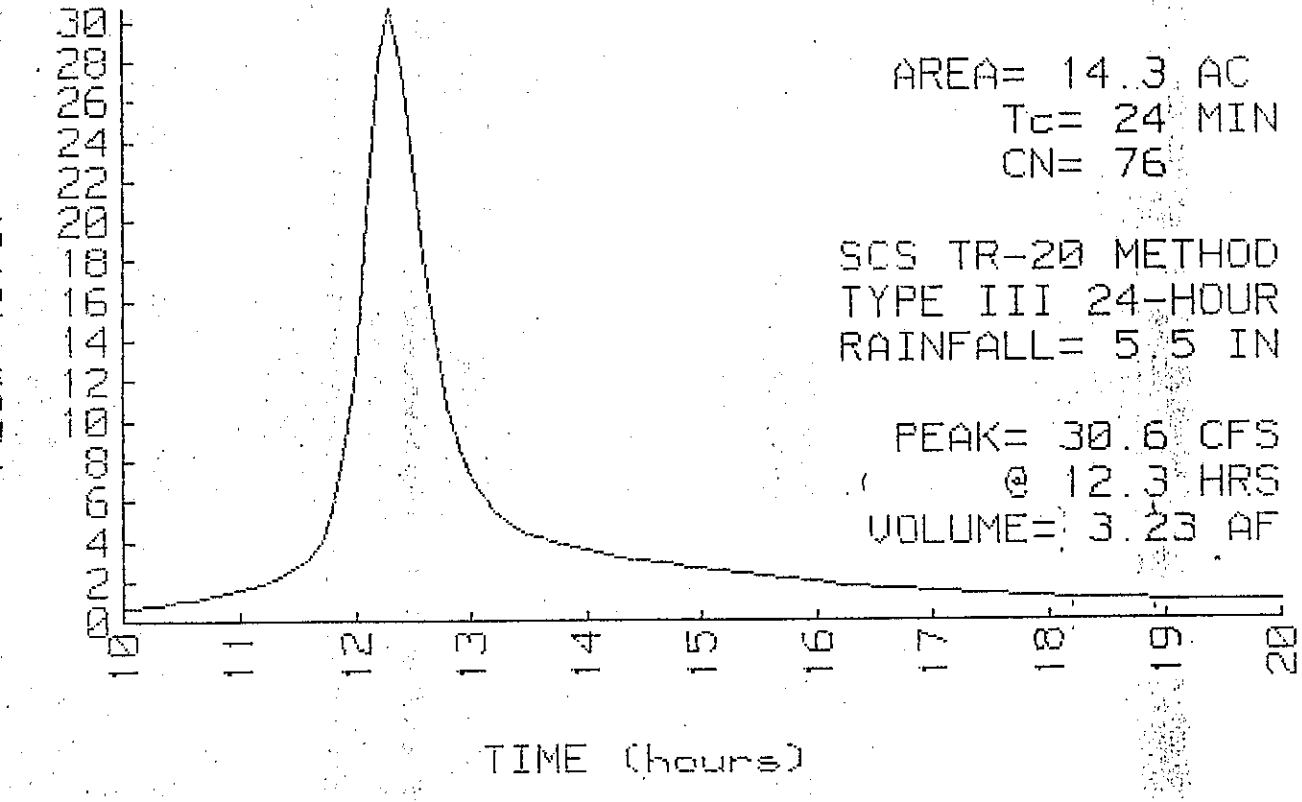
SUBCATCHMENT 1 WATERSHED I PRESENT CONDITION

ACRES	CN	
14.30	76	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 30.6 CFS @ 12.30 HRS
VOLUME= 3.23 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL85-EL80	20.0
Grass: Dense n=.24 L=175' P2=3 in s=.0286 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL80-EL72	1.0
Short Grass Pasture Kv=7 L=115' s=.0696 '/' V=1.85 fps		
DIRECT ENTRY	EL72-EL40	3.0
	Total Length= 290 ft Total Tc=	24.0

SUBCATCHMENT 1 RUNOFF
WATERSHED I PRESENT CONDITION

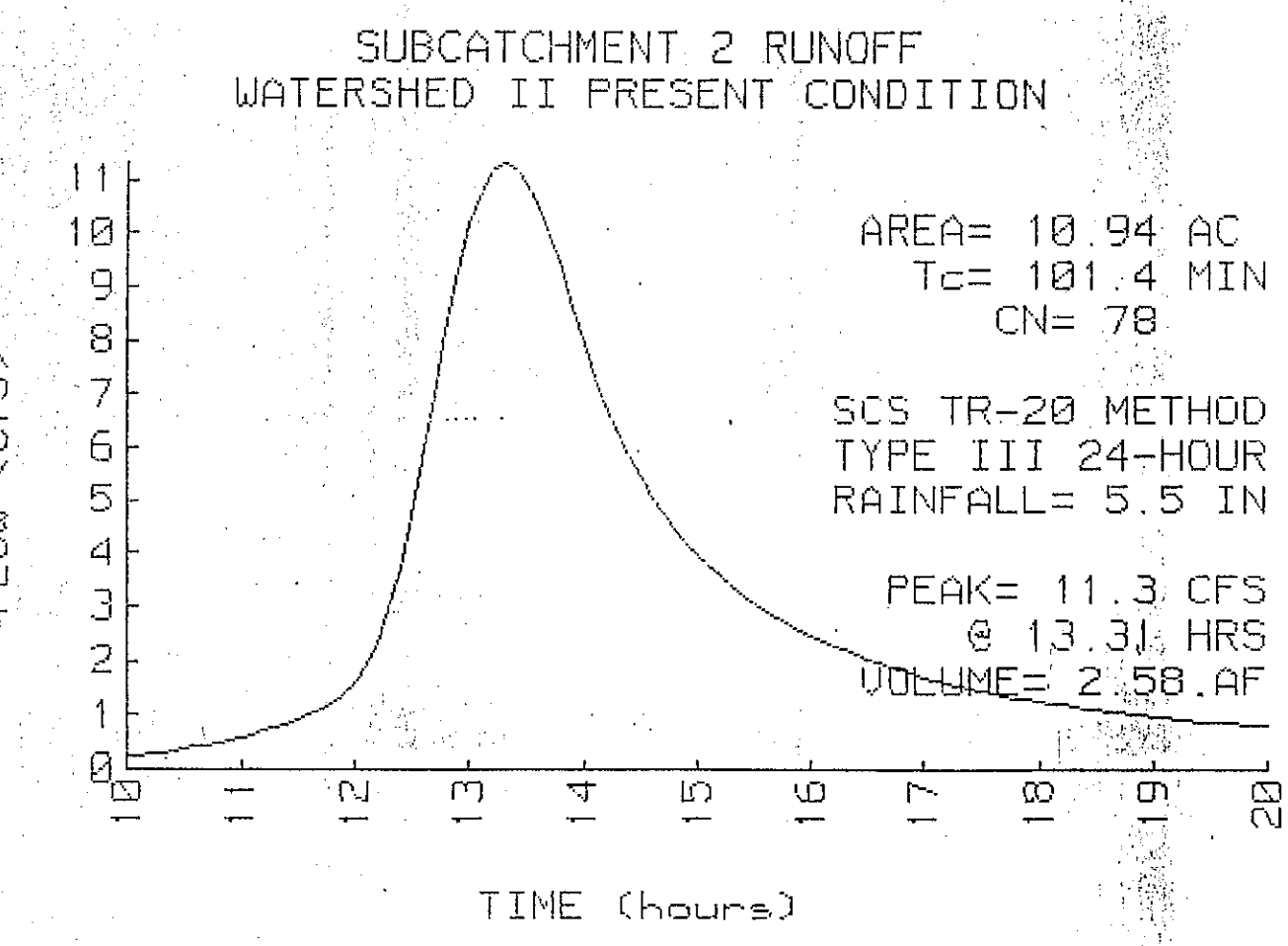


SUBCATCHMENT 2 WATERSHED II PRESENT CONDITION

ACRES	CN	
10.94	78	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 11.3 CFS @ 13.31 HRS
VOLUME= 2.58 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL80-EL78	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL78-EL70	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	EL70-EL49.5	8.0
	Total Length= 645 ft Total Tc=	101.4



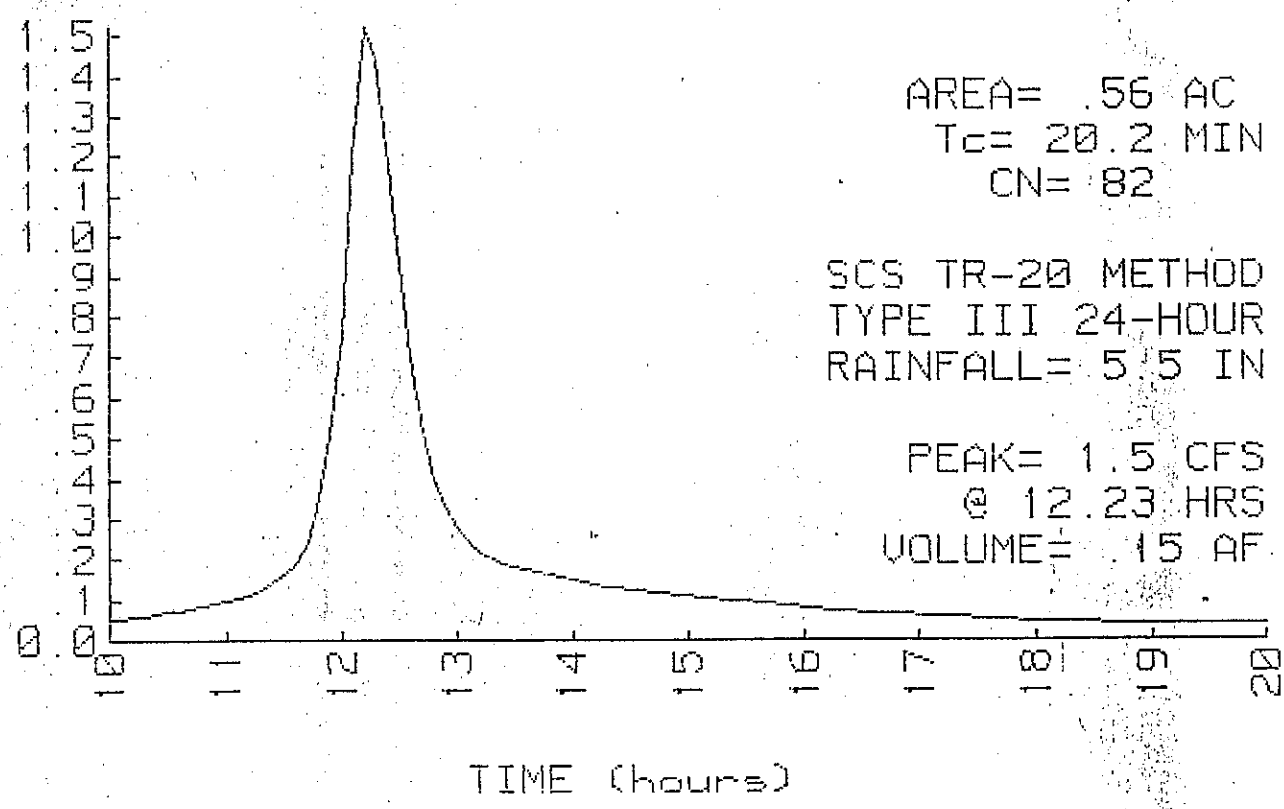
SUBCATCHMENT 3 WATERSHED III PRESENT CONDITION

ACRES	CN	
.56	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 1.5 CFS @ 12.23 HRS
VOLUME= .15 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL74.3-EL72	19.1
Grass: Dense n=.24 L=130' P2=3 in s=.0177 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL67	1.1
Short Grass Pasture Kv=7 L=100' s=.05 '/' V=1.57 fps		
	Total Length= 230 ft Total Tc=	20.2

SUBCATCHMENT 3 RUNOFF
WATERSHED III PRESENT CONDITION

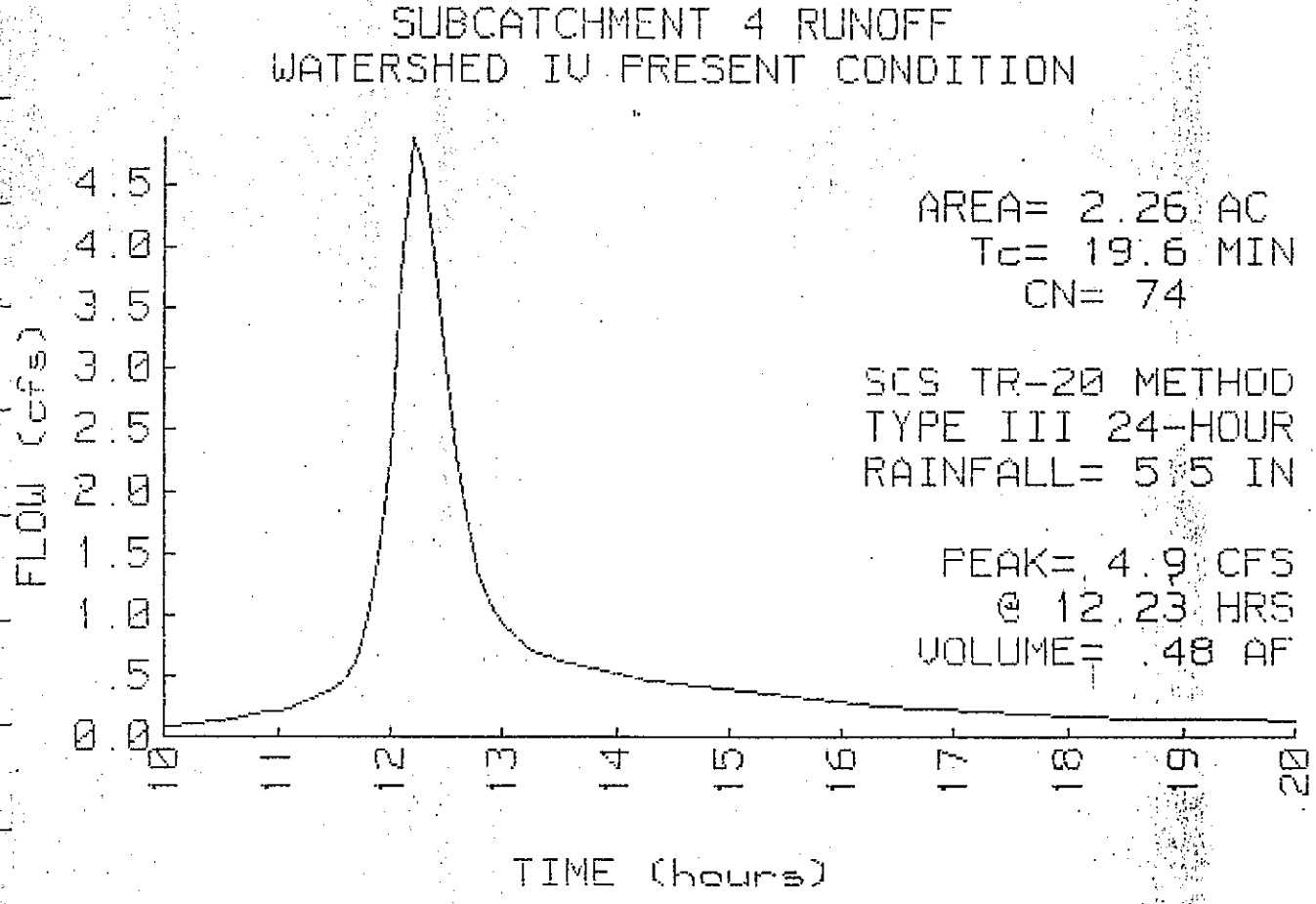


SUBCATCHMENT 4 WATERSHED IV PRESENT CONDITION

ACRES	CN	
2.26	74	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 4.9 CFS @ 12.23 HRS
VOLUME= .48 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.3-EL75.1	.5
Smooth surfaces n=.011 L=20' P2=3 in s=.01 '/'		
TR-55 SHEET FLOW	EL75.1-EL72	16.2
Grass: Dense n=.24 L=125' P2=3 in s=.0248 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL72-EL56	2.9
Short Grass Pasture Kv=7 L=290' s=.0552 '/' V=1.64 fps		
	Total Length= 435 ft	Total Tc= 19.6



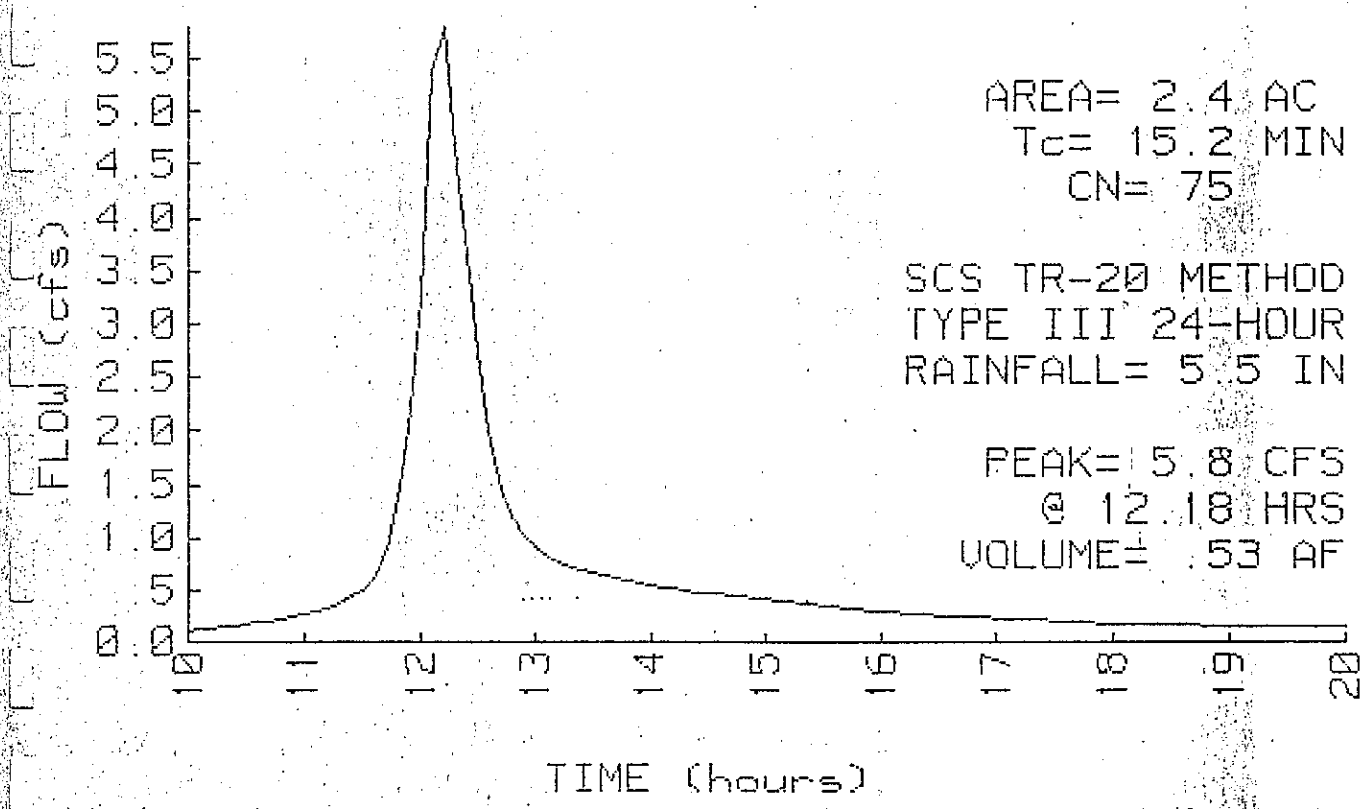
SUBCATCHMENT 5 WATERSHED V PRESENT CONDITION

ACRES	CN	
2.40	75	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 5.8 CFS @ 12.18 HRS
VOLUME= .53 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL75.8-EL75.1	1.5
Smooth surfaces n=.011 L=80' P2=3 in s=.0088 '/'		
TR-55 SHEET FLOW	EL75.1-EL73	9.4
Grass: Dense n=.24 L=70' P2=3 in s=.03 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL73-EL56	3.7
Short Grass Pasture Kv=7 L=345' s=.0493 '/' V=1.55 fps		
DIRECT ENTRY	EL56-EL51	.6
	Total Length= 495 ft	Total Tc= 15.2

SUBCATCHMENT 5 RUNOFF
WATERSHED V PRESENT CONDITION



REACH 1

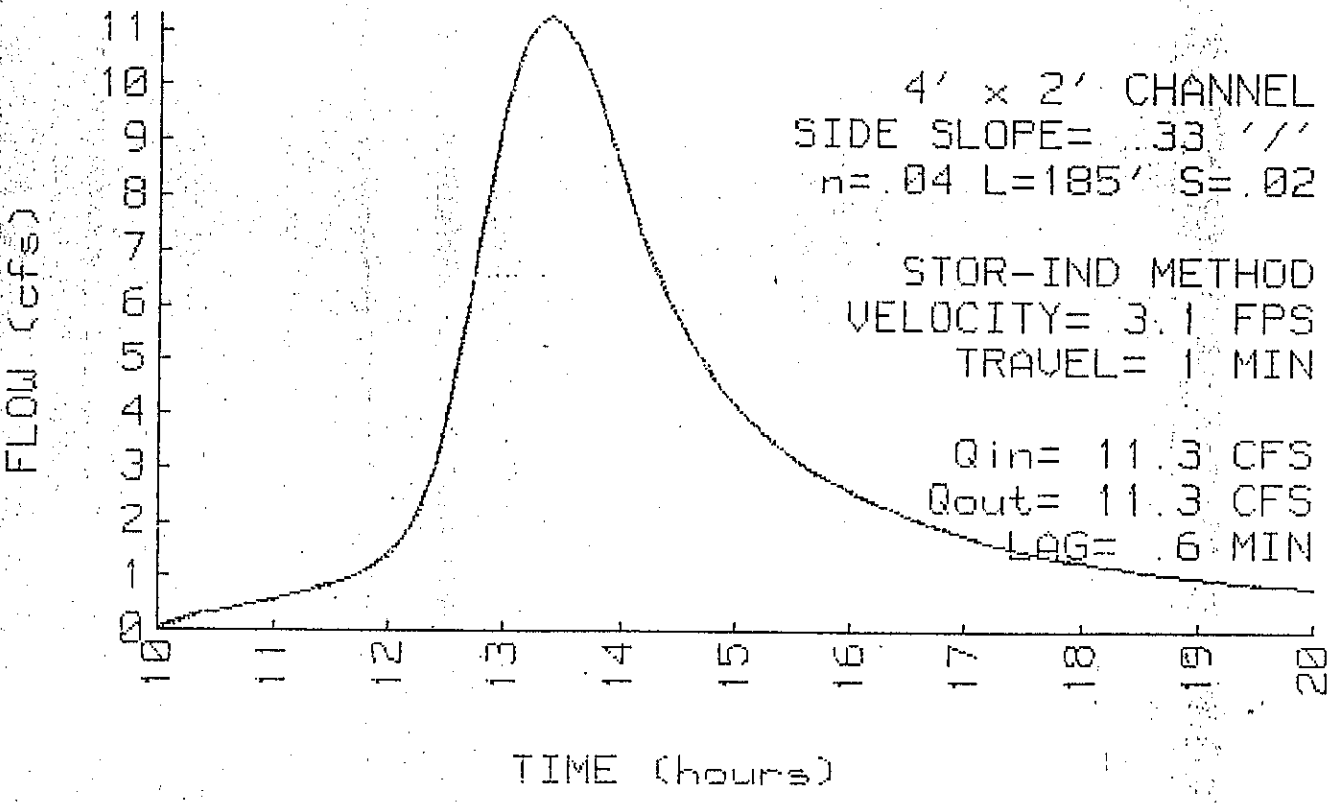
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .61 FT
PEAK VELOCITY= 3.1 FPS
TRAVEL TIME = 1.0 MIN
Qin = 11.3 CFS @ 13.38 HRS
Qout= 11.3 CFS @ 13.39 HRS
ATTEN= 0 % LAG= .6 MIN
IN/OUT= 2.57 / 2.57 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

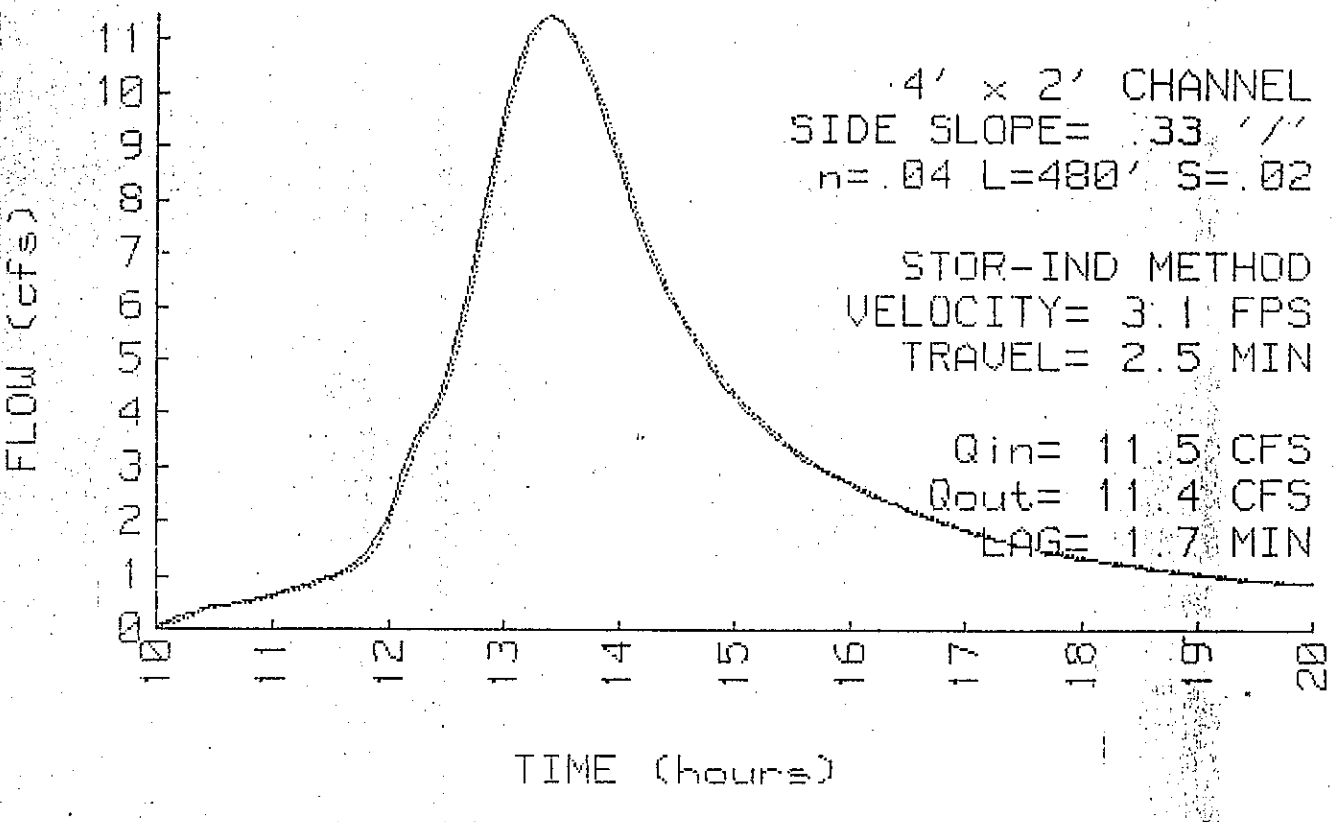
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 2

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .62 FT
PEAK VELOCITY= 3.1 FPS
TRAVEL TIME = 2.5 MIN
Qin = 11.5 CFS @ 13.38 HRS
Qout= 11.4 CFS @ 13.41 HRS
ATTEN= 0 % LAG= 1.7 MIN
IN/OUT= 2.72 / 2.71 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

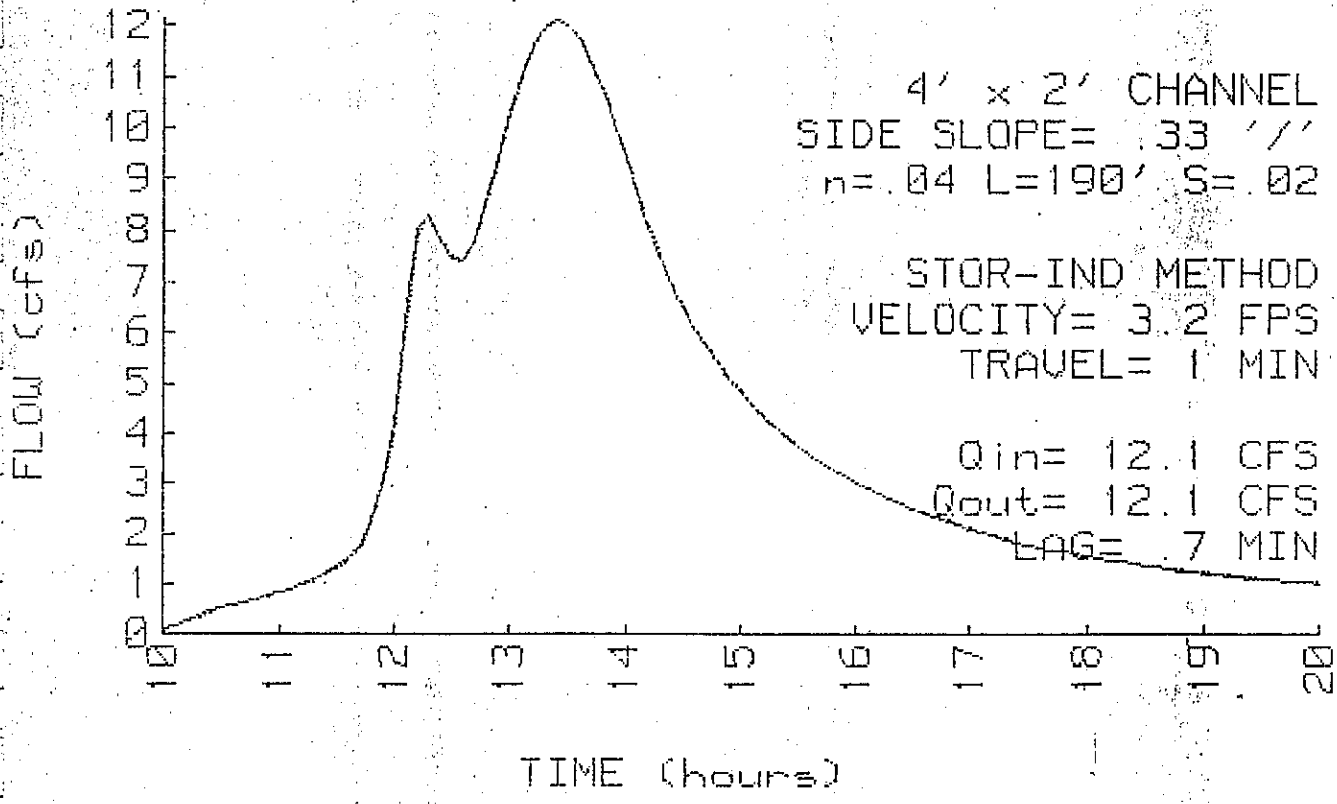
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .63 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = 1.0 MIN
Qin = 12.1 CFS @ 13.40 HRS
Qout= 12.1 CFS @ 13.41 HRS
ATTEN= 0 % LAG= .7 MIN
IN/OUT= 3.19 / 3.19 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

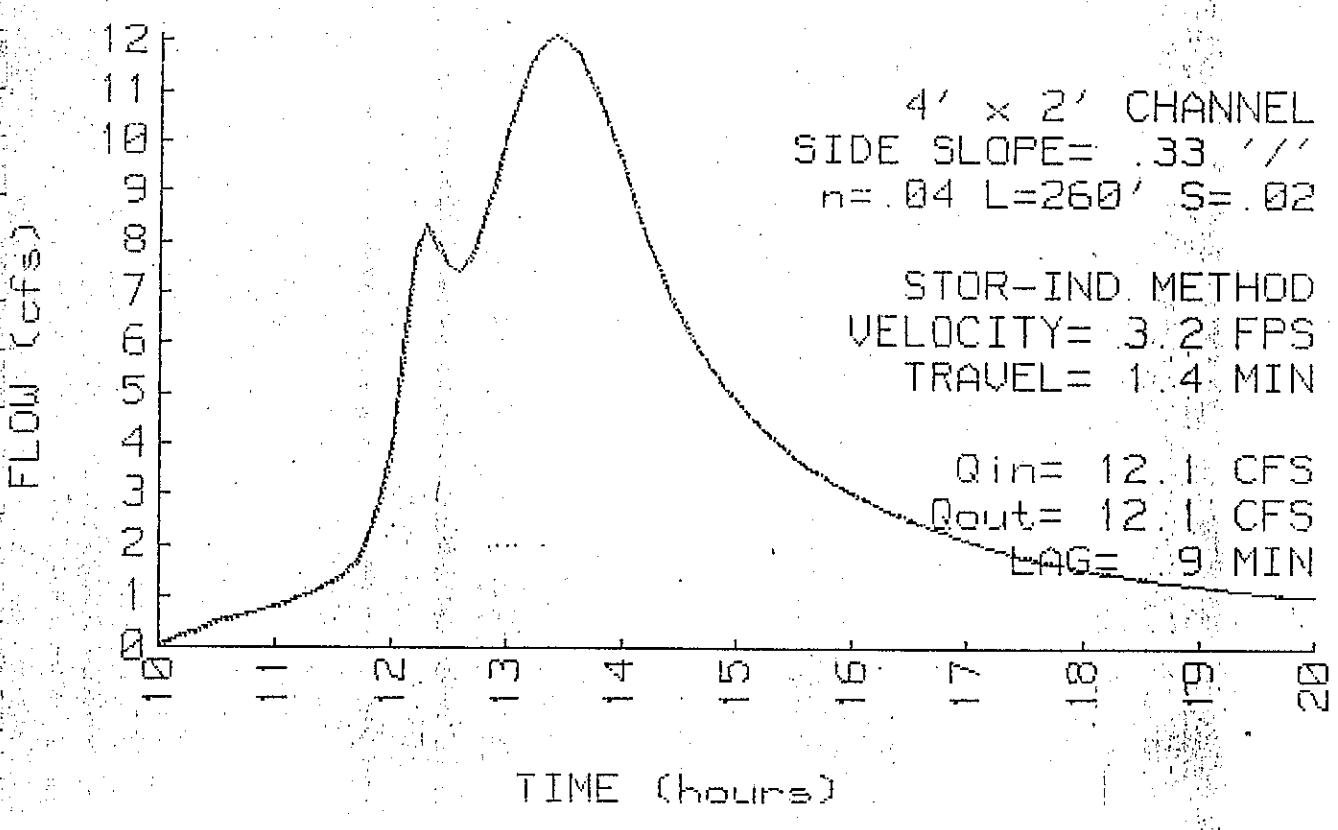
REACH 4

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 260 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .63 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = 1.4 MIN
Qin = 12.1 CFS @ 13.41 HRS
Qout= 12.1 CFS @ 13.42 HRS
ATTEN= 0 % LAG= .9 MIN
IN/OUT= 3.19 / 3.18 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

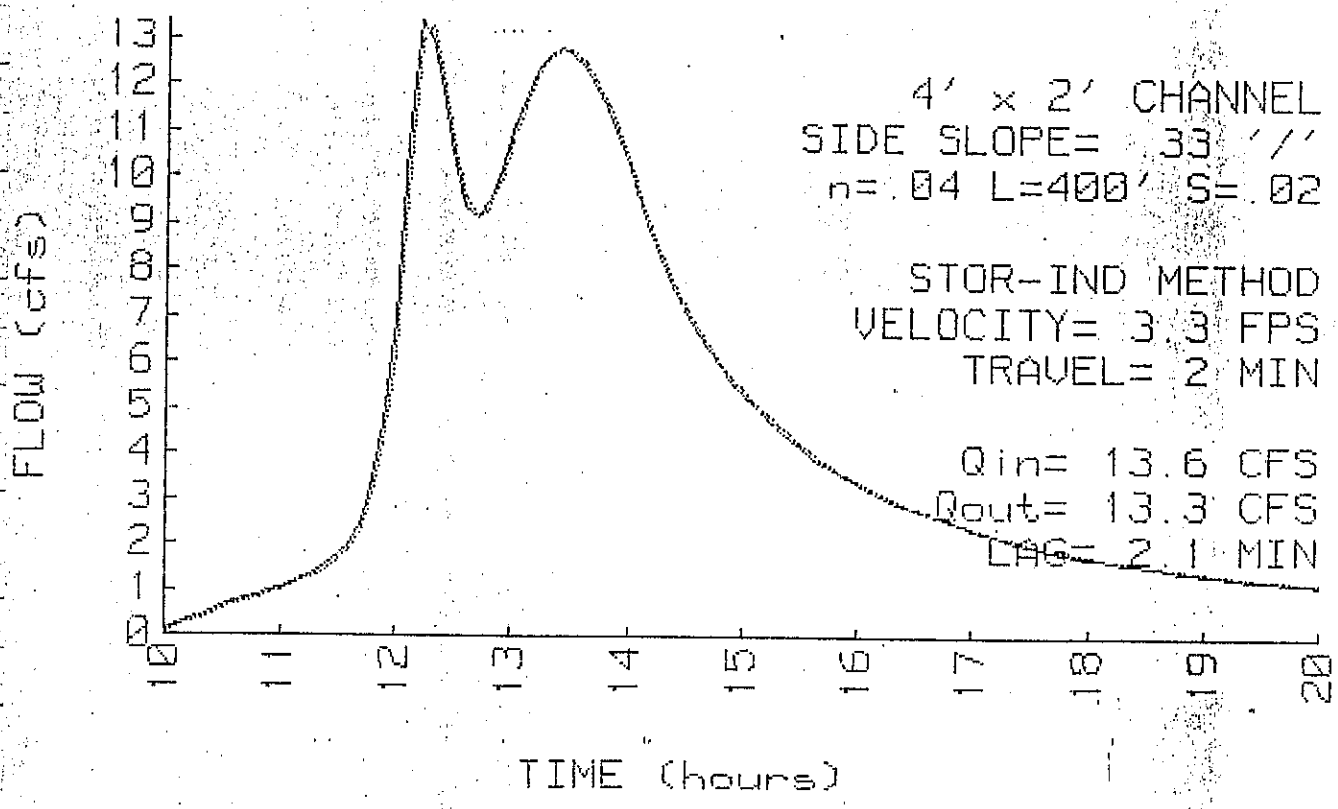
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 5

4' x 2' CHANNEL
SIDE SLOPE= .33 '//'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .66 FT
PEAK VELOCITY= 3.3 FPS
TRAVEL TIME = 2.0 MIN
Qin = 13.6 CFS @ 12.24 HRS
Qout= 13.3 CFS @ 12.27 HRS
ATTEN= 2 % LAG= 2.1 MIN
IN/OUT= 3.71 / 3.70 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



REACH 6

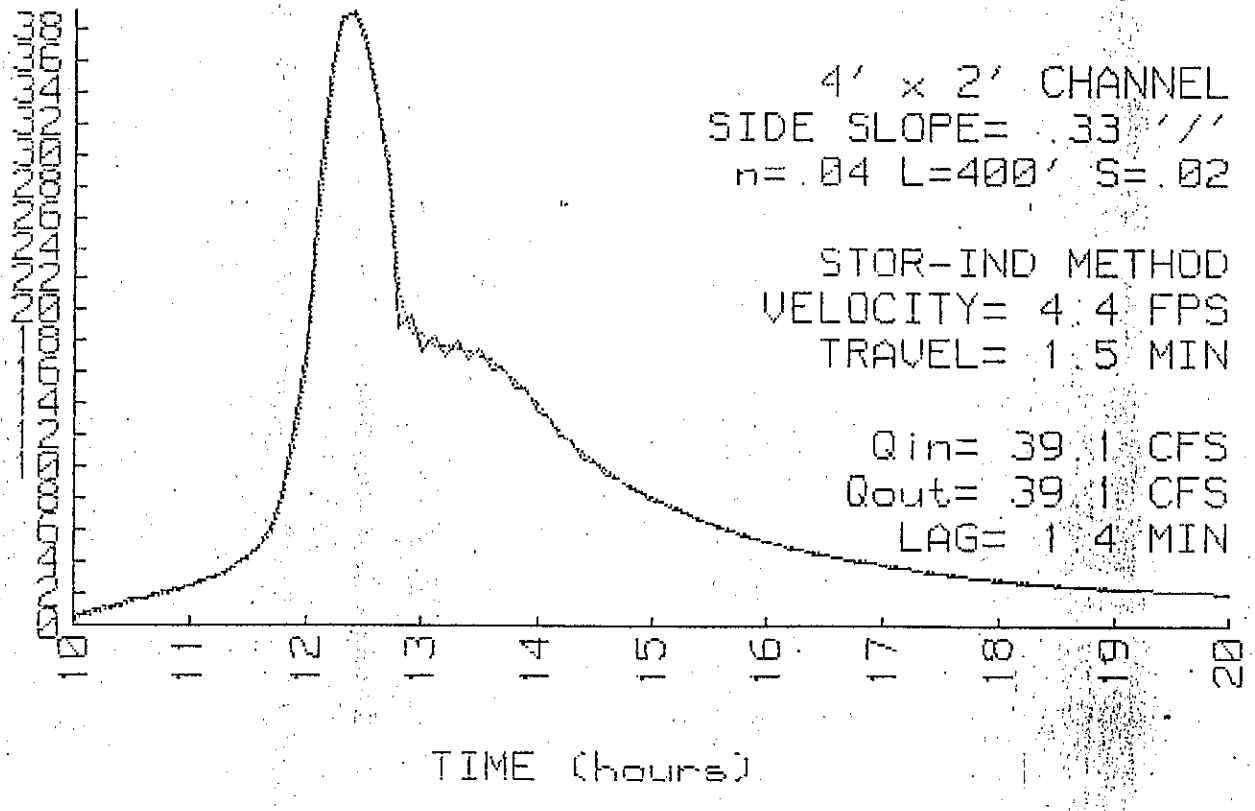
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.17 FT
PEAK VELOCITY= 4.4 FPS
TRAVEL TIME = 1.5 MIN
Qin = 39.1 CFS @ 12.35 HRS
Qout= 39.1 CFS @ 12.38 HRS
ATTEN= 0 % LAG= 1.4 MIN
IN/OUT= 6.93 / 6.92 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1 POND 1

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19363	31221	69439
52.0	26031	45394	114833

STOR-IND METHOD
PEAK ELEVATION= 43.5 FT
PEAK STORAGE = 5072 CF
Qin = 30.6 CFS @ 12.30 HRS
Qout= 27.0 CFS @ 12.42 HRS
ATTEN= 12 % LAG= 7.4 MIN
IN/OUT= 3.23 / 3.23 AF

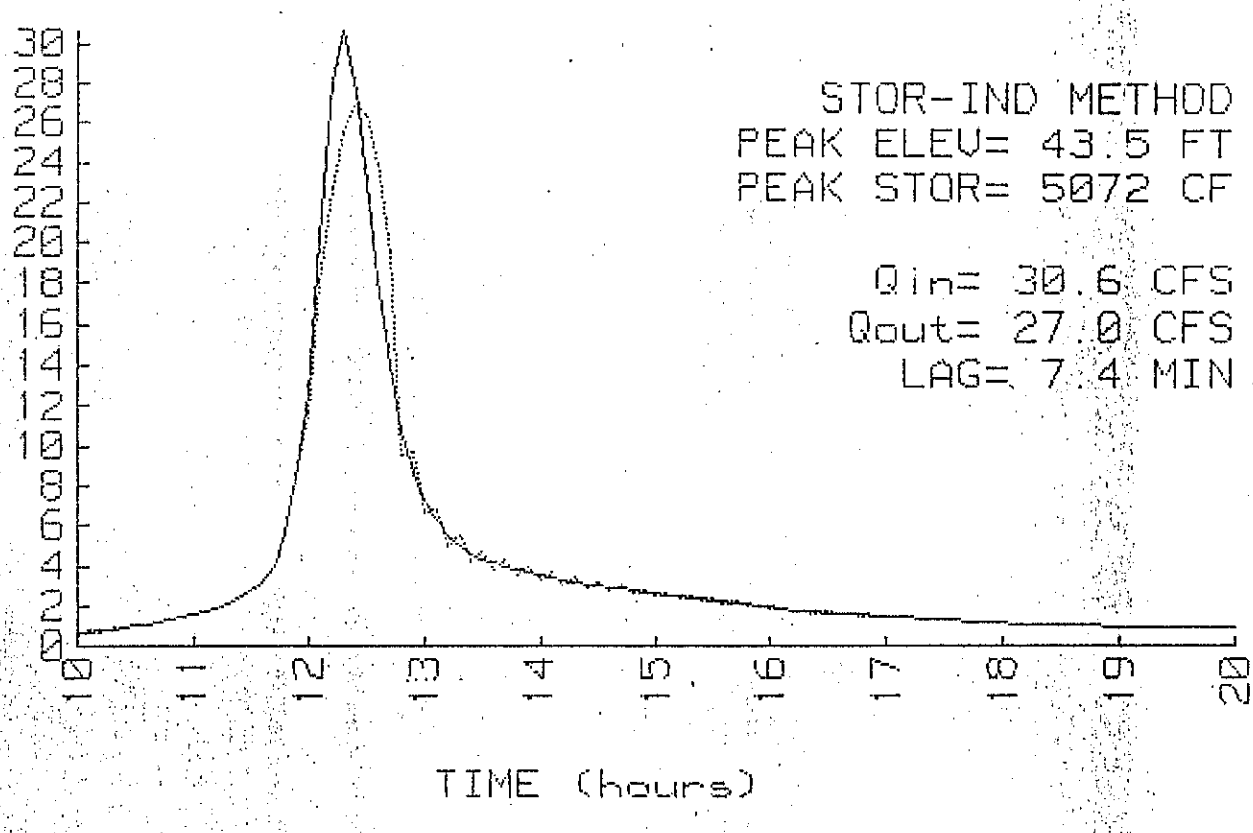
INVERT (FT) OUTLET DEVICES
38.6 24" CULVERT
n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.8	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		

POND 1 INFLOW & OUTFLOW

POND 1



STOR-IND METHOD
PEAK ELEV= 43.5 FT
PEAK STOR= 5072 CF

Qin= 30.6 CFS
Qout= 27.0 CFS
LAG= 7.4 MIN

POND 2 POND 2

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1228	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

STOR-IND METHOD
PEAK ELEVATION= 51.3 FT
PEAK STORAGE = 3052 CF
Qin = 11.3 CFS @ 13.31 HRS
Qout= 11.3 CFS @ 13.38 HRS
ATTEN= 0 % LAG= 3.9 MIN
IN/OUT= 2.58 / 2.57 AF

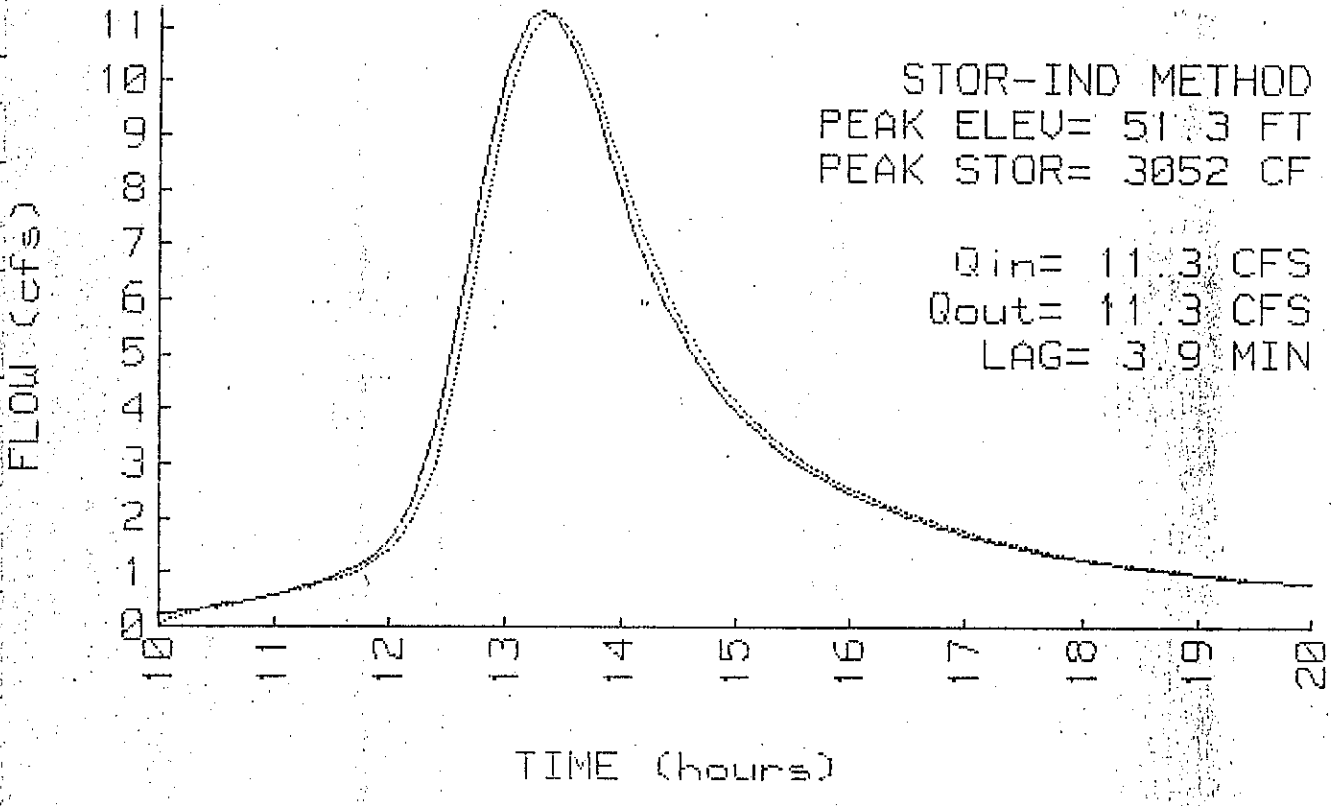
INVERT (FT) OUTLET DEVICES
49.5 24" CULVERT
n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.3	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						

POND 2 INFLOW & OUTFLOW

POND 2



POND 3 POND 3

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

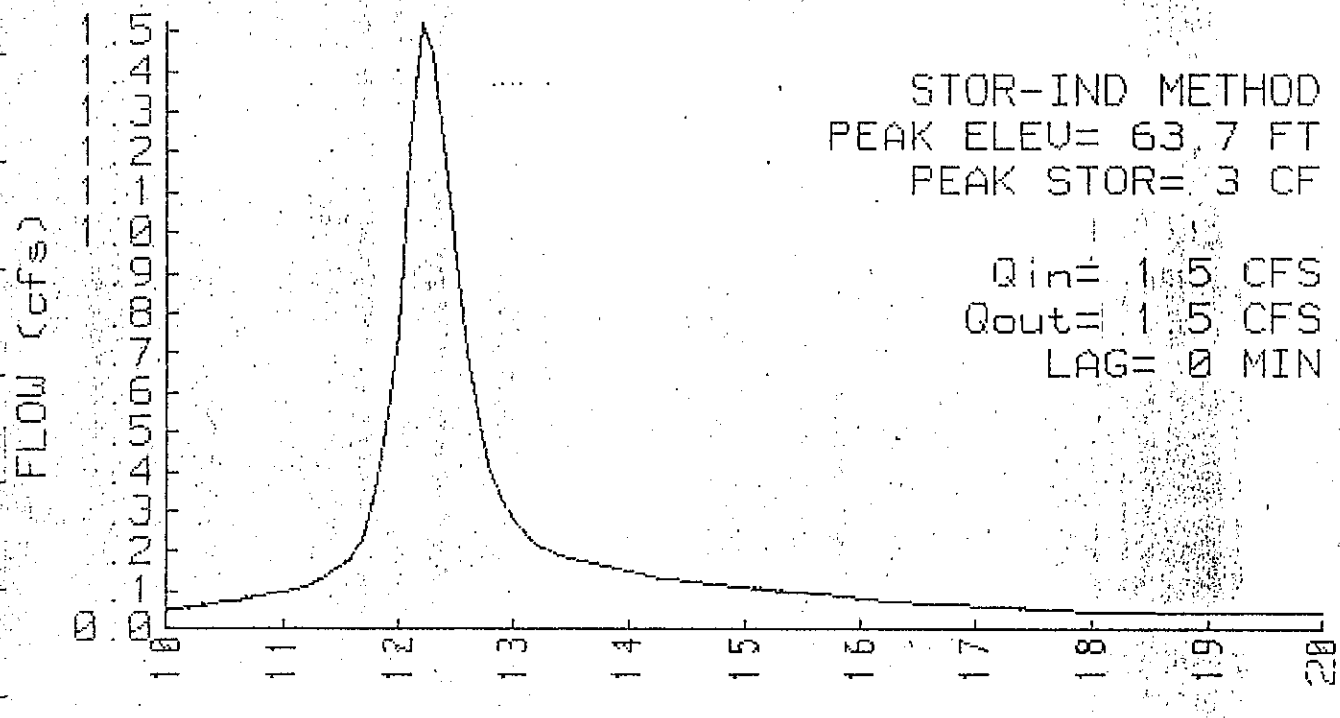
STOR-IND METHOD
PEAK ELEVATION= 63.7 FT
PEAK STORAGE = 3 CF
Qin = 1.5 CFS @ 12.23 HRS
Qout= 1.5 CFS @ 12.23 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .15 / .15 AF

INVERT (FT)	OUTLET DEVICES
63.0	12" CULVERT n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 OND 4

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

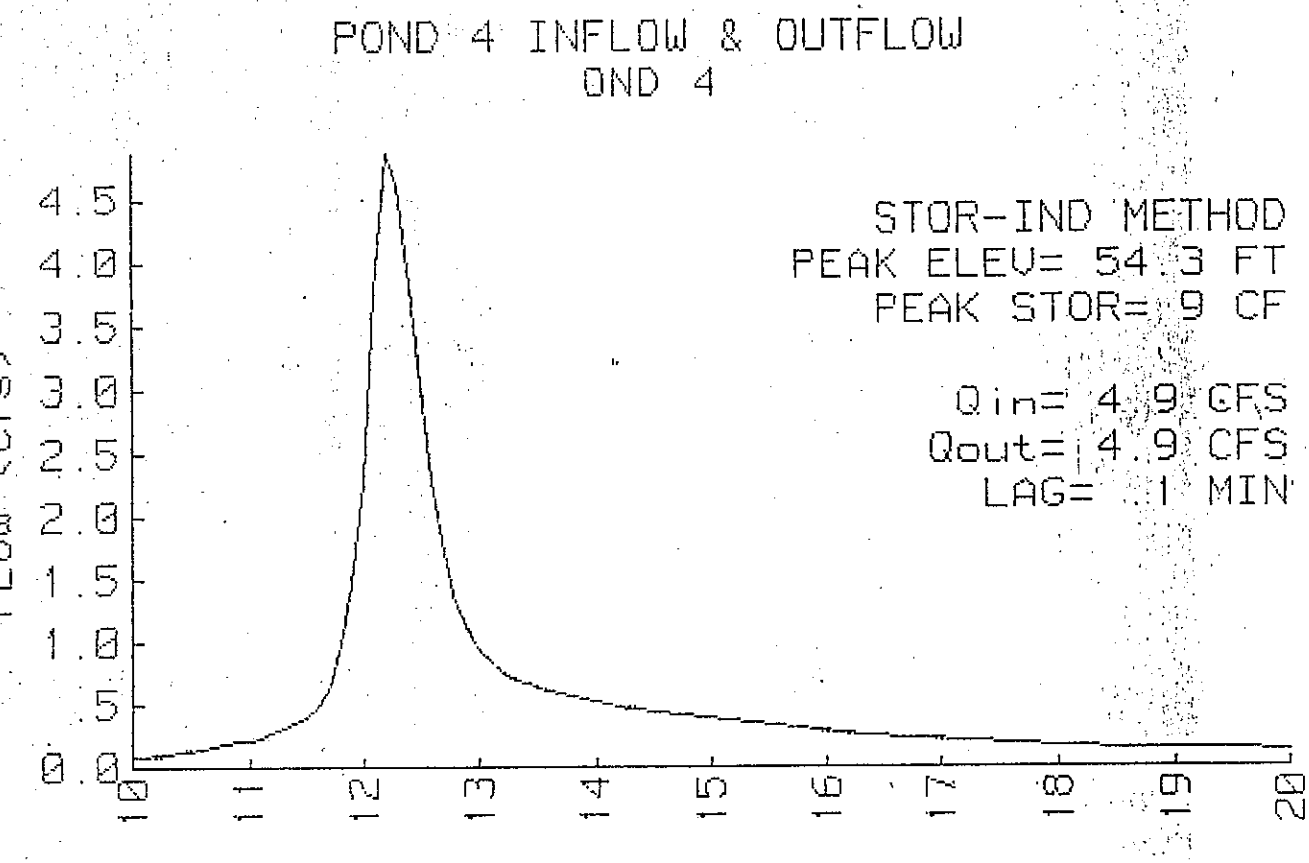
ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

STOR-IND METHOD
PEAK ELEVATION= 54.3 FT
PEAK STORAGE = 9 CF
Qin = 4.9 CFS @ 12.23 HRS
Qout= 4.9 CFS @ 12.23 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .48 / .48 AF

INVERT (FT) OUTLET DEVICES
52.0 12" CULVERT
n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									



POND 5 POND 5

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

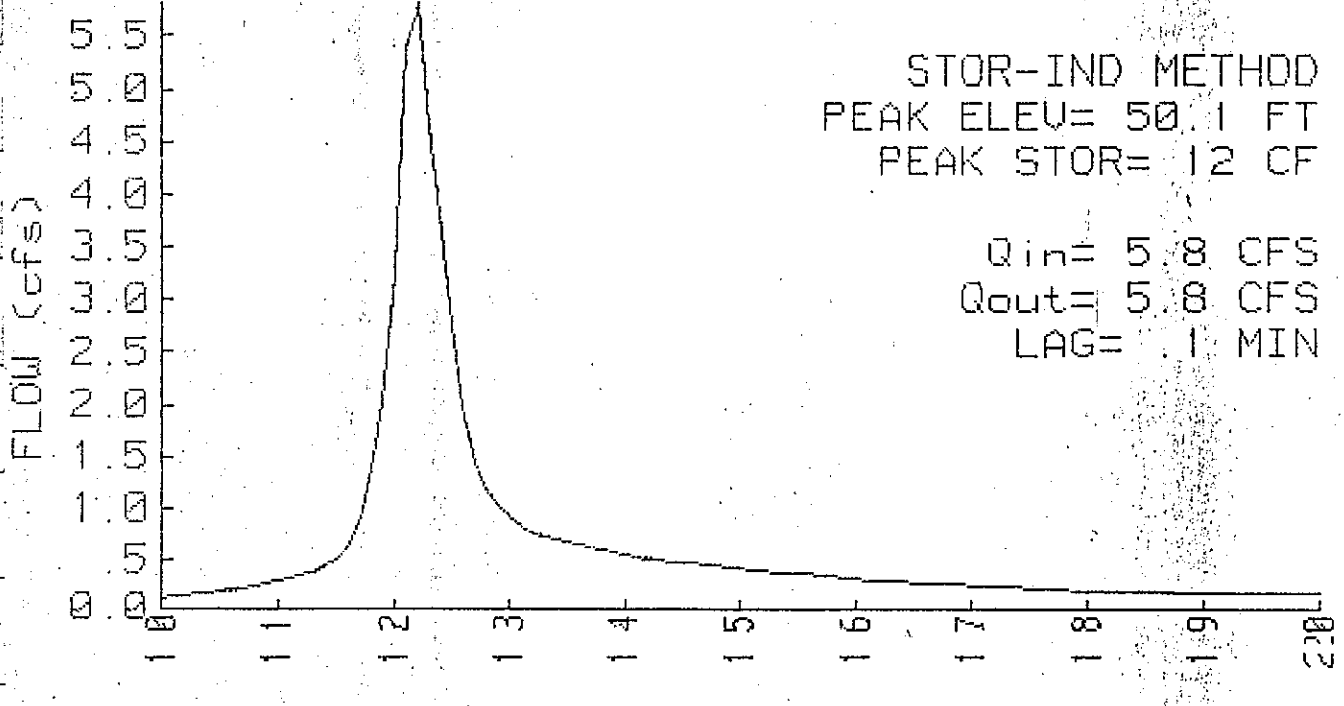
STOR-IND METHOD
PEAK ELEVATION= 50.1 FT
PEAK STORAGE = 12 CF
Qin = 5.8 CFS @ 12.18 HRS
Qout= 5.8 CFS @ 12.18 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .53 / .53 AF

INVERT (FT) OUTLET DEVICES
47.0 12" CULVERT
n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

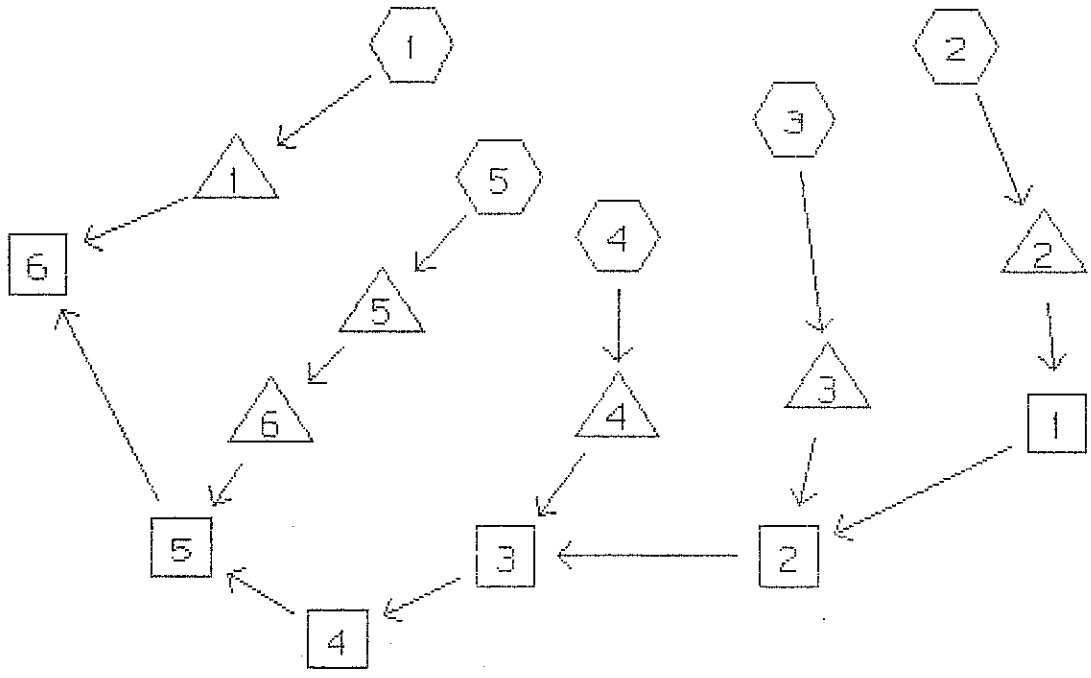
TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 5 INFLOW & OUTFLOW
POND 5



WATERSHED ROUTING



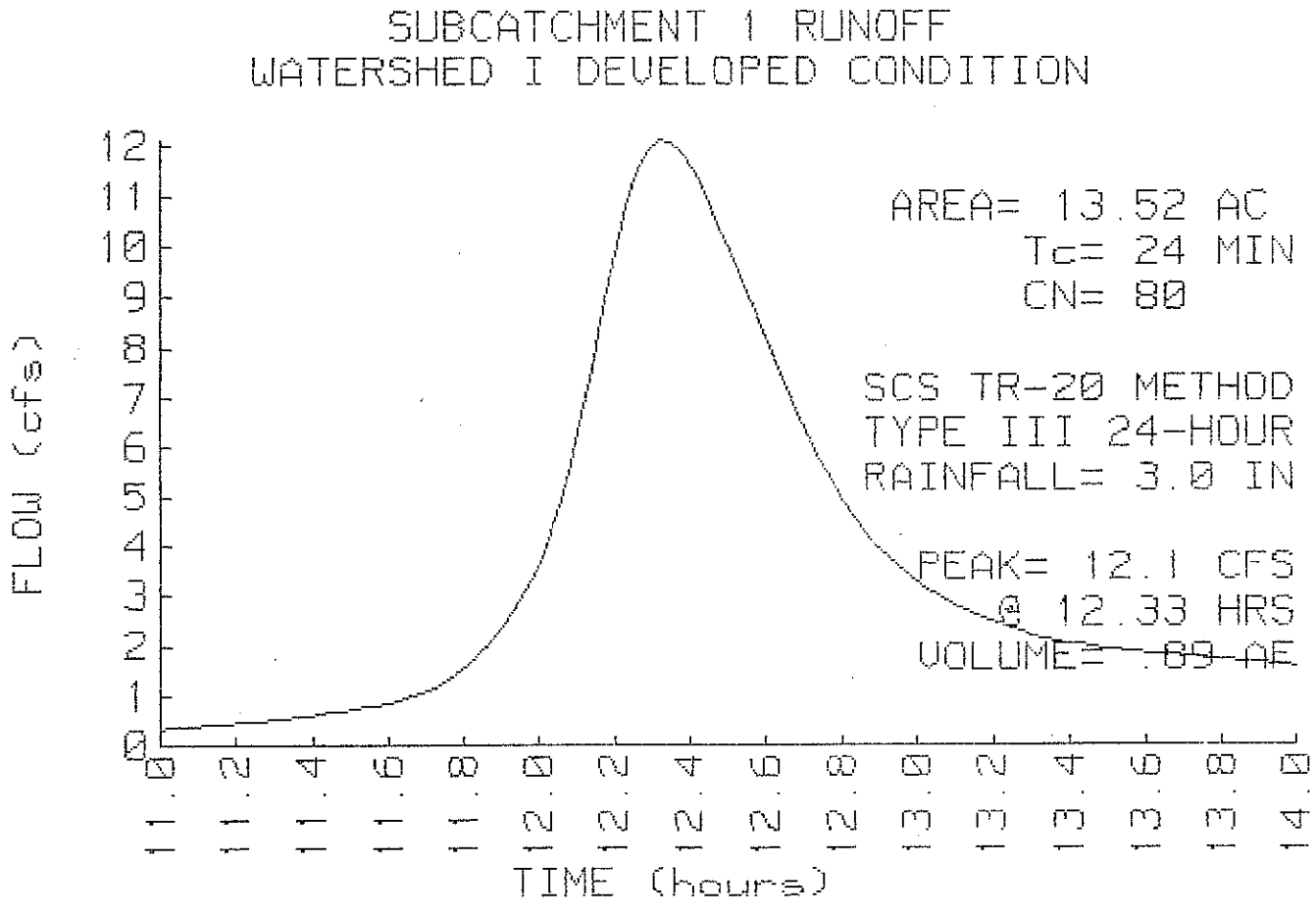
SUBCATCHMENT REACH POND LINK

SUBCATCHMENT 1 **WATERSHED I DEVELOPED CONDITION**

ACRES	CN	
13.52	80	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 12.1 CFS @ 12.33 HRS
VOLUME= .89 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL85-EL80	20.0
Grass: Dense n=.24 L=175' P2=3 in s=.0286 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL80-EL72	1.0
Short Grass Pasture Kv=7 L=115' s=.0696 '/' V=1.85 fps		
DIRECT ENTRY	EL72-EL40	3.0
	Total Length= 290 ft Total Tc=	24.0

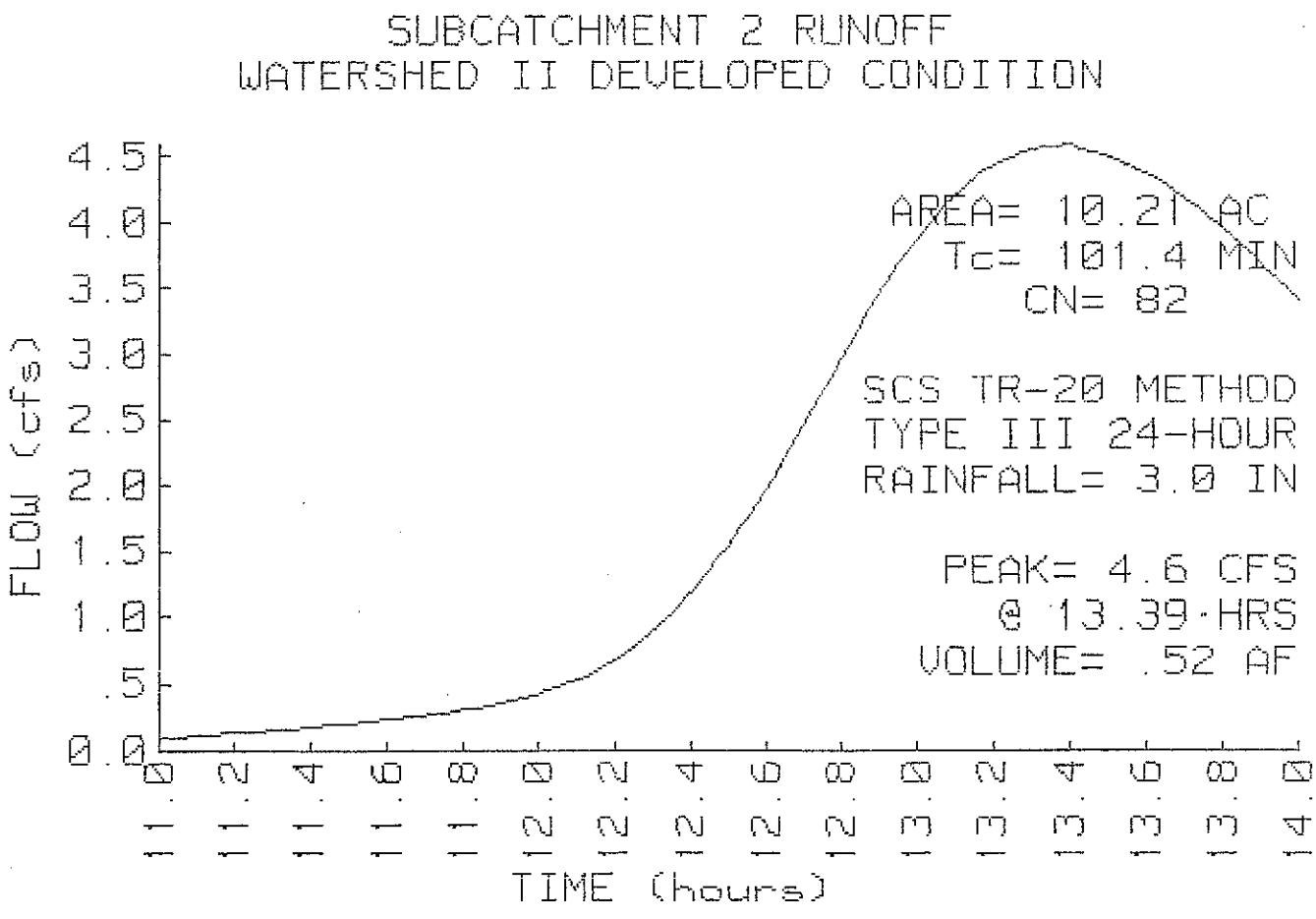


SUBCATCHMENT 2 WATERSHED II DEVELOPED CONDITION

ACRES	CN	
10.21	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 4.6 CFS @ 13.39 HRS
VOLUME= .52 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL80-EL78	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL78-EL70	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	EL70-EL49.5	3.0
	Total Length= 645 ft Total Tc=	101.4

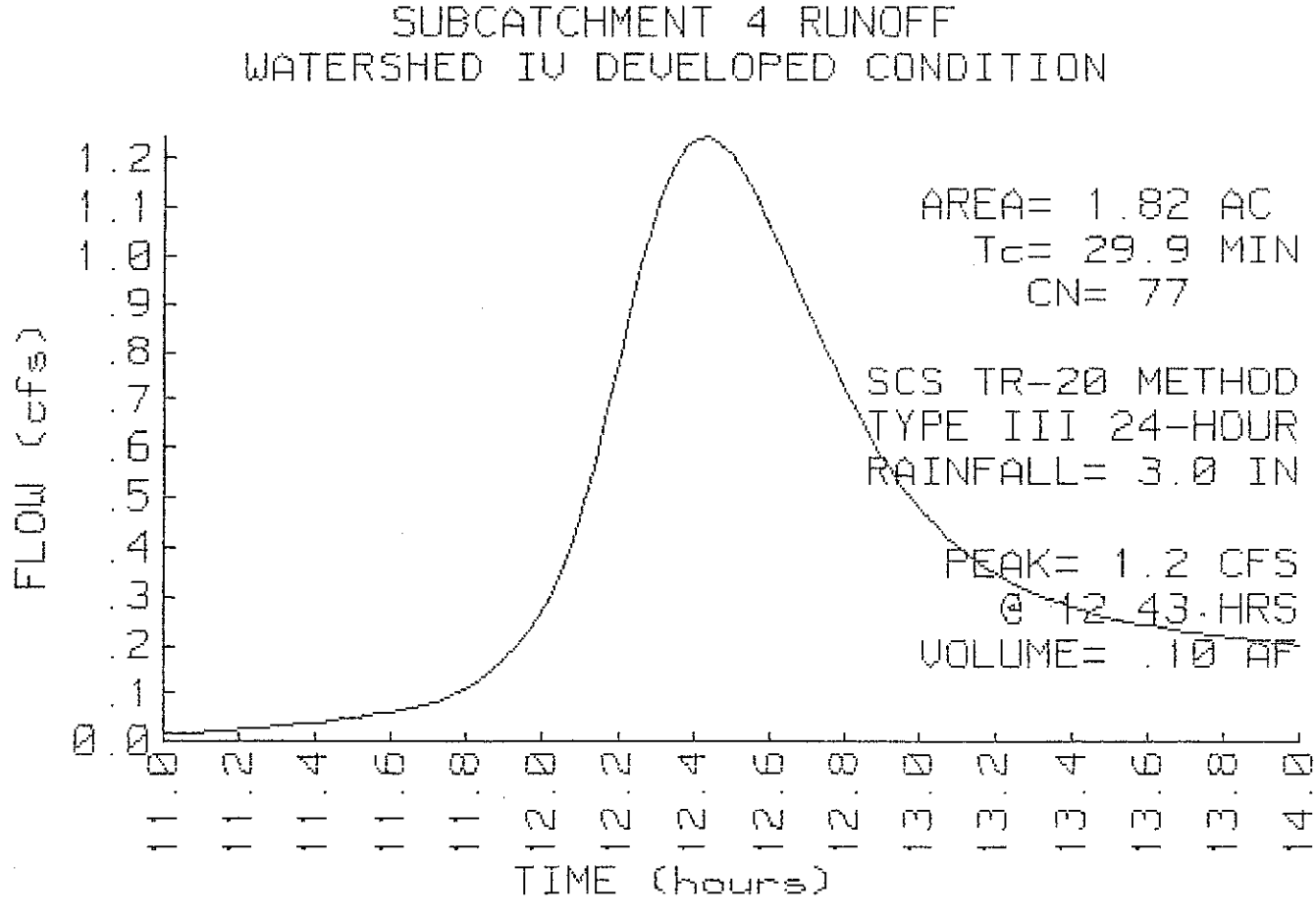


SUBCATCHMENT 4 **WATERSHED IV DEVELOPED CONDITION**

ACRES	CN	
1.82	77	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.2 CFS @ 12.43 HRS
VOLUME= .10 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL76.5-EL76.2**	3.2
Grass: Dense n=.24 L=15' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL76.6-EL74**	.5
Smooth surfaces n=.011 L=45' P2=3 in s=.05 '/'		
TR-55 SHEET FLOW	**EL74-EL72**	22.1
Grass: Dense n=.24 L=140' P2=3 in s=.0143 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL60**	1.1
Short Grass Pasture Kv=7 L=140' s=.0857 '/' V=2.05 fps		
DIRECT ENTRY	**EL60-EL56**	3.0
	Total Length= 340 ft Total Tc=	29.9

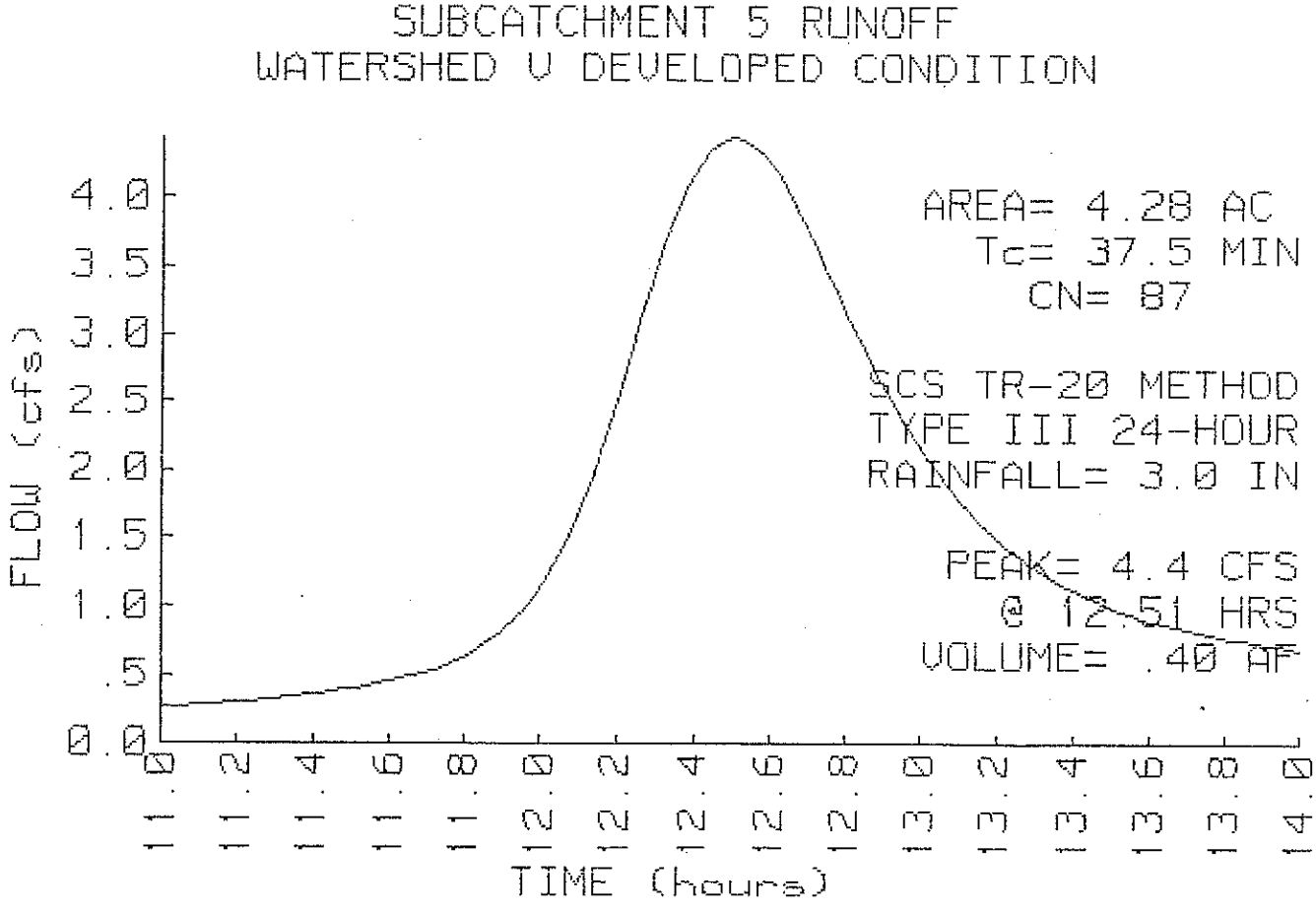


SUBCATCHMENT 5 **WATERSHED V DEVELOPED CONDITION**

ACRES	CN	
4.28	87	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 4.4 CFS @ 12.51 HRS
VOLUME= .40 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL74.2-EL73.5**	.5
Smooth surfaces n=.011 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL73.5-EL72**	35.7
Grass: Dense n=.24 L=190' P2=3 in s=.0079 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL68**	1.3
Short Grass Pasture Kv=7 L=105' s=.0381 '/' V=1.37 fps		
	Total Length= 325 ft	Total Tc= 37.5



REACH 1

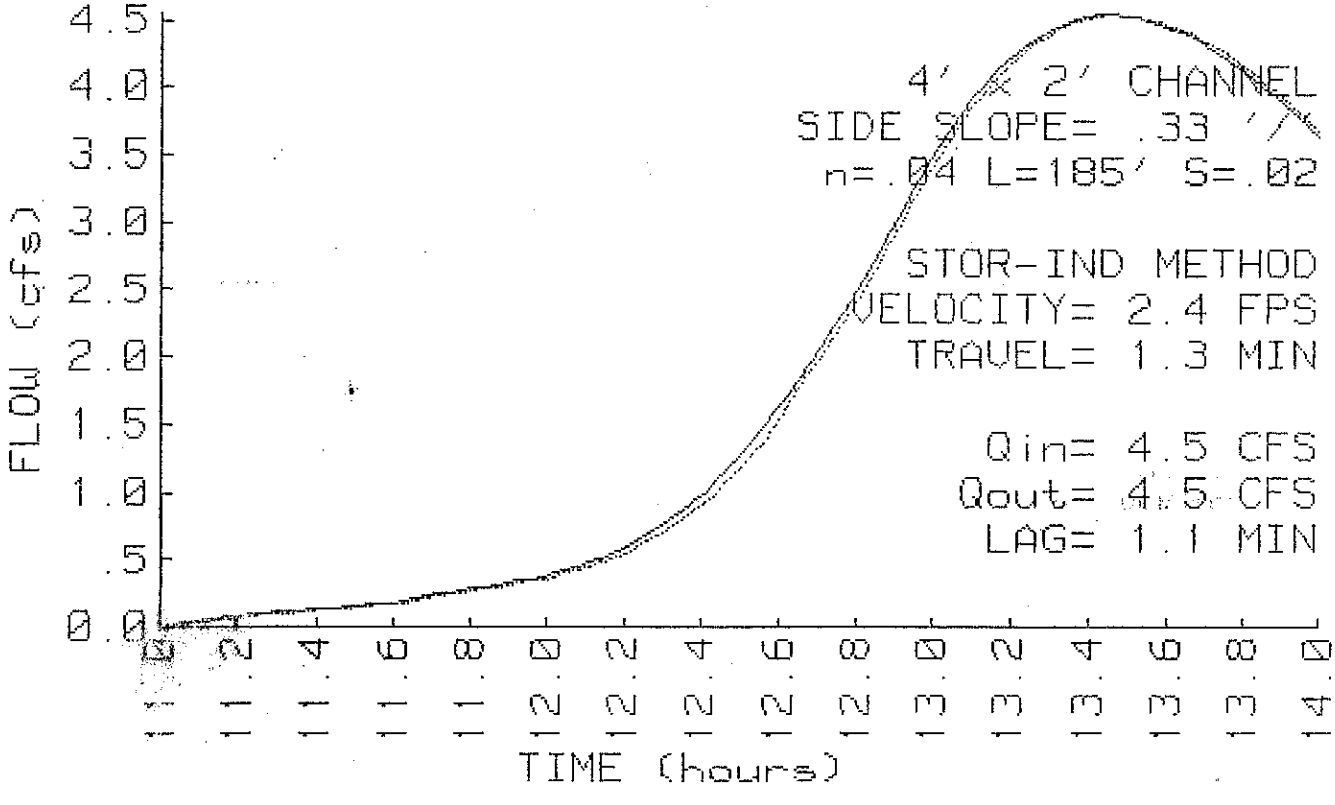
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .37 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 1.3 MIN
Qin = 4.5 CFS @ 13.45 HRS
Qout= 4.5 CFS @ 13.47 HRS
ATTEN= 0 % LAG= 1.1 MIN
IN/OUT= .49 / .48 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

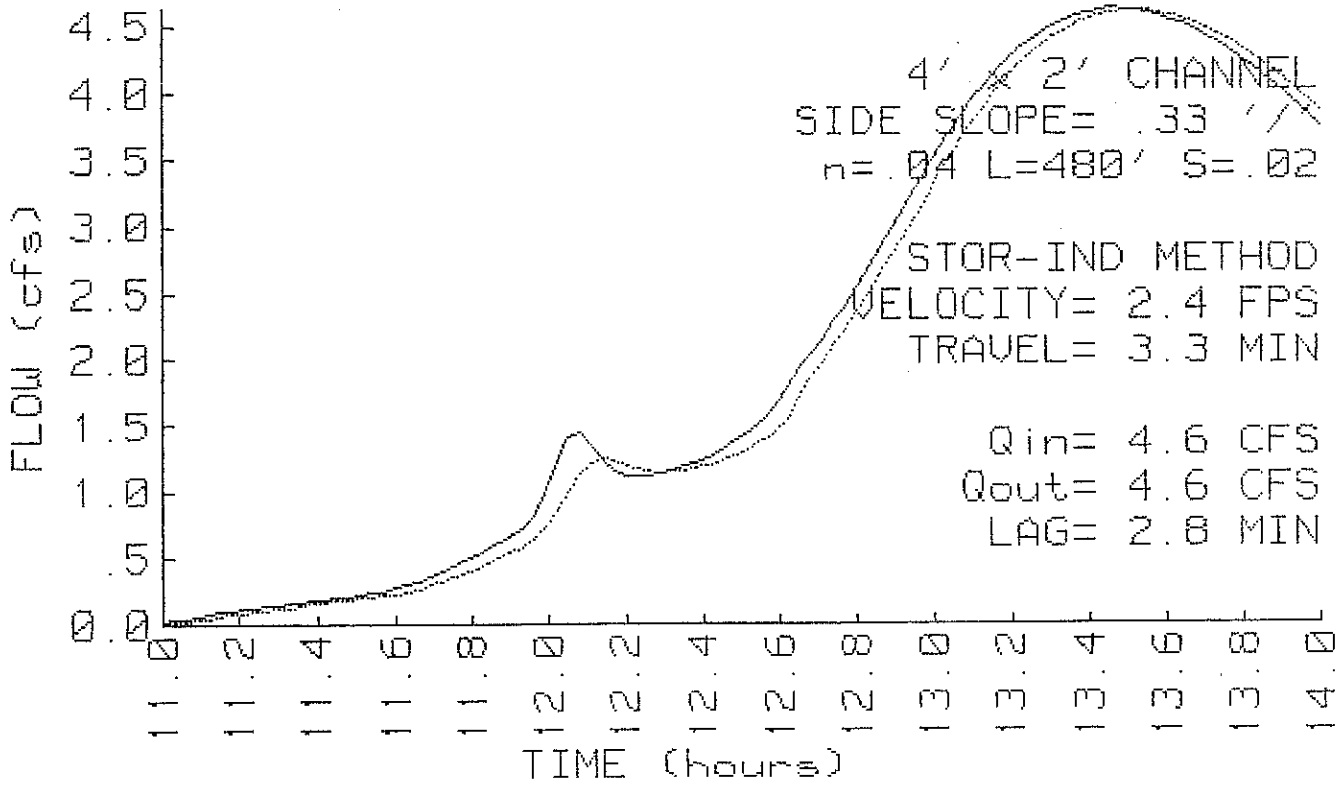
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 2

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .37 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 3.3 MIN
Qin = 4.6 CFS @ 13.47 HRS
Qout= 4.6 CFS @ 13.51 HRS
ATTEN= 0 % LAG= 2.8 MIN
IN/OUT= .53 / .51 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

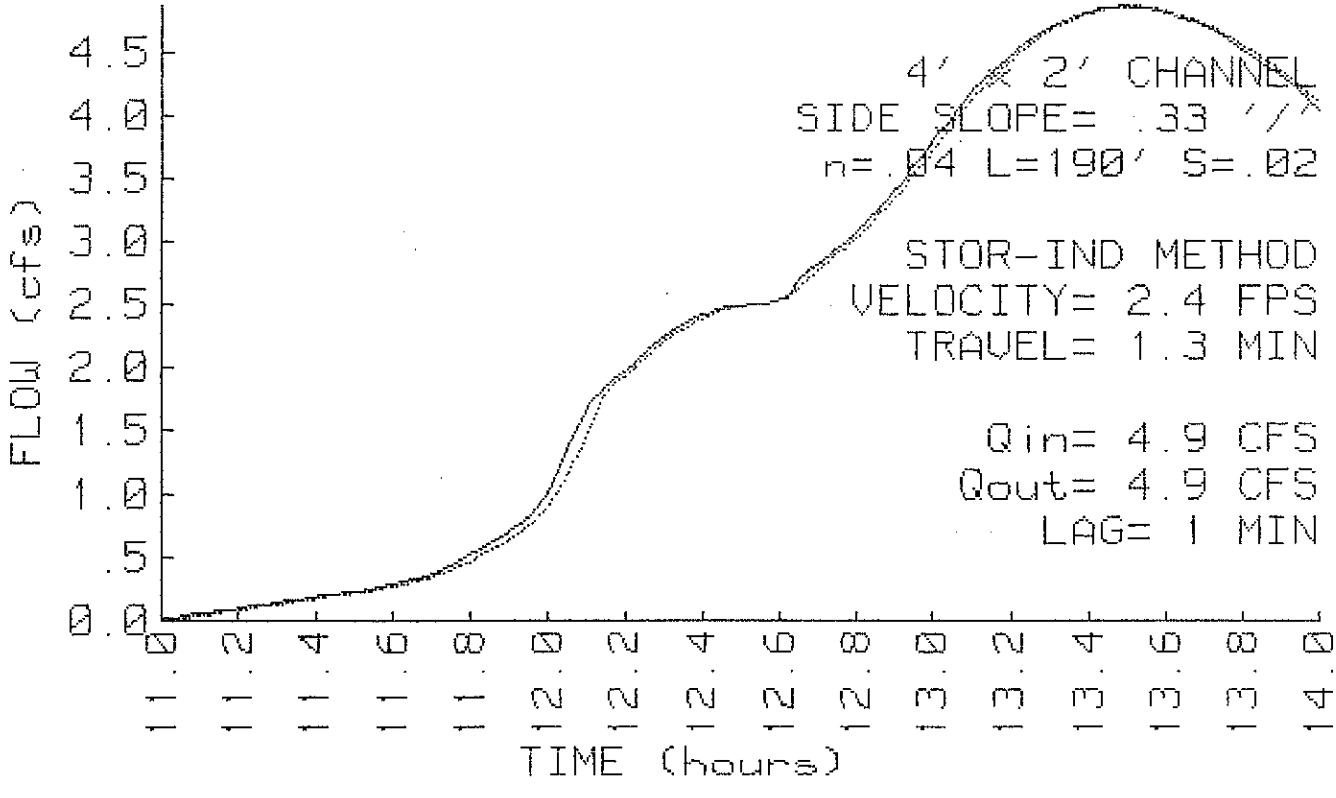
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .39 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 1.3 MIN
Qin = 4.9 CFS @ 13.49 HRS
Qout= 4.9 CFS @ 13.51 HRS
ATTEN= 0 % LAG= 1.0 MIN
IN/OUT= .61 / .61 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

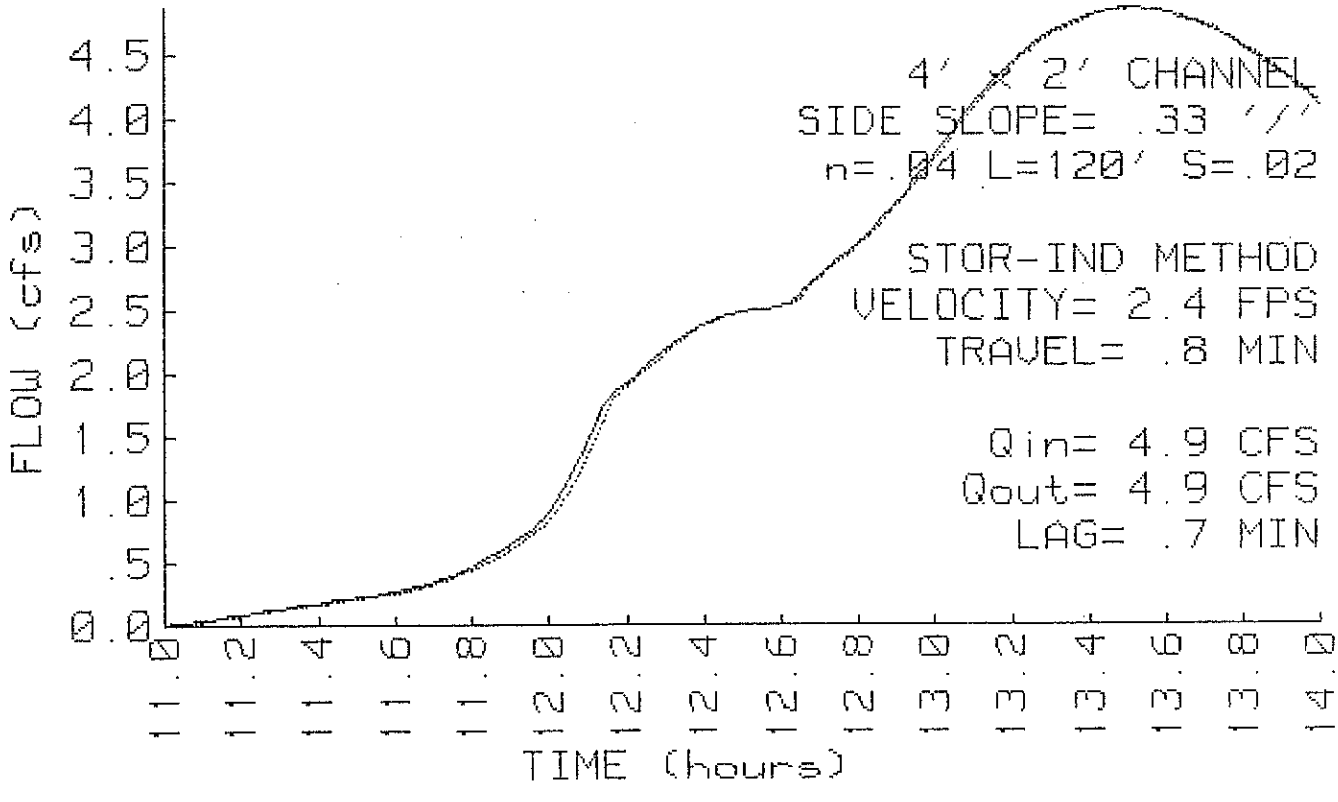
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 120 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .39 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = .8 MIN
Qin = 4.9 CFS @ 13.51 HRS
Qout= 4.9 CFS @ 13.52 HRS
ATTEN= 0 % LAG= .7 MIN
IN/OUT= .61 / .60 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

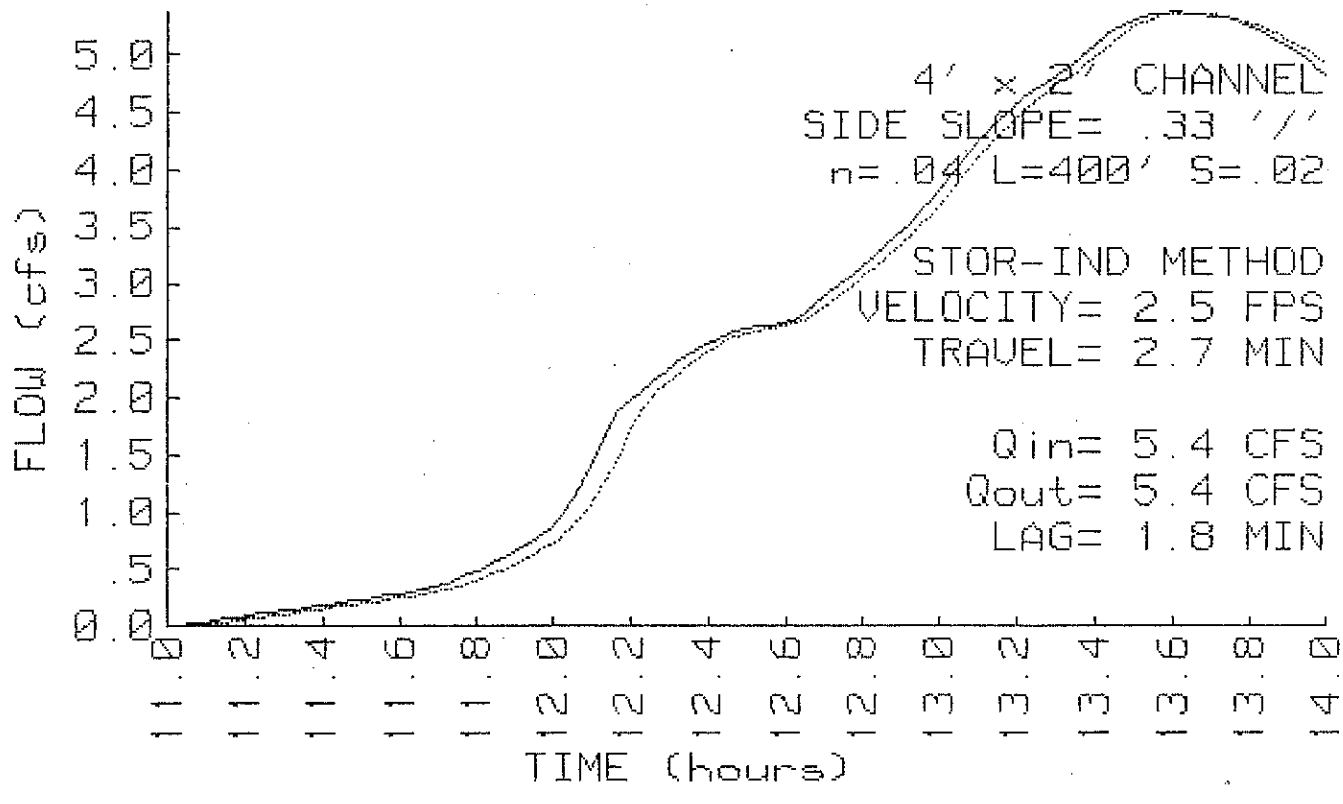
REACH 5

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .41 FT
PEAK VELOCITY= 2.5 FPS
TRAVEL TIME = 2.7 MIN
Qin = 5.4 CFS @ 13.61 HRS
Qout= 5.4 CFS @ 13.64 HRS
ATTEN= 0 % LAG= 1.8 MIN
IN/OUT= .65 / .63 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



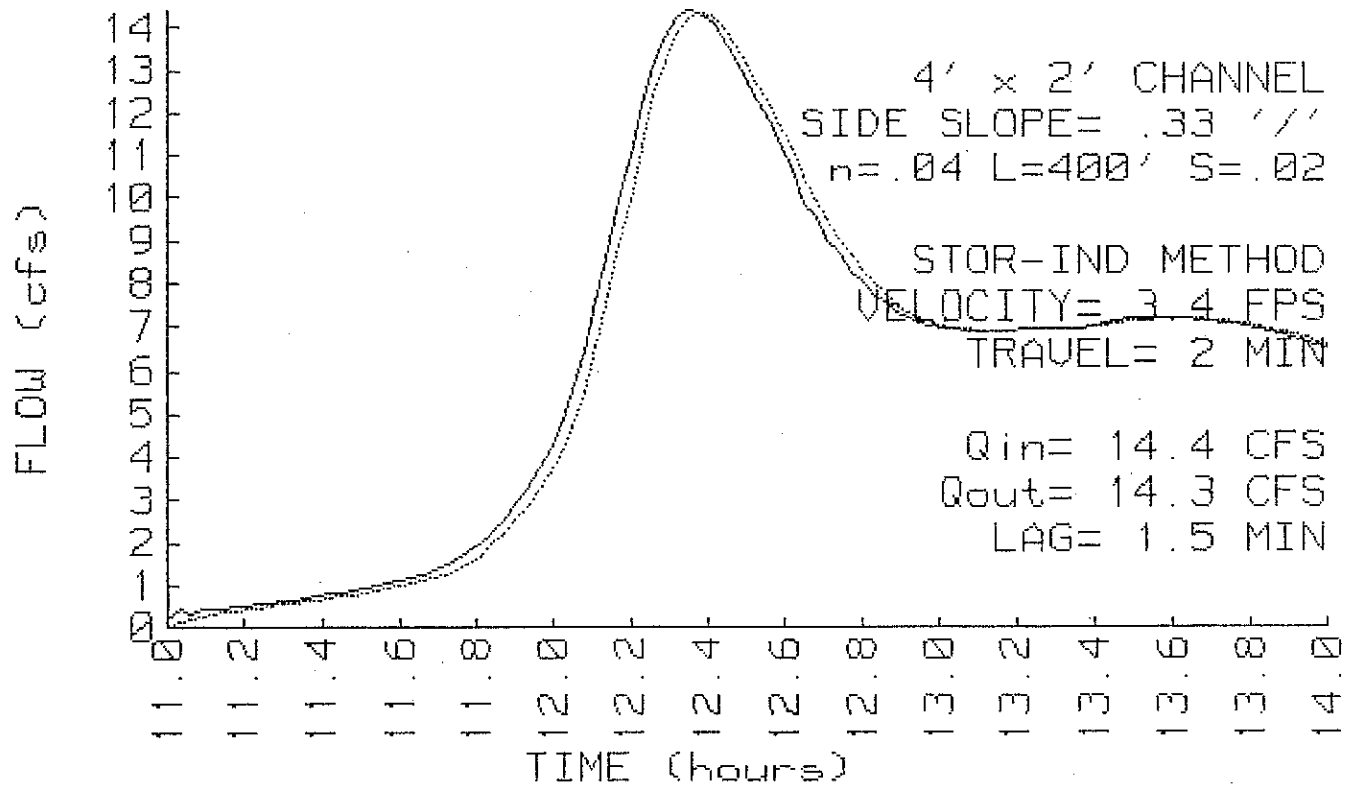
REACH 6 **REACH 3**

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .69 FT
PEAK VELOCITY= 3.4 FPS
TRAVEL TIME = 2.0 MIN
Qin = 14.4 CFS @ 12.36 HRS
Qout= 14.3 CFS @ 12.38 HRS
ATTEN= 0 % LAG= 1.5 MIN
IN/OUT= 1.52 / 1.50 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1 **POND 1**

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19363	31221	69439
52.0	26031	45394	114833

STOR-IND METHOD
PEAK ELEVATION= 40.4 FT
PEAK STORAGE = 285 CF
Qin = 12.1 CFS @ 12.33 HRS
Qout= 12.1 CFS @ 12.35 HRS
ATTEN= 0 % LAG= 1.0 MIN
IN/OUT= .89 / .89 AF

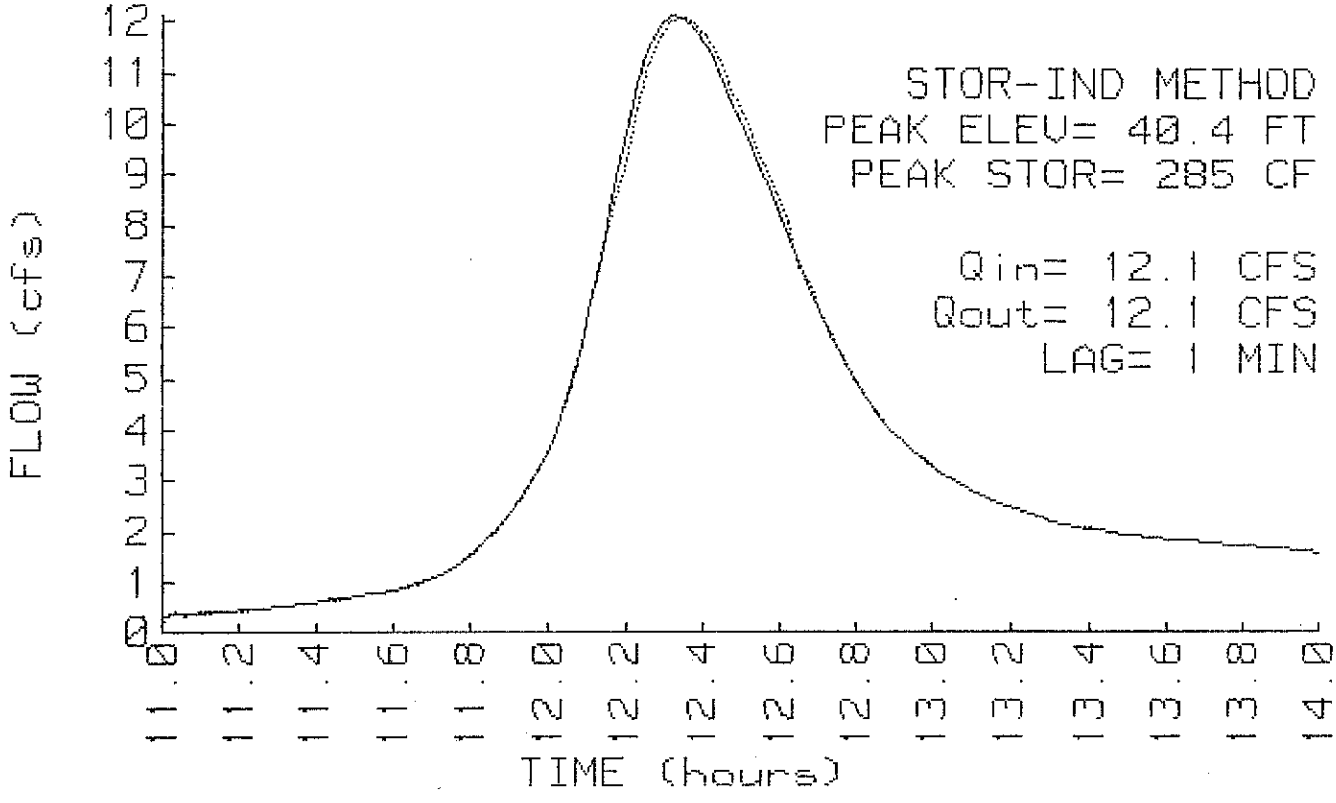
INVERT (FT) OUTLET DEVICES

38.6 **24" CULVERT**
n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.8	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		

POND 1 INFLOW & OUTFLOW
POND 1



POND 2 **POND 2**

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

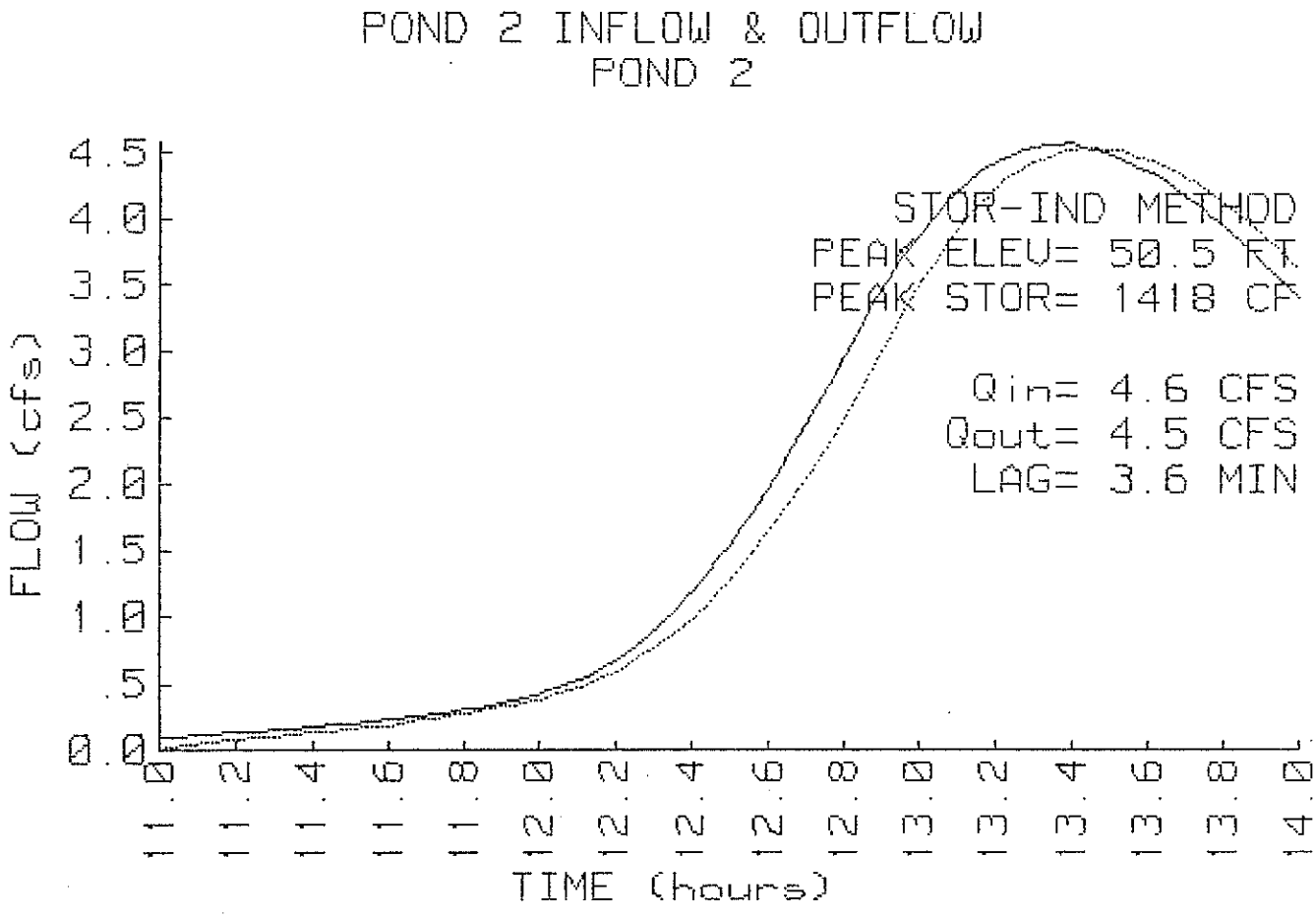
ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1228	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

STOR-IND METHOD
PEAK ELEVATION= 50.5 FT
PEAK STORAGE = 1418 CF
Qin = 4.6 CFS @ 13.39 HRS
Qout= 4.5 CFS @ 13.45 HRS
ATTEN= 1 % LAG= 3.6 MIN
IN/OUT= .52 / .49 AF

INVERT (FT)	OUTLET DEVICES
49.5	**24" CULVERT**
	n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.3	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						


POND 2 INFLOW & OUTFLOW
POND 2
STOR-IND METHOD
PEAK ELEV= 50.5 FT
PEAK STOR= 1418 CF
Qin= 4.6 CFS
Qout= 4.5 CFS
LAG= 3.6 MIN
FLOW (cfs)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0.0
11.0
11.2
11.4
11.6
11.8
12.0
12.2
12.4
12.6
12.8
13.0
13.2
13.4
13.6
13.8
14.0
TIME (hours)

POND 3 **POND 3**

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

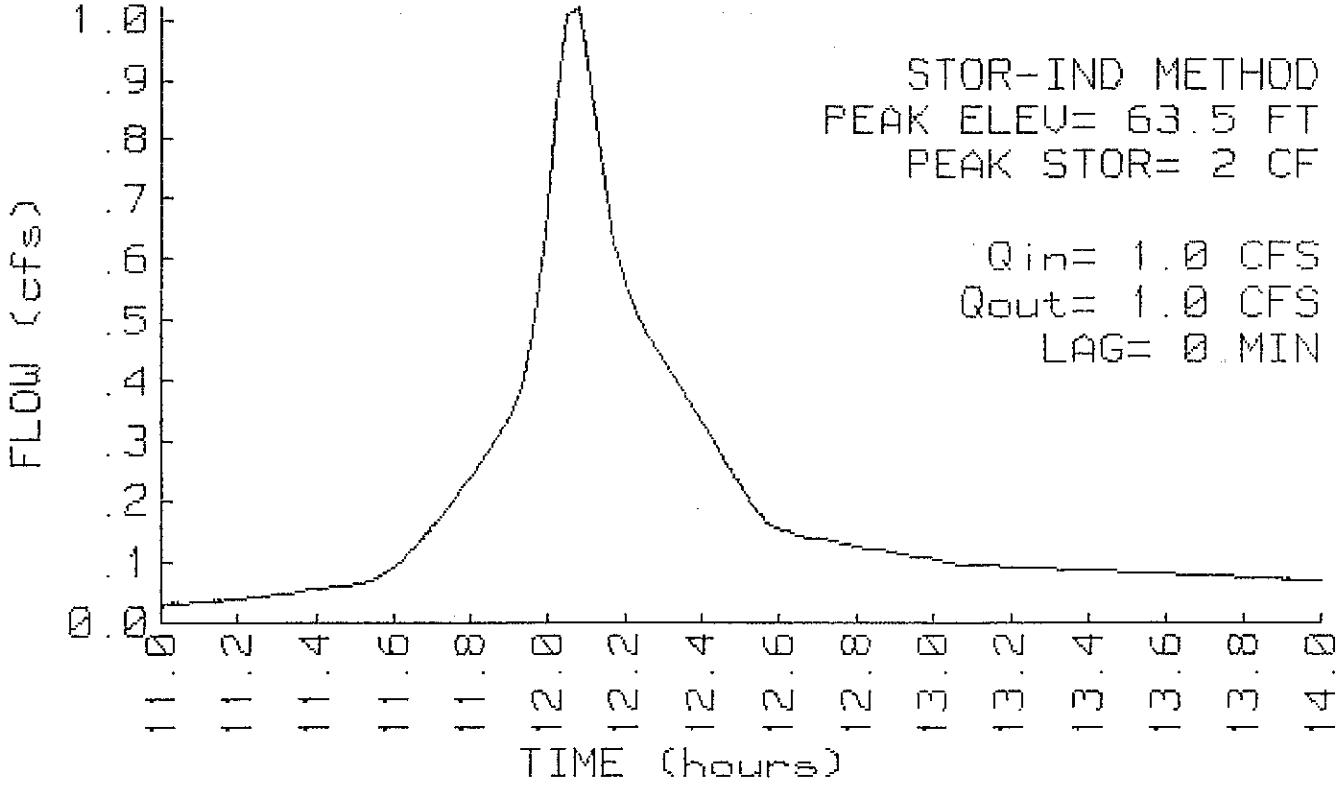
STOR-IND METHOD
PEAK ELEVATION= 63.5 FT
PEAK STORAGE = 2 CF
Qin = 1.0 CFS @ 12.07 HRS
Qout= 1.0 CFS @ 12.07 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .05 / .05 AF

INVERT (FT)	OUTLET DEVICES
63.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 **OND 4**

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

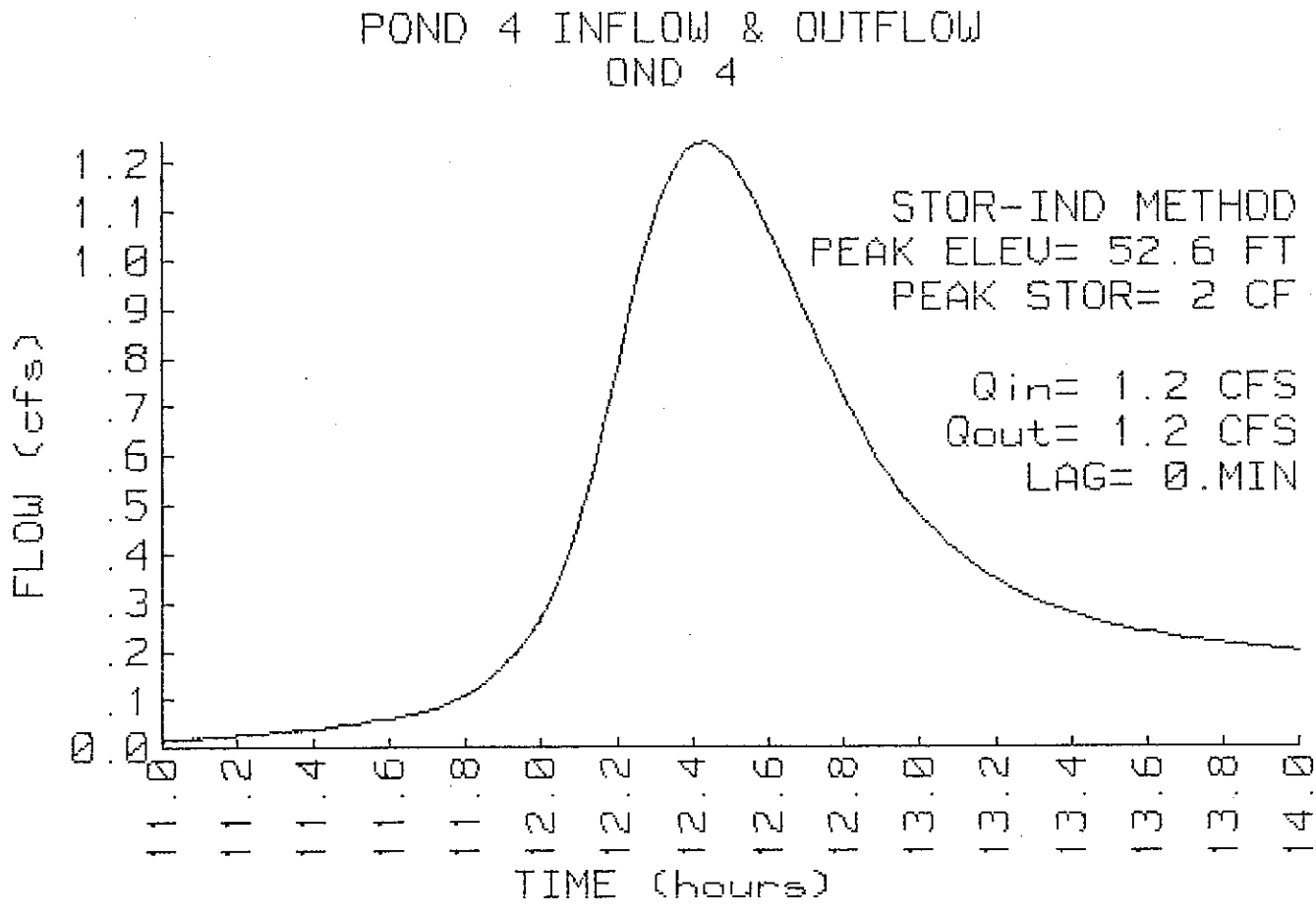
ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

STOR-IND METHOD
PEAK ELEVATION= 52.6 FT
PEAK STORAGE = 2 CF
Qin = 1.2 CFS @ 12.43 HRS
Qout= 1.2 CFS @ 12.43 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .10 / .10 AF

INVERT (FT)	OUTLET DEVICES
52.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									



POND 5 **POND 5**

STARTING ELEV= 54.0 FT
FLOOD ELEV= 60.0 FT

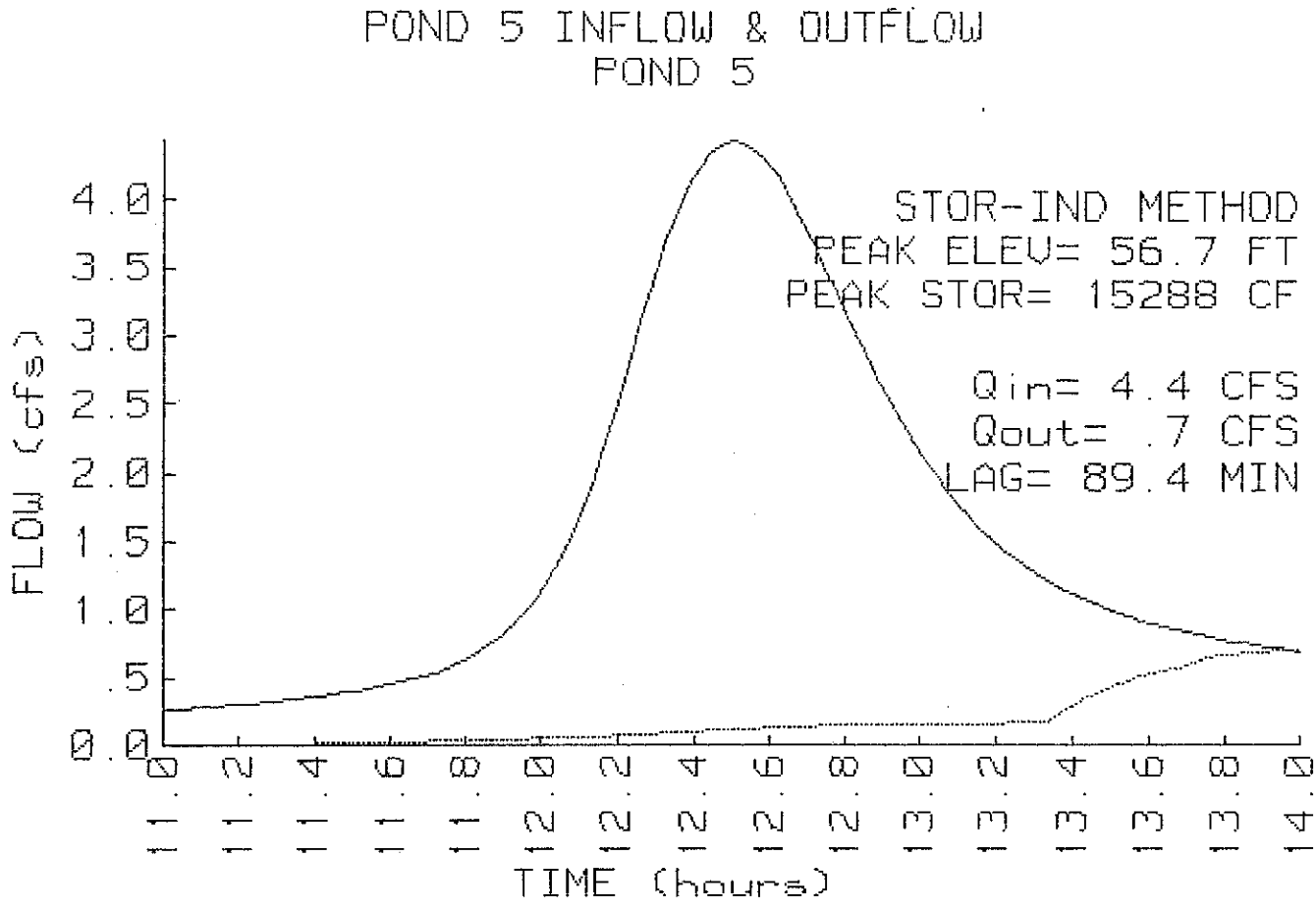
ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
54.0	3962	0	0
56.0	6110	10072	10072
58.0	8482	14592	24664
60.0	10993	19475	44139

STOR-IND METHOD
PEAK ELEVATION= 56.7 FT
PEAK STORAGE = 15288 CF
Qin = 4.4 CFS @ 12.51 HRS
Qout= .7 CFS @ 14.00 HRS
ATTEN= 84 % LAG= 89.4 MIN
IN/OUT= .40 / .05 AF

INVERT (FT)	OUTLET DEVICES
54.0	**2" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
54.0	0.0	0.0	0.0	0.0	.1	.1	.1	.1	.1	.1
55.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
56.0	.1	.1	.2	.2	.2	.2	.2	.6	1.3	2.3
57.0	3.5	4.8	6.3	7.9	9.6	11.5	13.4	15.4	17.6	19.8
58.0	22.0	24.4	26.8	29.3	31.8	34.4	37.1	39.7	42.5	45.2
59.0	48.0	50.9	53.7	56.6	59.5	62.4	65.3	68.2	71.1	74.0
60.0	76.9									


POND 5 INFLOW & OUTFLOW
POND 5
STOR-IND METHOD
PEAK ELEV= 56.7 FT
PEAK STOR= 15288 CF
Qin= 4.4 CFS
Qout= .7 CFS
LAG= 89.4 MIN
FLOW (cfs)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0.0
11.0 11.2 11.4 11.6 11.8 12.0 12.2 12.4 12.6 12.8 13.0 13.2 13.4 13.6 13.8 14.0
TIME (hours)

POND 6 **POND 6**

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

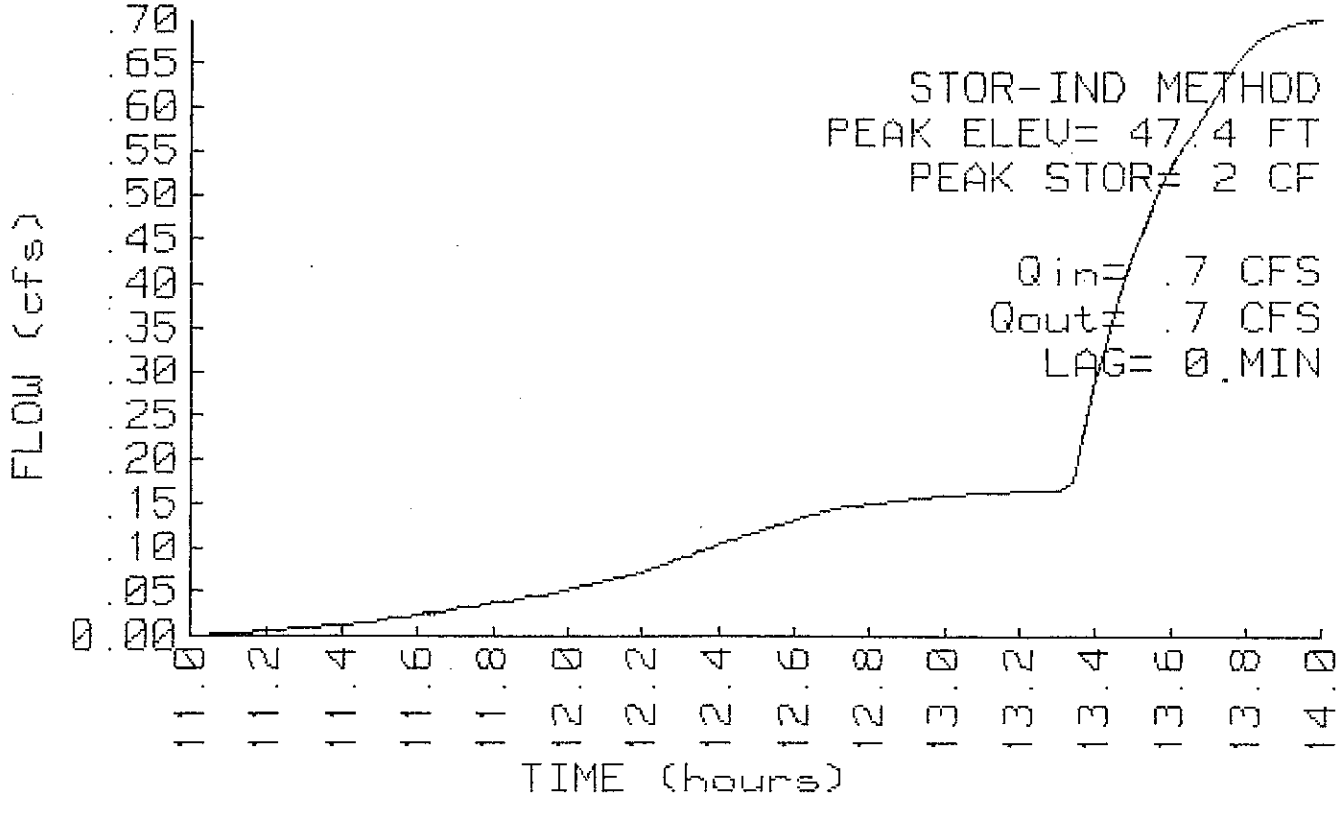
STOR-IND METHOD
PEAK ELEVATION= 47.4 FT
PEAK STORAGE = 2 CF
Qin = .7 CFS @ 14.00 HRS
Qout= .7 CFS @ 14.00 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .05 / .05 AF

INVERT (FT) OUTLET DEVICES
47.0 **12" CULVERT**
n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 6 INFLOW & OUTFLOW
POND 6



*10 YR. POST *

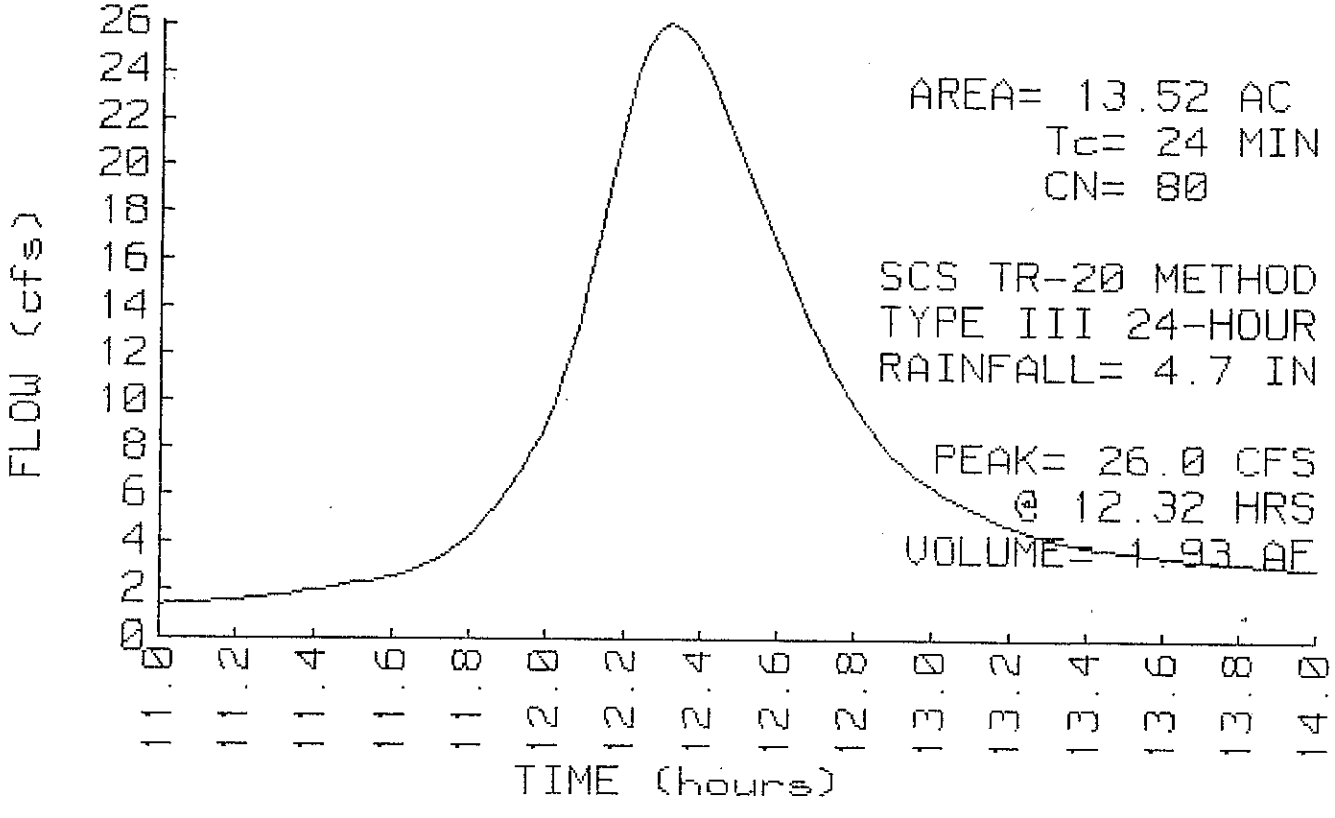
SUBCATCHMENT 1 **WATERSHED I DEVELOPED CONDITION**

ACRES	CN	
13.52	80	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 26.0 CFS @ 12.32 HRS
VOLUME= 1.93 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL85-EL80**	20.0
Grass: Dense n=.24 L=175' P2=3 in s=.0286 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL80-EL72**	1.0
Short Grass Pasture Kv=7 L=115' s=.0696 '/' V=1.85 fps		
DIRECT ENTRY	**EL72-EL40**	3.0
	Total Length= 290 ft Total Tc=	24.0

SUBCATCHMENT 1 RUNOFF
WATERSHED I DEVELOPED CONDITION

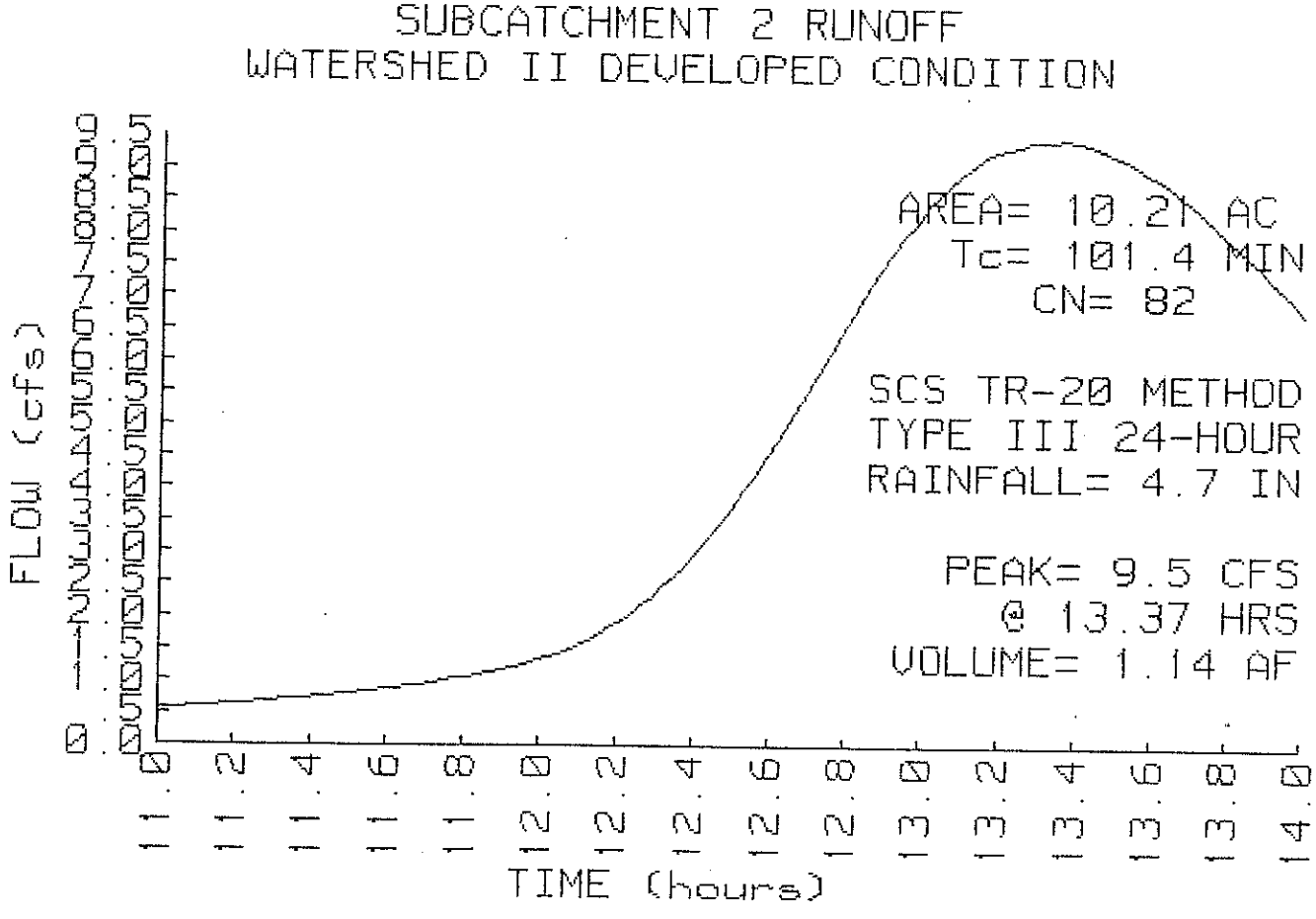


SUBCATCHMENT 2 **WATERSHED II DEVELOPED CONDITION**

ACRES	CN	
10.21	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 9.5 CFS @ 13.37 HRS
VOLUME= 1.14 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL80-EL78**	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL78-EL70**	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	**EL70-EL49.5**	3.0
	Total Length= 645 ft Total Tc=	101.4



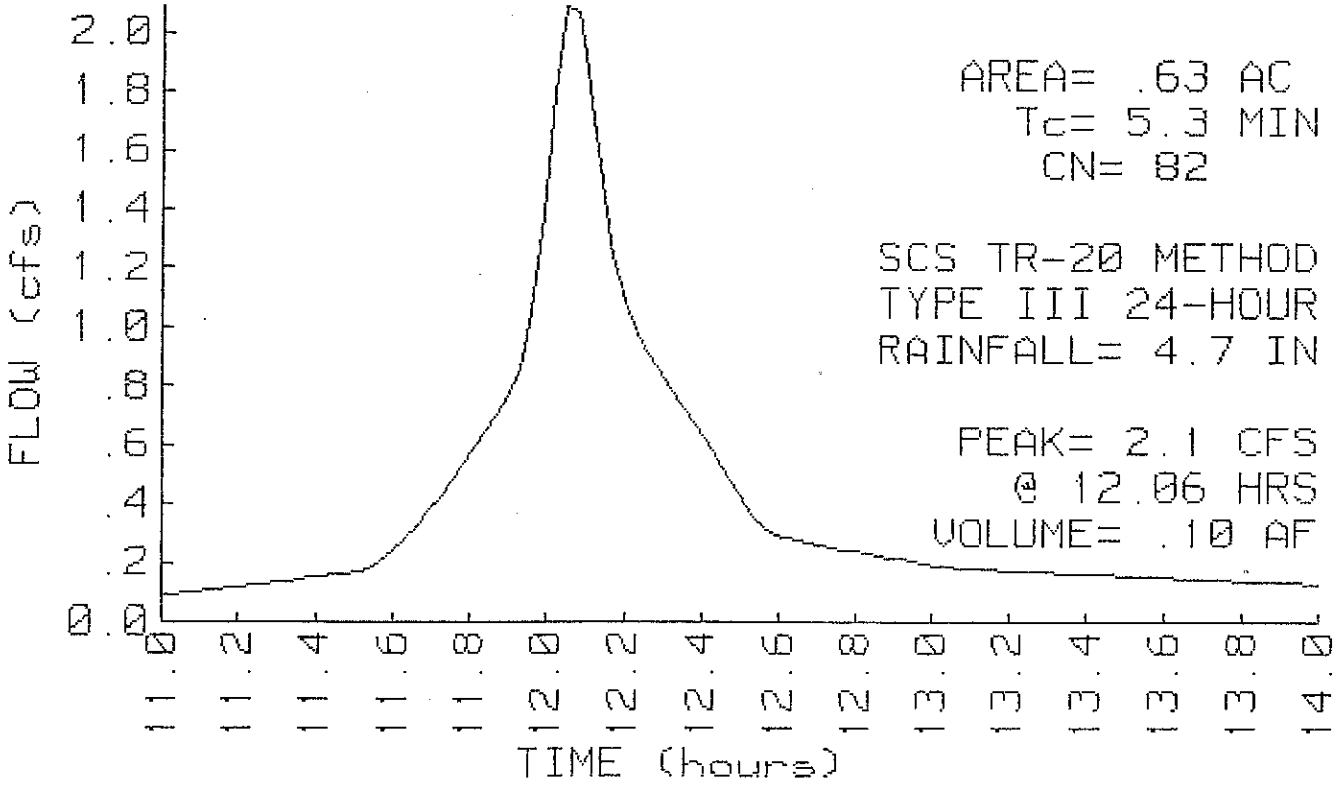
SUBCATCHMENT 3 **WATERSHED III DEVELOPED CONDITION**

ACRES	CN	
.63	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 2.1 CFS @ 12.06 HRS
VOLUME= .10 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL78-EL74**	1.2
Smooth surfaces n=.011 L=120'	P2=3 in s=.033 '/'	
SHALLOW CONCENTRATED/UPLAND FLOW	**EL74-EL72**	3.1
Short Grass Pasture Kv=7 L=150'	s=.0133 '/' V=.81 fps	
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL63**	1.0
Short Grass Pasture Kv=7 L=120'	s=.075 '/' V=1.92 fps	
	Total Length= 390 ft Total Tc=	5.3

SUBCATCHMENT 3 RUNOFF
WATERSHED III DEVELOPED CONDITION

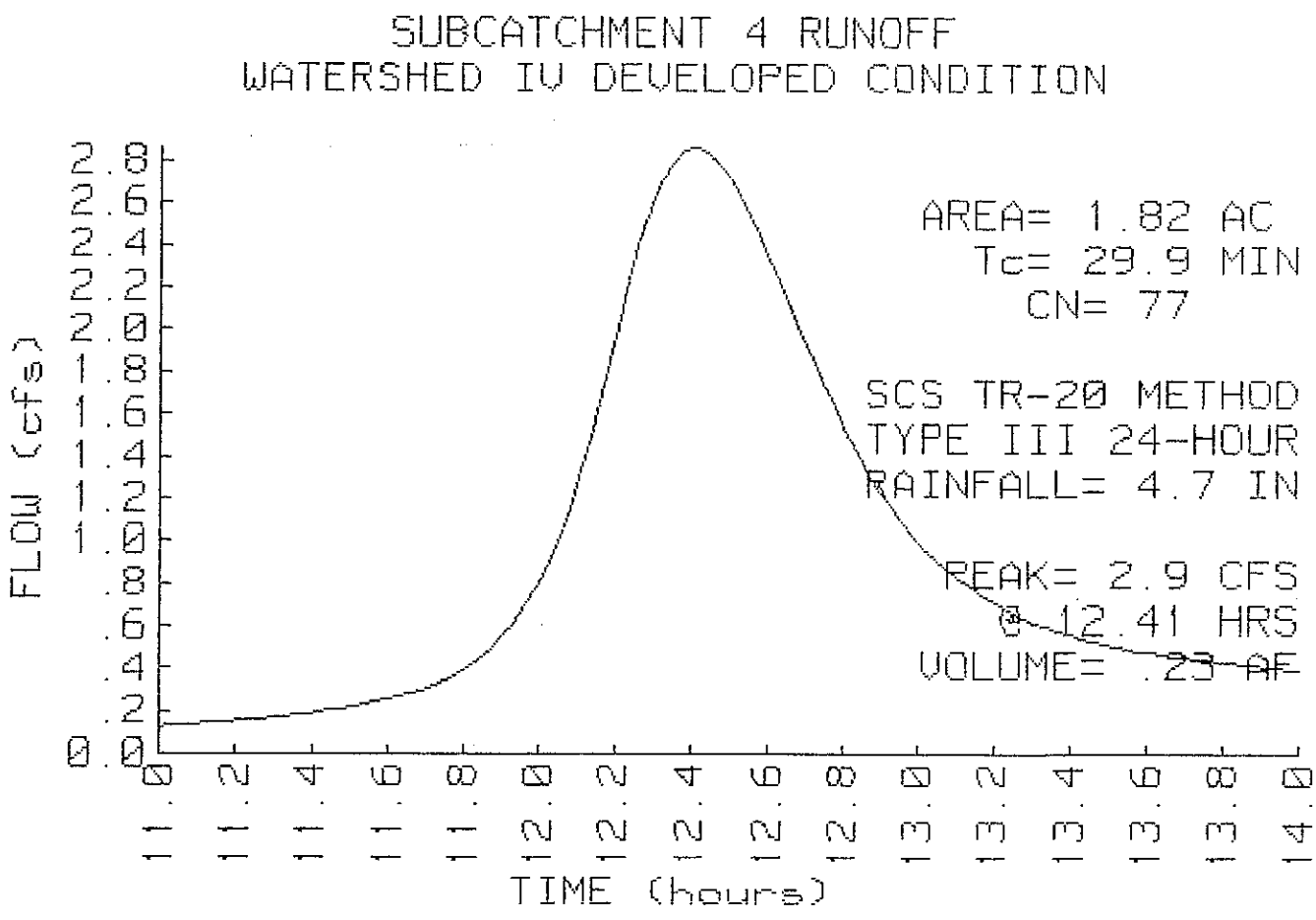


SUBCATCHMENT 4 **WATERSHED IV DEVELOPED CONDITION**

ACRES	CN	
1.82	77	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 2.9 CFS @ 12.41 HRS
VOLUME= .23 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL76.5-EL76.2**	3.2
Grass: Dense n=.24 L=15' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL76.6-EL74**	.5
Smooth surfaces n=.011 L=45' P2=3 in s=.05 '/'		
TR-55 SHEET FLOW	**EL74-EL72**	22.1
Grass: Dense n=.24 L=140' P2=3 in s=.0143 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL60**	1.1
Short Grass Pasture Kv=7 L=140' s=.0857 '/' V=2.05 fps		
DIRECT ENTRY	**EL60-EL56**	3.0
	Total Length= 340 ft Total Tc=	29.9

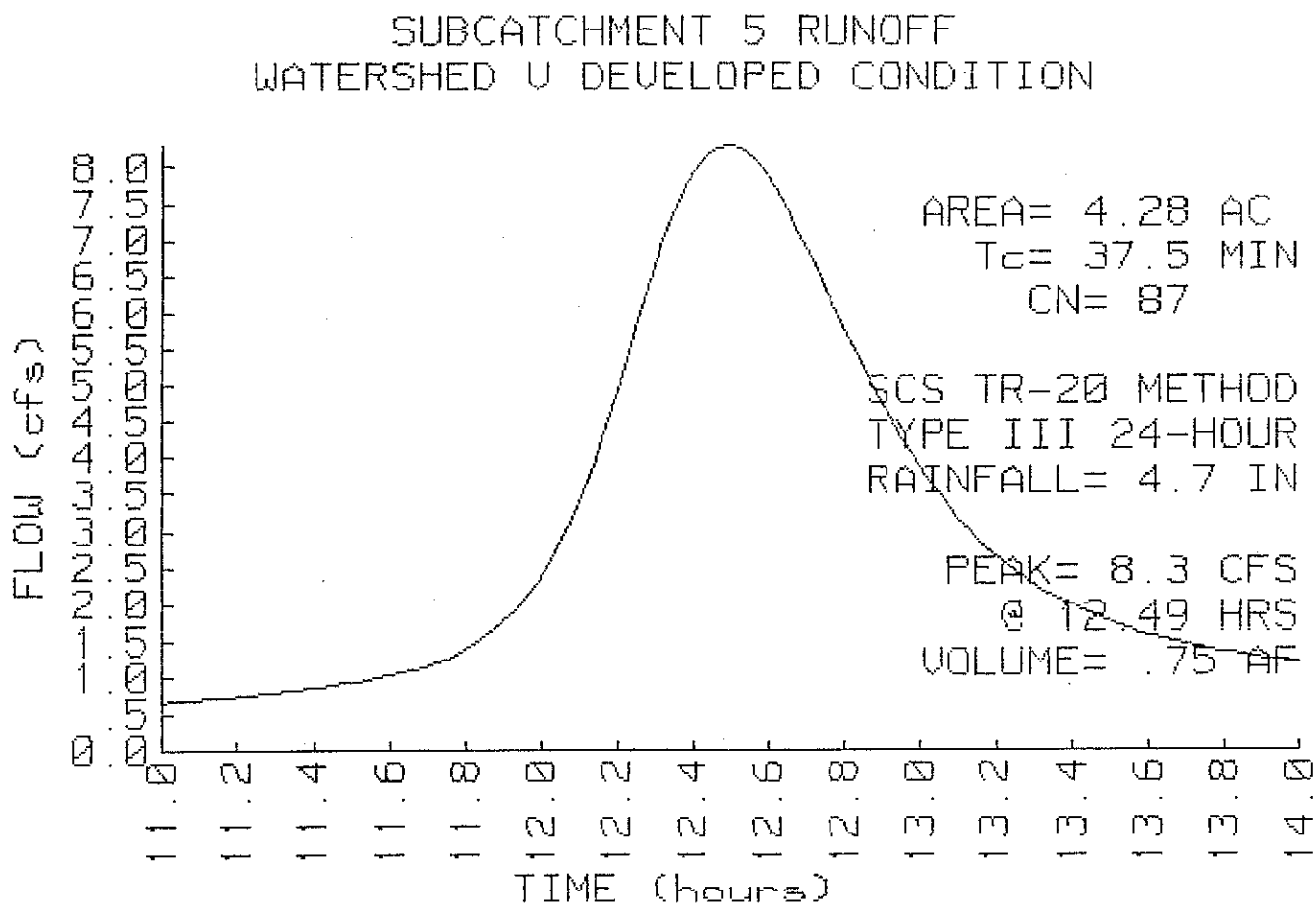


SUBCATCHMENT 5 **WATERSHED V DEVELOPED CONDITION**

ACRES	CN	
4.28	87	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 8.3 CFS @ 12.49 HRS
VOLUME= .75 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL74.2-EL73.5**	.5
Smooth surfaces n=.011 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL73.5-EL72**	35.7
Grass: Dense n=.24 L=190' P2=3 in s=.0079 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL68**	1.3
Short Grass Pasture Kv=7 L=105' s=.0381 '/' V=1.37 fps		
	Total Length= 325 ft Total Tc=	37.5



REACH 1

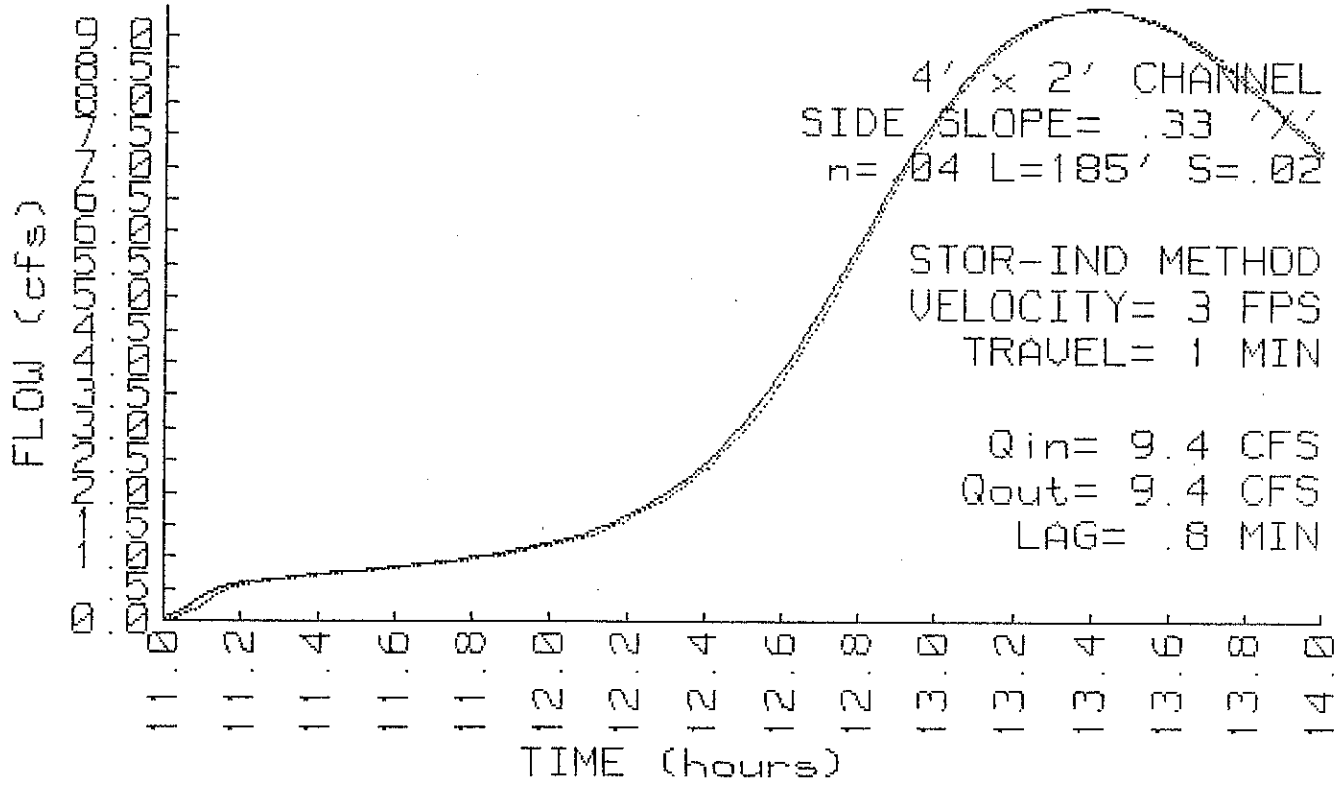
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .55 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 1.0 MIN
Qin = 9.4 CFS @ 13.41 HRS
Qout= 9.4 CFS @ 13.42 HRS
ATTEN= 0 % LAG= .8 MIN
IN/OUT= 1.09 / 1.08 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

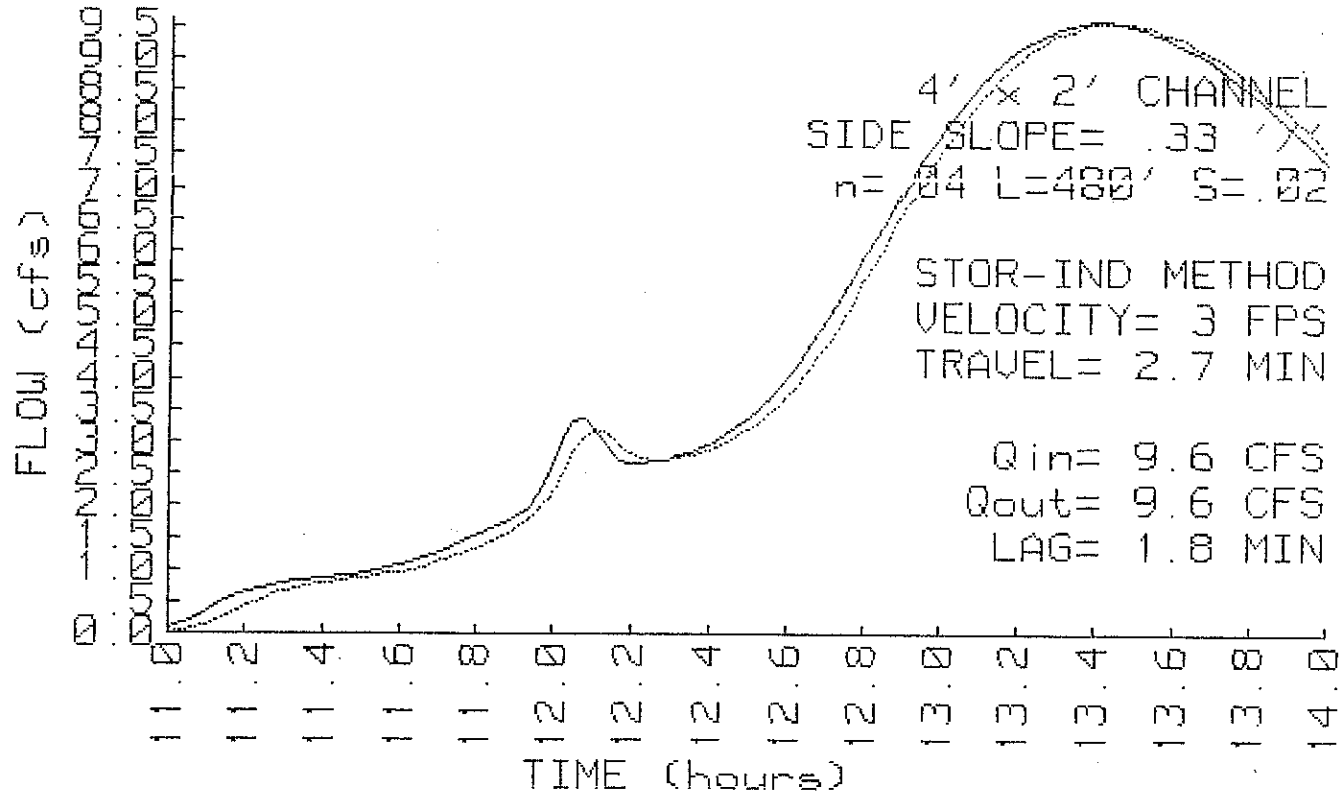
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 2

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .56 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 2.7 MIN
Qin = 9.6 CFS @ 13.42 HRS
Qout= 9.6 CFS @ 13.45 HRS
ATTEN= 0 % LAG= 1.8 MIN
IN/OUT= 1.18 / 1.15 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

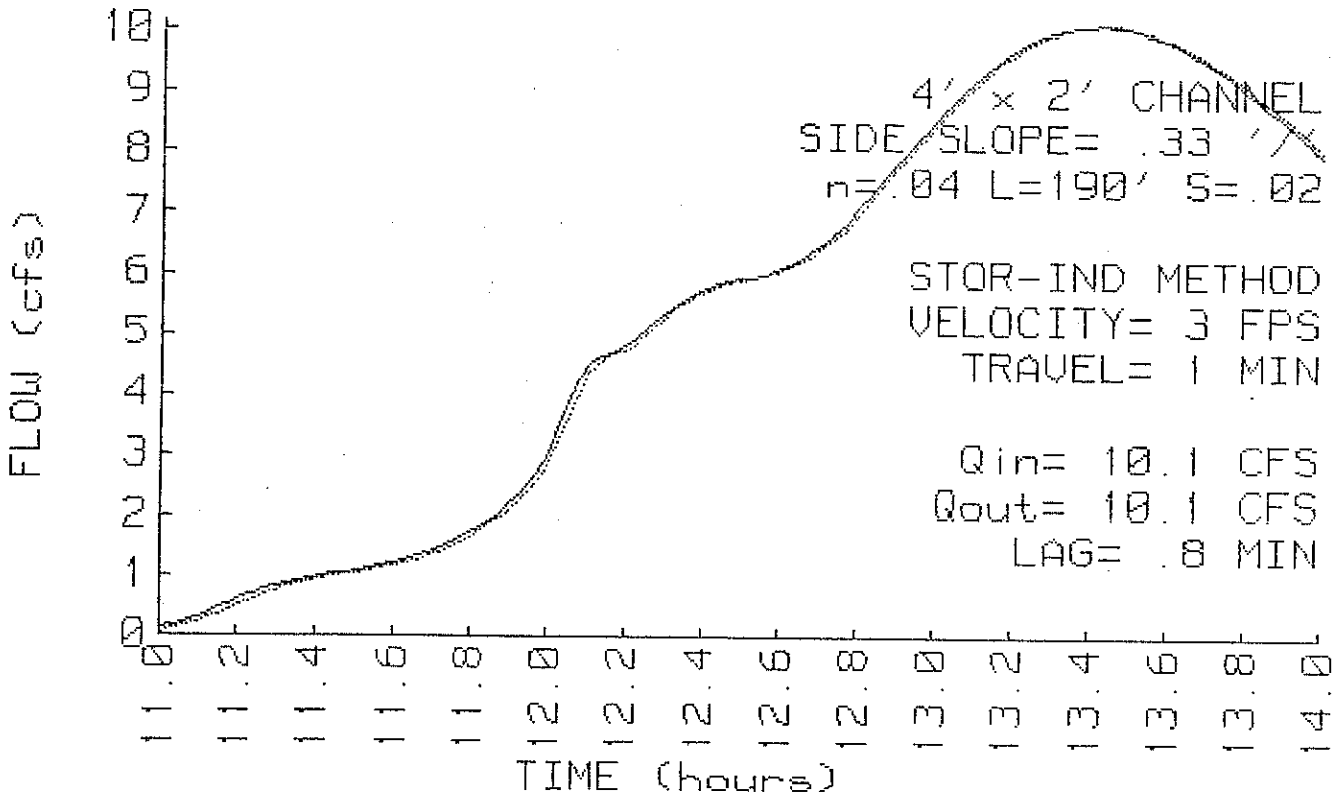
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .58 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = 1.0 MIN
Qin = 10.1 CFS @ 13.43 HRS
Qout= 10.1 CFS @ 13.44 HRS
ATTEN= 0 % LAG= .8 MIN
IN/OUT= 1.38 / 1.37 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

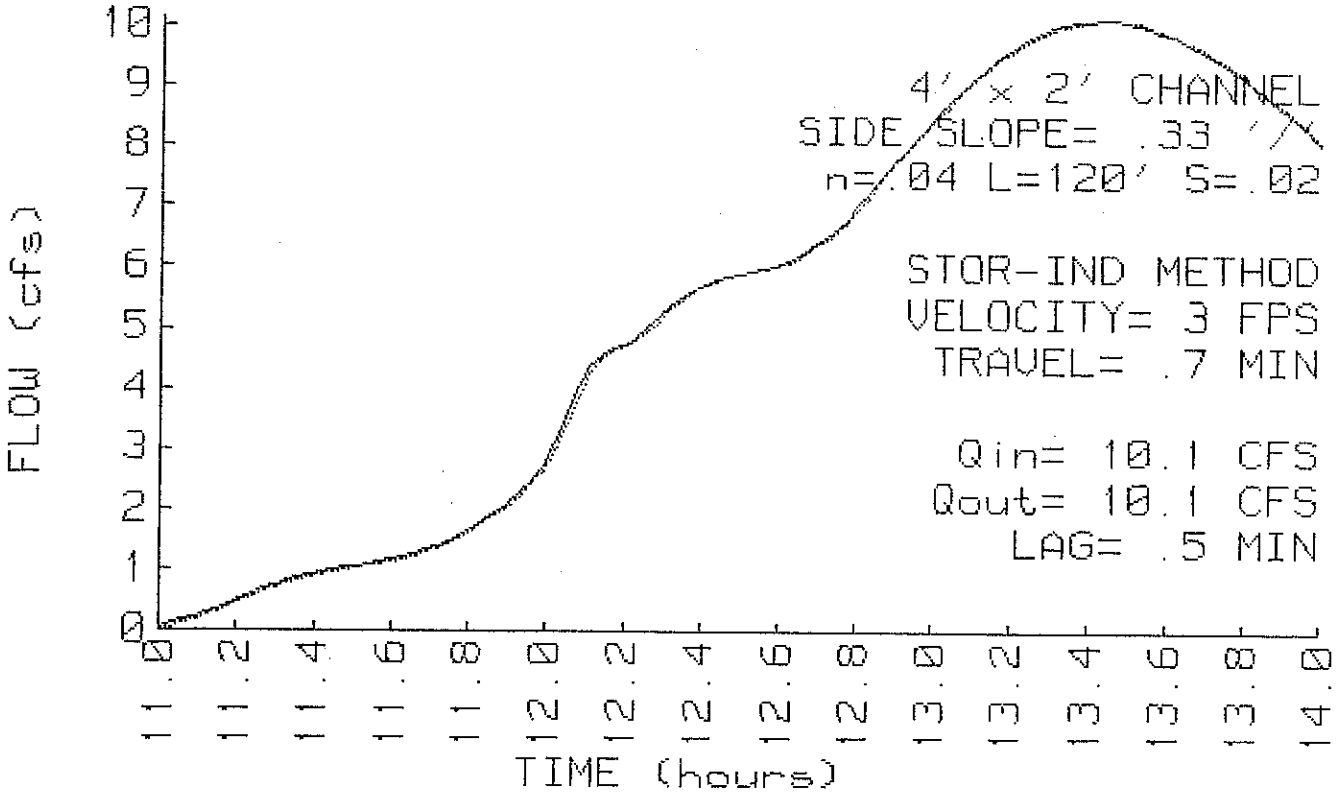
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 120 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .58 FT
PEAK VELOCITY= 3.0 FPS
TRAVEL TIME = .7 MIN
Qin = 10.1 CFS @ 13.44 HRS
Qout= 10.1 CFS @ 13.45 HRS
ATTEN= 0 % LAG= .5 MIN
IN/OUT= 1.37 / 1.36 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

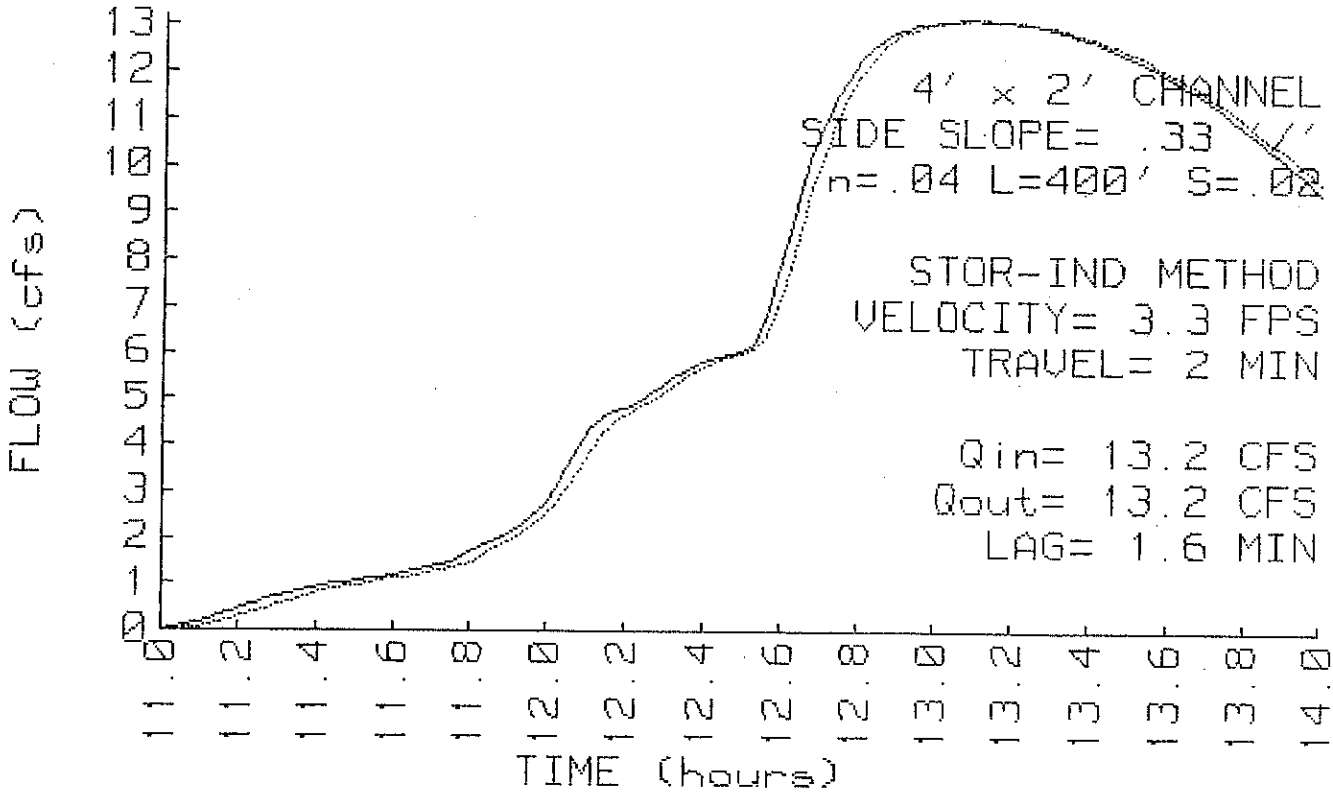
REACH 5

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .66 FT
PEAK VELOCITY= 3.3 FPS
TRAVEL TIME = 2.0 MIN
Qin = 13.2 CFS @ 13.08 HRS
Qout= 13.2 CFS @ 13.11 HRS
ATTEN= 0 % LAG= 1.6 MIN
IN/OUT= 1.74 / 1.71 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



REACH 6

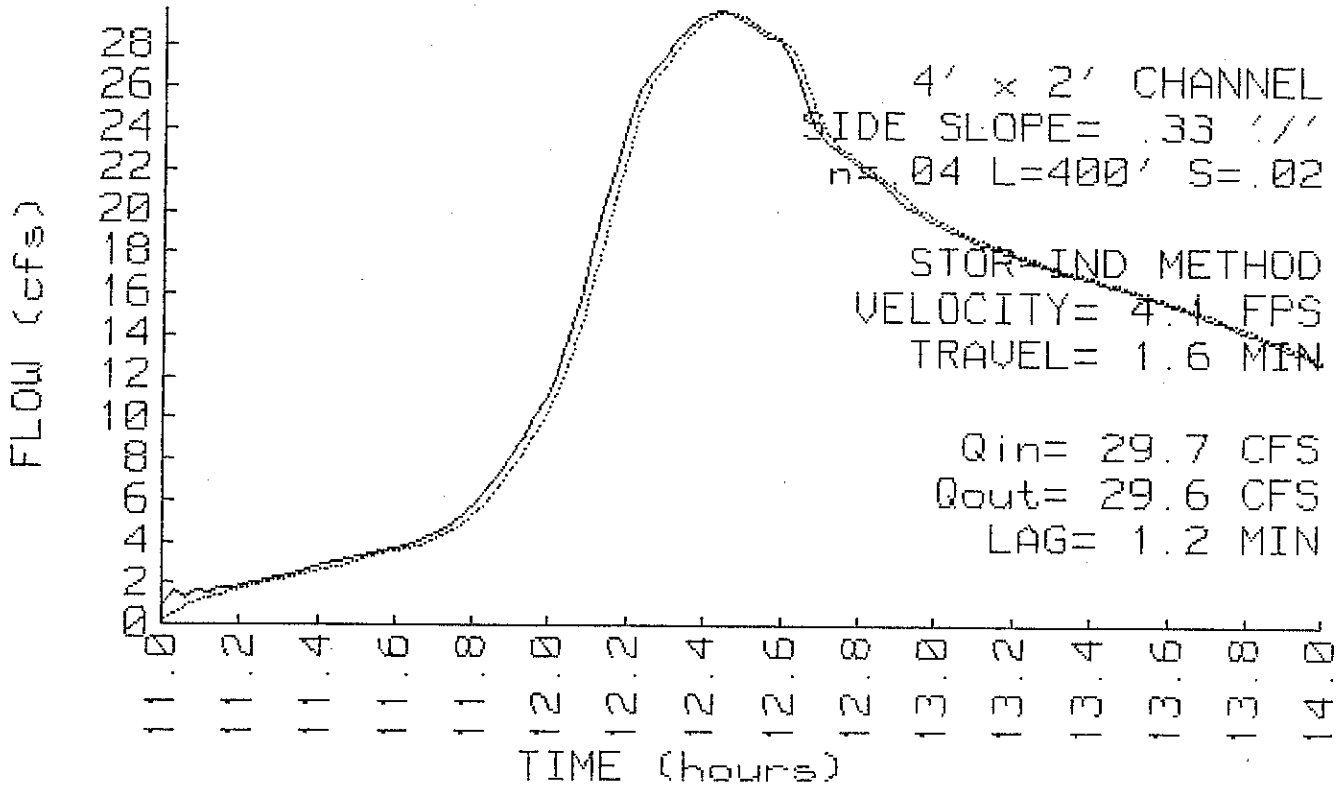
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.00 FT
PEAK VELOCITY= 4.1 FPS
TRAVEL TIME = 1.6 MIN
Qin = 29.7 CFS @ 12.44 HRS
Qout= 29.6 CFS @ 12.46 HRS
ATTEN= 0 % LAG= 1.2 MIN
IN/OUT= 3.65 / 3.61 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1

POND 1

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

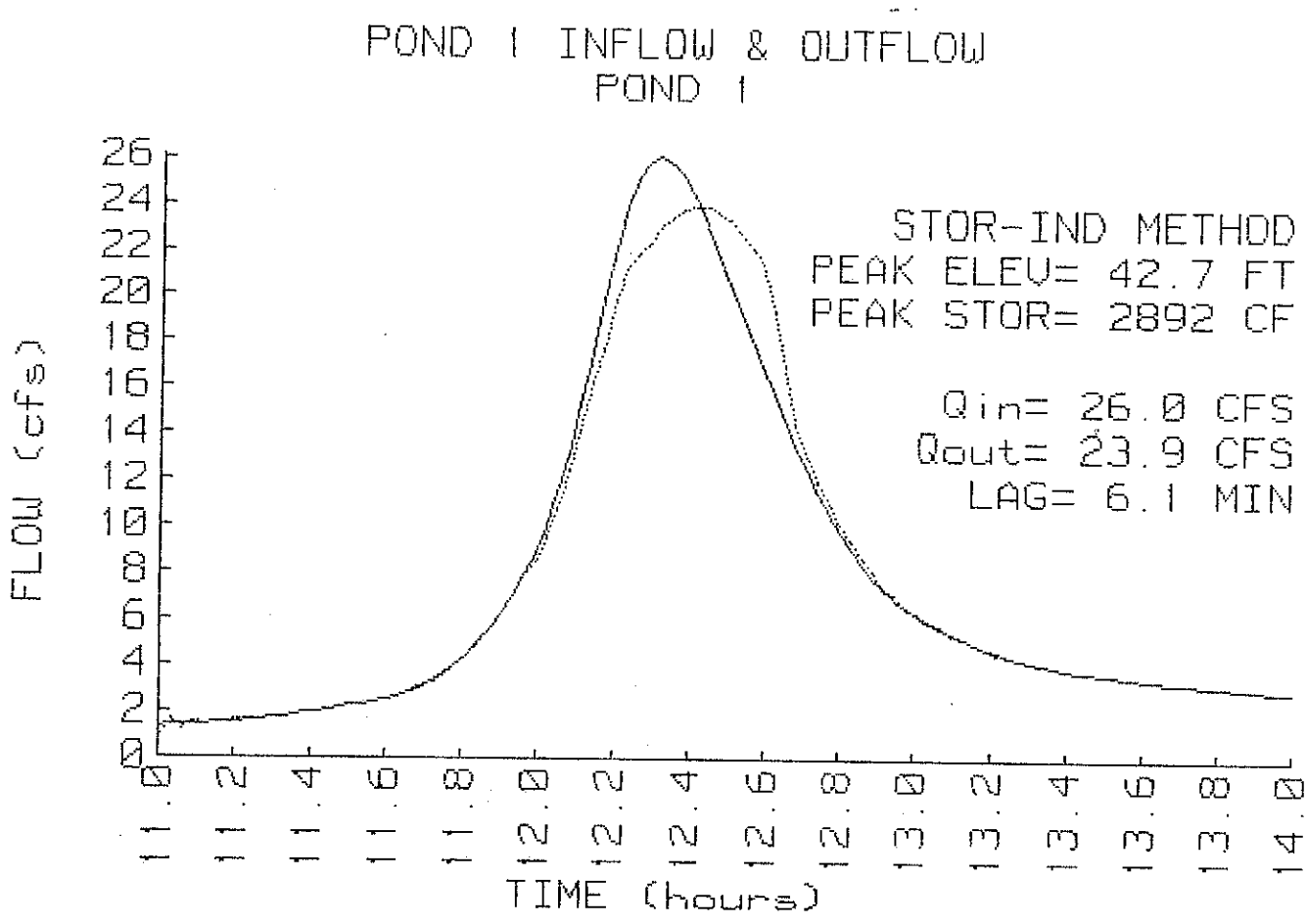
ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19363	31221	69439
52.0	26031	45394	114833

STOR-IND METHOD
PEAK ELEVATION= 42.7 FT
PEAK STORAGE = 2892 CF
Qin = 26.0 CFS @ 12.32 HRS
Qout= 23.9 CFS @ 12.42 HRS
ATTEN= 8 % LAG= 6.1 MIN
IN/OUT= 1.93 / 1.93 AF

INVERT (FT) OUTLET DEVICES
38.6 **24" CULVERT**
n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.8	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		


POND 1 INFLOW & OUTFLOW
POND 1
STOR-IND METHOD
PEAK ELEV= 42.7 FT
PEAK STOR= 2892 CF
Qin= 26.0 CFS
Qout= 23.9 CFS
LAG= 6.1 MIN
FLOW (cfs)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
11.0
11.2
11.4
11.6
11.8
12.0
12.2
12.4
12.6
12.8
13.0
13.2
13.4
13.6
13.8
14.0
TIME (hours)

POND 2 **POND 2**

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1228	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

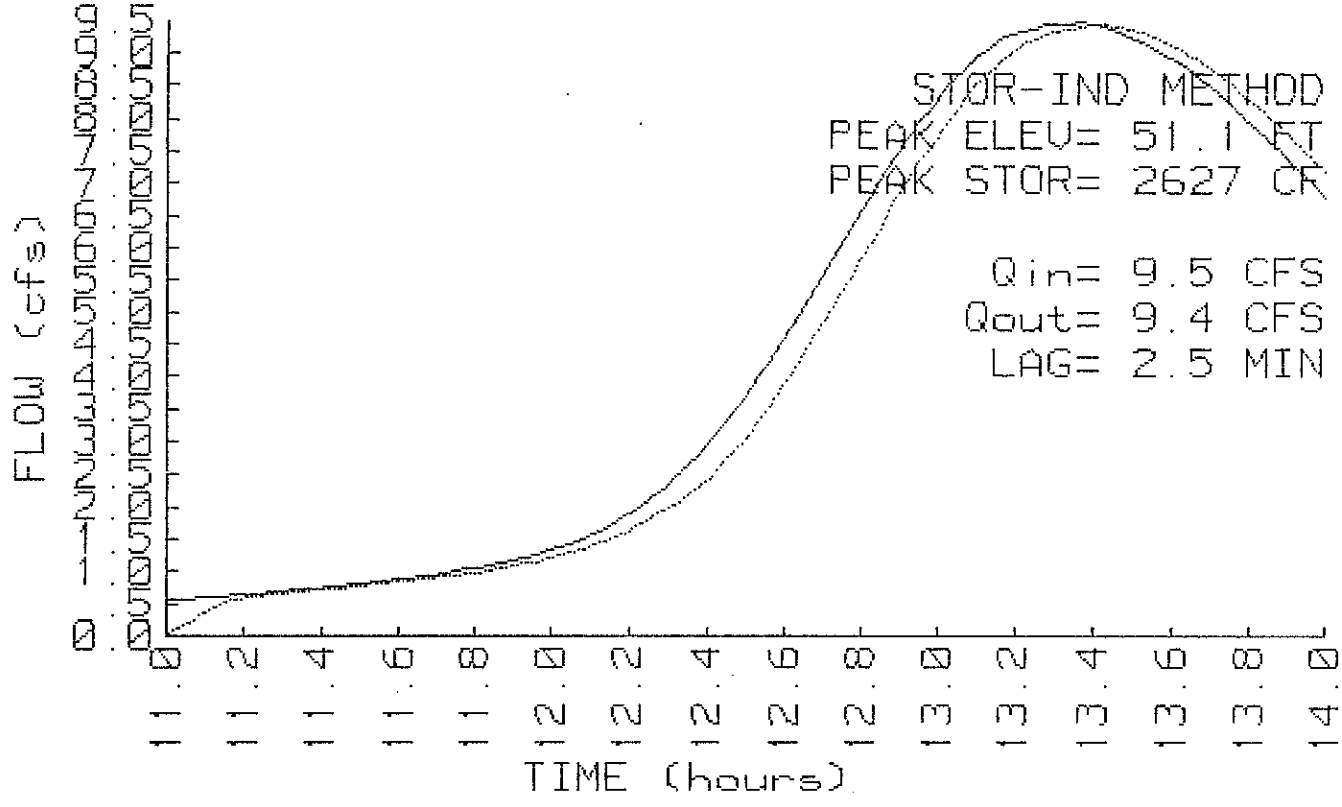
STOR-IND METHOD
PEAK ELEVATION= 51.1 FT
PEAK STORAGE = 2627 CF
Qin = 9.5 CFS @ 13.37 HRS
Qout= 9.4 CFS @ 13.41 HRS
ATTEN= 0 % LAG= 2.5 MIN
IN/OUT= 1.14 / 1.09 AF

INVERT (FT)	OUTLET DEVICES
49.5	**24" CULVERT**
	n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.3	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						

POND 2 INFLOW & OUTFLOW
POND 2



POND 3

POND 3

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

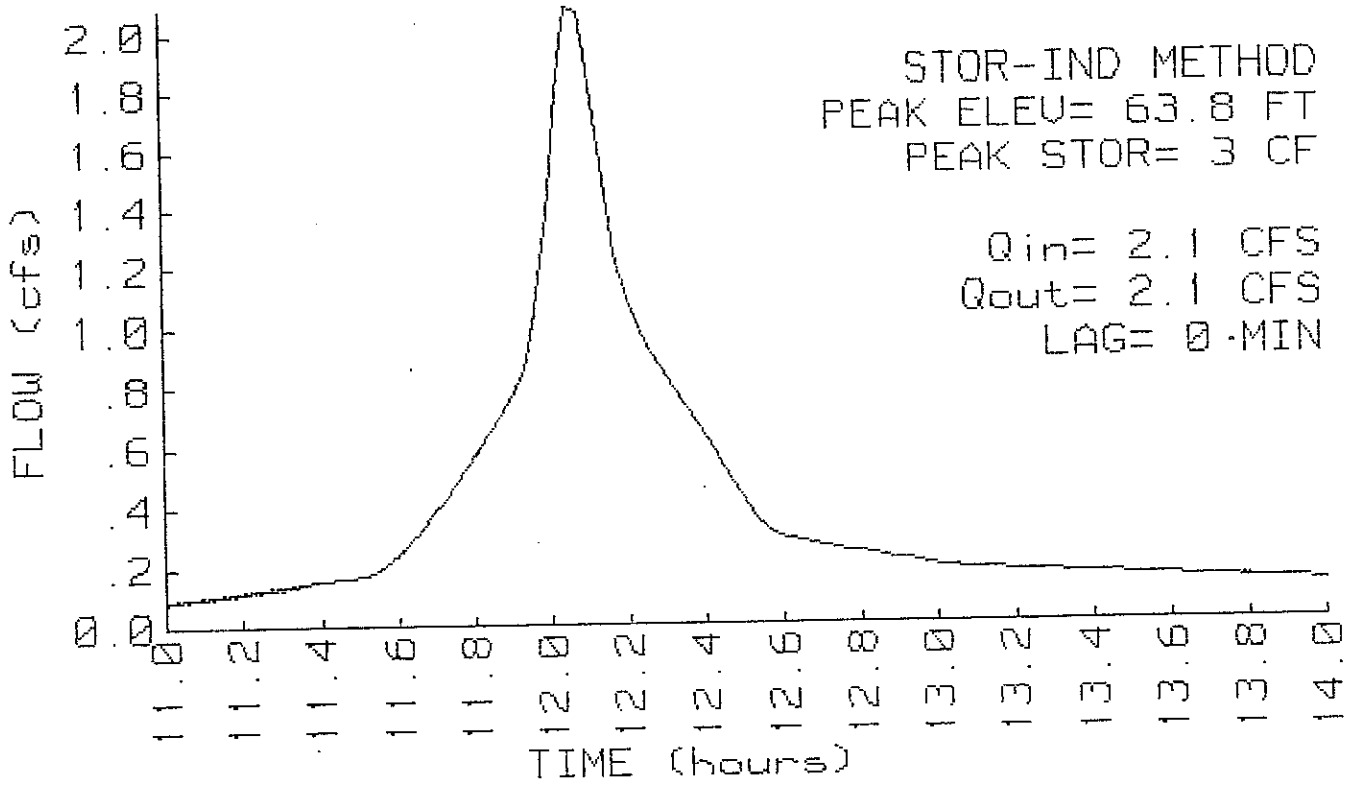
STOR-IND METHOD
PEAK ELEVATION= 63.8 FT
PEAK STORAGE = 3 CF
Qin = 2.1 CFS @ 12.06 HRS
Qout= 2.1 CFS @ 12.06 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .10 / .10 AF

INVERT (FT)	OUTLET DEVICES
63.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 **OND 4**

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

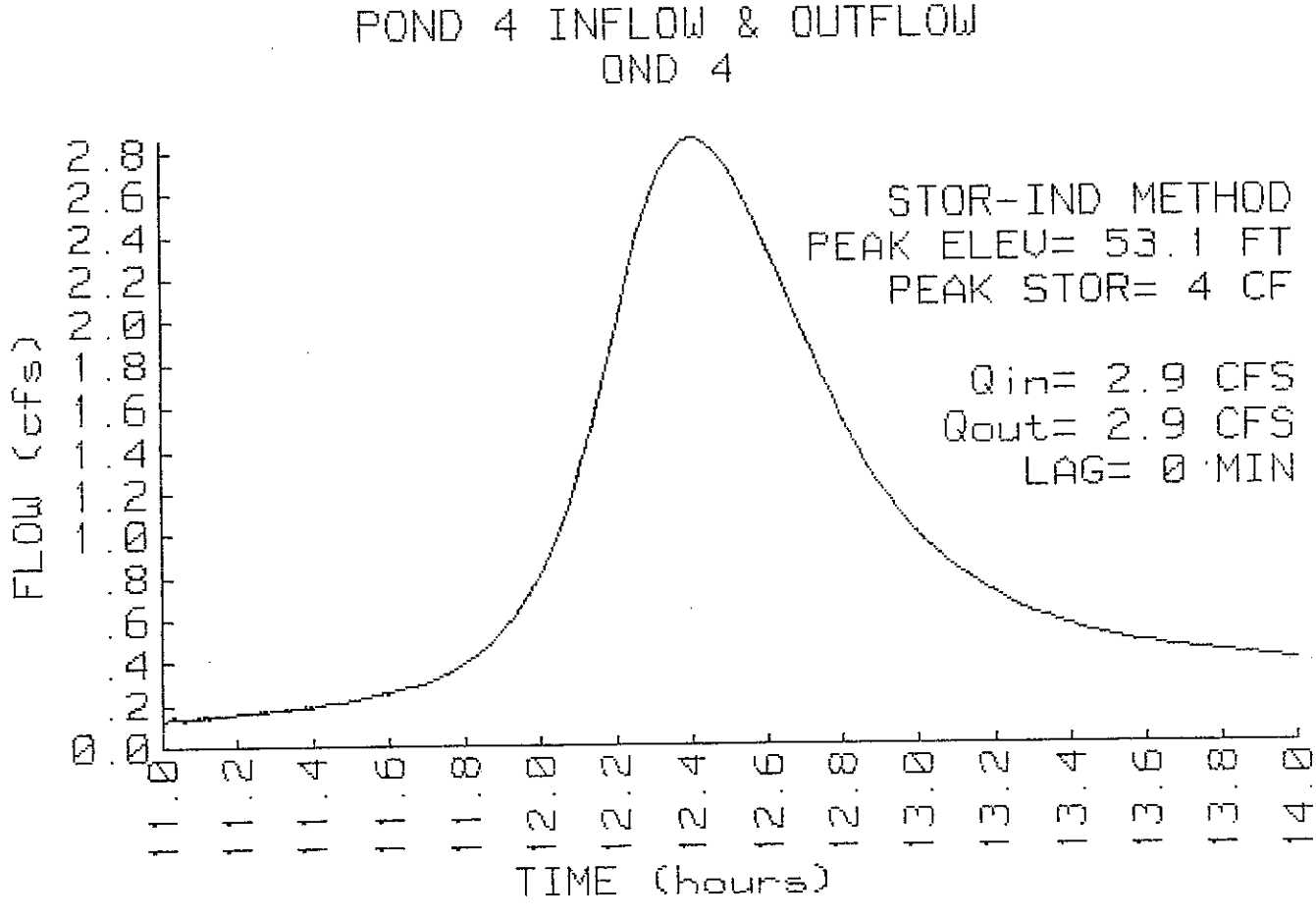
ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

STOR-IND METHOD
PEAK ELEVATION= 53.1 FT
PEAK STORAGE = 4 CF
Qin = 2.9 CFS @ 12.41 HRS
Qout= 2.9 CFS @ 12.41 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .23 / .23 AF

INVERT (FT)	OUTLET DEVICES
52.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									



POND 5 **POND 5**

STARTING ELEV= 54.0 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
54.0	3962	0	0
56.0	6110	10072	10072
58.0	8482	14592	24664
60.0	10993	19475	44139

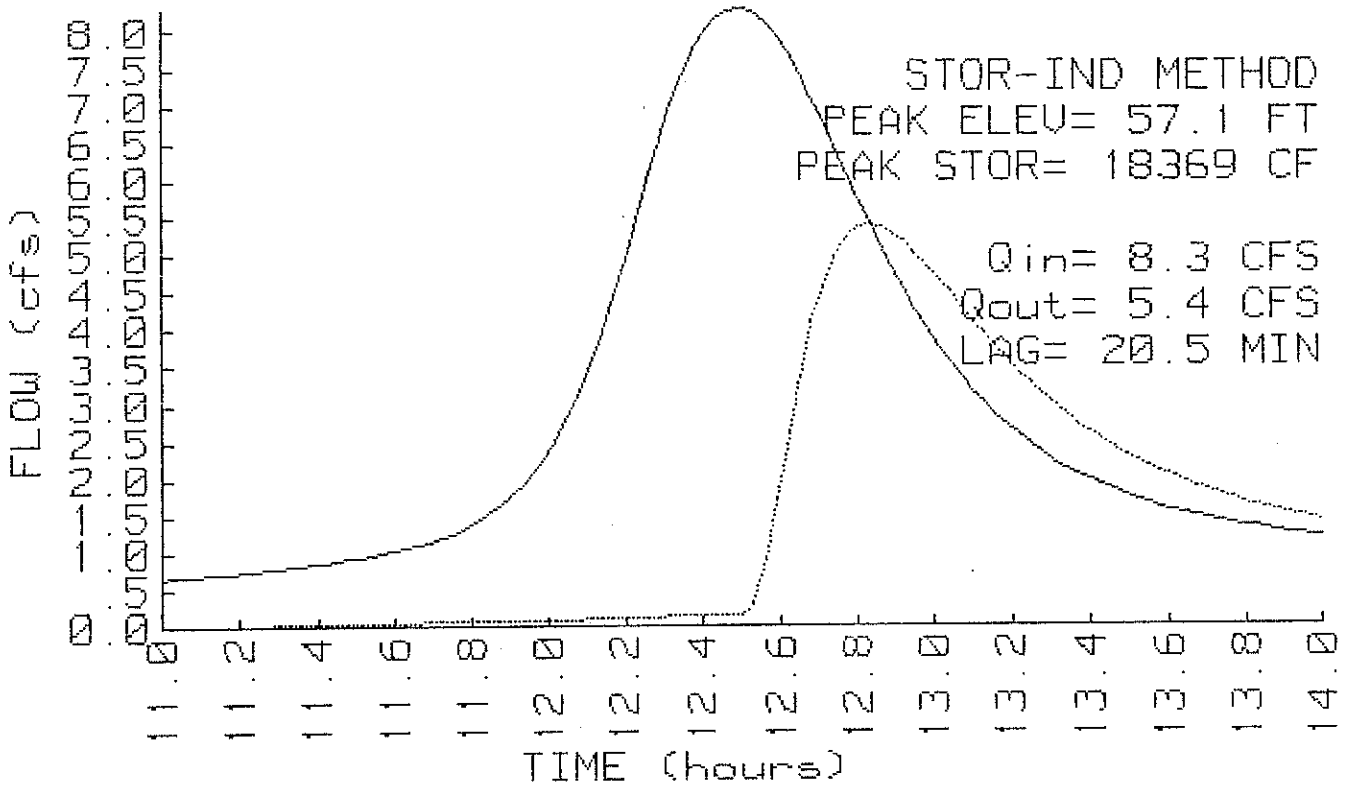
STOR-IND METHOD
PEAK ELEVATION= 57.1 FT
PEAK STORAGE = 18369 CF
Qin = 8.3 CFS @ 12.49 HRS
Qout= 5.4 CFS @ 12.83 HRS
ATTEN= 35 % LAG= 20.5 MIN
IN/OUT= .75 / .38 AF

INVERT (FT)	OUTLET DEVICES
54.0	**2" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
54.0	0.0	0.0	0.0	0.0	.1	.1	.1	.1	.1	.1
55.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
56.0	.1	.1	.2	.2	.2	.2	.2	.6	1.3	2.3
57.0	3.5	4.8	6.3	7.9	9.6	11.5	13.4	15.4	17.6	19.8
58.0	22.0	24.4	26.8	29.3	31.8	34.4	37.1	39.7	42.5	45.2
59.0	48.0	50.9	53.7	56.6	59.5	62.4	65.3	68.2	71.1	74.0
60.0	76.9									

POND 5 INFLOW & OUTFLOW
POND 5



POND 6 **POND 6**

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

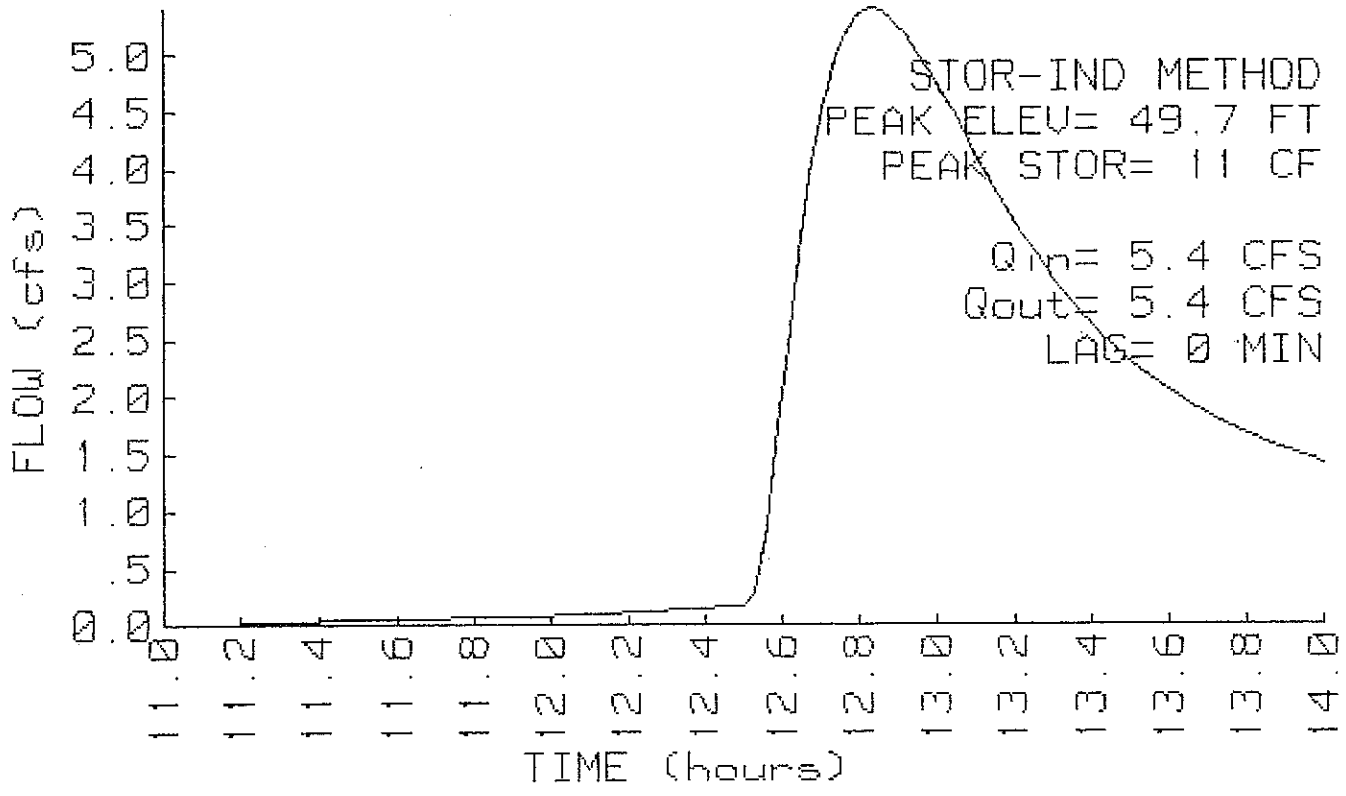
STOR-IND METHOD
PEAK ELEVATION= 49.7 FT
PEAK STORAGE = 11 CF
Qin = 5.4 CFS @ 12.83 HRS
Qout= 5.4 CFS @ 12.84 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .38 / .38 AF

INVERT (FT)	OUTLET DEVICES
47.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 6 INFLOW & OUTFLOW
POND 6



25 YR. 2051

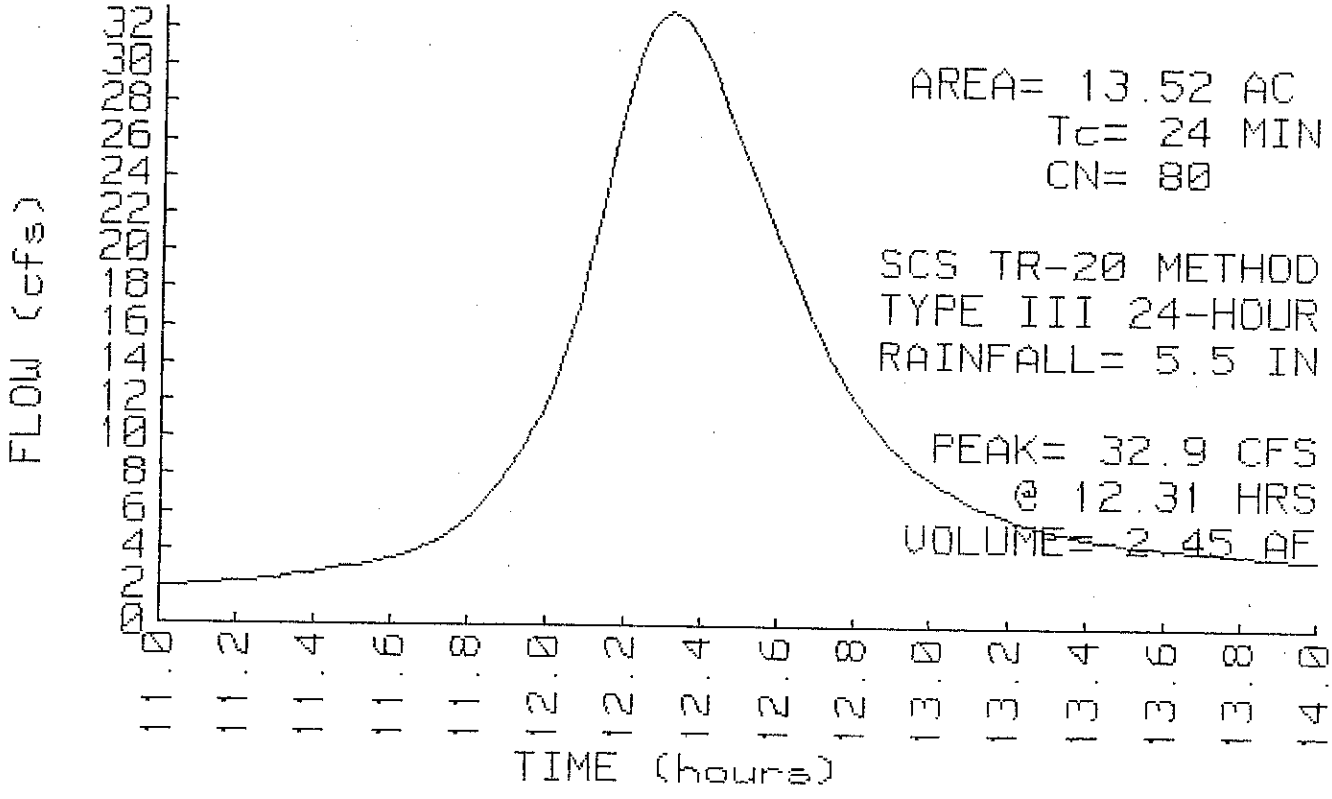
SUBCATCHMENT 1 **WATERSHED I DEVELOPED CONDITION**

ACRES	CN	
13.52	80	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 32.9 CFS @ 12.31 HRS
VOLUME= 2.45 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	EL85-EL80	20.0
Grass: Dense n=.24 L=175' P2=3 in s=.0286 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	EL80-EL72	1.0
Short Grass Pasture Kv=7 L=115' s=.0696 '/' V=1.85 fps		
DIRECT ENTRY	EL72-EL40	3.0
	Total Length= 290 ft Total Tc=	24.0

SUBCATCHMENT 1 RUNOFF
WATERSHED I DEVELOPED CONDITION



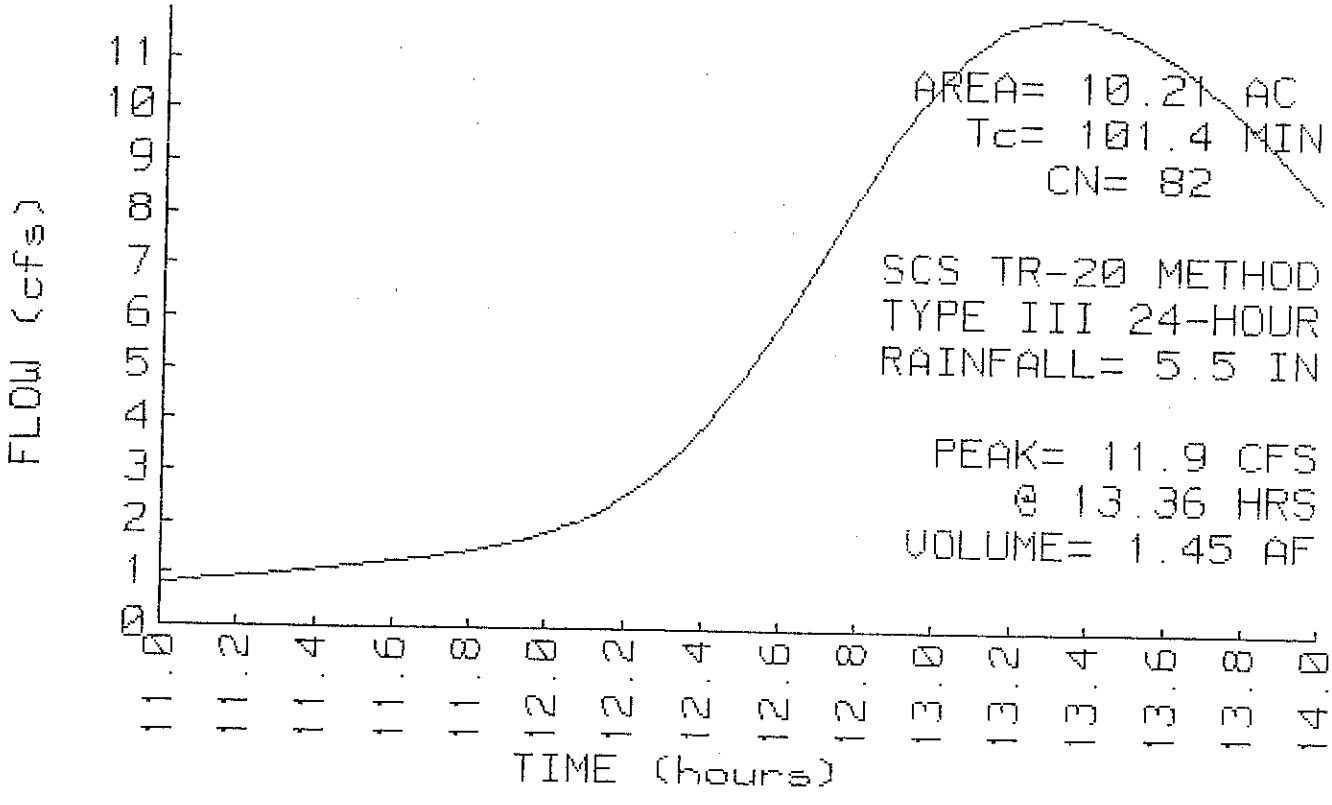
SUBCATCHMENT 2 **WATERSHED II DEVELOPED CONDITION**

ACRES	CN	
10.21	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 11.9 CFS @ 13.36 HRS
VOLUME= 1.45 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL80-EL78**	96.5
Grass: Dense n=.24 L=480' P2=3 in s=.0042 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL78-EL70**	1.9
Short Grass Pasture Kv=7 L=165' s=.041 '/' V=1.42 fps		
DIRECT ENTRY	**EL70-EL49.5**	3.0
	Total Length= 645 ft	Total Tc= 101.4

SUBCATCHMENT 2 RUNOFF
WATERSHED II DEVELOPED CONDITION

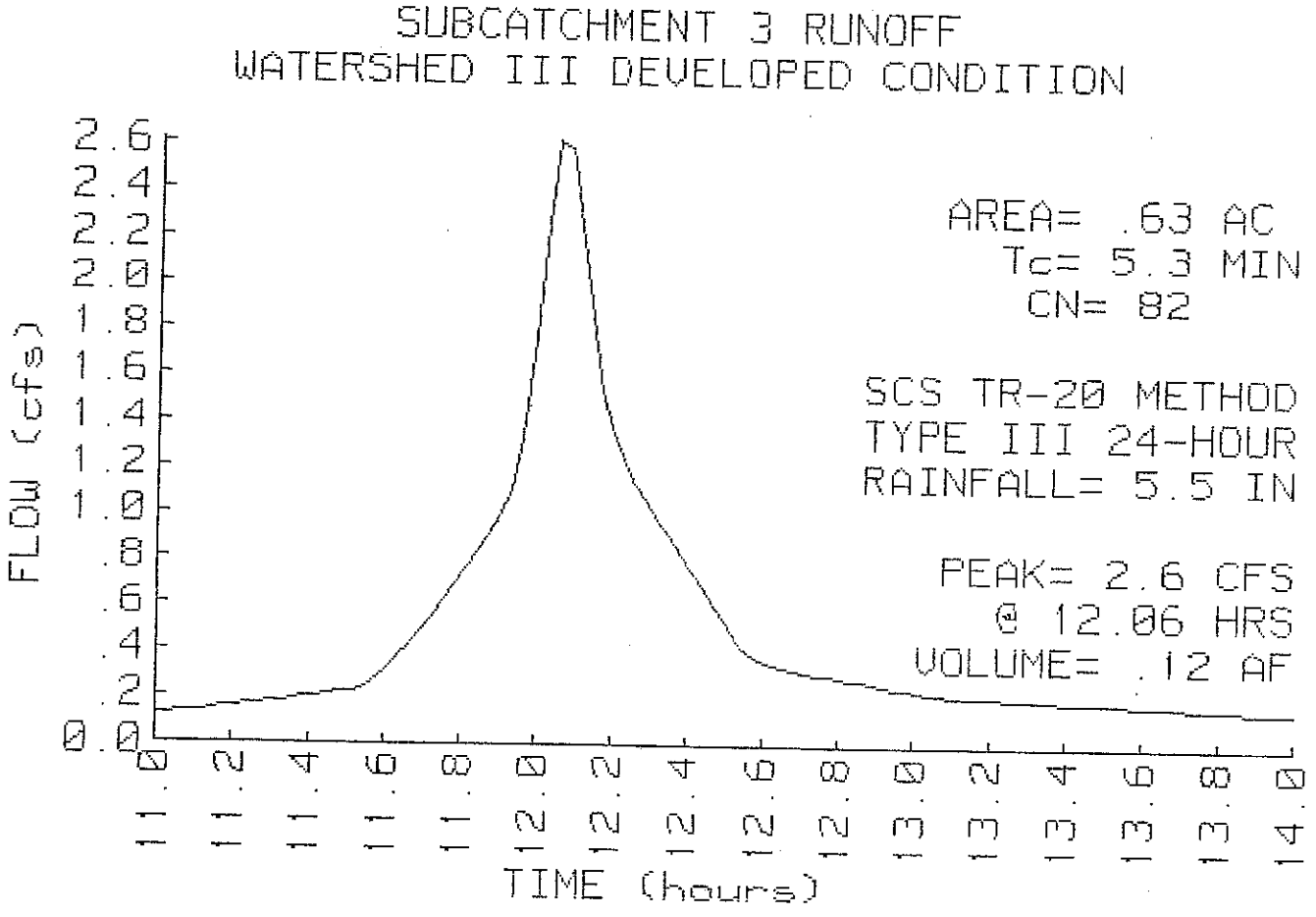


SUBCATCHMENT 3 **WATERSHED III DEVELOPED CONDITION**

ACRES	CN	
.63	82	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 2.6 CFS @ 12.06 HRS
VOLUME= .12 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL78-EL74**	
Smooth surfaces n=.011 L=120'	P2=3 in s=.033 '/'	1.2
SHALLOW CONCENTRATED/UPLAND FLOW	**EL74-EL72**	
Short Grass Pasture Kv=7 L=150'	s=.0133 '/' V=.81 fps	3.1
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL63**	
Short Grass Pasture Kv=7 L=120'	s=.075 '/' V=1.92 fps	1.0
	Total Length= 390 ft Total Tc=	5.3

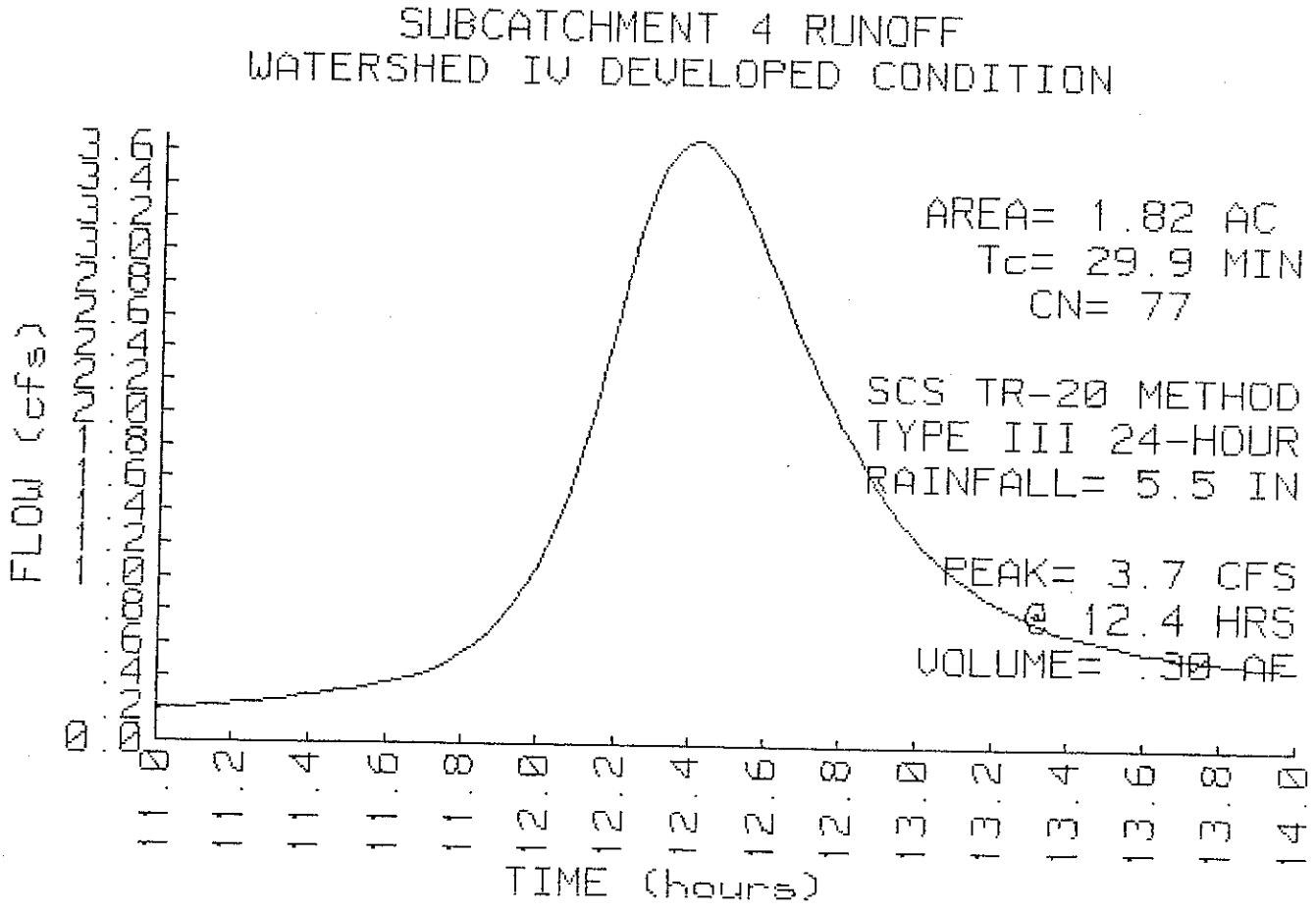


SUBCATCHMENT 4 **WATERSHED IV DEVELOPED CONDITION**

ACRES	CN	
1.82	77	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 3.7 CFS @ 12.40 HRS
VOLUME= .30 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL76.5-EL76.2**	3.2
Grass: Dense n=.24 L=15' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL76.6-EL74**	.5
Smooth surfaces n=.011 L=45' P2=3 in s=.05 '/'		
TR-55 SHEET FLOW	**EL74-EL72**	22.1
Grass: Dense n=.24 L=140' P2=3 in s=.0143 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL60**	1.1
Short Grass Pasture Kv=7 L=140' s=.0857 '/' V=2.05 fps		
DIRECT ENTRY	**EL60-EL56**	3.0
	Total Length= 340 ft Total Tc=	29.9

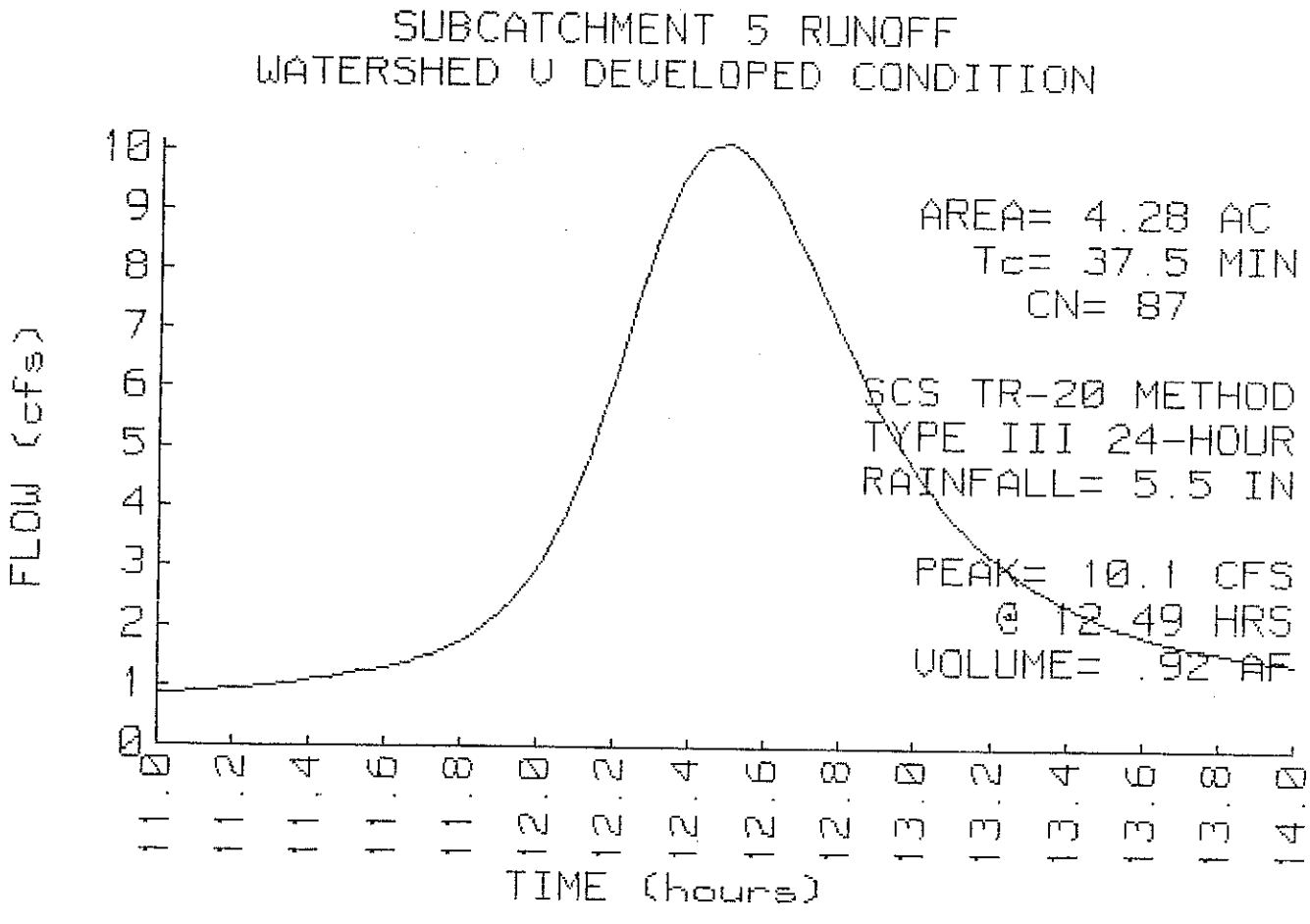


SUBCATCHMENT 5 **WATERSHED V DEVELOPED CONDITION**

ACRES	CN	
4.28	87	TOTAL WS

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 10.1 CFS @ 12.49 HRS
VOLUME= .92 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**EL74.2-EL73.5**	.5
Smooth surfaces n=.011 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	**EL73.5-EL72**	35.7
Grass: Dense n=.24 L=190' P2=3 in s=.0079 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**EL72-EL68**	1.3
Short Grass Pasture Kv=7 L=105' s=.0381 '/' V=1.37 fps		
	Total Length= 325 ft	Total Tc= 37.5



REACH 1

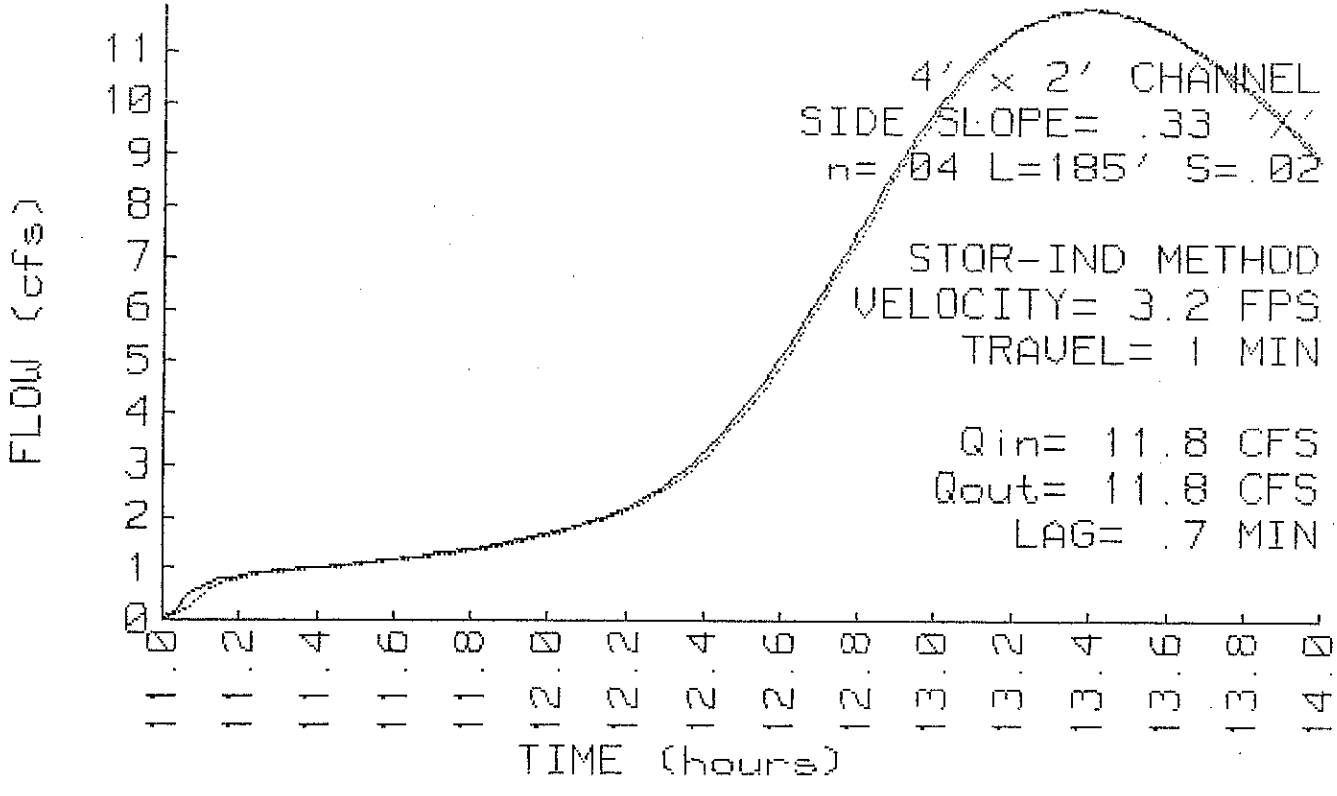
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 1

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 185 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .63 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = 1.0 MIN
Qin = 11.8 CFS @ 13.40 HRS
Qout= 11.8 CFS @ 13.42 HRS
ATTEN= 0 % LAG= .7 MIN
IN/OUT= 1.39 / 1.38 AF

REACH 1 INFLOW & OUTFLOW
REACH 1



REACH 2

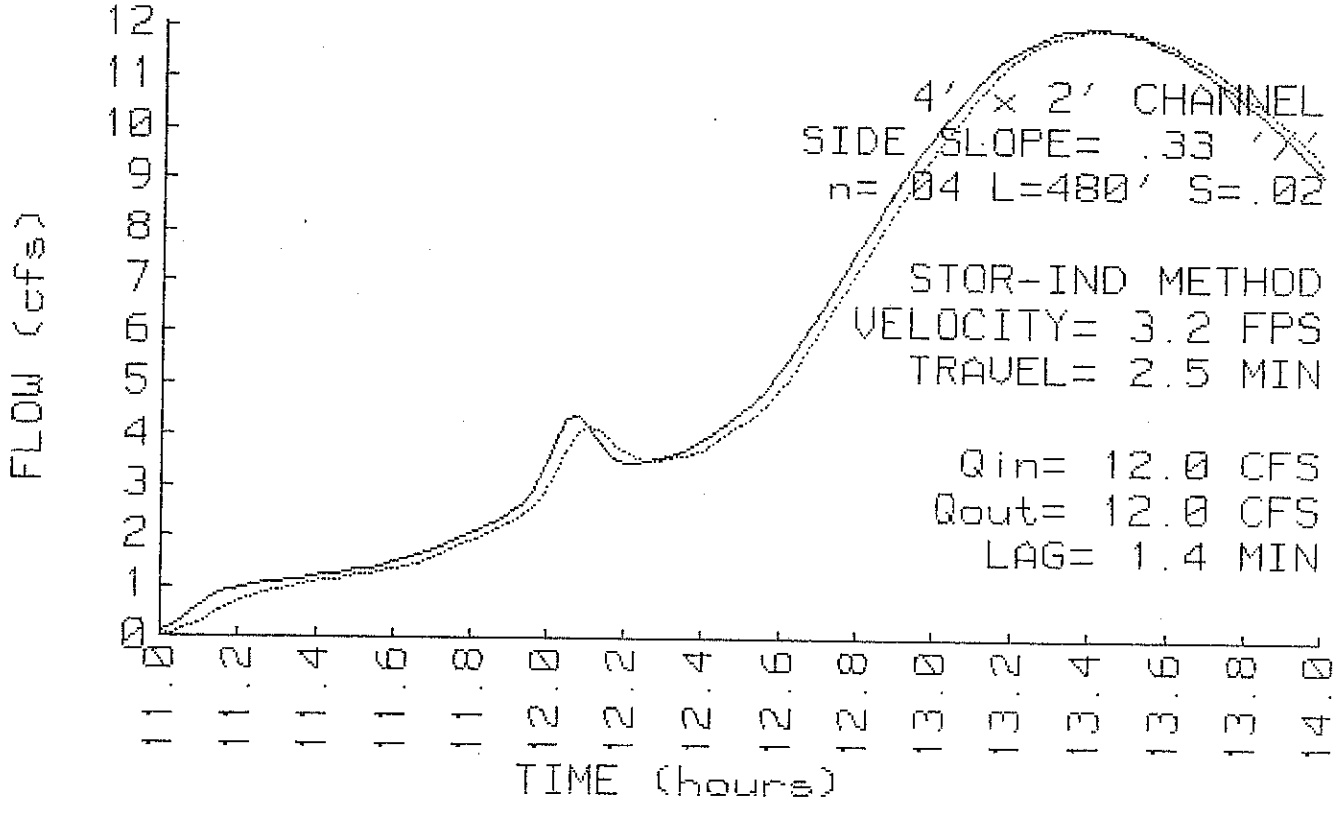
REACH 2

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 480 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .63 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = 2.5 MIN
Qin = 12.0 CFS @ 13.41 HRS
Qout= 12.0 CFS @ 13.44 HRS
ATTEN= 0 % LAG= 1.4 MIN
IN/OUT= 1.50 / 1.47 AF

REACH 2 INFLOW & OUTFLOW
REACH 2



REACH 3

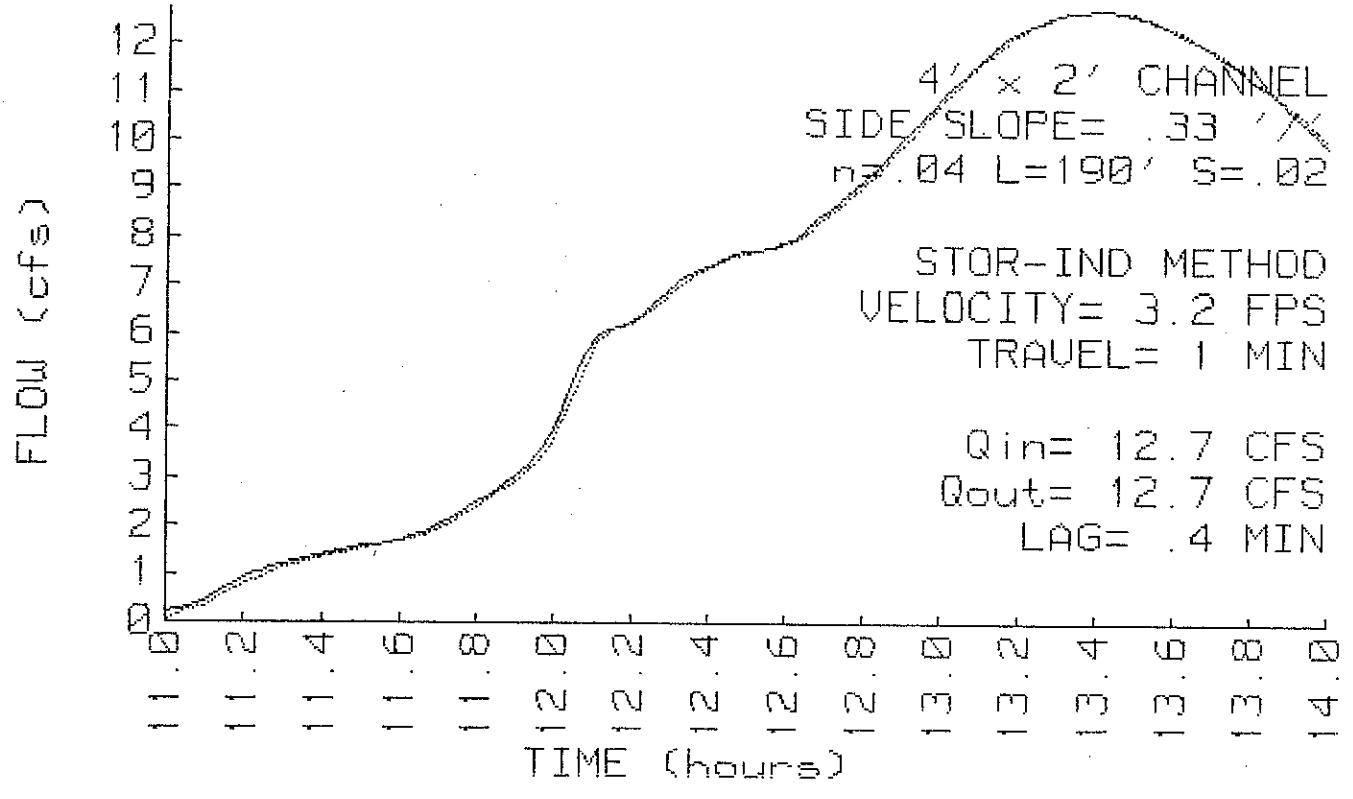
REACH 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 190 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .65 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = 1.0 MIN
Qin = 12.7 CFS @ 13.41 HRS
Qout= 12.7 CFS @ 13.42 HRS
ATTEN= 0 % LAG= .4 MIN
IN/OUT= 1.77 / 1.75 AF

REACH 3 INFLOW & OUTFLOW
REACH 3



REACH 4

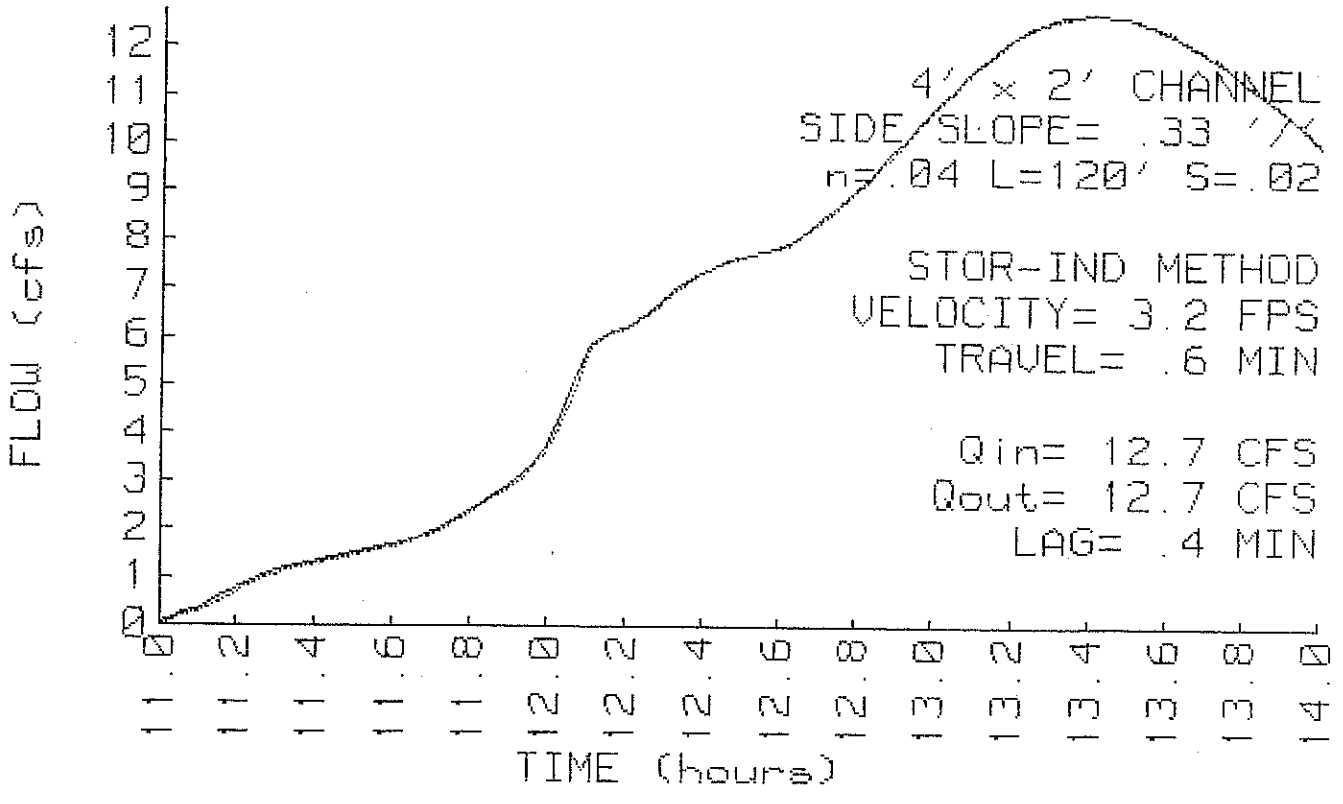
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 4

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 120 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .65 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = .6 MIN
Qin = 12.7 CFS @ 13.42 HRS
Qout= 12.7 CFS @ 13.43 HRS
ATTEN= 0 % LAG= .4 MIN
IN/OUT= 1.75 / 1.74 AF

REACH 4 INFLOW & OUTFLOW
REACH 4



REACH 5

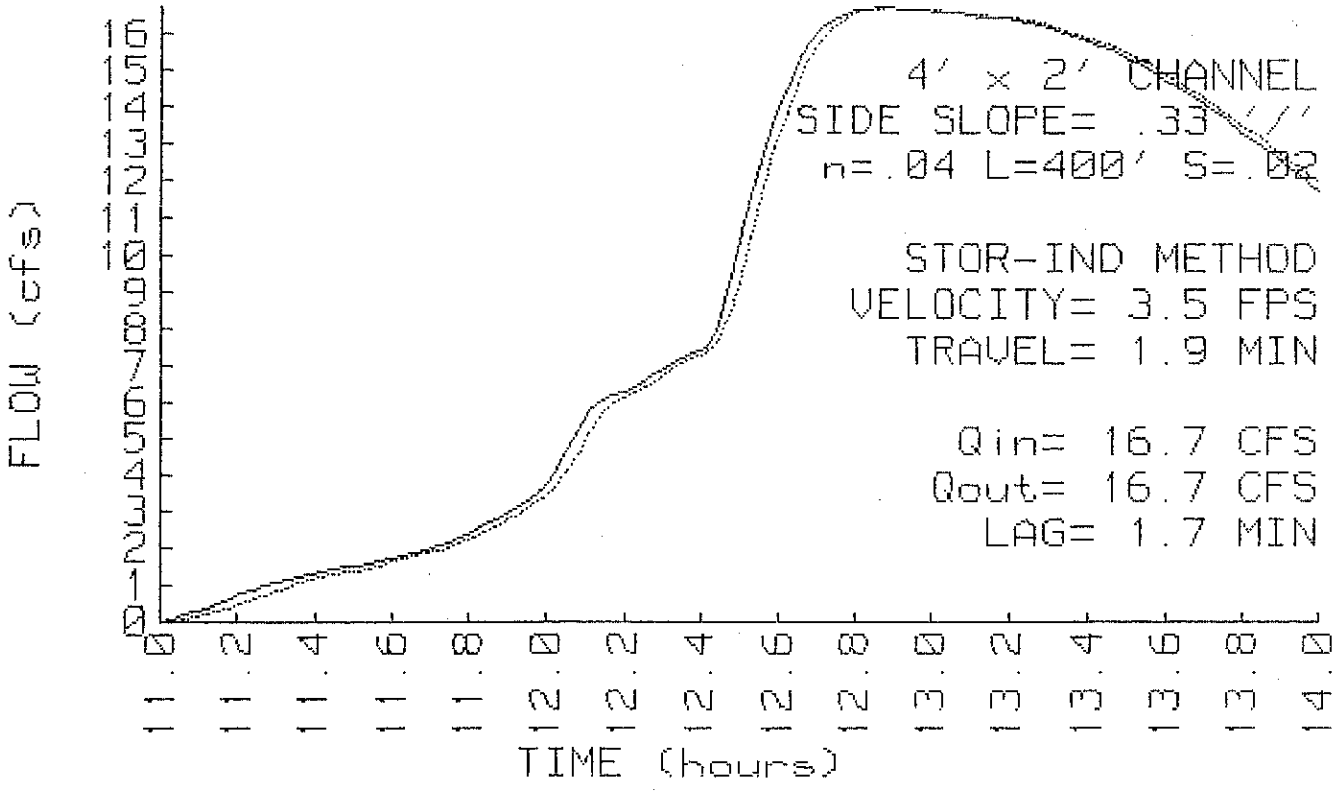
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 5

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .75 FT
PEAK VELOCITY= 3.5 FPS
TRAVEL TIME = 1.9 MIN
Qin = 16.7 CFS @ 12.87 HRS
Qout= 16.7 CFS @ 12.89 HRS
ATTEN= 0 % LAG= 1.7 MIN
IN/OUT= 2.29 / 2.26 AF

REACH 5 INFLOW & OUTFLOW
REACH 5



REACH 6

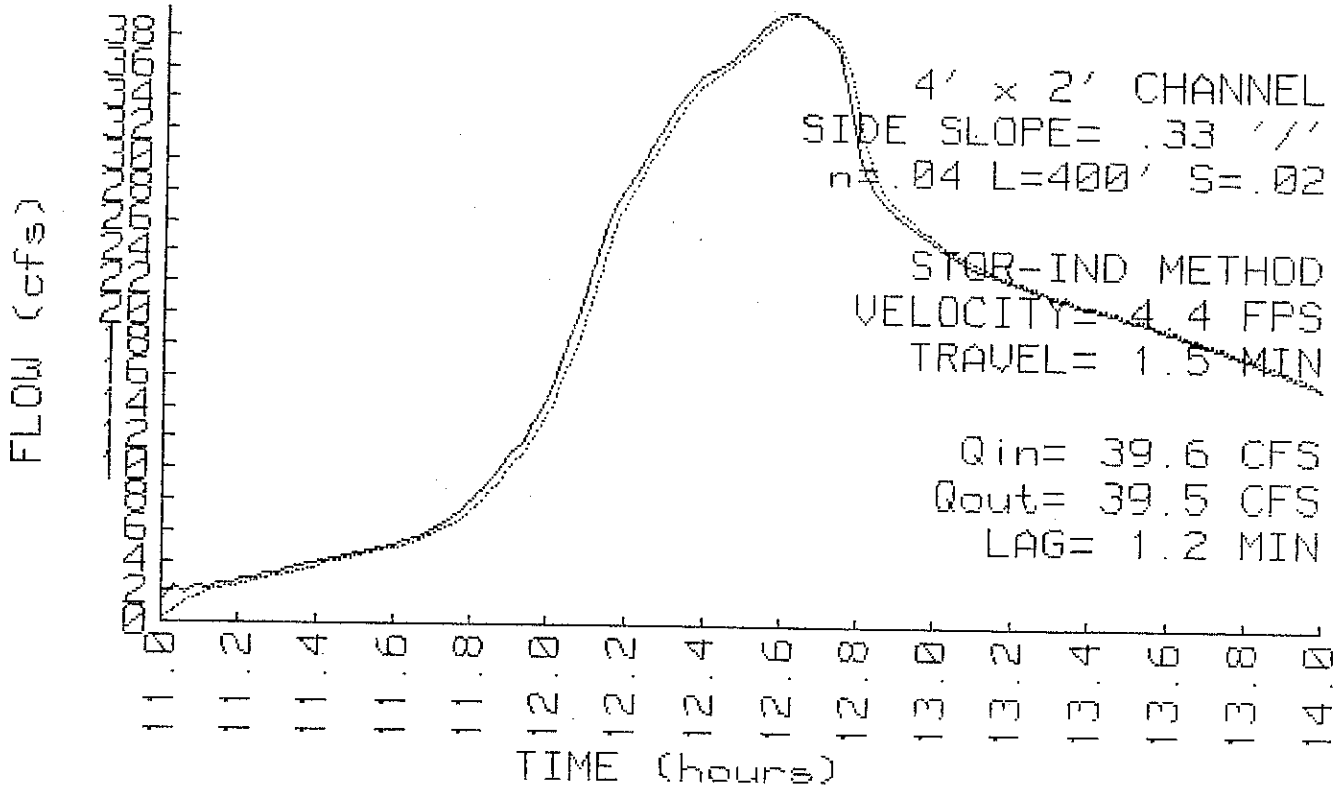
DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.9	1.5
.4	2.1	5.1
.6	3.5	10.7
.9	5.7	21.2
1.2	9.2	41.0
1.6	14.2	74.2
2.0	20.1	119.4

REACH 3

4' x 2' CHANNEL
SIDE SLOPE= .33 '/'
n= .04
LENGTH= 400 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.17 FT
PEAK VELOCITY= 4.4 FPS
TRAVEL TIME = 1.5 MIN
Qin = 39.6 CFS @ 12.61 HRS
Qout= 39.5 CFS @ 12.63 HRS
ATTEN= 0 % LAG= 1.2 MIN
IN/OUT= 4.71 / 4.66 AF

REACH 6 INFLOW & OUTFLOW
REACH 3



POND 1 **POND 1**

STARTING ELEV= 38.6 FT
FLOOD ELEV= 52.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
38.6	0	0	0
40.0	112	78	78
42.0	893	1005	1083
44.0	4492	5385	6468
46.0	7700	12192	18660
48.0	11858	19558	38218
50.0	19363	31221	69439
52.0	26031	45394	114833

STOR-IND METHOD
PEAK ELEVATION= 44.0 FT
PEAK STORAGE = 6347 CF
Qin = 32.9 CFS @ 12.31 HRS
Qout= 28.6 CFS @ 12.45 HRS
ATTEN= 13 % LAG= 7.9 MIN
IN/OUT= 2.45 / 2.45 AF

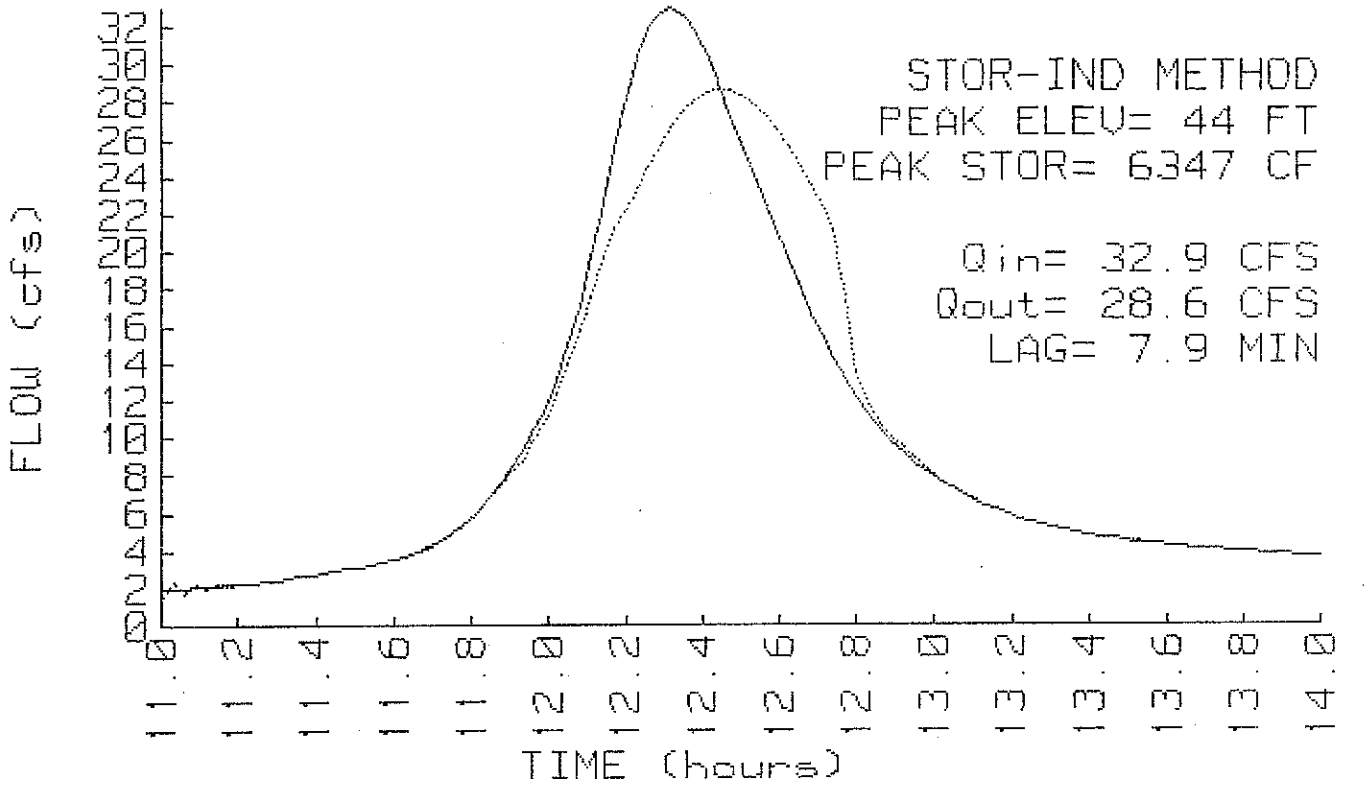
INVERT (FT)	OUTLET DEVICES
38.6	**24" CULVERT**
	n=.012 L=165' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
38.6	0.0	.2	.8	1.8	3.1	4.6	6.3	8.2	10.1	12.0
40.6	13.8	15.5	16.8	17.5	17.9	18.9	19.9	20.9	21.8	22.7
42.6	23.5	24.4	25.2	25.9	26.7	27.4	28.1	28.8	29.5	30.1
44.6	30.8	31.4	32.0	32.6	33.2	33.8	34.4	35.0	35.5	36.1
46.6	36.6	37.1	37.7	38.2	38.7	39.2	39.7	40.2	40.7	41.1
48.6	41.6	42.1	42.6	43.0	43.5	43.9	44.4	44.8	45.2	45.7
50.6	46.1	46.5	46.9	47.4	47.8	48.2	48.6	49.0		

POND 1 INFLOW & OUTFLOW

POND 1



POND 2 **POND 2**

STARTING ELEV= 49.5 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
49.5	10	0	0
50.0	1228	310	310
52.0	3125	4353	4663
54.0	6026	9151	13814
56.0	10825	16851	30665
58.0	16545	27370	58035
60.0	23800	40345	98380

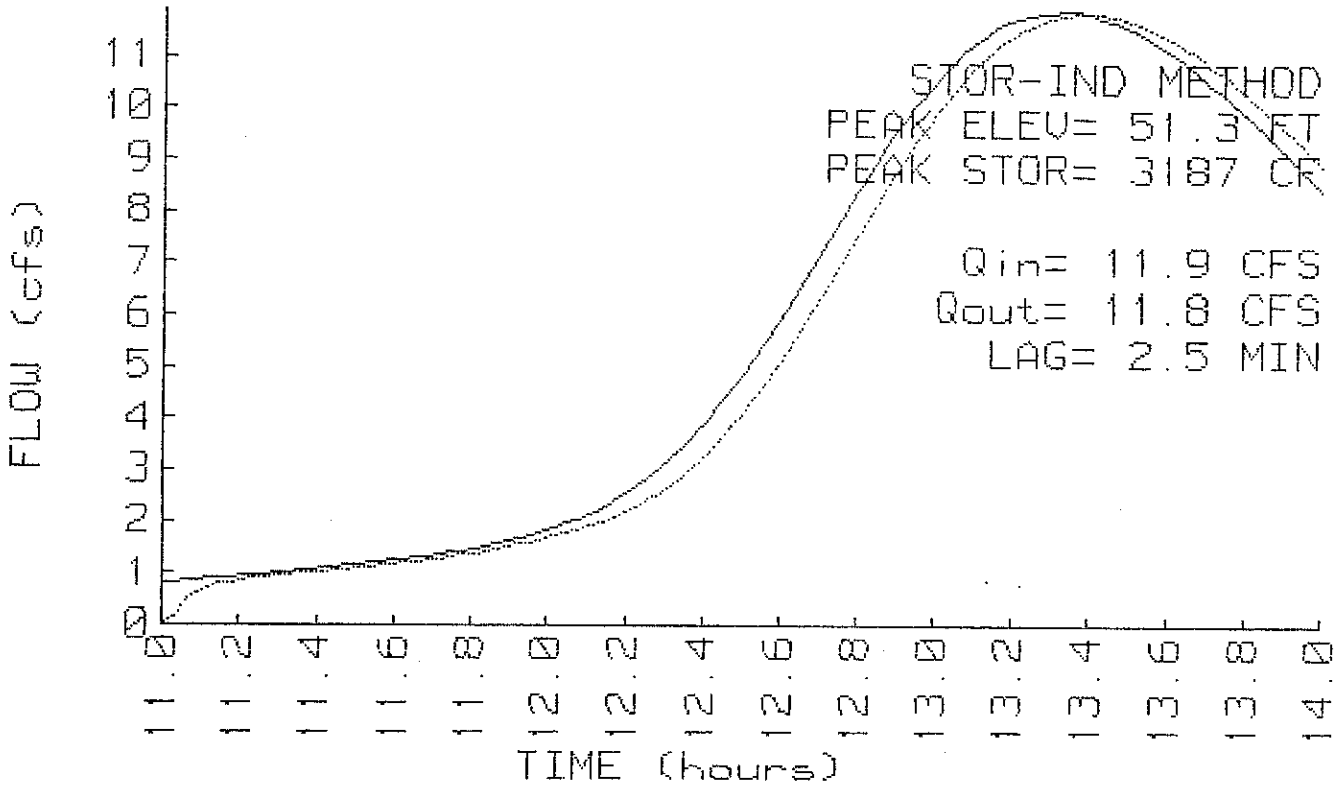
STOR-IND METHOD
PEAK ELEVATION= 51.3 FT
PEAK STORAGE = 3187 CF
Qin = 11.9 CFS @ 13.36 HRS
Qout= 11.8 CFS @ 13.40 HRS
ATTEN= 0 % LAG= 2.5 MIN
IN/OUT= 1.45 / 1.39 AF

INVERT (FT)	OUTLET DEVICES
49.5	**24" CULVERT**
	n=.012 L=115' S=.005'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
49.5	0.0	.2	.8	1.7	3.0	4.5	6.1	7.9	9.8	11.6
51.5	13.5	15.1	16.5	17.3	18.0	19.2	20.4	21.5	22.6	23.6
53.5	24.6	25.5	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.0
55.5	32.7	33.5	34.1	34.8	35.5	36.1	36.8	37.4	38.0	38.7
57.5	39.3	39.8	40.4	41.0	41.6	42.1	42.7	43.2	43.8	44.3
59.5	44.8	45.4	45.9	46.4						

POND 2 INFLOW & OUTFLOW
POND 2



POND 3 **POND 3**

STARTING ELEV= 63.0 FT
FLOOD ELEV= 67.0 FT

ELEVATION (FT)	CUM.STOR (CF)
63.0	0
67.0	16

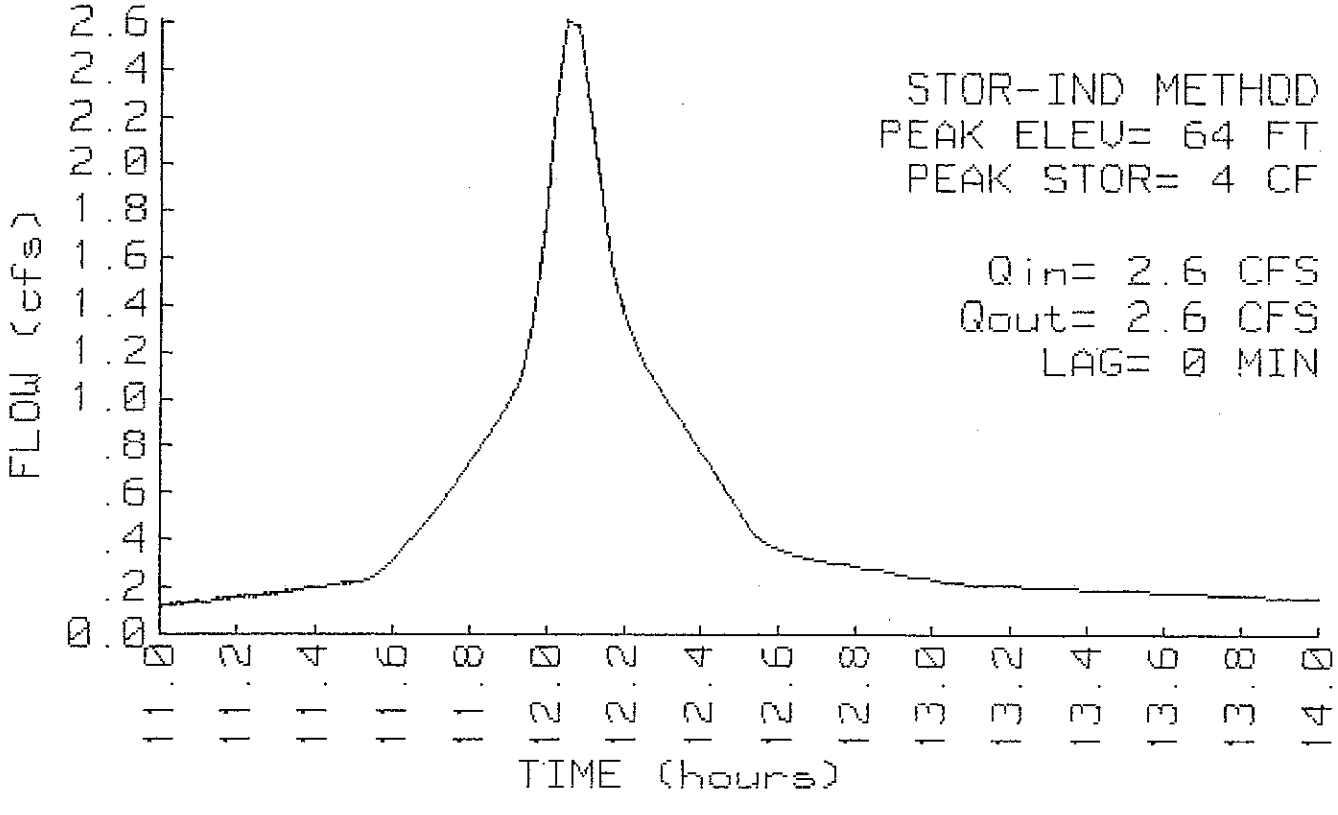
STOR-IND METHOD
PEAK ELEVATION= 64.0 FT
PEAK STORAGE = 4 CF
Qin = 2.6 CFS @ 12.06 HRS
Qout= 2.6 CFS @ 12.06 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .12 / .12 AF

INVERT (FT)	OUTLET DEVICES
63.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
63.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
64.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
65.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
66.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
67.0	6.7									

POND 3 INFLOW & OUTFLOW
POND 3



POND 4 **OND 4**

STARTING ELEV= 52.0 FT
FLOOD ELEV= 56.0 FT

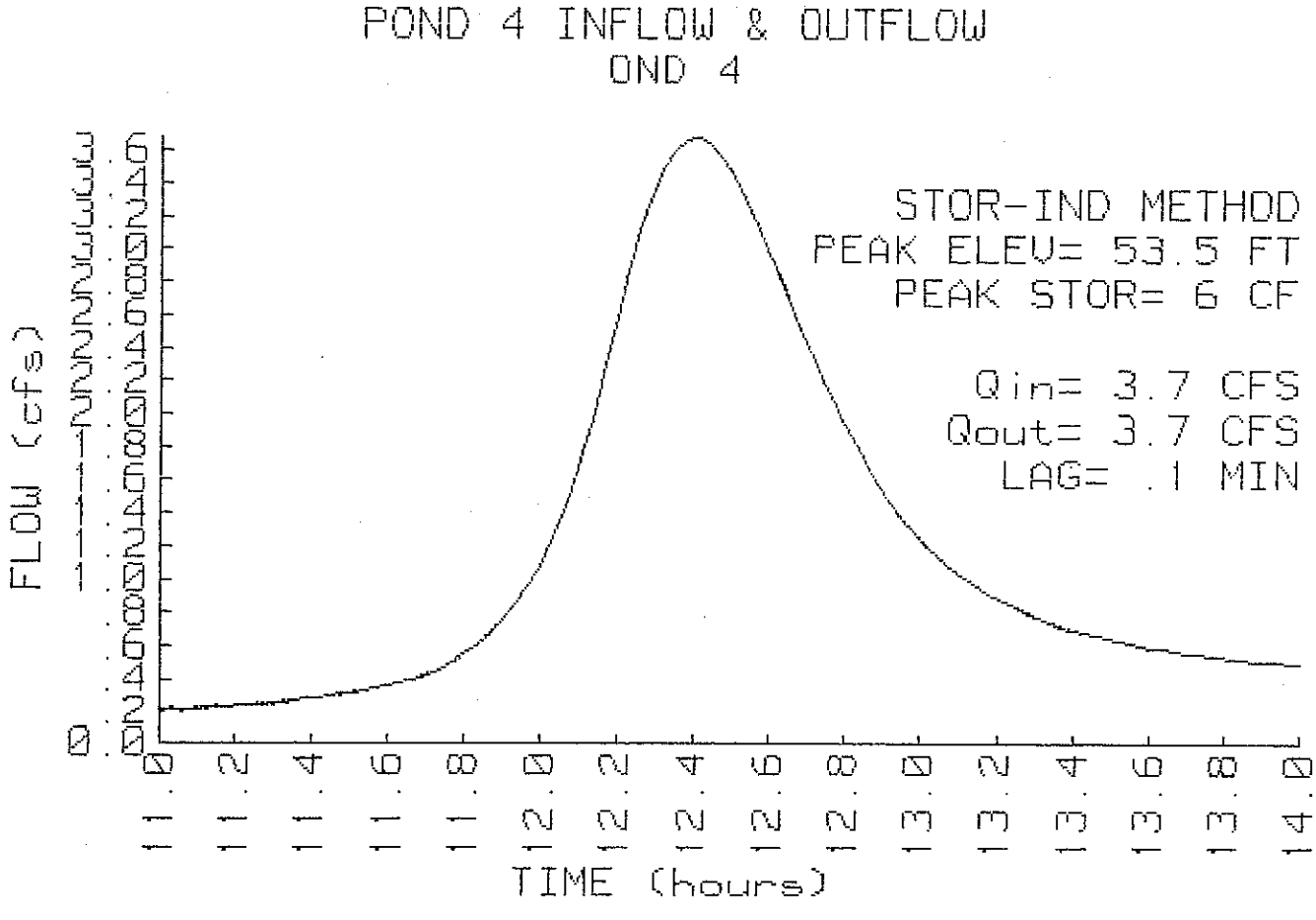
ELEVATION (FT)	CUM.STOR (CF)
52.0	0
56.0	16

STOR-IND METHOD
PEAK ELEVATION= 53.5 FT
PEAK STORAGE = 6 CF
Qin = 3.7 CFS @ 12.40 HRS
Qout= 3.7 CFS @ 12.40 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .30 / .30 AF

INVERT (FT)	OUTLET DEVICES
52.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
52.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
53.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
54.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
55.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
56.0	6.7									



POND 5 POND 5

STARTING ELEV= 54.0 FT
FLOOD ELEV= 60.0 FT

ELEVATION (FT)	AREA (SF)	INC.STOR (CF)	CUM.STOR (CF)
54.0	3962	0	0
56.0	6110	10072	10072
58.0	8482	14592	24664
60.0	10993	19475	44139

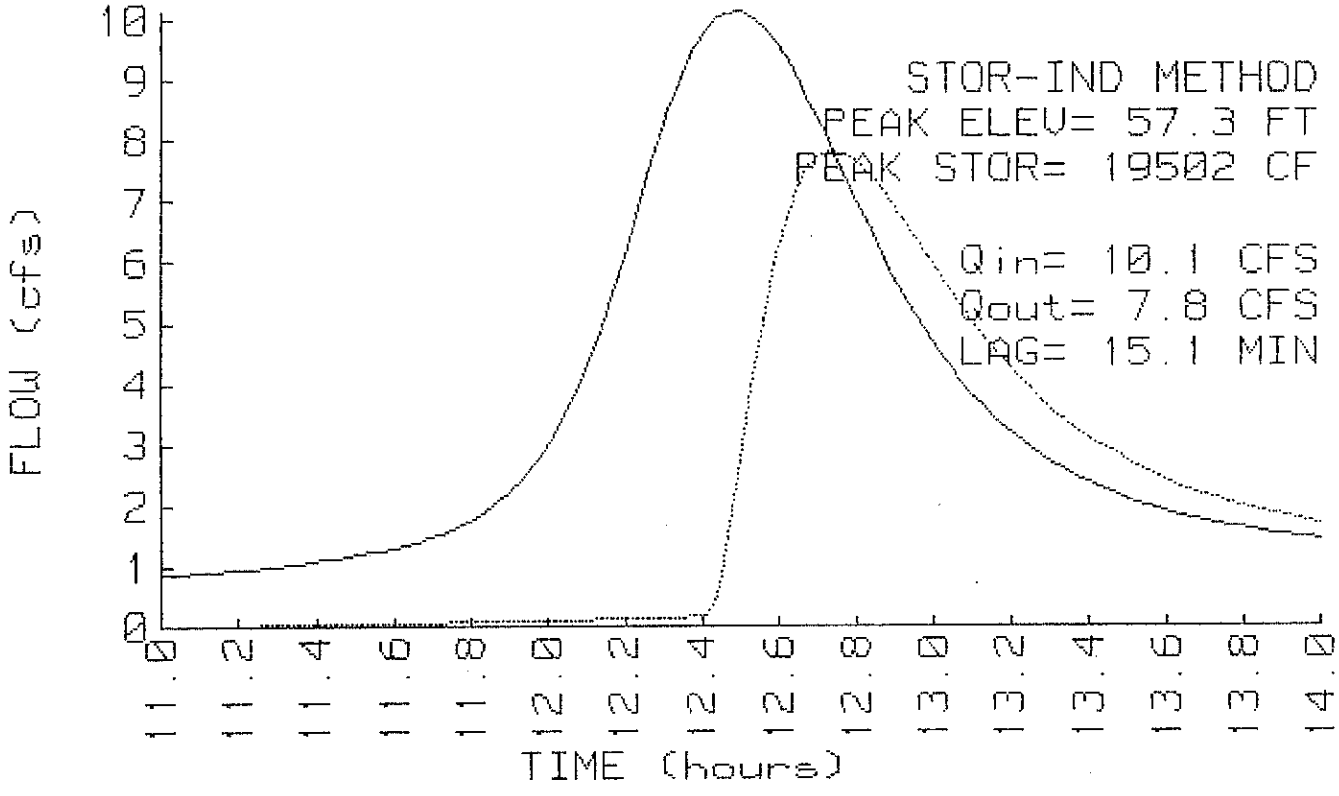
STOR-IND METHOD
PEAK ELEVATION= 57.3 FT
PEAK STORAGE = 19502 CF
Qin = 10.1 CFS @ 12.49 HRS
Qout= 7.8 CFS @ 12.74 HRS
ATTEN= 23 % LAG= 15.1 MIN
IN/OUT= .92 / .55 AF

INVERT (FT)	OUTLET DEVICES
54.0	**2" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)
56.6	**2' SHARP-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=3.27+.4 H/1 L=Length-2(.1 H)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
54.0	0.0	0.0	0.0	0.0	.1	.1	.1	.1	.1	.1
55.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
56.0	.1	.1	.2	.2	.2	.2	.2	.6	1.3	2.3
57.0	3.5	4.8	6.3	7.9	9.6	11.5	13.4	15.4	17.6	19.8
58.0	22.0	24.4	26.8	29.3	31.8	34.4	37.1	39.7	42.5	45.2
59.0	48.0	50.9	53.7	56.6	59.5	62.4	65.3	68.2	71.1	74.0
60.0	76.9									

POND 5 INFLOW & OUTFLOW
POND 5



POND 6 **POND 6**

STARTING ELEV= 47.0 FT
FLOOD ELEV= 51.0 FT

ELEVATION (FT)	CUM.STOR (CF)
47.0	0
51.0	16

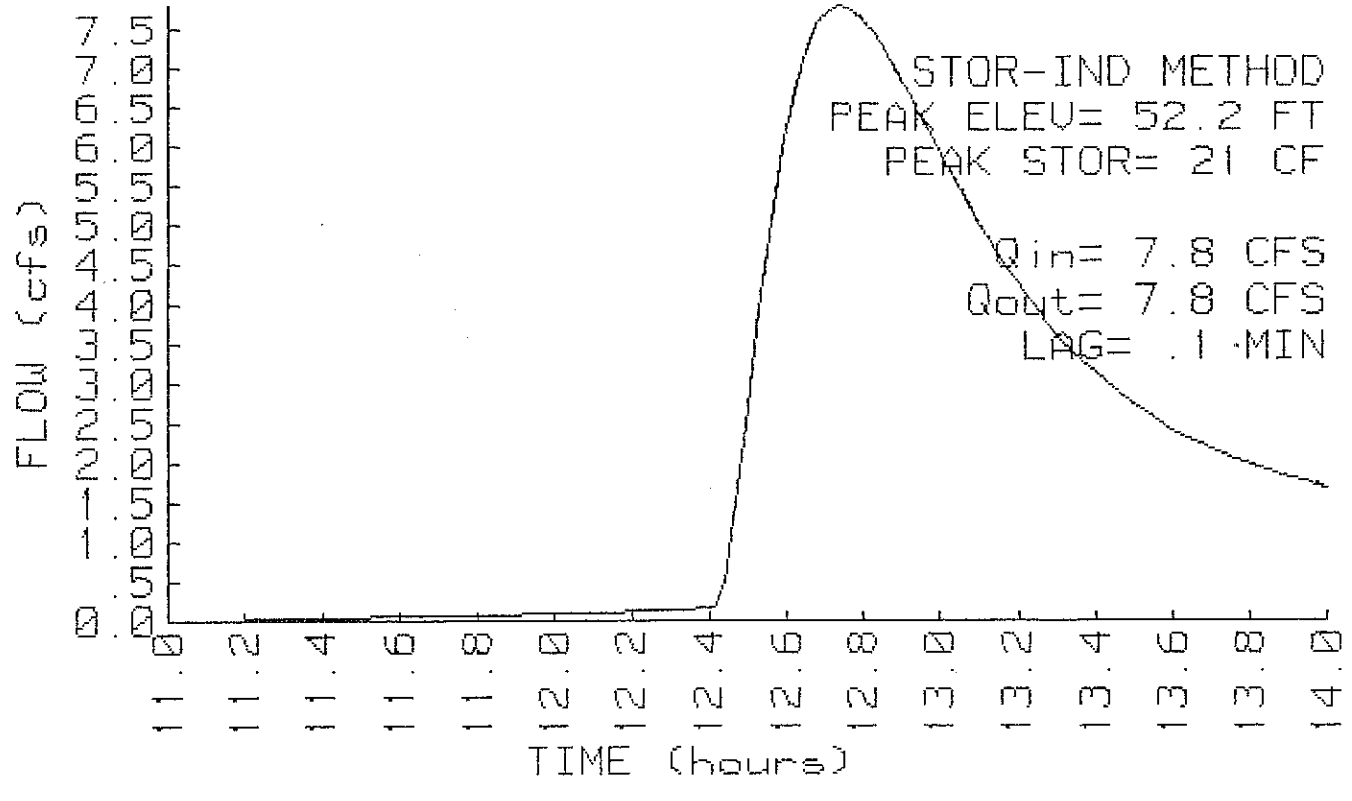
STOR-IND METHOD
PEAK ELEVATION= 52.2 FT
PEAK STORAGE = 21 CF
Qin = 7.8 CFS @ 12.74 HRS
Qout= 7.8 CFS @ 12.74 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .55 / .55 AF

INVERT (FT)	OUTLET DEVICES
47.0	**12" CULVERT** n=.012 L=65' S=.01'/' Ke=.5 Cc=.9 Cd=.6

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
47.0	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
48.0	2.7	2.9	3.2	3.4	3.6	3.8	3.9	4.1	4.2	4.4
49.0	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5	5.6
50.0	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6
51.0	6.7									

POND 6 INFLOW & OUTFLOW
POND 6



Finance Department

Duane G. Kline
Director

CITY OF PORTLAND

May 6, 1998

John Schmidt, Logistics Director
SuperValu
56 Milliken Street
Portland, ME 04103

Re: Performance Bond #5797212, dated July 26, 1994
56 Milliken Street Dock Addition and Related Site Work

Dear Mr. Schmidt:

This is to inform you that I am authorizing the release and return of the above-named performance bond. This bond was required by the city as a performance guarantee for the dock addition and related site work at the SuperValu Distribution Center.

As there is no mailing address on the face of the bond, I am unsure of whom to notify at the Safeco Insurance Company. I am therefor returning the bond to you, so that you may forward it to your insurance company.

If you require any further information, please let me know.

Sincerely,

Duane G. Kline
Finance Director

DGK.jlb

pc: Joe Gray, Director of Planning & Urban Development
Rick Knowland, Senior Planner