ATTACHMENT B

JN .06
Redington V. .farm Project
MDOT Design for Road Culverts

Storm Event	25-Yr		
Runoff Coefficient	0.16	to	0.20
Rainfall Intensity (in/h	6.4		

Culvert Station	Tributary Drainage Areas (SF)			Total Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
	1	2	3								
REDINGTON ACCESS ROAD											
1400+20	152,283	151,891		6.98	6.4		7.15		8.94	24	0.75
1406+00	499,991			11.48	6.4		11.75		14.69	30	0.73
1411+10	151,891			3.49	6.4		3.57		4.46	18	0.79
1415+20	375,912			8.63	6.4		8.84		11.05	24	0.87
1420+30	125,915			2.89	6.4		2.96		3.70	15	0.87
1424+20	142,234			3.27	6.4		3.34		4.18	15	0.99
1428+20	214,090			4.91	6.4		5.03		6.29	18	0.95
1432+30	398,809			9.16	6.4		9.38		11.72	24	0.89
1436+30	384,451			8.83	6.4		9.04		11.30	24	0.89
1440+30	748,116	99,529	131,726	22.48	6.4		23.02		28.78	36	0.82
1443+70	483,881	227,194	23,744	16.87	6.4		17.27		21.59	30	0.90
1447+70	288,673			6.63	6.4		6.79		8.48	24	0.75
1451+50	146,837	226,422	44,524	9.59	6.4		9.82		12.28	24	0.93
1455+60	120,618			2.77	6.4		2.84		3.54	15	0.87
1461+50	296,678			6.81	6.4		6.97		8.72	24	0.75
1465+80	226,422	44,524		6.22	6.4		6.37		7.96	24	0.71
1469+80	227,194	23,744		5.76	6.4		5.90		7.37	24	0.68
1473+70	99,529			2.28	6.4		2.34		2.92	15	0.76
1477+60	114,740	16,986		3.02	6.4		3.10		3.87	15	0.88
1482+30	50,386			1.16	6.4		1.18		1.48	12	0.72
1485+00	44,223			1.02	6.4		1.04		1.30	12	0.66
1487+60	16,986			0.39	6.4		0.40		0.50	12	0.50
1489+20	23,744			0.55	6.4		0.56		0.70	12	0.50
1490+80	44,524			1.02	6.4		1.05		1.31	12	0.66
1494+00	82,011			1.88	6.4		1.93		2.41	12	1.00

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Storm Event	25-Yr		
Runoff Coefficient	0.16	to	0.20
Rainfall Intensity (in/hr)	6.4		

Culvert Station	Tributary Drainage Area (SF)	Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
REDINGTON SUMMIT ROAD									
1205+00	14,310	0.33	6.4		0.34		0.42	12	< 0.58
1210+50	67,296	1.54	6.4		1.58		1.98	12	0.87
1212+80	528,095	12.12	6.4		12.41		15.52	30	0.76
1214+20	306,973	7.05	6.4		7.22		9.02	24	0.76
1218+30	124,673	2.86	6.4		2.93		3.66	15	0.88
1221+30	176,758	4.06	6.4		4.16		5.19	18	0.85
1224+30	153,054	3.51	6.4		3.60		4.50	18	0.79
1227+40	10,584	0.24	6.4		0.25		0.31	12	< 0.58
1229+70	14,892	0.34	6.4		0.35		0.44	12	< 0.58
1243+10	9,517	0.22	6.4		0.22		0.28	12	< 0.58
1251+70	95,879	2.20	6.4		2.25		2.82	15	0.75
1253+80	14,637	0.34	6.4		0.34		0.43	12	< 0.58
1257+50	48,102	1.10	6.4		1.13		1.41	12	0.73
REDINGTON ACCESS ROAD AND SPUR TO TURBINES 8,9,10 and 11									
1304+50	57,472	1.32	6.4		1.35		1.69	12	0.78
1308+30	53,300	1.22	6.4		1.25		1.57	12	0.75
1311+70	45,199	1.04	6.4		1.06		1.33	12	0.68
1314+10	12,606	0.29	6.4		0.30		0.37	12	< 0.58
1318+20	18,808	0.43	6.4		0.44		0.55	12	< 0.58
1322+40	26,974	0.62	6.4		0.63		0.79	12	< 0.58
1324+30	20,420	0.47	6.4		0.48		0.60	12	< 0.58
1332+30	40,572	0.93	6.4		0.95		1.19	12	0.65
REDINGTON SUMMIT ROAD									
1152+30	138,342	3.18	6.4		3.25		4.07	15	0.94
1156+00	67,351	1.55	6.4		1.58		1.98	12	0.87
1158+70	7,023	0.16	6.4		0.17		0.21	12	< 0.58
1160+00	19,095	0.44	6.4		0.45		0.56	12	< 0.58
1162+00	29,560	0.68	6.4		0.69		0.87	12	< 0.58
1164+00	31,912	0.73	6.4		0.75		0.94	12	< 0.58
1166+00	38,805	0.89	6.4		0.91		1.14	12	0.63
1168+00	17,911	0.41	6.4		0.42		0.53	12	< 0.58
1169+00	38,627	0.89	6.4		0.91		1.14	12	0.63
1172+00	13,103	0.30	6.4		0.31		0.39	12	< 0.58
1174+50	5,053	0.12	6.4		0.12		0.15	12	< 0.58
1177+00	97,816	2.25	6.4		2.30		2.87	15	0.79
1180+00	118,884	2.73	6.4		2.79		3.49	15	0.88
1183+00	113,303	2.60	6.4		2.66		3.33	15	0.83
1185+00	195,765	4.49	6.4		4.60		5.75	18	0.88
1189+00	196,656	4.51	6.4		4.62		5.78	18	0.88
1192+00	106,686	2.45	6.4		2.51		3.13	15	0.79

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Culvert Station	Tributary Drainage Area (SF)	Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
1195+00	71,933	1.65	6.4		1.69		2.11	12	0.90
1198+00	161,006	3.70	6.4		3.78		4.73	18	0.79
1200+50	40,010	0.92	6.4		0.94		1.18	12	0.63
REDINGTON ACCESS ROAD AND SPUR TO TURBINES 2,3,4									
1522+00	26,329	0.60	6.4		0.62		0.77	12	< 0.58
1520+40	38,553	0.89	6.4		0.91		1.13	12	0.63
Spur SW	12,835	0.29	6.4		0.30		0.38	12	< 0.58
1516+00	25,718	0.59	6.4		0.60		0.76	12	< 0.58
SW of T3	68,380	1.57	6.4		1.61		2.01	12	0.86
1513+00	6,229	0.14	6.4		0.15		0.18	12	< 0.58
1511+20	67,390	1.55	6.4		1.58		1.98	12	0.86
1505+50	25,462	0.58	6.4		0.60		0.75	12	< 0.58
1502+50	11,078	0.25	6.4		0.26		0.33	12	< 0.58

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Rainfall Intensity (in/hr)	6.4		

Culvert Station	Tributary Drainage Area (SF)	Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
UPPER BLACK NUBBLE SUMMIT ROAD									
2000+20	598,615	13.74	6.4		14.07		17.59	30	0.83
2002+20	261,048	5.99	6.4		6.14		7.67	24	0.65
2004+20	133,640	3.07	6.4		3.14		3.93	15	0.95
2007+20	45,303	1.04	6.4		1.06		1.33	12	0.67
2009+20	84,501	1.94	6.4		1.99		2.48	15	0.73
2011+20	245,803	5.64	6.4		5.78		7.22	24	0.62
2013+20	245,803	5.64	6.4		5.78		7.22	24	0.62
2016+20	51,518	1.18	6.4		1.21		1.51	12	0.73
2018+20	70,664	1.62	6.4		1.66		2.08	12	0.89
2025+20	95,597	2.19	6.4		2.25		2.81	15	0.78
2028+20	29,123	0.67	6.4		0.68		0.86	12	< 0.58
2030+20	43,389	1.00	6.4		1.02		1.27	12	0.67
2032+20	65,390	1.50	6.4		1.54		1.92	12	0.85
2034+20	45,720	1.05	6.4		1.07		1.34	12	0.67
2038+20	31,360	0.72	6.4		0.74		0.92	12	< 0.58
2040+20	71,764	1.65	6.4		1.69		2.11	12	0.89
2044+00	21,816	0.50	6.4		0.51		0.64	12	< 0.58
2048+50	39,378	0.90	6.4		0.93		1.16	12	0.65
2051+00	25,420	0.58	6.4		0.60		0.75	12	< 0.58
2053+00	51,580	1.18	6.4		1.21		1.52	12	0.74
2057+00	96,276	2.21	6.4		2.26		2.83	15	0.78
2060+00	126,881	2.91	6.4		2.98		3.73	15	0.93
UPPER BLACK NUBBLE ACCESS ROAD									
2100+30	148,085	3.40	6.4		3.48		4.35	18	0.77
2104+00	646,086	14.83	6.4		15.19		18.99	30	0.86
2106+00	203,536	4.67	6.4		4.78		5.98	18	0.95
2108+30	97,902	2.25	6.4		2.30		2.88	15	0.80
2111+30	68,161	1.56	6.4		1.60		2.00	12	0.88
2114+20	44,265	1.02	6.4		1.04		1.30	12	0.67
2117+40	26,895	0.62	6.4		0.63		0.79	12	< 0.58
2120+00	45,014	1.03	6.4		1.06		1.32	12	0.67
2122+00	50,885	1.17	6.4		1.20		1.50	12	0.73
2124+00	35,179	0.81	6.4		0.83		1.03	12	0.59
2126+00	22,638	0.52	6.4		0.53		0.67	12	< 0.58
2128+00	12,226	0.28	6.4		0.29		0.36	12	< 0.58
2130+50	17,217	0.40	6.4		0.40		0.51	12	< 0.58
2133+50	40,260	0.92	6.4		0.95		1.18	12	0.59
2136+00	66,818	1.53	6.4		1.57		1.96	12	0.88
2140+30	113,528	2.61	6.4		2.67		3.34	15	0.85

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Culvert Station	Tributary Drainage Area (SF)	Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
SPUR TO TURBINE 17									
2249+50	13,905	0.32	6.4		0.33		0.41	12	< 0.58
2251+50	19,219	0.44	6.4		0.45		0.56	12	< 0.58
2253+00	20,013	0.46	6.4		0.47		0.59	12	< 0.58
SPUR TO TURBINE 15									
2355+00	83,563	1.92	6.4		1.96		2.46	15	0.72
2355+50	87,857	2.02	6.4		2.07		2.58	15	0.73
2358+50	59,790	1.37	6.4		1.41		1.76	12	0.81
2361+50	8,284	0.19	6.4		0.19		0.24	12	< 0.58
2362+00	22,496	0.52	6.4		0.53		0.66	12	< 0.58
2363+30	11,379	0.26	6.4		0.27		0.33	12	< 0.58
2365+00	13,062	0.30	6.4		0.31		0.38	12	< 0.58
SPUR TO TURBINE 14									
2451+30	44,541	1.02	6.4		1.05		1.31	12	0.67
2452+70	36,475	0.84	6.4		0.86		1.07	12	0.61
2453+30	11,372	0.26	6.4		0.27		0.33	12	< 0.58
SPUR TO TURBINE 13									
2400+70	56,253	1.29	6.4		1.32		1.65	12	0.75
2403+50	93,571	2.15	6.4		2.20		2.75	15	0.90
2405+50	20,108	0.46	6.4		0.47		0.59	12	< 0.58
2406+20	32,237	0.74	6.4		0.76		0.95	12	< 0.58
2407+00	122,234	2.81	6.4		2.87		3.59	15	0.92
2410+50	15,620	0.36	6.4		0.37		0.46	12	< 0.58
LOWER BLACK NUBBLE SUMMIT ROAD									
2801+30	80,672	1.85	6.4		1.90		2.37	15	0.99
2803+30	105,891	2.43	6.4		2.49		3.11	15	0.80
2805+30	34,734	0.80	6.4		0.82		1.02	12	0.59
2807+30	26,308	0.60	6.4		0.62		0.77	12	< 0.58
2810+00	10,116	0.23	6.4		0.24		0.30	12	< 0.58
2821+00	11,515	0.26	6.4		0.27		0.34	12	< 0.58
2823+00	27,917	0.64	6.4		0.66		0.82	12	< 0.58
2825+00	35,193	0.81	6.4		0.83		1.03	12	0.59
2827+00	17,130	0.39	6.4		0.40		0.50	12	< 0.58
2829+00	20,111	0.46	6.4		0.47		0.59	12	< 0.58
2831+00	25,193	0.58	6.4		0.59		0.74	12	< 0.58
2833+00	37,211	0.85	6.4		0.87		1.09	12	0.59
2835+00	51,193	1.18	6.4		1.20		1.50	12	0.74

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MDOT Design for Road Culverts

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2837+00	52,944	1.22	6.4		1.24		1.56	12	0.74
2839+00	67,359	1.55	6.4		1.58		1.98	12	0.88
2841+00	60,022	1.38	6.4		1.41		1.76	12	0.81
2843+00	51,297	1.18	6.4		1.21		1.51	12	0.74
2845+00	62,136	1.43	6.4		1.46		1.83	12	0.84
2847+00	102,558	2.35	6.4		2.41		3.01	15	0.80
2849+00	94,561	2.17	6.4		2.22		2.78	15	0.77
2852+00	69,469	1.59	6.4		1.63		2.04	12	0.89
2853+30	34,181	0.78	6.4		0.80		1.00	12	0.58
2855+00	15,882	0.36	6.4		0.37		0.47	12	< 0.58
2858+00	23,344	0.54	6.4		0.55		0.69	12	< 0.58
2864+50	13,272	0.30	6.4		0.31		0.39	12	< 0.58
2873+00	21,245	0.49	6.4		0.50		0.62	12	< 0.58
2876+00	6,327	0.15	6.4		0.15		0.19	12	< 0.58
2883+50	50,094	1.15	6.4		1.18		1.47	12	0.70
LOWER BLACK NUBBLE ACCESS ROAD									
2750+00	76,757	1.76	6.4		1.80		2.26	12	0.97
2752+00	457,952	10.51	6.4		10.77		13.46	24	0.99
2754+00	120,757	2.77	6.4		2.84		3.55	15	0.88
SPUR TO TURBINES 20, 21, 22									
2900+00	25,486	0.59	6.4		0.60		0.75	12	< 0.58
2901+00	8,230	0.19	6.4		0.19		0.24	12	< 0.58
2904+00	9,311	0.21	6.4		0.22		0.27	?	?
2905+50	30,377	0.70	6.4		0.71		0.89	12	< 0.58
2907+00	26,183	0.60	6.4		0.62		0.77	12	< 0.58
2909+00	31,540	0.72	6.4		0.74		0.93	12	< 0.58
2911+00	34,003	0.78	6.4		0.80		1.00	12	0.58
2913+00	9,141	0.21	6.4		0.21		0.27	12	< 0.58
2915+00	17,482	0.40	6.4		0.41		0.51	12	< 0.58
2917+00	34,202	0.79	6.4		0.80		1.01	12	0.58
2919+00	34,777	0.80	6.4		0.82		1.02	12	0.58
2920+80	122,910	2.82	6.4		2.89		3.61	15	0.90
2923+00	121,767	2.80	6.4		2.86		3.58	15	0.90
2925+00	115,202	2.64	6.4		2.71		3.39	15	0.87
2927+00	130,670	3.00	6.4		3.07		3.84	15	0.93
2929+00	104,331	2.40	6.4		2.45		3.07	15	0.82
2931+00	106,202	2.44	6.4		2.50		3.12	15	0.82
2933+00	97,610	2.24	6.4		2.29		2.87	15	0.80
2935+00	142,340	3.27	6.4		3.35		4.18	15	1.00
2937+00	65,438	1.50	6.4		1.54		1.92	12	0.85
2939+00	50,694	1.16	6.4		1.19		1.49	12	0.74
2941+00	37,676	0.86	6.4		0.89		1.11	12	0.63
2943+00	20,765	0.48	6.4		0.49		0.61	12	< 0.58
2945+00	6,156	0.14	6.4		0.14		0.18	12	< 0.58
2948+50	24,162	0.55	6.4		0.57		0.71	12	< 0.58
2950+00	23,448	0.54	6.4		0.55		0.69	12	< 0.58
2952+00	39,060	0.90	6.4		0.92		1.15	12	0.64

SPUR TO TURBINE 19									
2200+00	38,611	0.89	6.4		0.91		1.13	12	0.64
2206+00	9,758	0.22	6.4		0.23		0.29	12	< 0.58

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Redington . .farm Project
MDOT Design for Road Culverts

Runoff Coefficient	0.16	to	0.20
Rainfall Intensity (in/hr)	6.4	for 25 yr	storm event
Rainfall Intensity (in/hr)	7.8	for 100 yr	storm event

Culvert Station	Tributary Drainage Area (SF)	Tributary Drainage Area (AC)	Intensity (in/hr)	c =	Flow (cfs) 0.16	to	Flow (cfs) 0.20	Culvert Size (in)	Hw/d
RATIONAL METHOD: INSET AREA 1,2, AND 7 AND REDINGTON CASE STUDY CALCULATIONS									
Figure A	981,929	22.54	6.4		23.08		28.85	36	0.83
Figure B	2,154,235	49.45	6.4		50.64		63.30	48	0.88
Figure C	1,049,880	24.10	6.4		24.68		30.85	36	0.86
Figure 1	986,898	22.66	7.8		28.27		35.34	36	0.83
Figure 2	737,880	16.94	7.8		21.14		26.43	36	0.95
Figure 3	531,548	12.20	7.8		15.23		19.04	30	0.78
Figure 4	181,465	4.17	6.4		4.27		5.33	18	0.83

REDINGTON ACCESS AND SUMMIT ROADWAY CULVERTS

BPR 1021 SERIES CALCULATIONS

			Reference
RF	=	Rainfall Factor	Fig 12-5
LF	=	Land Use Factor	Fig 12-6(b)
FF	=	Frequency Factor	Fig 12-6(c)
Q_I	=	Runoff Index (cfs)	Fig 12-6(a)
Q_{design}	=	Design Flow (cfs)	unknown

Q_{design} = RF X LF X FF X Q_I

Culvert Station	Storm Event	RF	LF	FF	Q_I (cfs)	Q_{design} (cfs)
1440+23	100 year	0.79	0.3	1.39	73	24.05
1444+63	100 year	0.79	0.3	1.39	60	19.77
1212+70	100 year	0.79	0.3	1.39	47	15.48
1221+28	25 year	0.79	0.3	1.00	23	5.45

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: Figure 1
Runoff Area=22.646 ac Runoff Depth=1.79"
Flow Length=3,076' Tc=33.5 min CN=70 Runoff=27.32 cfs 3.370 af

Subcatchment 2: Figure 2
Runoff Area=16.926 ac Runoff Depth=1.79"
Flow Length=2,779' Tc=30.2 min CN=70 Runoff=21.41 cfs 2.522 af

Subcatchment 3: Figure 3
Runoff Area=12.200 ac Runoff Depth=1.79"
Flow Length=1,528' Tc=26.8 min CN=70 Runoff=16.28 cfs 1.821 af

Subcatchment 4: Figure 4
Runoff Area=4.170 ac Runoff Depth=1.87"
Flow Length=897' Tc=27.6 min CN=71 Runoff=5.74 cfs 0.648 af

Subcatchment A: Inset Area 1
Runoff Area=22.540 ac Runoff Depth=1.79"
Flow Length=2,186' Tc=33.0 min CN=70 Runoff=27.37 cfs 3.355 af

Subcatchment B: Inset Area 2
Runoff Area=49.454 ac Runoff Depth=1.76"
Flow Length=3,960' Tc=67.0 min CN=70 Runoff=40.61 cfs 7.251 af

Subcatchment C: Inset Area 7
Runoff Area=24.102 ac Runoff Depth=1.79"
Flow Length=2,782' Tc=29.5 min CN=70 Runoff=30.81 cfs 3.592 af

Total Runoff Area = 152.038 ac Runoff Volume = 22.558 af Average Runoff Depth = 1.78"

Subcatchment 1: Figure 1

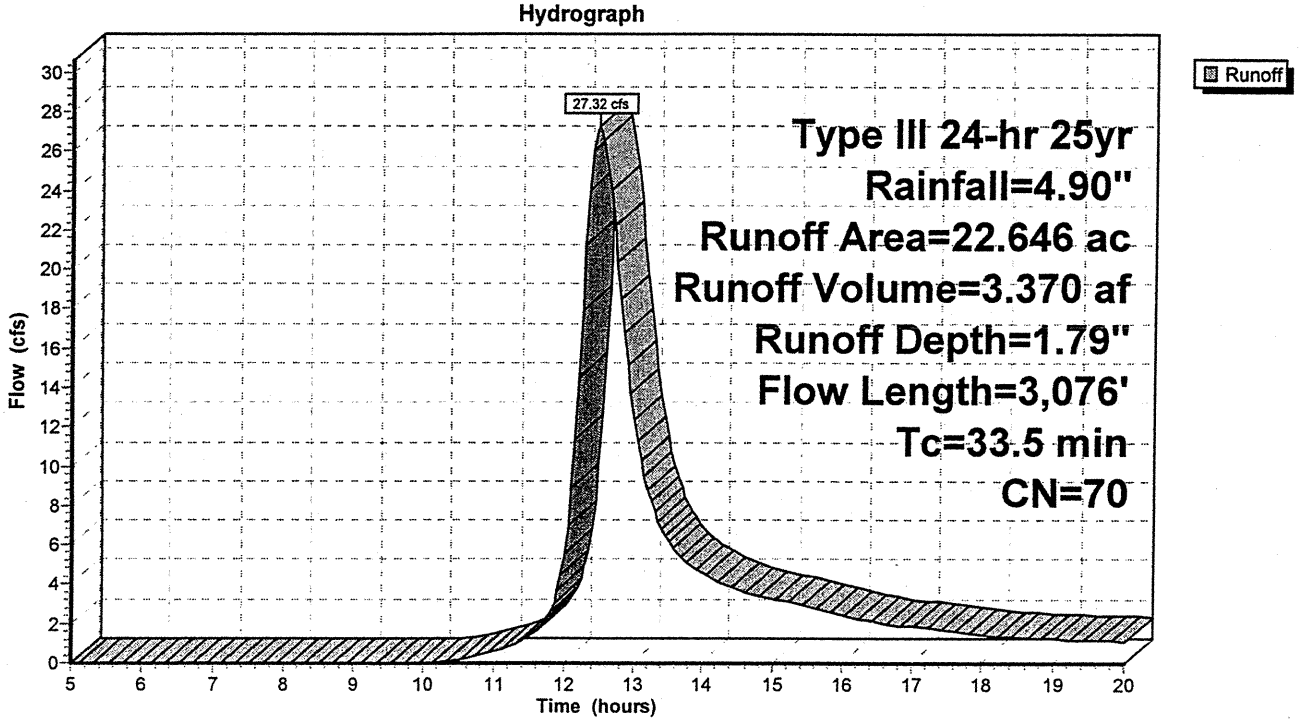
Runoff = 27.32 cfs @ 12.49 hrs, Volume= 3.370 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
22.380	70	Forest
0.266	89	Gravel
22.646	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.1500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
1.7	208	0.1700	2.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.4	360	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.0	402	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.3	2,056	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	3,076	Total			

Subcatchment 1: Figure 1



Subcatchment 2: Figure 2

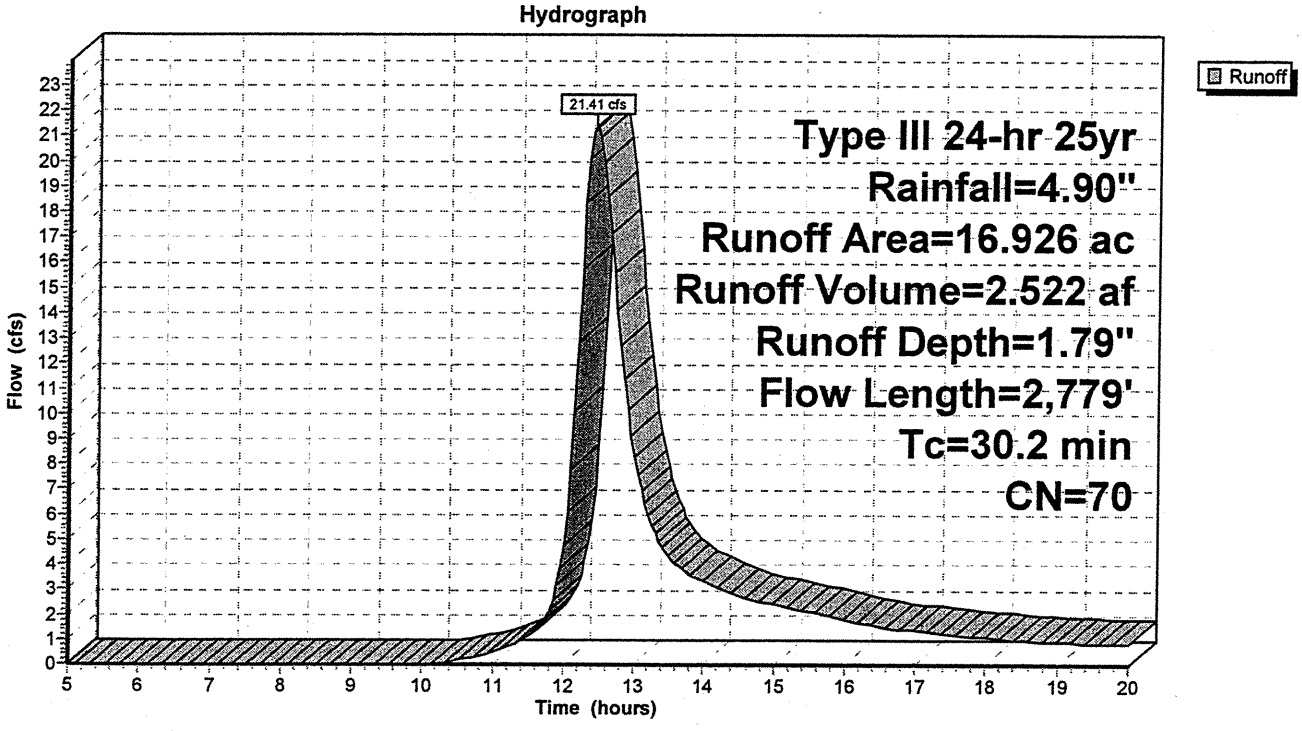
Runoff = 21.41 cfs @ 12.44 hrs, Volume= 2.522 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
16.660	70	Forest
0.266	89	Gravel
16.926	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.1600	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
1.9	258	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.0	755	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.1	331	0.1300	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	1,000	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	385	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.2	2,779	Total			

Subcatchment 2: Figure 2



Subcatchment 3: Figure 3

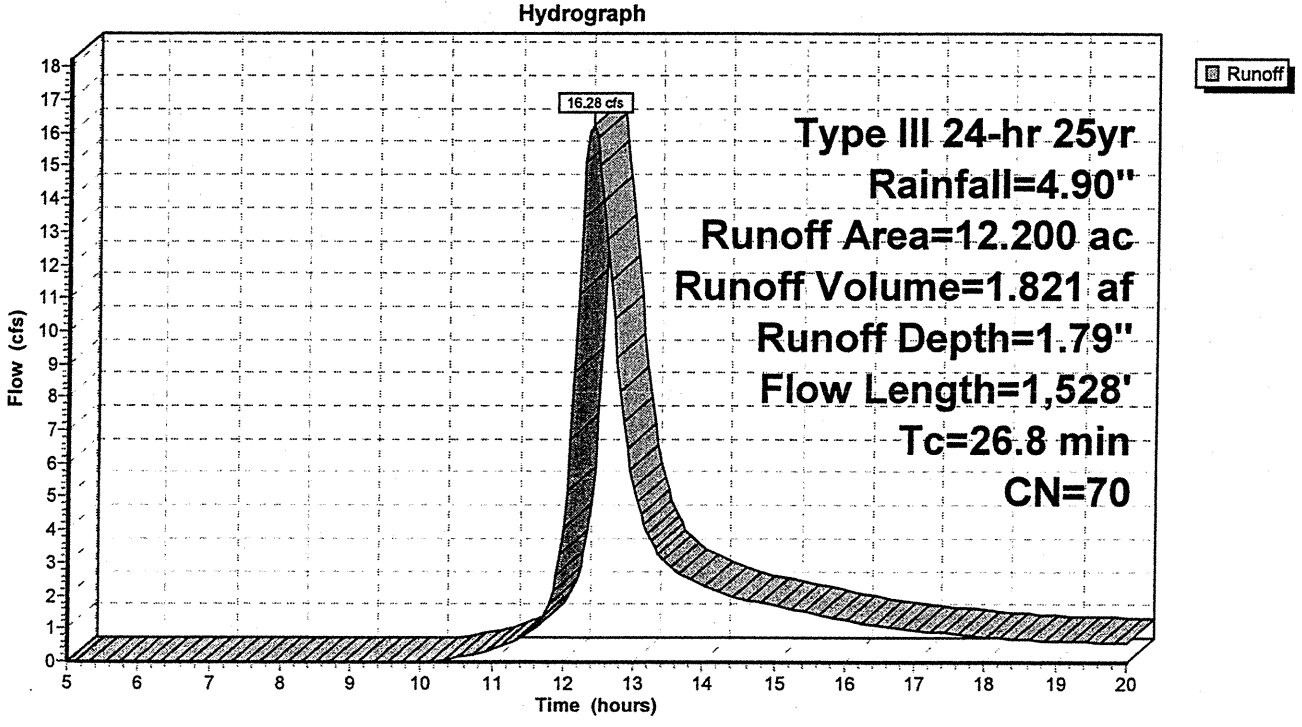
Runoff = 16.28 cfs @ 12.39 hrs, Volume= 1.821 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
12.000	70	Forest
0.200	89	Gravel
12.200	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.1000	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
7.6	818	0.1300	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.3	343	0.0700	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.1	317	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.8	1,528	Total			

Subcatchment 3: Figure 3



Subcatchment 4: Figure 4

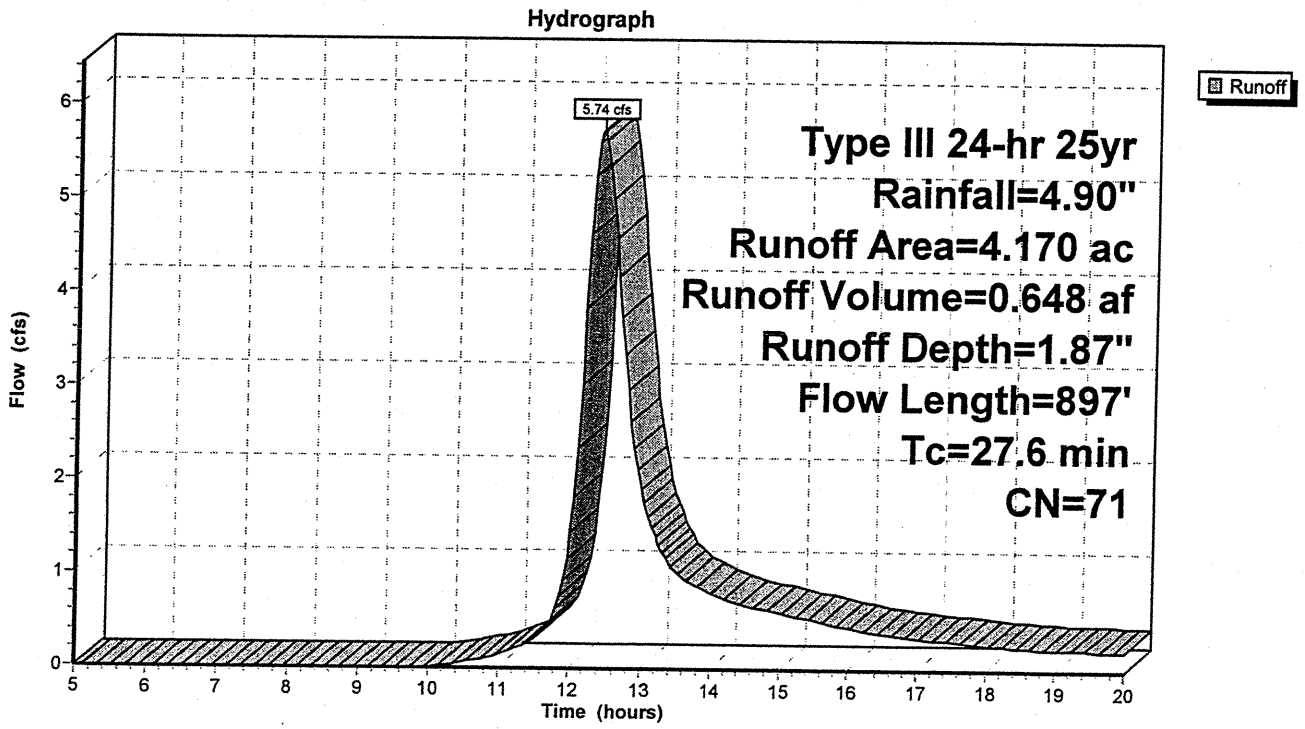
Runoff = 5.74 cfs @ 12.40 hrs, Volume= 0.648 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
4.000	70	Forest
0.170	89	Gravel
4.170	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	50	0.0300	0.0		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
3.5	232	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	147	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	213	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.1	255	0.1700	2.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.6	897	Total			

Subcatchment 4: Figure 4



Subcatchment A: Inset Area 1

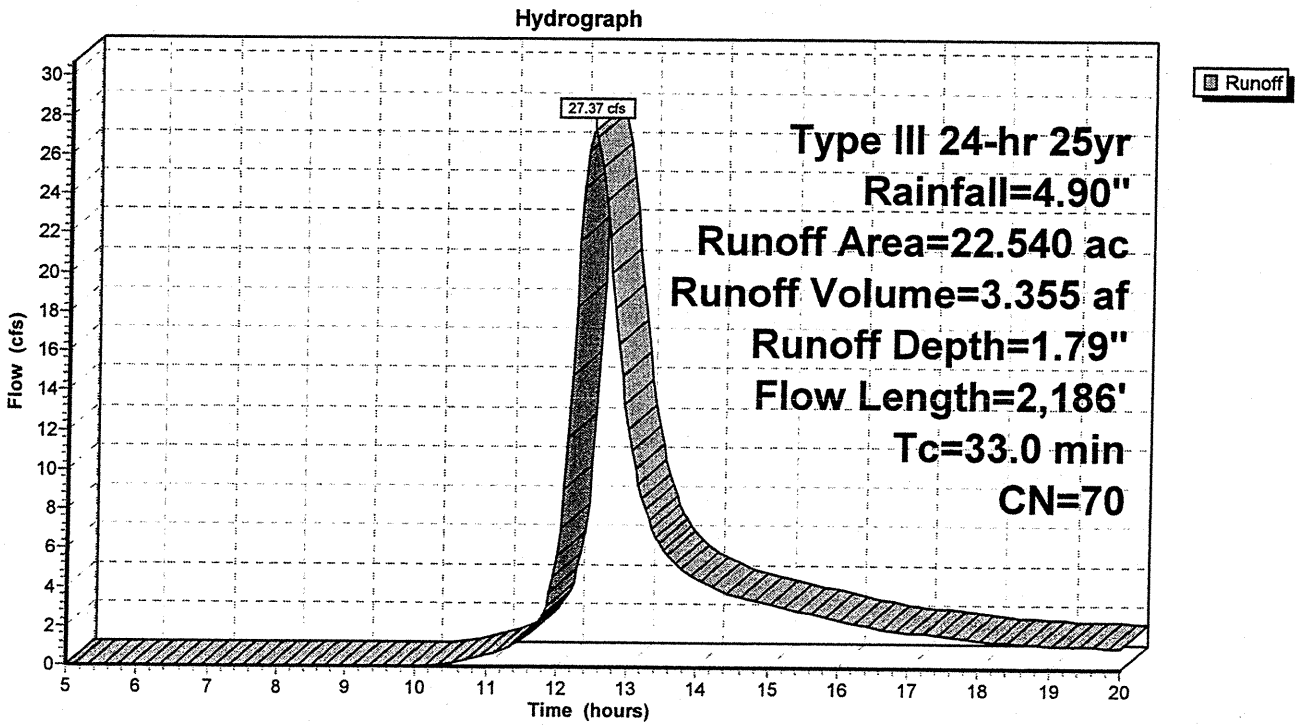
Runoff = 27.37 cfs @ 12.48 hrs, Volume= 3.355 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
22.010	70	Forest
0.530	89	Gravel
22.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	50	0.0500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
8.2	820	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	550	0.2200	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	766	0.2300	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	2,186	Total			

Subcatchment A: Inset Area 1



Subcatchment B: Inset Area 2

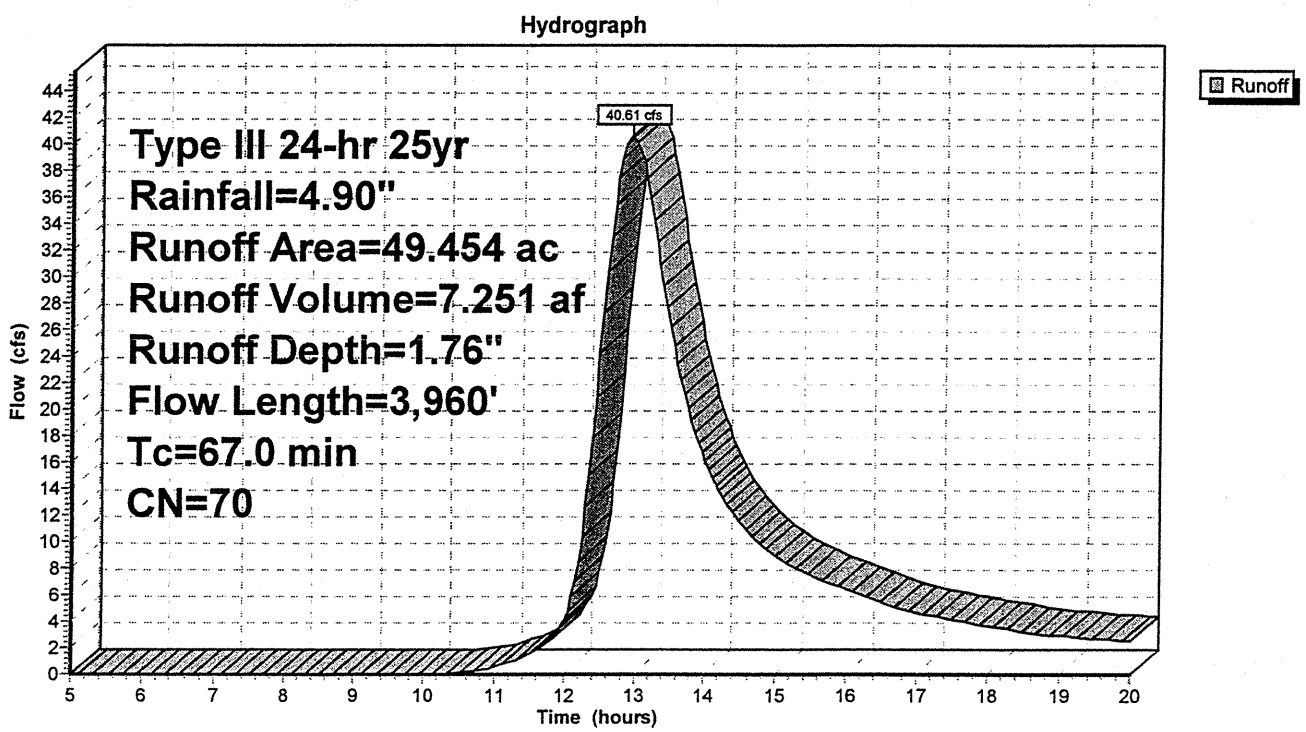
Runoff = 40.61 cfs @ 12.93 hrs, Volume= 7.251 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
48.988	70	Forest
0.466	89	Gravel
49.454	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	50	0.0500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
10.8	916	0.0800	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.3	1,108	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.5	736	0.0100	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,150	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
67.0	3,960	Total			

Subcatchment B: Inset Area 2



Subcatchment C: Inset Area 7

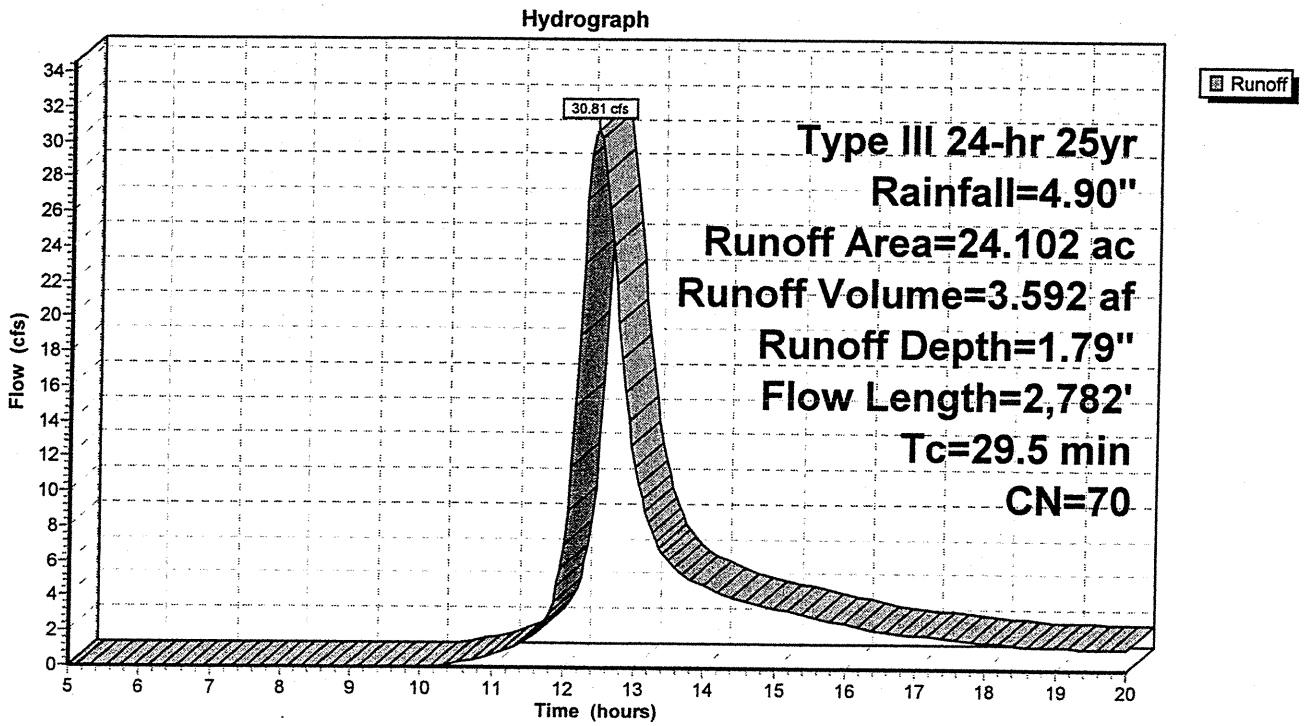
Runoff = 30.81 cfs @ 12.43 hrs, Volume= 3.592 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25yr Rainfall=4.90"

Area (ac)	CN	Description
23.769	70	Forest
0.333	89	Gravel
24.102	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.4000	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
2.5	467	0.4000	3.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	1,585	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.1	680	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.5	2,782	Total			

Subcatchment C: Inset Area 7



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: Figure 1 Runoff Area=22.646 ac Runoff Depth=2.50"
Flow Length=3,076' Tc=33.5 min CN=70 Runoff=38.49 cfs 4.712 af

Subcatchment 2: Figure 2 Runoff Area=16.926 ac Runoff Depth=2.50"
Flow Length=2,779' Tc=30.2 min CN=70 Runoff=30.17 cfs 3.527 af

Subcatchment 3: Figure 3 Runoff Area=12.200 ac Runoff Depth=2.50"
Flow Length=1,528' Tc=26.8 min CN=70 Runoff=22.95 cfs 2.545 af

Subcatchment 4: Figure 4 Runoff Area=4.170 ac Runoff Depth=2.59"
Flow Length=897' Tc=27.6 min CN=71 Runoff=8.02 cfs 0.901 af

Subcatchment A: Inset Area 1 Runoff Area=22.540 ac Runoff Depth=2.50"
Flow Length=2,186' Tc=33.0 min CN=70 Runoff=38.60 cfs 4.691 af

Subcatchment B: Inset Area 2 Runoff Area=49.454 ac Runoff Depth=2.46"
Flow Length=3,960' Tc=67.0 min CN=70 Runoff=57.44 cfs 10.150 af

Subcatchment C: Inset Area 7 Runoff Area=24.102 ac Runoff Depth=2.50"
Flow Length=2,782' Tc=29.5 min CN=70 Runoff=43.44 cfs 5.023 af

Total Runoff Area = 152.038 ac Runoff Volume = 31.550 af Average Runoff Depth = 2.49"

Subcatchment 1: Figure 1

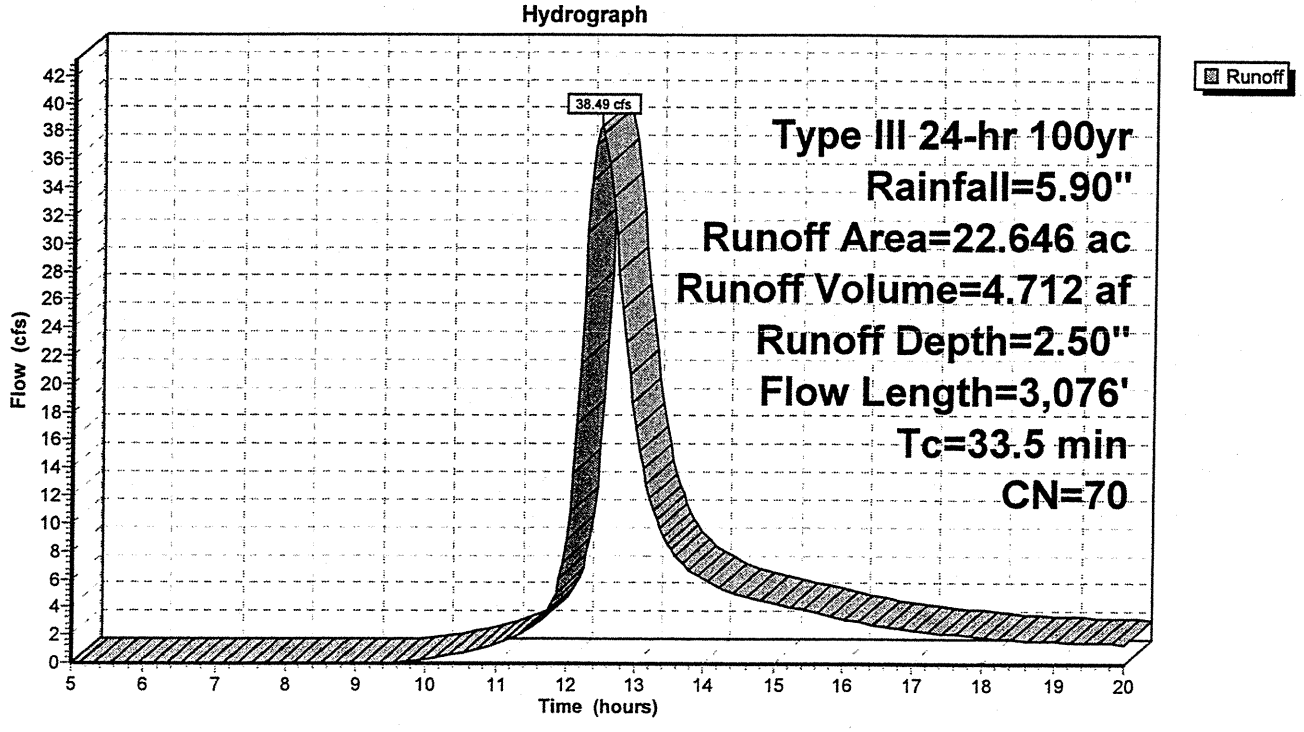
Runoff = 38.49 cfs @ 12.48 hrs, Volume= 4.712 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
22.380	70	Forest
0.266	89	Gravel
22.646	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.1500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
1.7	208	0.1700	2.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.4	360	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.0	402	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.3	2,056	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	3,076	Total			

Subcatchment 1: Figure 1



Subcatchment 2: Figure 2

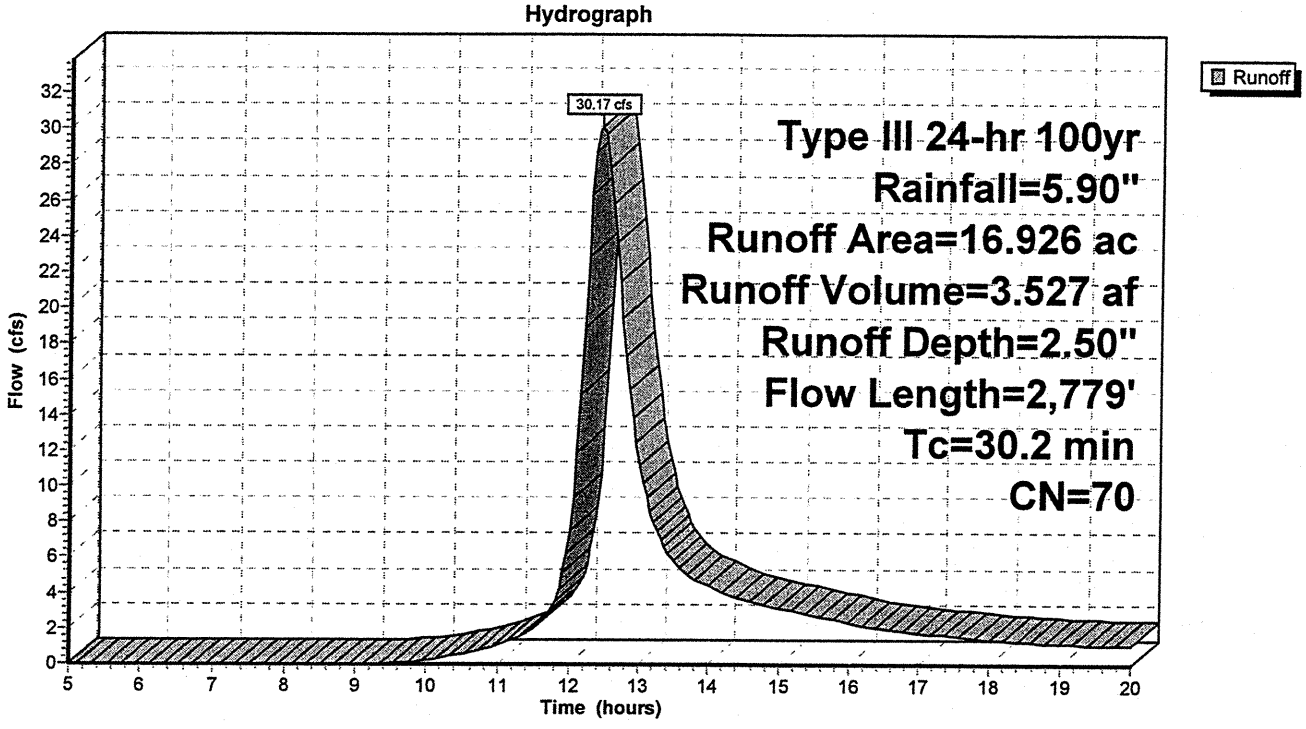
Runoff = 30.17 cfs @ 12.43 hrs, Volume= 3.527 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
16.660	70	Forest
0.266	89	Gravel
16.926	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.1600	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
1.9	258	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.0	755	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.1	331	0.1300	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.7	1,000	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	385	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.2	2,779	Total			

Subcatchment 2: Figure 2



Subcatchment 3: Figure 3

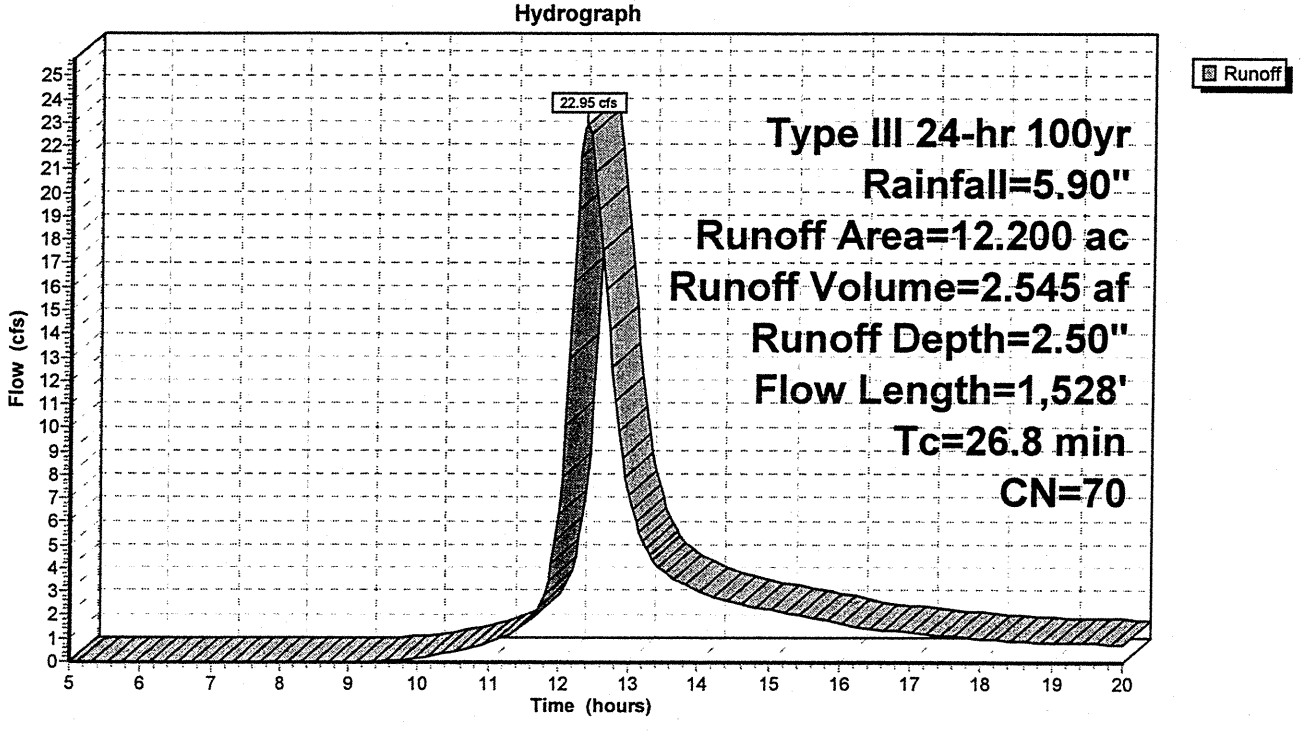
Runoff = 22.95 cfs @ 12.38 hrs, Volume= 2.545 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
12.000	70	Forest
0.200	89	Gravel
12.200	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.1000	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
7.6	818	0.1300	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.3	343	0.0700	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.1	317	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.8	1,528	Total			

Subcatchment 3: Figure 3



Subcatchment 4: Figure 4

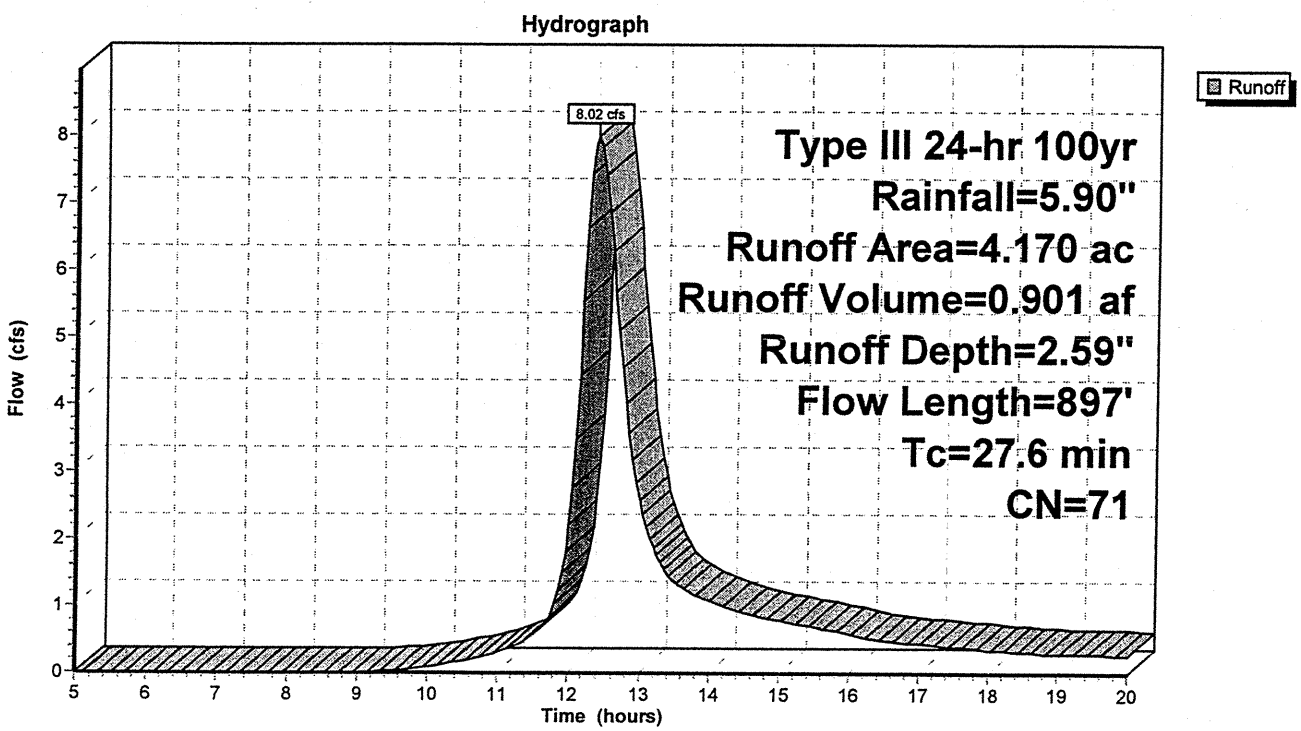
Runoff = 8.02 cfs @ 12.39 hrs, Volume= 0.901 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
4.000	70	Forest
0.170	89	Gravel
4.170	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2	50	0.0300	0.0		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
3.5	232	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	147	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	213	0.2500	2.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.1	255	0.1700	2.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.6	897	Total			

Subcatchment 4: Figure 4



Subcatchment A: Inset Area 1

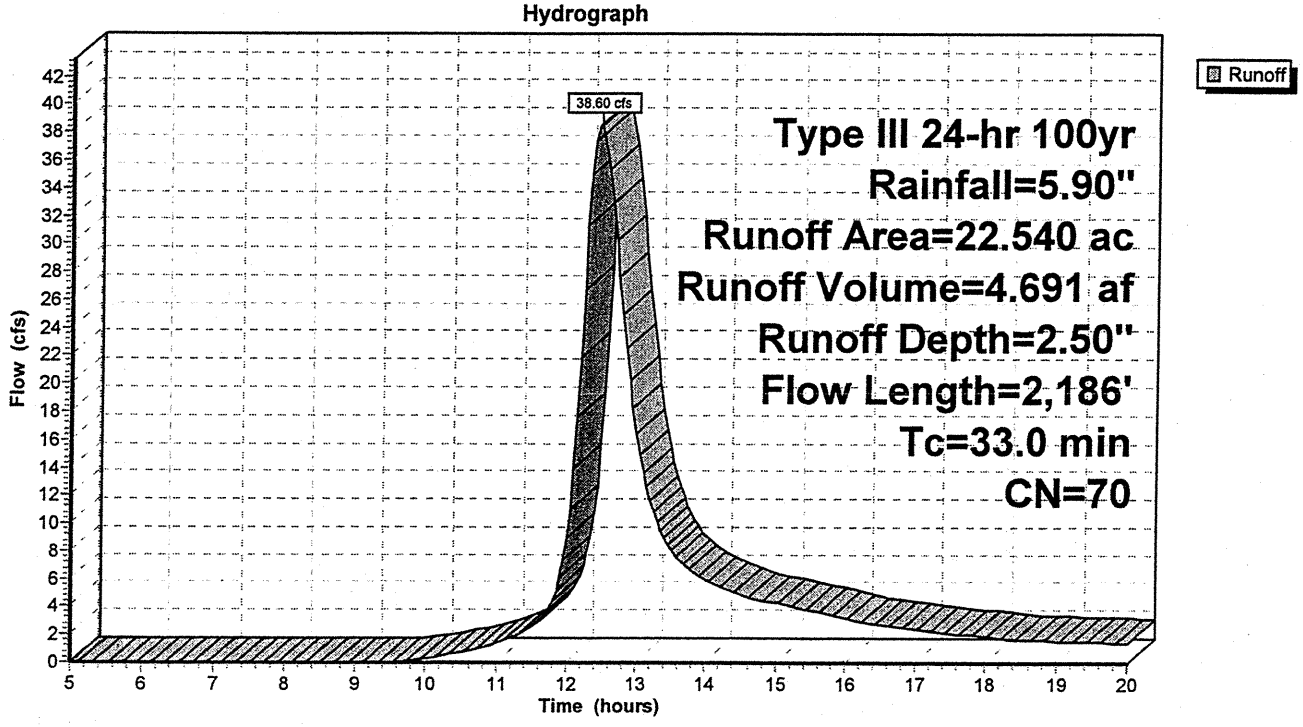
Runoff = 38.60 cfs @ 12.47 hrs, Volume= 4.691 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
22.010	70	Forest
0.530	89	Gravel
22.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	50	0.0500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
8.2	820	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	550	0.2200	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	766	0.2300	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	2,186	Total			

Subcatchment A: Inset Area 1



Subcatchment B: Inset Area 2

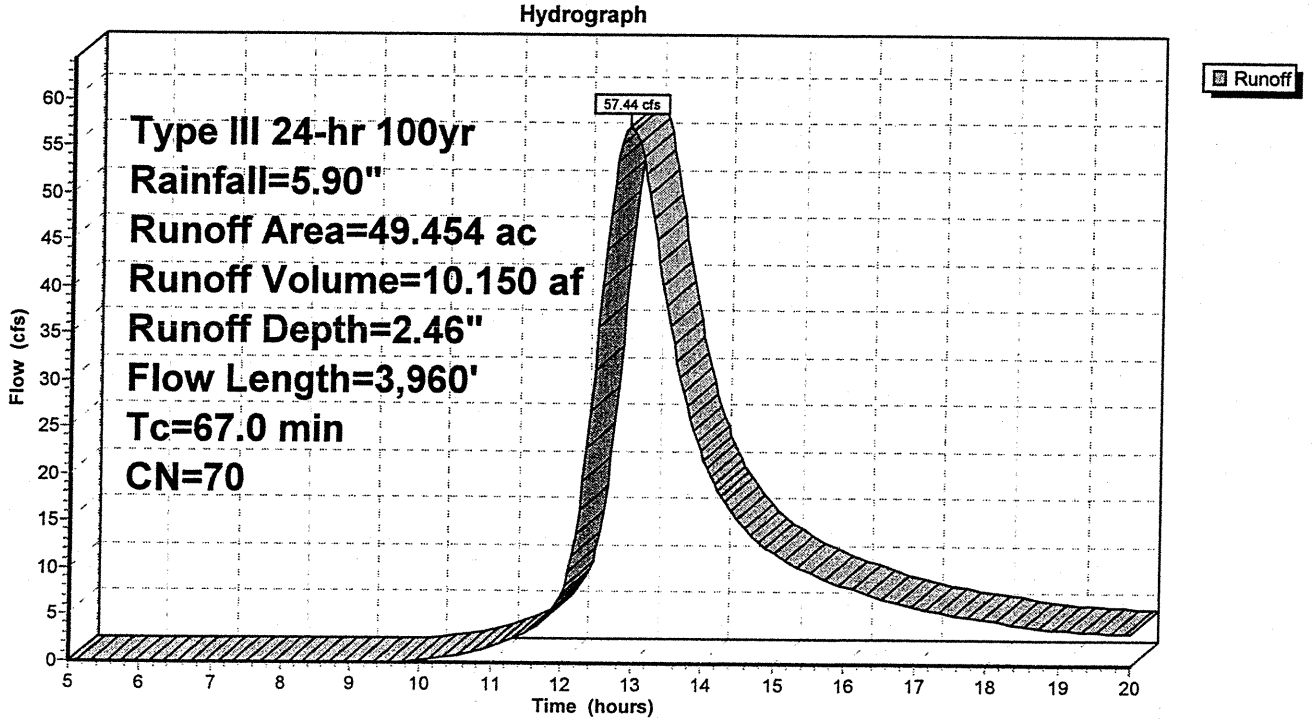
Runoff = 57.44 cfs @ 12.92 hrs, Volume= 10.150 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
48.988	70	Forest
0.466	89	Gravel
49.454	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	50	0.0500	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
10.8	916	0.0800	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.3	1,108	0.2000	2.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.5	736	0.0100	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,150	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
67.0	3,960	Total			

Subcatchment B: Inset Area 2



Subcatchment C: Inset Area 7

Runoff = 43.44 cfs @ 12.42 hrs, Volume= 5.023 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100yr Rainfall=5.90"

Area (ac)	CN	Description
23.769	70	Forest
0.333	89	Gravel
24.102	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.4000	0.1		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.90"
2.5	467	0.4000	3.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	1,585	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.1	680	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.5	2,782	Total			

Subcatchment C: Inset Area 7