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FRANKS
 WORKING
 SHEETS

FILE COPY

Ridgetop Estates
 (Formerly The Knolls)
 91-355

Detention Requirements
 Total Site Area = 64.0 Acres

East Watershed:

Commercial Area Differential = 11.9Ac(4.75-2.31) = 29.04 cfs
 Residential Differential = 17.4Ac(3.26-2.31) = 16.53 cfs
 Total Differential Required = 45.57 cfs

Differential Provided @ Northeast Basin = 22.0 cfs
 Differential Provided @ Southeast Basin = 23.6 cfs
 Total Differential Provided = 45.6 cfs

West Watershed:

Differential Required = 34.7Ac(3.26-2.31) = 32.97 cfs
 Differential Provided @ Northwest Basin = 14.0 cfs
 Differential Provided @ Southwest Basin = 19.0 cfs
 Total Differential Provided = 33.0 cfs

EAST W. 45.6
 WEST W. 33
78.6 REQD

Detention is provided for two watersheds with 4 Detention Basins.
 Detention is provided for the commercial area in the East Watershed.

Total Q to be Detained:

Improved: 11.9 x 4.75 = 56.53 cfs
 52.1 x 3.26 = 169.85 cfs
 Total = 226.38 cfs

Unimproved: 64.0 x 2.31 = 147.84 cfs

226.38 - 147.84 = 78.54 cfs x 1800 = 141,372 cfs

IDEAL 30 MIN
 26 MIN. PROVIDED
 123,700 cfs
 REQD 20 MIN
 94,248 cfs

Actual Q Detained:

Northeast Basin - 31.21 - 7.35 = 23.86 cfs
 Southeast Basin - 31.88 - 7.65 = 24.23 cfs
 Northwest Basin - 26.27 - 11.06 = 15.21 cfs
 Southwest Basin - 35.85 - 15.89 = 19.96 cfs

ACTUAL
 38,300 CF
 35,300 CF
 29,800 CF
 31,400 CF
134,800 REQD. PROVIDED
 15,900
 11,100 SEDIMENT STORAGE
 123,700 ACTUAL STORAGE

Total Q Detained = 83.26 cfs > 78.6 cfs OK.

2

Job Name: THE KNOLLS
 Job No.: 91355 Sheet:

Prepared: DRC Date: 09/22/91
 1 Checked: _____ Revised: 11/04/91

Northeast Basin

Elevation of Weir = 536.17 ft msl
 Length of Weir = 19.00 ft Weir Constant = 3.00
 FL of Orifice = 531.00 ft msl Orifice Constant = 0.60
 Diameter of Orifice = 12.00 in
 Time Increment = 1.00 min

Area sq ft	Storage cu ft	Elevation msl	Time min	25 Yr Inflow cfs	Outflow cfs	Storage cu ft	Elevation msl
0	0	531.00	0	31.21	0.00	0	531.00
200	50	531.50	1	31.21	2.71	1710	532.01
6123	1631	532.00	2	31.21	3.28	3386	532.25
7169	2960	532.20	3	31.21	3.70	5037	532.46
8951	17468	534.00	4	31.21	4.07	6665	532.66
11819	38238	536.00	5	31.21	4.41	8273	532.86
15113	65170	538.00	6	31.21	4.72	9862	533.06
*****			7	31.21	5.00	11435	533.25
			8	31.21	5.27	12991	533.44
			9	31.21	5.53	14532	533.64
			10	31.21	5.77	16059	533.83
			11	31.21	5.99	17572	534.01
			12	31.21	6.16	19075	534.15
			13	31.21	6.33	20568	534.30
			14	31.21	6.49	22051	534.44
			15	31.21	6.64	23525	534.58
			16	31.21	6.79	24990	534.72
			17	31.21	6.94	26447	534.86
			18	31.21	7.08	27895	535.00
			19	31.21	7.22	29334	535.14
			20	31.21	7.35	30766	535.28
			21	0	7.31	30327	535.24
			22	0	7.27	29891	535.20
			23	0	7.23	29457	535.15
			24	0	7.19	29026	535.11
			25	0	7.15	28597	535.07
			26	0	7.11	28170	535.03
			27	0	7.06	27747	534.99
			28	0	7.02	27325	534.95
			29	0	6.98	26906	534.91
			30	0	6.94	26490	534.87

~ 38,300 ✓

O.F. 18

100 Yr. Highwater with low
 Flow Blocked :

$$\text{Sill} + \left(\frac{Q_{in}}{C \times L} \right)^{2/3} = H$$

$$\text{Sill} + \left(\frac{43.3}{36.77} \right)^{2/3} = 0.75 \text{ ft}$$

.83

Set Sill Opening @ 10" ✓

$$536.17 + 0.83 = 537.00$$

OK P.G.

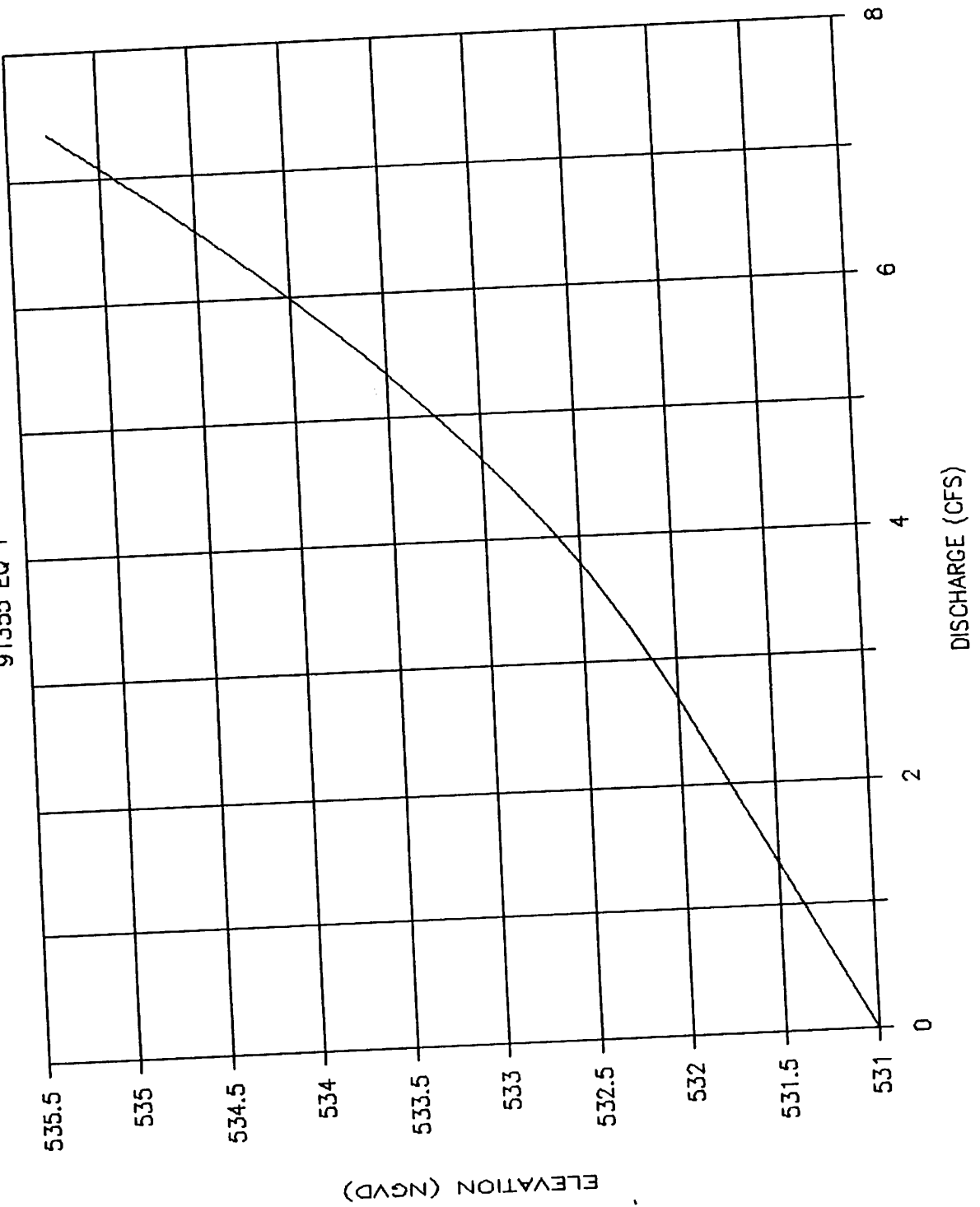
$$Q_{15} = 26.45 \text{ cfs}$$

$$\times 1.39$$

$$Q_{100} = 36.77$$

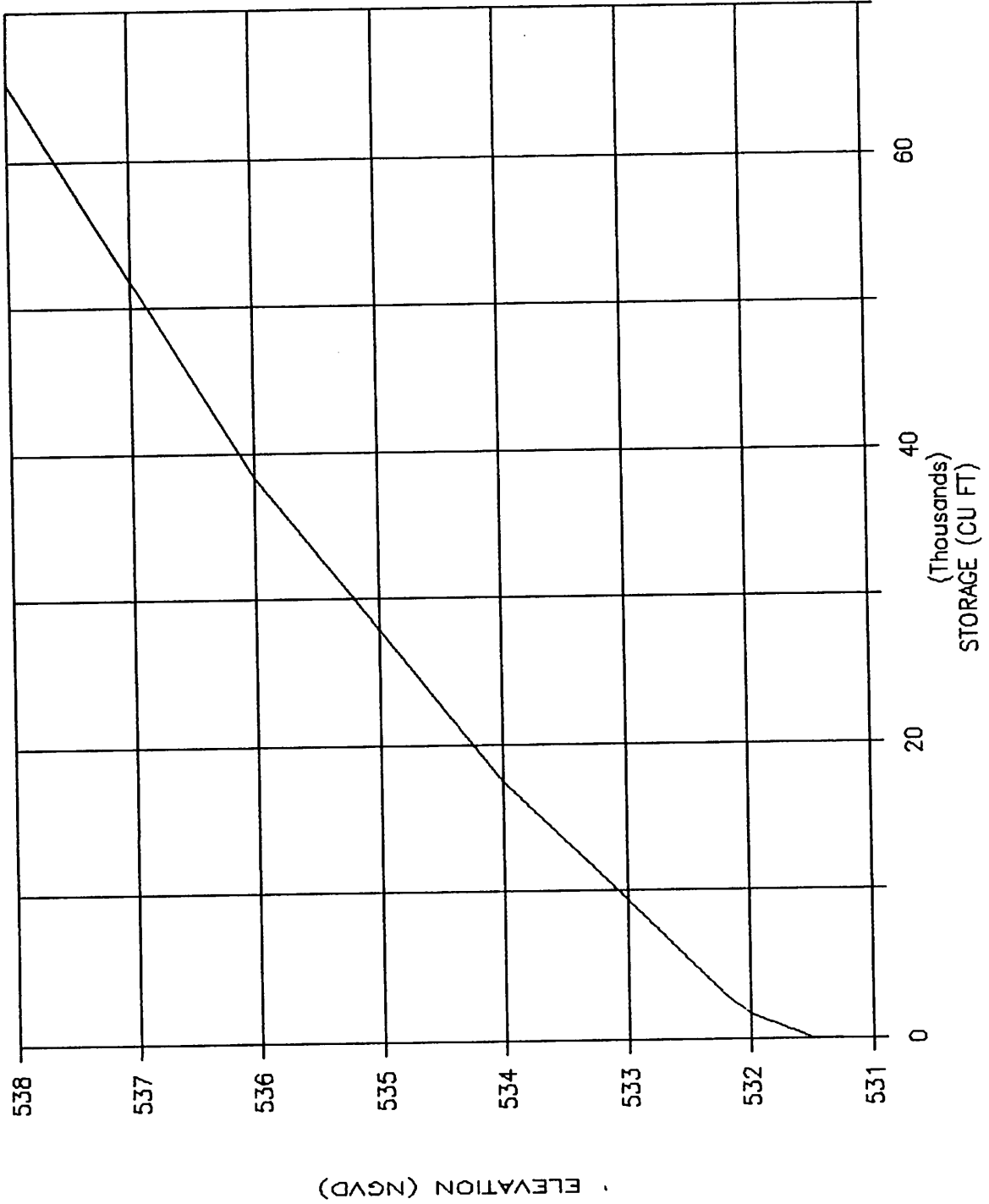
ELEVATION VS. DISCHARGE

91355 EQ 1



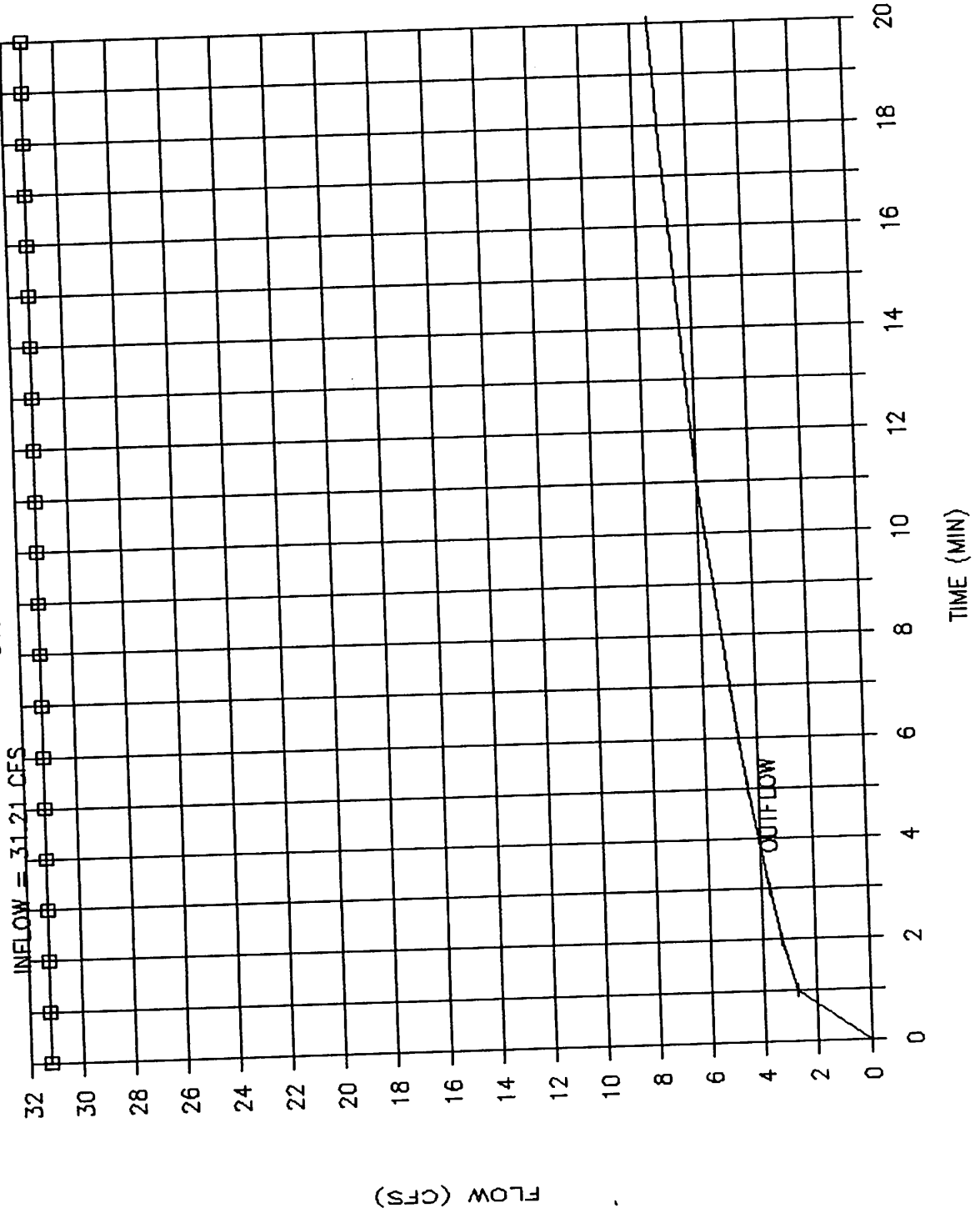
ELEVATION vs. STORAGE

91355 ES 1



INFLOW - OUTFLOW HYDROGRAPHS

91355 IO 1



Job Name: THE KNOLLS
 Job No.: 91356 Sheet:

Prepared: DRC Date: 09/22/91
 2 Checked: _____ Revised: 11/04/91

Southeast Basin

Elevation of Weir = 532.17 ft msl ✓
 Length of Weir = 19.00 ft Weir Constant = 3.00
 FL of Orifice = 527.00 ft msl Orifice Constant = 0.60
 Diameter of Orifice = 12.00 in
 Time Increment = 1.00 min

Area sq ft	Storage cu ft	Elevation msl	Time min	Inflow cfs	Outflow cfs	Storage cu ft	Elevation msl	
0	0	527.00	0	31.88	0.00	0	527.00	
200	50	527.50	1	31.88	3.23	1719	528.23	
2525	731	528.00	2	31.88	3.83	3402	528.52	
6161	2468	528.40	3	31.88	4.22	5062	528.75	
8874	14496	530.00	4	31.88	4.57	6700	528.96	
11915	35285	532.00	5	31.88	4.90	8319	529.18	
15713	62913	534.00	6	31.88	5.20	9920	529.39	
*****				7	31.88	5.48	11504	529.60
			8	31.88	5.75	13072	529.81	
			9	31.88	5.99	14625	530.01	
			10	31.88	6.17	16168	530.16	
			11	31.88	6.34	17700	530.31	
			12	31.88	6.50	19223	530.45	
			13	31.88	6.66	20736	530.60	
			14	31.88	6.81	22240	530.74	
			15	31.88	6.96	23735	530.89	
			16	31.88	7.11	25222	531.03	
			17	31.88	7.25	26700	531.17	
			18	31.88	7.39	28169	531.32	
			19	31.88	7.52	29631	531.46	
			20	31.88	7.65	31084	531.60	
			21	0	7.61	30628	531.55	
			22	0	7.57	30173	531.51	
			23	0	7.53	29722	531.46	
			24	0	7.49	29272	531.42	
			25	0	7.45	28825	531.38	
			26	0	7.41	28381	531.34	
			27	0	7.37	27939	531.29	
			28	0	7.32	27500	531.25	
			29	0	7.28	27063	531.21	
			30	0	7.24	26628	531.17	

~ 35,300

(25 yr)

OF 2

100 Yr Highwater with
 Low Flow Blocked:

$$\text{Sill} + \left(\frac{Q_{in}}{C \times L} \right)^{2/3} = H$$

$$\text{Sill} + \left(\frac{40.8}{3.0 \times 19} \right)^{2/3} = 0.76 \text{ ft.}$$

.80

Set Sill Opening @ 10" ✓
 532.17 + 0.83 = 533.06
 OK

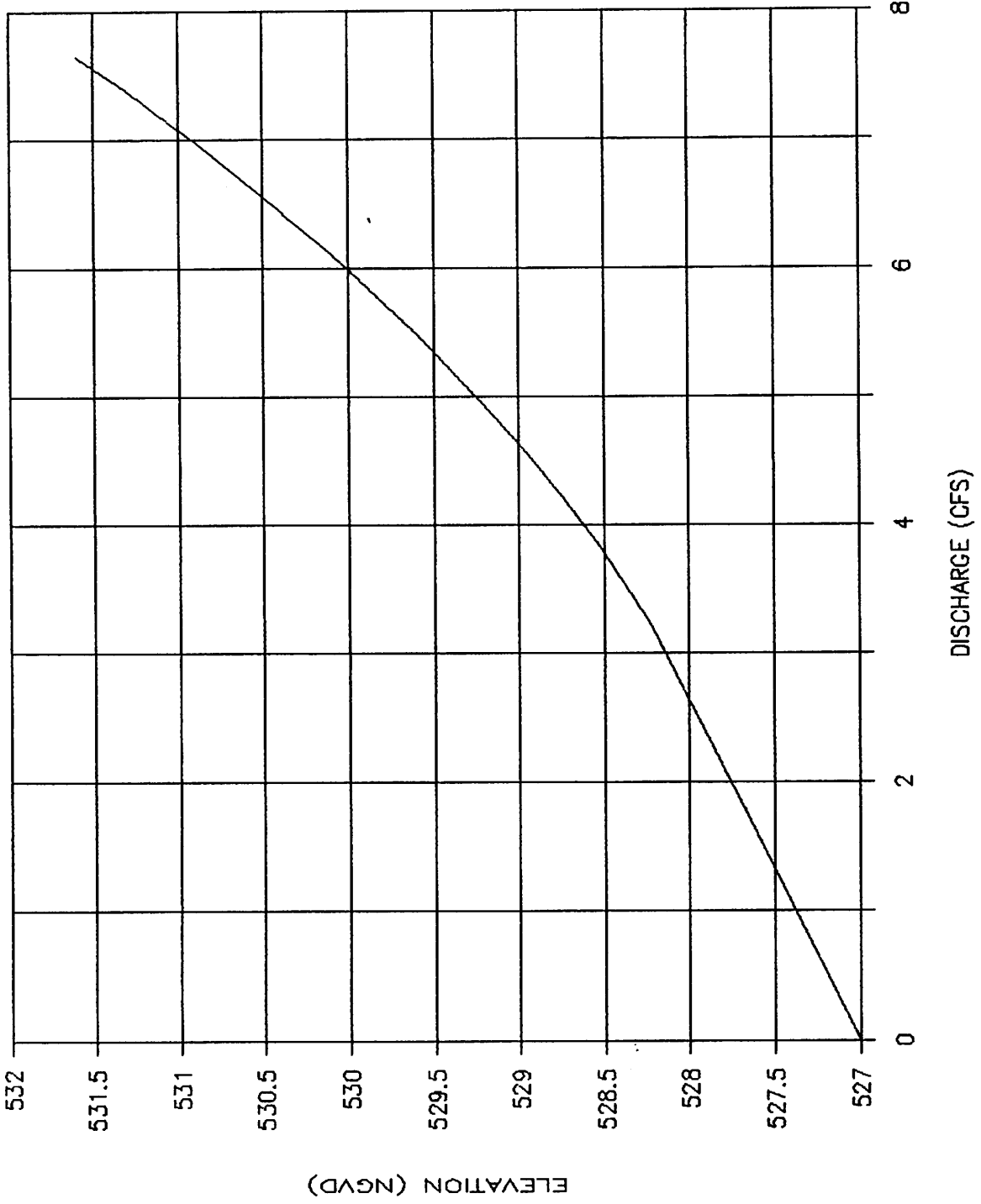
$$Q_{15} = 27.02 \text{ cfs.}$$

x 1.39

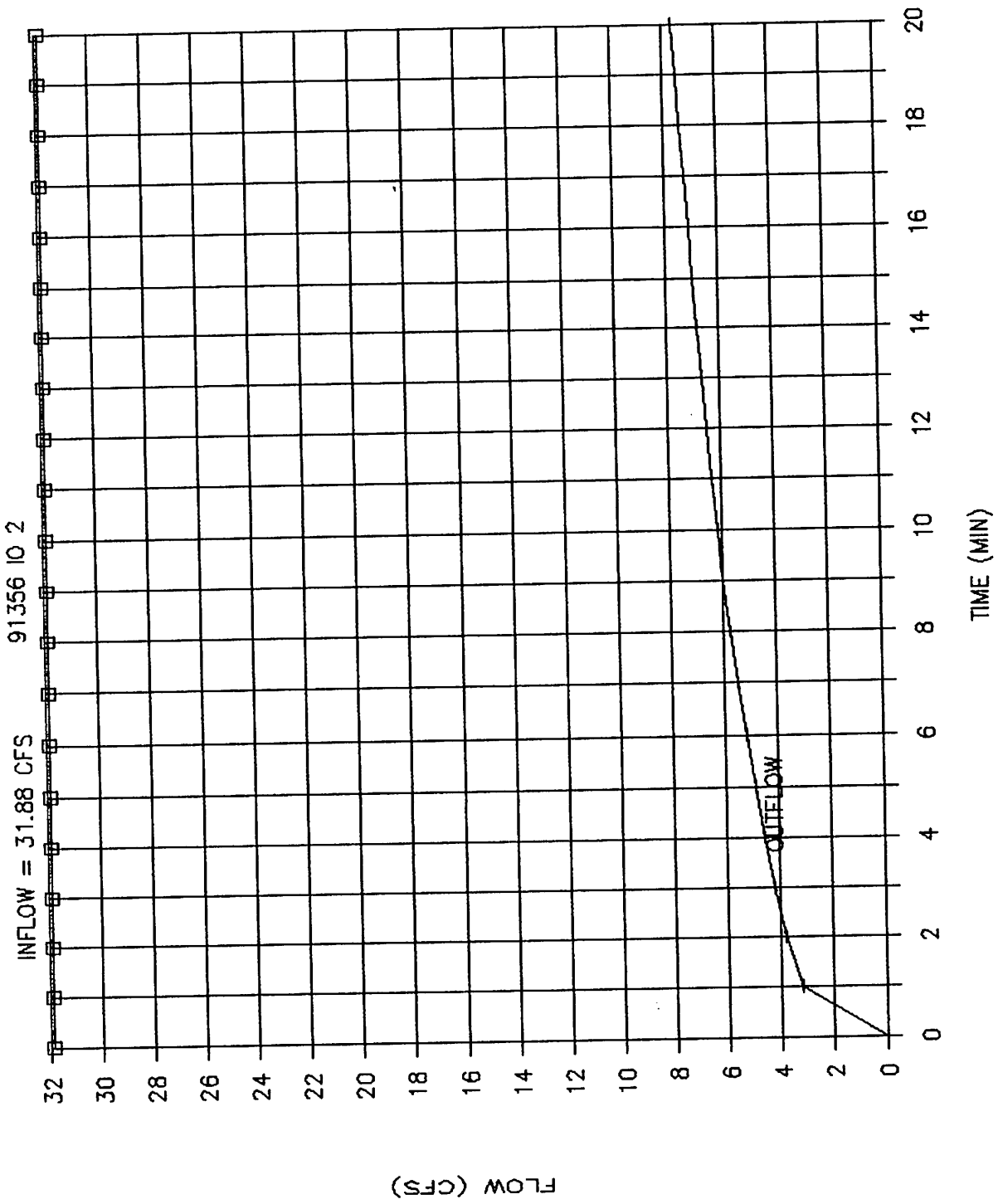
$$Q_{100} = 37.56 \text{ cfs.}$$

ELEVATION VS. DISCHARGE

91356 EQ 2

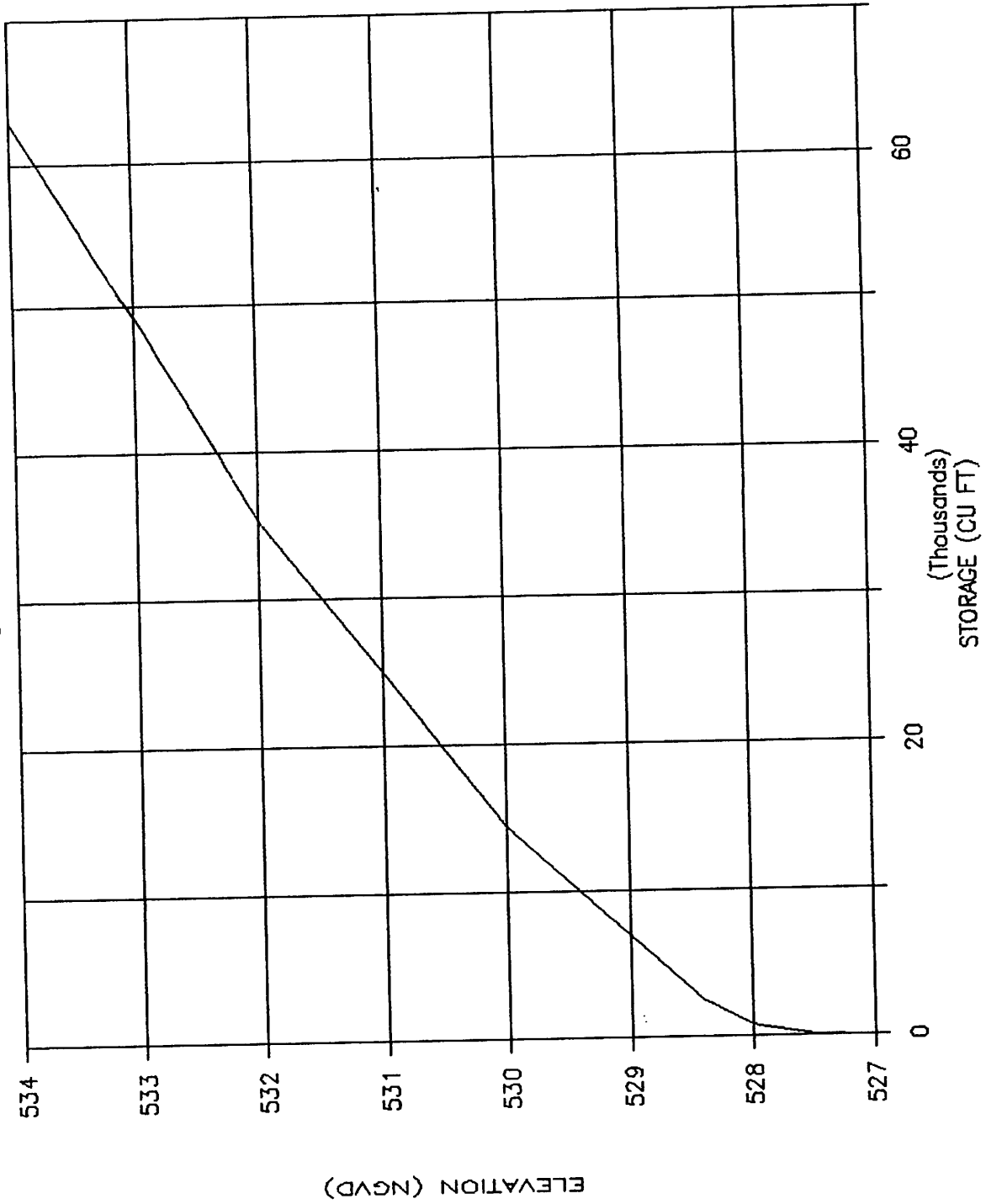


INFLOW - OUTFLOW HYDROGRAPHS



ELEVATION vs. STORAGE

91356 ES 2



Job Name: THE KNOLLS
 Job No.: 91355 Sheet:

Prepared: DRC Date: 09/22/91
 3 Checked: _____ Revised: 11/04/91

Northwest Basin

Elevation of Weir = 554.25 ft msl ✓
 Length of Weir = 19.00 ft Weir Constant = 3.00
 FL of Orifice = 549.50 ft msl Orifice Constant = 0.60
 Diameter of Orifice = 15.00 in
 Time Increment = 1.00 min

(25 yr)

Area sq ft	Storage cu ft	Elevation msl	Time min	Inflow cfs	Outflow cfs	Storage cu ft	Elevation msl
1	0	549.50	0	26.27	0.00	0	549.50
465	117	550.00	1	26.27	3.54	1364	550.48
4689	2694	551.00	2	26.27	5.43	2614	550.97
6355	8216	552.00	3	26.27	6.14	3822	551.20
9533	24104	554.00	4	26.27	6.72	4995	551.42
13020	46657	556.00	5	26.27	7.23	6138	551.62

			6	26.27	7.71	7251	551.83
			7	26.27	8.12	8340	552.02
			8	26.27	8.41	9412	552.15
			9	26.27	8.68	10467	552.28
			10	26.27	8.94	11507	552.41
			11	26.27	9.19	12532	552.54
			12	26.27	9.43	13542	552.67
			13	26.27	9.66	14539	552.80
			14	26.27	9.88	15523	552.92
			15	26.27	10.09	16493	553.04
			16	26.27	10.30	17452	553.16
			17	26.27	10.50	18398	553.28
			18	26.27	10.69	19332	553.40
			19	26.27	10.88	20256	553.52
			20	26.27	11.06	21168	553.63
			21	0	10.93	20512	553.55
			22	0	10.80	19864	553.47
			23	0	10.67	19224	553.39
			24	0	10.54	18592	553.31
			25	0	10.41	17967	553.23
			26	0	10.28	17351	553.15
			27	0	10.15	16742	553.07
			28	0	10.01	16141	553.00
			29	0	9.88	15548	552.92
			30	0	9.75	14963	552.85

-554.25 = 29,800

OF 59

100 yr Highwater with
 Low Flow Blocked:

$$\text{Sill} + \left(\frac{Q_{in}}{C \times L} \right)^{2/3} = H$$

$$\text{Sill} + \left(\frac{33.6}{30.94} \right)^{2/3} = 0.67 \text{ ft.}$$

Set Sill opening @ 9" ✓
 554.25 + 0.75 = 555.00 ✓

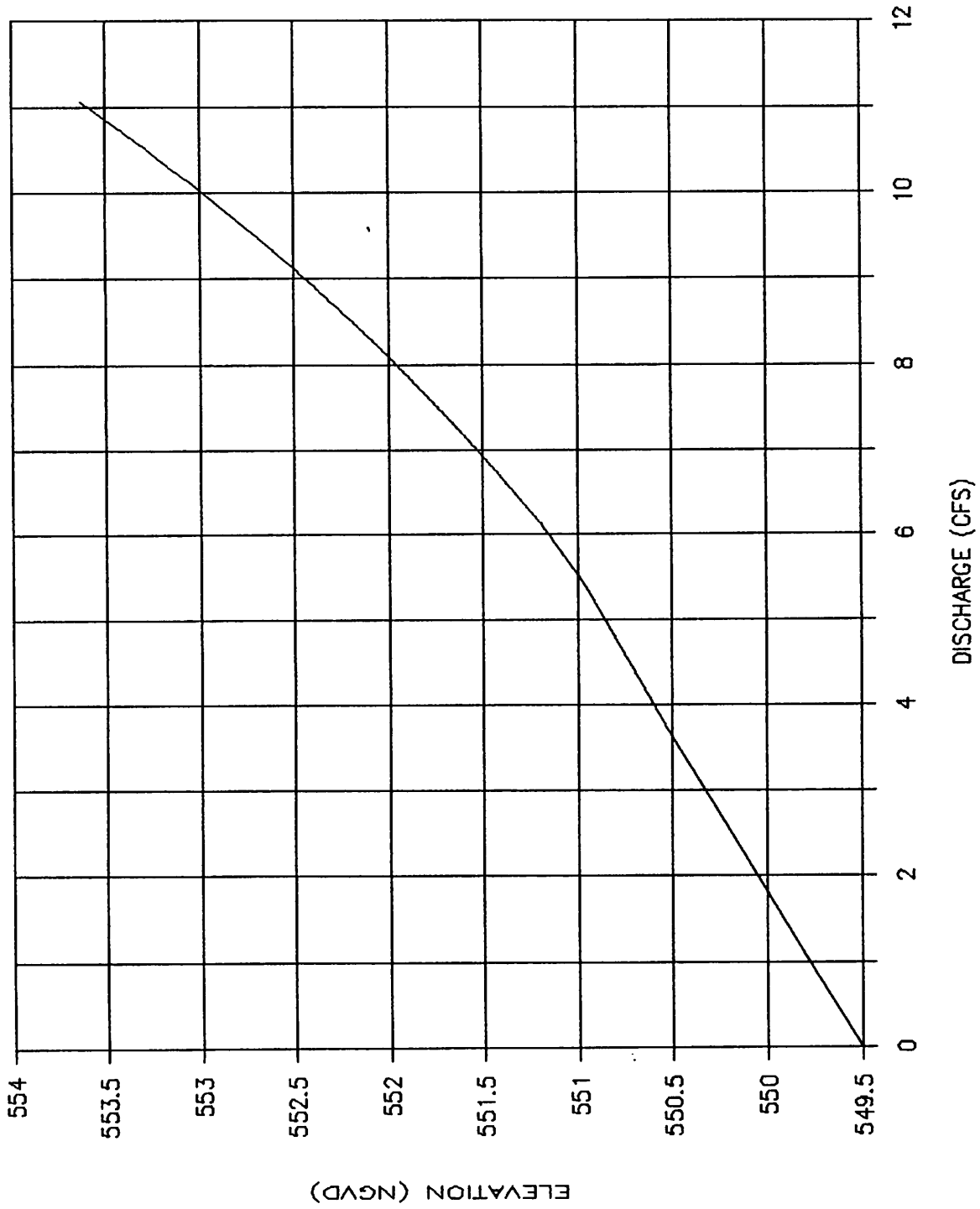
OK

$$Q_{15} = \frac{22.26 \text{ cfs}}{\times 1.39}$$

$$Q_{100} = 30.94$$

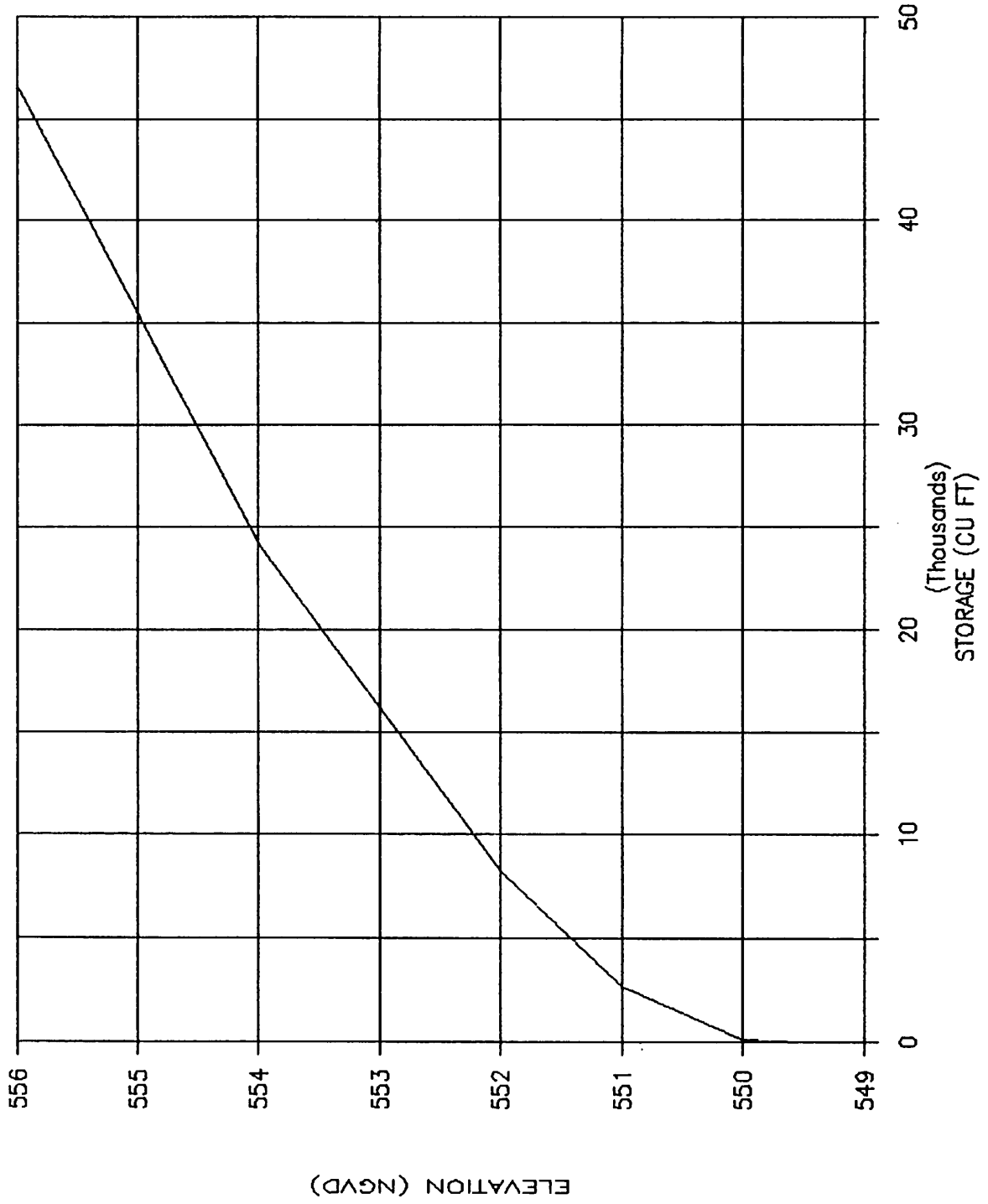
ELEVATION VS. DISCHARGE

91355 EQ 3



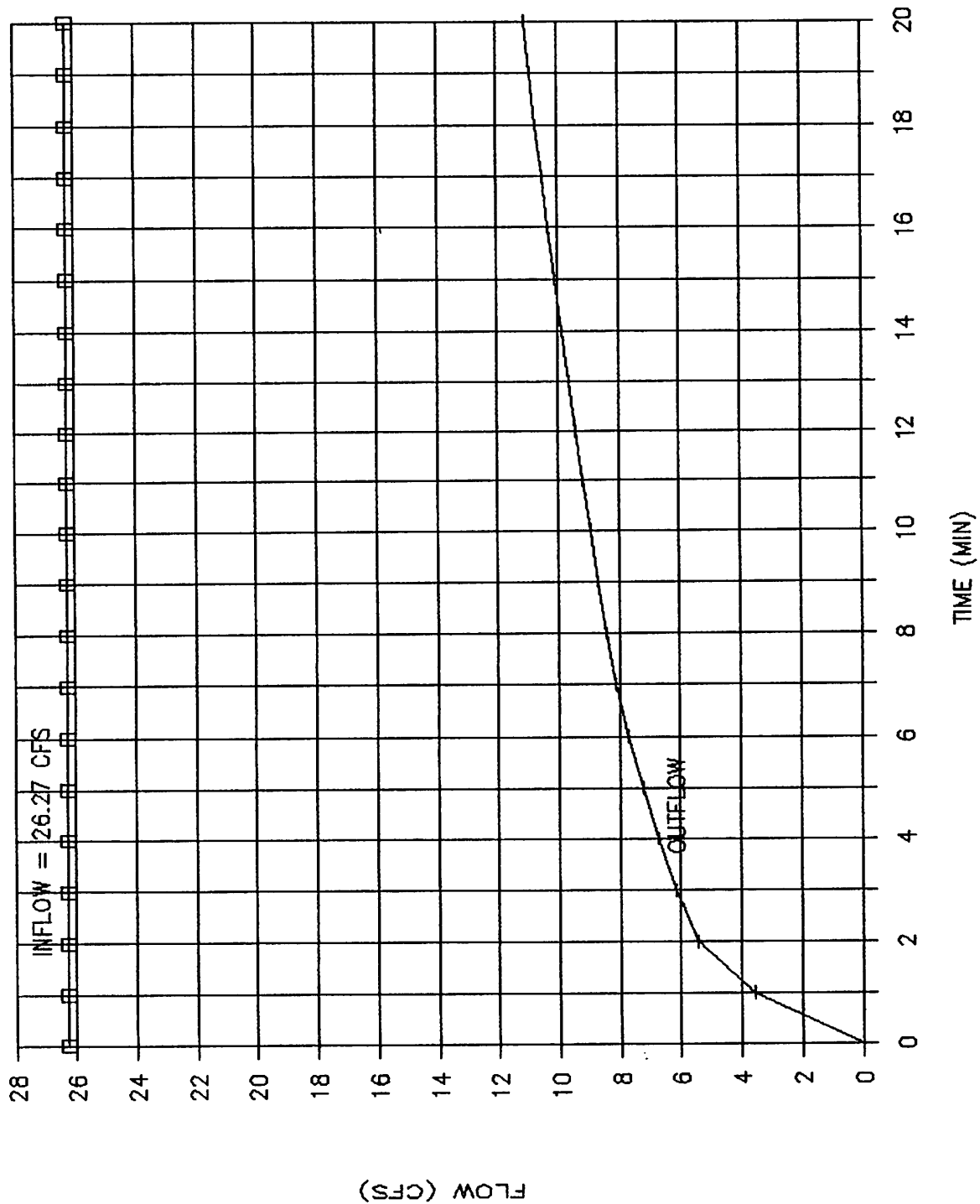
ELEVATION VS. STORAGE

91355 ES 3



INFLOW - OUTFLOW HYDROGRAPHS

91355 10 3



Job Name: THE KNOLLS
 Job No.: 91355 Sheet:

Prepared: DRC Date: 09/22/91
 4 Checked: _____ Revised: 11/04/91

Southwest Basin

Elevation of Weir = 543.12 ft msl ✓
 Length of Weir = 19.00 ft Weir Constant = 3.00
 FL of Orifice = 538.50 ft msl Orifice Constant = 0.60
 Diameter of Orifice = 18.00 in
 Time Increment = 1.00 min (25 yr)

Area sq ft	Storage cu ft	Elevation msl	Time min	Inflow cfs	Outflow cfs	Storage cu ft	Elevation msl
0	0	538.50	0	35.85	0.00	0	538.50
426	107	539.00	1	35.85	5.16	1841	539.62
5193	2916	540.00	2	35.85	7.74	3528	540.08
10540	18649	542.00	3	35.85	8.66	5160	540.29
14919	44108	544.00	4	35.85	9.46	6743	540.49
*****			5	35.85	10.18	8283	540.68
			6	35.85	10.84	9783	540.87
			7	35.85	11.44	11248	541.06
			8	35.85	12.01	12678	541.24
			9	35.85	12.53	14078	541.42
			10	35.85	13.02	15447	541.59
			11	35.85	13.49	16789	541.76
			12	35.85	13.93	18104	541.93
			13	35.85	14.26	19399	542.06
			14	35.85	14.51	20679	542.16
			15	35.85	14.76	21945	542.26
			16	35.85	15.00	23196	542.36
			17	35.85	15.23	24433	542.45
			18	35.85	15.46	25657	542.55
			19	35.85	15.68	26867	542.65
			20	35.85	15.89	28064	542.74
			21	0	15.73	27121	542.67
			22	0	15.56	26187	542.59
			23	0	15.39	25264	542.52
			24	0	15.22	24351	542.45
			25	0	15.05	23448	542.38
			26	0	14.88	22556	542.31
			27	0	14.71	21673	542.24
			28	0	14.54	20801	542.17
			29	0	14.37	19939	542.10
			30	0	14.20	19087	542.03

543.00 ≈ 31,400

OF 43

100 yr Highwater with
 Low Flow Blocked:

$$\text{Sill} + \left(\frac{Q_{in}}{C \times L} \right)^{2/3} = H$$

$$\text{Sill} + \left(\frac{45.9}{3.0 \times 19} \right)^{2/3} = 0.92 \text{ ft.}$$

Set Sill Opening @ 11"
 543.12 + 0.92 = 544.04 ✓

OK
 2

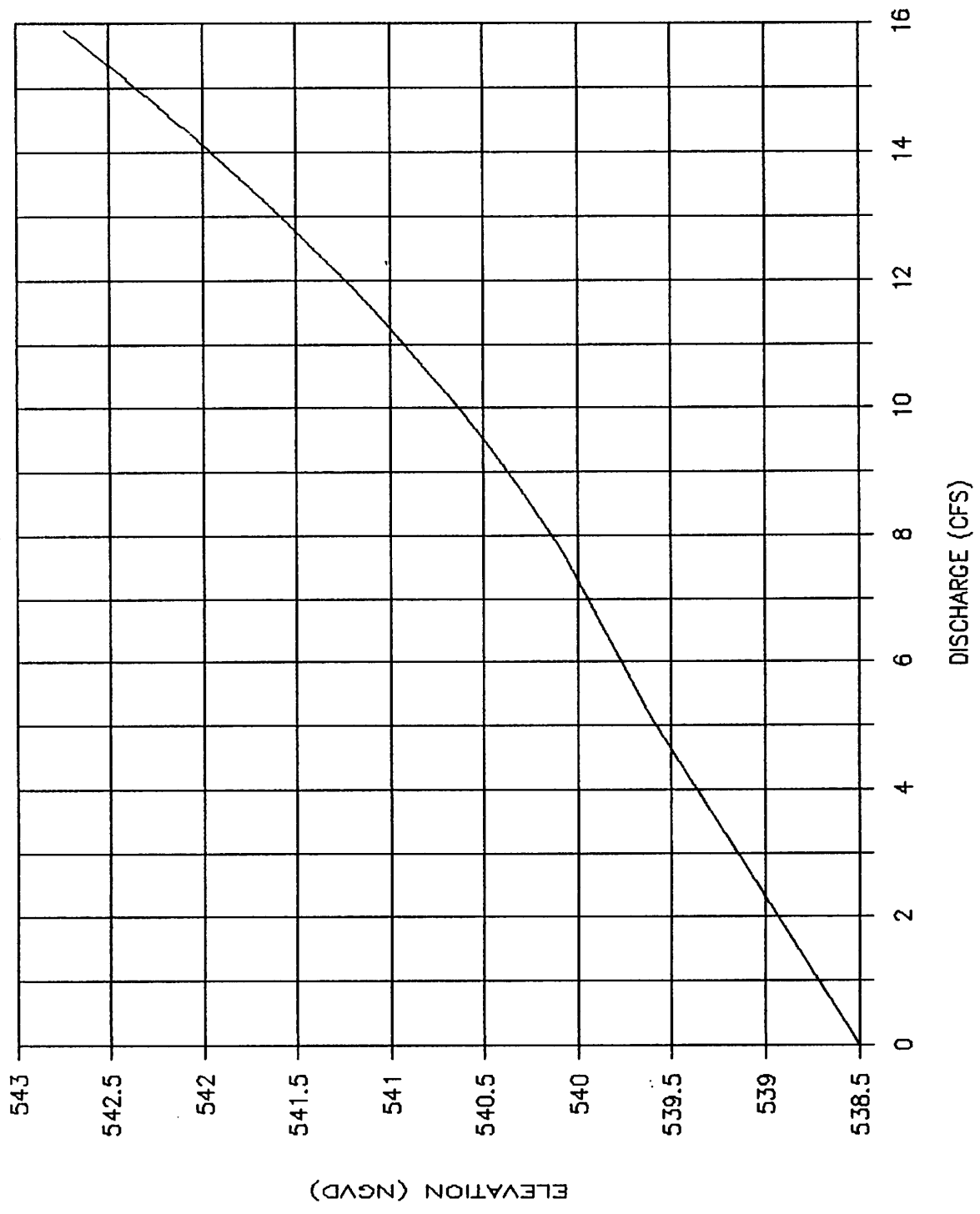
$$Q_{15} = 30.38 \text{ cfs.}$$

$$\times 1.39$$

$$Q_{100} = 42.23 \text{ cfs.}$$

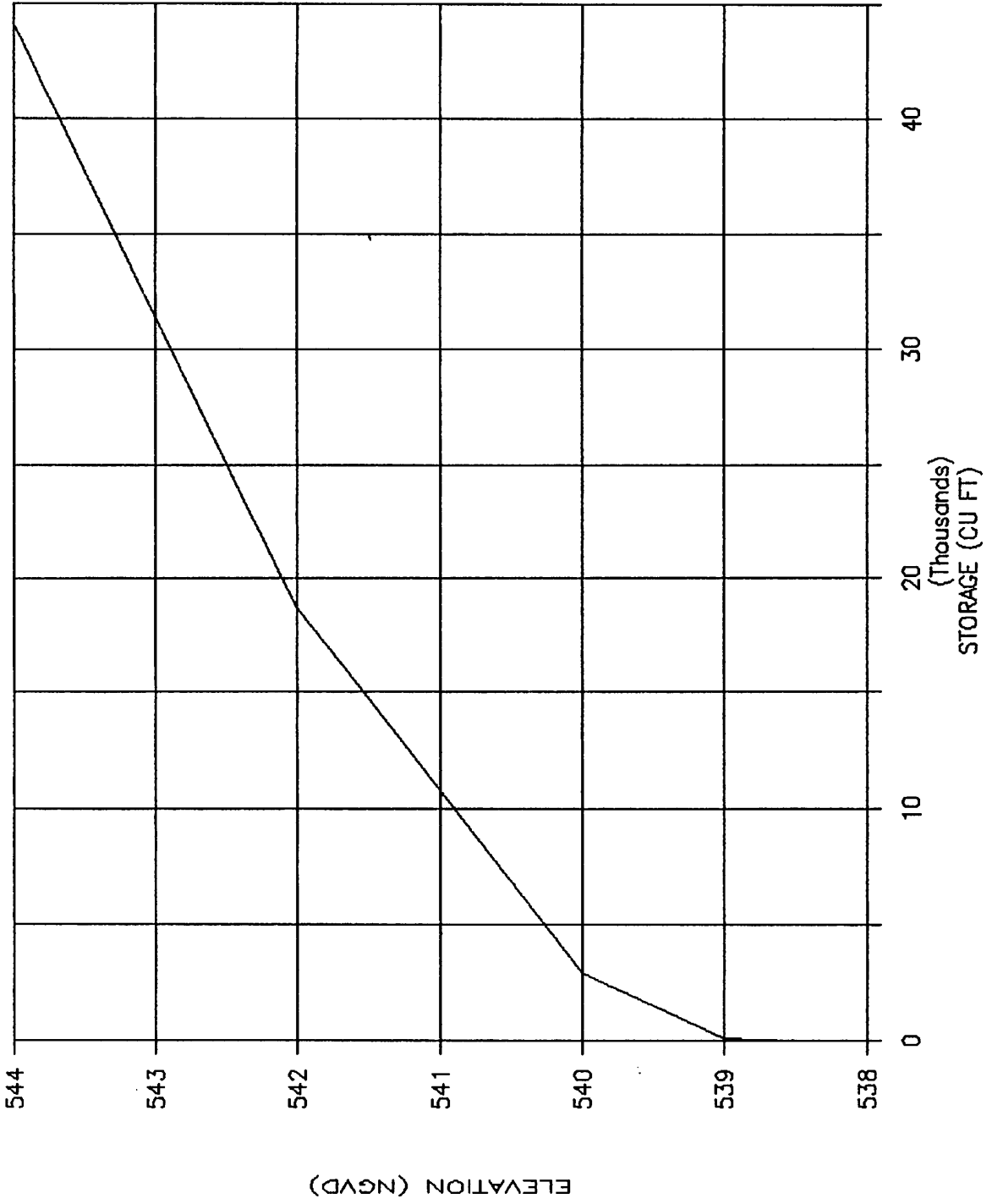
ELEVATION VS. DISCHARGE

91355 EQ 4



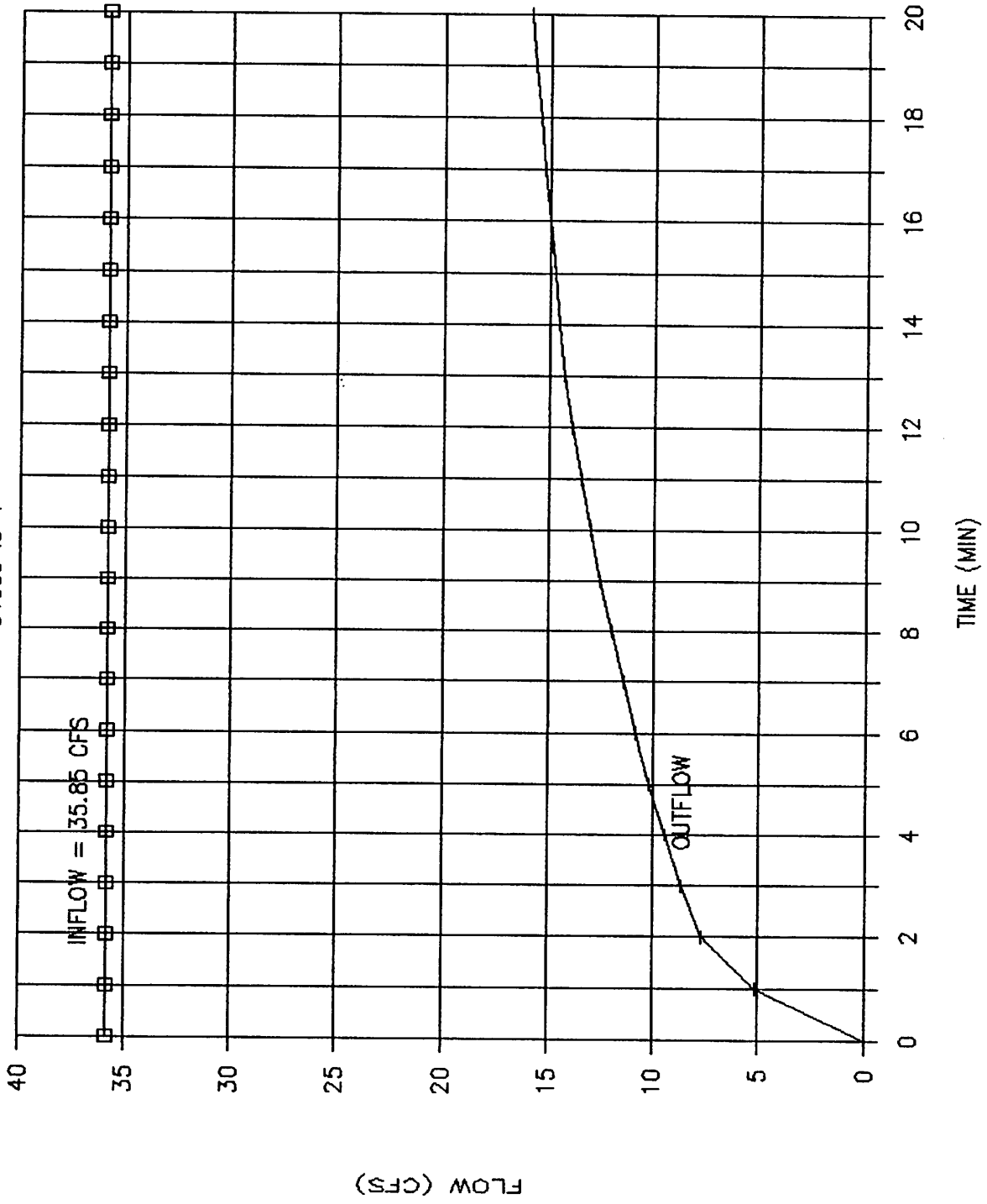
ELEVATION vs. STORAGE

91355 ES 4



INFLOW - OUTFLOW HYDROGRAPHS

91355 IO 4



North east Basin $0.48 + 0.22 + 2.76 + 0.40 + 0.34 + 2.73 = 7.09$ Acres
 Southeast Basin $27.02 \text{ cfs} \div 2.64 = 10.2$ Acres
 Northwest Basin $22.26 \text{ cfs} \div 2.64 = 8.43$ Acres
 Southwest Basin $30.38 \text{ cfs} \div 2.64 = 11.51$ Acres

2 YEAR SEDIMENT STORAGE REQUIRED

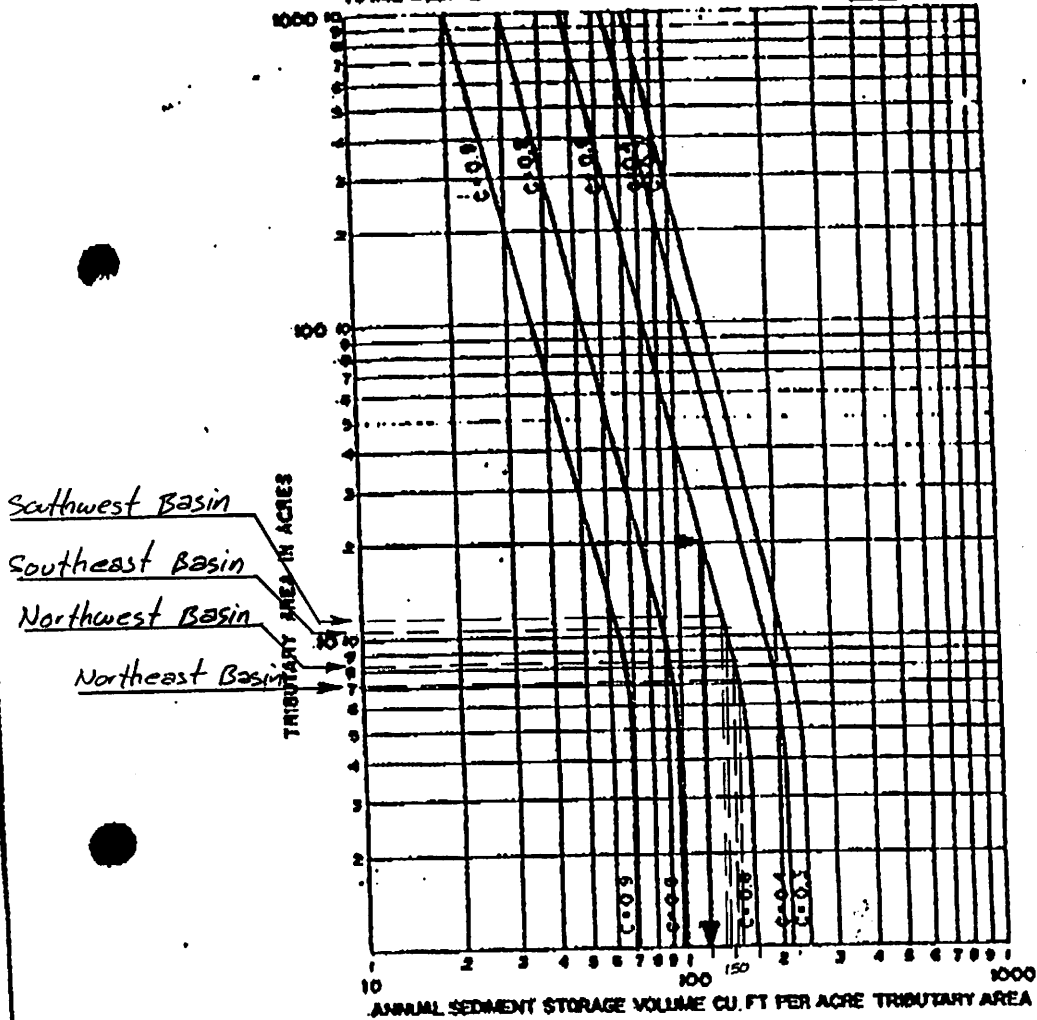
EXAMPLE:

TRIBUTARY AREA = 20 ACRES

RATIONAL METHOD RUNOFF COEFFICIENT "C" = 0.6

SEDIMENT STORAGE = 120 CU. FT. PER ACRE PER YEAR

TOTAL SEDIMENT STORAGE = 120 X 20 = 2400 CU. FT. PER YEAR.



ANNUAL SEDIMENT STORAGE

FIG. 6

2 Yr. Storage Requirement :

Northeast Basin	(160) (7.09) (2)	= 2,269 cu. ft.	✓
Southeast Basin	(145) (10.23) (2)	= 2,967 cu. ft.	✓
Northwest Basin	(155) (8.43) (2)	= 2,613 cu. ft.	✓
Southwest Basin	(140) (11.51) (2)	= 3,223 cu. ft.	✓