APPENDIX I

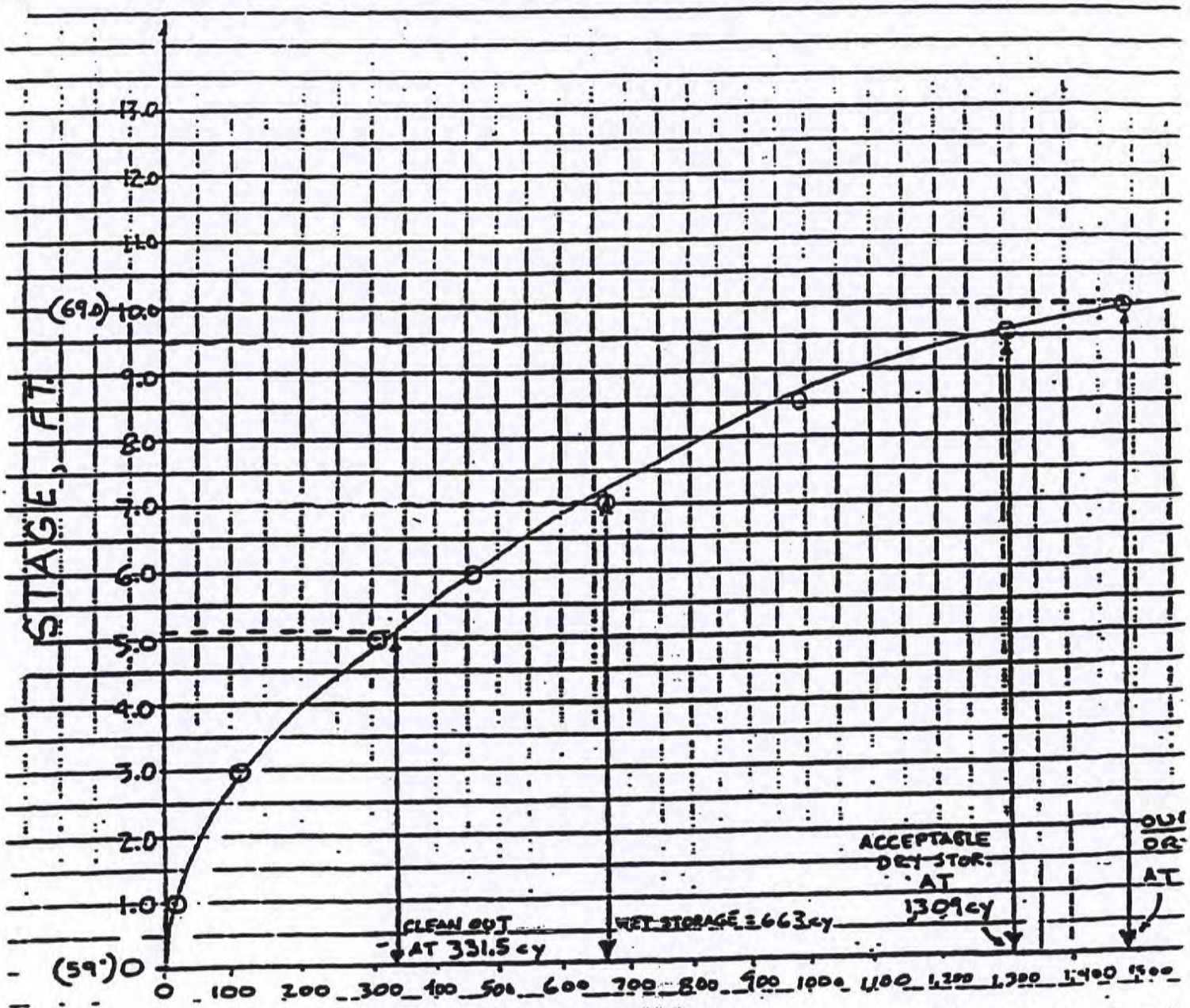
NEW SMALL TOWN SCHOOL

Temporary Sediment Basin Appendix

Project: _____

Basin # 1

Stage - Storage Curve



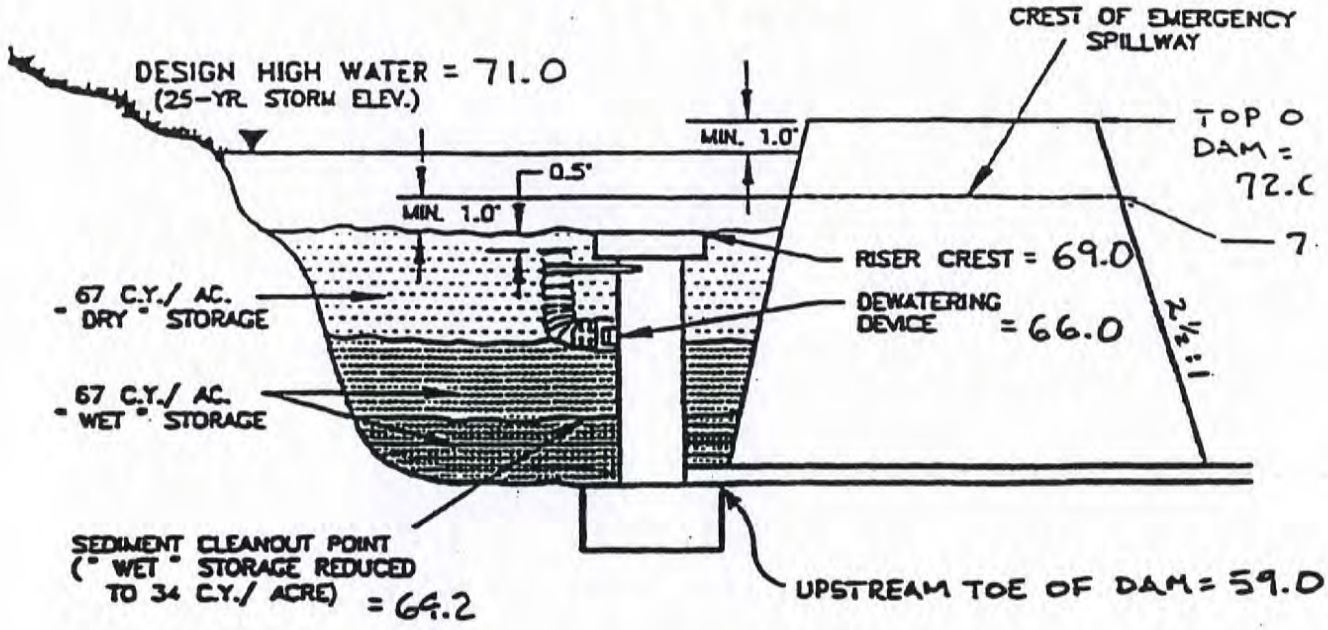
PICK PTS. FOR GRAPH: *USE V = 0.9 x A x D

STAGE	STORAGE*
1' (60)	14.7 cy
3' (62)	101.1 cy
5' (64)	301.2 cy
6' (65)	454.9 cy
7' (66)	663.0 cy

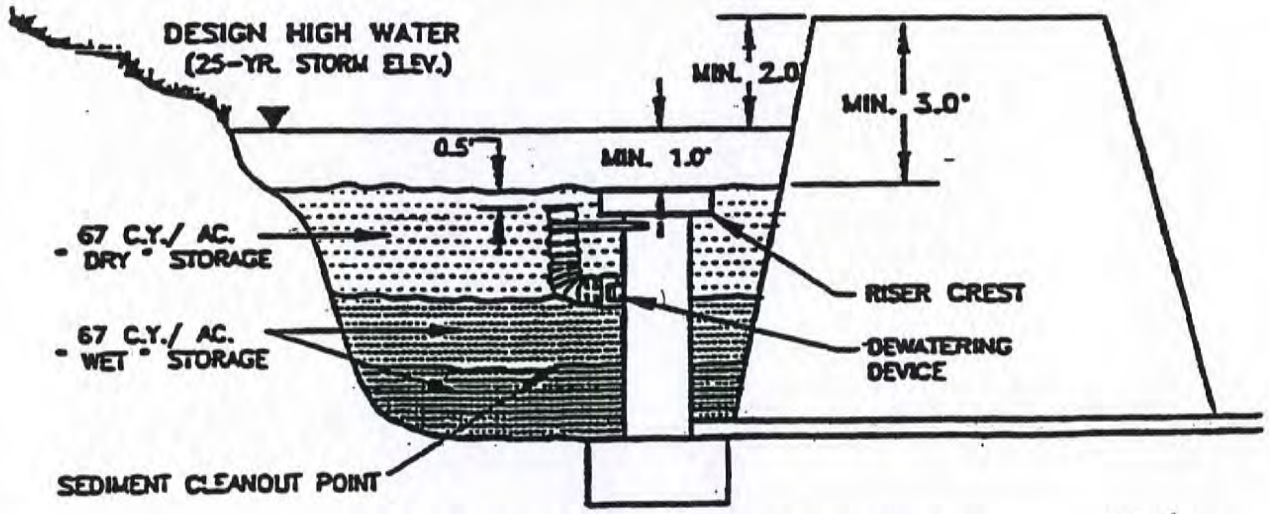
STAGE	STORAGE
8.5 (67.5)	998 cy
9.5 (68.5)	1,309 cy
10.0 (69.0)	1,478 cy
11.0 (70.0)	1,982 cy

PRELIMINARY DESIGN

SEDIMENT BASIN SCHEMATIC ELEVATIONS



DESIGN ELEVATIONS WITH EMERGENCY SPILLWAY



N/A

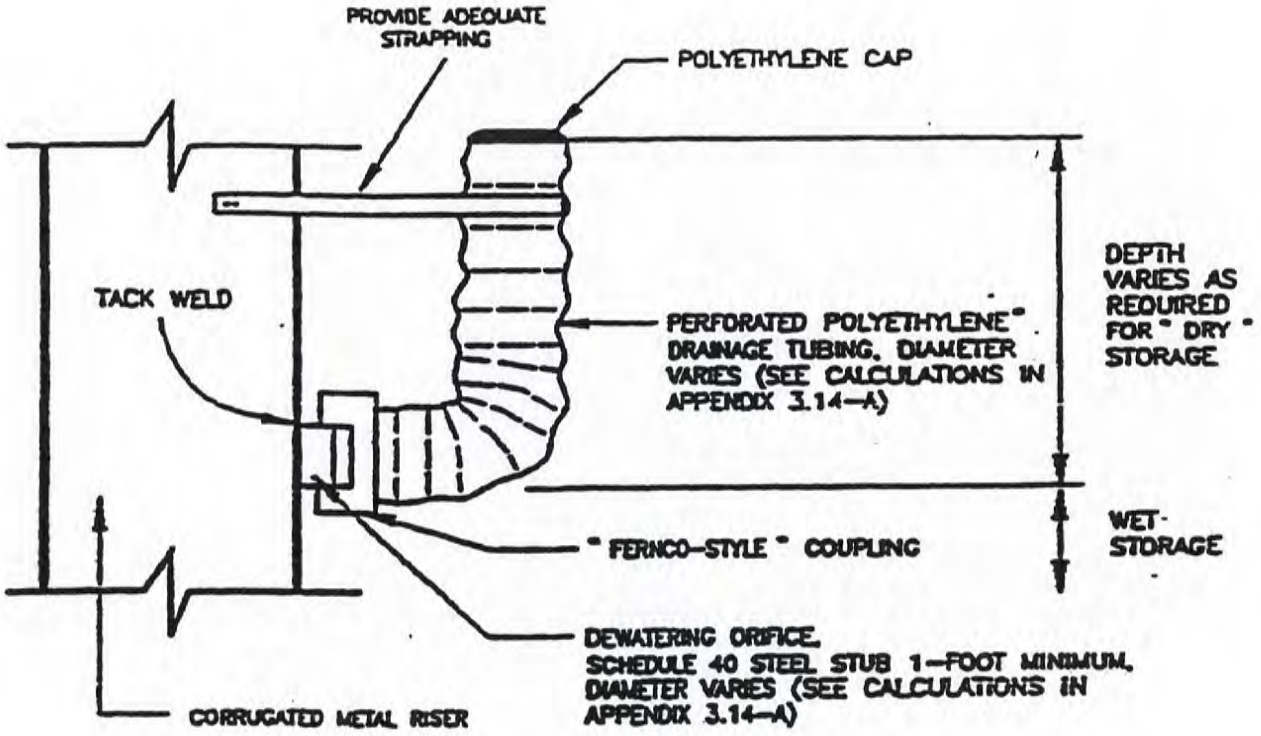
DESIGN ELEVATIONS WITHOUT EMERGENCY SPILLWAY

(RISER PASSES 25-YR. EVENT)

Source: Va. DSWC

Plate 3.14

RECOMMENDED DEWATERING SYSTEM FOR SEDIMENT BASINS



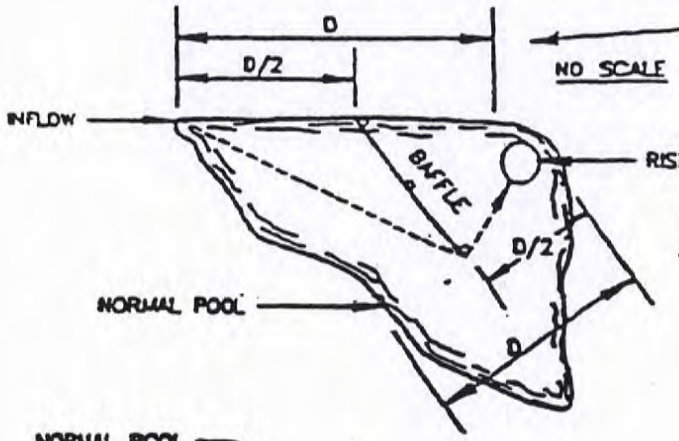
NOTE: WITH CONCRETE RISER, USE PVC SCHEDULE 40 STUB FOR DEWATERING ORIFICE

*DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294

Source: Va. DSWC

Plate 3.14-1

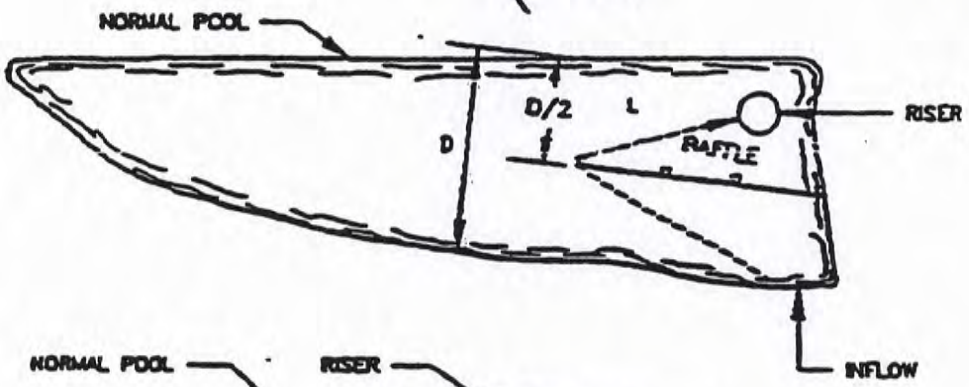
EXAMPLE PLAN VIEWS OF BAFFLE LOCATIONS IN SEDIMENT BASINS

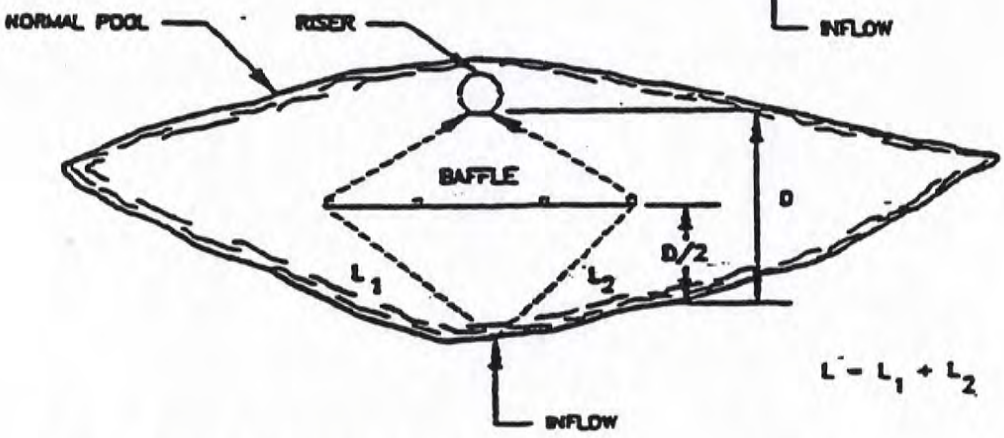


NO SCALE

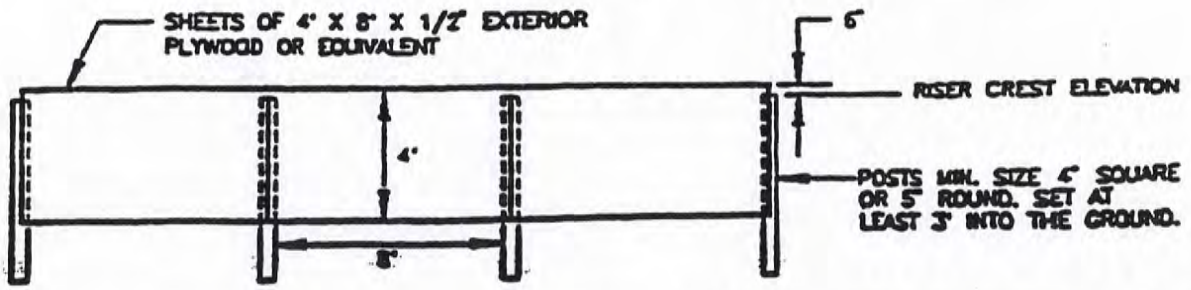
THIS ORIENTATION IS CLOSEST TO WHAT WE WANT, BUT BAFFLE SHOULD BE MORE PERPENDICULAR TO DIRECTION OF FLOW IN OUTLET BAS

L = TOTAL DISTANCE FROM THE POINT OF INFLOW AROUND THE BAFFLE TO THE RISER.





$L = L_1 + L_2$



Source: USDA-SCS

Plate 3.14-6

PROJECT: NEW SMALL TOWN SCHOOL DATE: 3-16-99

RUNOFF CALCULATIONS FOR SEDIMENT BASIN

* NEED Q_2 & Q_{25} USE RATIONAL METHOD, $Q = CIA$

9.5 Ac. DRAIN TO BASIN

I. FIND T_C

A. HYDRAULIC GRADIENT (CRITICAL FLOW PATH) = 1,140'

B. OVERLAND FLOW: USUALLY USE 200' MAX., BUT SO FLAT USE 300'; USE SEELYE CHART

T_t = 15.5 min.

C. SHALLOW CONC. FLOW - USE FOR REMAINDER OF FLOW PATH EXCEPT LAST 180'.

$T_t = \frac{L}{60V}$; SLOPE AVG. = $\frac{88-80}{660}$ = 1.2%

FROM PLATE 5.2, V = 5.5 f/s

$\therefore T_t = \frac{660}{60(5.5)}$ = 2.0 MIN.

D. CHANNEL FLOW FOR 210' IN NATURAL DRAINAGEWAY. FROM PLATE 5.3 FOR 10' HT. ABOVE OUTLET & L = 210, T_t = 2.0 MIN.

E. T_c = 15.5 + 2.0 + 2.0 = 19.5 min.

F. FIND I, USE PLATE 5-17 (WESTMORELAD Co.)

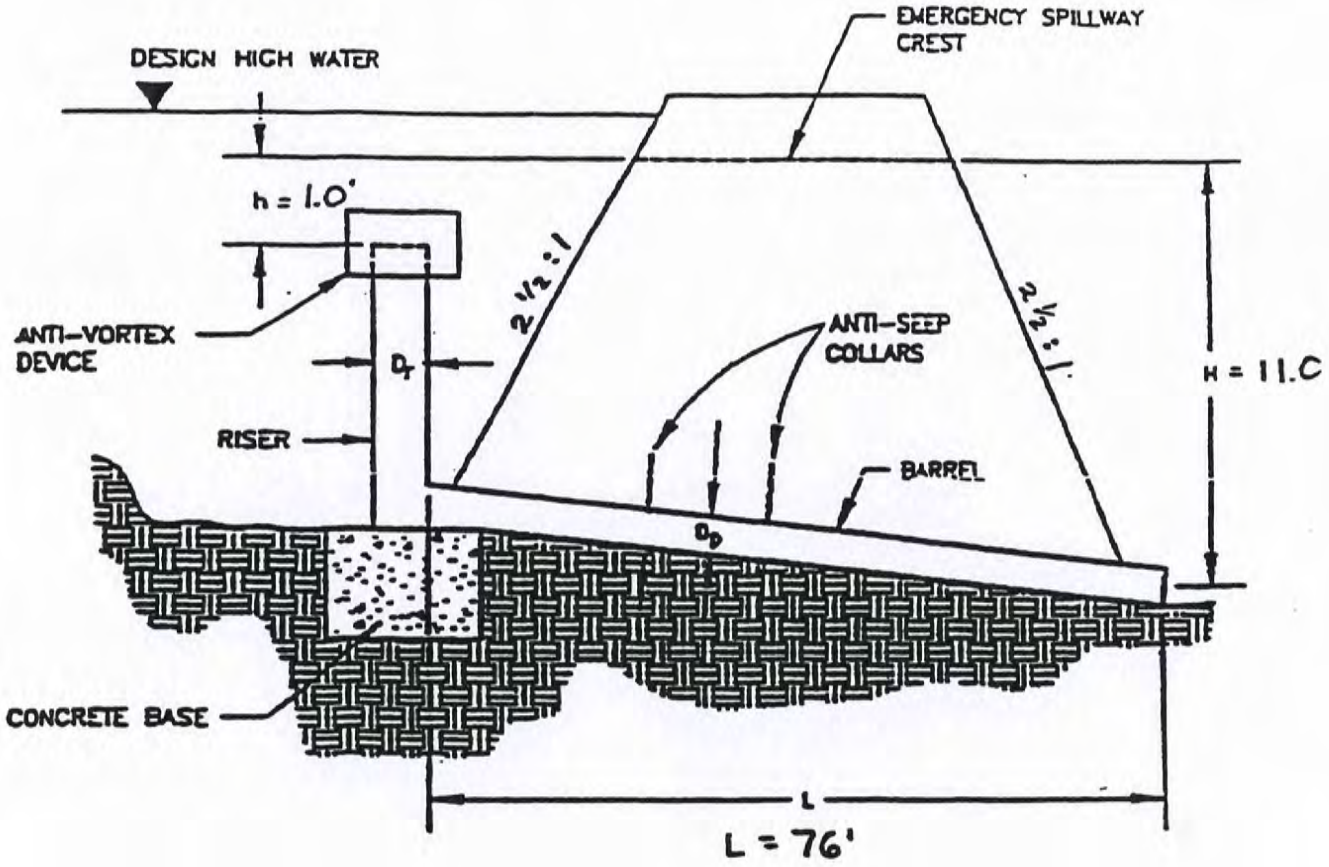
I_2 = 3.2 in./hr. I_{25} = 5.2 in./hr

G. $Q = CIA$; FOR C use 0.8 for totally denuded condition

Q_2 = .8 (3.2) 9.5 = **24.3 cfs**

Q_{25} = .8 (5.2) 9.5 = **39.5 cfs**

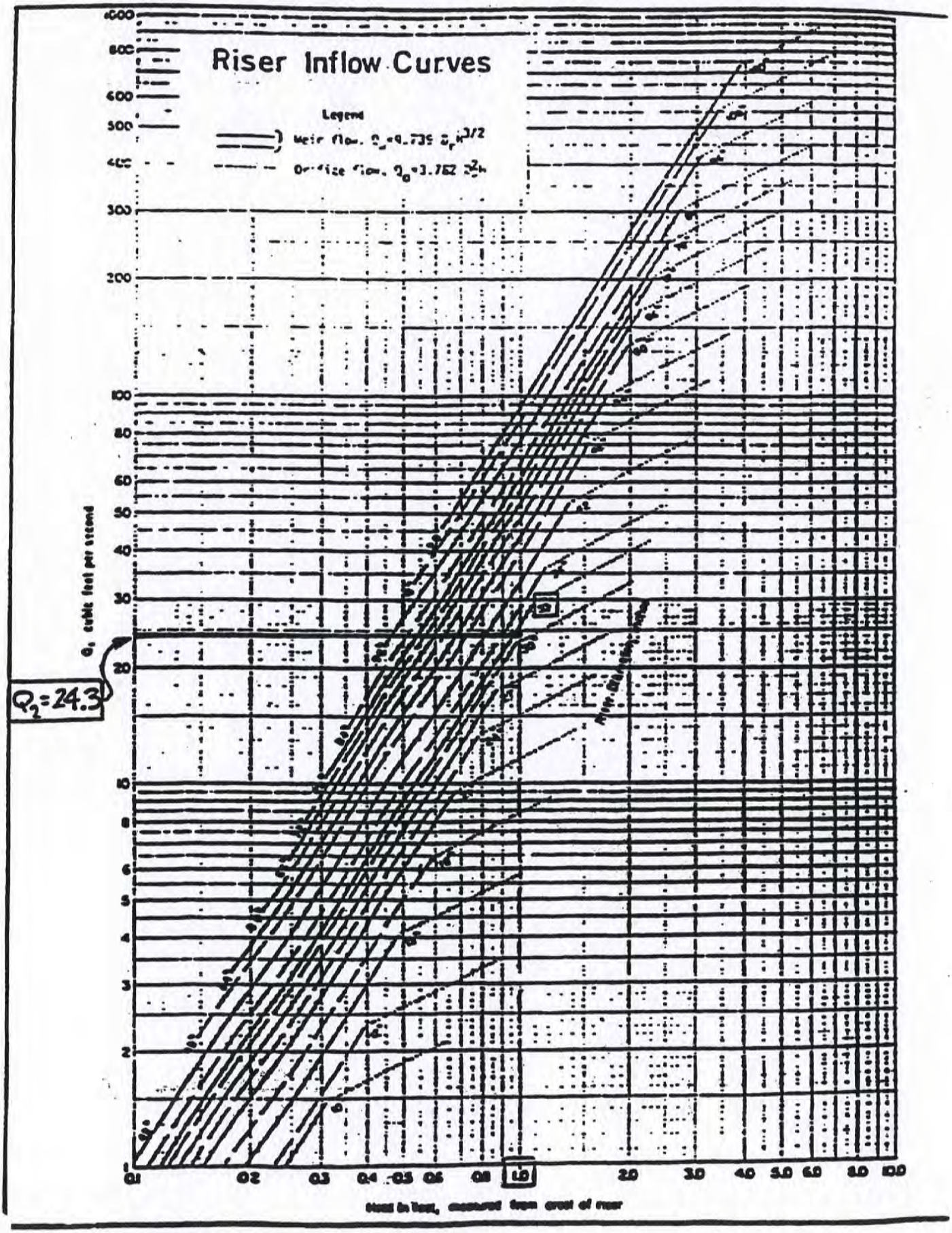
PRINCIPAL SPILLWAY DESIGN



H = HEAD ON PIPE THROUGH EMBANKMENT
h = HEAD OVER RISER CREST
L = LENGTH OF PIPE THROUGH EMBANKMENT
D_p = DIAMETER OF PIPE THROUGH EMBANKMENT
D_r = DIAMETER OF RISER

Source: Va. DSWC

Plate 3.14



Source: USDA-SCS

Plate 3.14-1

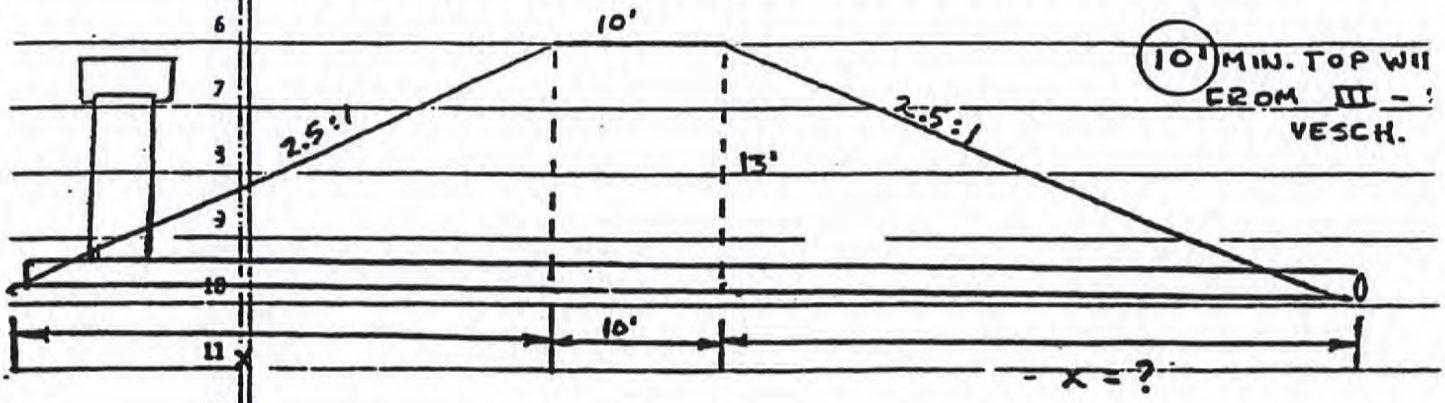
SUPPLEMENT:

PREPARED BY: LKE
DATE: 3-1

VII. PRINCIPLE SPILLWAY DESIGN.

FIND LENGTH OF BARREL REQUIRED

EMBANKMENT X-SEC FROM AP-2 & GUIDANCE FROM PAGE III-80 "EMBANKMENT CROSS SECT VESCH, 1992 ED. LOOKS LIKE THIS:



(10') MIN. TOP WI
FROM III -
VESCH.

L = LENGTH OF BARREL, IN FT.

$L = 2x + 10$ $x = ?$

$13' - X(\text{SLOPE}) = 0$; SLOPE = $\frac{1.0}{2.5}$ or .4 ft/

$13 - X(0.4) = 0$

$13 = 0.4x$

$32.5' = x$

$\therefore L = 2x + 10$

$L = 2(32.5) + 10$

$L = 75'$; we used (76) to account for slope of p

ACTUALLY, YOU CAN USE A MORE EXACT CALCULATION:

slope on pipe = .04 ft/ft., 75(.04) = 3.0'

∴ Actually our pipe through embankment would be 75 + 3.0 = 78'.

TABLE 3.14-B
PIPE FLOW CHART, n = 0.013

FOR REINFORCED CONCRETE PIPE INLET $K_m = K_e + K_b = 0.65$ AND 70 FEET OF REINFORCED CONCRETE PIPE CONDUIT (full flow assumed)

Note correction factors for pipe lengths other than 70 feet

Diameter of pipe in inches

h_f in feet	12"	15"	18"	21"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"
1	3.35	3.44	6.39	11.8	19.9	36.0	58.8	93.8	91.4	81.5	114	139	167	197	235	264	302	342
2	4.55	7.69	11.7	16.7	28.5	26.8	84.6	76.0	101	139	161	197	236	278	324	374	427	483
3	5.57	9.43	14.4	20.4	27.5	45.0	66.9	93.1	124	159	198	241	289	341	397	458	523	592
4	6.43	10.9	16.6	23.5	31.8	52.0	77.3	108	143	183	228	278	334	394	459	529	604	683
5	7.19	12.2	18.5	26.3	35.5	58.1	86.4	120	160	205	255	311	373	440	513	591	675	764
6	7.88	13.3	20.3	28.8	38.9	63.7	94.6	132	175	224	280	341	409	482	562	647	739	837
7	8.51	14.4	21.9	31.1	42.0	68.8	102	143	189	242	302	368	441	521	607	699	798	904
8	9.10	15.4	23.5	33.3	44.9	73.5	109	153	202	259	323	394	473	557	649	748	854	966
9	9.65	16.3	24.9	35.3	47.7	78.0	116	161	214	275	342	418	500	590	688	793	905	1025
10	10.2	17.2	26.2	37.2	50.3	82.2	122	170	226	289	361	440	527	622	725	836	954	1080
11	10.7	18.0	27.5	39.0	52.7	86.2	128	178	237	304	379	462	553	653	761	877	1001	1133
12	11.1	18.9	28.7	40.6	55.0	90.1	134	186	247	317	395	482	578	682	794	916	1045	1184
13	11.6	19.6	29.9	42.4	57.3	93.7	139	194	257	330	411	502	601	710	827	953	1088	1232
14	12.0	20.4	31.0	44.1	59.4	97.3	145	201	267	342	427	521	624	736	858	989	1129	1278
15	12.5	21.1	32.1	45.6	61.5	101	150	208	277	354	442	539	646	763	888	1024	1169	1323
16	12.9	21.8	33.2	47.1	63.5	104	155	215	286	366	457	557	667	787	917	1057	1207	1367
17	13.3	22.4	34.2	48.5	65.3	107	159	222	294	377	471	574	688	812	946	1090	1244	1409
18	13.7	23.1	35.2	49.9	67.4	110	164	228	303	388	484	591	708	835	973	1121	1280	1450
19	14.0	23.7	36.1	51.3	69.2	113	168	234	311	399	497	607	727	858	1000	1152	1315	1489
20	14.4	24.3	37.1	52.6	71.0	116	173	240	319	409	510	623	746	880	1026	1182	1350	1528
21	14.7	24.9	38.0	53.9	72.8	119	177	246	327	419	523	638	764	902	1051	1211	1383	1566
22	15.1	25.5	38.9	55.2	74.5	122	181	252	335	429	535	653	783	923	1076	1240	1415	1603
23	15.4	26.1	39.8	56.5	76.2	125	186	258	342	439	547	668	800	944	1100	1268	1447	1639
24	15.8	26.7	40.6	57.7	77.8	127	189	263	350	448	559	682	817	964	1123	1295	1478	1674
25	16.1	27.2	41.5	58.9	79.4	130	193	269	357	458	571	696	834	984	1147	1322	1509	1708
26	16.4	27.7	42.3	60.0	81.0	133	197	274	364	467	582	710	850	1004	1169	1348	1539	1742
27	16.7	28.3	43.1	61.2	82.5	135	201	279	371	476	593	723	867	1023	1192	1373	1568	1775
28	17.0	28.8	43.9	62.3	84.1	138	204	285	378	484	604	737	883	1041	1214	1399	1597	1808
29	17.3	29.3	44.7	63.4	85.5	140	208	290	384	493	615	750	898	1060	1235	1423	1625	1840
30	17.6	29.8	45.4	64.5	87.0	143	212	294	391	501	625	763	913	1078	1256	1448	1653	1871

h_f in feet	Correction Factors For Other Pipe Lengths																	
20	1.30	1.24	1.21	1.18	1.15	1.12	1.10	1.08	1.07	1.06	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.03
25	1.22	1.18	1.15	1.13	1.12	1.09	1.08	1.06	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02
40	1.15	1.13	1.11	1.10	1.08	1.07	1.05	1.05	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02
50	1.09	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01
60	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	.96	.97	.97	.97	.98	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	.99	.99
90	.93	.94	.94	.95	.95	.96	.97	.97	.98	.98	.98	.98	.98	.99	.99	.99	.99	.99
100	.90	.91	.92	.93	.93	.93	.95	.96	.97	.97	.97	.98	.98	.98	.98	.98	.98	.99
120	.84	.86	.87	.89	.90	.91	.93	.94	.96	.96	.96	.96	.97	.97	.97	.97	.97	.98
140	.80	.82	.83	.85	.86	.88	.90	.91	.92	.93	.94	.94	.95	.95	.96	.96	.96	.97
160	.76	.78	.80	.82	.83	.86	.88	.89	.90	.91	.92	.93	.94	.94	.95	.95	.95	.96

80-70 76-70

Source: USDA-SCS

SUPPLEMENT:

EXPANDED CHART INTERPOLATION

PREPARED BY
DATE 5-1

SEE AP-7, CHART 3.14-B

INTERPOLATION ON BOTTOM CHART TO FIND CORRECTION FACTOR FOR 76" PIPE

$$\frac{80-70}{.97-1.0} = \frac{76-70}{x-1.0}$$

$$-333.33 = \frac{6}{x-1.0}$$ [multiply both sides by $(x-1.0)$]

$$-333.33x + 333.33 = 6$$

$$-333.33x = -327.33$$

$$x = \boxed{0.98}$$

TABLE 3.14-A
PIPE FLOW CHART, n = 0.025 Corrugated Metal

FOR CORRUGATED METAL PIPE INLET $K_m = K_e + K_b = 1.0$ AND 70 FEET OF CORRUGATED ARTAL PIPE CONDUIT (full flow assumed)
Note correction factors for pipe lengths other than 70 feet

Q, in cfs	Diameter of pipe in inches																			
	6"	8"	10"	12"	15"	18"	21"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"
1	0.33	0.76	1.35	1.98	3.48	5.47	7.99	11.0	18.8	28.8	41.1	55.7	71.6	91.8	113	137	163	191	221	255	290
2	0.47	0.98	1.76	2.80	4.92	7 74	11.3	15.6	26.6	40.8	58.2	78.8	103	130	160	194	231	271	314	360	410
3	0.58	1.22	2.16	3.43	6.03	9 48	13.8	19.1	32.6	49.9	71.2	96.5	126	159	196	237	282	331	384	441	501
4	0.67	1.40	2.49	3 97	6.96	10 9	16.0	22.1	37.6	57.7	82.3	111	145	184	226	274	326	383	444	510	580
5	0.74	1.57	2.79	4.41	7.78	12.2	17.9	24.7	42.1	64.5	92.0	125	162	205	253	306	365	428	496	570	648
6	0.82	1.72	3.05	4.86	8.52	13.4	19.6	27.0	46.1	70.6	101	136	178	225	277	336	399	469	544	624	710
7	0.88	1.86	3.30	5.25	9.20	14.5	21.1	29.2	49.8	76.3	109	147	192	243	300	362	431	506	587	674	767
8	0.94	1.99	3.51	5.61	9.84	15.5	22.6	31.2	53.2	81.5	116	158	205	260	320	388	461	541	628	721	820
9	1.00	2.11	3.74	5.95	10.4	16.4	24.0	33.1	56.4	86.5	123	167	218	275	340	411	489	574	666	764	870
10	1.05	2.22	3.94	6.27	11.0	17.3	25.3	34.9	59.5	91.2	130	176	230	290	358	433	516	605	703	806	917
11	1.10	2.33	4.13	6.58	11.5	18.2	26.5	36.6	62.4	95.6	136	185	241	304	376	454	541	635	736	845	962
12	1.15	2.43	4.32	6 87	12.1	19.0	27.7	38.2	65.2	99.9	142	193	252	318	392	475	565	663	769	883	1006
13	1.20	2.53	4.49	7.15	12.6	19 7	28.8	39.8	67.8	104	148	201	262	331	408	494	588	690	800	919	1045
14	1.25	2.63	4.66	7.42	13.0	20 5	29.9	41.3	70.4	108	154	208	272	343	424	513	610	716	830	953	1085
15	1.29	2.72	4.83	7.68	13.5	21.2	30.9	42.8	72.8	112	159	216	281	355	439	531	631	741	860	987	1123
16	1.33	2.81	4.99	7.93	13.9	21.9	32.0	44.2	75.2	115	165	223	290	367	453	548	652	765	888	1019	1160
17	1.37	2.90	5.14	8.18	14.3	22.6	32.9	45.5	77.5	119	170	230	299	378	467	565	673	789	915	1051	1195
18	1.41	2.98	5.29	8.41	14.8	23.2	33.9	46.8	79.6	122	174	236	308	389	480	581	692	812	943	1081	1230
19	1.45	3.06	5.43	8.64	15.2	23.9	34.8	48.1	81.8	126	179	243	316	400	494	597	711	834	967	1111	1264
20	1.49	3.14	5.57	8.87	15.6	24.5	35.7	49.4	84.1	129	184	249	325	410	506	613	729	856	993	1139	1297
21	1.53	3.22	5.71	9.09	15.9	25.1	36.6	50.6	86.2	132	188	255	333	421	519	628	747	877	1017	1168	1329
22	1.56	3.29	5.85	9.30	16.3	25.7	37.5	51.8	88.2	135	193	261	341	430	531	643	765	898	1041	1195	1360
23	1.60	3.37	5.98	9.51	16.7	26.2	38.3	53.0	90.2	138	197	267	348	440	543	657	782	918	1064	1222	1390
24	1.63	3.44	6.11	9.72	17.0	26.8	39.1	54.1	92.1	141	201	273	356	450	555	671	799	937	1087	1248	1420
25	1.66	3.51	6.23	9.92	17.4	27.4	39.9	55.2	94.0	144	206	279	363	459	566	685	815	957	1110	1274	1450
26	1.70	3.58	6.36	10.1	17.7	27.9	40.7	56.3	95.9	147	210	284	370	468	577	699	831	976	1131	1299	1478
27	1.73	3.65	6.48	10.3	18.1	28.4	41.5	57.4	97.7	150	214	290	377	477	588	712	847	994	1153	1324	1507
28	1.76	3.72	6.60	10.5	18.4	29.0	42.3	58.4	99.5	153	218	295	384	486	599	725	863	1013	1174	1348	1534
29	1.79	3.78	6.71	10.7	18.7	29.5	43.0	59.5	101	155	221	300	391	494	610	738	878	1030	1195	1372	1561
30	1.83	3.83	6.83	10.9	19.1	30.0	43.7	60.5	103	158	225	305	398	503	620	750	893	1048	1216	1396	1588
Q, in cfs	Correction Factors For Other Pipe Lengths																			
20	1.69	1.63	1.58	1.53	1.47	1.42	1.37	1.34	1.28	1.24	1.20	1.18	1.16	1.14	1.13	1.11	1.10	1.10	1.09	1.08	1.08
30	1.44	1.41	1.39	1.36	1.32	1.29	1.27	1.24	1.21	1.18	1.15	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.07	1.06	1.06
40	1.28	1.27	1.25	1.23	1.21	1.20	1.18	1.17	1.14	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.05	1.04
50	1.16	1.16	1.15	1.14	1.13	1.12	1 11	1.10	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.03
60	1.07	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.01
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	.94	.94	.95	.95	.95	.95	.96	.96	.96	.97	.97	.97	.98	.98	.98	.98	.98	.98	.99	.99	.99
90	.89	.89	.90	.90	.91	.91	.92	.92	.93	.94	.94	.95	.95	.96	.96	.96	.97	.97	.97	.97	.94
100	.85	.85	.86	.86	.87	.88	.89	.89	.90	.91	.92	.93	.93	.94	.94	.95	.95	.95	.96	.96	.94
120	.78	.79	.79	.80	.81	.82	.83	.83	.85	.86	.87	.89	.89	.90	.91	.89	.92	.93	.93	.94	.92
140	.72	.73	.74	.75	.76	.77	.78	.79	.81	.82	.84	.85	.86	.87	.88	.86	.89	.90	.91	.91	.90
160	.68	.69	.69	.70	.71	.73	.74	.75	.77	.79	.80	.82	.83	.84	.85	.93	.87	.88	.89	.89	

Source: USDA-SCS

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TABLE 3.14-A
PIPE FLOW CHART, n = 0.025

FOR CORRUGATED METAL PIPE INLET $K_m = K_e + K_b = 1.0$ AND 70 FEET OF CORRUGATED METAL PIPE CONDUIT (full flow assumed)
Note correction factors for pipe lengths other than 70 feet

Head in feet	Discharge in cubic feet per second — Diameter of pipe in inches																			
	6"	8"	10"	12"	15"	18"	21"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"
1	0.33	0.70	1.25	1.98	3.48	5.47	7.99	11.0	18.8	28.8	41.2	55.7	72.6	91.8	113	137	163	191	222	255	290
2	0.47	0.99	1.76	2.80	4.92	7 74	11.3	15.6	26.6	40.8	58.2	78.8	103	130	160	194	231	271	314	360	410
3	0.58	1.22	2.16	3.43	6.02	9 48	13.8	19.1	32.6	49.9	71.3	96.5	126	159	196	237	282	331	384	441	502
4	0.67	1.40	2.49	3.97	6.96	10 9	16.0	22.1	37.6	57.7	82.3	111	145	184	226	274	326	383	444	510	580
5	0.74	1.57	2.79	4.43	7.78	12.2	17.9	24.7	42.1	64.5	92.0	125	162	205	253	306	365	428	496	570	648
6	0.81	1.72	3.05	4.86	8.52	13.4	19.6	27.0	46.1	70.6	101	136	178	225	277	336	399	469	544	624	710
7	0.88	1.86	3.30	5.25	9.20	14.5	21.1	29.2	49.8	76.3	109	147	193	243	300	362	431	506	587	674	767
8	0.94	1.99	3.53	5.61	9.84	15.5	22.6	31.2	53.2	81.5	116	158	205	260	320	388	461	541	628	721	820
9	1.00	2.11	3.74	5.95	10.4	16.4	24.0	33.1	56.4	86.5	123	167	218	275	340	411	489	574	666	764	870
10	1.05	2.22	3.94	6.27	11.0	17.3	25.3	34.9	59.5	91.2	130	176	230	290	358	433	516	605	702	806	917
11	1.10	2.33	4.13	6.58	11.5	18.2	26.5	36.6	62.4	95.6	136	185	241	304	376	454	541	635	736	845	962
12	1.15	2.43	4.32	6 87	12.1	19.0	27.7	38.2	65.2	99.9	142	193	252	318	392	475	565	663	769	883	1004
13	1.20	2.53	4.49	7.15	12.6	19 7	28.8	39.8	67.8	104	148	201	262	331	408	494	588	690	800	919	1045
14	1.25	2.63	4.66	7.42	13.0	20.5	29.9	41.3	70.4	108	154	208	272	343	424	513	610	716	830	953	1085
15	1.29	2.72	4.83	7.68	13.5	21.2	30.9	42.8	72.8	112	159	216	281	355	439	531	631	741	860	987	1123
16	1.33	2.81	4.99	7.93	13.9	21.9	32.0	44.2	75.2	115	165	223	290	367	453	548	652	765	888	1019	1160
17	1.37	2.90	5.14	8.18	14.3	22.6	32.9	45.5	77.5	119	170	230	229	378	467	565	672	789	915	1051	1195
18	1.41	2.98	5.29	8.41	14.8	23.2	33.9	46.8	79.8	120	174	236	308	389	480	581	692	812	942	1081	1230
19	1.45	3.06	5.43	8.64	15.2	23.9	34.8	48.1	82.0	126	179	243	316	400	494	597	711	834	967	1111	1264
20	1.49	3.14	5.57	8.87	15.6	24.5	35.7	49.4	84.1	129	184	249	325	410	506	613	729	856	993	1139	1297
21	1.53	3.22	5.71	9.09	15.9	25.1	36.6	50.6	86.2	132	188	255	333	421	519	628	747	877	1017	1168	1329
22	1.56	3.29	5.85	9.30	16.3	25.7	37.5	51.8	88.2	135	193	261	341	430	531	643	765	898	1041	1195	1360
23	1.60	3.37	5.98	9.51	16.7	26.2	38.3	53.0	90.2	138	197	267	348	440	543	657	782	918	1064	1222	1390
24	1.63	3.44	6.11	9.72	17.0	26.8	39.1	54.1	92.1	141	201	273	356	450	555	671	799	937	1087	1248	1420
25	1.66	3.51	6.23	9.92	17.4	27.4	39.9	55.2	94.0	144	206	279	363	459	566	685	815	957	1110	1274	1450
26	1.70	3.58	6.36	10.1	17.7	27.9	40.7	56.3	95.9	147	210	284	370	468	577	699	831	976	1133	1299	1478
27	1.73	3.65	6.48	10.3	18.1	28.4	41.5	57.4	97.7	150	214	290	377	477	588	712	847	994	1153	1324	1507
28	1.76	3.72	6.60	10.5	18.4	29.0	42.3	58.4	99.5	153	218	295	384	486	599	725	863	1013	1174	1348	1534
29	1.79	3.78	6.71	10.7	18.7	29.5	43.0	59.5	101	155	221	300	391	494	610	738	878	1030	1195	1372	1561
30	1.82	3.85	6.83	10.9	19.1	30.0	43.7	60.5	103	158	225	305	398	503	620	750	893	1048	1216	1396	1588
	Correction Factors For Other Pipe Lengths																			
20	1.69	1.63	1.58	1.53	1.47	1.42	1.37	1.34	1.28	1.24	1.20	1.18	1.16	1.14	1.13	1.11	1.10	1.10	1.09	1.08	1.08
25	1.44	1.41	1.39	1.36	1.32	1.29	1.27	1.24	1.21	1.18	1.15	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.07	1.06	1.06
30	1.29	1.27	1.25	1.23	1.21	1.20	1.18	1.17	1.14	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.05	1.04
35	1.18	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.03
40	1.10	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.01
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	.94	.94	.95	.95	.95	.95	.96	.96	.96	.97	.97	.97	.98	.98	.98	.98	.98	.98	.99	.99	.99
70	.89	.89	.90	.90	.91	.91	.92	.92	.93	.94	.94	.95	.95	.96	.96	.96	.97	.97	.97	.97	.94
80	.85	.85	.86	.86	.87	.88	.89	.89	.90	.91	.92	.93	.93	.94	.94	.95	.95	.95	.96	.96	.94
90	.82	.82	.83	.83	.84	.85	.86	.86	.87	.88	.89	.89	.90	.91	.91	.92	.92	.93	.93	.94	.92
100	.78	.79	.79	.80	.81	.82	.83	.83	.85	.86	.87	.89	.89	.90	.91	.89	.92	.93	.91	.91	.90
110	.72	.73	.74	.75	.76	.77	.78	.79	.81	.82	.84	.85	.86	.87	.88	.86	.89	.90	.91	.91	
120	.68	.69	.69	.70	.71	.73	.74	.75	.77	.79	.80		.83	.84	.85	.92	.87	.88	.89	.89	

80-70 76-70

Source: USDA-SCS

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1776

FIND MIN. BARREL SIZE FOR CORR METAL

3.1

TABLE 3.14-D

CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE DESIGN TABLE

Riser Diam., in.	Cylinder		Height, inches	Minimum Size Support Bar	Minimum Top	
	Diameter, inches	Thickness, gage			Thickness	Stiffe:
12	18	16	6	#6 Rebar or 1½ x 1½ x 3/16 angle	16 ga. (F&C)	-
15	21	16	7	" "	" "	-
18	27	16	8	" "	" "	-
21	30	16	11	" "	16 ga.(C), 14 ga.(F)	-
24	36	16	13	" "	" "	-
27	42	16	15	" "	" "	-
36 → USE	54	14	17	#8 Rebar	14 ga.(C), 12 ga.(F)	-
42	60	16	19	" "	" "	-
48	72	16	21	1¼" pipe or 1¼ x 1¼ x ¼ angle	14 ga.(C), 10 ga.(F)	-
54	78	16	25	" "	" "	-
60	90	14	29	1½" pipe or 1½ x 1½ x ¼ angle	12 ga.(C), 8 ga.(F)	-
66	96	14	33	2" pipe or 2 x 2 x 3/16 angle	12 ga.(C), 8 ga.(F) w/stiffener	2 x 2 x angle
72	102	14	36	" "	" "	2½ x 2½ ¼ ang
78	114	14	39	2½" pipe or 2 x 2 x ¼ angle	" "	" "
84	120	12	42	2½" pipe or 2½ x 2½ x ¼ angle	" "	2½ x 2½ 5/16 ang

Note$_1$: The criterion for sizing the cylinder is that the area between the inside of the cylinder and the outsi of the riser is equal to or greater than the area inside the riser. Therefore, the above table is invalid for us with concrete pipe risers.

Note$_2$: Corrugation for 12"-36" pipe measures 2½" x ½"; for 42" -84" the corrugation measures 5" x 1" or 8" 1".

Note$_3$: C = corrugated; F = flat.

Source: Adapted from USDA-SCS and Carl M. Henshaw Drainage Products Information.

Source: USDASCS

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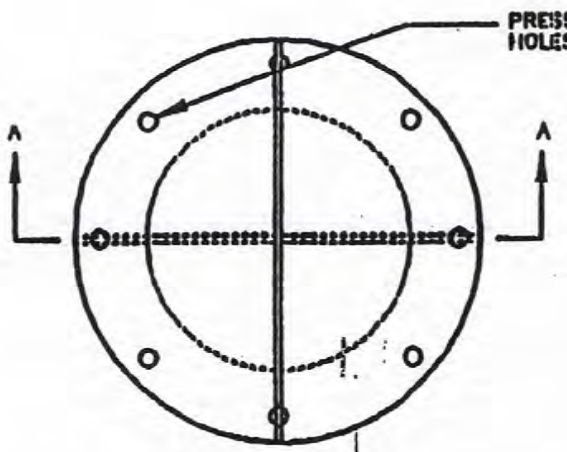
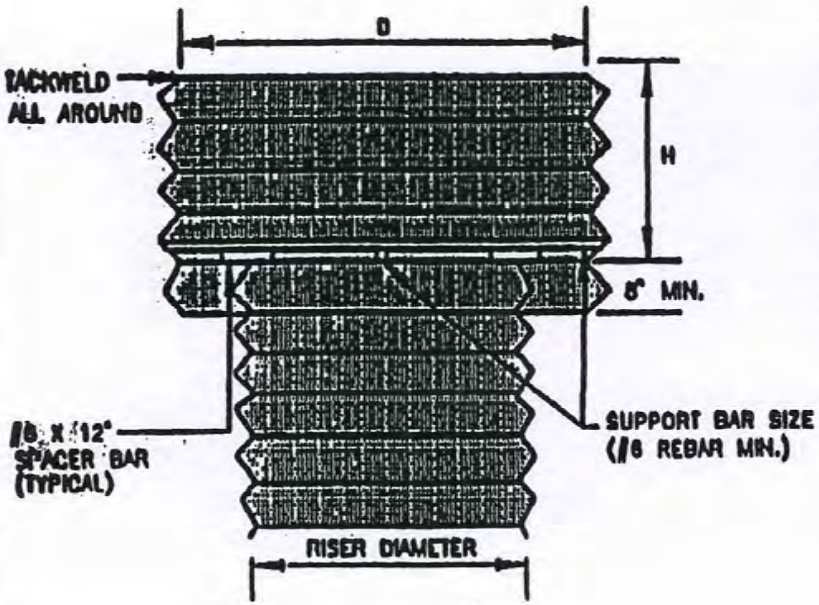
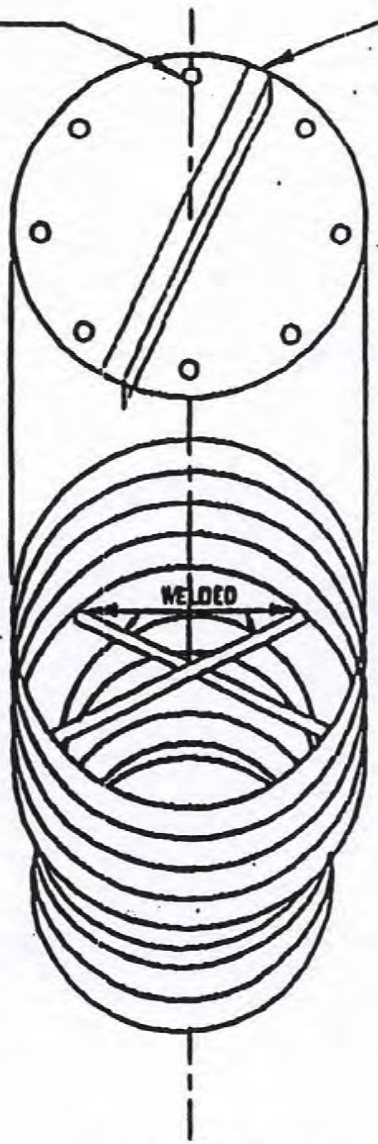
ANTI- VORTEX DEVICE DESIGN



PLAN VIEW



SECTION A-A



ISOMETRIC

TOP STIFFENER (IF REQUIRED) IS __X__X__ ANGLE WELDED TO TOP AND ORIENTED PERPENDICULAR TO CORRUGATIONS. N/A

TOP IS 14 GAGE CORRUGATED METAL OR 1/8" STEEL PLATE. PRESSURE RELIEF HOLES MAY BE OMMITTED, IF ENDS OF CORRUGATIONS ARE LEFT FULLY OPEN WHEN THE TOP IS ATTACHED.

CYLINDER IS 14 GAGE CORRUGATED METAL PIPE OR FABRICATED FROM 1/8" STEEL PLATE.

NOTES:

1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.
2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO TOP OF RISER.

Plate 3.14

TABLE 3.14-C

DESIGN DATA FOR EARTH SPILLWAYS

* WE NEED TO PASS 15.2 cfs; WE COULD HAVE USED

VARIABLES BETW. -8' & .9' BUT FOR ADD. SAFETY & CONST. EASE

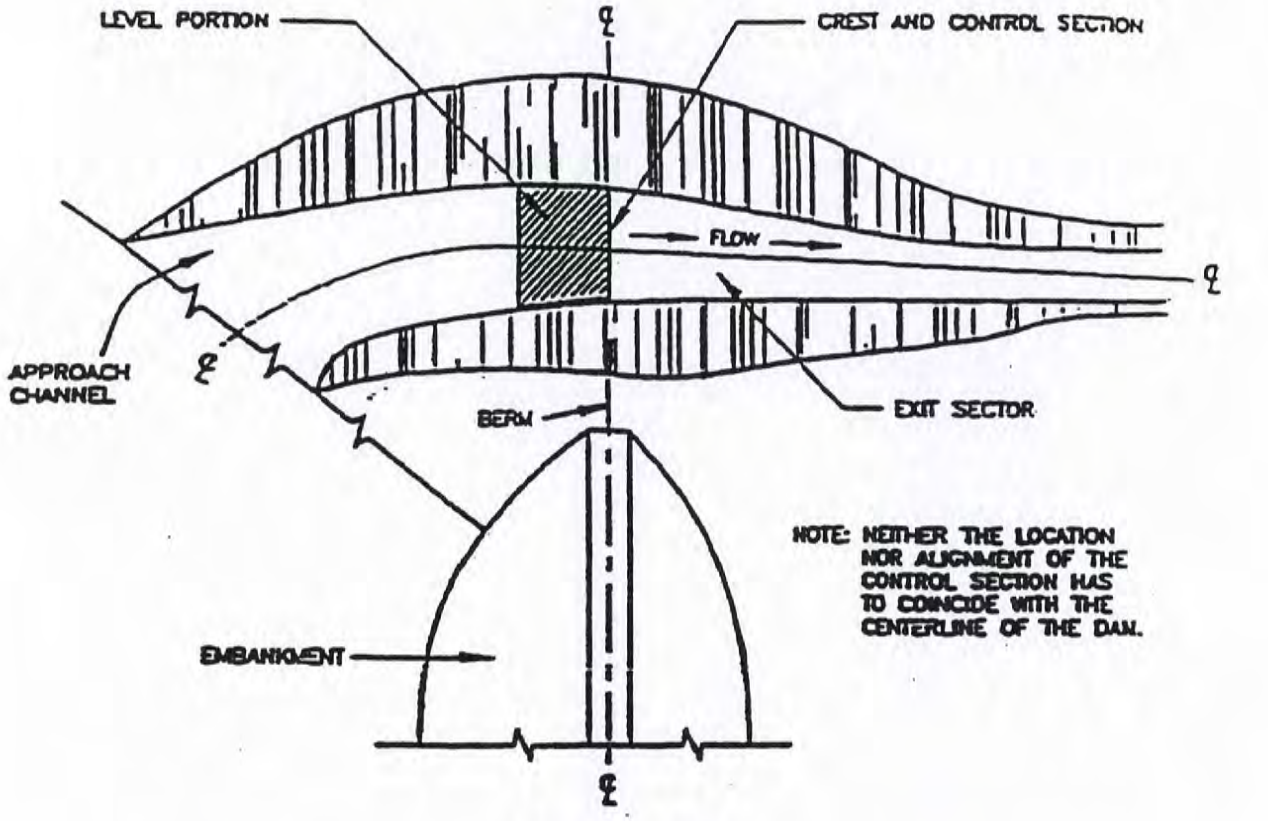
USE 1.0'

USE →

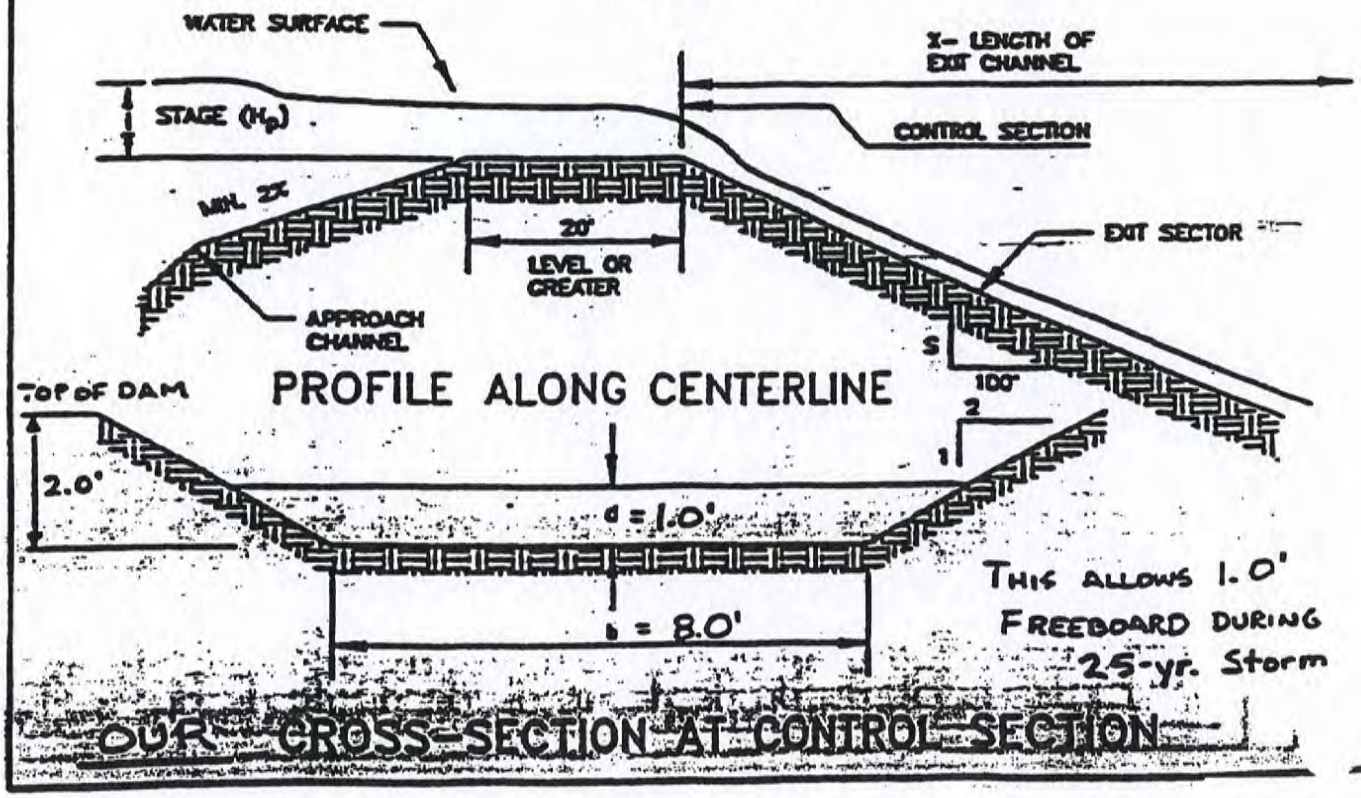
STAGE (m) in FEET	SPILLWAY DISCHARGE	BOTTOM WIDTH (b) IN FEET																
		8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
0.5	0	5	7	9	10	11	13	14	15	17	18	20	21	22	24	25	27	28
	V	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	1	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	2	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.6	0	8	10	12	14	16	18	20	22	24	26	28	30	32	34	35	37	39
	V	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	1	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
	2	34	34	34	34	34	34	37	37	37	37	37	37	37	37	37	37	37
0.7	0	11	13	14	16	18	20	23	25	28	30	33	35	38	41	43	46	48
	V	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
	1	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	2	38	40	40	40	41	41	41	41	41	41	41	41	41	41	41	41	41
0.8	0	14	16	19	22	26	29	32	35	38	42	45	46	44	51	54	57	60
	V	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	1	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	2	44	44	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45
0.9	0	17	20	24	28	32	35	39	43	47	51	55	57	60	64	68	71	75
	V	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
	1	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
	2	47	47	48	48	48	48	48	48	48	48	49	49	49	49	49	49	49
1.0	0	20	24	29	33	38	42	47	51	56	61	65	68	72	77	81	85	90
	V	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	1	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	2	51	51	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52
1.1	0	23	28	34	39	44	49	54	60	65	70	74	79	84	89	95	100	105
	V	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	2	35	35	35	35	35	35	35	36	36	36	36	36	36	36	36	36	36
1.2	0	28	33	40	47	54	61	68	75	82	89	96	97	98	104	110	116	122
	V	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	1	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	2	38	38	39	39	39	39	39	39	40	40	40	40	40	40	40	40	40
1.3	0	32	38	46	53	60	68	75	83	90	98	105	112	119	126	133	140	147
	V	4.5	4.6	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
	1	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	2	42	42	42	43	43	43	43	43	43	43	43	44	44	44	44	44	44
1.4	0	37	44	51	58	66	74	82	90	98	106	111	117	127	134	142	150	158
	V	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
	1	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	2	43	46	46	46	46	47	47	47	47	47	47	47	48	48	48	48	48
1.5	0	41	50	58	66	75	83	92	101	109	116	125	133	142	150	160	169	178
	V	4.8	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.1	5.1
	1	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	2	69	69	70	70	71	71	71	71	71	71	71	72	72	72	72	72	72
1.6	0	46	56	65	75	84	94	104	113	122	132	142	149	158	168	178	187	197
	V	5.0	5.1	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	1	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	2	73	74	74	75	75	76	76	76	76	76	76	76	76	76	76	76	76
1.7	0	52	62	72	83	94	103	113	126	135	145	156	166	177	187	196	206	217
	V	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
	1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	2	76	78	79	80	80	80	80	80	80	80	80	80	80	80	80	80	80
1.8	0	58	69	81	93	105	116	127	139	150	160	172	183	194	206	216	228	239
	V	5.3	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	1	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	2	80	82	83	84	85	85	85	85	85	85	85	85	85	85	85	85	85
1.9	0	65	76	88	102	114	127	140	152	164	176	188	200	213	225	238	250	263
	V	5.5	5.5	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
	1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	2	85	85	86	87	88	88	88	88	88	88	88	88	88	88	88	88	88
2.0	0	71	83	97	111	125	138	151	164	178	191	204	218	231	245	258	271	285
	V	5.6	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9
	1	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3
	2	91	90	91	91	91	92	92	92	92	92	92	92	92	92	92	92	92
2.1	0	77	91	107	122	139	154	169	184	199	214	229	244	259	274	289	304	319
	V	5.7	5.8	5.9	5.9	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	1	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	2	91	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93
2.2	0	84	100	116	133	149	165	181	197	213	229	245	261	277	293	309	325	341
	V	5.9	5.9	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
	1	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	2	96	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100
2.3	0	90	109	124	140	156	172	188	204	220	236	252	268	284	300	316	332	348
	V	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
	1	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	2	100	102	103	103	103	103	104	104	104	104	104	104	104	104	104	104	104
2.4	0	95	115	132	148	165	181	198	214	231	247	264	280	297	313	330	346	363
	V	6.1	6.2	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
	1	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	2	104	106	107	107	107	107	108	108	108	108	108	108	108	108	108	108	108

Source: USDA-SCS

EXCAVATED EARTH SPILLWAY

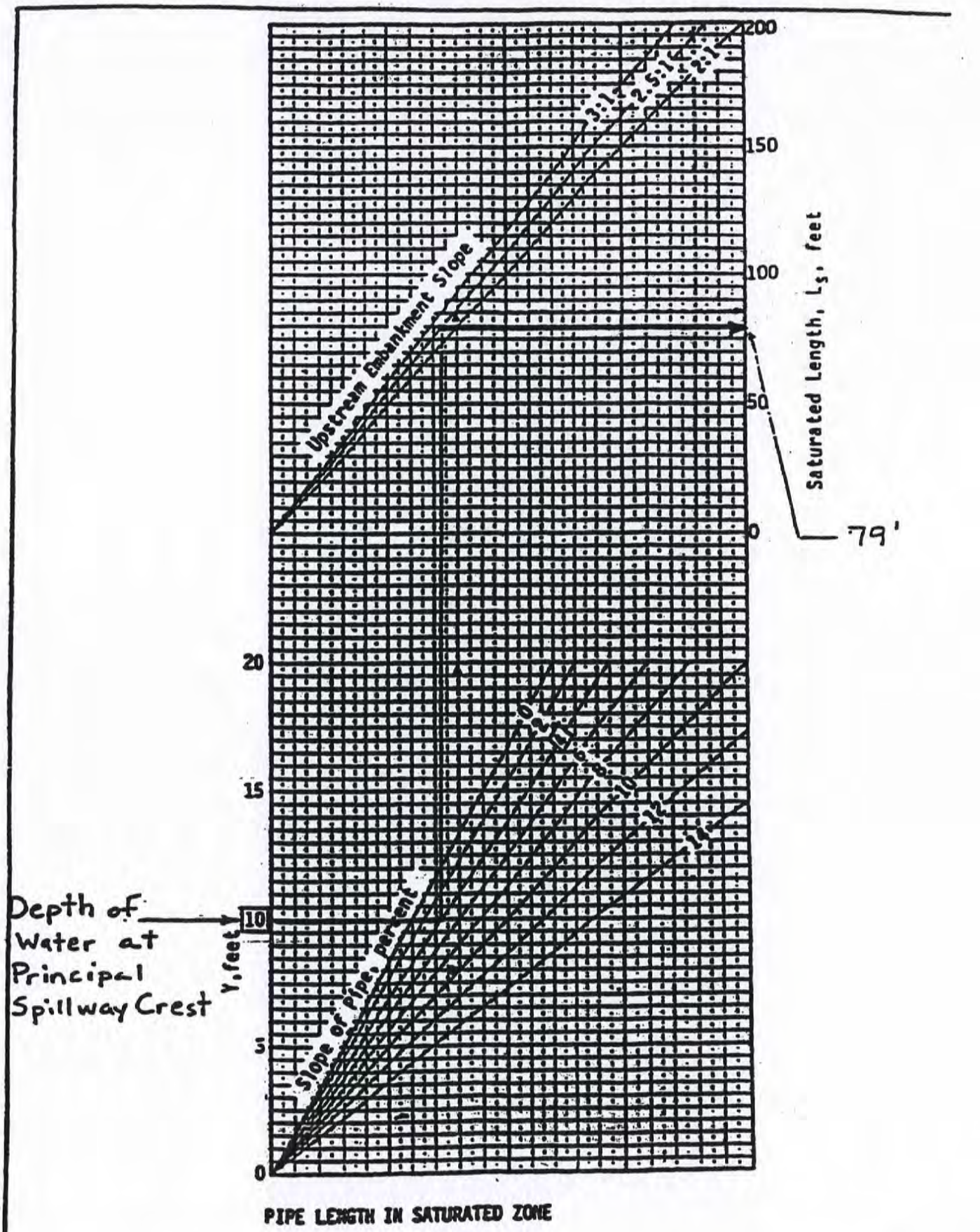


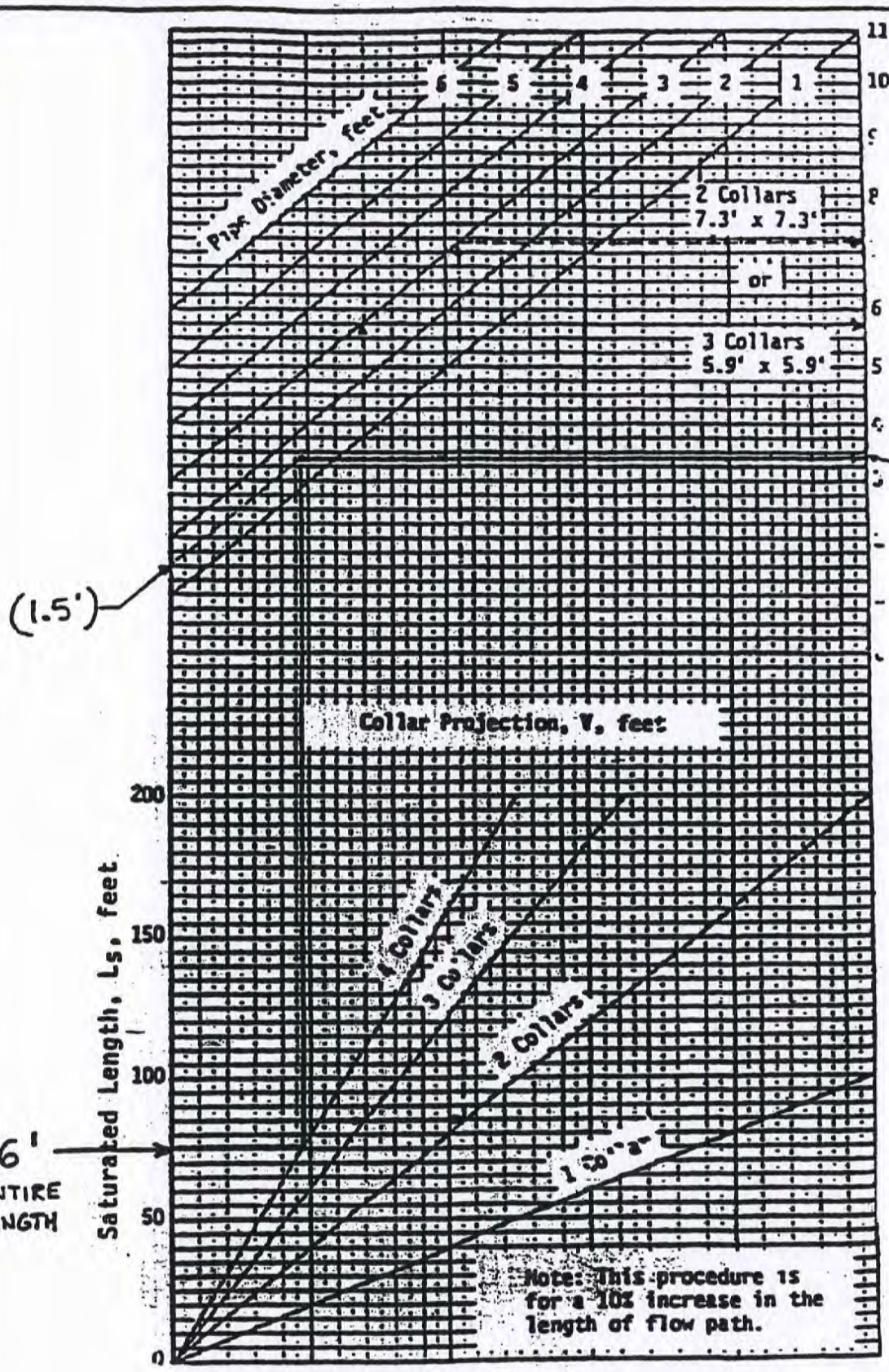
PLAN VIEW



Source: USDA-SCS

Plate 3.14


Upstream Embankment Slope
3:1
2.5:1
2:1
200
150
100
50
0
Saturated Length, L_s, feet
79'
20
15
10
5
0
Depth of Water at Principal Spillway Crest
Y, feet
Slope of Pipe, percent
PIPE LENGTH IN SATURATED ZONE

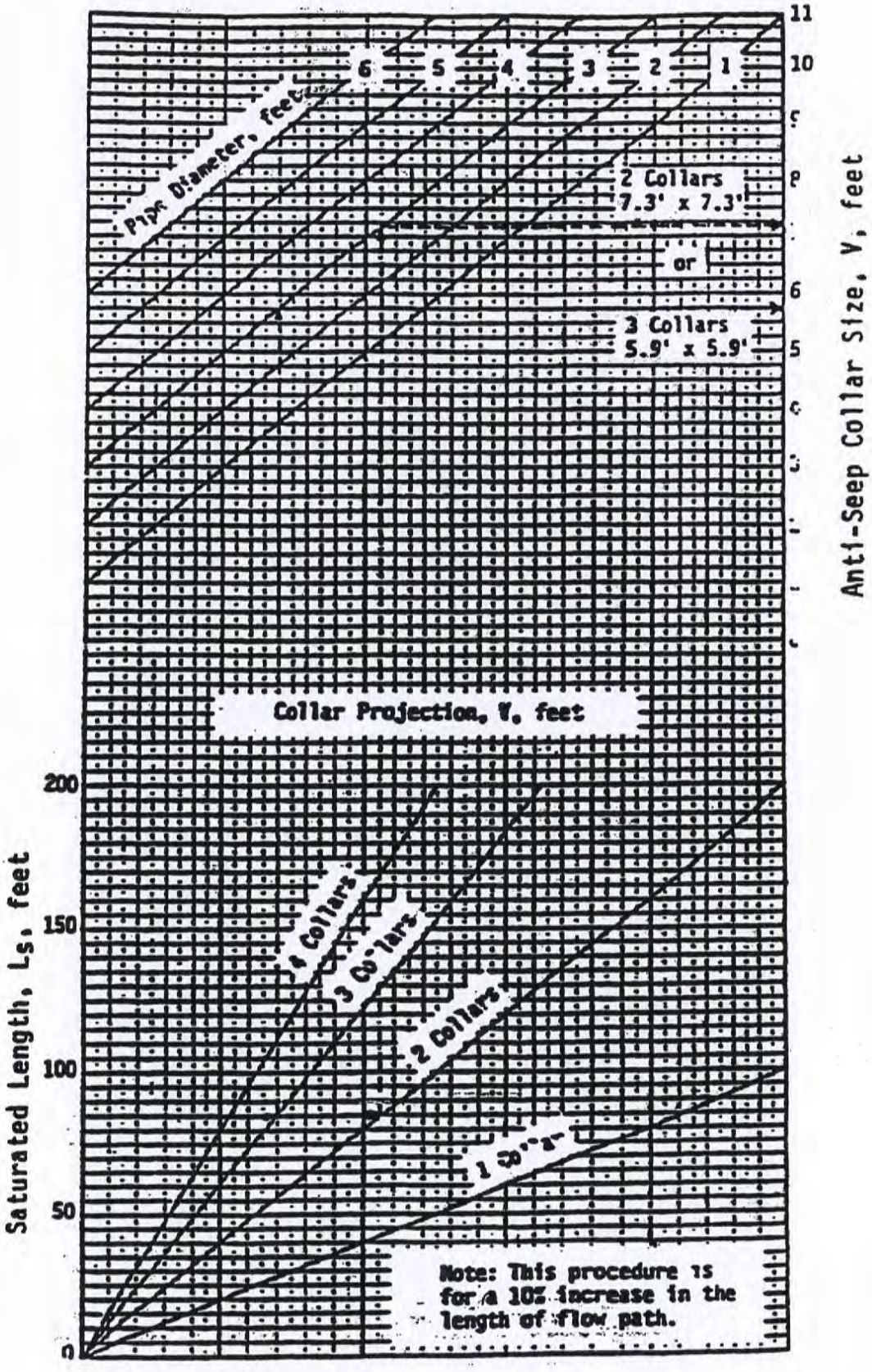


NUMBER OF ANTI-SEEP COLLARS REQUIRED

For Our 18" Concrete Barrel (1.5')

Source: USDA-SCS

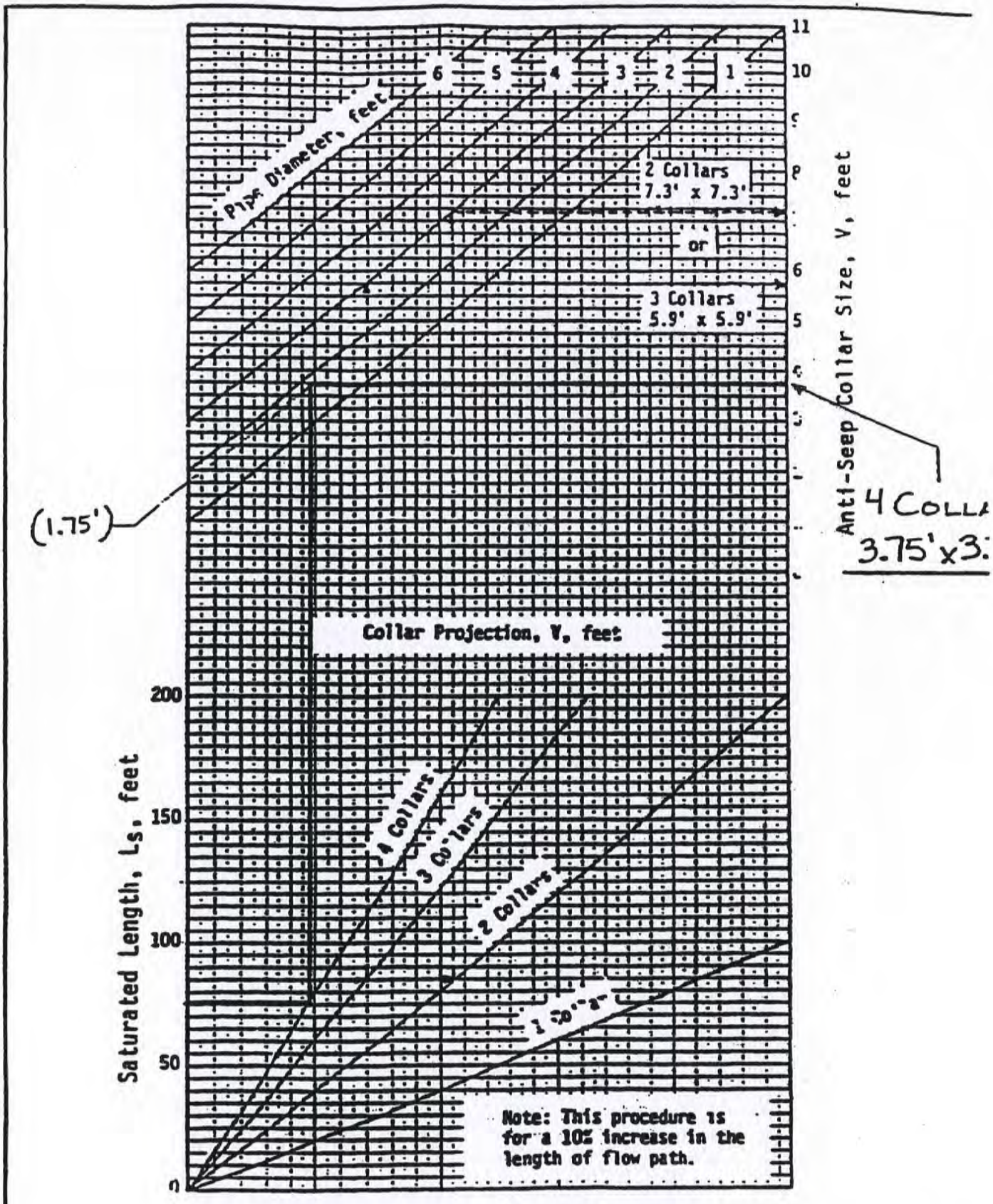
Plate 3.14



NUMBER OF ANTI-SEEP COLLARS REQUIRED

FIND # OF ANTI-SEEP COLLARS REQ. FOR CORRUGATED METAL PIPE

Source: USDA-SCS 21 Plate 3.14-



NUMBER OF ANTI-SEEP COLLARS REQUIRED * 21

FIND # OF ANTI-SEEP COLLARS REQ. FOR 12 = 1.75

Source: USDA-SCS * 21 CORRUGATED METAL PIPE - Plate 3.14-12