6.1 Sediment Basin

Description

A sediment basin is a temporary settling pond that releases runoff at a controlled rate. The basin is designed to slowly release runoff, detaining it long enough to allow most of the sediment to settle. Sediment basins typically consist of a dam or embankment, the pool area for water and sediment storage, principal and emergency spillways, and a controlled dewatering device or skimmer. Secondary benefits include runoff control and preserving the capacity of downstream reservoirs, ditches, canals, diversions, waterways and streams. The entire structure may be removed when construction is complete and the drainage area is stabilized or may be converted to a detention basin for post-construction storm water management.

Condition Where Practice Applies

Sediment basins under these guidelines are limited to sites where:

- Failure of the structure would not result in loss of life, damage to homes or buildings, or interruption of use or service from private utilities.
- The drainage area is 100 ac. or less.
- The height of the dam is 25 ft. or less, as measured from the natural streambed at the downstream toe of the dam to the top of the dam.
- The basin is to be removed within 36 months after its construction.

Sediment basins exceeding any of these limits shall conform to Ohio Dam Safety Laws, local requirements, or U.S.D.A Natural Resources Conservation Service Standards and Specifications No. 378 for ponds and No. 350 for sediment basins, whichever is most restrictive.

Ohio Dam Safety Laws may apply to basins larger than 15 ac.-ft. (24,000 cy) as measured to the top of the dam. Information is available from the Ohio Department of Natural Resources, Division of Water, 2045 Morse Road, Bldg. E-2, Columbus, Ohio 43229-6605; phone (614) 265-6731.

Planning Considerations

Sediment basins and sediment traps are generally accepted methods for treating sediment-laden runoff. Sediment basins and traps are usually placed near the perimeter of construction-sites to prevent off-site sedimentation. Construction activity should be phased to allow them to remain functional for as long as possible, ideally until the area contributing runoff is stabilized with dense permanent vegetation. Settling ponds, both traps and basins, are generally recommended as the principal sediment-control practices for construction-sites. The typical components of a settling basin are shown in Figure 6.1.2 on the following page.

Effectiveness – Sediment basins do not trap all the sediment that washes into them. Sediment basins are not as effective in controlling fine particles (i.e., silt, clay) as sand and other coarse particles. Therefore, sediment basins as with all sediment controls should be used in conjunction with erosion control practices such as temporary seeding to reduce the total amount of sediment washing into them. Soil analysis may be necessary to determine whether a sediment basin will be a feasible means of preventing off-site sedimentation.

Timing – Sediment basins, along with other sediment-control practices, must be constructed as a first step in any land disturbing activity and must be functional before upslope land disturbance takes place.

Construction Phases – Sediment basins should be placed so they function through all phases of the site's development, both before and after new drainage systems are constructed.

Location – It is practical and economical to locate sediment basins where the largest storage capacity can be obtained with the least amount of earthwork, such as depressions and drainage ways (without a defined bed or bank). Do not place sediment basins in or immediately adjacent to wetlands or stream channels.

Diverting Runoff – Temporary diversions at the perimeter of construction sites are used to direct runoff to sediment basins.

Below Storm Drains – Sediment basins may be placed beyond the ends of proposed storm-drain systems. Postponing construction of the last sections of the storm drain may be necessary to provide adequate area for the sediment basin between the outlet and receiving watercourse.

Storm Drain Diversions – Storm drains may also be temporarily redirected through sediment basins during construction (Figure 6.1.1).

Utilities – Give special consideration to sediment basin location and potential interference with construction of proposed drainage ways, utilities and storm drains.

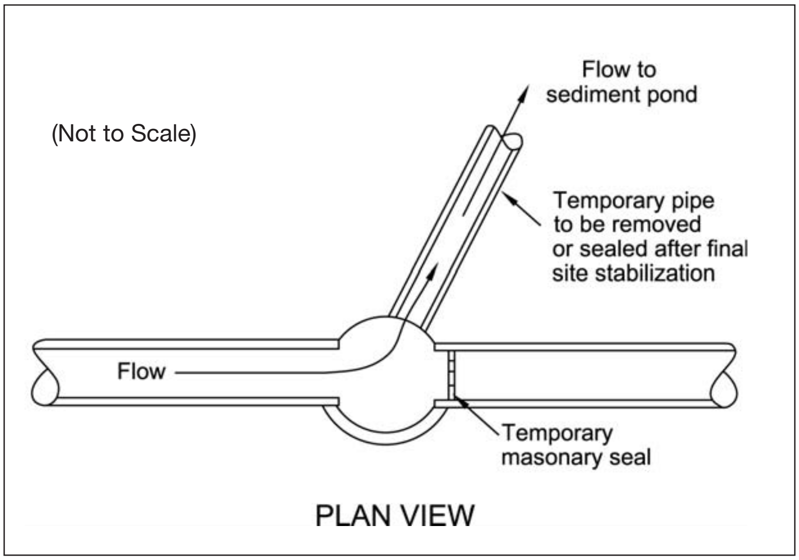

Figure 6.1.1 Temporary storm drain diversion

Design Criteria

For the purposes of this manual the design of a sediment basin is broken down into five parts which include:

1) Pool Design
2) Embankment Design
3) Dewatering Design
4) Principal Spillway Design
5) Emergency Spillway Design.

Generally accepted practices and procedures shall be followed to meet these design criteria. Sediment basins shall be designed by a registered professional engineer. Runoff computations shall be based upon the worst soil-cover conditions expected to occur in the contributing drainage area during the anticipated effective life of the structure. Runoff volumes must be computed by accepted engineering methods such as the NRCS curve number method.

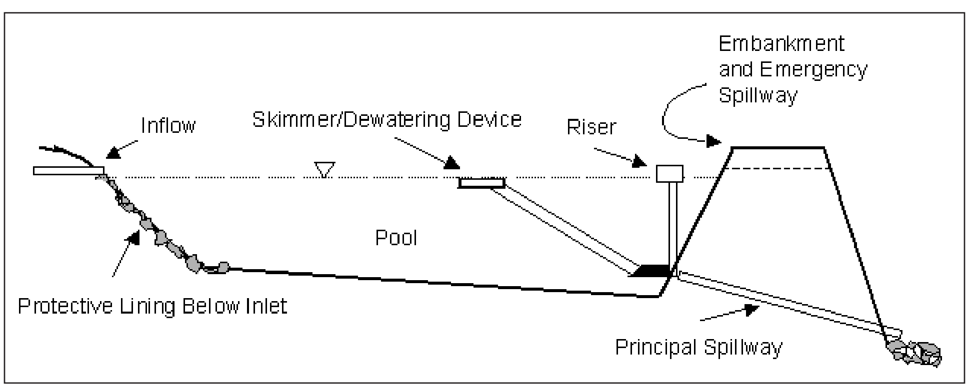

Figure 6.1.2 Typical components of a settling basin

1. POOL DESIGN:

Capacity – The minimum total design volume for the sediment basin shall consist of two components, the dewatering zone and the sediment storage zone. These zones are shown schematically in Figure 6.1.3. The volume of the dewatering zone shall be calculated for the entire drainage area by the method shown below. The drainage area includes the entire area contributing runoff to the sediment basin, offsite as well as on.

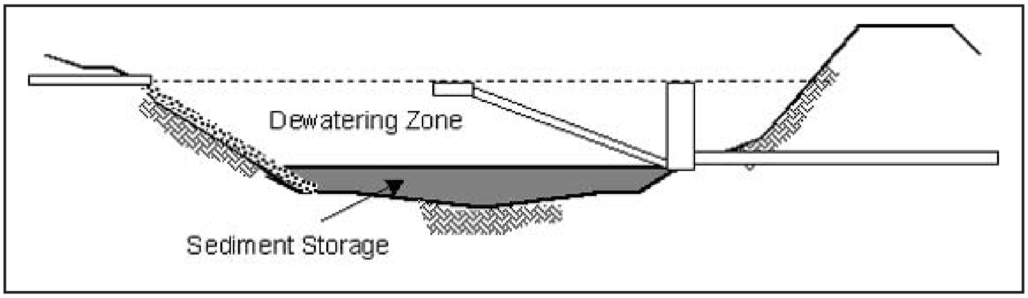

Figure 6.1.3 Pool showing dewatering area and additional sediment storage area

a) Dewatering Zone Volume -

The volume of the dewatering zone shall be a minimum of 1800 cubic feet per acre of drainage (67 yd^3/acre) or the minimum stated in the current NPDES construction general permit. Increasing this volume will increase the effectiveness of the basin, provided dewatering times are appropriately adjusted as well.

b) Sediment Storage Zone Volume -

The volume of the sediment storage zone shall be calculated by one of the following methods.

Method 1: The volume of the sediment storage zone shall be 1000 cubic feet (37 cubic yards) per disturbed acre within the watershed of the basin. OR

Method 2: The volume of the sediment storage zone shall be the volume necessary to store the sediment as calculated with RUSLE or a similar generally accepted erosion prediction model. While the sediment storage volume may extend to the expected time period of the construction project, the minimum estimated time between cleanouts shall be six months.

The total volume of the dewatering zone and the sediment storage zone shall be provided below the principal spillway elevation. The elevation at which the sediment storage zone reaches the design capacity should be designated by the top of stake located near the center of the basin. Accumulated sediment shall be removed from the basin whenever it reaches that elevation on the cleanout stake.

Depth – The pool shall be configured to maximize the optimum depth of 3 ft. Depths over 5 ft. should be avoided. The depth shall be measured to the invert of the principal spillway. These are optimum criteria and will not be feasible for all sediment basins.

Flow Length-to-Width Ratio – The length-to-width ratio shall be 4:1 or greater. If the flow length from the inlet of the basin to the principal spillway is not greater than or equal to the minimum length, either the inlet of the basin should be relocated farther away from the principal spillway, or one or more solid baffles should be used to increase the flow length within the basin. Flow length is to be measured at the elevation of the invert of the principal spillway. Where runoff from disturbed areas enters the basin from different directions, it is better to combine flows from the various areas into a single inlet into the basin rather than have multiple inlets into the basin. If multiple inlets to the basin exist, the flow length to width ratio from all inlets must be at least 4:1.

Use of Baffles in Sediment Basins – If individual situations require greater trapping efficiency or if optimum depth and length-to-width ratios are not feasible, baffles may be incorporated into the design. Baffles may be constructed of porous or solid materials depending upon their purpose. Solid baffles, as shown in Figures 6.1.4 and 6.1.5, may be used to increase the flow length within the basin.

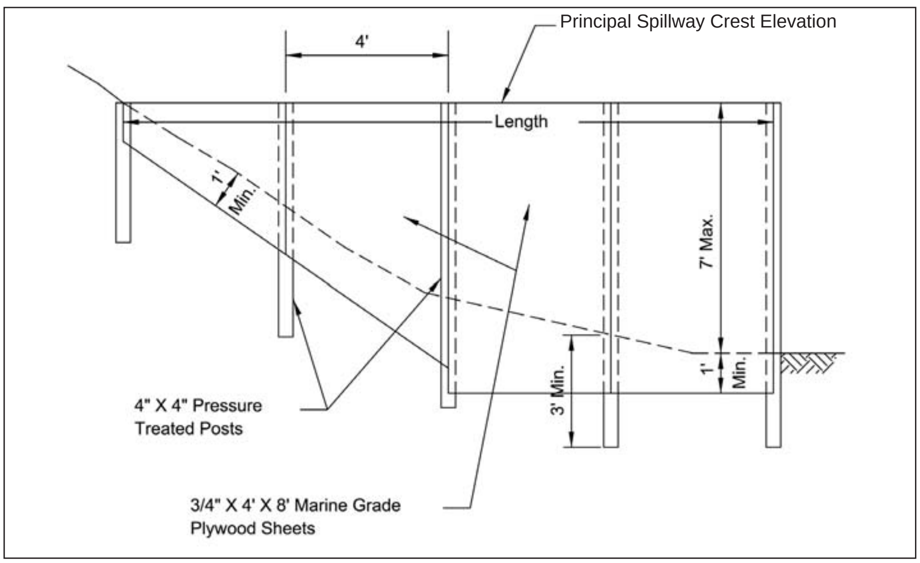

Figure 6.1.4 Typical construction of a solid baffle

Porous baffles, as shown in figure 6.1.5, are used to dampen turbulent currents and increase sedimentation. Porous baffles are typically constructed of jute matting, rock, plastic safety fence, or other material. Porous baffles typically partition the basin into two or three cells. Whether porous or solid baffles, the height shall extend to the crest elevation of the principal spillway.

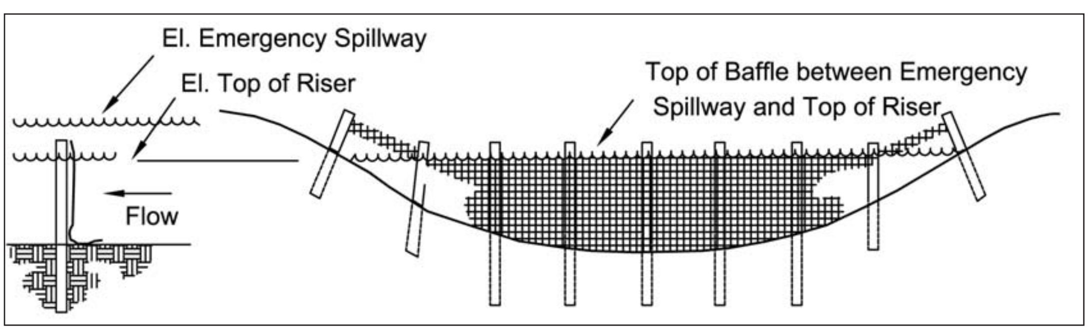

Figure 6.1.5 Porous baffle placed to increase pond efficiency (left shown in profile, right in cross-section)

Basin Inlet—A suitable protective lining for each collection channel or other device that discharges to the basin should be provided; the lining should extend to the bottom of the basin and at least 10' along the basin bottom for energy dissipation.

Safety—Sediment basins are attractive to children and can be dangerous, particularly where 2:1 or steeper side slopes lead directly into water 3 ft. or deeper. Danger is also increased where side slopes are not vegetated. Fencing and warning signs shall be installed to minimize the danger associated with sediment basins.

2. EMBANKMENT DESIGN:

Embankment Slope—Embankment slopes must be sufficiently flat to ensure stability; however, in all cases the combined upstream and downstream side slopes of the settled embankment shall not be less than 5 horizontal to 1 vertical (5:1) with neither slope being steeper than 2:1.

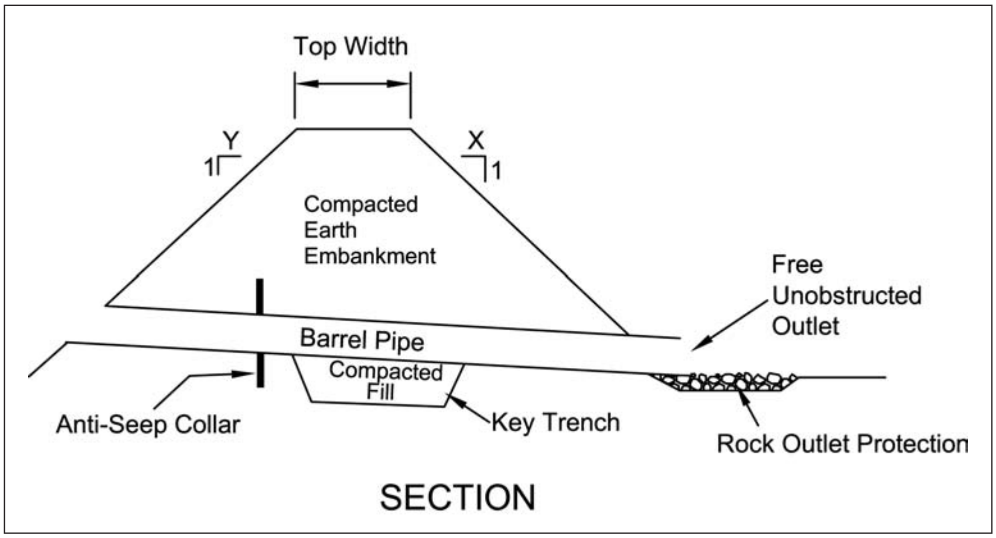

Figure 6.1.6 Embankment Design

Embankment Cutoff Trench—Use cutoff trenches to prevent seepage from flowing along the foundation of the embankment. Install cutoff trenches to a depth that extends into a relatively impervious layer. In all cases the minimum depth shall be 3 ft. and constructed of mechanically compacted material. A cutoff trench shall have a bottom width adequate to accommodate the equipment used for excavation, backfill, and compaction operations. Side slopes shall be no steeper than 1:1.

Embankment Settlement—The embankment design height shall be increased by the amount needed to ensure that after all settlement has taken place the height of the dam will equal or exceed the design height. This increase shall not be less than 5%.

Embankment Top Width—The minimum top width of the embankment shall be as shown below.

Table 6.1.1 Embankment Top Width

Embankment Height at Centerline (ft.)	Minimum Top Width (ft.)
< 15	8
15 – 20	10
> 20	12

3. DEWATERING DEVICE DESIGN:

Dewatering should be part of all sediment basins. The minimum dewatering time for sediment basins is 48 hours. The maximum dewatering time should not exceed 7 days. The lower limit of dewatering is the top of the sediment storage zone, or the top of the permanent pool if a permanent pool is used. The upper limit is the crest of the principal spillway. Sediment basins shall be dewatered using a device that discharges water from the top of the dewatering zone.

Typical methods or devices for accomplishing this may include the following: skimmers, floating pumps, siphons or other acceptable methods that provide dewatering between 48 hours and 7 days. Where ice or other reasons make dewatering from the top of the water surface impractical, multiple orifices or a single orifice may be used to dewater down to the top of the sediment storage zone. Any dewatering of the sediment zone must be accomplished using protected dewatering methods (e.g. perforated riser with gravel cone or wire mesh and filter fabric covering perforations). All of these methods are appropriate for meeting the requirements of this standard, but only sizing procedures for skimmers are included below. Concern regarding ice may justify changing outlet types during months of hardest freezing or provide frequent monitoring and mainteance as a means of preventing freezing of the skimmer.

A schematic of a skimmer is shown in figure 6.1.7 or 6.1.8. Typically a single orifice plate is placed in the discharge pipe to control water outflow or discharge. It is recommended that the orifice be placed near the water surface or floating device to allow a constant head and a more consistent discharge. Note the dewatering device is not the same as the principal or emergency spillway. However, the dewatering device outlet may be connected to the principal spillway outlet.

Sediment basins are often permanent stormwater detention facilities (wet pond, dry pond, ...) modified for sediment control use during construction. Permanent stormwater ponds and sediment basins often have different volume and drawdown requirements. Thus, if the same facility (basin) is to be used both for sediment control during construction and for permanent stormwater control, the facility will require two different outlet designs - one to be used during construction, and the other to be installed upon completion of the development. Plans should explicitly show design calculations and outlet design details for both uses and configurations.

It is recommended that calculation summaries and design details for both outlets be included on the same plan page during submittal for ease of evaluation by the reviewing agency. Table 6.1.1.a highlights summary information that should be included.

In addition, the point at which the temporary sediment basin outlet is to be replaced with the permanent stormwater basin outlet should be clearly specified on the page(s) with outlet design details.

Table 6.1.1.a Summary information for Sediment Basin versus Permanent Stormwater Facility

	Sediment Basin				Permanent Stormwater Facility			
Contributing Drainage Area (ac.)	Dewatering Volume (yd^3) or (ac-ft)	Sediment Storage Volume (yd^3) or (ac-ft)	Detention Time Min 48 hr (hours)	Sediment Control Orifice Size (in) or (in^2)	Water Quality Volume-WQv (yd^3) or (ac-ft)	Permanent Pool Volume (yd^3) or (ac-ft)	Detention Time (hours)	WQv Orifice Size (in) or (in^2)

Sizing Procedures for Skimmers

Two types of skimmer are discussed here: the Faircloth Skimmer, a patented device manufactured and sold by William Faircloth of North Carolina; and the Delaware DOT skimmer incorporated into the State of Delaware Dept. of Transportation specifications. While similarly drawing water from near the surface, the devices differ in the location of the orifice control. The Faircloth Skimmer has its orifice control located near the water surface and will maintain the same head over the orifice during dewatering. The Delaware DOT skimmer has its orifice control located at the lowest portion of the device and therefore will not have a consistent head throughout the dewatering period. Thus two different design approaches must be used in sizing the orifices for each skimmer.

Delaware DOT skimmer discharge:

Discharge from the Delaware DOT skimmer can be calculated with the orifice flow equation shown below. The discharge from the Delaware DOT skimmer will vary since the head will change as the basin is dewatered.

Orifice Flow Equation: $Q=CA(2gH)^{0.5}$

Where: Q = discharge in cubic feet per second (cfs)

C = orifice coefficient, typically a value of 0.6 is used for C

A = cross-sectional area of the orifice plate in square feet

g = acceleration due to gravity, 32.2 ft/sec2

H = head above orifice in feet, from the orifice center to the water surface

As an alternative to utilizing the orifice flow equation, the following table can be utilized to determine discharge, Q, in cfs. The average head is used with the given range (e.g. for 0-2 feet, H = 0.5 feet)

Table 6.1.2 Discharge, Q, in cfs for different orifice sizes and head above orifice (ft).

Orifice size (in.)	0' to 1'	1' to 2'	2' to 3'	3' to 4'	4' to 5'
1"	0.019	0.032	0.042	0.049	0.056
1.5"	0.041	0.072	0.093	0.110	0.125
2"	0.074	0.129	0.166	0.196	0.223
2.5"	0.116	0.201	0.259	0.307	0.348
3"	0.167	0.289	0.373	0.442	0.501
3.5"	0.227	0.394	0.508	0.602	0.682
4"	0.297	0.514	0.664	0.786	0.891

The orifice shall be designed to remove the entire volume of the dewatering zone. The minimum dewatering time for the sediment basin is 48 hours. The maximum dewatering time should not exceed 7 days. The dewatering orifice shall be designed by the following procedure or other equivalent means.

Step 1 – Knowing the size and shape of your dewatering zone, calculate the volume of water (cubic feet) in each 1-foot increment from the bottom of the dewatering zone to the top of the dewatering zone (e.g., 0'-1', 1'-2', 2'-3', 3'-4', 4'-5').

Step 2 – Select a trial orifice size, and use the chart on page 9 to determine the discharge, Q, for each 1-foot increment of head.

Step 3 – Divide each volume calculated in step 1 by the corresponding Q (step 2) to get the total dewatering time.

Step 4 – Sum the dewatering times for the 1-foot increments to get the total dewatering time. Make sure to convert the units from seconds to days (86,400 seconds/day).

Step 5 – If the dewatering time is less than 2 days or greater than 7 days, select a different orifice size and repeat steps 2-5.

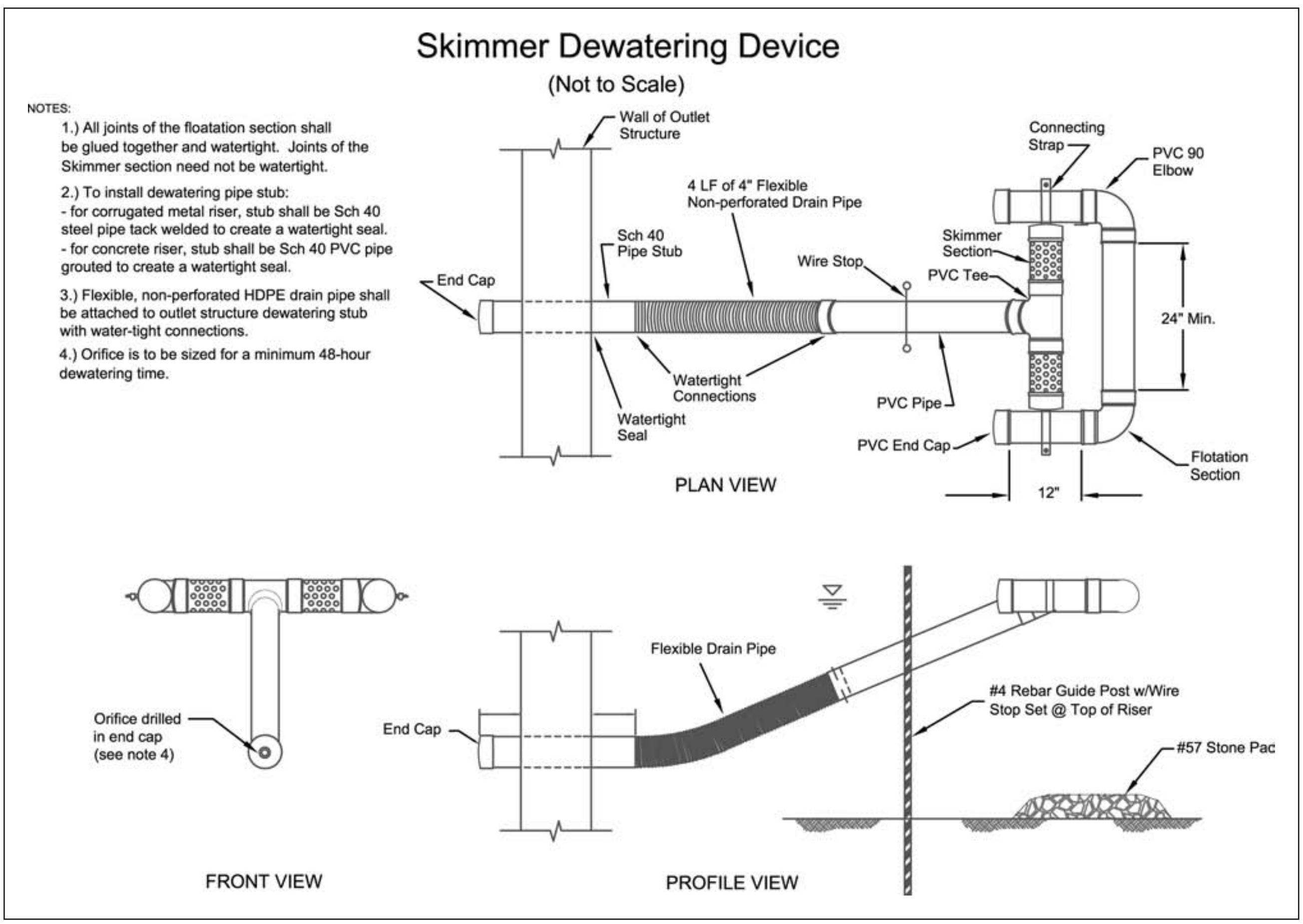

Figure 6.1.7 Delaware Dept. of Transportation Skimmer

Faircloth skimmer discharge:

The typical components of the Faircloth skimmer are shown in Figure 6.1.8. This skimmer consists of three primary parts: the arm assembly, the water entry unit and the "C" enclosure keep debris from water entrance. The "C" enclosure floats on the water surface and suspends the water entry unit just below the water surface. The arm assembly transports the water from the water entry unit to the basin's principal spillway barrel. Water discharge rate is to be controlled by an orifice located at the connection between the water entry unit and the arm assembly.

Instructions for design, installation and maintenance of Faircloth skimmers is available from the J.W. Faircloth & Sons Company at www.fairclothskimmer.com.

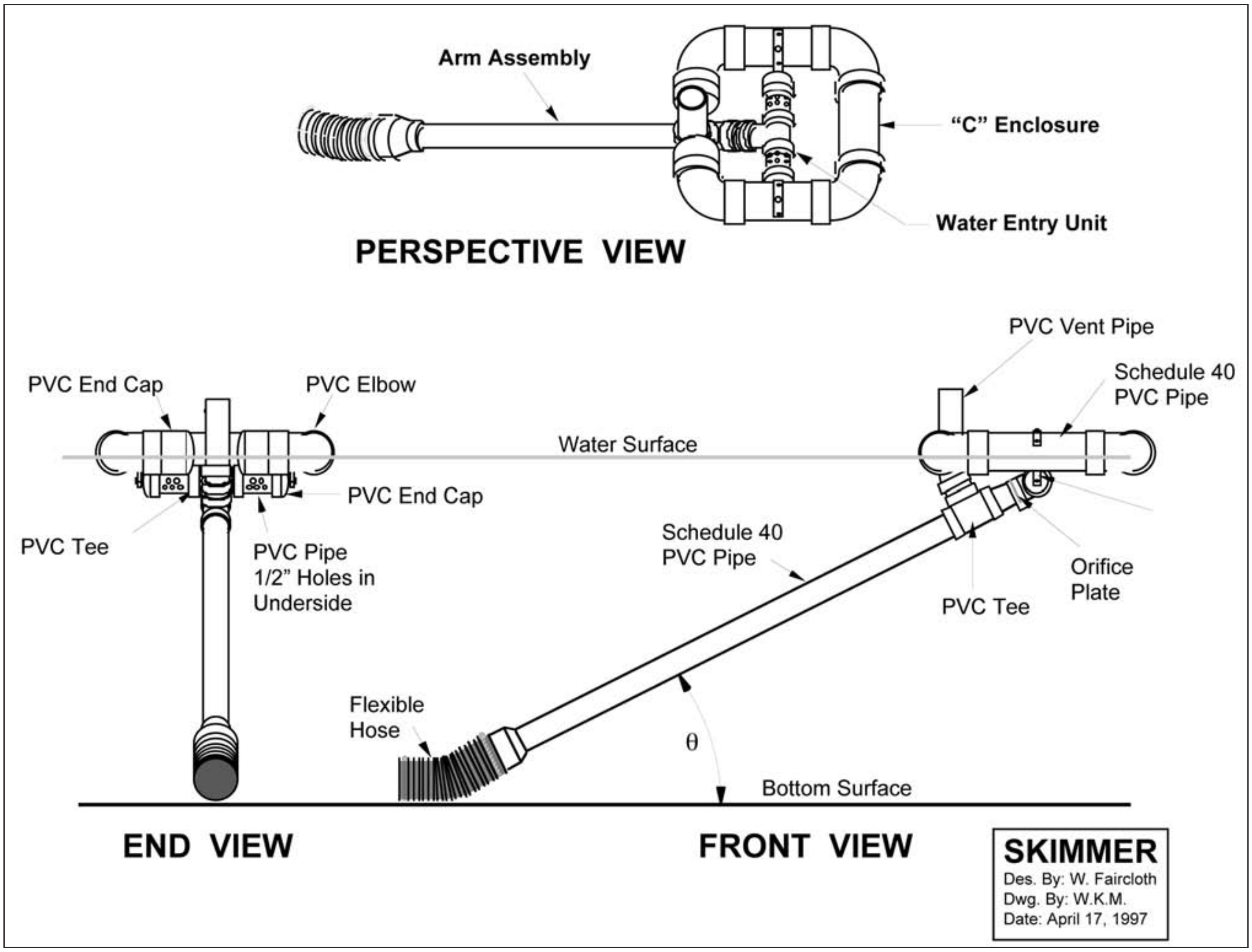

Figure 6.1.8 Faircloth Skimmer Schematic Developed by Warren Faircloth, North Carolina (Penn State Ag and Biol. Eng Fact Sheet F-252)

4) PRINCIPAL SPILLWAY DESIGN:

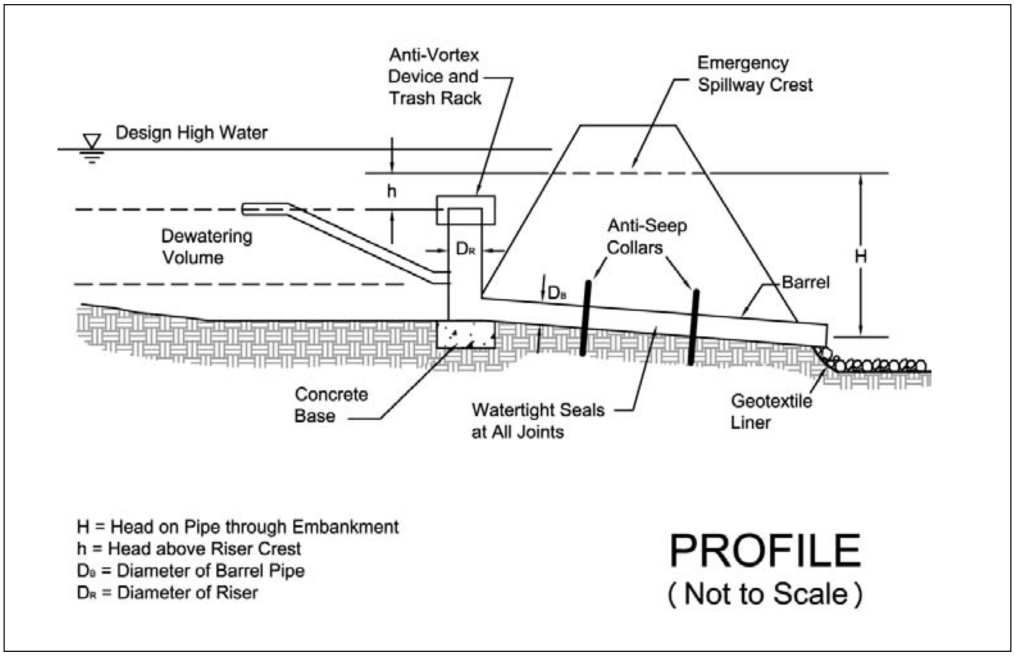

Figure 6.1.10 Principal Spillway Design

Capacity – The principal spillway must be designed to pass the discharge from a 10-year, 24-hour duration storm when the water surface is at the crest of the emergency spillway.

Materials – Principal spillway materials shall meet the NRCS standard and specification for ponds (NRCS Field Office Technical Guide standard 378).

Configuration – Configurations consisting of a riser and barrel (non-perforated) principal spillway with a skimmer dewatering device are encouraged although other configurations may be utilized provided the dewatering time is between 48 hours and 7days.

Staging Requirements – The principal spillway crest elevation must be a minimum of 1 ft. below the elevation of the emergency spillway crest. The minimum difference in elevation between the crest of the emergency spillway and settled top of dam shall be 2 ft., or 1 ft. above the water surface in the reservoir with the emergency spillway flowing at design depth, whichever is greater.

Sizing Procedures for Riser and Barrel – A principal spillway riser and barrel design procedure is shown below. The minimum riser diameter is 15", and the minimum barrel diameter is 12".

1. Determine Q from the design criteria. The principal spillway must be designed to pass the discharge from a 10-year, 24-hour duration storm when the water surface is at the crest of the emergency spillway.

2. Determine h as the difference in elevation between the crests of the principal spillway and the emergency spillway as shown in Figure 6.1.10.

3. Determine H as the difference in elevation between the barrel outlet and crest of the emergency spillway as shown in Figure 6.1.10.

4. Using Q and h, refer to the Riser Inflow Curves (Figure 6.1.11 for CMP), and find the riser size required. Different materials will require using alternative Riser Inflow (Inlet) Curves or equations.

5. Using Q and H, refer to the Barrel Size table (Table 6.1.3) to find the appropriate barrel size.

6. Compare barrel flow (Q_{pipe}), weir flow at the riser (Q_{weir}), orifice flow at the riser ($Q_{orifice\text{-}high}$), and flow at the entrance to the barrel ($Q_{orifice\text{-}low}$) in order to insure the lowest or controlling flow of the principal spillway meets the 10-year, 24-hour flow. Equations are shown below except those provided with figures.

$Q_{weir} = CLH^{1.5}$

where Q = Discharge across weir (cfs)
C = Weir coefficient
L = Length of weir (circumference of riser, ft)
H = Head above the orifice (ft)

$Q_{orifice\text{-}high} = CA(2gh)^{0.5}$

where Qorifice-high = Discharge due to orifice flow at the riser
C = Coefficient of discharge
A = Cross-sectional area of the riser (ft^2)
g = Acceleration due to gravity, (32.2 ft/sec^2)
h = Head above the riser, from the riser crest to the water surface (ft)

$Q_{orifice\text{-}low} = CA(2gh)^{0.5}$

where Qorifice-low = Pipe discharge at the barrel entrance
C = Coefficient of discharge
A = Cross-sectional area of the barrel conduit (ft^2)
g = Acceleration due to gravity (32.2 ft/sec^2)
h = Head above barrel entrance from orifice to water surface (ft)

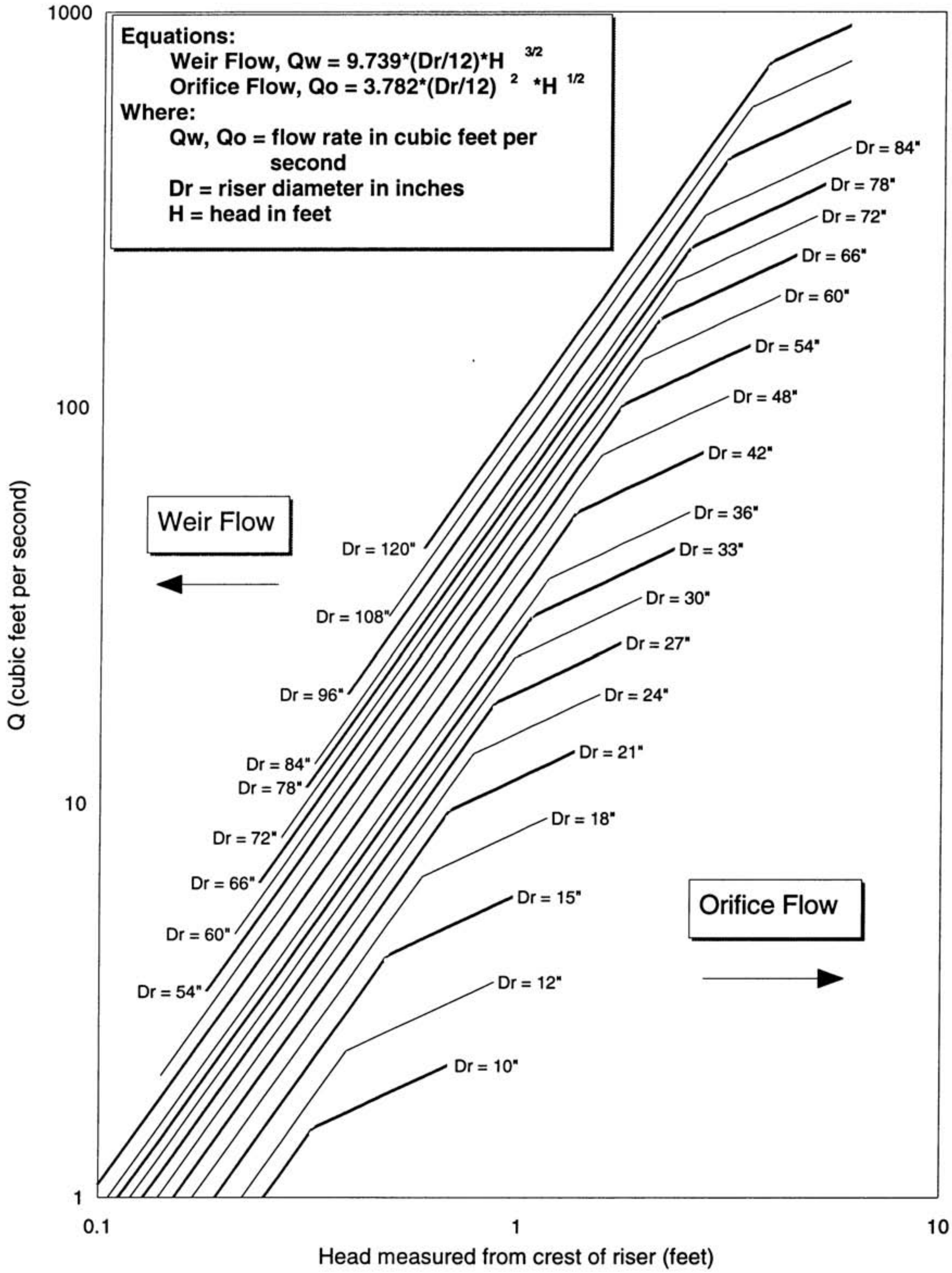

Figure 6.1.11 Riser Inflow Curves

Table 6.1.3 Barrel Size--For Corrugated Metal Pipe Principal Spillway Based on flow rate (Q) and head (H)

Head, H (ft.)	Barrel Diameter (in.)										
	12	15	18	21	24	30	36	42	48	54	60
	Flow Raate, Q (cfs)										
1	1.98	3.48	5.47	7.99	11.0	18.8	28.8	41.1	55.7	72.6	91.8
2	2.80	4.92	7.74	11.3	15.6	26.6	40.8	58.2	78.8	103	130
3	3.43	6.02	9.48	13.8	19.1	32.6	49.9	71.2	96.5	126	159
4	3.97	6.96	10.9	16.0	22.1	37.6	57.7	82.3	111	145	184
5	4.43	7.78	12.2	17.9	24.7	42.1	64.5	92.0	125	162	205
6	4.86	8.52	13.4	19.6	27.0	46.1	70.6	101	136	178	225
7	5.25	9.20	14.5	21.1	29.2	49.8	76.3	109	147	192	243
8	5.61	9.84	15.5	22.6	31.2	53.2	81.5	116	158	205	260
9	5.95	10.4	16.4	24.0	33.1	56.4	86.5	123	167	218	275
10	6.27	11.0	17.3	25.3	34.9	59.5	91.2	130	176	230	290
11	6.58	11.5	18.2	26.5	36.6	62.4	95.6	136	185	241	304
12	6.87	12.1	19.0	27.7	38.2	65.2	99.9	142	193	252	318
13	7.15	12.6	19.7	28.8	39.8	67.8	104	148	201	262	331
14	7.42	13.0	20.5	29.9	41.3	70.4	108	154	208	272	343
15	7.68	13.5	21.2	30.9	42.8	72.8	112	159	216	281	355
16	7.93	13.9	21.9	32.0	44.2	75.2	115	165	223	290	367
17	8.18	14.3	22.6	32.9	45.5	77.5	119	170	230	299	378
18	8.41	14.8	23.2	33.9	46.8	79.8	120	174	236	308	389
Length L (ft.)	Correction Factors for Pipe Lengths										
20	1.53	1.47	1.42	1.37	1.34	1.28	1.24	1.20	1.18	1.16	1.14
30	1.36	1.32	1.29	1.27	1.24	1.21	1.18	1.15	1.13	1.12	1.11
40	1.23	1.21	1.20	1.18	1.17	1.14	1.12	1.11	1.10	1.09	1.08
50	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.06	1.05
60	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	.95	.95	.95	.96	.96	.96	.97	.97	.97	.98	.98
90	.90	.91	.91	.92	.92	.93	.94	.94	.95	.95	.96
100	.86	.87	.88	.89	.89	.90	.91	.92	.93	.93	.94

Barrel Size Chart

Riser Base – The principal spillway must be weighted to prevent flotation. The minimum factor of safety against flotation shall be 1.1. If concrete is used for the weighted riser base, the formula shown below may be used in calculating the required volume of concrete.

$$V = 0.62\ HD_R^2 - \frac{HW_R}{87.6}$$

Where:
H = Height of Riser (ft.)
D_R = Diameter of Riser (ft.)
W_R = Weight of Riser (lb./ft.)
V = Volume of Concrete (ft.^{3})

Trash Rack and Anti-Vortex Device—To prevent pipes from becoming clogged with straw or construction debris, a trash rack should be used. However, if conditions make clogging unlikely, a trash rack may not be necessary.

Seepage Control Along Principal Spillway—Seepage along the principal spillway conduit extending through the embankment shall be controlled by use of a filter and drainage diaphragms, or anti-seep collars. The placement and design of these controls shall meet requirements as set forth in the NRCS standard and specification for Ponds (378).

Outlet Protection—The discharge from a sediment basin shall be designed, to prevent accelerated erosion or sedimentation. Typical alternatives include riprap or concrete structures, storm sewers, and similar means that dissipate the energy without causing erosion to the downstream channel or stilling basin.

5) EMERGENCY SPILLWAY DESIGN:

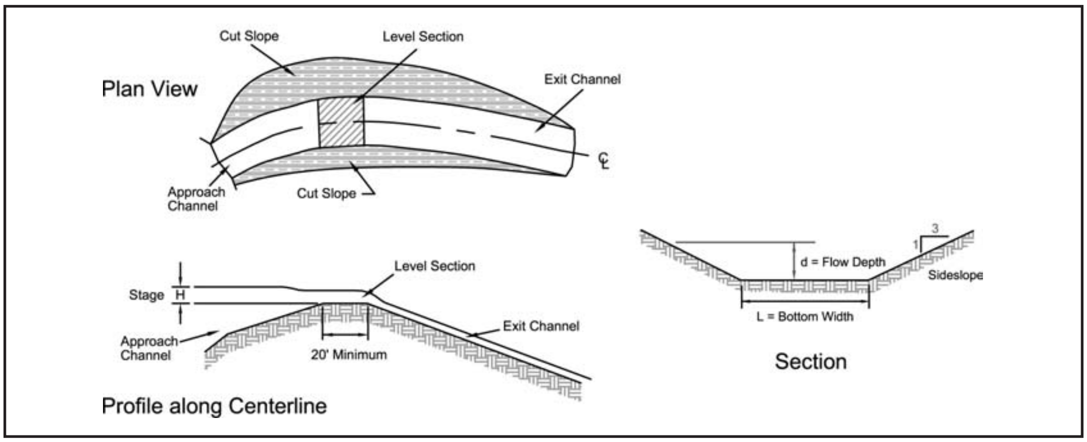

Figure 6.1.12 Emergency Spillway Design

Location and Shape—Constructed earth spillways shall be trapezoidal and located in undisturbed ground. It must not be constructed over the embankment. Spillways should have an approach channel, a flat control section, and an exit channel. Side slopes of the trapezoidal spillway are typically 3:1 or flatter. The exit channel shall be lined with grasses or riprap as appropriate, based on channel velocities.

Capacity—The capacity of the emergency spillway shall be that required to pass the peak flow from a 25-year, 24-hour storm less any reduction creditable to pipe conduit discharge detention storage and routing.

Emergency Spillway Sizing Procedure—Three methods for sizing the emergency spillway are shown below.

1) Utilize tables provided in Chapter 11 of the NRCS' Engineering Field Handbook for determining emergency spillway capacity.
2) Utilize the weir equation with the level being equal to 20 or 25 feet:

$$Q=CLH^{1.5}$$

Where this procedure is used, the maximum value of "C" should be 2.8. "L" is the bottom width of the spillway at the crest, and "H" is the height of water in the pond-above the spillway crest.

3) Having determined the design discharge "Q", find the spillway width and stage required in the Capacity of Earth Spillways table below. The stage is the difference between the pond surface and the crest of the emergency spillway.

Staging Requirements—The principal spillway invert elevation must be a minimum of 1 ft. below the elevation of the emergency spillway crest. The minimum difference in elevation between the crest of the emergency spillway and settled top of dam shall be 2 ft., or 1 ft. above the water surface in the reservoir with the emergency spillway flowing at design depth, whichever is greater.

Exit Channel Outlet Protection—The discharge from an emergency spillway shall be designed to prevent accelerated erosion or sedimentation. Typical alternatives include vegetation, riprap, concrete structures, and similar means that dissipate energy without causing erosion.

Table 6.1.4 Capacity of Earth Spillways

Stage (ft.)	Bottom Width (ft.)																
	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	Flow Rate Q (cfs)																
0.5	6	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28
0.6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	35	37	39
0.7	11	13	16	18	20	23	25	28	30	33	35	38	41	43	44	46	48
0.8	13	16	19	22	26	29	32	35	38	42	45	46	48	51	54	57	60
0.9	17	20	24	28	32	35	39	43	47	51	53	57	60	64	68	71	75
1.0	20	24	29	33	38	42	47	51	56	61	63	68	72	77	81	86	90
1.1	23	28	34	39	44	49	54	60	65	70	74	79	84	89	95	100	105
1.2	28	33	40	45	51	58	64	69	76	80	86	92	98	104	110	116	122
1.3	32	38	46	53	58	65	73	80	86	91	99	106	112	119	125	133	140
1.4	37	44	51	59	66	74	82	90	96	103	111	119	127	134	142	150	158
1.5	41	50	58	66	75	85	92	101	108	116	125	133	142	150	160	169	178
1.6	46	56	65	75	84	94	104	112	122	132	142	149	158	168	178	187	197
1.7	52	62	72	83	94	105	115	126	135	145	156	167	175	187	196	206	217
1.8	58	69	81	93	104	116	127	138	150	160	171	182	194	204	214	226	233
1.9	64	76	88	102	114	127	140	152	164	175	188	201	213	225	235	248	260
2.0	71	83	97	111	125	138	153	164	178	193	204	218	232	245	256	269	283
2.1	77	91	107	122	135	149	162	177	192	207	220	234	250	267	276	291	305
2.2	84	100	116	131	146	163	177	194	210	224	238	253	269	288	301	314	330
2.3	90	108	124	140	158	175	193	208	226	243	258	275	292	306	323	341	354
2.4	99	116	136	152	170	189	206	224	241	260	275	294	312	327	346	364	378

A maintenance program shall be established to maintain the capacity and function of the sediment basin.

Note: The side slopes cut for the emergency spillway must be no steeper than 2:1.

Operation and Maintenance:

Sediment basins shall be inspected on a weekly basis and after each runoff event. Necessary activities are shown as follows:

1. Establish vegetative cover and fertilize as necessary to maintain a vigorous cover in and around the sediment basin.
2. Remove undesirable vegetation periodically to prevent growth of trees and shrubs on the embankment and spillway areas.
3. Promptly repair eroded areas. Reestablish vegetative cover immediately where scour erosion has removed established seeding.
4. Promptly remove any burrowing rodents that may invade areas of the embankment.
5. Remove trash and debris that may block spillways and accumulate in the pond.
6. Remove sediment from basin when it fills the design depth of the sediment storage zone. This elevation shall be marked on a cleanout stake near the center of the basin.
7. Check spillway outlets and points of inflow to ensure drainage is not causing erosion and that outlets are not clogged. Replace displaced riprap immediately.
8. After the entire construction project is completed, temporary sediment basins should be dewatered and regraded to conform to the contours of the area. All temporary structures should be removed and the area seeded, mulched and stabilized as necessary.

References:

Barfield, B.J., R.C. Warner, and C.T. Haan. 1985. Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press (Stillwater, OK).

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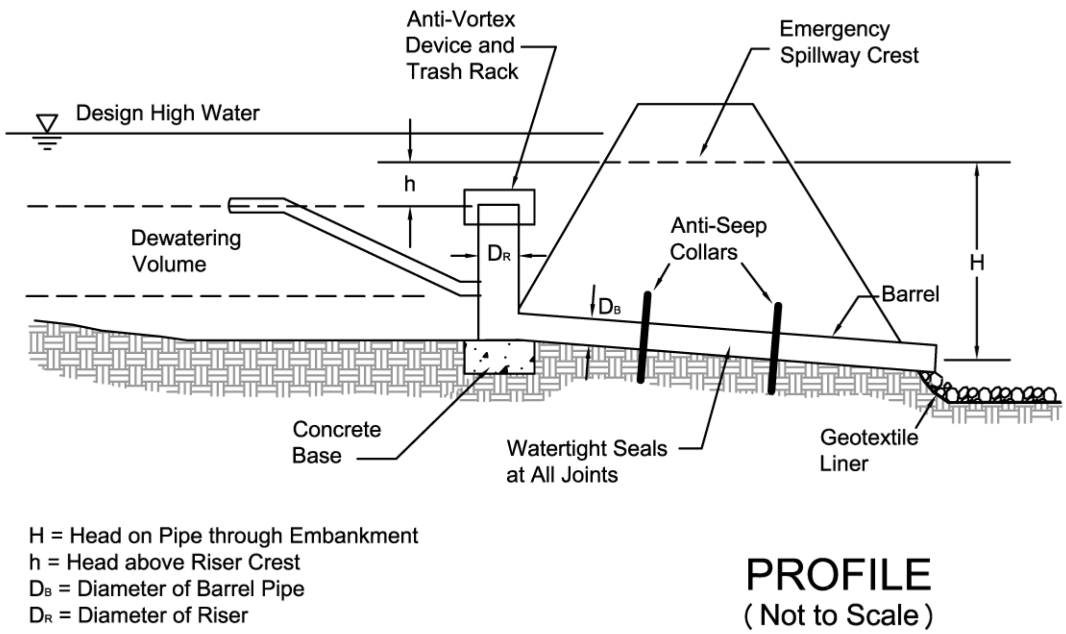
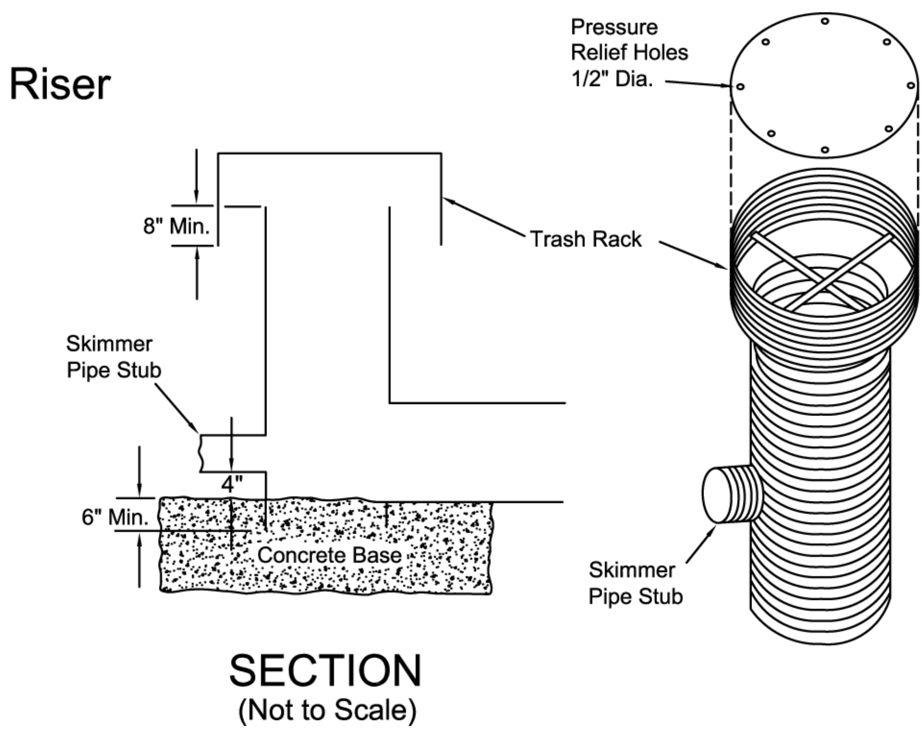
Specifications
for

Sediment Basins





Specifications
for

Sediment Basins

1. Sediment basins shall be constructed and operational before upslope land disturbance begins.
2. Site Preparation -The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat. The pool area shall be cleared as needed to facilitate sediment cleanout. Gullies and sharp breaks shall be sloped to no steeper than 1:1. The surface of the foundation area will be thoroughly scarified before placement of the embankment material.
3. Cut-Off Trench -The cutoff trench shall be excavated along the centerline of the embankment. The minimum depth shall be 3 ft. unless specified deeper on the plans or as a result of site conditions. The minimum bottom width shall be 4 ft., but wide enough to permit operation of compaction equipment. The trench shall be kept free of standing water during backfill operations.
4. Embankment -The fill material shall be free of all sod, roots, frozen soil, stones over 6 in. in diameter, and other objectionable material. The placing and spreading of the fill material shall be started at the lowest point of the foundation and the fill shall be brought up in approximately 6 in. horizontal layers or of such thickness that the required compaction can be obtained with the equipment used. Construction equipment shall be operated over each layer in a way that will result in the required compaction. Special equipment shall be used when the required compaction cannot be obtained without it. The moisture content of fill material shall be such that the required degree of compaction can be obtained with the equipment used.
5. Pipe Spillway -The pipe conduit barrel shall be placed on a firm foundation to the lines and grades shown on the plans. Connections between the riser and barrel, the anti-seep collars and barrel and all pipe joints shall be watertight. Selected backfill material shall be placed around the conduit in layers and each layer shall be compacted to at least the same density as the adjacent embankment. All compaction within 2 ft. of the pipe spillway will be accomplished with hand-operated tamping equipment.
6. Riser Pipe Base -The riser pipe shall be set a minimum of 6 in. in the concrete base.
7. Trash Racks -The top of the riser shall be fitted with trash racks firmly fastened to the riser pipe.
8. Emergency Spillway - The emergency spillway shall be cut in undisturbed ground. Accurate construction of the spillway elevation and width is critical and shall be within a tolerance of 0.2 ft.
9. Seed and Mulch -The sediment basin shall be stabilized immediately following its construction. In no case shall the embankment or emergency spillway remain bare for more than 7 days.
10. Sediment Cleanout -Sediment shall be removed and the sediment basin restored to its original dimensions when the sediment has filled one-half the pond's original depth or as indicated on the plans. Sediment removed from the basin shall be placed so that it will not erode.
11. Final removal - Sediment basins shall be removed after the upstream drainage area is stabilized or as indicated in the plans. Dewatering and removal shall NOT cause sediment to be discharged. The sediment basin site and sediment removed from the basin shall be stabilized.