

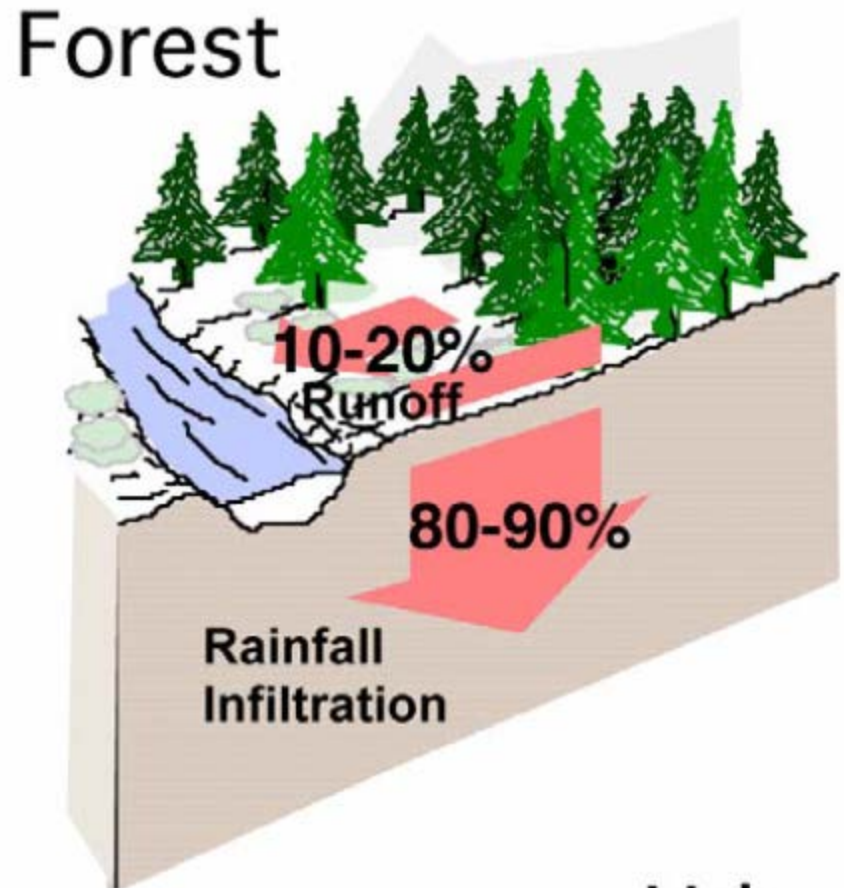
Hillside Farming: Managing Soil and Water Slope

AWQA MEETING

12/11/2013

Preventing Runoff at the Source

- **4 Ds:**
 - Decrease
 - Detain
 - Dissipate
 - Divert
- **ACT**
 - Avoid
 - Control
 - Trap



Cover Crop

Seed Varieties	Life Cycle & Planting Time	Grass Characteristics	Lbs. of seed per 100 ft. by 10 ft. of roadway	Lbs. of seed per acre	Estimated cost per acre for seed
<p>*Cereal Rye "Merced" Variety Secale cereal</p> <p>*Don't confuse cereal rye with annual rye <i>Lolium multiflorum</i>, potentially an invasive weed</p>	<p>Annual early season Sept-Nov.</p>	<p>Good on dry, sandy slopes, excellent roots</p>	2	80	52 (a)
<p>Common Barley "UC 937" Variety Hordeum vulgare</p>	<p>Annual late season Nov. & Dec. or for emergencies</p>	<p>Good on all soils, fair roots</p>	4.5	180	63 (b)
<p>Trios "102" Tricale</p>	<p>Annual early season Sept. -Nov.</p>	<p>Good on all soils, good roots & low growth pattern</p>	1.5	60	57 (c)
<p>California Brome <i>Bromus carinatus</i> (nurse crop, fast germ. rate, short lived - 3 yrs.)</p> <p>Creeping wild rye <i>Leymus triticoides</i> (long lived, slow germ. rate)</p>	<p>Perennial Native Mix early season Sept. & Oct.</p>	<p>Good on dry, sandy slopes, good roots</p> <p>Good on dry sandy slopes, and loam/clay soils, excellent roots</p>	0.3	25	174 (d)
			1	25	750 (e)

Row Arrangement

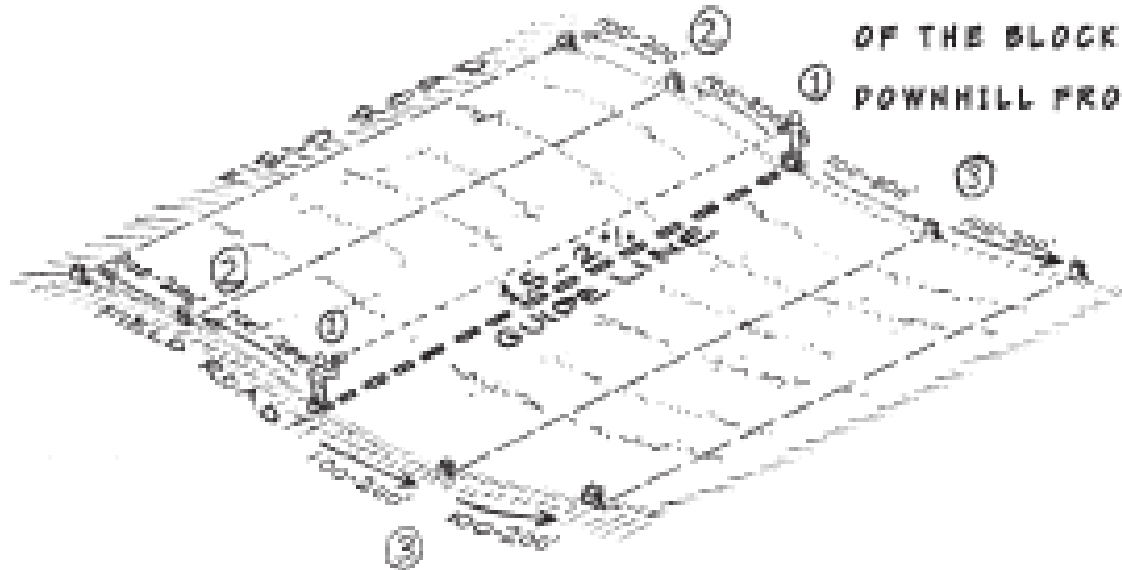


Row Arrangement

1. LAY GUIDELINE ON STEEPEST PORTION OF THE BLOCK, SETTING IT AT 1.0-1% SLOPE AND MARKING ENDS WITH SACKS OR STAKES.

2. USING A STRING TO MAINTAIN DISTANCE APART, WALK UPHILL 100' OR 200', USING WHEELS OR TAPE TO MEASURE THE DISTANCE

3. AFTER COMPLETING THE TOP HALF OF THE BLOCK, MAKE MEASUREMENTS DOWNHILL FROM GUIDELINE



Row Arrangement Figure A: Laying Guidelines

Row Arrangement



Road Seeding



Road Protection



Waterbars



Waterbars

Table. Water bar spacing recommendations for unpaved roads from Kocher, Gerstein, and Harris. 2007. as adapted from Keller and Sherar 2003. For this table, 'erosive soils' are those with high concentrations of silt or fine sands relative to clay content.

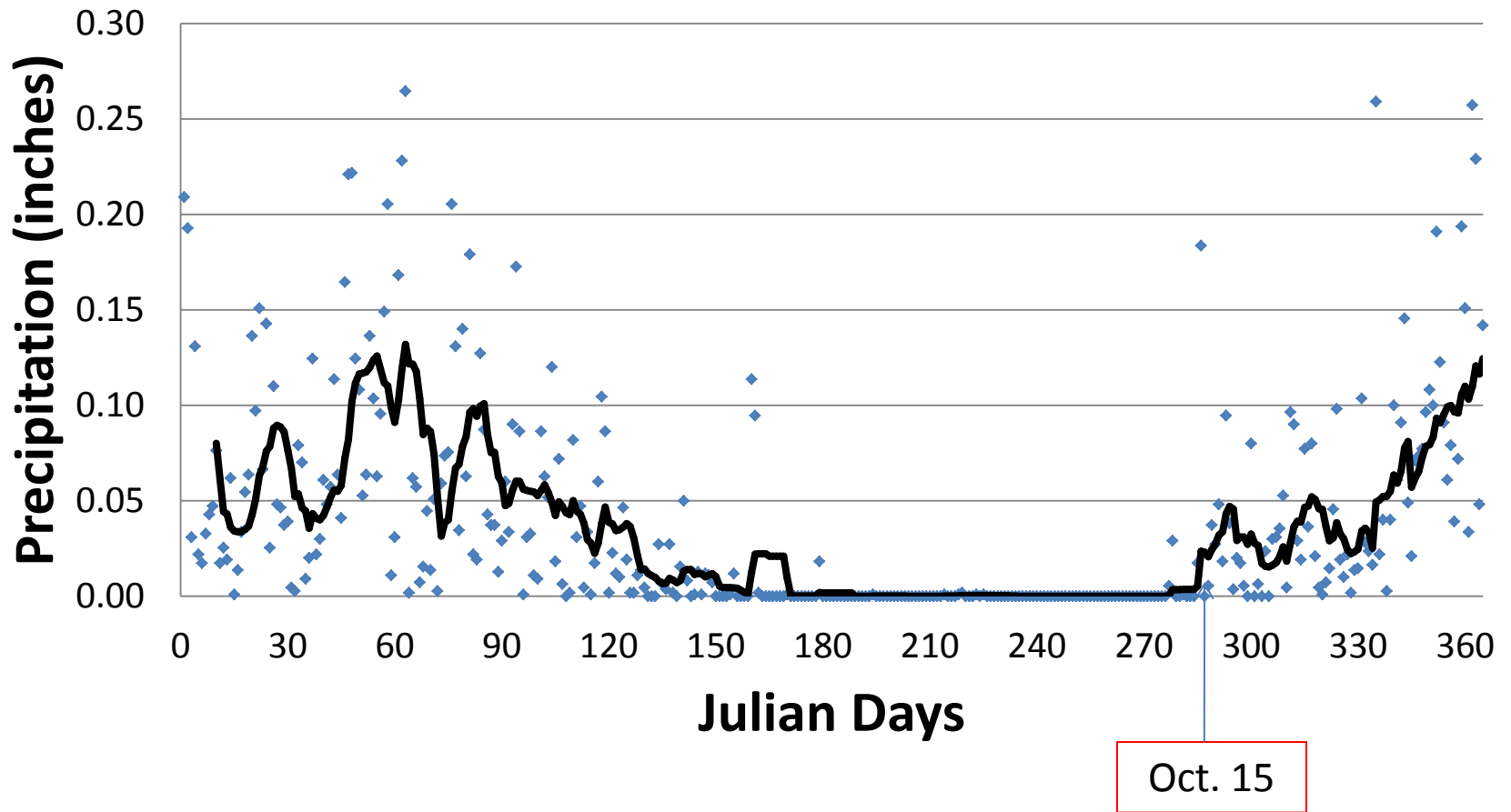
Road or trail Grade (%)	Soil erodibility	
	Low to non-erosive soils (ft)	Erosive soils (ft)
0-5	250	130
6-10	200	100
11-15	150	65
16-20	115	50
21-30	100	40
30+	50	30

Hoop Houses Anchor Row Protection



Daily Average Precipitation - Salinas

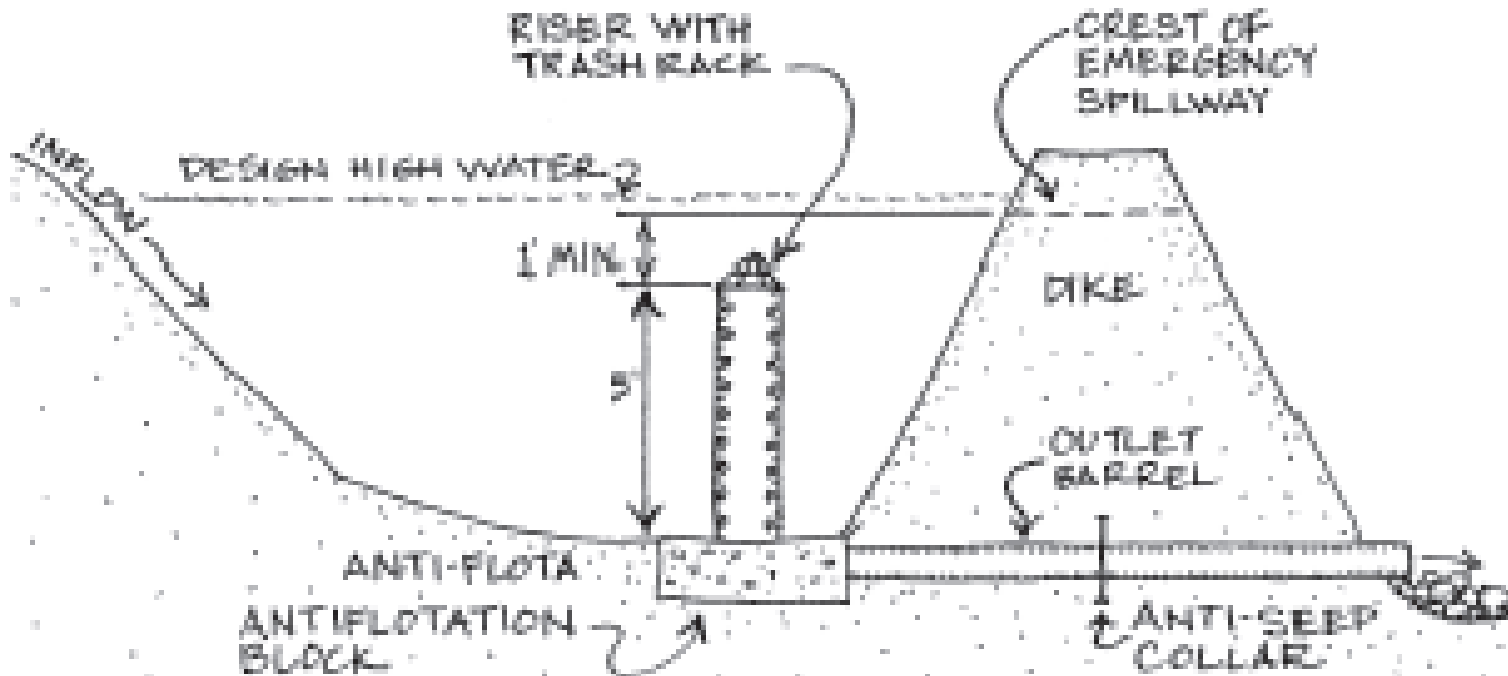
2002-2012 – CIMIS Precipitation Data



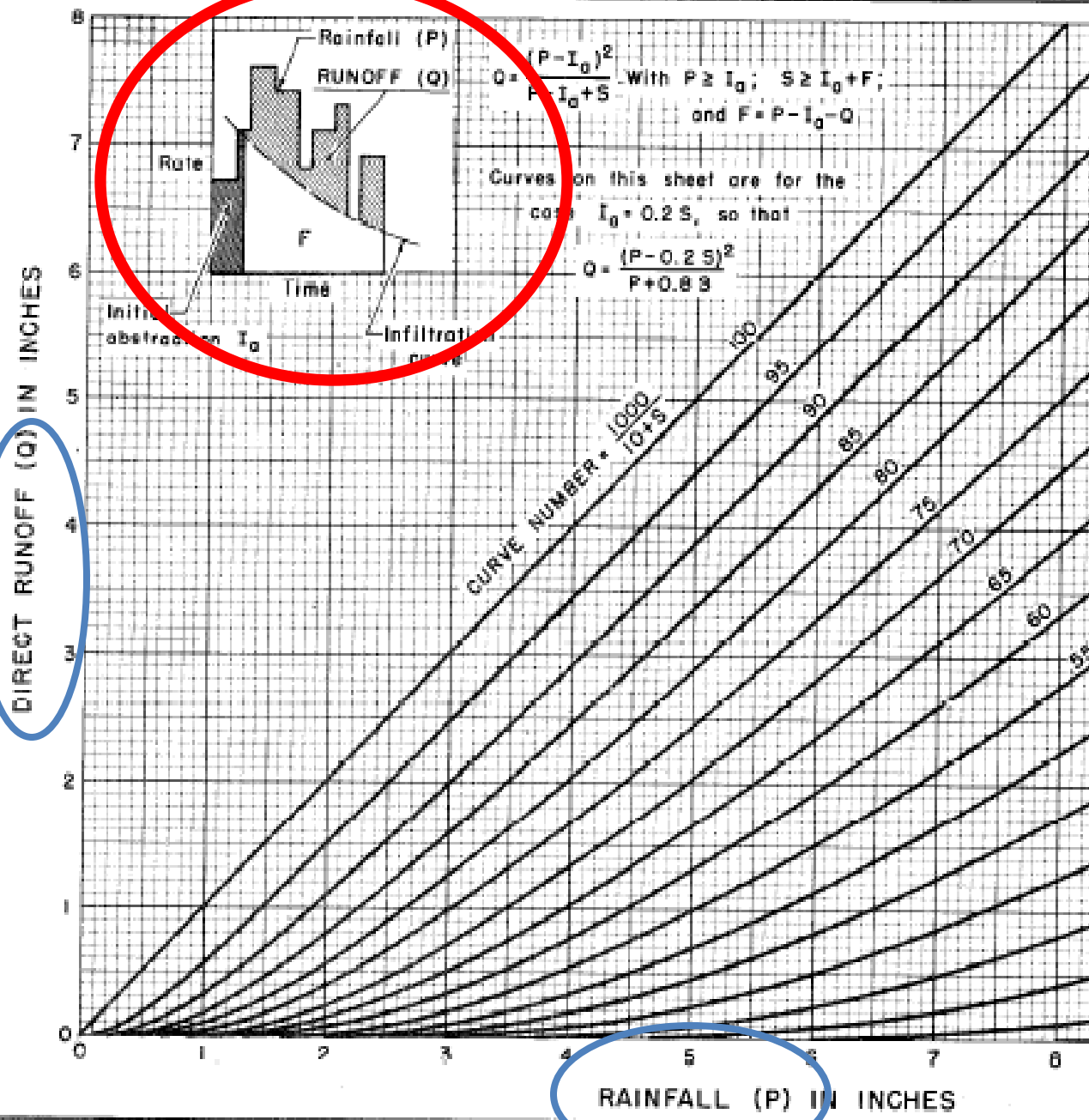
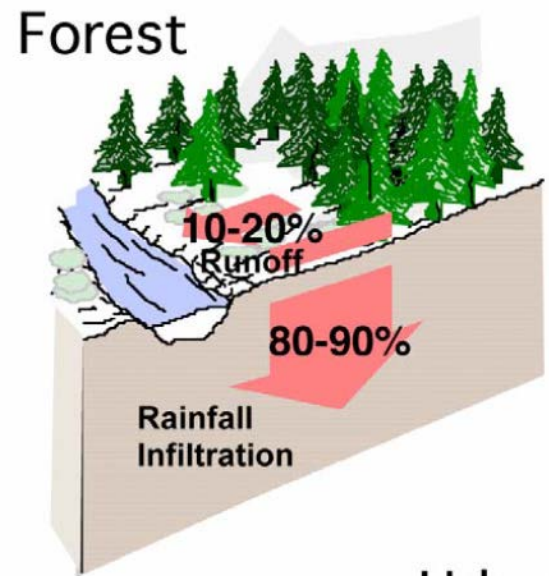
Sediment Basin (NRCS)

Sediment Storage: 900 cu.ft./acre

Detention Storage: 3600 cu.ft./acre



HYDROLOGY: SOLUTION OF RUNOFF EQUATION $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$



Sediment and Stormwater Control Basins

- Water erosion is affected by:
 - Precipitation patterns
 - Soil properties
 - Slope
 - Vegetative cover

Runoff

Cultivated Hillslope Lands of Northern
Monterey Co.

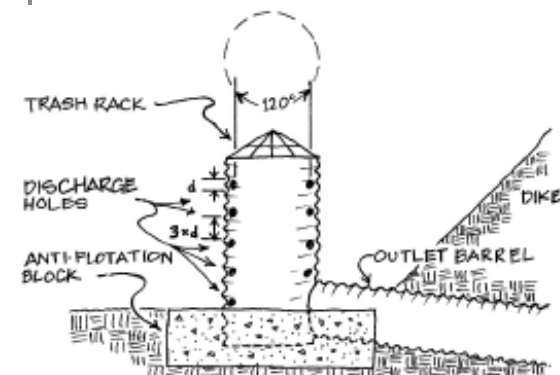
1.5 cfs / acre

Principal Spillways Design

Table A1. Discharge Table for a Corrugated Metal Pipe Riser (Head= 1.0 ft) and Size of Concrete Required for Anti-floatation Block.

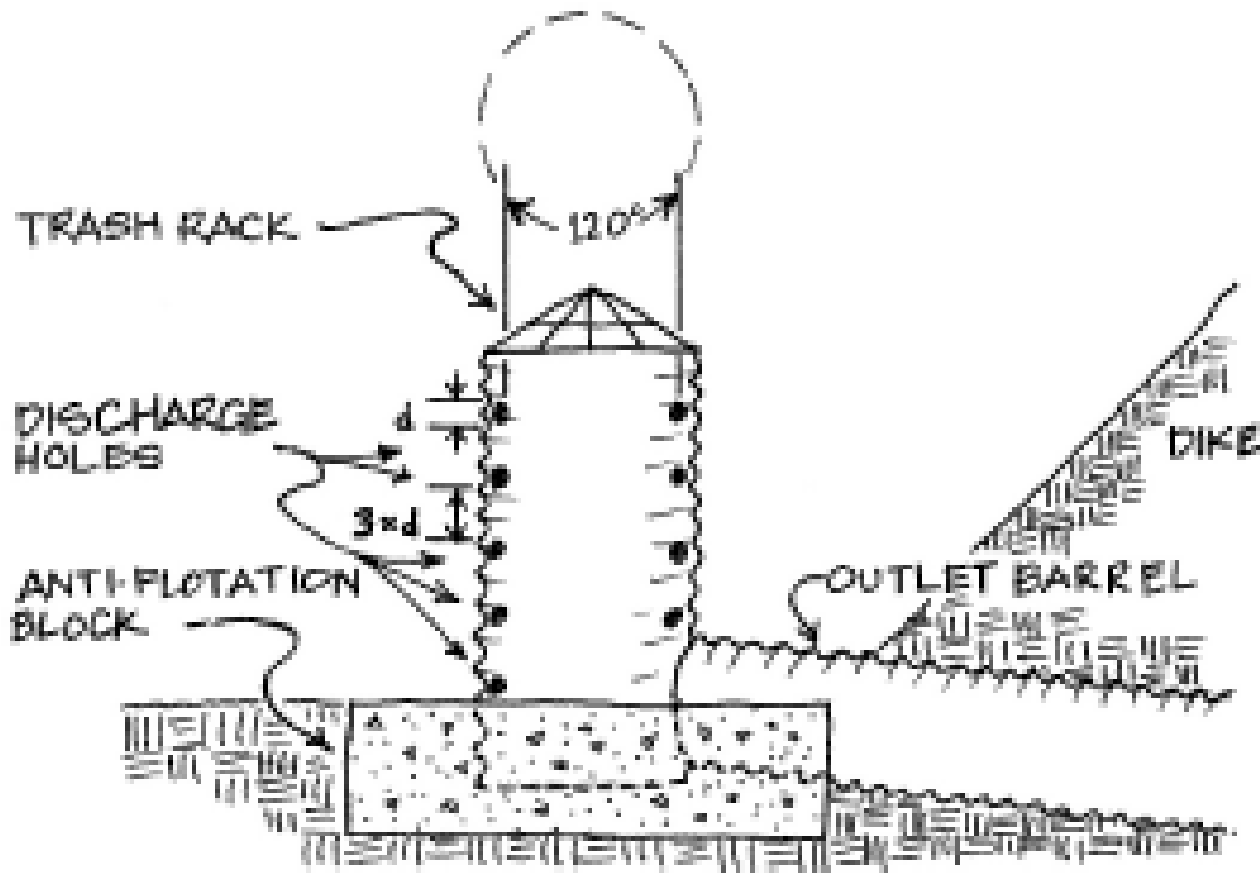
Riser Diameter (inches)	Discharge (cfs)	Size of Concrete for Anti-floatation Block (cu.ft)
12	4.1	4.2
18	6.7	9.4
24	10.1	16.8
30	21.4	26.2
36	25.7	37.7
42	30.0	51.4
48	34.2	67.1
54	38.5	84.9
60	42.8	104.8

$$\text{Flow Rate} = 5 \text{ acres} \times 1.5 \text{ cfs/ac} = 7.5 \text{ cfs}$$



Spillway Figure A: Configuration of discharge holes on outlet pipe.

Principal Spillways Design



Spillway Figure A: Configuration of discharge holes on outlet pipe.

Principal Spillways Design

Table A2. Discharge Table for a Corrugated Metal Pipe Barrel Flowing Full with a Head of 5.0 ft (K = 1, L = 70 ft).

Barrel Diameter (inches)	Discharge (cfs)
12	4.5
18	12.2
24	24.7
30	42.1
36	64.5
42	91.9

Flow Rate = 5 acres x 1.5 cfs/ac = 7.5 cfs

