Appendix 19: Spillway Surge Pond Design, Elkhorn Goldfields

SPILLWAY DESIGN (SURGE POND) CALCULATIONS, ELKHORN GOLDFIELDS

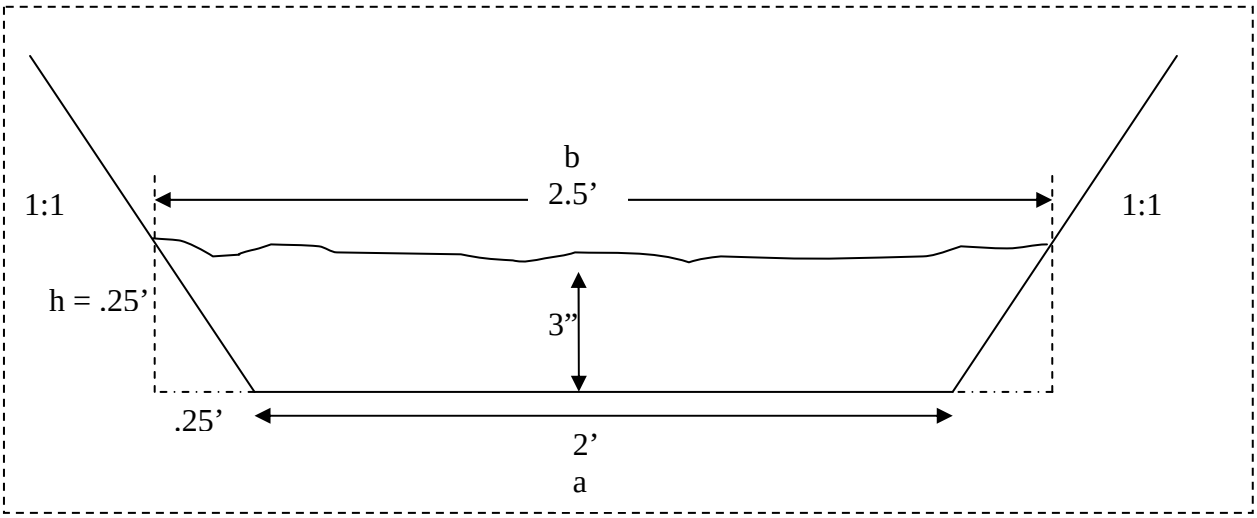
- 100 YR – 24 HR STORM EVENT IS 3.6” OF RAIN PER ISOPULUVIAL
- MAX RAINFALL PER 30%, 1ST QUARTER HUFF DIST. 2 HRS IS 1.3
- MAX = 1.332”/10 MIN
- POND SIZE = 150’ X 50’
- TOTAL WATER TO FALL IN POND = 150’ X 50’ X **Error! Bookmark not defined.**(3.6”/(12”/1 FT)) = 2,250 FT^3
- 2,250 FT^3 X (7.48 GAL/ 1 FT^3) = 16,830 GAL

- MAX EVENT = 1.332”/10 MIN SLOPE = 5’/100’ = 0.05
- 150’ X 50’ X (1.332”/12”) = 832.50 FT^3
- 10 MIN = 600 SEC
- (FLOWS INTO POND) Q = 832.5 / 600 = 1.3875 CFS

- V = (1.49/.045) (R_H)^(2/3) (0.05)^(1/2) R_H = A / P_W
- V = 33.11 (R_H)^(2/3) (0.2236)
- V = 7.4036 (R_H)^(2/3)

- Q = A(7.4036) (R_H)^(2/3)
- (1.3875/7.4036) = A(A/P_W)^(2/3)
- 0.1874 = A(A/P_W)^(2/3)

DESIGN



- A = ½ (a + b)(h)
- A = ½ (2.5 +2)(0.25) = 0.5625 FT^2
- P_W = 2 + 0.3536 + 0.3536 = 2.708 FT

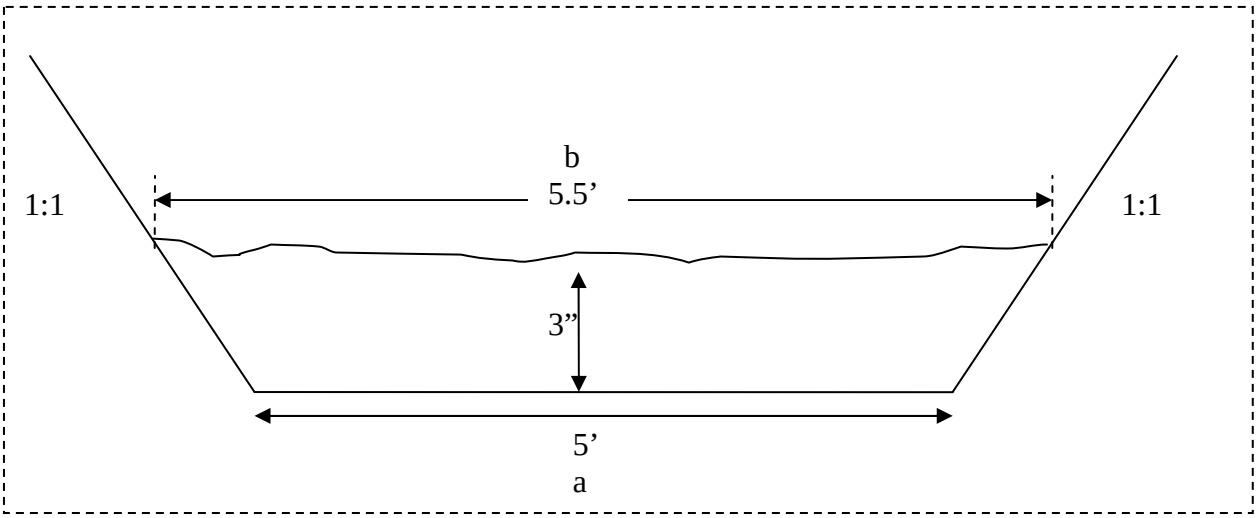
- $Q = A(7.4036)\ (R_H)^{(2/3)}$ $\qquad R_H = A / P_W$
- $Q = 1.3875$
- $(1.3875/7.4036) = A(A/P_W)^{(2/3)}$
- $0.1874 = A(A/P_W)^{(2/3)}$

- $A(A/P_W)^{(2/3)} = 0.5625 \text{ X } (0.5625/2.707)^{(2/3)} = 0.197 > Q = 0.1874$
  (FLOW OUT) (FLOW IN)

FOR RAIN 3.6” IN 10 MIN

- Q = 3.75 cfs INFLOW
- $0.5065 = A\ (A/P_N)^{(2/3)}$

DESIGN



- A = ½ (5.5 +5)(0.25) = 1.3125
- $P_W = 5 + 0.3536 + 0.3536 = 5.708$

- $Q_{IN} = 0.5065$
- $Q_{OUT} = 0.4927$

SPILLWAY DESIGN (SEDIMENT BASIN) CALCULATIONS

- 100 YR – 24 HR STORM EVENT IS 3.6”
- MAX = 1.332”/10 MIN
- POND SIZE = 40’ X 20’= 800 FT^2 (LARGEST)
- TOTAL WATER TO FALL IN POND = 800’ X **Error! Bookmark not defined.**(3.6”/(12”/1 FT)) = 240 FT^3
- 240 FT^3 X (7.48 GAL/ 1 FT^3) = 1,795 GAL

- MAX EVENT = 1.332”/10 MIN
- 800’ X (1.332”/12”) = 88.8 FT^3
- 10 MIN = 600 SEC
- Q_{IN} = 88.8 / 600 = 0.148 cfs

- V = (1.49/.045) (R_H)^(2/3) (0.01)^(1/2)
- V = 33.11 (R_H)^(2/3) (0.10)
- V = 7.4036 (R_H)^(2/3)

- Q = A(3.311) (R_H)^(2/3)
- (0.148/3.311) = A(A/R_H)^(2/3)
- 0.0447 = A(A/R_H)^(2/3)

- @ 3” OR 0.25’ DEEP (WATER)
- 1’ WIDE, 1:1 SLOPES Q = 0.1007 OUT Q = 0.0447 IN
- SO 15” DEEP, 1’ WIDE, 1:1 SLOPES 1% PLENTY

2 STORM EVENTS

- 10 YR 24 HR => 2.4”
- 100 YR 24 HR => 3.6”
- USED 30%, 1ST QUARTILE HUFF DISTRIBUTION OVER 2 HOURS

- T 6N
- R 3W
- S 10,11,14,15

			FAIR
BOBOWIC	14,11(2)	B	69
CASEYPEAK	15	D	84
DRYADINE	11,14	C	79
FRANCONI	10	B	69
HANSON	14	B	69
HELMVILLE	10	C	79
REDFERN(2)	14	D	84
TEPECREEK	11	B	69
TEPECREEK(2)	10	B	69
TIGERON(2)	14	B	69
TROPAL	11	D	84
TROPAL(2)	11	D	84