0006

Document Information Form

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Explanation:

SEDIMENTATION STRUCTURES CALCULATIONS

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Refer to:
- ☐ **Confidential**
- ☐ **Shelf**
- ☐ **Expandable**

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PRELIMINARY

C.V. SPUR
SEDIMENTATION STRUCTURES
CALCULATIONS

*A. Use 1.7 inch figure for ten-year, 24-hour precipitation event.

**B. Table A-4, p. 538 - Runoff Curve No. (C.N.) = 92
Cover - Herbaceous
Condition - Poor
Soil Group - D (High Runoff Potential)

**C. From figure A-4, p. 541, the direct runoff is found to be .90 inches.

D. Drainage Area = 84.33 acres. Total runoff will be .90"x84.33 acres = 75.90 acre-inches or 6.32 acre feet.

E. Sediment storage of .1 acre-feet/acre is also provided; 84.33 acres x .1 = .84 acre-feet. Total required pond capacity is therefore 6.32 acre-feet + .84 acre-feet or 7.16 acre-feet.

F. The volumes of the sedimentation ponds are as follows:

Ponds North of Plant
100'x100'x6' = 1.377 acre-feet
70'x 70'x7' = .787 acre-feet
70'x 70'x7' = .787 acre-feet

Below Piles
100'x150'x6' = 2.066 acre-feet

Below Refuse
100'x150'x6' = 2.066 acre-feet

Filter Pond
150'x 75'x6' = 1.550 acre-feet

Total Volume 8.633 acre-feet

G. All structures will be designed to overflow at a rate in excess of that required for a ten-year, 24-hour precipitation event. Overflows, discharge structures, and culverts are designed from the following:

Area #I - 19.26 acres

.9" ÷ 10 hr = .09 in/hr ÷ 60 min/hr = .0015 in/min
.0015 in/min x 19.26 ac = .029 ac.in/min÷12 in/ft = .0024 acre-feet/min
.0024 acre-feet/min x 326,700 gal/acre-foot = 787 gpm

A three foot rectangular wier will flow 846 gpm at 4-inch depth; therefore, the overflow will be three feet wide and 18 inches deep.

Equivalent area of the above wier is 1.00 ft^2. Area of an 18-inch culvert is 1.77 ft^2; therefore, any culverts below this area will be a minimum of 18 inches.

Area II - 22.34 acres

.9" ÷ 10 hr = .09 in/hr ÷ 60 min/hr = .0015 in/min
.0015 in/min x 22.34 ac = .034 ac in/min ÷ 12 in/ft = .0028 acre-feet/min
.0028 acre-feet/min x 326,700 gal/acre-foot = 912 gpm

A three foot rectangular wier will flow 925 gpm at 4.25 inch depth; therefore, the overflow will be a minimum of three feet wide and 18 inches deep.

Equivalent area of the above wier is 1.06 ft^2. Area of an 18-inch culvert is 1.77 ft^2; therefore, any culverts used below this area will be a minimum of 24 inches.

Area III - 42.73 acres

.9" ÷ 10 hr = .09 in/hr ÷ 60 min/hr = .0015 in/min
.0015 in/min x 42.73 ac = .064 ac in/min ÷ 12 in/ft = .0053 acre-feet/min
.0053 acre-feet/min x 326,700 gal/acre-foot = 1745 gpm

A three foot rectangular wier will flow 1742 gpm at 6.50 inch depth; therefore, the overflow will be a minimum of three feet wide and 18 inches deep.

Equivalent area of the above wier is 1.625 ft^2. Area of a 24-inch culvert is 3.14 ft^2; therefore, any culvert used below this area will be a minimum of 24 inches.

Total at Filter Pond - 84.33 acres

.9" ÷ 10 hr = .09 in/hr ÷ 60 min/hr = .0015 in/min
.0015 in/min x 84.33 ac = .126 ac in/min ÷ 12 in/ft = .0105 acre-feet/min
.0105 acre-feet/min x 326,700 gal/acre-foot = 3444 gpm

A five foot rectangular wier will flow 3436 gpm at 7.25-inch depth; therefore, the overflow will be a minimum of five feet wide and 18 inches deep.

Equivelant area of the above wier is 3.02 ft^2. Area of 36-inch culvert is 7.07 ft^2; therefore, any culvert used below this area will be a minimum of 36 inches in diameter.

NOTE: All discharge structures will be equipped with energy dissipators to prevent erosion.

*Taken from NOAA, Atlas II, Volume 6, "Precipitation Frequency Atlas of Western U.S. - 1973".

**Calculations made using the reference "Design of Small Dams" by the Bureau of Reclamation, Appendix A, "Estimating Rainfall Runoff from Soil and Cover Data".