M/037/088

Water Resources

Environmental Studies

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DATE: 18 December 96

PROJECT: Lisbon Valley

ATTN:

DESCRIPTION/REMARKS Review & Comment

1) Appendices will follow in separate transmittal

2) I will wait for your comments before sending out the final

Appendices Attached — APPENDIX A

Number of pages Including Cover Sheet: 12
Any problems receiving, please call: 303/989-8588
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By: Thompson
HTL

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Appendix A

HYDRO-TRIAD, LTD.
CALCULATION SHEET

By: TI Date: 11/13/96 Subject: Lisbon Job No.: 475-004
Checked: TB Date: 12/18/96 Sheet No. 1 of 5

Revisions: By: Date:

Sediment Pond Sizing

Criteria

Storm: 10-yr, 24-hour

Assumptions

25% of waste rock dumps worked at a time. Remainder bypasses basins.

50% of direct precipitation ⇒ runoff

10-yr, 24-hour storm = 1.9" (HTL report)

$1.9'' \times \frac{1 ft}{12''} = 0.158 ft$ of rainfall

At Sentinel Pit #2, contributing areas are "L" & "M"

= 5 + 159 acres = 164 acres = 7,143,840 ft^2

25% of area = 1,785,960 ft^2

Runoff volume = 1,785,960 ft^2 × 0.158 ft × 0.5

V_{RO} = 141,090 ft^3 = 5200 CY

HYDRO-TRIAD, LTD.
CALCULATION SHEET

By: _____ Date: _____ Subject: _____ Job No.: _____

Checked: _____ Date: _____ Sheet No. 2 of 5

Revisions: _____ By: _____ Date: _____

South of Pad

Contributing Subbasins are "C" & "D"

72 + 77 acres = 149 acres

$149 \text{ acres} \times \frac{43560 \text{ ft}^2}{\text{acre}} = 6{,}490{,}440 \text{ ft}^2$

$V_{RO} = \frac{6{,}490{,}440 \text{ ft}^2}{4} \times \frac{0.158 \text{ ft}}{2} = 128{,}186 \text{ ft}^3$

$= 4700 \text{ CY}$

East of GTD Pit

Contributing Subbasins are "E", "F", "G" & "H"

Areas are 33 + 114 + 107 + 104 acres
E, F & G are waste rock dumps ∴ assume only 75% of area contributes. Assume 100% of H contributes

Area Contributing = $\frac{33 + 114 + 107}{4} + 104$ acres = 167.5 acres

$167.5 \text{ acres} \times \frac{43560 \text{ ft}^2}{\text{acre}} = 7{,}296{,}300 \text{ ft}^2$

$V_{RO} = 7{,}296{,}300 \text{ ft}^2 \times \frac{0.158 \text{ ft}}{2} = 576{,}400 \text{ ft}^3 = 21{,}300 \text{ CY}$

HYDRO-TRIAD, LTD.
CALCULATION SHEET

By: _____ Date: _____ Subject: _____ Job No.: _____

Checked: TB Date: 12/18/96 Sheet No. 3 of 5

Determine flows Thru Sediment Barriers

Assume 4:1 length to width dimensions
4 foot high barrier (bales)
Conductivity ≈ 1 cm/s (Sand-Gravel)
Flow occurs over half of barrier (plugging, etc)
Size such that Qout = 150% Qin

SP#2

5200 CY = 140,400 ft³ (want Q ≈ 5200×1.5 = 7800 CY/d)

At 4' deep, Surface Area ≈ 35,100 ft²

$4X^2 = 35{,}100$ where X = width ⇒ X = 93 ft

At mean head @ 2', flow thru barrier =

Q = A×V = A×Kdh/dl assume dl = 2'

$Q = 2 \times 93' \times \frac{1\,cm}{s} \cdot \frac{1\,in}{2.54\,cm} \cdot \frac{1\,ft}{12\,in} \times \frac{3600\,s}{1\,h} \times \frac{24\,h}{1\,d} \times \frac{2'}{2'}$

527,000 ft³/d = 19,500 CY/d

Can decrease size

Try 50' × 200' × 4' ≈ 1480 CY

$Q = 2 \times 50 \times \frac{1\,in}{2.54\,cm} \cdot \frac{1}{12} \cdot 3600 \times 24 = 283{,}500\ ft^3/d = 10{,}500\ CY$

Try 40' × 160' × 4' ≈ 950 CY

$Q = 2 \times 40 \times \frac{1}{2.54} \times \frac{1}{12} \times 3600 \times 24 = 226{,}800\ ft^3/d = 8{,}400\ CY$

Try 38' × 152' × 4' = 23,100 ft³ ≈ 900 CY

$Q = 2 \times 38 \times \frac{1}{2.54} \times \frac{1}{12} \times 3600 \times 24 = 215{,}400\ ft^3/d = 7980\ CY$ OK

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HYDRO-TRIAD, LTD.
CALCULATION SHEET

By: _____ Date: _____ Subject: _____ Job No.: _____

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South of Pad

4700 CY = Qin ∴ want Q = 7050 CY/d

Try 35' x 140' x 4' = 19600 ft³ = 725 CY

Q = 2 x 35 x 2834 = 198,380 ft³/d = 7300 CY/d

Try 30' x 120' x 4' = 14,400 ft³ = 530 CY

Q = 2 x 30 x 2834 = 170,040 ft³/d = 6300 CY/d

Use 35' x 140'

Try 34' x 136' x 4' = 18,496 ft³ = 685 CY

Q = 2 x 34 x 2834 = 192,712 ft³/d = 7100 CY/d

≈ 675 CY

East of GTO Pit

21,300 CY ∴ want Q = 31,950 CY/d

Due to size, assume 6' depth

Try 100 x 400 x 6 = 240,000 ft³ = 8850 CY

Q = 4 x 100 x 2834 = 1,132,000 ft³/d = 42,000 CY/d

Try 80 x 320 x 6 = 153,600 ft³ = 5700 CY

Q = 4 x 80 x 2834 = 906,880 ft³/d = 33,600 CY/d

Try 75 x 300 x 6 = 135,000 ft³ = 5000 CY

Q = 4 x 75 x 2834 = 850,200 ft³/d = 31,500

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HYDRO-TRIAD, LTD.
CALCULATION SHEET

By: _____ Date: _____ Subject: _____ Job No.: _____

Checked: _____ Date: _____ Sheet No. 5 of 5

SP#2 = 900CY
South of Pond = 675CY
GTD Pit = 5000CY

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