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Memorandum

Date:	January 12, 2006	File No:	2977-321-00-01
To:	Barry Fedorak		
From:	Arvid Pederson		
Subject:	Public Works Canada, Ekalugad Fiord, FOX-C - Sewage Lagoon		

Distribution: File

1.0 DESIGN CRITERIA / ASSUMPTIONS

The following are the design criteria/assumptions:

- Sewage Flow = 100% of water consumption.
- Average Daily Water Consumption = 200 L.
- Number of People in Camp = 40.
- Each Cell to hold 50% of sewage flow for construction season.
- Construction Season = 90 days.
- 3:1 side slopes.
- 1.0 m maximum liquid depth (between High Water Level (HWL) and floor).
- 0.5 m freeboard.
- 2.0 m wide berms compacted to a minimum of 95% SPD.
- Lagoon to be lined with 40 mil HDPE liner.
- Lagoon to be a minimum of 100 m from camp and water bodies containing aquatic life.

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2.0 SEWAGE VOLUME CALCULATION

Therefore, total volume required per cell:

$$\text{Required Volume} = \frac{200\ \text{L}}{\text{person/day}} \times 40\ \text{persons} \times (90 \times 50\%)\ \text{days}$$

= 360,000 L (360 m^3) or 19 m square at mid depth (assuming 1.0 m of liquid).

3.0 SEWAGE LAGOON SIZING

- Assume a square shaped lagoon for both Cells.
- Therefore, the area at mid-depth for each Cell = 19 x 19 m square.
- Therefore, width at floor for each Cell = 19 m - 2(3)(0.5) m = 16 m
- Therefore, width at HWL for each Cell = 19 m + 2(3)(0.5) m = 22 m

4.0 VOLUME CHECK

$$\text{Volume per Cell} = \frac{h}{3}\left[B + B1 + \sqrt{B(B1)}\right]$$

h = depth of liquid

B = area at HWL

B1 = area at floor

$$= \frac{1.0\ \text{m}}{3}\left[22(22) + 16(16) + \sqrt{22(22) \times 16(16)}\right]$$

= 0.33 m [484 + 256 + 352 m^2]

= 360.4 m^3 > 360 m^3 (required volume)

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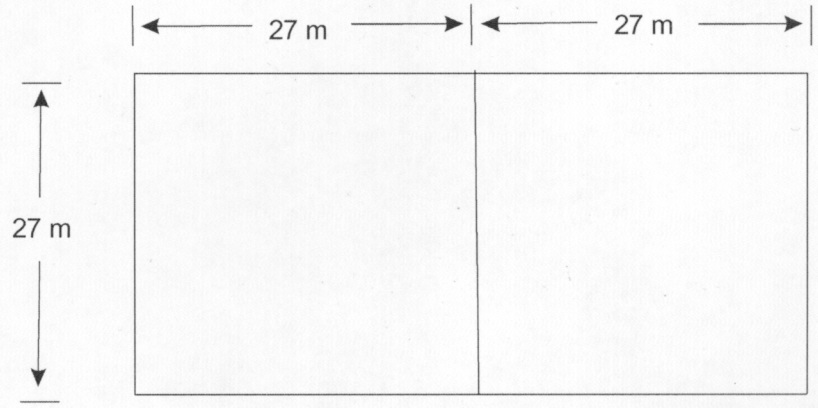
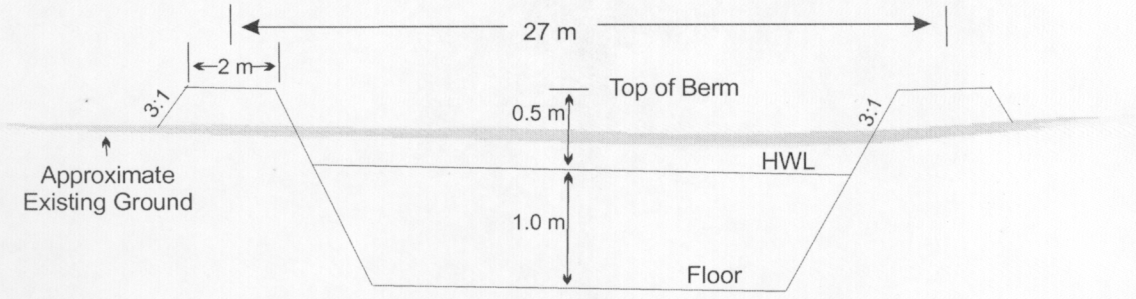
5.0 LAGOON DIMENSIONS

Length/side for each Cell = 22 m (@ HWL) + 2(3)(0.5) m + 2.0 m

= 27 m centreline to centreline dykes





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6.0 SUBMITTAL

This memo has been prepared and submitted by UMA Engineering Ltd., as documented below:

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