Cylindrical concrete tank to house 50 lb cylinder

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Cylindrical C. for a tank to house oil cylinders.

\[ L = 24' \]
\[ d = 18' \]
\[ c = \text{thickness of cylinder wall} \]
\[ w = 100 = \text{wt. of 1 ft.}^3 \text{ of water} \]
\[ \phi = 30^\circ \]
\[ P = \text{force per ft. long} \]

\[ P = \frac{\frac{L}{2}}{\frac{d}{2}} \left( \frac{1 - \tan^2\phi}{1 + \tan^2\phi} \right) \]

When \( \phi = 30^\circ \)

\[ \tan \phi = \frac{1 - \tan^2\phi}{1 + \tan^2\phi} \]

\[ P = \frac{100 \times 24 \times c}{6} = 9600 \text{ lb.} \]
\[(3.0 \pm 0.5)(x + 0.5)dx - \text{for } d.\]
\[ \rho_1 = \frac{c_1}{\gamma_1} \]

and \[ \rho_2 = \frac{c_2}{\gamma_2} - \frac{c_1}{\gamma_2} = c_1 \left( \frac{\gamma_2^2 - \gamma_1^2}{\gamma_2^2 - \gamma_1^2} \right) \]

\[ \gamma_1 = \frac{\rho_2 \gamma_2^2}{\gamma_2^2 - \gamma_1^2} + \frac{\rho_1 \gamma_1^2 \gamma_2^2}{\gamma_2^2 - \gamma_1^2} \]

on the inside edge
\[ \gamma = \gamma_1 \text{ and we get} \]

\[ \gamma_1 = \frac{2 \rho_2 \gamma_2^2}{\gamma_2^2 - \gamma_1^2} \]

compressive stress,

and on the outside edge
\[ \gamma = \gamma_2 \]

\[ \gamma_2 = \frac{\rho_2 \gamma_2^2}{\gamma_2^2 - \gamma_1^2} + \frac{\rho_1 \gamma_1^2 \gamma_2^2}{\gamma_2^2 - \gamma_1^2} \]

\[ = \rho_2 \frac{\gamma_2^2 + \gamma_1^2}{\gamma_2^2 - \gamma_1^2} \text{ compressive stress} \]
\[ p_2 = \frac{800}{144} \text{ lb. min}^{-2} = 5.56 \text{ lb. min}^{-2} \]

\[ q_1 = q_2 = 600 \text{ lb. min}^{-2} \]

\[ \gamma_1 = 76'' = 90 \text{ in.} \]

It is required to find \( y_2 \).

From 1

\[ q_1 (y_2 - y_1) = 2p_2 y_2^2 \]

\[ y_2^2 (q_1 - 2p_2) = q_1 y_1 \]

\[ y_2 = y_1 \sqrt{\frac{q_1}{q_1 - 2p_2}} \]

Taking the true root

\[ y_2 = 90 \sqrt{\frac{600}{600 - 11}} = 90 \sqrt{\frac{600}{589}} \]

\[ = 90 \times 0.974 \]

\[ = 91 \text{ in.} \]

From 8

\[ q_2 (y_2^2 - y_1^2) = p_2 (y_2^2 + y_1^2) \]

\[ y_2^2 (q_2 - p_2) = y_1^2 (q_2 + p_2) \]

\[ y_2 = y_1 \sqrt{\frac{q_2 + p_2}{q_2 - p_2}} \]

\[ = 90 \sqrt{\frac{600 + 8.6}{600 - 8.6}} \]

\[ = 90 \sqrt{\frac{608.6}{591.4}} \]

\[ = 90 \times 0.972 \]

\[ = 91 \text{ in.} \]
Therefore, from this point of view, the thickness of the cylinder need be only
\[ y_2 - y_1 = 91 - 90 = 1 \text{ inch}. \]

Again,
\[ d = 2r = 91 \times 2 = 182 \text{ miles}. \]

\[ \rho \times 78.2 = 2 \times \ell \cdot \frac{f_0}{\rho} \]
\[ \ell = \frac{91 \times 5.6}{600} = \frac{91 \times 5.6}{600} = 0.85 \text{ miles} \]

Which agrees well with the previous figures.