Anchorage Yard tank gets a lift

The 70,000-gallon fuel tank in the Anchorage yard got a lift recently so that it could be inspected. The liner in the containment area will be extended beneath the tank and other improvements will be made. In this photo, John Howe, a carpenter for Facilities South, ties a tag line on the top of the tank before the tank was lifted.

In the photograph below, the tank is about to be set on blocks. The lift took about 10 minutes, but preparation was much longer. (The person without the hard hat is not an ARRC employee.)
Weight of Tank

\[ \text{Volume} = \pi \times 25 \times 12.25 \times 8 \]
\[ = 628 \times 25 \times 0.8 \times 12.25 = 8199 \]
\[ \text{Top} = \frac{\pi \times 25}{4} \]
\[ = \frac{491 \times 0.8 \times 12.25}{4} = 5968 \]
\[ \text{Bottom} = \frac{\pi \times 25 \times 7}{4} \]
\[ = 518 \times 12.25 \times 0.8 \times 7 \]
\[ = 8314 \]
\[ \text{Subtotal} = 32185 \]

Boat R's on strut post \( E_8 = 8' \times 20" \)

Top R over center post \( = \pi \frac{25}{4} \times 0.8 \)

Roof beams \( \text{SS} \times 6 \times 10 \)

\[ \text{Add a} \]
\[ \text{400 steel pins} \]

\[ \pi \frac{25}{4} = 20 \text{ ea.} \]

\[ \text{Say position 4' 0" of center} \]

\[ V_{max} = 50 \times 2.5 \times 12.5 = 7818 \]

\[ 40 \text{ psf snow load} + 10.2 \text{ psf OC} = 50 \text{ psf TL} \]

\[ M = \frac{w \times l^2}{4} = \frac{50 \times 2.5 \times 12.5 \times 12.5}{4} = 4883 \text{ ft-lb} \]

\[ S_{w} = \frac{M \times 9.6}{F_b} \]

\[ \text{Act. E5 x 9.6} \]

\[ S = 5.56 > 2.0 \text{ (ok)} \]

\[ \text{wt of roof beam} = 20 \times 12.5 \times 9" \]

\[ \text{Pipe post} \]

\[ \text{Manhole doubler R's} \]

\[ 6" \text{ pipe stubbed into tank} = 5' \times 18.97 \times 2 = 200 \]

\[ \text{Misc. (vent ladders, gauge board, etc.)} \]

\[ 2 \text{ Ladders} = 2 \times 2 \times 18.97 \times 2 = 75 \]

\[ \text{Vent \& G. \(6" \) pipe + cap} \]

\[ = 9.5 \times 18.97 = 1575 \]

\[ \text{Valves} = 2 \times 7.5 = 15 \]

\[ \text{1/4" Steam pipes \& Legs} = 3 \times 17 \times 21.3 \times 3 = 502 \]

\[ \text{4993} \]
Other misc items:

Soil stuck to bot of tank say 1' aug = \( \frac{\pi}{4} \times \frac{25}{12} \times 130 = 5318 \) #

Rigging:

4 ea. 1/4" Ø x 39' slings = 4 x 39 x 2.67 = 417 #
8 ea. 1" Ø shackles = 8 x 5 # = 40 #
2 ea. 8" Ø pipe spreaders x 20' = 43. # x 20 x 2 = 1720 #
1 ea. block = 200 #
MISC = 1000
300

3677

46,173

Suction on bottom
\[
8' \quad 1.5' \\
\text{Ratio} \quad \frac{H}{L} = \frac{38.60}{7.50} = \frac{5.15}{1} = \frac{4''}{.78''} \\
\text{Use} \quad 34'' : 4'' \text{ slope on} \quad \text{padeyes} \quad 11° \\
\text{Use} \quad 37'' \text{ chains with} \quad 20' \text{ spreader bar to lift this way} \\
\text{from} \quad T-0 \text{ slings} \\
\text{check arc for} \quad 20' \text{ chord length:} \\
\angle \alpha = 2 \cos^{-1} \frac{7.5}{12.5} = 106.26° \\
\text{Arc}^A = \frac{106.26°}{360°} \times 78.54 = 23.18 \\
\text{Arc}^B = \frac{360° - 106.26°}{2} \times \frac{78.54}{360°} = 16.09 \\
78.54' = 2 \times 39.27
Pad eyes per tank pick

Wire rope slings

Strength edge

Shackles

Pad-eyes

\[
\text{Throat reqd} = \frac{13.44'' \times 1.2}{2 \times 5.2^2} = 1.22''
\]

\[
\phi \text{ reqd (pin by pin)} = \frac{9.50''}{0.9 \times 3.6 \times 1.125} = 0.24 < 0.6''
\]

Use \( 3/4 \)""