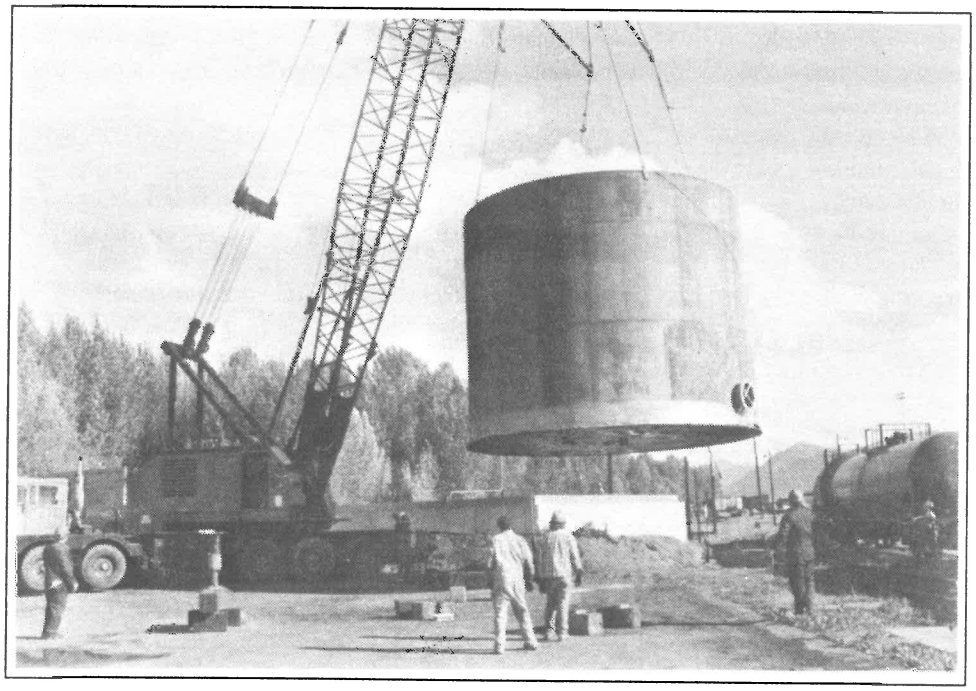
Anchorage Yard tank gets a lift

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.)



The mission of the Alaska Railroad Corporation and its employees is to provide high quality, safe, cost-effective freight, passenger, and real estate services for our customers.

If you have a news story or idea, contact your department reporter or **Scott Banks**, Corporate Communications, at 265-2695.

Alaska Railroad Corporation
P.O. Box 107500
Anchorage, Alaska 99510-7500

Weight of Tank

bottom $\pi 25 \times 8$ = $628^{\#} \times .320 \times 40.8 =$ 8199

sides = tapers $\pi 25 \times 12.25$ = $962^{\#} \times .260 \times 40.8 =$ 10,204

top = $\frac{\pi 25^2}{4}$ = $491^{\#} \times 1.05$ lap $\times .26 \times 40.8 =$ 5968

bot = $\frac{\pi 25.67^2}{4}$ = $518^{\#} \times 1.05$ lap $\times$ Say $.375 \times 40.8 =$ 8314

subtotal **32,185**

Bot ℄'s on ctr post ⊏8 = $8' \times 20^{\#}/' =$ 160#

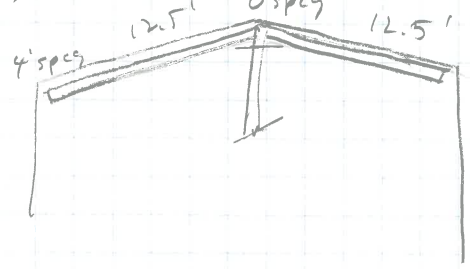
Top ℄ over center post = $\pi 2^2/4 \times \frac{5}{8} \times 40.8 =$ 80#

Roof beams (Say W6 × 10) = Add fa .260 steel not 1.250 =

$\frac{\pi 25}{4} = 20$ ea. fa max 4' OC

Sump = $2 \times 2 \times 4 \times 10.2 =$ 80#

Say position 4' OC. outside



$V_{max} = \frac{50 \times 2.5 \times 12.5}{2} = 781^{\#}$

40 psf snow ld + 10.2 psf DL = 50 psf TL

$M = \frac{wl^2}{4} = \frac{50 \times 2.5 \text{ avg} \times 12.5^2}{4} = 4883$ #-ft

$S_{req'd} = \frac{M}{F_b} = \frac{4883 \text{ #-ft} \times 12 \text{ in/ft}}{22000 \text{ K/in}^2} = 2.66 \text{ in}^3$

Act. ⊏5×9 lbs

~~W6×9~~ $S = 5.56 > 2.66$ okay.

wt roof beams = ~~20~~ 14 × 12.5 × 9# = 1575#

~~2250~~

actually 2ea ⊏8 × 20 = 21 × 2 × 15 = 630#

Pipe post ~~Say 6"Ø pipe = 21' × 18.97 =~~ ~~398#~~

Manhole doubler ℄s & rings = 600# ±

6"Ø pipe stubbed into ~~tank~~ = $5' \times 18.97 \times 2 =$ 200#

℄ 1/4 × 24"Ø on bot of 6"Ø pipe = $10.2 \times \pi 2\frac{1}{2} =$ 32#

Misc. (vent, ladders, gauge board, etc)

2 Ladders = Bar 2×2×3/8 + 5/8"Ø rungs = $2(21 \times 1.043 + 2 \times 20 \times 2.55) =$ 248

Vent & 6"Ø pipe + cap) = $3.5' \times 18.97 =$ 66

Gauge bd (top, bd, float) = $(10.2 \times 14^{\#}) + (2 \times 20 \times 6.1 + 20 \times 3) + (8 \times 7) =$ 502

Values = $2 \times 75^{\#} =$ 150

1 1/4"Ø Steam sched 80 pipes + Legs = $3 \times \pi 21 \times 3^{\#} + 8 \times 3.19 \times 3' =$ 670

4993

Other misc items:

Soil stuck to bot of tank say 1" avg = $\frac{\pi 25^2}{4} \times \frac{1}{12} \times 130 =$ **5318#**

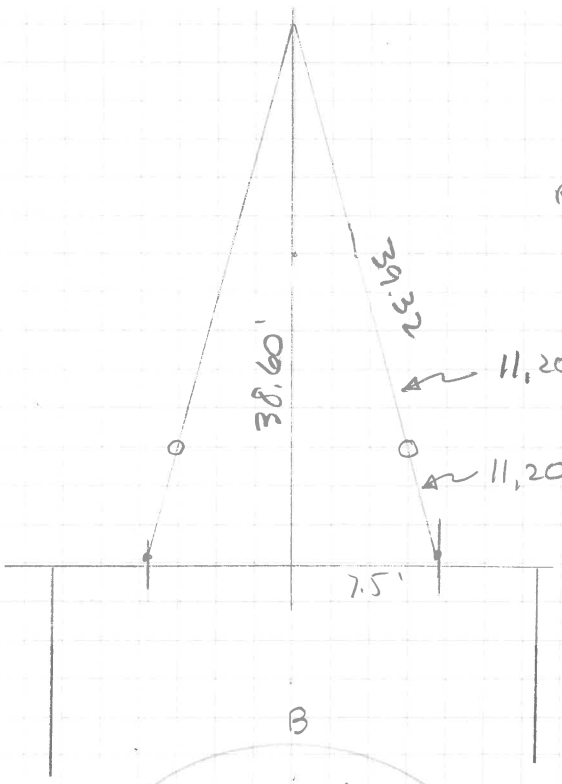
Rigging:

4ea. 1¼" Ø x 39' slings	= 4 x 39 x 2.67 =	417#
8 ea. 1" Ø shackles	= 8 x 5# =	40#
2 ea. 8" Ø sched 80 pipe spreaders x 20'	= 43.# x 20 x 2 =	1720#
ends of spreaders =		200#
1 ea. block =		1000
misc.		300

3677

46,173

Suction on bottom ?



8' lift

$\tan^{-1} \frac{1}{5.15} = 10.99°$

Ratio $\frac{H}{L} = \frac{38.60}{7.50} = \frac{5.15}{1} = \frac{4"}{.78"}$

Use 3/4" : 4" slope on padeyes	11°

$h = \sqrt{37^2 - 7.5^2} =$

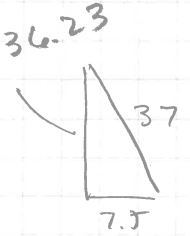
$y = \sqrt{20^2 - 10^2} = 17.32'$

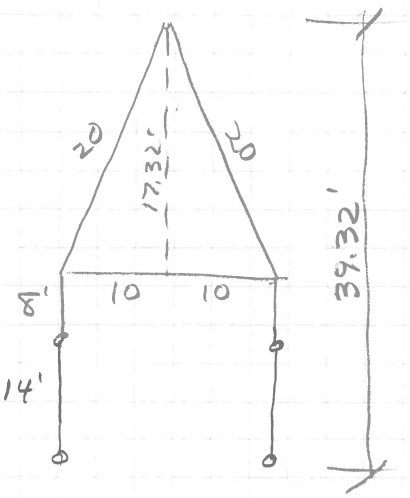
65'

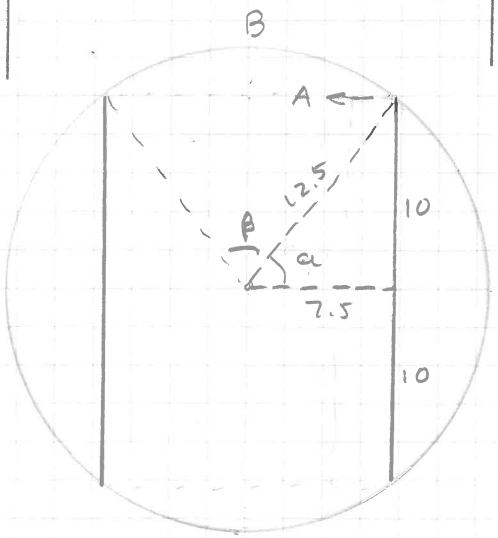
$11{,}200 \times \frac{1}{.833} = 13{,}445$

11,200# pick

20' high







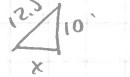
$A = 23.18$

$P_{dir\ A} = 9.5^k \times \frac{7.5}{35} = 2^k$

$P_{\perp\ tk.wall} \sim \frac{P_{dir\ A}}{2} = 1^k$ ok to lift this way

Use 37' slings w/ 20' spreader bars, 20'± down from T.O. slings.

check arc for 20' chord length:



$x = \sqrt{12.5^2 - 10^2} = 7.50'$

$\angle \alpha = 2\cos^{-1} \frac{7.5}{12.5} = 106.26°$

$\angle \beta$

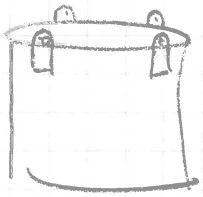
$C = \pi 25 = 78.54'$

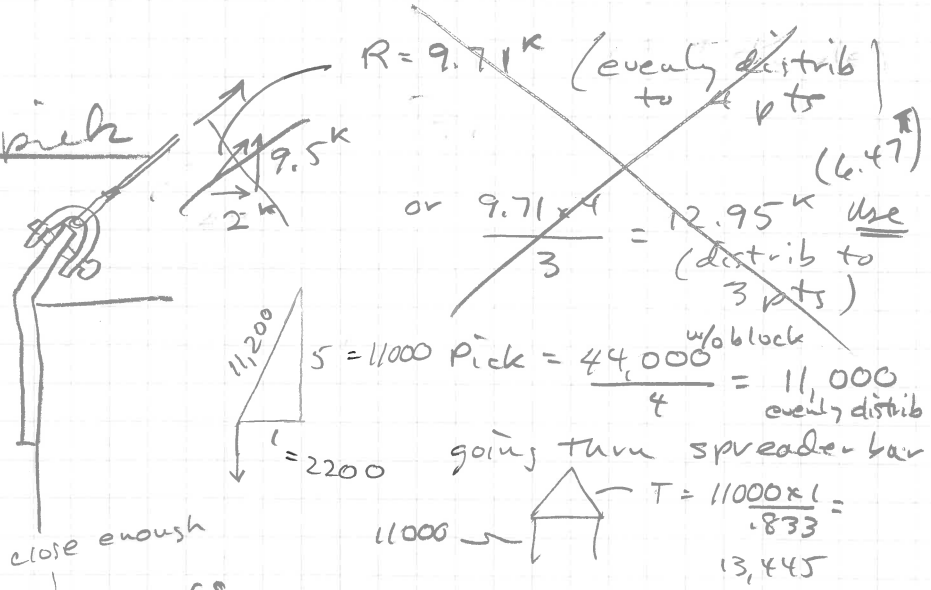
Arc "A" $= \frac{106.26}{360} \times 78.54 = 23.18$

Arc "B" $= \frac{360 - 106.26 \times 2}{2 \times 360} \times 78.54 = 16.09$

$78.54' = 2 \times \overline{39.27}$

Pad eyes for tank pick





Wire rope slings

$$12.95 \times \frac{FS}{5} = 64.75^K$$

$$\text{Strength reqd} = 12.95 \times \frac{FS}{3} = 38.85^K$$

BS = 3/4" Ø IWRC, IPS = 25.6^K

$$FS = \frac{25.6}{9.50} = 2.69$$

BS 1 1/4" Ø IWRC $= \frac{69.4^K}{13.45} = 5.16$

BS = 7/8" Ø IWRC, IPS = 34.6^K

$$FS = \frac{34.6}{9.50 + I} = 3.64$$

BS = 1" Ø IWRC 44.9^K

$$FS = \frac{44.9}{13.45} = 3.34$$

Use 1 1/4" Ø IWRC, IPS, matched

Shackles say 1" Ø 8 1/2 T Ø pin = 1 1/8"

Use 1" Ø shackle

Pad-eyes

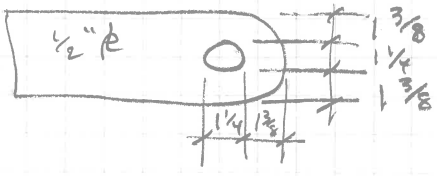
Say 1/2" PL

$$\text{Throat reqd} = \frac{13.44^{k} \times 1.2}{2 \times .5^{in} \times 22^{k/in^2}} = .73^{in} \text{ in tension} \times \frac{22}{14} = 1.15 \text{ in shear}$$

Impact

$$\text{Ø reqd (pin brg)} = \frac{9.50^K}{.9 \times 36^{k/in^2} \times 1.125^{in}} = .26 << 1/2"$$

1/2" PL OK



Use 3/4" PL