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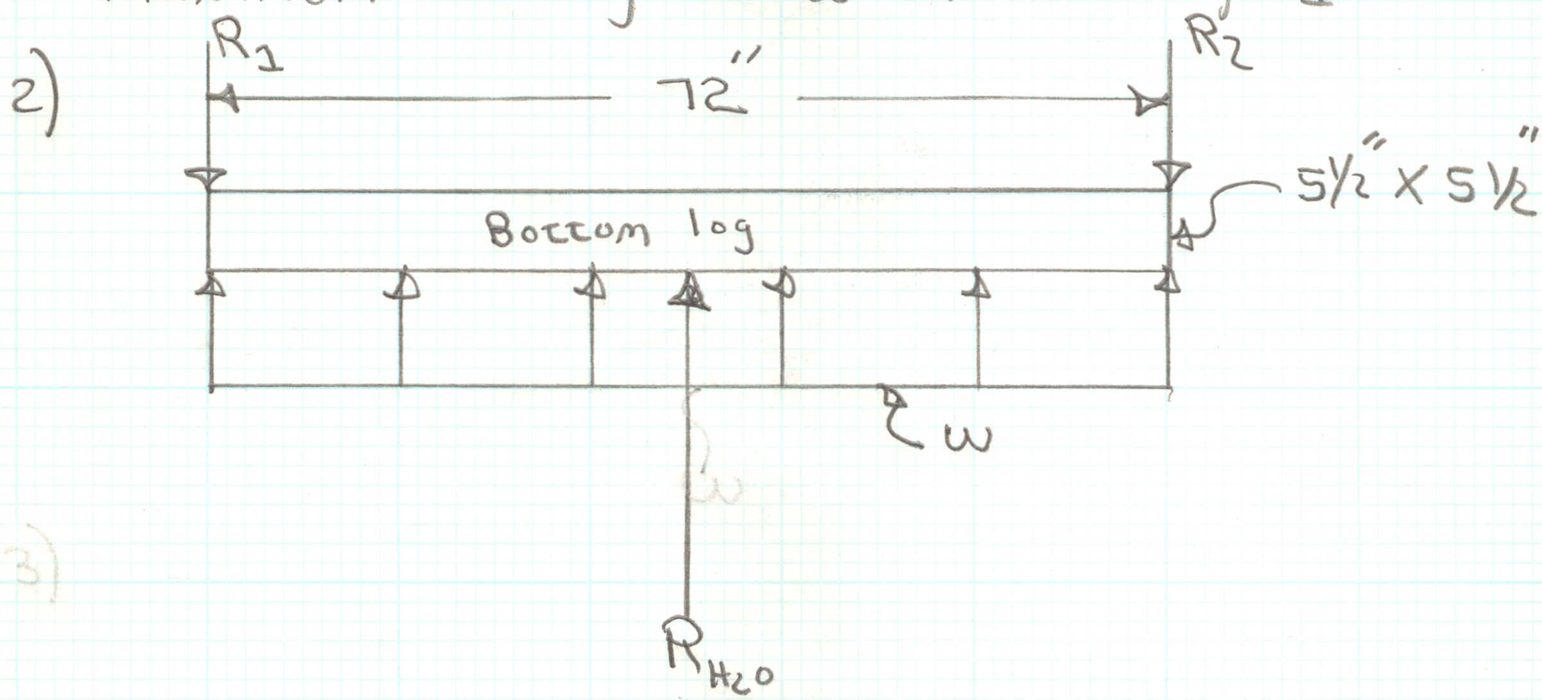
Indian River Power Supply
Addendum Calculations
Stoplog Structure
Stop log Analysis

1) Assume stop logs are commercial grade southern yellow long leaf pine.
From the Mass Building Code use a maximum bending stress of 1000 PSI

2) 

3) $\sigma = \dfrac{MY}{I}$

$I = \dfrac{bh^3}{6}$ since $b = h = 5\frac{1}{2}$ $= \dfrac{h^4}{6} = \dfrac{(5.5\,in)^4}{6}$

$= 152.5\ in^4$

$Y = 5\frac{1}{2}''/2 = 2.75''$

$Z = I/Y = 152.5\ in^4 / 2.75'' = 55.5\ in^3$

4) $\sigma = \frac{M}{Z} = \frac{M}{55.5\ in^3}$

5) Area = $5\frac{1}{2}'' * 72'' = 396\ in^2$

6) depth = 15 feet = 180''

7) $R_{H2O} = \sigma_{H2O} * depth * area$

$= 62.4\ \frac{lb}{ft^3} * 15\ feet * \frac{396\ in^2}{144\ in^2/ft^2}$

$= 2574\ lb_F$

8) $w = R_{H2O} / L = 2574\ lb_F / 72'' = 36\ lb_F/in$

9) For a uniform distributed load that is simply supported.

$M_{max} = \frac{1}{8} wL = \frac{2574\ lb_F * 72''}{8}$

$= 23,166\ in\text{-}lb_F$

10) $\therefore$ stress $= \frac{M}{Z} = \frac{23166\ in\text{-}lb_F}{55.5\ in^3}$

$= 417$ PSI

11) Safety Factor $= \frac{\sigma_{max\ Mass\ Code}}{\sigma_{H2O}} = \frac{1000}{417}$

11) contd

$$SF = \frac{1000\ PSI}{417\ PSI} = 2.4 \leftarrow \text{okay}$$

Conclusion:

Use long leaf Southern Yellow Pine Stoplogs for the Indian River Stop log Structure