Pole Loads & Reactions

Load line angle from vertical		$\theta := 2$	degree
Tag line angle from horizontal		$\alpha := 60$	degree
Assume a Load Weight of		$Load := 8.3$	kips
Length of tag line	$Lt := \frac{1000}{\cos(30 \cdot deg)}$	$Lt = 1154.7$	feet
Approximate tag line tension	$Tension := (Load + Lh + Ball) \cdot \sin(\theta \cdot deg) \cdot 2$	$Tension = 0.735$	kips
Vertical component of tag line	$Tv := Tension \cdot \cos(30 \cdot deg) + 0.001 \cdot Lt$	$Tv = 1.791$	kips
Total lifted weight	$Wt := Load + Lh + Ball + Tv$	$Wt = 12.32$	kips
Actual tension in tag line	$T := Tension + \frac{0.3}{1000} \cdot 550$	$T = 0.9$	kips

Loads on sheave pins

Load line force above, headache ball	$P := \frac{Wt}{\cos(\theta \cdot deg)}$	$P = 12.327$	kips
Force horizontal	$Ph := P \cdot \sin(\theta \cdot deg)$	$Ph = 0.43$	kips
Force vertical	$Pv := \frac{P}{2} + P \cdot \cos(\theta \cdot deg)$	$Pv = 18.482$	kips

Moment at base of head

$$Ma1 := \left(\frac{-P}{2} \cdot \sin(45 \cdot deg) + \frac{P}{2} \cdot \sin(\theta \cdot deg)\right) \cdot 34.625$$

$$Ma2 := \frac{P}{2} \cdot \sin(\theta \cdot deg) \cdot 20.75 + \frac{P}{2} \cdot \sin(45 \cdot deg) \cdot 17.25$$

$$Ma3 := \left(\frac{P}{2} \cdot \cos(45 \cdot deg) + \frac{P}{2} \cdot \cos(\theta \cdot deg)\right) \cdot 24.75$$

$$Ma4 := \frac{P}{2} \cdot \cos(\theta \cdot deg) \cdot 24.75 + \left(\frac{P}{2} - \frac{P}{2} \cdot \sin(45 \cdot deg)\right) \cdot 6.375$$

$Ma := Ma1 + Ma2 + Ma3 + Ma4$ $\quad Ma = 360.46$ in-kip

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Determine pole deflection vaules

Wind load of pole, from page 5	$w := 5$		lb/ft
Wind load in kips per inch	$w := \frac{5}{1000 \cdot 12}$	$w = 0.00042$	kip/incl
Deflection due to wind load	$\Delta l := \frac{w \cdot (La \cdot 12)^3}{24 \cdot E \cdot I} \cdot (4 \cdot Lb \cdot 12 + 3 \cdot La \cdot 12)$	$\Delta l = 0.699$	inch