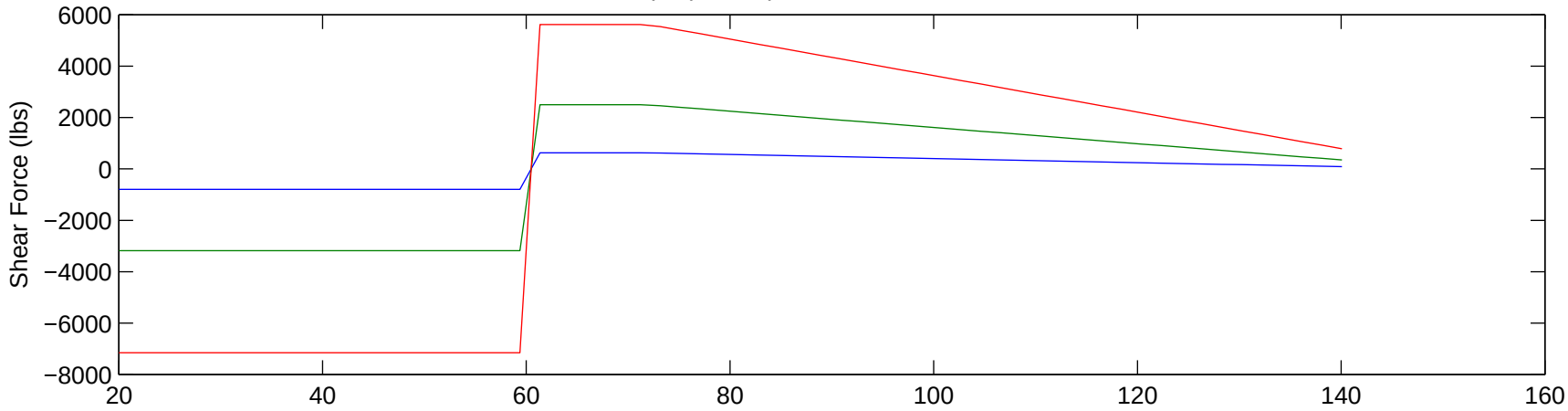
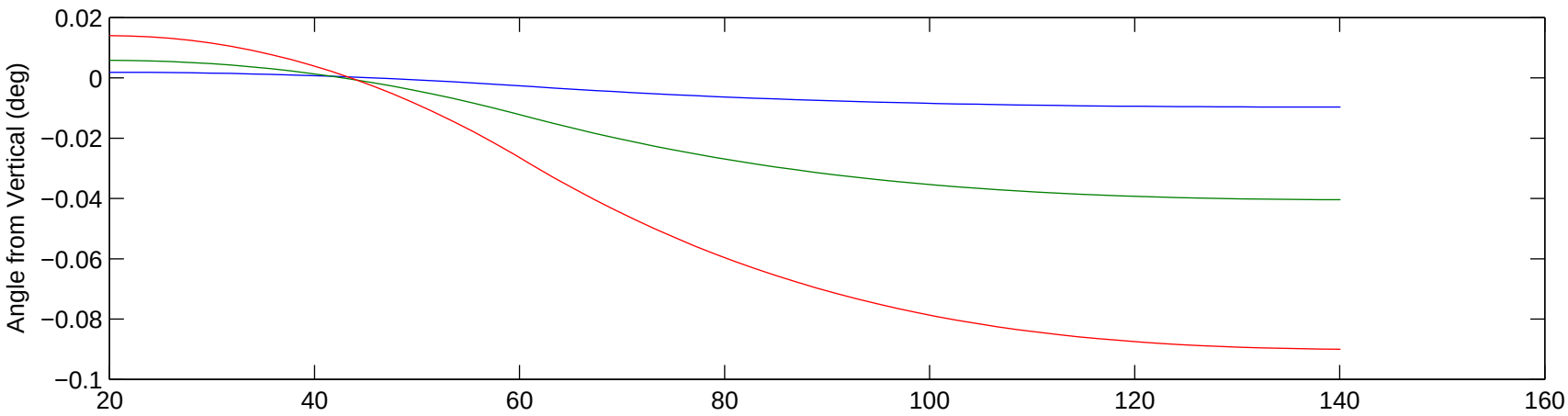
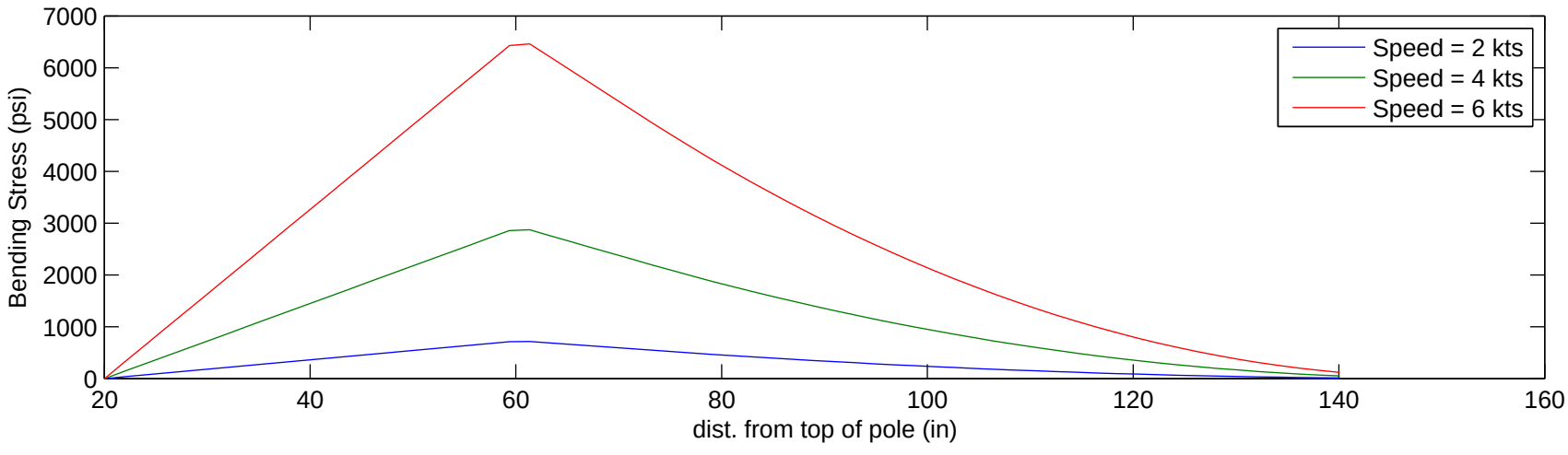
12.75 in Diameter Pipe (Sch 80) S1 = 40 in S2 = 12 in T = 69 in

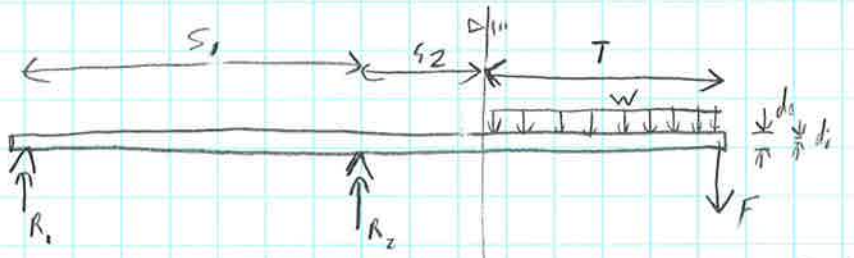






HYDRO PHASE PACK

$\zeta_t = \frac{\zeta d}{u}$



$\Sigma F = 0$

$R_1 + R_2 - F - wT = 0$

$R_1 + R_2 = F + wT$

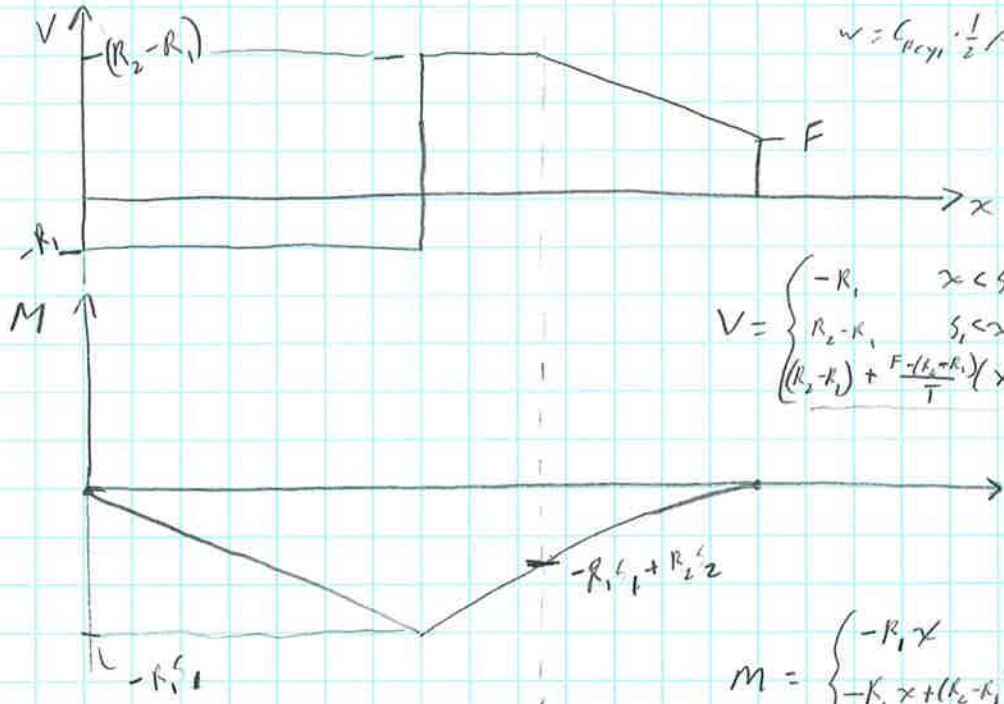
$\Sigma M = 0$

$\zeta_1 R_2 - wT\left[\zeta_1 + \zeta_2 + \frac{T}{2}\right] - F[\zeta_1 + \zeta_2 + T] = 0$

$$\begin{cases} R_2 = \frac{1}{\zeta_1}\left[wT\left[\zeta_1 + \zeta_2 + \frac{T}{2}\right] + F[\zeta_1 + \zeta_2 + T]\right] \\ R_1 = F + wT - R_2 \end{cases}$$

$F = C_{D_{sph}} \cdot \frac{1}{8}\rho u^2 \pi d_t^2$ } TRAMBUCH MODELED AS SPHERES

$w = C_{D_{cyl}} \cdot \frac{1}{2}\rho u^2 d_0^2$ } $[F/L]$



$$V = \begin{cases} -R_1 & x < \zeta_1 \\ R_2 - R_1 & \zeta_1 < x < (\zeta_1 + \zeta_2) \\ (R_2 - R_1) + \frac{F - (R_2 - R_1)}{T}\left(x - (\zeta_1 + \zeta_2)\right) & \hookrightarrow \; x > \zeta_1 \zeta_2 \end{cases}$$

$$M = \begin{cases} -R_1 x & x < \zeta_1 \\ -R_1 x + (R_2 - R_1)(x - \zeta_1) & \zeta_1 < x < \zeta_2 \zeta_1 \\ -R_1\zeta_1 + R_2\zeta_1 + \frac{F - (R_2 - R_1)}{2T} x^2 & \end{cases}$$

$w = C_{D_{cyl}} \cdot \frac{1}{2}\rho u^2 \cdot d_0$

$F = C_{D_{sph}} \cdot \frac{1}{2}\rho u^2 (\pi d_T^2)/4$