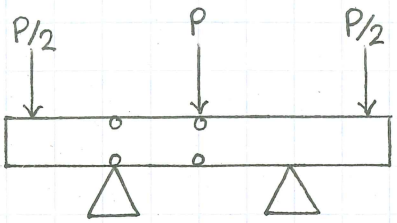
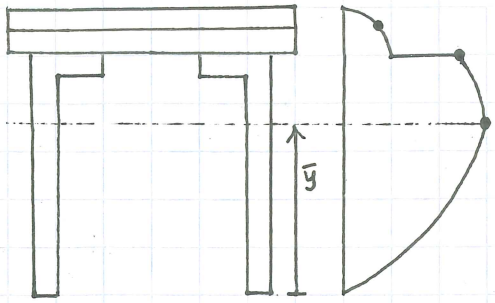
CIV102 - STRUCTURES and MATERIALS

Topic: Example Bridge Design Part III

1)





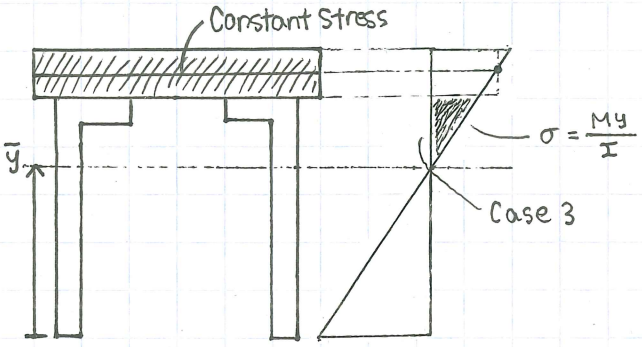
SFD/BMD → Failure By $\begin{cases} \sigma_{ten} \\ \sigma_{comp} \end{cases}$

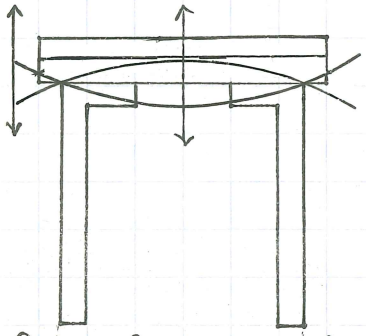
SFD → Failure By $\begin{cases} \tau_{xy\,max} \\ \tau_{xy\,glue} \end{cases}$

Buckling

Case 1
Case 2
Case 3
] $\sigma - M$

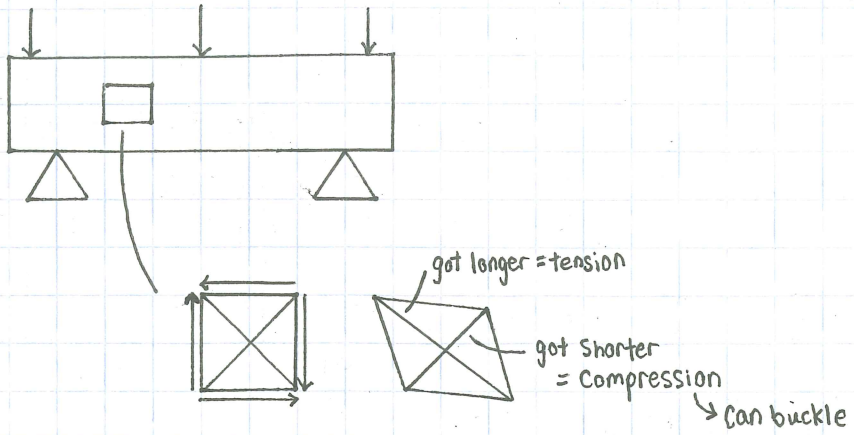
Case 4 → τ_{xy}

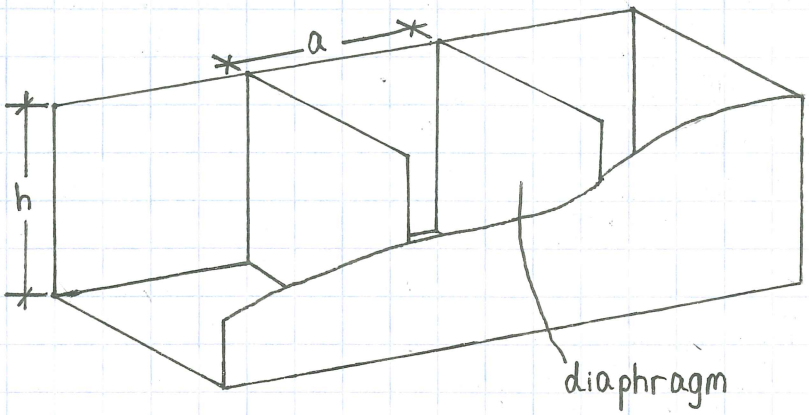




Case 2 | Case 1 | Case 2

2) Shear Buckling





$$\tau_{xy} = \frac{5\pi^2 E}{12(1-\mu^2)}\left[\left(\frac{t}{a}\right)^2 + \left(\frac{t}{h}\right)^2\right]$$

τ_{crit} = buckling shear stress

$$= \frac{5\pi^2 4000}{12(1-0.2^2)}\left[\left(\frac{1.27}{200}\right)^2 + \left(\frac{1.27}{100}\right)^2\right]$$

$\tau_{crit} = 3.45\,MPa$

↑ new failure stress, recalc P by $\frac{VQ}{IB}$