STAGGERED FASTENERS

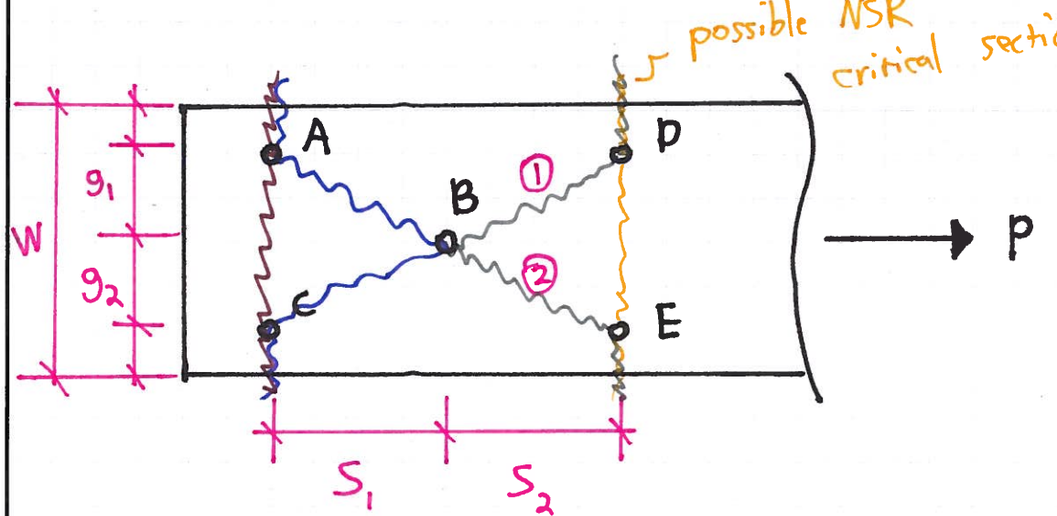
AISC Manual p 16.1-20

$$\left(\frac{s_i^2}{4g_i}\right)$$

s_i = spacing (pitch), of holes along the line of loading

g_i = gauge, ie spacing of holes transverse to loading

EXAMPLE: The flat PL shown has a thickness, t_p, and width, W.



PATH DE: (must resist 100% of the applied load P)

$$A_n = A_g - \sum A_{holes} = W t_p - (2\ holes)(d_{hole} + \tfrac{1}{16}'')(t_p)$$

PATH DBE: (must resist 100% of load) "no bolts have to be sheared"

$$A_n = A_g - \sum A_{holes} + \sum \left(\frac{s^2}{4g}\right) t_p$$

$$= W t_p - (3\ holes)(d_{hole} + \tfrac{1}{16})(t_p) + \underbrace{\left(\frac{s_2^2}{4 g_2}\right) t_p}_{②} + \underbrace{\left(\frac{s_2^2}{4 g_1}\right) t_p}_{①}$$

this gets us to an area

length

PATH AC: $A_n = W t_p - (2 \text{ holes})(d_{hole} + \frac{1}{16}")(t_p)$

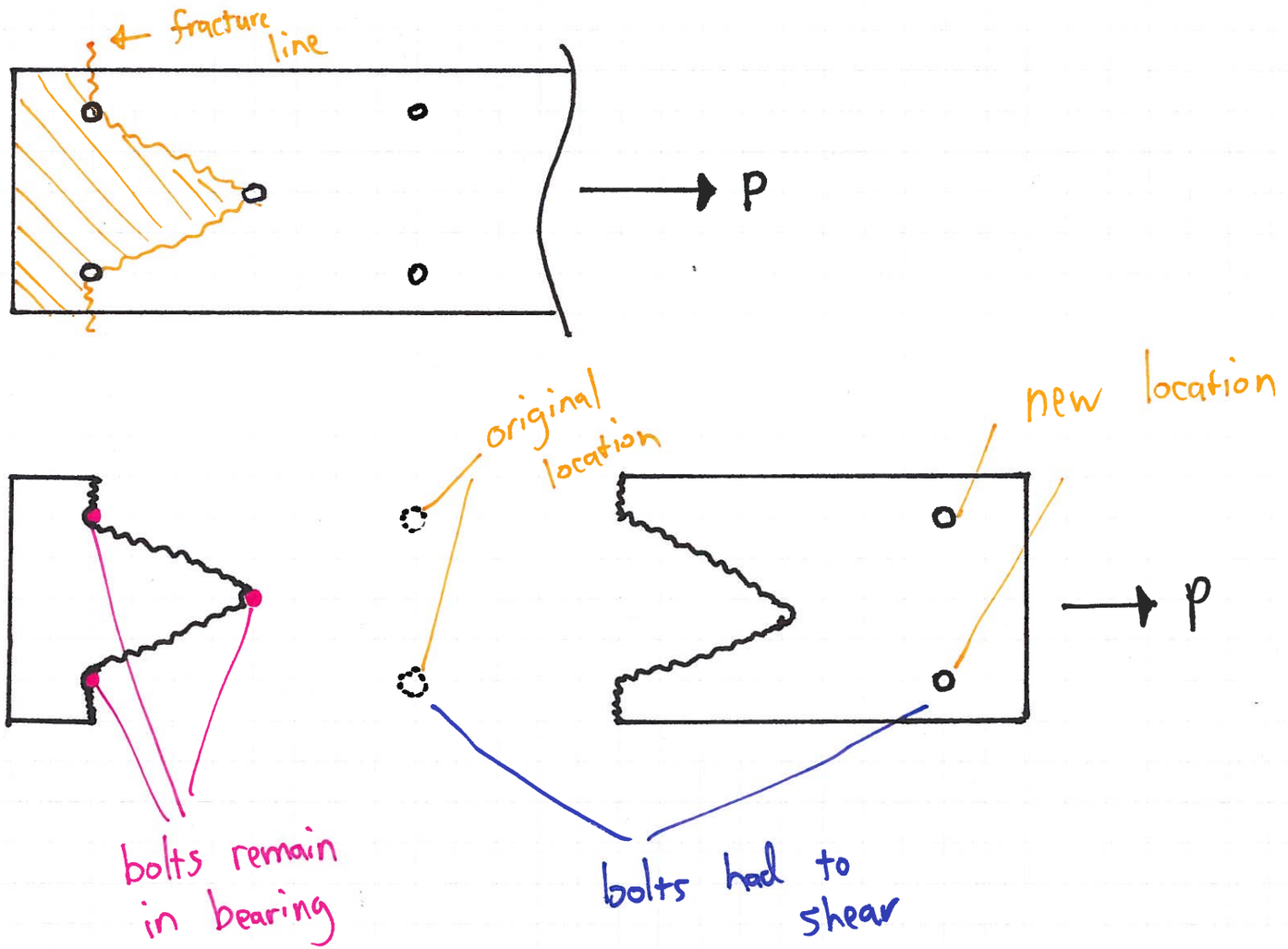
However, for NSR of line AC, it is only required to carry $\frac{2}{5}$ of the load.

$\frac{3}{5}$ of P_u is carried by bolts B, D, & E.

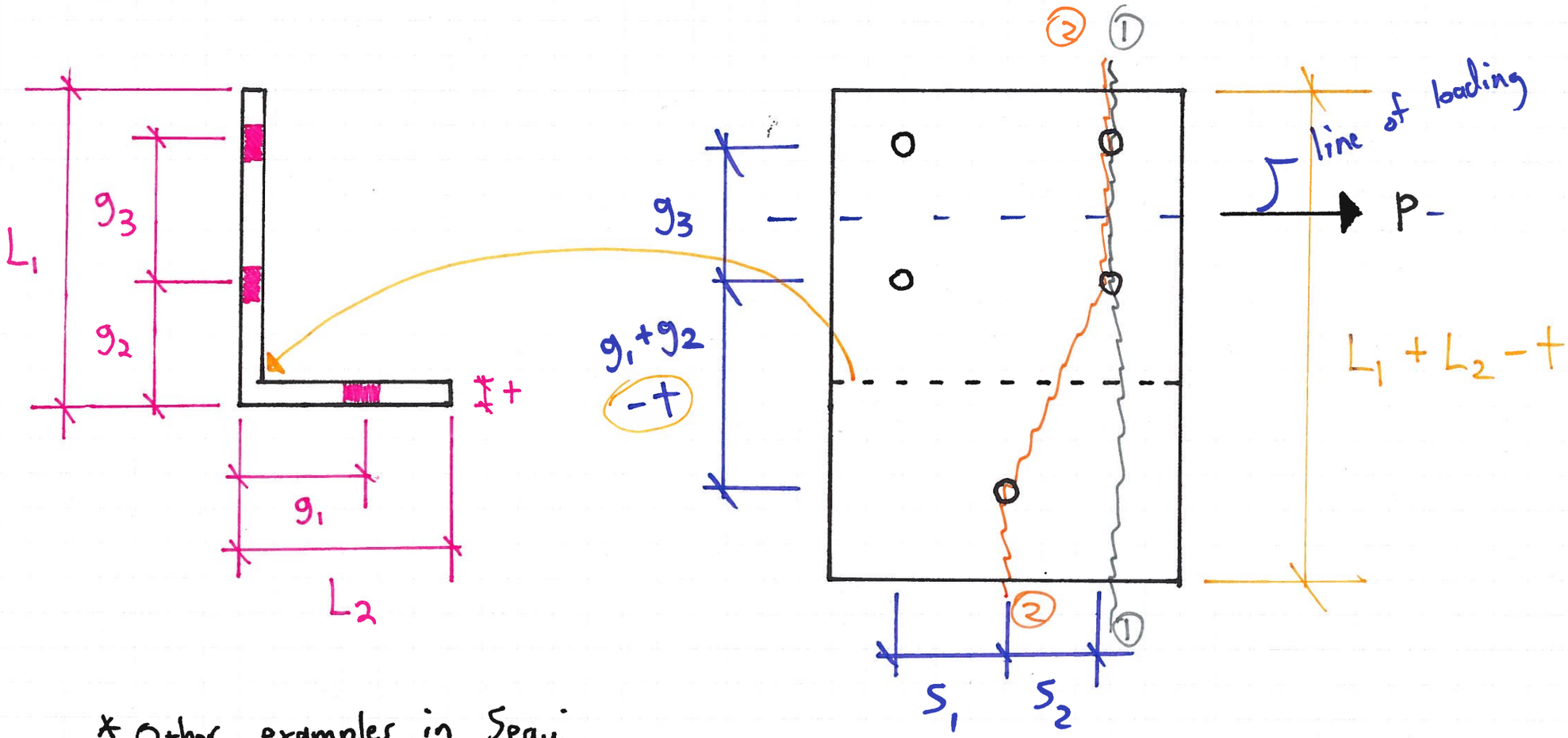
MATHEMATICALLY:

$$\frac{2}{5} P_u = \phi F_u A_e \rightarrow P_u = \frac{5}{2} \phi F_u A_e = \frac{5}{2} \phi F_u U A_n$$

∴ to determine if A_n for this section is critical (ie results in a minimum P_u), it has to be multiplied by $\frac{5}{2}$



WHAT ABOUT ANGLES? → we unfold them to be flat



* Other examples in Sequ

W, C, S