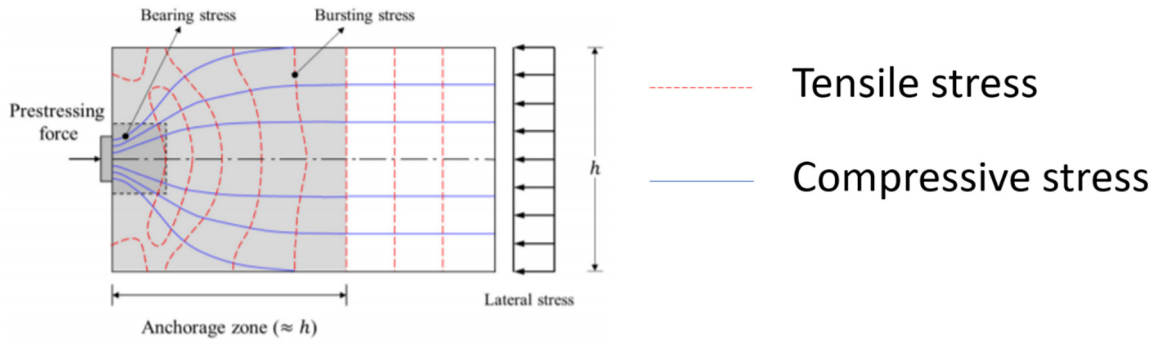
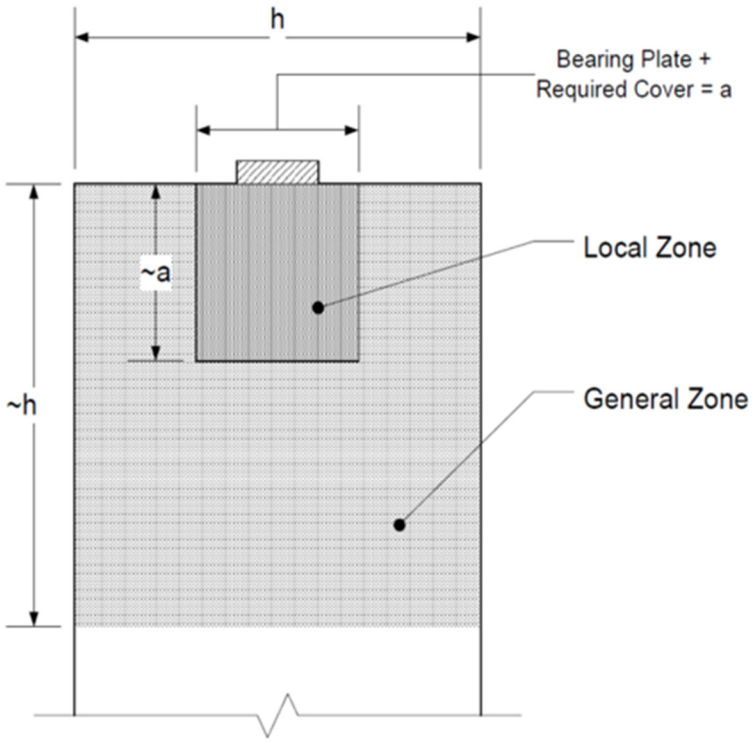
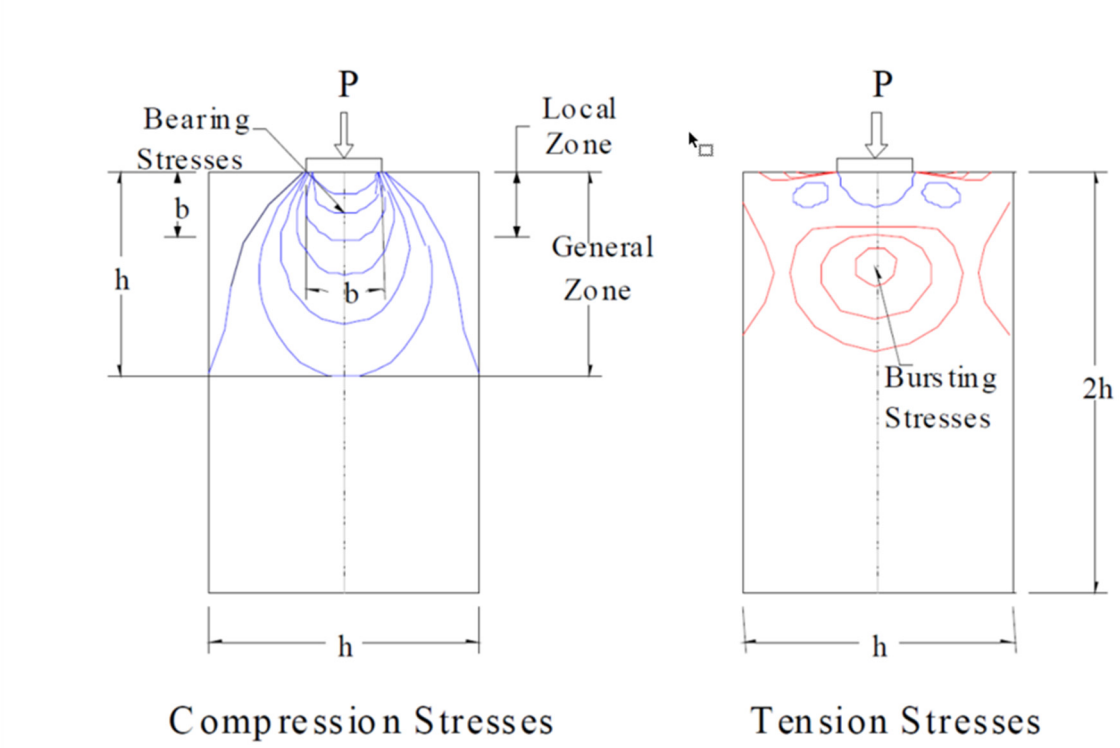
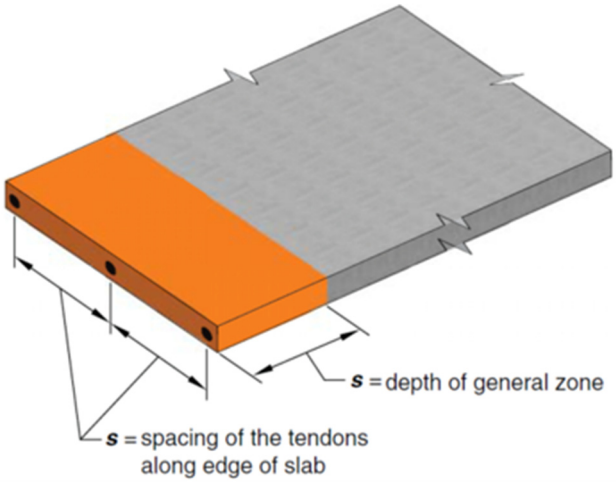
Spiral reinforcement for anchorage zone



Anchorage zone is the transfer zone for carrying compression forces from anchorage. Length of this zone is about maximum length of section. In case of beam length of this zone is about depth of beam. High compressive stresses will occur near anchorage and tensile stresses will occur away of anchorage.







Anchorage zone consist of two zones

1.Local zone - Carry high compression

2.General zone – High tensile stresses in this zone

Local zone

- Check bearing resistance according to AASHTO 5.8.4.4.2 (imperial unit)

$$P_r = \phi f_n A_b \qquad (5.8.4.4.2\text{-}1)$$

for which f_n is determined as the lesser of the following:

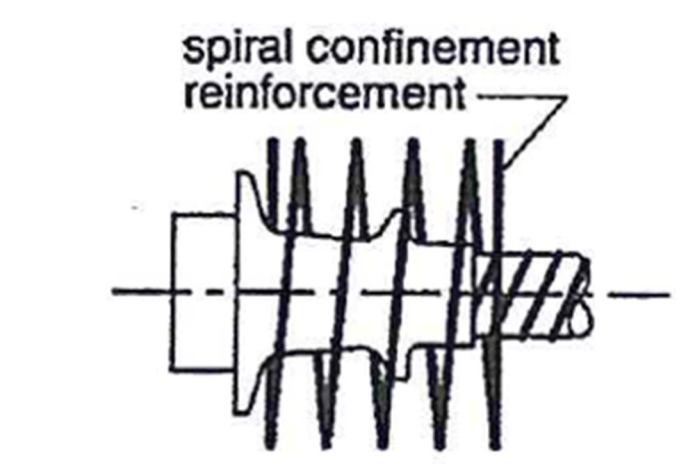
$$f_n = 0.7\, f'_{ci} \sqrt{\frac{A}{A_g}}, \qquad (5.8.4.4.2\text{-}2)$$

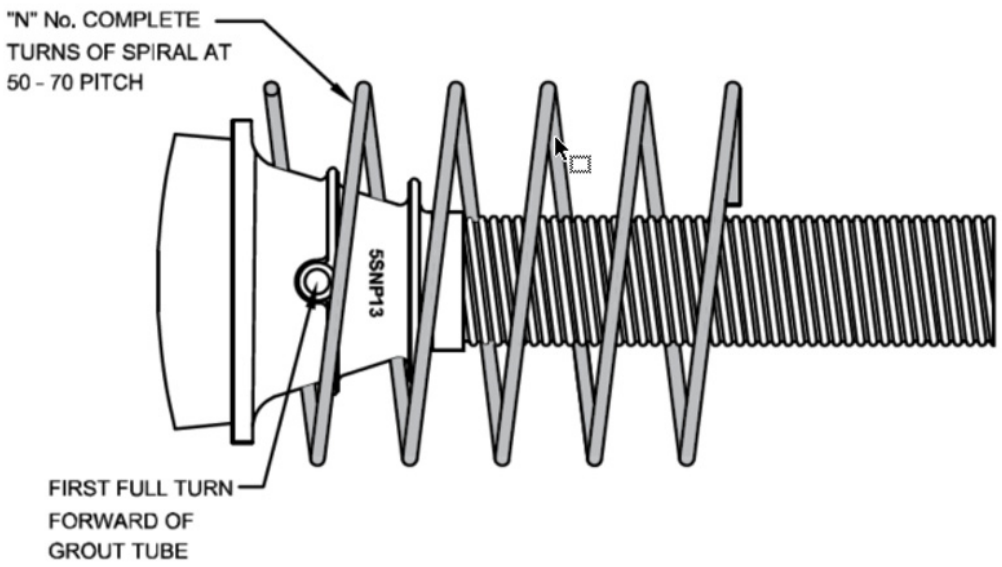
$$f_n = 2.25\, f'_{ci} \qquad (5.8.4.4.2\text{-}3)$$

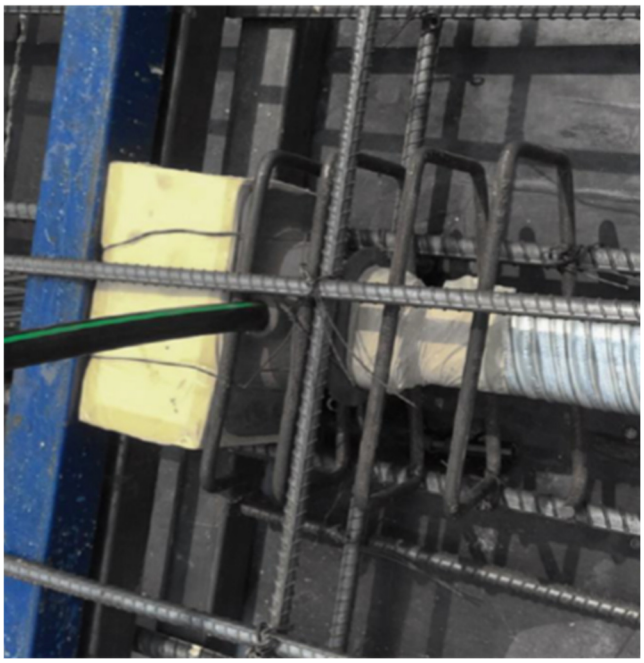
- Check slenderness ratio according to AASHTO 5.8.4.4.2

$$n/t \le 0.08 \left(\frac{E_b}{f_b}\right)^{0.33}$$

- Check confined reinforcement according to NCHRP



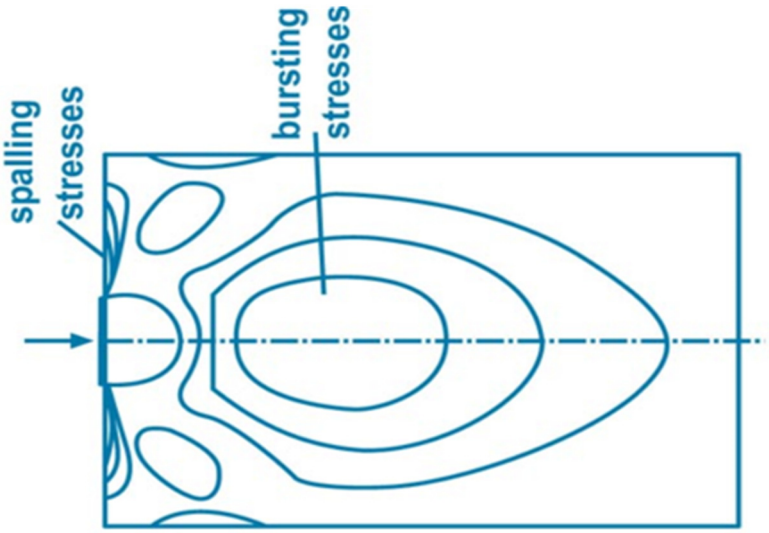


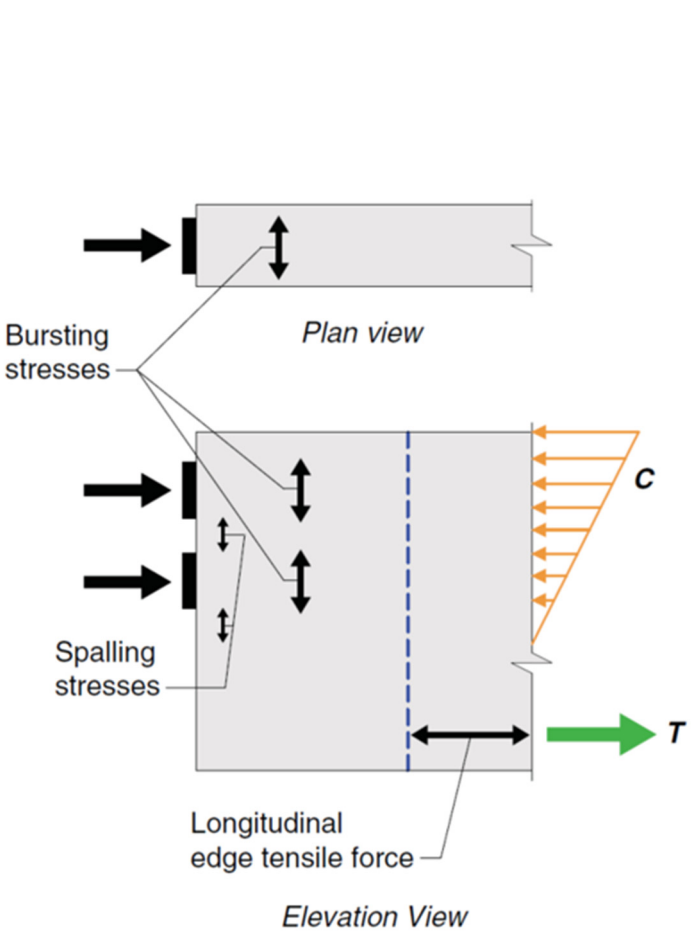


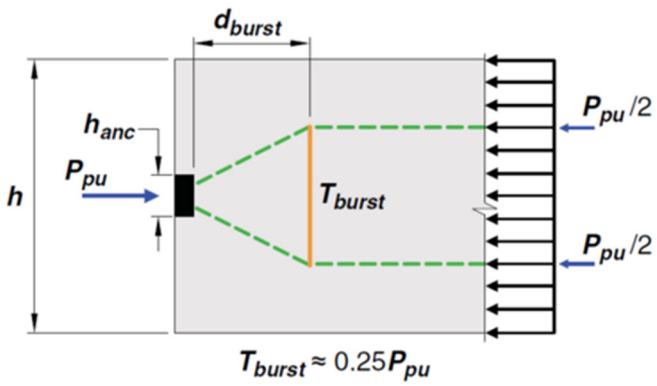
Spiral reinforcement in anchorage zone will confine concrete in local zone that make concrete in this zone can carry higher compression.

General zone

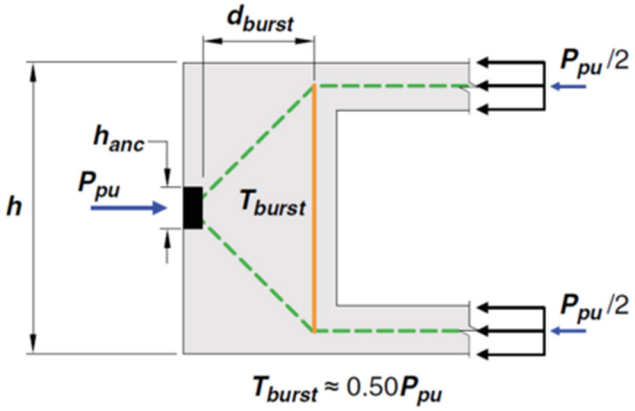
Provide reinforcement for resisting bursting and spalling stresses



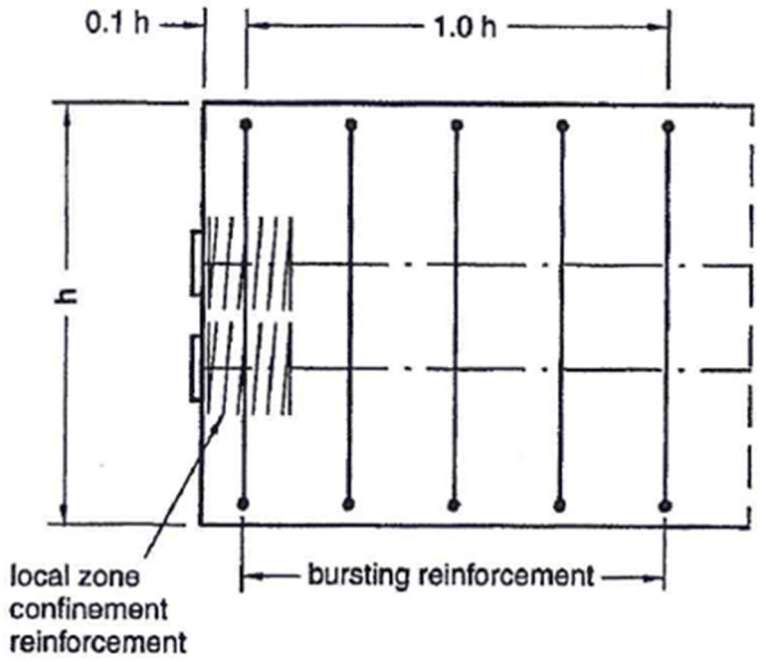




(a) Rectangular section



(b) Flanged section with end diaphragm



In Post-tensioned slab, bursting stresses are not much in general zone.

In Post-tensioned beam, many strands in one anchorage that make high bursting stresses and spalling stresses. Beam section require reinforcement for resist these stresses.

เอกสารอ้างอิง

1) G.P. Wollmann; ”Anchorage Zone in Post-tensioned Concrete Structure”

2) ACI Committee 318; “Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary”

3) AASHTO LRFD “Bridge Design Specifications” 8th Edition-2017

4) G.P. Wollmann, C.R. Wollmann; ”Anchorage Zone Design”

5) NCHRP, “Anchorage Zone Reinforcement for Post-Tensioned Concrete Girders”

6) นเรฏฐ์ พันธราธร, “การออกแบบคอนกรีตอัดแรง”

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