

## CODE

- (a) Longitudinal reinforcement ratio within  $0.15\ell_w$  from the end of a vertical wall segment, and over a width equal to the wall thickness, shall be at least  $0.5\sqrt{f'_c}/f_y$ .
- (b) The longitudinal reinforcement required by 18.10.2.4(a) shall extend vertically above and below the critical section at least the greater of  $\ell_w$  and  $M_u/3V_u$ .
- (c) No more than 50 percent of the reinforcement required by 18.10.2.4(a) shall be terminated at any one section.

## COMMENTARY

The requirement for minimum longitudinal reinforcement in the ends of the wall is to promote the formation of well-distributed secondary flexural cracks in the wall plastic hinge region to achieve the required deformation capacity during earthquakes (Lu et al. 2017; Sritharan et al. 2014). Furthermore, significantly higher in-place concrete strengths than used in design calculations may be detrimental to the distribution of cracking. 18.10.2.4(a) specifies the required reinforcement ratio in the end tension zones, as shown for different wall sections in Fig. R18.10.2.4.

The longitudinal reinforcement required by 18.10.2.4(a) should be located at a critical section where concentrated yielding of longitudinal reinforcement is expected (typically the base of a cantilever wall) and must continue to a sufficient elevation of the wall to avoid a weak section adjacent to the intended plastic hinge region. A height above or below the critical section of  $M_u/3V_u$  is used to identify the length over which yielding is expected.

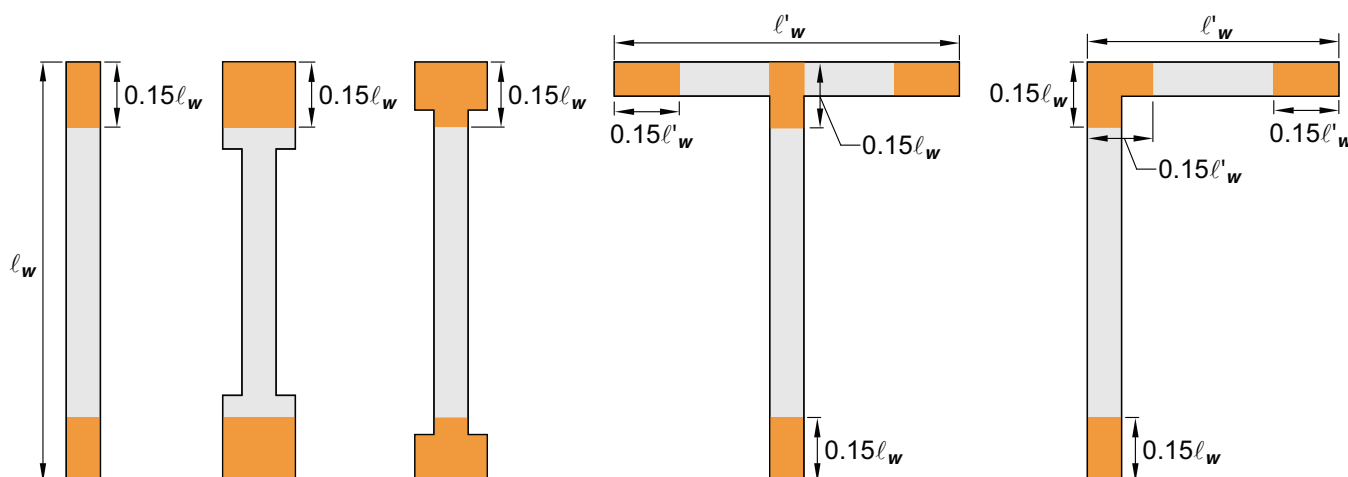


Fig. R18.10.2.4—Locations of longitudinal reinforcement required by 18.10.2.4(a) in different configurations of wall sections.

**18.10.2.5** Reinforcement in coupling beams shall be developed for  $f_y$  in tension in accordance with 25.4, 25.5, and (a) and (b):

- (a) If coupling beams are reinforced according to 18.6.3.1, the development length of longitudinal reinforcement shall be 1.25 times the values calculated for  $f_y$  in tension.
- (b) If coupling beams are reinforced according to 18.10.7.4, the development length of diagonal reinforcement shall be 1.25 times the values calculated for  $f_y$  in tension.

### 18.10.3 Design forces

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The possibility of yielding in components of structural walls should be considered, as in the portion of a wall between two window openings, in which case the actual shear may be in excess of the shear indicated by lateral load analysis based on factored design forces.