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CODE

COMMENTARY

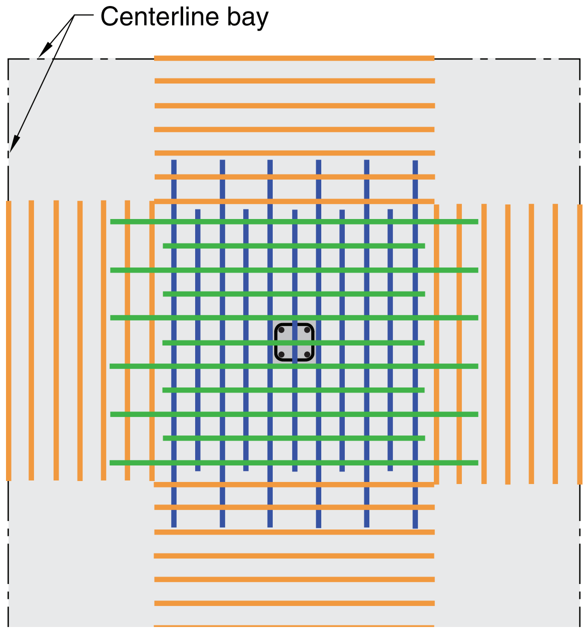

Fig. R8.6.1.1—Arrangement of minimum reinforcement near the top of a two-way slab.

8.6.1.2 If $v_{uv} > \phi 2\lambda_s\lambda\sqrt{f_c'}$ on the critical section for two-way shear surrounding a column, concentrated load, or reaction area, $A_{s,min}$, provided over the width b_{slab}, shall satisfy Eq. (8.6.1.2)

$$A_{s,min} = \frac{5 v_{uv} b_{slab} b_o}{\phi \alpha_s f_y} \quad (8.6.1.2)$$

where b_{slab} is the width specified in 8.4.2.2.3, α_s is given in 22.6.5.3, ϕ is the value for shear, and λ_s is given in 22.5.5.1.3.

R8.6.1.2 Tests on interior column-to-slab connections with lightly reinforced slabs with and without shear reinforcement (Peiris and Ghali 2012; Hawkins and Ospina 2017; Widianto et al. 2009; Muttoni 2008; Dam et al. 2017) have shown that yielding of the slab flexural tension reinforcement in the vicinity of the column or loaded area leads to increased local rotations and opening of any inclined crack existing within the slab. In such cases, sliding along the inclined crack can cause a flexure-driven punching failure at a shear force less than the strength calculated by the two-way shear equations of Table 22.6.5.2 for slabs without shear reinforcement and less than the strength calculated in accordance with 22.6.6.3 for slabs with shear reinforcement.

Tests of slabs with flexural reinforcement less than $A_{s,min}$ have shown that shear reinforcement does not increase the punching shear strength. However, shear reinforcement may increase plastic rotations prior to the flexure-driven punching failure (Peiris and Ghali 2012).

Inclined cracking develops within the depth of the slab at a shear stress of approximately $0.17\lambda_s\lambda\sqrt{f_c'}$. At higher shear stresses, the possibility of a flexure-driven punching failure increases if $A_{s,min}$ is not satisfied. $A_{s,min}$ was developed for an interior column, such that the factored shear force on the critical section for shear equals the shear force associated with local yielding at the column faces.

To derive Eq. (8.6.1.2) the shear force associated with local yielding was taken as $8A_{s,min}f_yd/b_{slab}$ for an interior column connection (Hawkins and Ospina 2017) and generalized as $(\alpha_s/5)A_{s,min}f_yd/b_{slab}$ to account for edge and corner conditions. $A_{s,min}$ also needs to be provided at the periphery of drop panels and shear caps.