

3.24.3.1 Case A—Main Reinforcement Perpendicular to Traffic (Spans 2 to 24 Feet Inclusive)

The live load moment for simple spans shall be determined by the following formulas (impact not included):

HS 20 Loading:

$$\left(\frac{S+2}{32}\right)P_{20} = \text{Moment in foot-pounds per foot-width of slab} \quad (3-15)$$

IIS 15 Loading:

$$\left(\frac{S+2}{32}\right)P_{15} = \text{Moment in foot-pounds per foot-width of slab} \quad (3-16)$$

In slabs continuous over three or more supports, a continuity factor of 0.8 shall be applied to the above formulas for both positive and negative moment.

3.24.3.2 Case B—Main Reinforcement Parallel to Traffic

For wheel loads, the distribution width, E , shall be $(4 + 0.06S)$ but shall not exceed 7.0 feet. Lane loads are distributed over a width of $2E$. Longitudinally reinforced slabs shall be designed for the appropriate HS loading.

For simple spans, the maximum live load moment per foot width of slab, without impact, is closely approximated by the following formulas:

HS 20 Loading:

Spans up to and including 50 feet: LLM = 900S
foot-pounds
Spans 50 feet to 100 feet: LLM = 1,000
(1.30S-20.0)
foot-pounds

HS 15 Loading:

Use 3/4 of the values obtained from the formulas for HS 20 loading

Moments in continuous spans shall be determined by suitable analysis using the truck or appropriate lane loading.

3.24.4 Shear and Bond

Slabs designed for bending moment in accordance with Article 3.24.3 shall be considered satisfactory in bond and shear.

3.24.5 Cantilever Slabs

3.24.5.1 Truck Loads

Under the following formulas for distribution of loads on cantilever slabs, the slab is designed to support the load independently of the effects of any edge support along the end of the cantilever. The distribution given includes the effect of wheels on parallel elements.

3.24.5.1.1 Case A—Reinforcement Perpendicular to Traffic

Each wheel on the element perpendicular to traffic shall be distributed over a width according to the following formula:

$$E = 0.8X + 3.75 \quad (3-17)$$

The moment per foot of slab shall be $(P/E) \times$ foot-pounds, in which X is the distance in feet from load to point of support.

3.24.5.1.2 Case B—Reinforcement Parallel to Traffic

The distribution width for each wheel load on the element parallel to traffic shall be as follows:

$$E = 0.35X + 3.2, \text{ but shall not exceed 7.0 feet} \quad (3-18)$$

The moment per foot of slab shall be $(P/E) \times$ foot-pounds.

3.24.5.2 Railing Loads

Railing loads shall be applied in accordance with Article 2.7. The effective length of slab resisting post loadings shall be equal to $E = 0.8X + 3.75$ feet where no parapet is used and equal to $E = 0.8X + 5.0$ feet where a parapet is used, where X is the distance in feet from the center of the post to the point under investigation. Railing and wheel loads shall not be applied simultaneously.

3.24.6 Slabs Supported on Four Sides

3.24.6.1 For slabs supported along four edges and reinforced in both directions, the proportion of the load carried by the short span of the slab shall be given by the following equations:

$$\text{For uniformly distributed load, } p = \frac{b^4}{a^4 + b^4} \quad (3-19)$$

$$\text{For concentrated load at center, } p = \frac{b^3}{a^3 + b^3} \quad (3-20)$$