

CODE

16.5.2 Dimensional limits

16.5.2.1 Effective depth d for a bracket or corbel shall be calculated at the face of the support.

16.5.2.2 Overall depth of bracket or corbel at the outside edge of the bearing area shall be at least $0.5d$.

16.5.2.3 No part of the bearing area on a bracket or corbel shall project farther from the face of support than (a) or (b):

- (a) End of the straight portion of the primary tension reinforcement
- (b) Interior face of the transverse anchor bar, if one is provided

16.5.2.4 For normalweight concrete, the bracket or corbel dimensions shall be selected such that V_u/ϕ shall not exceed the least of (a) through (c):

- (a) $0.2f'_c b_w d$
- (b) $(3.3 + 0.08f'_c) b_w d$
- (c) $11b_w d$

16.5.2.5 For lightweight concrete, the bracket or corbel dimensions shall be selected such that V_u/ϕ shall not exceed the lesser of (a) and (b):

- (a) $\left(0.2 - 0.07 \frac{a_v}{d}\right) f'_c b_w d$
- (b) $\left(5.5 - 1.9 \frac{a_v}{d}\right) b_w d$

16.5.3 Required strength

16.5.3.1 The section at the face of the support shall be designed to resist simultaneously the factored shear V_u , the factored restraint force N_{uc} , and the factored moment M_u .

16.5.3.2 Factored restraint force, N_{uc} , and shear, V_u , shall be the maximum values calculated in accordance with the factored load combinations in Chapter 5. It shall be permitted to calculate N_{uc} in accordance with 16.2.2.3 or 16.2.2.4, as appropriate.

COMMENTARY

R16.5.2 Dimensional limits

R16.5.2.2 A minimum depth, as shown in Fig. R16.5.1a and R16.5.1b, is required at the outside edge of the bearing area so that a premature failure will not occur due to a major crack propagating from below the bearing area to the sloping face of the corbel or bracket. Failures of this type have been observed (Kriz and Raths 1965) in corbels having depths at the outside edge of the bearing area less than required in 16.5.2.2.

R16.5.2.3 The restriction on the location of the bearing area is necessary to ensure development of the specified yield strength of the primary tension reinforcement near the load.

If the corbel is designed to resist restraint force N_{uc} , a bearing plate should be provided and fully anchored to the primary tension reinforcement (Fig. R16.5.1b).

R16.5.2.4 These limits impose dimensional restrictions on brackets and corbels necessary to comply with the maximum shear friction strength allowed on the critical section at the face of support.

R16.5.2.5 Tests (Mattock et al. 1976a) have shown that the maximum shear friction strength of lightweight concrete brackets and corbels is a function of both f'_c and a_v/d .

R16.5.3 Required strength

R16.5.3.1 Figure R16.5.1b shows the forces applied to the corbel. M_u can be calculated as $[V_u a_v + N_{uc}(h - d)]$.

R16.5.3.2 In editions of the Code prior to ACI 318-19, specific provisions for restraint forces at bearing connections were included only for corbels and brackets. In 2019, 16.2.2.3 and 16.2.2.4 were added to include consideration of restraint forces at all bearing connections. Consequently the provisions applicable only to brackets or corbels were removed and a reference made to 16.2.2.3 or 16.2.2.4.