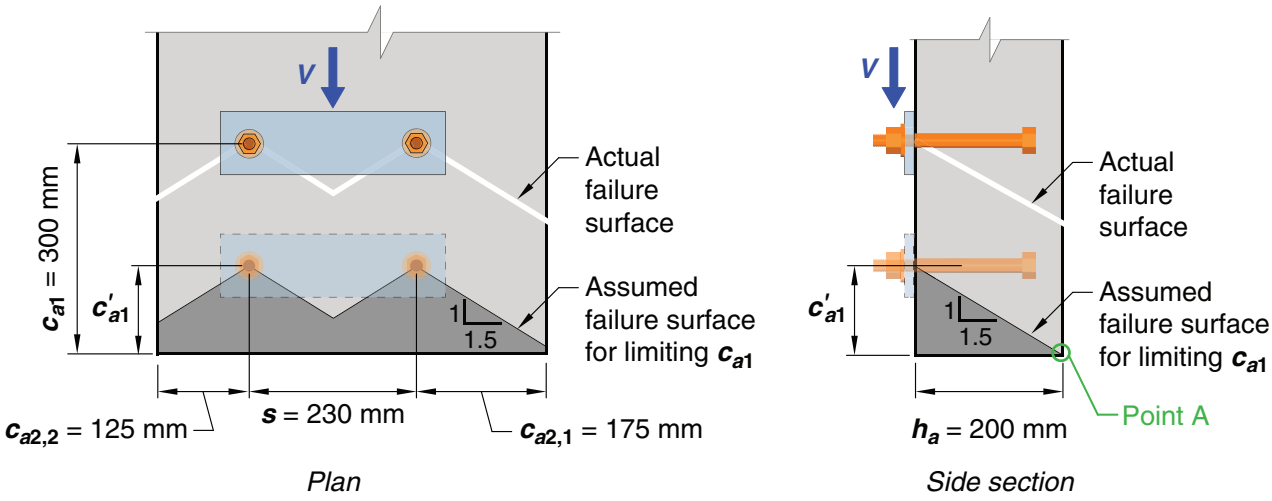
CODE

COMMENTARY

prevents the use of a calculated strength based on individual breakout volumes for an anchor group configuration.

This approach is illustrated in Fig. R17.7.2.1.2. In this example, the limiting value of c_{a1} is denoted as c'_{a1} and is used to calculate A_{Vc}, A_{Vco}, $\psi_{ed,V}$, and $\psi_{h,V}$ as well as V_b (not shown). The requirement of 17.7.2.1.2 may be visualized by moving the actual concrete breakout surface originating at the actual c_{a1} toward the surface of the concrete in the direction of the applied shear. The value of c_{a1} used to calculate A_{Vc} and to be used in 17.7.2.1 through 17.7.2.6 is determined when (a) an outer boundary of the failure surface first intersects the concrete surface;, or (b) the intersection of the breakout surface between individual anchors within the group first intersects the concrete surface. For the example shown in Fig. R17.7.2.1.2, point "A" shows the intersection of the assumed failure surface for limiting c_{a1} with the concrete surface.



1. The actual c_{a1} = 300 mm
2. The two edge distances c_{a2} as well as h_a are all less than $1.5c_{a1}$.
3. The limiting value of c_{a1} (shown as c'_{a1} in the figure) to be used to calculate A_{Vc} and to be used in 17.7.2.1 through 17.7.2.6 is the largest of the following:

   $(c_{a2,max})/1.5$ = 175 mm / 1.5 = 117 mm

   $(h_a)/1.5$ = 200 mm / 1.5 = 133 mm (controls)

   $s/3$ = 230 mm / 3 = 77 mm
4. For this case, A_{Vc}, A_{Vco}, $\psi_{ed,V}$, and $\psi_{h,V}$ are:

   A_{Vc} = (125 mm + 230 mm + 175 mm)(1.5 x 133 mm) = 105,735 mm^2

   A_{Vco} = 4.5(133 mm)^2 = 79,600 mm^2

   $\psi_{ed,V}$ = 0.7 + 0.3(125 mm)/(133 mm) = 0.98

   $\psi_{h,V}$ = 1.0 because c_{a1} =$(h_a)/1.5$. Point A shows the intersection of the assumed failure surface with the concrete surface that establishes the limiting value of c_{a1}.

Fig. R17.7.2.1.2—Example of shear where anchors are located in narrow members of limited thickness.