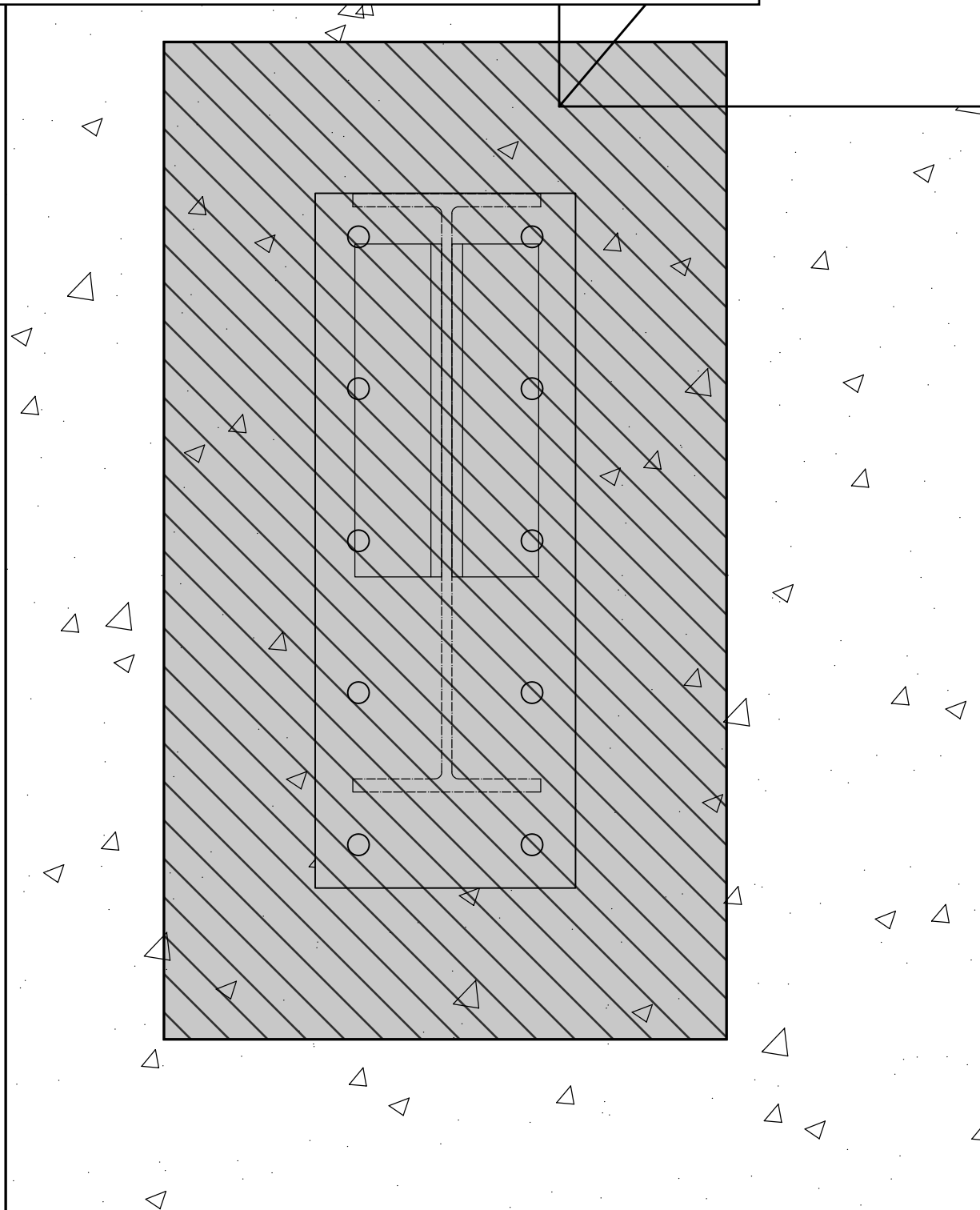
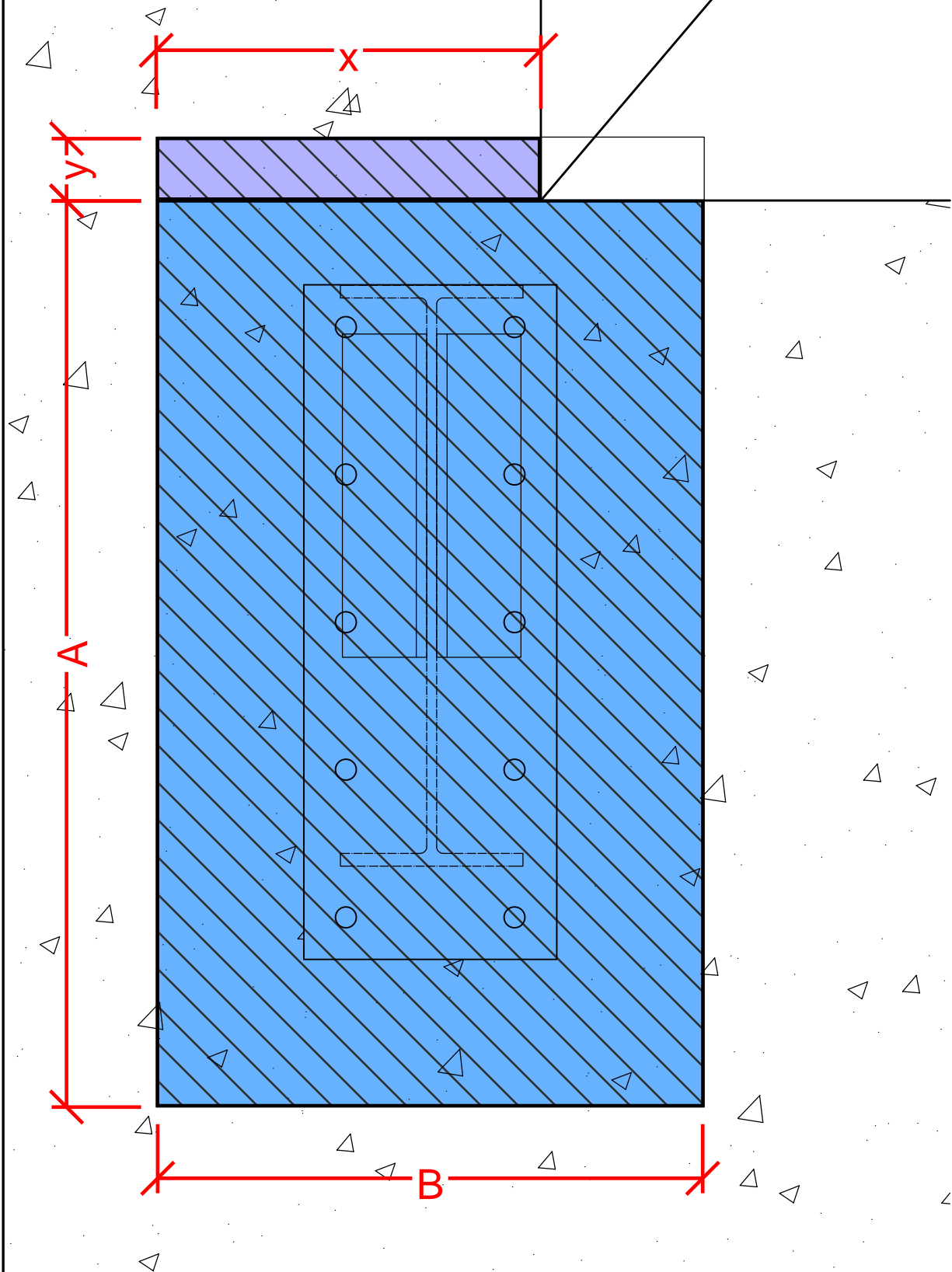
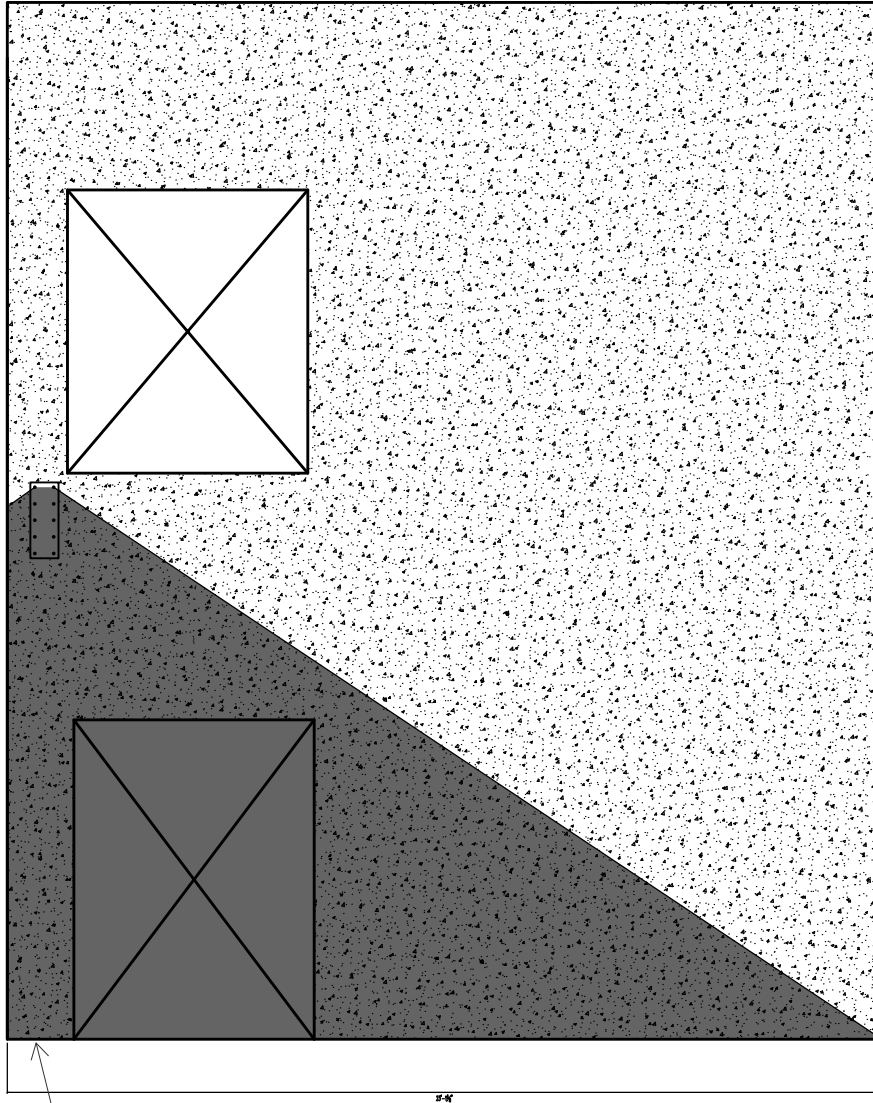


Cannot develop full breakout cone due to opening. Breakout cone is hatched area shown below. See next page for effective cone area.



Total Effective Shear Cone Area
 $= x*y + A*B$





Projected concrete failure area (shaded in grey) without door blockout taken into account.

$$A_{Vc} = 277.375 \times 7.25 = 2010.96 \text{ in}^2$$

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

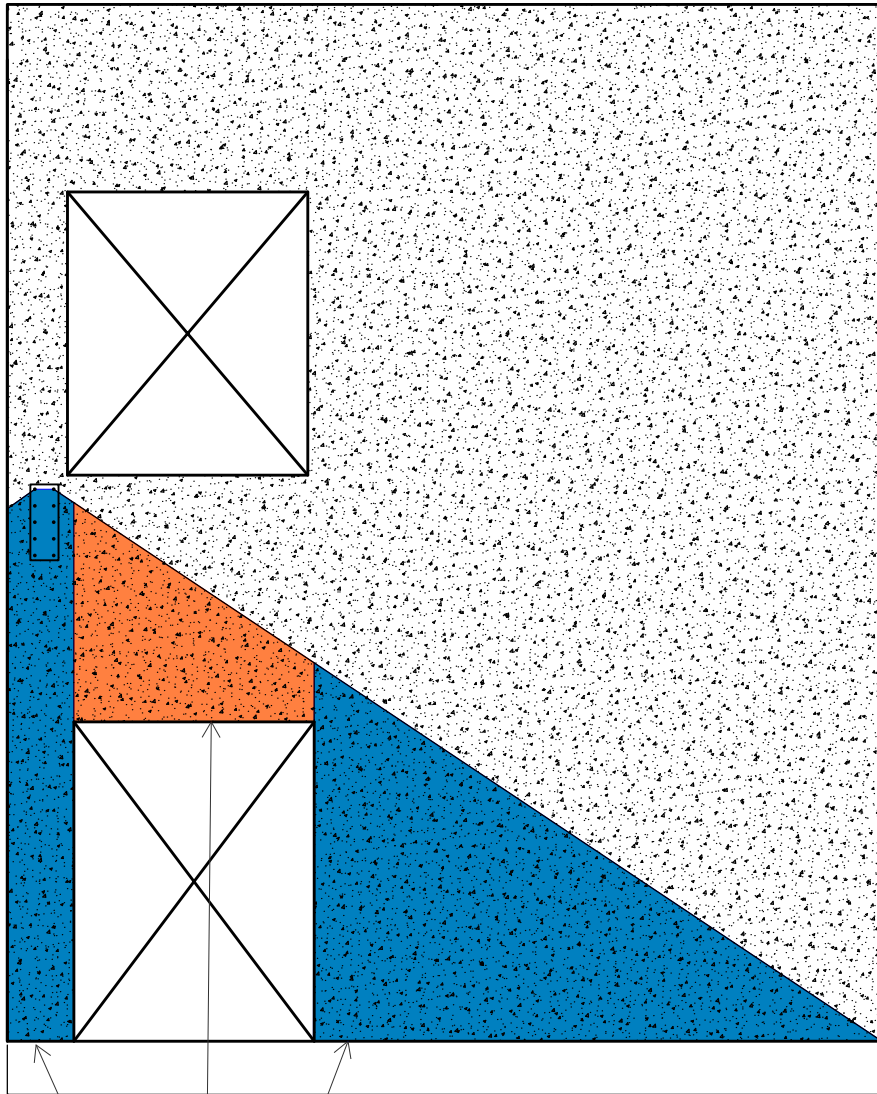
Shear perpendicular to edge in y-direction:

$$V_{by} = \min[7(l_e/d_s)^{0.2}\lambda_a\lambda_s\sqrt{f_c}C_{a1}^{1.5}; 9\lambda_a\sqrt{f_c}C_{a1}^{1.5}] \text{ (Eq. 17.5.2.2a \& Eq. 17.5.2.2b)}$$

l_e (in)	d_s (in)	λ_a	f_c (psi)	C_{a1} (in)	V_{by} (lb)
4.13	0.750	1.00	4000	175.00	1248212

$$\phi V_{cbgy} = \phi (A_{Vc} / A_{Vco}) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{by} \text{ (Sec. 17.3.1 \& Eq. 17.5.2.1b)}$$

A_{Vc} (in ²)	A_{Vco} (in ²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
2010.93	137812.50	1.000	0.710	1.000	6.017	1248212	0.70	54479



Effective concrete failure area taking door blockout into account.

Breakout strength would be based on weighted average of areas shown above.