Rail Connection to Brick Wall

RailOD := 1.66 in ConnSpacing := 4.2 ft

$P_L := 200\ \text{lbf}$

$w_L := 50\ \frac{\text{lbf}}{\text{ft}}$

$H := \max(P_L, w_L \cdot \text{ConnSpacing}) = 210\ \text{lbf}$

Sum moments around bottom of bracket:

$$T := H \cdot \frac{1.5\ \text{in} + 3.5\ \text{in} + 0.5 \cdot \text{RailOD}}{1.5\ \text{in}} = 816\ \text{lbf}$$

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Table 6 — Carbon steel sleeve anchor allowable loads in clay brick[1,2,3,4]

Nominal Anchor Diameter	Nominal embedment in.	(mm)	Tension lb	(kN)	Shear lb	(kN)
1/4	1	(25)	350	(1.5)	305	(1.4)
5/16	1	(25)	345	(1.5)	530	(2.3)
3/8	1-1/4	(32)	375	(1.7)	850	(3.8)
1/2	1-1/2	(38)	435	(1.9)	1,230	(5.5)

1 Based on using a safety factor of 4.
2 Due to wide strength variations encountered in masonry, these values should be considered as guide values.
3 Installation in the mortar joints is outside the scope of the published data.
4 Minimum anchor spacing shall be two (2) complete bricks in any direction. Minimum edge distance shall be the lesser of two (2) complete bricks or 16 inches in any direction.

3/8 in. anchor:

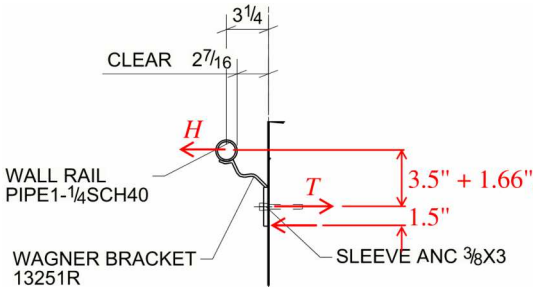
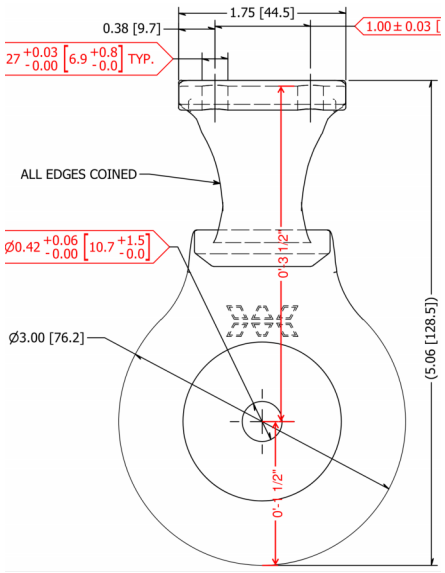
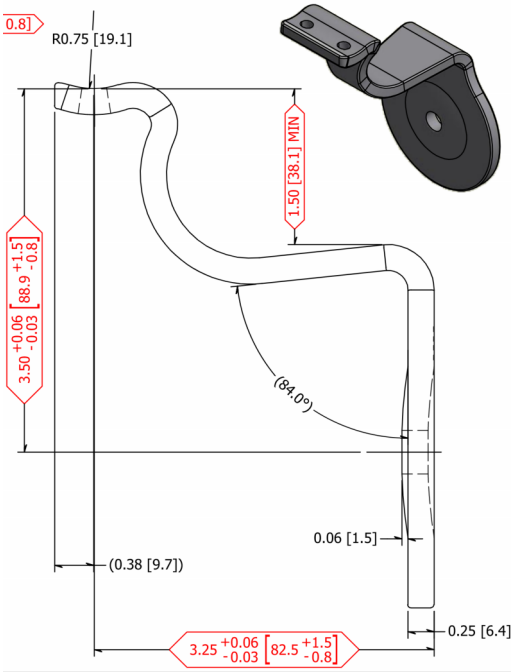
$T_{Allowable} := 375\ \text{lbf}$

$\text{StrengthRatio} := \frac{T}{T_{Allowable}} = 2.18$

Evaluation := **if**(StrengthRatio ≤ 1.0, "OK", "NG") = "NG"

Without the 4.0 factor of safety, the anchor strength would be:

$T_n := 4 \cdot 375\ \text{lbf} = 1500\ \text{lbf}$

The actual factor of safety in this case would be:

$FS := \frac{T_n}{T} = 1.84$