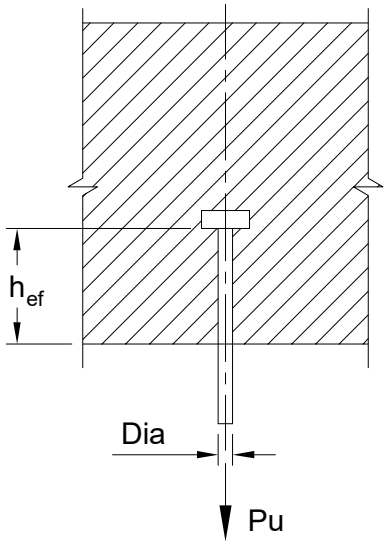
Design a Single Headed Anchor Bolt in Tension Away from Edges as per ACI 318-11 Appendix D



Load

Ultimate Load, P_u= 7000 lb

Material Properties

Concrete Strength, f'_c= 4000 psi

Tensile Strength of Anchor Bolt Grade, f_{uta}= 58000 psi

Strength Reduction Factor (According to Cl.D.4.4.a of ACI318), Φ_1= 0.75

Strength Reduction Factor (According to Cl.D.4.4.c of ACI318), Φ_2= 0.70

Modification Factor for Lightweight Concrete, λ= 1.00

Determine Anchor Diameter

Required Effective Area of Anchor Bolt (According to Eq.D.3 of ACI318),

$A_{se\_Req} = \dfrac{P_u}{\Phi_1 * 1.0 * f_{uta}}$ = 0.161 in^2

Provided Anchor Bolt, Dia= SEL("ACI/Anchor"; Dia;) = 0.625 in

Provided Area of Anchor Bolt, A_{se_Prov}= TAB("ACI/Anchor"; Ase; Dia=Dia) = 0.226 in^2

Check Validity= IF($A_{se\_Prov} \geq A_{se\_Req}$; "Valid"; "Increase Dia") = Valid

Determine Emended Length

Factor (According to Cl.D.5.2.6 of ACI318), $\psi_{c,N}$= 1.00

Effective Embedment Length (According to Cl.D.5.2.1 of ACI318),

$h_{ef\_Req} = \left(\dfrac{P_u}{\Phi_2 * \psi_{c,N} * 24 * \lambda * \sqrt{f'_c}} \right)^{2/3}$ = 3.51 in

Provided Embedment Length, h_{ef_Prov}= 4.00 in

Check Validity= IF($h_{ef\_Prov} \geq h_{ef\_Req}$; "Valid"; "Increase h_{ef}") = Valid

Determine Head Size

Factor (According to Cl.D.5.3.6 of ACI318), $\psi_{c,P}$= 1.00

Required Head Size for Anchor Bolt (According to Eq.D-15 of ACI318),

$$A_{brg} = \frac{P_u}{\Phi_2 * \psi_{c,P} * 8 * f'c} = 0.313 \text{ in}^2$$

Design Summary

Diameter of Anchor Bolt, Dia=	Dia	=	0.625 in
Embedment Length of Anchor Bolt, h_{ef}=	h_{ef_Prov}	=	4.00 in
Head Size of Anchor Bolt, A_{brg}=	A_{brg}	=	0.313 in^2