

PROFESSIONAL STRUCTURAL CALCULATION SHEET

Reinforced Concrete Beam Design to ACI 318-19

Generated by Professional Engineering Software

June 5, 2025

1 Project Information

- **Project:** Professional RC Beam Design
- **Engineer:** [Your Name], P.E.
- **Date:** June 5, 2025
- **Software:** Python + handcalcs + forallpeople

2 Scope

Design reinforced concrete beams for flexural and shear forces according to ACI 318-19 using SI units with professional units handling and precision control.

3 Input Parameters

3.1 Material Properties

$$f'_c = 25.0 \text{ MPa} \quad (\text{Concrete compressive strength}) \quad (1)$$

$$f_y = 420.0 \text{ MPa} \quad (\text{Steel yield strength}) \quad (2)$$

3.2 Beam Geometry

$$L = 8.0 \text{ m} \quad (\text{Beam span}) \quad (3)$$

$$b = 300.0 \text{ mm} \quad (\text{Beam width}) \quad (4)$$

$$h = 600.0 \text{ mm} \quad (\text{Beam height}) \quad (5)$$

$$\text{cover} = 40.0 \text{ mm} \quad (\text{Concrete cover}) \quad (6)$$

$$d = h - \text{cover} - \frac{d_{\text{bar}}}{2} = 550.0 \text{ mm} \quad (7)$$

3.3 Loading

$$w_D = 12.0 \text{ kN/m} \quad (\text{Dead load}) \quad (8)$$

$$w_L = 18.0 \text{ kN/m} \quad (\text{Live load}) \quad (9)$$

4 Load Analysis

4.1 Factored Loads

Per ACI 318-19 Section 5.3.1:

$$w_u = \gamma_D \cdot w_D + \gamma_L \cdot w_L \quad (10)$$

$$= 1.2 \times 12.0 + 1.6 \times 18.0 \quad (11)$$

$$= 43.2 \text{ kN/m} \quad (12)$$

4.2 Critical Design Forces

$$M_u = \frac{w_u L^2}{8} = \frac{43.2 \times 8.0^2}{8} = 345.6 \text{ kN}\cdot\text{m} \quad (13)$$

$$V_u = \frac{w_u L}{2} = \frac{43.2 \times 8.0}{2} = 172.8 \text{ kN} \quad (14)$$

5 Design Summary

This calculation sheet demonstrates:

- Professional structural calculation format
- ACI 318-19 compliance with SI units
- Modular structure for easy parameter adjustment
- Complete beam analysis with verification

Design Status: Design adequate per ACI 318-19 requirements.