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Structural Engineering EQT

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Structural Engineering

Test Questions (Two questions)

Please solve the questions listed below and mathematics notations for numbers and equations in MS Word Document:
Please note that you need to follow Australian standards AS3600,AS2327.1,AS4100 compulsorily. Without this these questions cannot be solved.

Question 1. A pinned-base portal frame is constructed adjacent to a concrete building as shown. From analysis, it is shown that the forces acting on the foundation through the column due to:

Wind load, Wu : -120 kN (Uplift)
Dead load, G : 19 kN (downward)
Live load, Q : 25 kN (downward)

In order to reduce the weight of the concrete footing required for counteracting the uplift force, a column consisting of two rectangular sections, 90mm x 10mm and 6m

long each, is installed between the footing and the concrete ceiling as shown in the Figure. The column is ideally pinned at both ends about both the x-x and y-y axes.

(a) Determine the member capacity, ϕNc, for the column. Grade 300 steel is to be used for the column. Assume that the form factor kf = 1.0 and no deduction for hole area is necessary.

(b) Hence, determine the minimum volume of concrete required for the footing. Specific weight of concrete = 24 kN/m3.
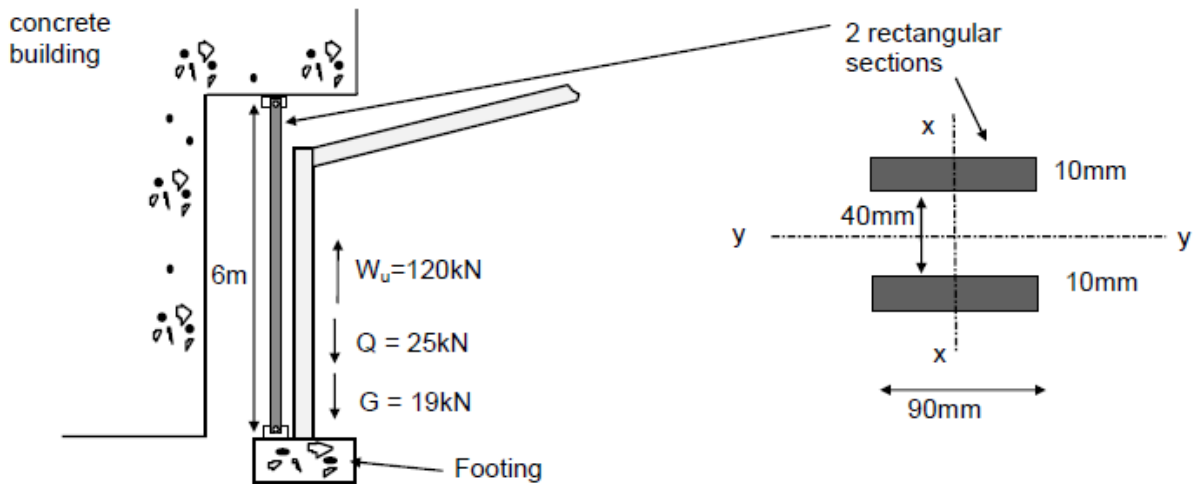
Question 2. A small footbridge with an effective span of $5m$ consists of two UB sections supporting $150mm$ concrete slab with a width of $1.8m$ (see figure below).

Assume a live load of $6.6kN/m2$
Steel Grade 250
Density of concrete (reinforced) $2450kg/m3$

Assume that the bottom flange of the beams is bolted to the supports and that stiffener plates are provided at these points, providing full restraint against torsion. Choose a suitable size of UB, checking for moment capacity, shear capacity and deflection (only). Include the self-weight of the beam in your final check.

1 800

All dimensions in mm.

5 000

150
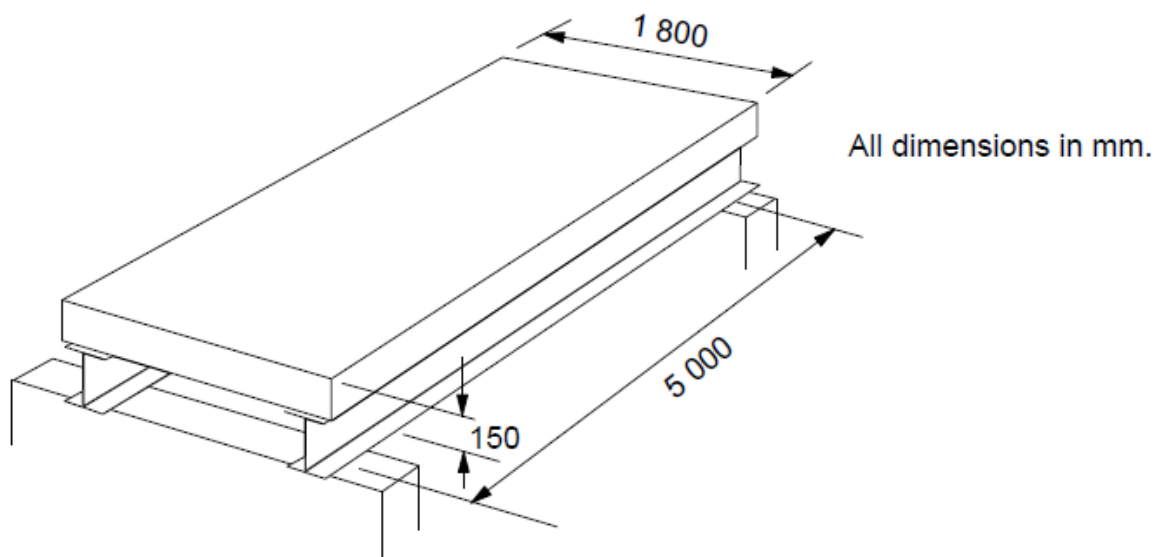
	List of References
	A list of end-text references formatted according to the international standard requirements using the APA format. Marks will be deducted if in-text or end-text references are not formatted correctly.

Academic Misconduct (Including Plagiarism)

All Universities regard academic misconduct of any form as unacceptable. Academic misconduct, which includes but is not limited to, plagiarism; inadequate and in correct referencing; will be dealt as clear case of Misconduct (including Plagiarism) Policy.