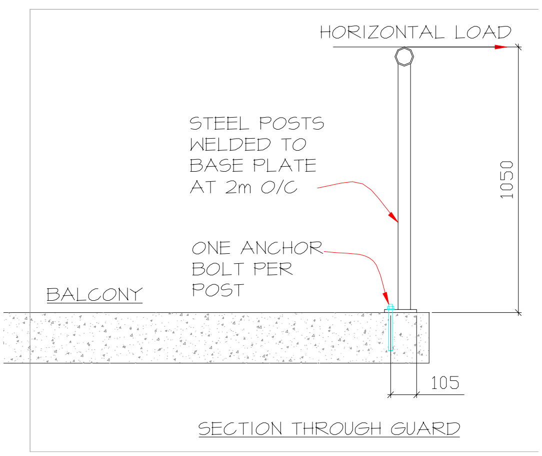
BCCP – Sample Questions from 2003 Exam

Section B

MB11. In accordance with BCBC 1998 Part 4 Limit States Design, the load combination for seismic design of storage facilities shall include:

A. $0.85D + \gamma(1.5E)$.
B. $0.85D + \gamma(1.0E)$.
C. $1.0D + \gamma(1.0L + 1.0E)$.
D. $1.25D + 0.70 \times \gamma(1.5L + 1.5E)$.

MB16. Diagram MB-16



For a guard on a balcony of a motel, what is the approximate factored tension load which the anchor bolt indicated in Diagram B7 must resist?

A. 10.0 kN (2250 lb).
B. 15.0 kN (3370 lb).
C. 22.5 kN (5060 lb).
D. 45.0 kN (10,120 lb).

Section C

MC8. A long cantilevered slab must be designed for which of the following?

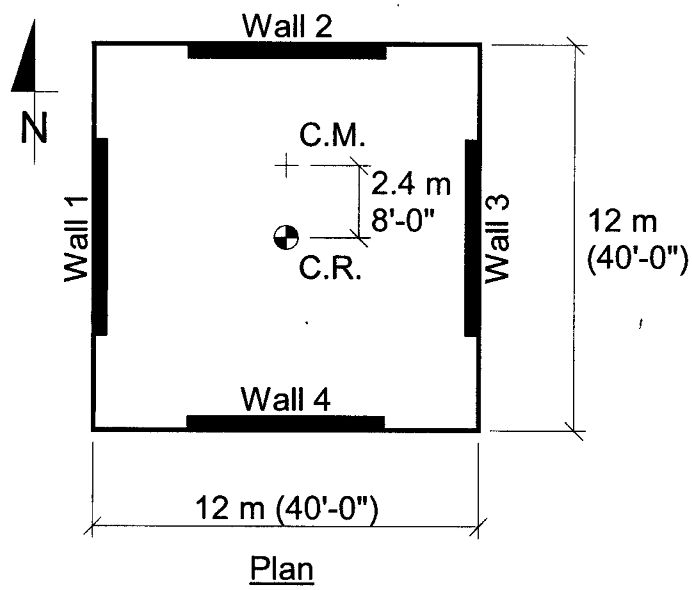
i). Gravity loads.
ii). Wind uplift.
iii). Seismic vertical forces.

A. All of the above.
B. i) only.
C. i) and ii) only.
D. i) and iii) only.

MC10. Shear walls placed in the East-West direction may attract in-plane shears resulting from North-South seismic loads.

A. True.
B. False.

MC38. Diagram MC-38



The plan of a single-storey building is shown in Diagram MC-38. The building is square (12 m or 40’-0” to a side) and each of the four exterior faces has an identical shear wall, such that the Centre of Rigidity (C.R.) is located at the geometric centre of the building. Assume, however, that the building’s distribution of mass causes its Centre of Mass (C.M.) to be located 2.4 m (8’-0”) to the north of the geometric centre. Assume also that the roof diaphragm can be characterized as rigid. If the Code-prescribed lateral seismic force is V = 100 kN (22.5 kips), what is the governing design shear force in Wall 4?

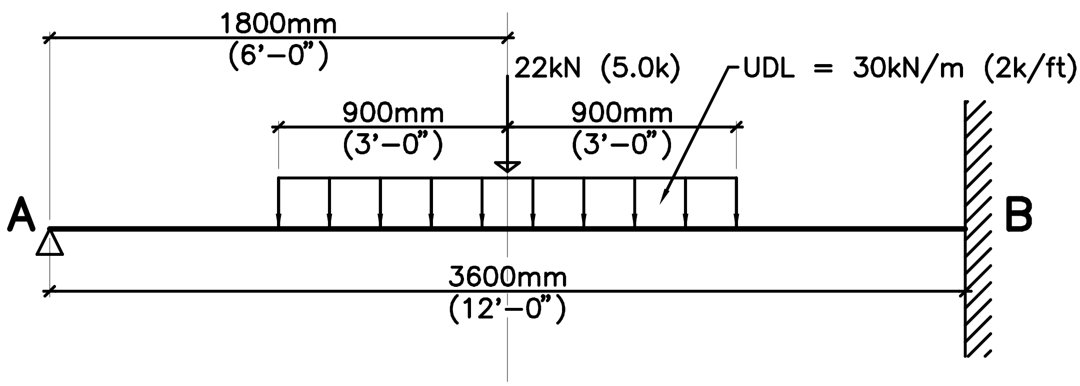
A. 30 kN (6.75 kips).
B. 40 kN (9.0 kips).
C. 50 kN (11.25 kips).
D. 60 kN (13.5 kips).

MC45. An existing 30m (100ft) high office building is braced using steel braced frames having nominal ductility. A 15m (50ft) high hospital will be erected next to the existing building. The hospital will be braced with ductile moment resisting steel frames. The actual stiffnesses and deflections of the two buildings are not known. Assume the existing building does not exceed code deflection limits. Both buildings are on the same legal property. What is the minimum required separation between the two buildings to ensure code compliance?

A. 300mm (12in).
B. 450mm (18in).
C. 750mm (30in).
D. 1200mm (48in).

Section D

MD6. Diagram D-1



In Diagram D-1, what is the load in the support at A?

A. 24.5KN (5.5 Kips).
B. 33.5KN (7.5 Kips).
C. 38KN (8.5 Kips).
D. 42KN (9.5 Kips).

Section E

ME2. A concrete wall is supporting a beam with heavy concentrated reaction. The width of the beam is 300 mm (12'') and the thickness of the supporting concrete wall is 200 mm (8''). Without detailed analysis, what is the maximum horizontal length of the wall for its design to be considered as effective in supporting the beam reaction?

A. 300 mm (12'').
B. 700 mm (28'').
C. 1100 mm (44'').
D. 1500 mm (60'').

ME20. A 10-storey building has a ductile coupled shear wall system in the centre, and a concrete frame around the perimeter.
The central coupled wall system is designed to carry 100% of seismic base shear at R = 4.0. The perimeter moment frame is considered to be 'Not Part of the Lateral Force Resisting System'. This moment frame should then be designed for:

A. Gravity loads only.
B. Gravity loads plus 25% of factored seismic base shear.
C. Gravity load + axial and shear effects generated by the structure undergoing a displacement of 1 times that calculated for factored seismic load.
D. Gravity load + axial and shear effects generated by the structure undergoing a displacement of 4 times that calculated for factored seismic load.

ME23. A nominally ductile shear wall (R = 2.0) is supported on a raft footing with soil anchors providing overturning resistance. The wall is subject to a factored seismic moment at the base of 50,000 kN.m (36,880 ft.k.). The wall has a nominal moment capacity of 120,000 kN.m (88512 ft.k.) and a probable moment capacity of 135,000 kN.m (99,576 ft.k) at the base.

What is the minimum moment that can be used to design the footing?

A. 50,000 kN.m (36,880 ft.k).
B. 100,000 kN.m (73,760 ft.k).
C. 120,000 kN.m (88,512 ft.k).
D. 135,000 kN.m (99,576 ft.k).

Section F

Diagram F-3

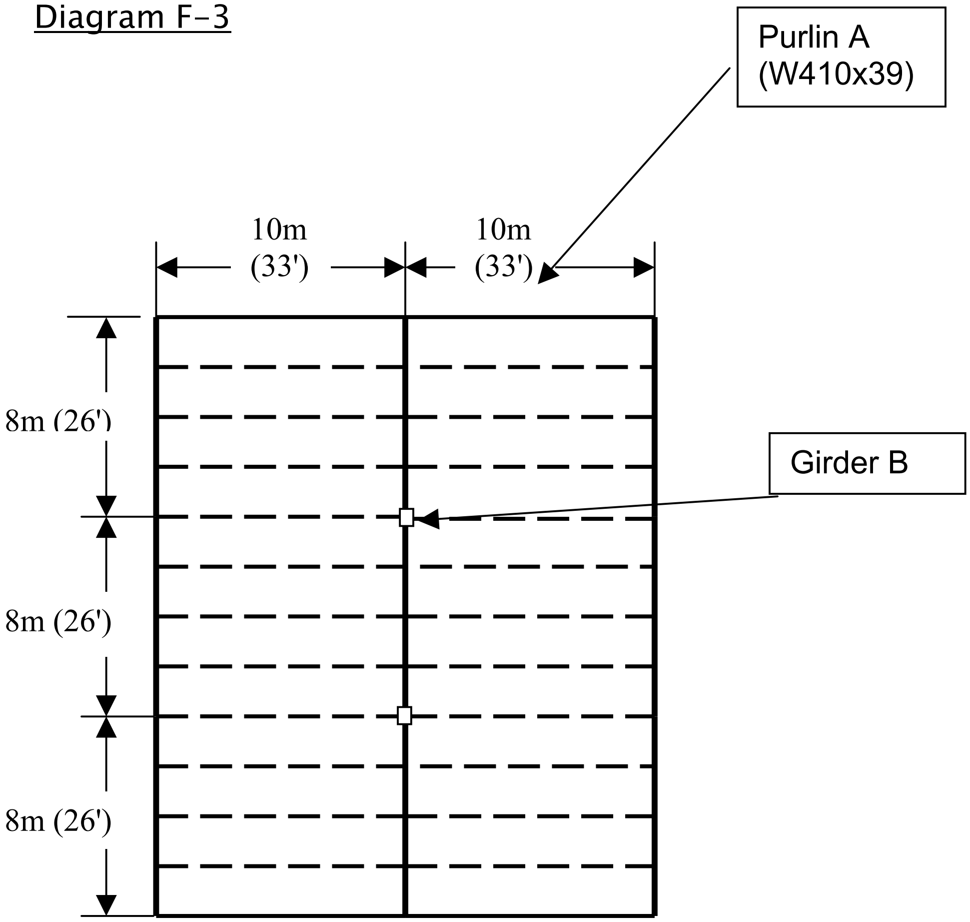


Diagram F-3 is a roof of a single story building. Loading design information is as follows:

i) Ss= 1.8 (Ca=1.0 no drifting)

ii) Sr = 0.3

iii) Roofing + Deck = 0.5 kPa (10psf) now, increasing to 1.0 kPa (20psf) after 20 years.

iv) Purlin loading = 0.4 kN/m / 2m = 0.2 kPa (4psf)

v) Service load wind uplift = 1.0 kPa (20 psf) (Sum of interior and exterior pressure)

Scuppers are located around the roof and ponding is not an issue. Purlin A is a simply supported W410x39 with the top flange laterally supported by the steel deck. continued on next page…

MF20. In Diagram F-3 the factored design moment of typical 'Purlin A' under the effects of factored dead load including self weight and snow load would be:

A. 80 kNm (59k-ft).
B. 100 kNm (74k-ft).
C. 120 kNm (88.5k-ft).
D. 140 kNm (103k-ft).

MF21. Referring to Diagram F-3, determine the factored bending moment resistance of 'Purlin A' to wind uplift.

A. Mr = 338 kNm (249k-ft).
B. Mr = 227 kNm (167k-ft).
C. Mr = 27 kNm (20k-ft).
D. Mr = 0 kNm (0k-ft). (Beam has no capacity)

MF23. A W410x39 in 350W would have the following moment resistance:

A. $\phi F_y Z$ only if the top flange is continuously restrained by being attached to decking.
B. $\phi F_y S$ only if the top flange is continuously restrained by being attached to decking.
C. $\phi F_y Z$ for unsupported lengths less than an L_u of approximately 1730mm.
D. $\phi F_y S$ for unsupported lengths less than an L_u of approximately 1730mm.

Section G

MG15. What is the compressive resistance of an interior SPS 3 finger jointed SPF 38x89 (2x4") stud quality stud?

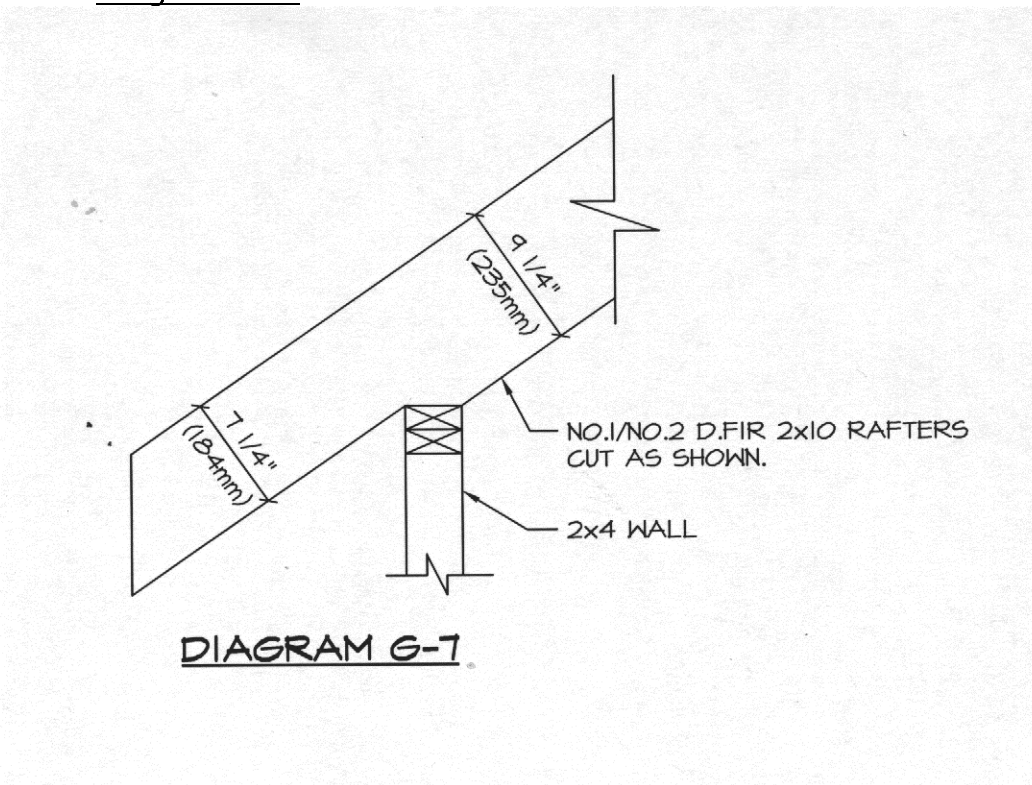
Assume that the stud is sheathed, untreated, and is part of a wall system of more than 3 studs spaced at 300mm (12") apart. Height of the stud is 2.4m (8'-0"). Assume standard term loading.

A. 10.5 kN (2.4 kips).
B. 3.3 kN (3.0 kips).
C. 18.3 kN (4.1 kips).
D. 21.9 kN (4.9 kips).

MG19. What is the compressive resistance of a 341mm x 392mm (13 ½" x 15 ½") D. Fir No. 1 sawn timber column 9.15m (30'-0") high? Ignore accidental moments. Assume standard term loading, wet service condition, and that the column is effectively pinned at the top and bottom.

A. Cr = 579 kN (130 kips).
B. Cr = 686 kN (154 kips).
C. Cr = 636 kN (143 kips).
D. Cr = 1187 kN (266 kips).

MG21. <u>Diagram G-7</u>



Using the roof rafter configuration shown in Diagram G-7 and assuming Case 1 untreated No.1/No.2 Grade D.Fir in dry services conditions, calculate the shear capacity for the overhang.

A. 3.77 kN (850 lbs).
B. 4.15 kN (930 lbs).
C. 5.54 kN (1245 lbs).
D. 6.09 kN (1370 lbs).

Section H

MH18. Compared to results from non-absorbent cylinder tests, block fill grout will have an in-the-wall compressive strength, which is:

A. much lower.
B. slightly lower.
C. about the same.
D. much higher.