	Project details				
mpa The Concrete Centre	**G2.3 Actions for a propped cantilever**	Calculated by	**MM**	Job no.	**G2**
		Checked by	**CIEG**	Sheet no.	**1/3**
		Client	**TCC**	Date	**Nov 2026**

Example

Determine the static equilibrium and uplift, structural resistance, and deformation load combinations for the propped cantilever shown in Figure G2.3.1. The action P at the end of the cantilever arises from the permanent action of a wall.

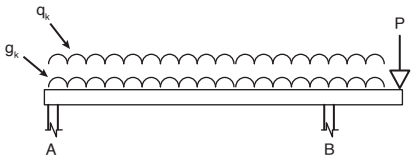


Figure G2.3.1: Propped cantilever beam and loading

General notes:

This calculation is intended to show the use of Eurocode 0 formulae for the combination of actions for ultimate limit states (ULS) i.e. the structural resistance using verification case VC1, and static equilibrium and uplift using verification case VC2 (a) and (b). This example also demonstrates how to combine actions for serviceability limit state (SLS) for deflections.

For the purposes of this example, the permanent action, P is considered to be from a separate source than the self-weight of the structure, so both the favourable/stabilising and unfavourable conditions for the different verification cases need to be considered.

This worked example is based on the versions of the codes of practice, guidance documents and publications as noted in the List of References. The user is responsible for ensuring that they use the latest version of the documents.

Abbreviations

General:	Cl.	Clause
	F.	Formula
	Fig.	Figure
	WE	Worked example
Codes of practice:	EC0-1	BS EN 1990-1:2023+A1:2026 [1]
	NA EC0-1	NA to BS EN 1990-1:2023+A1:2026 [2]
Guidance documents:	G2. How to	G2 - How to: Actions (2026) [3]

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G2.3.1 ULS: Static equilibrium and uplift limit state for maximum uplift at A

For the static equilibrium and uplift limit state, F. (8.12) is used with the less favourable outcome of verification case VC2(a) (see Fig. G2.3.2) and VC2(b) (see Fig. G2.3.3).

EC0-1: Table A.1.3 & NA EC0-1: Table NA.3

(Alternatively, use How to look-up table)

G2. How to: Table G2.8

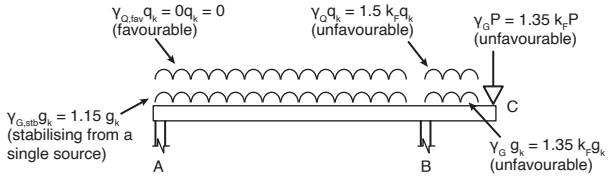


Figure G2.3.2: Maximum uplift at A using VC2(a)

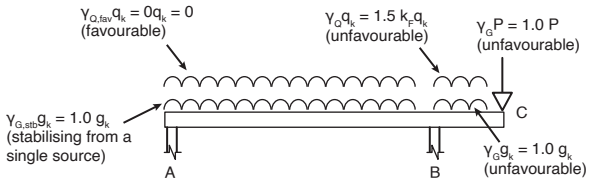


Figure G2.3.3: Maximum uplift at A using VC2(b)

G2.3.2 ULS: Structural resistance

F. (8.12) is used with verification case VC1.

EC0-1: Table A.1.3 & NA EC0-1: Table NA.3

(Alternatively, use How to look-up table)

G2. How to: Table G2.8

a) For maximum moment at B and anchorage of top reinforcement BA

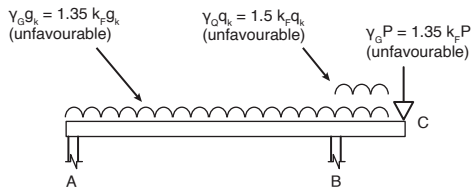


Figure G2.3.4: ULS – maximum moment at B

b) For maximum sagging moment AB

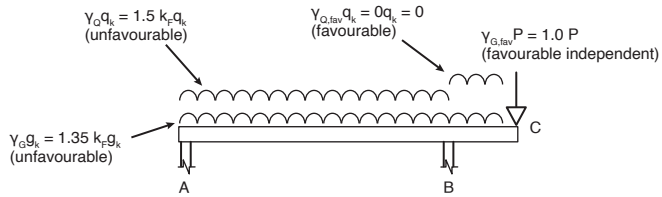


Figure G2.3.5: ULS – maximum span moment AB

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G2.3.3 SLS: deformation

For deflections, quasi-permanent actions are considered, hence F. (8.31) is used. EC0-1: Table A.1.6
(Alternatively, use How to look-up table) G2. How to: Table G2.10

Note:

Engineering judgement should be applied for the particular case study under consideration to determine the appropriate actions and loading arrangements for the serviceability limit states. These, together with deflection limits (instantaneous, short-term and long-term) should be agreed with the Client and the Design Team.

a) For maximum deformation at C

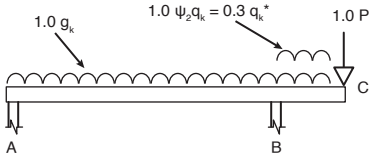


Figure G2.3.6: SLS – maximum deformation at C

b) For maximum deformation AB

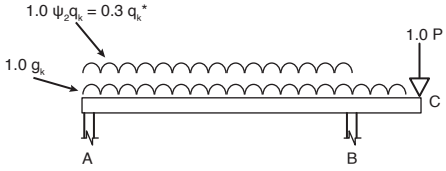


Figure G2.3.7: SLS – maximum deformation AB

List of references

[1] British Standards Institution. (2026) BS EN 1990-1:2023+A1:2026 Eurocode – Basis of structural and geotechnical design. Part 1: New structures. London, BSI.

[2] British Standards Institution. (2026) NA to BS EN 1990-1:2023+A1:2026 UK National Annex to Eurocode – Basis of structural and geotechnical design – Part 1: New structures. London, BSI.

[3] MPA The Concrete Centre. (2026) How to design concrete structures using Eurocode 2 (second generation). G2 – Actions. London, TCC.

* Assuming category B: office area: ψ_2 = 0.3 NA EC0-1: Table NA.2

Revision number	Revision date	Notes
1.0	Nov 2026	First publication

At the time of publication, work on the second generation of Eurocodes and supporting documents is ongoing. Where possible, this worked example has been developed based on the standards that have been published to date, but in some instances, the relevant documents have not yet been finalised and so anticipated values are included and clearly noted as such. Amendments are planned for all of the Eurocodes ahead of the March 2028 date of adoption and users are advised to ensure they are referring to the latest version of a standard or publication.

The Concrete Centre acknowledges and appreciates the support given by many individuals, companies and organisations forming part of the Concrete Industry Eurocode 2 Group (CIEG) in the preparation of this worked example.

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