PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Cover sheet	LoadTakedown (auto)	

STRUCTURAL CALCULATIONS FOR BUILDING CONTROL — DRAFT · P1

DRAFT SAMPLE

CALCULATION COVER SHEET

Example House · structural calculations for Building Control

Project	**Example House** 3 bed detached house, new build (example project)	**Job No.**	LTD-EX-001
Calculation Section / Rev	Full pack, sheets i–xiii and 1–41 / **P1**	**Date**	29 Oct 2026
Building Type	House (two storeys, cavity masonry, timber floors and roof)	**Author**	LoadTakedown (auto)
Calculation Description	Load takedown, overall stability, steelwork, padstones, lintels, masonry (Approved Document A 2C), timber floor and roof members and foundations for a two-storey detached house with a single-storey lean-to rear extension.		
Drawings Referenced	EX-01 Ground Floor Plan, EX-02 First Floor Plan, EX-03 Roof Plan, EX-04 Elevations & Section, all Rev A	**Dated**	Oct 2026
Design Codes	Eurocodes + UK NA, PD 6697 · Approved Document A (2004 incl. 2010 & 2013 amendments)		

61 elements designed

130 checks run

128 pass

2 supplier designs to review

Ready for your review and sign-off

Prepared automatically from the architect's drawings. Every assumption is listed on sheet vii for the checking engineer to confirm.

Revision Notes

Rev	Description	Date
P1	First issue: draft for engineer review.	29 Oct 2026

	Name	Signature	Date
Prepared by	LoadTakedown (auto)	generated	29 Oct 2026
Checked by			

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT **Contents**	**CALC BY** LoadTakedown (auto)	**CHECKED BY**

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Front matter is numbered i–xiii; calculation sheets 1–41. Element references match the marked-up plans in Appendix A.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Briefing notes	LoadTakedown (auto)	

BRIEFING NOTES

Structural calculations are required in justification of the proposed construction of **Example House**, a two-storey detached house of cavity masonry with timber first floor, a 35° trussed rafter main roof, a projecting front bay, and a single-storey rear extension with a 15° lean-to roof.

Calculations are provided for the overall stability, masonry, steelwork and lintels, as well as a load take-down assessment for the design of the foundations. The first floor rear wall is carried over the open-plan kitchen on two steel beams (SB1a, SB1b), one under each leaf, and the 3.5 m rear bifold opening has one extra heavy duty cavity lintel spanning both leaves (L11; no steel shows in the facing brick anywhere).

These calculations should be read in conjunction with the architect's drawings listed on the cover sheet. Element references (SB1a, PS1, L1 …) match the marked-up plans in Appendix A.

These calculations should be submitted to Building Control for review prior to the commencement of work on site. They are a **draft**: they must be reviewed, amended where necessary and signed by a chartered engineer before issue.

Scope

1. Load takedown from roof to foundations for every load-bearing wall.
2. Steel beams SB1a, SB1b, with their bearings; lintels L1–L18; piers PR1–PR15.
3. Approved Document A Section 2C checks for wall thickness, openings, returns and lateral restraint.
4. First floor joists, lean-to rafters; design loads for the trussed rafter supplier.
5. Out-of-plane wind on the rear bifold wall, the corner panels and the gables; generic wind posts.
6. Wind loading and overall stability; strip foundations.

Exclusions

1. Temporary works, propping and sequence of construction (contractor's responsibility).
2. Trussed rafters and their bracing (supplier design to BS EN 1995-1-1 and PD 6693-1; loads given on sheet 15).
3. Drainage, below-ground services and build-over agreements; party wall matters.
4. Non-structural items, fire protection specification beyond the notes given.

CDM 2015

The client, designers and contractor have duties under the Construction (Design and Management) Regulations 2015. On a domestic project the client duties normally pass to the contractor or principal contractor. Risk is normal for this type of project: no unusual residual hazards have been identified in the structural design. The steel beams SB1a/SB1b are a two-person or mechanical lift. Client duties: annex, sheet 39.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Technical references	LoadTakedown (auto)	

TECHNICAL REFERENCES

Design codes

DOCUMENT	USED FOR
BS EN 1990:2002+A1:2005 + UK NA	Basis of design, combinations, ψ factors
BS EN 1991-1-1:2002 + UK NA	Densities, self-weight, imposed loads (Cat. A, H)
BS EN 1991-1-3:2003 + UK NA	Snow, incl. UK exceptional drift (NA Annex B)
BS EN 1991-1-4:2005+A1:2010 + UK NA	Wind actions; PD 6688-1-4
BS EN 1993-1-1:2005 + UK NA	Steel beams; BS EN 1993-1-5 web bearing
BS EN 1995-1-1:2004+A2:2014 + UK NA	Timber joists and rafters; PD 6693-1:2019
BS EN 1996-1-1:2005+A1:2012 + UK NA	Masonry: bearing, piers, shear walls; PD 6697:2019
BS EN 1997-1:2004+A1:2013 + UK NA	Foundations; BS 8004:2015
BS 5977-1:1981	Lintels: method for assessment of load
Approved Document A (2004 incl. 2010 & 2013 amendments)	Sections 2C (masonry), 2E (strip foundations), 5 (A3)
NHBC Standards Chapters 4.2, 6.1	Foundation depth near trees; movement joints

First-generation Eurocodes with UK National Annexes are used throughout; withdrawn British Standards are not mixed in. Scope: England.

Software and inputs

Calculation engine	LoadTakedown engine 2.19.0 (wall engine 1.11.0)
Input drawings	EX-01 to EX-04 Rev A, scale 1:50 detected and confirmed
Site	Suburban Bristol (assumed)
Input hash	`d7b80285746c20c41c6087dc8fdc84c2…`

Design basis

			REFERENCES
Consequence class		**Class 1**	ADA Table 11; BS EN 1991-1-7 A.1
Design working life		**50 years**	BS EN 1990 Table NA.2.1
ULS combination	$1.35\,G_k + 1.5\,Q_{k,1} + 1.5\,\psi_0\,Q_{k,i}$	**eq. 6.10**	BS EN 1990 eq. 6.10; UK NA Table NA.A1.2(B)
Combination factors ψ_0	floors 0.7, roof 0.7, snow 0.5, wind 0.5		UK NA Table NA.A1.1
Steel	S355, $\gamma_{M0} = 1.0$, $\gamma_{M1} = 1.0$		UK NA to BS EN 1993-1-1
Timber	C24, service class 1, $\gamma_M = 1.3$		BS EN 338; UK NA Table NA.3
Masonry	Category I, class 2 execution, $\gamma_M = 2.7$		UK NA to BS EN 1996-1-1 Table NA.1
Deflection, steel	imposed ≤ $L/360$; total ≤ $L/500$ (practice, masonry)		UK NA NA.2.23 (imposed); practice (total)
Deflection, timber	$w_{net,fin} \le L/250$; vibration $f_1 > 8$ Hz		UK NA to BS EN 1995-1-1 NA.2.6
Fire resistance	$R30$ to structural elements		Approved Document B Vol 1, App. B

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Structural notes	LoadTakedown (auto)	

STRUCTURAL NOTES

General

1. All dimensions to be checked on site before fabrication or ordering. Structural sizes are given here; setting out is from the architect's drawings.
2. The contractor is responsible for temporary works, propping and stability during construction, including needling and propping where openings are formed.
3. Any discrepancy between these calculations, the drawings and the site is to be reported to the engineer before work proceeds.

Steelwork

1. Steel grade S355JR to BS EN 10025-2; sections UKB to BS 4-1. Bolts grade 8.8 to BS EN ISO 4014 with nuts and washers.
2. SB1a and SB1b bolted together at each bearing and at 600 c/c with M16 grade 8.8 bolts through tube spacers: they tie the pair for racking at the bearings; they are not relied on to share vertical load.
3. Each beam on a 10 mm steel bearing plate bedded in mortar on its padstone, bottom flange bolted to the plate (2 no. M12) and the plate fixed to the padstone (2 no. M12 resin anchors).
4. Beams wedged and packed to full bearing with steel shims and dry-pack mortar; pockets made good in C25/30 concrete, full depth, with masonry built tight to both sides of the web for fork restraint.
5. SB1a (under rearFirst's brick outer leaf) hot-dip galvanised to BS EN ISO 1461; SB1b primed. Both inside the house and fire protected to R30 (2 layers 12.5 mm fire-rated board on noggings, or an intumescent coating tested for R30). No steel shows in the facing brick.
6. Steel below ground (wind post bases) encased in concrete, 75 mm minimum cover.

Timber

1. Structural timber C24 to BS EN 338, stress graded to BS EN 14081, kiln dried; preservative treated where in contact with masonry.
2. Joists bear 90 mm minimum on the inner leaf or spine, or are carried on joist hangers to BS EN 845-1; joists are not built into the cavity.
3. Strutting: one row at mid-span for spans 2.5 to 4.5 m. Lean-to rafters skew-nailed to the wall plate and strapped (30 x 5) at 1.2 m.

Masonry

1. Outer leaf 102.5 mm clay facing brick, 20 N/mm² (F2,S2). Inner leaves 100 mm medium-density aggregate concrete block, 3.6 N/mm²; internal walls 100 mm dense block, 3.6 N/mm².
2. 7.3 N/mm² block only where a calculation needs it: both leaves of the rear return walls retL/retR, the padstone bearings, the spine wall, and all blockwork below DPC.
3. Mortar M4 (designation iii) above DPC; below DPC 7.3 N/mm² block and M6 (class ii) mortar, outer leaf in engineering brick class B.
4. Cavity 100 mm, fully filled below DPC to 225 mm below the DPC with lean concrete. Stainless steel wall ties to BS EN 845-1 (Type 4) at 900 x 450 mm, and at 300 mm vertical within 225 mm of openings and movement joints.
5. Lateral restraint straps 30 x 5 mm galvanised at ≤ 2 m centres at first floor, ceiling ties and rafters (Approved Document A 2C35, 2C36).
6. Steel wind posts (generic, SWL from the supplier's table): stainless, in the cavity, tied to both leaves at ≤ 225 mm, fixed at foundation/DPC and strapped to the roof at the head.
7. Rear return walls: both leaves toothed (bonded) into the side walls' inner leaf.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Structural notes	LoadTakedown (auto)	

STRUCTURAL NOTES (CONTINUED)

Foundations

1. Mass concrete trench fill, C25/30 (or the designated concrete for the site's sulfate class to BS 8500); where reinforced, 75 mm cover against the ground and 50 mm to blinding.
2. Minimum depth 1.0 m below finished ground level on firm clay of medium volume change potential (assumed; NHBC 4.2), deeper where trees are within influence.
3. Heave precautions where trees are near on shrinkable clay: compressible material on the inside faces of the trench fill and a void under the ground floor beams to NHBC 4.2.
4. Inspect at formation: Building Control to inspect every trench before concrete; inform the engineer of soft spots, roots, made ground or water.

Ground floor

1. Ground floor: suspended precast beam and block by the manufacturer, designed by them for the spans and loads given (sheet 1); 100 mm minimum bearing on the inner leaf and spine with a DPC under the beams; ventilated void below.

Proprietary and supplier items

1. Lintels are generic types (cavity lintel standard / heavy / extra heavy duty, box lintel) selected against representative safe working loads; the chosen product's own table must give at least the SWL scheduled, 'or equal'. No product is named.
2. Bay lintels and bay corner posts by a specialist supplier, to the loads given on the bay sheet.
3. Trussed rafters by a specialist supplier; design, bracing and fixings to be submitted to Building Control before installation.

One source: these notes are printed from the calculation data (the same text appears in the calculation report).

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Assumptions register	LoadTakedown (auto)	

ASSUMPTIONS AND SITE-VERIFICATION REGISTER

Each assumption below underpins the calculations that follow. The checking engineer should confirm each one, on site or from the drawings, and tick it before the pack is signed. Any change may alter member sizes.

REF	ASSUMPTION	ENGINEER ✓
A1	Codes: BS EN 1990, 1991-1-1/-1-3/-1-4, 1993-1-1, 1995-1-1, 1996-1-1 (first generation) with UK National Annexes; PD 6697:2019; Approved Document A (2004 incl. 2010 & 2013 amendments).	☐
A2	Site (assumed): Suburban Bristol (assumed), altitude 50 m, 10 km to the sea, 2 km inside town; snow zone 2, vb,map 22.5 m/s. Confirm from the UK NA maps for the real address.	☐
A3	ULS: eq 6.10, 1.35 Gk + 1.5 Qk,1 + 1.5 psi0 Qk,i (psi0: floors 0.7, roof imposed 0.7, snow 0.5, wind 0.5). Roof imposed and snow not combined. SLS: characteristic.	☐
A4	Loads from the LoadTakedown engine run of the bundled example project (engine 2.19.0); first-floor imposed load raised from 1.5 to 2.0 kN/m2 for movable stud partitions (EN 1991-1-1 6.3.1.2(8)), applied to everything the floor reaches.	☐
A5	Steel S355 (fy 355/345 N/mm2), gammaM0 = gammaM1 = 1.0. SB1 as a UB pair between the rear return walls (engineer's scheme), downstand boxed in. Beams unrestrained between supports (masonry is not taken as restraint), so the masonry on the top flange is a destabilising load: zg = +h/2, C1 = 1.13, C2 = 0.454. Class 3 sections use W_el for bending and LTB.	☐
A6	SB1 is two UBs side by side over the 4.195 m clear opening between the rear return walls (150 mm bearings, design span 4.345 m), one under each leaf and bearing on that leaf of the returns, with no post. The pair projects about 91 mm below the rear-bay ceiling and is boxed in; the architect is to be told. Fork restraint at each bearing: masonry built tight to both sides of the web over the full depth. Each beam bears on a 10 mm steel bearing plate bedded in mortar on its own leaf of the return (on a padstone where the bearing check needs one; see the padstone schedule); each bottom flange is bolted to its plate (2 no. M12) against twist and creep.	☐
A7	Ceiling loads, one set everywhere and the same as given to the truss supplier: 0.25 kN/m2 dead, plus 0.25 kN/m2 imposed under the main-roof loft (the 0.9 kN point load is local to the trusses). Masonry weights: brick outer leaf 2.20 kN/m2; 100 mm medium-density block 1.37 and dense block 1.96 kN/m2; plaster 0.25 kN/m2 per room face.	☐
A8	Lateral stability: diaphragm distribution by tributary width; in-plane racking checked pier by pier (rocking, toe, compressed-length shear) with piers coupled only where the spandrel is >= 450 mm deep (judgement, stated). The hall wall and the extension side walls are not relied on. Front wind: leftMain/rightMain take the whole diaphragm share. Gable wind: front, spine and the rear return walls (with rearExt); rearFirst's overturning is a vertical couple between the returns. The spine stays as drawn (100 mm dense block, no bond beam). The return-to-side-wall corners are taken as bonded (confirm on site).	☐
A9	Wind: roof external pressure coefficients interpolated to 35 deg (Table 7.4a); the Severn Estuary is taken as sea for the distance to the shore.	☐
A10	Masonry: clay facing brick 20 N/mm2 (Group 1, fb 17); concrete block 3.6 N/mm2 generally (medium-density inner leaves, dense internal walls); 7.3 N/mm2 only where a calculation needs it: both leaves of the rear return walls retL/retR (padstone bearings, piers and racking), the spine, and all blockwork below DPC; M4 mortar above DPC, M6 (class ii) below; gammaM = 2.7 (Category I units, Class 2 execution). Brick flexural strengths (NA.6) assume water absorption 7-12 % (confirm).	☐
A11	Timber C24, service class 1, gammaM 1.3, ksys 1.1; floor imposed medium term (kmod 0.8), snow short term (0.9).	☐
A12	Ground: firm clay of medium volume change potential, presumed allowable bearing 100 kPa, no trees within influence; to be confirmed on site. Trench fill 1.0 m deep minimum (NHBC 4.2: 0.9 m for medium VCP; 1.0 m adopted); heave precautions where trees are near.	☐
A13	Ground floor: suspended beam and block by the manufacturer, spanning front to spine and spine to the extension rear wall; included in the foundation loads.	☐
A14	Lintels and wind posts: generic types with representative SWL tables (unfactored, clearly labelled representative), standing in for the chosen product's table, 'or equal'; no product named. Bay lintels and corner posts by a specialist supplier to the loads given.	☐
A15	Lean-to: rafters on a ledger fixed to the house's outer leaf (load to SB1a) and a wall plate on the rearExt inner leaf.	☐
A16	Trussed rafters and their bracing by the supplier, to the loads stated; the engineer checks bearings and supports.	☐
A17	All dimensions to be checked on site; propping and temporary works by the contractor.	☐
A18	Joist directions and bearings as assumed on the first floor joist sheets (Not shown on drawings)	☐
A19	SB1 bearings on the rear return walls, clear of openings (EX-02, EX-04)	☐
A20	Trussed rafter reactions to be confirmed by the supplier (Supplier design)	☐

Verified by _____

Site visit date _____

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Engineer review items	LoadTakedown (auto)	

ITEMS FOR ENGINEER ATTENTION AND SITE NOTES

Amber items are designs by others that the engineer reviews when issued. Blue items fall outside an Approved Document A rule and are justified by the calculation sheet given. Site notes are conditions to confirm on site.

REF	ITEM	ACTION	SHEET
For the engineer: supplier designs to review			
RF1	Trussed rafters designed by the supplier	Review the supplier design and reactions when issued	15
BAY	Bay lintels and corner posts by specialist supplier, loads given	Review the supplier design against the loads given	13
Outside a deemed-to-satisfy rule, justified by calculation			
R2	Front wall, corner: Return 1738 mm meets the 665 mm minimum, but the opening next to the corner is 2400 mm high, over the 2.1 m of AD A Diagram 14 note 7.	Justified by calculation (ADA 2C3(d)): the corner panel in lateral bending (LW4, util 0.40); the bay opening's lintel and bay posts designed (lintel schedule, bay sheet).	10, 13
R4	Left extension wall, corner: Side door 500 mm from the outside corner to its jamb, under the 665 mm minimum (349 mm on the setting-out line). Inside-face basis: 198 mm, 368 mm.	Justified by calculation (ADA 2C3(d)): steel wind post WP1 in the side door jamb (util 0.39) and the corner panel in lateral bending (LW3, util 0.02).	12, 10
R7–R8	2 corners (front, front): Bay corner pier: 273 mm from the outside corner to the jamb (122 mm on the setting-out line). Bay corner pier: 356 mm from the outside corner to the jamb (205 mm on the setting-out line).	Bay lintels and corner posts by specialist supplier, loads given (bay sheet).	13
R9–R10	2 corners (Rear return wall (left), Rear return wall (right)): Rear return 1902 mm meets 699 mm, but the 4195 mm opening is over 3 m and its head (SB1 soffit, 2449 mm) over 2.1 m: outside Diagram 14.	Justified by calculation (ADA 2C3(d)): SB1, padstones, the returns as piers and as flanged shear walls (stability sheets).	21, 25, 6
rearExt	Rear extension wall (G): single opening over 3 m - covered by the extra heavy duty bifold lintel, the piers and the lateral and stability checks	Justified by calculation (ADA 2C3(d))	27, 10
rearLine	Rear line (G): single opening over 3 m (SB1 between the rear returns) - justified by calculation	Justified by calculation (ADA 2C3(d))	6
Site notes (confirm on site; not design flags)			
L11	Bifold head deflection	Bifold maker to confirm the head deflection their doors need; lintel supplier to confirm deflection	27
SB1	SB1 pair projects 91 mm below the rear-bay ceiling	Boxed in; architect to note on the drawings	20
RET	Rear returns bonded to the side walls (stability relies on them)	Tooth both leaves into the side walls' inner leaf	6
FDN	Founding depth and bearing assumed (firm clay, medium VCP)	Inspect at formation; deepen and add heave precautions where trees are near	36

2 supplier designs for engineer review no open design flags — **FLAG: engineer to confirm**

DRAFT SAMPLE

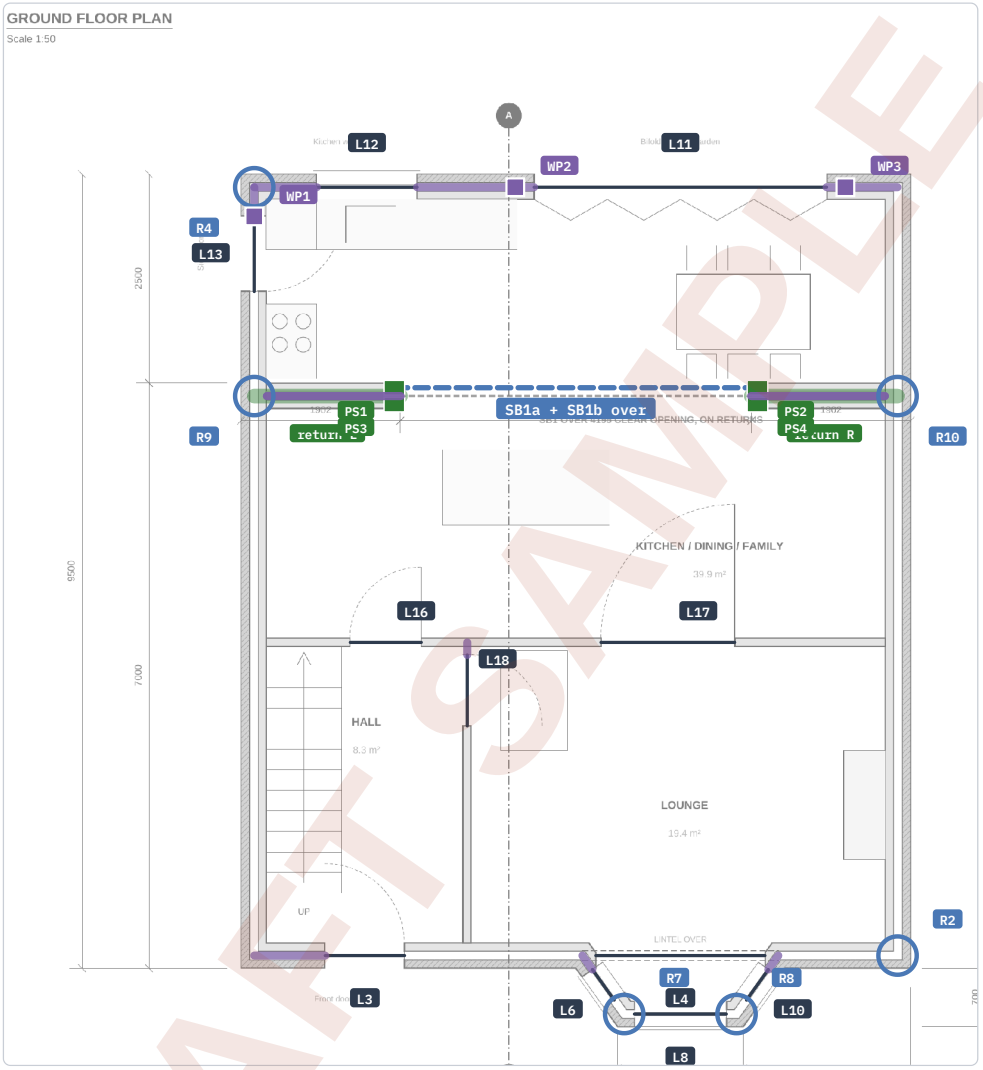
PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Member schedule	LoadTakedown (auto)	

SUMMARY OF MEMBERS AND RESULTS

REF	SIZE / SPECIFICATION	SPAN	BEARING / LOCATION	UTIL.		SHEET
Steel beams						
SB1a	203×133×25 UB S355	4.34 m	PS1, PS2	0.86	PASS	21
SB1b	254×146×31 UB S355	4.34 m	PS3, PS4	0.82	PASS	23
Padstones and bearings						
PS1, PS2, PS3, PS4	440×215×100 precast		under SB1a, SB1b	0.67	PASS	25
Lintels (generic types, or equal) and wind posts						
5 no. CL-S	CL-S: cavity lintel, standard duty		see lintel schedule	0.63	PASS	27
L2, L4, L15	CL-H: cavity lintel, heavy duty		see lintel schedule	0.89	PASS	27
L11	CL-XH: cavity lintel, extra heavy duty		3900 long	0.64	PASS	27
L16, L18	BX-S: box lintel, 100 mm		1200 long, 1200 long	0.52	PASS	27
L17	BX-H: box lintel, 100 mm		1950 long	0.85	PASS	27
WP1	steel wind post, standard duty	2.64 m	left extension wall	0.39	PASS	12
WP2	steel wind post, heavy duty	2.70 m	rear extension wall	0.90	PASS	12
WP3	steel wind post, standard duty	2.70 m	rear extension wall	0.83	PASS	12
BAY	bay lintels L5–L10 and corner posts		specialist supplier, loads given	–	CALC	13
Masonry						
PR1–PR15	piers, 3.6 N/mm² block (7.3 in the returns)		between openings	0.75	PASS	31
LW1–LW7	out-of-plane wind panels (EC6 6.3)		bifold wall, corners, gables	0.87	PASS	10
R2	Return 1738 mm meets the 665 mm minimum, but the opening next to the corner is 2400 mm high, over the 2.1 m of AD A Diagram 14 note 7.		Front wall	–	CALC	10, 13
R4	corner return 500 mm (req. 665)		Left extension wall	–	CALC	12, 10
R7–R8	2 corner returns: Bay corner pier: 273 mm from the outside corner to the jamb (122 mm on the setting-out line). Bay corner pier: 356 mm from the outside corner to the jamb (205 mm on the setting-out line).		bay	–	CALC	13
R9–R10	2 corner returns: Rear return 1902 mm meets 699 mm, but the 4195 mm opening is over 3 m and its head (SB1 soffit, 2449 mm) over 2.1 m: outside Diagram 14.		Rear return wall (left), Rear return wall (right)	–	CALC	21, 25, 6
Timber						
J1	C24 47×145 @ 400	2.81 m	first floor	0.77	PASS	17
J2	C24 47×195 @ 400	3.64 m	first floor	0.68	PASS	18
J3	C24 47×195 @ 400	0.64 m	first floor	0.05	PASS	19
J4	2 no. C24 47×195 bolted	3.64 m	first floor	0.17	PASS	19
RF1	trussed rafters @ 600, by supplier		trussed rafters	0.86	FLAG	15
RF2	C24 47×125 @ 400	2.30 m	lean-to rafters	0.50	PASS	16
Foundations						
FDN	trench fill 450–750 wide × 1000 deep		all load-bearing walls	0.85	PASS	36

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Marked-up plans EX-01	LoadTakedown (auto)	



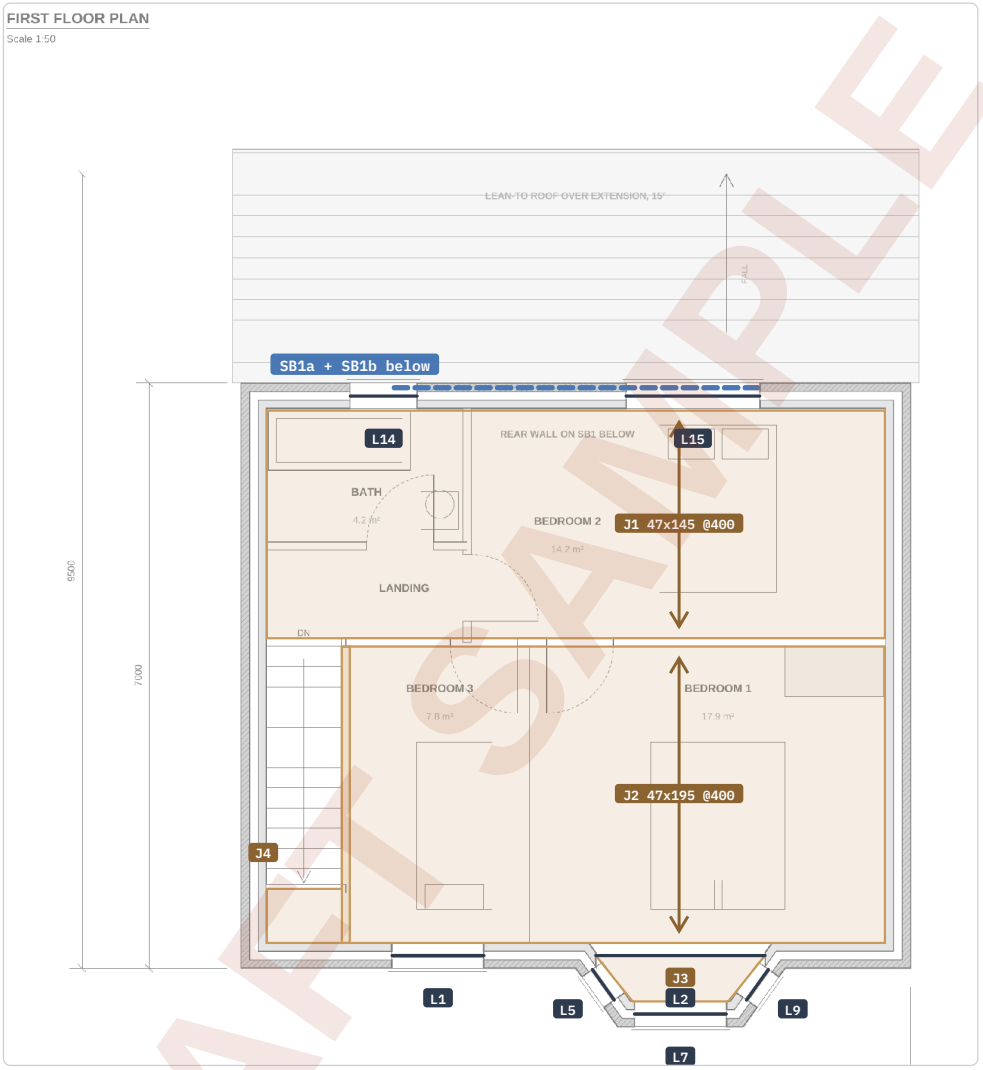
Steel beam (dashed: at first floor over) · Lintel · Padstone · Pier · CALC: outside ADA rule, justified by calculation · Wind post (generic)

Ground floor plan (EX-01) reproduced from the architect's drawing at reduced scale, marked up with element references used in these calculations. Do not scale.

REF	SIZE / SPECIFICATION	LOCATION / NOTE	UTIL.
SB1a	203×133×25 UB S355	at first floor, under first floor rear wall	0.86
SB1b	254×146×31 UB S355	at first floor, under first floor rear wall	0.82
WP1, WP2, WP3	steel wind posts (generic)	left extension wall, rear extension wall, sheet 12	0.90
PS1, PS2, PS3, PS4	440×215×100 padstones	under SB1a, SB1b	0.67
12 piers	masonry piers, ground storey	see pier schedule, sheet 31	0.75
11 lintels	lintels, ground storey	see lintel schedule, sheet 27	0.85
R2	corner return	opening head 2400 mm at corner · CALC, sheet 10, 13	CALC
R4	corner return	return 500 mm < 665 mm · CALC, sheet 12, 10	CALC
R7–R8	2 corner returns	return 273 to 274 mm < 665 mm · CALC, sheet 13	CALC
R9–R10	2 corner returns	opening head 2449 mm at corner · CALC, sheet 21, 25, 6	CALC

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Marked-up plans EX-02	LoadTakedown (auto)	



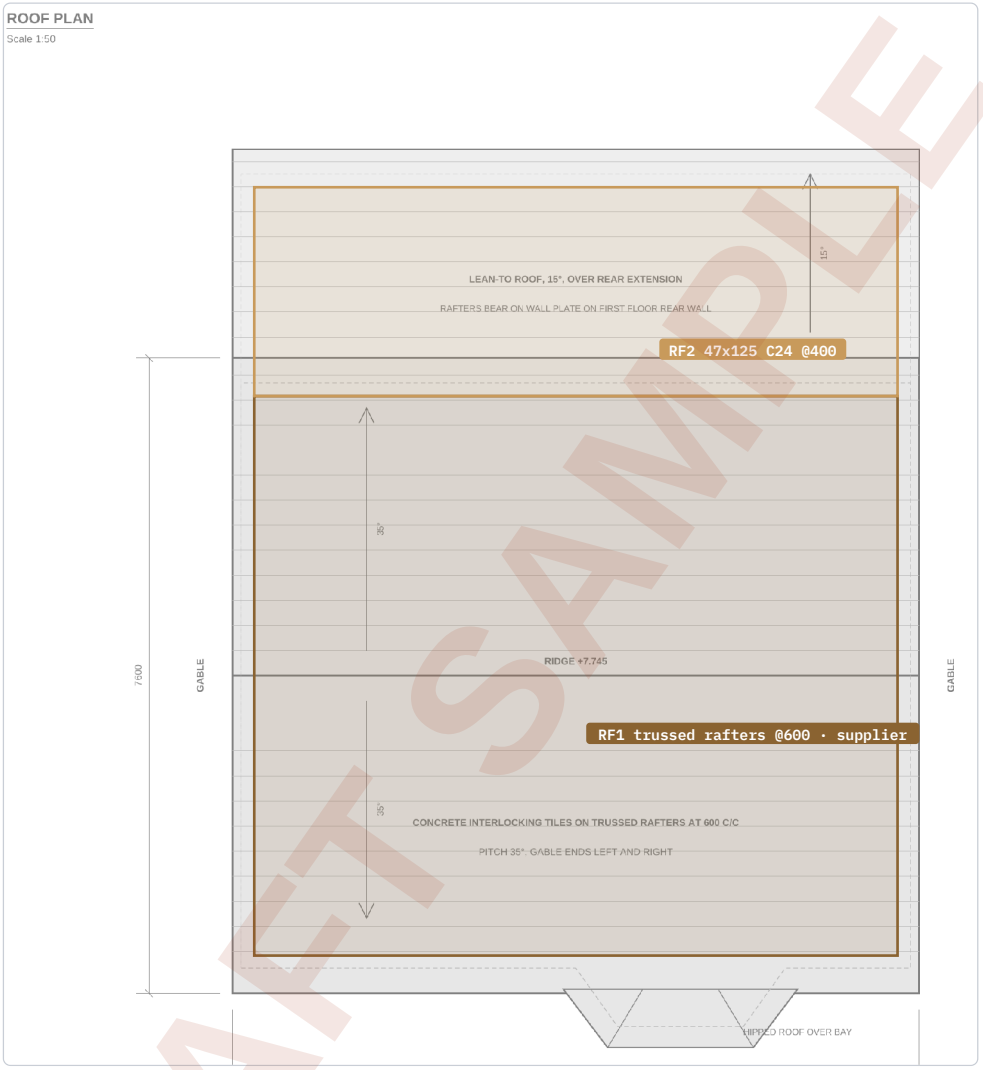
Joist zone and span direction · Steel beam below · Lintel

First floor plan (EX-02) reproduced from the architect's drawing at reduced scale, marked up with element references used in these calculations. Do not scale.

REF	SIZE / SPECIFICATION	LOCATION / NOTE	UTIL.
J1	C24 47×145 @ 400 c/c	span 2.81 m	0.77
J2	C24 47×195 @ 400 c/c	span 3.64 m	0.68
J3	C24 47×195 @ 400 c/c	span 0.64 m	0.05
J4	2 no. C24 47×195 bolted	span 3.64 m	0.17
7 lintels	lintels, first storey	see lintel schedule, sheet 27	0.89

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Marked-up plans EX-03	LoadTakedown (auto)	



Trussed rafters (supplier design) Cut rafters

Roof plan (EX-03) reproduced from the architect's drawing at reduced scale, marked up with element references used in these calculations. Do not scale.

REF	SIZE / SPECIFICATION	LOCATION / NOTE	UTIL.
RF1	trussed rafters @ 600 c/c	supplier design	0.86
RF2	C24 47×125 @ 400 c/c	span 2.30 m	0.50

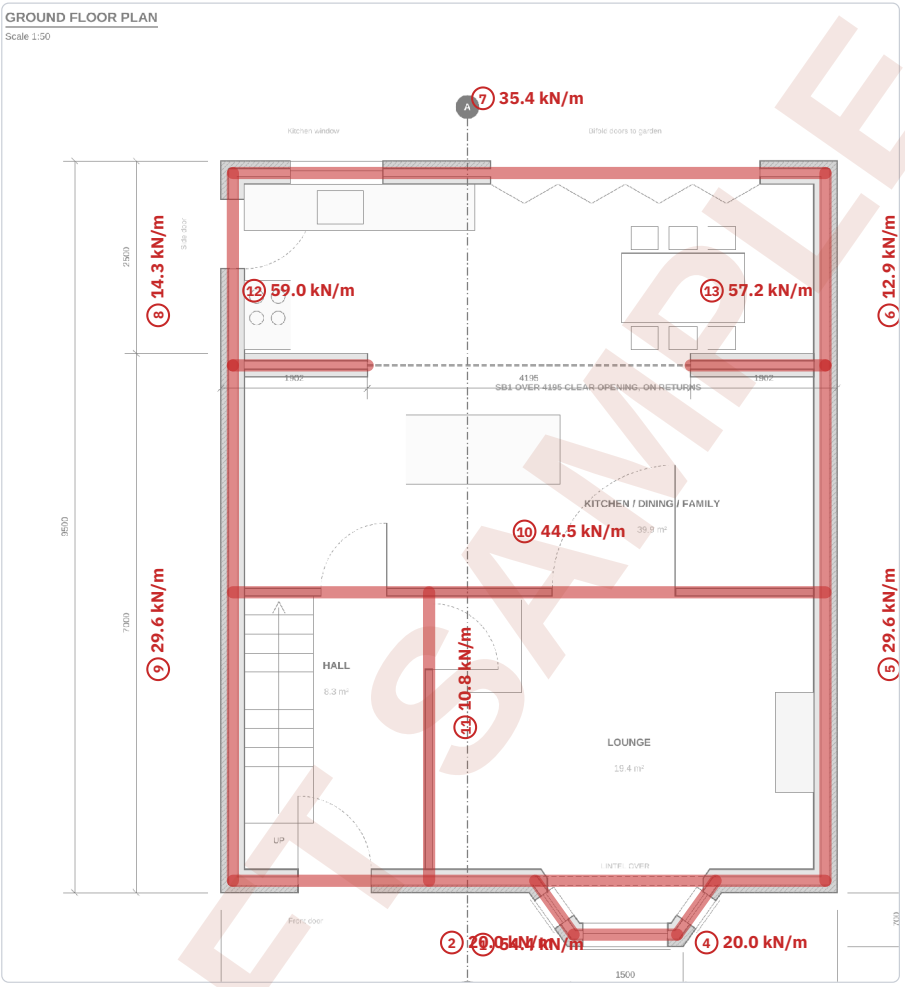
DRAFT SAMPLE

LoadTakedown

Structural calculations · draft for engineer review

SHEET NO. / REV
xiii P1

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Marked-up plans EX-01	LoadTakedown (auto)	



Foundation reference and SLS line load (kN/m)

Foundation loads (SLS) reproduced from the architect's drawing at reduced scale, marked up with element references used in these calculations. Do not scale.

REF	SIZE / SPECIFICATION	LOCATION / NOTE	SLS KN/M
1	Front wall	750 wide × 1000 deep	54.4
2	Bay side (left)	600 wide × 1000 deep	20.0
3	Bay front	600 wide × 1000 deep	15.0
4	Bay side (right)	600 wide × 1000 deep	20.0
5	Right gable wall	600 wide × 1000 deep	29.6
6	Right extension wall	600 wide × 1000 deep	12.9
7	Rear extension wall	600 wide × 1000 deep	35.4
8	Left extension wall	600 wide × 1000 deep	14.3
9	Left gable wall	600 wide × 1000 deep	29.6
10	Spine wall	600 wide × 1000 deep	44.5
11	Hall wall	450 wide × 1000 deep	10.8
12	Rear return wall (left)	750 wide × 1000 deep	59.0
13	Rear return wall (right)	750 wide × 1000 deep	57.2

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Loading schedule	LoadTakedown (auto)	

LOADING SCHEDULE

Characteristic (working) loads, all **on plan** for roofs and floors (slope loads divided by cos α). These totals are the values the calculations use. Partial factors are applied on each element sheet (BS EN 1990 eq. 6.10). Snow drift is on the snow sheet (sheet 3) only.

REFERENCES

BS EN 1991-1-1 Table A; UK NA Table NA.2

	ITEM	WORKING KN/M²
Main roof, 35 deg, concrete interlocking tiles on trussed rafters (all on plan)		
Dead	Tiles, battens, felt 0.55 on slope / cos 35	0.671
	Trusses / structure 0.20 on slope / cos 35	0.244
	Ceiling and services (on plan)	0.250
	Total dead, g_k	**1.165**
Imposed	Greater of roof imposed 0.50 (cat H, 0.6(60-35)/30) / snow 0.27	0.500
	Loft ceiling imposed (+ 0.9 kN point to the truss design)	0.250
	Total imposed, q_k	**0.750**
Lean-to roof, 15 deg (all on plan)		
Dead	Tiles, battens, felt 0.55 on slope / cos 15	0.569
	Rafters 0.20 on slope / cos 15	0.207
	Ceiling lining on the rafters (on plan, no loft)	0.250
	Total dead, g_k	**1.026**
Imposed	Greater of roof imposed 0.60 (cat H) / snow 0.32 (drift: snow sheet)	0.600
	Total imposed, q_k	**0.600**
First floor, timber joists		
Dead	Boards	0.150
	Ceiling and services	0.150
	Joists	0.200
	Total dead, g_k	**0.500**
Imposed	Domestic cat A1	1.500
	Movable partitions, EN 1991-1-1 6.3.1.2(8)	0.500
	Total imposed, q_k	**2.000**
Ground floor, suspended beam and block (by manufacturer)		
Dead	Beam and block, 150 mm (by manufacturer)	1.700
	Insulation	0.050
	65 mm sand/cement screed	1.430
	Total dead, g_k	**3.180**
Imposed	Domestic cat A1	1.500
	Movable partitions	0.500
	Total imposed, q_k	**2.000**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Loading schedule	LoadTakedown (auto)	

LOADING SCHEDULE (CONTINUED)

REFERENCES

BS EN 1991-1-1 Annex A; manufacturers' data

	ITEM	WORKING KN/M²
Cavity wall 102.5 brick / 100 cavity / 100 block		
Dead	102.5 facing brick	2.200
	100 medium-density block, 13.7 kN/m3	1.370
	Plaster, room face	0.250
	Total dead, g_k	**3.820**
Rear return walls retL/retR: 100 block / 102.5 cavity / 100 block (inside the house)		
Dead	2 x 100 medium-density block, 13.7 kN/m3	2.750
	Plaster, both room faces	0.500
	Total dead, g_k	**3.250**
Outer leaf		
Dead	102.5 facing brick	2.200
	Total dead, g_k	**2.200**
Inner leaf		
Dead	100 medium-density block	1.370
	Plaster, room face	0.250
	Total dead, g_k	**1.620**
Internal loadbearing wall		
Dead	100 dense block, 19.6 kN/m3	1.960
	Plaster, both faces	0.500
	Total dead, g_k	**2.460**

Imposed loads

BS EN 1991-1-1 UK NA

Domestic floors, Category A	q_k	**1.50** kN/m²	UK NA Table NA.2
Movable partitions	q_k	**0.50** kN/m²	BS EN 1991-1-1 6.3.1.2(8)
Roof, no access (Cat. H), α ≤ 30°	q_k	**0.60** kN/m²	UK NA Table NA.7
Ceiling / loft	q_k	**0.25** kN/m²	PD 6693-1 practice

Roof imposed load and snow are not combined; the greater is used (BS EN 1991-1-1 3.3.2(1)).

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Snow loading	LoadTakedown (auto)	

SNOW LOADS

REFERENCES

Ground snow

BS EN 1991-1-3; UK NA

Snow zone, site altitude	$Z = 2$, $A = 50$ m		UK NA Figure NA.1
Ground snow, UK NA formula	$s_k = 0.15 + (0.1 \times 2 + 0.05) + (50 - 100)/525$	**0.305** kN/m²	UK NA NA.2.8 eq. NA.1
Characteristic ground snow adopted	$s_k = 0.40$ (conservative, above the formula)	**0.40** kN/m²	

Zone 2, read from UK NA Figure NA.1 for the assumed site (Bristol); recheck for the real address.

Exposure, thermal coefficients	$C_e = 1.0$, $C_t = 1.0$		BS EN 1991-1-3 5.2(7),(8)

Roof snow, undrifted

BS EN 1991-1-3 5.3, Table 5.2

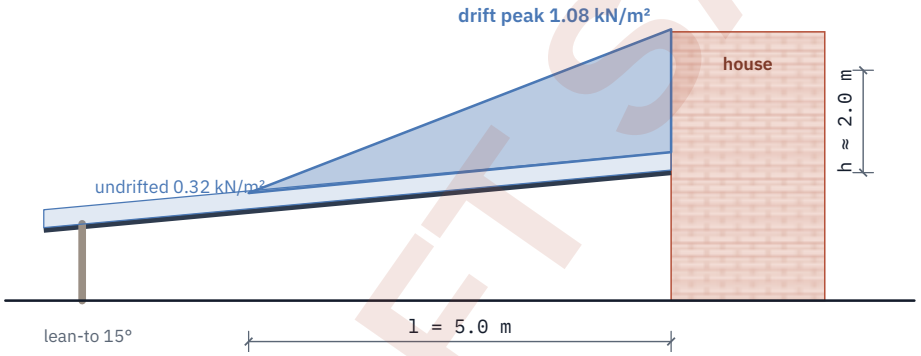
Main roof, α = 35°	$\mu_1 = 0.8\,(60 - 35)/30 = 0.667$	**0.267** kN/m²	Table 5.2; eq. 5.1
Lean-to roof, α = 15°	$\mu_1 = 0.8$: $s = 0.8 \times 0.40$	**0.32** kN/m²	eq. 5.1

Roof imposed load (Cat. H) 0.60 kN/m² on the lean-to and 0.50 kN/m² on the main roof exceed undrifted snow; they are not combined (BS EN 1991-1-1 3.3.2).

Drift at the abutment, persistent

BS EN 1991-1-3 5.3.6, Fig. 5.7

The lean-to abuts the two-storey house wall, so snow drifts against it and slides off the main roof onto it.



Lean-to against the house wall: undrifted layer and the drift wedge against the abutment.

Height of abutment above lean-to	h	**2.03** m	
Wind drift coefficient	$\mu_w = (b_1 + b_2)/2h \le \gamma\, h / s_k$ $(0.8 \le \mu_w \le 4)$	**2.265**	eq. 5.8
Sliding from main roof	μ_s	**0.446**	5.3.6(1)
Total	$\mu_2 = \mu_s + \mu_w$	**2.712**	
Drift length	$l_s = 2h$ $(5 \le l_s \le 15$ m)	**5.00** m	eq. 5.9
Peak drift load	$s = \mu_2\, s_k$	**1.08** kN/m²	

Exceptional drift, accidental

UK NA Annex B.3

Drift length	$l = \min(5h, b_1, 15$ m)	**6.70** m	Annex B.3
Shape coefficient	$\mu = \min(2h/s_k, 2b/l, 5)$	**2.00**	Annex B.3
Peak drift load	$s = \mu\, s_k$ (accidental, $\gamma = 1.0$)	**0.80** kN/m²	BS EN 1990 eq. 6.11b

Drift loads are carried into the lean-to rafters (sheet 16) and SB1a (sheet 21), which carries the lean-to ledger.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Wind loading	LoadTakedown (auto)	

WIND LOADING

REFERENCES

Basic wind velocity

Fundamental basic wind velocity	$v_{b,map}$	**22.5** m/s	BS EN 1991-1-4; UK NA
Altitude factor	$c_{alt} = 1 + 0.001\,A = 1 + 0.001 \times 50$	**1.05**	UK NA Figure NA.1
Direction, season, probability	$c_{dir} = c_{season} = c_{prob} = 1.0$		UK NA eq. NA.2a
Basic wind velocity	$v_b = v_{b,map}\,c_{alt}$	**23.62** m/s	UK NA Tables NA.1, NA.2
Basic velocity pressure	$q_b = 0.613\,v_b^2$	**0.342** kN/m²	UK NA NA.2.4

Peak velocity pressure

Reference height (ridge)	$z_e = h$	**7.75** m	BS EN 1991-1-4 eq. 4.10
Site	10 km to sea, 2 km inside town		UK NA NA.2.17
Exposure factor, country	$c_e(z)$	**2.68**	BS EN 1991-1-4 7.2.2
Town correction	$c_{e,T}$	**0.80**	UK NA Fig. NA.7
Exposure factor	$c_e = c_e(z)\,c_{e,T}$	**2.14**	UK NA Fig. NA.8
Peak velocity pressure	$q_p = c_e\,q_b$	**0.73** kN/m²	UK NA eq. NA.3a

Pressure coefficients, walls

Wind on front: zones D, E	$c_{pe,D} = 0.800$, $c_{pe,E} = -0.505$	BS EN 1991-1-4 Table 7.1
Wind on gable: zones D, E	$c_{pe,D} = 0.796$, $c_{pe,E} = -0.492$	h/d interpolated
Lack of correlation	$(c_{pe,D} - c_{pe,E}) \times 0.85$	7.2.2(3); UK NA
Structural factor	$c_s\,c_d = 1.0$ ($h < 15$ m)	BS EN 1991-1-4 6.2(1)a

Overall wind force per direction

WIND ON	NET C	TOTAL FORCE	GROUND STOREY
Front / rear elevations	1.115	47.4 kN	38.6 kN
Gable (side) elevations	1.094	43.0 kN	32.7 kN

BS EN 1991-1-4 5.3, eq. 5.3

Forces are carried by the first floor and roof diaphragms to the shear walls; see Overall stability, sheet 5.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Overall stability	LoadTakedown (auto)	

OVERALL STABILITY

Approved Document A: within the 2C rules

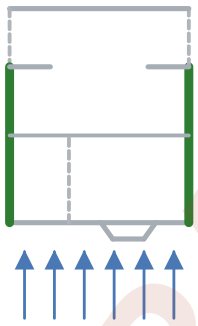
REFERENCES

ADA 2C; 2C3(d)

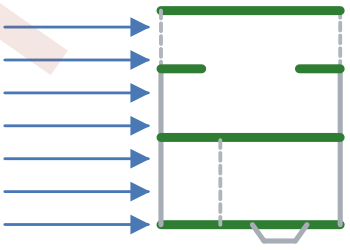
ELEVATION	WALLS	BASIS	
Front (with the bay)	Front wall	ADA 2C: length, openings, returns and piers within the rules; R2 corner panel and the bay by calculation / supplier (local items, not racking).	DEEMED
Left side	Left gable wall, Left extension wall	ADA 2C: leftMain has no openings; leftExt's side door corner by wind post WP1 (local item).	DEEMED
Right side	Right gable wall, Right extension wall	ADA 2C: no openings.	DEEMED
Spine (internal)	Spine wall	ADA 2C: internal loadbearing wall, two doors with piers to Diagram 14.	DEEMED
Rear line (returns + SB1, rearFirst over)	Rear return wall (left), Rear return wall (right), First floor rear wall	4.2 m opening over 3 m with a head over 2.1 m: outside ADA 2C; racking checked (returns as flanged shear walls).	CALC
Extension rear wall (bifold)	Rear extension wall	3.5 m bifold over 3 m: outside ADA 2C; racking checked.	CALC

Where every ADA 2C rule is met the elevation is deemed stable and no racking calculation is needed. The rear line (returns, SB1 opening, the bifold wall and the first floor rear wall over) is outside the rules and is checked by calculation: racking tables on sheet 6.

Wind on front · 47.4 kN



Wind on gable · 43.0 kN



Load path

BS EN 1996-1-1 6.2; PD 6697

WIND ON	FORCE	SHEAR WALLS	RACKING UTIL.	
Front	47.4 kN	Left gable wall, Right gable wall	–	DEEMED
Gable	43.0 kN	Front wall, Spine wall, Rear return wall (left), Rear return wall (right), Rear extension wall, First floor rear wall	0.84	PASS

Not relied on (dashed): Hall wall, Left extension wall, Right extension wall (reasons on sheet 6).

Rear line racking, governing utilisation sheet 6 — **0.84** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Overall stability 4 walls outside ADA, panel by panel	LoadTakedown (auto)	

REFERENCES

SHEAR WALLS: WIND ON GABLE, PANEL BY PANEL

Rear wall kept at ground as two cavity returns either side of the SB1 opening: x-direction racking at ground taken by front, spine, the returns and rearExt; rearFirst's racking comes down onto the returns, and its overturning moment is a vertical couple between them.

kN, kNm, mm

PANEL MM	N_{Ed}	V_{Ed}	M_{Ed}	e	l_c	V_{Rd}	M_{Rd}	SHEAR	ROCK	TOE	UTIL.
Rear return wall (left) (G) · 100 mm both leaf · share V_{Ed} 9.2 kN											
151–1751 outer leaf, to jamb	20.6	2.21	5.98	290	368	5.1	7.1	0.43	0.84	0.72	**0.84**
whole wall 1600	20.6	2.21	5.98	290	368	5.1	7.1	0.43	0.84	0.72	**0.84**
Rear return wall (right) (G) · 100 mm both leaf · share V_{Ed} 9.2 kN											
151–1751 inner leaf, to jamb	48.2	6.64	17.93	372	972	12.6	26.1	0.53	0.69	0.64	**0.69**
whole wall 1600	48.2	6.64	17.93	372	972	12.6	26.1	0.53	0.69	0.64	**0.69**
Rear extension wall (G) · 100 mm inner leaf · share V_{Ed} 2.5 kN											
0–849	7.5	0.45	1.12	148	830	5.7	2.9	0.08	0.38	0.19	**0.38**
4349–5749	12.5	1.77	4.39	353	1042	7.6	7.9	0.23	0.56	0.25	**0.56**
6949–7698	6.7	0.31	0.78	117	748	5.1	2.3	0.06	0.34	0.18	**0.34**
whole wall 7698	26.7	2.54	6.85	257	7698	46.7	98.9	0.05	0.07	0.04	**0.07**
First floor rear wall (F) · 100 mm inner leaf · share V_{Ed} 10.6 kN											
0–1149 opening side	10.2	2.68	1.20	118	1149	7.9	5.3	0.34	0.23	0.15	**0.34**
1949–3200 opening side	11.1	2.99	1.35	121	1251	8.6	6.3	0.35	0.21	0.15	**0.35**
3200–4449 opening side	11.1	2.01	1.21	108	1249	8.6	6.3	0.23	0.19	0.14	**0.23**
6049–7698 opening side	14.7	2.95	1.77	121	1648	11.3	11.0	0.26	0.16	0.14	**0.26**
whole wall 7698	47.2	10.63	28.70	609	7698	49.8	169.8	0.21	0.17	0.10	**0.21**

Returns by leaf (house side wall bonded to the inner leaf, extension side wall to the outer): retL outer 0.84 / inner 0.84 at 24 % outer share; retR outer 0.66 / inner 0.69 at 28 % outer share. rearFirst movement joint: each panel couples between its return and the joint, 4.95 kN on retL against 4.65 kN as one couple; the larger is used. Net 0.48 kN on SB1b at the joint, which does not govern.

Within the AD A 2C rules, checked for information: Front wall (G) 0.67, Spine wall (G) 0.70, Front wall (F) 0.77.

Not relied on: Hall wall (G). 100 mm single-storey block with a 380 mm spandrel: its 2.75 m pier rocks under any useful share. Not counted; the first floor diaphragm spans 7.7 m to the gable walls. So that it does not attract racking and crack, its head is detailed as a slip joint: 10 mm compressible filler under the deck, joists not built in, and out-of-plane restraint only by vertical-slotted straps (no in-plane connection to the deck).

Not relied on: Left extension wall (G). Extension side wall, single storey, with the side door: its 1.25 m panel beyond the door rocks under any useful share. Front-direction racking is taken by leftMain; the extension's own front-wind load goes along the lean-to rafters to the house (see the wind case).

Not relied on: Right extension wall (G). Extension side wall, single storey: not needed for front-direction racking (rightMain takes the whole share); anything it attracts unloads rightMain.

PASS – Shear, rocking and toe checks satisfied for every panel and wall

Governing: Rear return wall (left) (G) panel 151–1751 mm **0.84** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: Approved Document A	LoadTakedown (auto)	

REFERENCES

APPROVED DOCUMENT A, SECTION 2C: CONDITIONS

The simple rules of Section 2C are used for the masonry walls where every condition is met. Where a rule is exceeded the aspect is justified by calculation (2C3(d)), with the calculation sheet referenced.

Approved Document A 2C1–2C24

PARA.	RULE	REQUIRED	PROVIDED	
2C4	Storeys	≤ 3	2	PASS
2C4	Height to ridge	≤ 15 m	7.75 m	PASS
2C4	Height ≤ 2 × least width	≤ 15.4 m	7.75 m	PASS
2C8	Cavity leaves / cavity	≥ 90 / ≥ 50 mm	100–102.5 / 100 mm	PASS
2C14	Floor area enclosed by structural walls	≤ 70 m²	≈ 29 m² (largest)	PASS
2C15	Imposed load, floors / roof	≤ 2.0 / 1.0 kN/m²; roofs ≤ 6 m span ≤ 1.5	2.0 / 0.6 kN/m²; lean-to (2.5 m span) drift 1.08	PASS
2C16	Site wind speed / building height	Diagram 6	S 23.6 m/s, 7.75 m	PASS
2C17	Wall length between buttresses	≤ 12 m	7.70 m	PASS
2C21	Unit strength (Diagram 9, Condition A)	brick ≥ 5, block ≥ 2.9 N/mm²	20 / 3.6 N/mm² (7.3 where calculated)	PASS
2C23	Floor span onto wall	≤ 6 m	3.64 m	PASS
2C24	Combined load at base of wall	≤ 70 kN/m	59.0 kN/m	PASS
2C24	Lintel bearing	≥ 150 mm	150 mm	PASS
2C27	Openings: single opening width	≤ 3 m	3.5 m (rear bifold)	CALC

2C15: the lean-to spans 2.5 m (≤ 6 m), so 1.5 kN/m² is allowed; the drift peak of 1.08 kN/m² is within it. The members under the drift are still designed for it by calculation: lean-to rafters (sheet 16), SB1a (sheet 21).

2C27: the 3.5 m rear bifold exceeds the 3 m single opening limit, so it is designed by calculation: one extra heavy duty cavity lintel over both leaves (sheet 27), the piers (sheet 31), out-of-plane wind with wind posts WP2 and WP3 at the jambs (sheets 10, 12) and racking of the rear line (sheet 6).

PASS – Section 2C conditions met except where justified by calculation

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: Approved Document A R2, R4, R7–R8, R9–R10 by calculation	LoadTakedown (auto)	

REFERENCES

APPROVED DOCUMENT A: OPENINGS AND RETURNS

Openings in each wall

ADA 2C Diagram 14 notes 1, 2

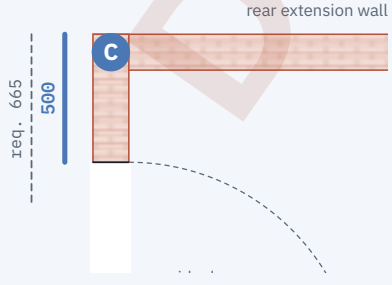
WALL	STY	L M	ΣW M	ΣW / L	W MAX M	≤ 2/3, ≤ 3 M
Front wall	G	7.70	2.97	0.39	2.02	PASS
Front wall	F	7.70	3.12	0.41	2.02	PASS
Bay side (left)	G, F	0.86	0.45	0.52	0.45	PASS
Bay front	G, F	1.34	1.10	0.82	1.10	CALC
Bay side (right)	G, F	0.86	0.45	0.52	0.45	PASS
Rear extension wall	G	7.70	4.70	0.61	3.50	CALC
Left extension wall	G	2.50	0.90	0.36	0.90	PASS
First floor rear wall	F	7.70	2.40	0.31	1.60	PASS
Spine wall	G	7.70	2.45	0.32	1.60	PASS
Hall wall	G	3.75	0.85	0.23	0.85	PASS
Rear line, 2 returns + opening	G	7.70	4.20	0.55	4.20	CALC

Returns at corners

ADA 2C Diagram 14 note 7

REF	CORNER	PROV. MM	REQ. MM	
R1	Front wall (G/F)	1000	665	PASS
R3	Rear extension wall (G)	1000	665	PASS
R5	First floor rear wall (F)	1300	665	PASS
R6	First floor rear wall (F)	1800	665	PASS
R2	Front wall (G/F) Return 1738 mm meets the 665 mm minimum, but the opening next to the corner is 2400 mm high, over the 2.1 m of AD A Diagram 14 note 7. Justified: sheet 10, 13.	1738	665	CALC
R4	Left extension wall (G) · see below	500	665	CALC
R7–R8	2 bay corners (G/F) Bay corner pier: 273 mm from the outside corner to the jamb (122 mm on the setting-out line). Justified: sheet 13.	273 to 274	665	CALC
R9–R10	Rear return wall (left) and Rear return wall (right) (G) Rear return 1902 mm meets 699 mm, but the 4195 mm opening is over 3 m and its head (SB1 soffit, 2449 mm) over 2.1 m: outside Diagram 14. Justified: sheet 21, 25, 6.	1902	699	CALC

ADA Diagram 14 note 7



R4 · left extension wall corner

Side door 500 mm from the outside corner to its jamb, under the 665 mm minimum (349 mm on the setting-out line). Inside-face basis: 198 mm, 368 mm. Required **665 mm** (Diagram 14 note 7); provided **500 mm**.

Justified by calculation (ADA 2C3(d)): steel wind post WP1 in the side door jamb (util 0.39) and the corner panel in lateral bending (LW3, util 0.02).

Justified by calculation: sheet 12, 10.

***PASS** – Returns meet Diagram 14 or are justified by calculation (CALC, sheets given)*

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: Approved Document A (W1 + W2)/6	LoadTakedown (auto)	

REFERENCES

ADA PIERS BETWEEN OPENINGS, PER ELEVATION

Approved Document A Diagram 14: every pier between two openings is at least $(W_1 + W_2)/X$, X = 6 (Table 8). W_1, W_2 are the openings either side. Piers at corners are the returns (sheet 8).

Front

ADA Diagram 14

WALL	STY	PIER AT MM	W_1	W_2	$(W_1 + W_2)/6$	PROVIDED	
Front wall	G	1799–4087	950	2024	(950 + 2024)/6 = **496**	2288	PASS
Front wall	F	2749–4087	1100	2024	(1100 + 2024)/6 = **521**	1338	PASS

Rear

ADA Diagram 14

WALL	STY	PIER AT MM	W_1	W_2	$(W_1 + W_2)/6$	PROVIDED	
Rear extension wall	G	4349–5749	3500	1200	(3500 + 1200)/6 = **783**	1400	PASS
First floor rear wall	F	1949–4449	800	1600	(800 + 1600)/6 = **400**	2500	PASS

Left side

ADA Diagram 14

No pier between two openings on this elevation.

Right side

ADA Diagram 14

No pier between two openings on this elevation.

Internal walls

ADA Diagram 14

WALL	STY	PIER AT MM	W_1	W_2	$(W_1 + W_2)/6$	PROVIDED	
Spine wall	G	1999–4149	850	1600	(850 + 1600)/6 = **408**	2150	PASS

***PASS** – Every pier between openings meets (W1 + W2)/6*

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: lateral load LW1–LW7	LoadTakedown (auto)	

REFERENCES

OUT-OF-PLANE WIND ON PANELS AND PIERS

BS EN 1996-1-1 6.3.1: the leaves share the panel load in proportion to their resistances (ties to both leaves). Design wind $w_{Ed} = 1.5\ q_p\ c_{net}$, $q_p = 0.73$ kN/m²; c_{net} 1.4 at the corners (zone A + internal), 1.1 elsewhere. Flexural strengths UK NA Table NA.6 (M4): clay brick f_{xk1} 0.40, f_{xk2} 1.10; 3.6 block 0.25 / 0.45; γ_M 2.7. Precompression: $f_{xd1,app} = f_{xd1} + \sigma_d$ (6.3.1(4)).

Panel moments	$M_{Rd} = f_{xd}\,Z$ per leaf, summed; $\mu = f_{xd1,app}/f_{xd2}$	6.3.1; Annex E
Yield line, rectangle	$q_{Rd} = 24\ m_2 / [b^2\,(\sqrt{(3 + (b/a)^2)} - b/a)^2]$	Johansen; affine b = h/√μ; continuous edge l/√2

LW1 · Rear bifold wall: pier between bifold and window, masonry alone

Rear extension wall; c_net 1.1

vertical strip, simply supported. Vertical strip DPC to the lean-to wall plate, free vertical edges (openings): fails, so wind post WP2.

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.026	0.174	0.427 / 0.999
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.031	0.124	0.289 / 0.389

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.1$	**1.210** kN/m²
Design moment	$M_{Ed} = w_{Ed}\ b\ h^2/8 = 1.210 \times 1.40 \times 2.70^2/8$	**1.544** kNm
Moment vs resistance	$M_{Ed} = 1.544$ vs $M_{Rd} = 0.716$ kNm	**2.16**

FAIL – Masonry alone fails (2.16): wind post WP2 provided (sheet 12)

LW2 · Rear bifold wall: corner panel between the corner and WP3

Rear extension wall; c_net 1.4

horizontal strip, simply supported. Spanning horizontally between the bonded corner and wind post WP3, per metre height (corner zone A).

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.000	0.148	0.259 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.000	0.093	0.154 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.4$	**1.540** kN/m²
Design moment	$M_{Ed} = w_{Ed}\ l^2/8 = 1.540 \times 0.473^2/8$	**0.043** kNm
Moment vs resistance	$M_{Ed} = 0.043$ vs $M_{Rd} = 0.991$ kNm	**0.04**

PASS – LW2: utilisation 0.04

LW3 · R4 corner panel, side door (leftExt)

Left extension wall; c_net 1.4

horizontal strip, simply supported. Between the bonded corner and wind post WP1, spanning horizontally, per metre height.

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.000	0.148	0.259 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.000	0.093	0.154 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.4$	**1.540** kN/m²
Design moment	$M_{Ed} = w_{Ed}\ l^2/8 = 1.540 \times 0.349^2/8$	**0.023** kNm
Moment vs resistance	$M_{Ed} = 0.023$ vs $M_{Rd} = 0.991$ kNm	**0.02**

PASS – LW3: utilisation 0.02

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: lateral load	LoadTakedown (auto)	

REFERENCES

OUT-OF-PLANE WIND ON PANELS AND PIERS (CONTINUED)

LW4 · R2 front corner panel beside the bay opening

Front wall; c_net 1.4

horizontal strip, simply supported. Between the corner (rightMain) and the bay return wall bayR, both bonded, spanning horizontally, per metre height, simply supported (corner zone A).

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.000	0.148	0.259 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.000	0.093	0.154 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.4$	**1.540** kN/m²
Design moment	$M_{Ed} = w_{Ed}\ l^2/8 = 1.540 \times 1.427^2/8$	**0.392** kNm
Moment vs resistance	$M_{Ed} = 0.392$ vs $M_{Rd} = 0.991$ kNm	**0.40**

PASS – LW4: utilisation 0.40

LW5 · Gable wall, first floor storey

Left gable wall; c_net 1.1

yield line, rectangular panel. First floor to ceiling-tie straps (simply supported), vertical edges continuous at the bonded corners; yield line (Annex E method), both leaves; c_net area-weighted over zones A and B.

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.027	0.175	0.307 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.020	0.113	0.188 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.1$	**1.210** kN/m²
Panel resistance	$q_{Rd} = 24\ m_2 / [b^2\ (\sqrt{(3 + (b/a)^2)} - b/a)^2]$	**1.398** kN/m²
Resistance vs load	$q_{Rd} = 1.398$ vs $w_{Ed} = 1.210$ kN/m²	**0.87**

a = 4.74, b = 3.68

PASS – LW5: utilisation 0.87

LW6 · Gable triangle above the ceiling ties

Left gable wall; c_net 1.1

yield line, triangular panel. Supported along the ceiling-tie line and the rakes (straps at <= 2 m, ADA Diagram 16); yield lines to the incentre of the affine triangle; no precompression taken.

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.000	0.148	0.259 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.000	0.093	0.154 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.1$	**1.210** kN/m²
Panel resistance	$q_{Rd} = 6\ m_2 / r^2$	**2.765** kN/m²
Resistance vs load	$q_{Rd} = 2.765$ vs $w_{Ed} = 1.210$ kN/m²	**0.44**

r = 1.467 m

PASS – LW6: utilisation 0.44

LW7 · Rear bifold wall: pier between WP2 and the window

Rear extension wall; c_net 1.1

horizontal cantilever from the bonded corner. Horizontal cantilever from wind post WP2 to the window jamb (free edge), per metre height; the window frame's half goes to the jamb and is in WP2's load.

LEAF	UNIT	T MM	f_{xk1} / f_{xk2}	σ_d	$f_{xd1,app}$	M_{Rd1} / M_{Rd2}
outer	clay facing brick, 20 N/mm²	102.5	0.40 / 1.10	0.000	0.148	0.259 / 0.713
inner	medium-density block, 3.6 N/mm²	100.0	0.25 / 0.45	0.000	0.093	0.154 / 0.278

Design wind	$w_{Ed} = 1.5\ q_p\ c_{net} = 1.5 \times 0.73 \times 1.1$	**1.210** kN/m²
Design moment	$M_{Ed} = w_{Ed}\ l^2/2 = 1.210 \times 1.175^2/2$	**0.836** kNm
Moment vs resistance	$M_{Ed} = 0.836$ vs $M_{Rd} = 0.991$ kNm	**0.84**

PASS – LW7: utilisation 0.84

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Wind posts WP1, WP2, WP3	LoadTakedown (auto)	

WIND POSTS (GENERIC)

Steel wind posts, generic, SWL from the supplier's table. The table below is **REPRESENTATIVE** (unfactored total lateral UDL by post height), clearly not any maker's data: the chosen post must give at least the SWL scheduled, "or equal".

TYPE (REPRESENTATIVE)	2400 MM	2700 MM	3000 MM	3300 MM
steel wind post, standard duty (generic)	5.0	4.4	3.8	3.3
steel wind post, heavy duty (generic)	8.0	7.0	6.2	5.5

WP1 · Left extension wall

In the side door jamb nearer the corner (R4): half the door and half the corner panel (corner zone A).

Post height, load width	h = 2.644 m, b = 0.625 m, c_{net} = 1.4	
Characteristic wind on the post	$W_k = q_p\, c_{net}\, b\, h = 0.73 \times 1.4 \times 0.625 \times 2.644$	**1.70** kN
Design (for information)	$W_{Ed} = 1.5\, W_k$; $M_{Ed} = W_{Ed}\, h/8$	**2.54 kN, 0.84** kNm
Representative SWL at this height	steel wind post, standard duty (generic)	**4.4** kN
	W_k / SWL = 1.70 / 4.4	**0.39**

PASS – WP1: utilisation 0.39

WP2 · Rear extension wall

In the pier beside the bifold, 225 mm from the jamb (just past L11's bearing, the lintel end strapped to the post): takes the pier, half the window and L11's end reaction (bifold head wind).

Post height, load width	h = 2.700 m, b = 2.000 m, c_{net} = 1.1	
Characteristic wind on the post	$W_k = q_p\, c_{net}\, b\, h = 0.73 \times 1.1 \times 2.000 \times 2.700$	**4.36** kN
Bifold head reaction	P_k at 2.10 m (L11 end)	**1.99** kN
Maximum moment, UDL + point	$M_{k,max}$ (401 points up the post)	**2.127** kNm
Equivalent UDL	$W_{eq} = 8\, M_{k,max} / h = 8 \times 2.127 / 2.70$	**6.30** kN
Representative SWL at this height	steel wind post, heavy duty (generic)	**7.0** kN
	W_{eq} / SWL = 6.30 / 7.0	**0.90**

PASS – WP2: utilisation 0.90

WP3 · Rear extension wall

In the corner-side jamb pier (PR7), 225 mm from the bifold jamb, L11's other end strapped to it: takes L11's end reaction, the jamb strip and half the corner panel (corner zone A).

Post height, load width	h = 2.700 m, b = 0.461 m, c_{net} = 1.4	
Characteristic wind on the post	$W_k = q_p\, c_{net}\, b\, h = 0.73 \times 1.4 \times 0.461 \times 2.700$	**1.28** kN
Bifold head reaction	P_k at 2.10 m (L11 end)	**1.99** kN
Maximum moment, UDL + point	$M_{k,max}$ (401 points up the post)	**1.226** kNm
Equivalent UDL	$W_{eq} = 8\, M_{k,max} / h = 8 \times 1.226 / 2.70$	**3.63** kN
Representative SWL at this height	steel wind post, standard duty (generic)	**4.4** kN
	W_{eq} / SWL = 3.63 / 4.4	**0.83**

PASS – WP3: utilisation 0.83

Governing wind post utilisation (WP2) **0.90** PASS

Fixing (all posts): stainless steel post in the cavity, tied to both leaves at <= 225 mm, fixed at DPC/foundation and at the wall plate (strapped to the roof).

∴ PROVIDE WP1, WP3 STANDARD DUTY; WP2 HEAVY DUTY WIND POSTS (GENERIC, OR EQUAL)

REFERENCES

representative SWL, kN

BS EN 1991-1-4; supplier SWL

BS EN 1991-1-4; supplier SWL

sheet 27

M_Ed = 1.5 M = 3.19 kNm

BS EN 1991-1-4; supplier SWL

sheet 27

M_Ed = 1.5 M = 1.84 kNm

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026

SUBJECT	CALC BY	CHECKED BY
Bay L5–L10, corner posts	LoadTakedown (auto)	

REFERENCES

BAY: LINTELS AND CORNER POSTS BY SPECIALIST SUPPLIER

Bay lintels and corner posts by specialist supplier, loads given. Loads are characteristic (G_k, Q_k) with the ULS value (1.35 G_k + 1.5 Q_k); posts from DPC to the first floor and from the first floor to the bay roof plate, each at the two front corners of the bay (B left, C right); supplier to design the posts, their fixings to the masonry and the bay roof plate, and to confirm the head deflection for the windows.

Corner posts: loads to the supplier

BS EN 1990 eq. 6.10

N_Ed = 1.35 G_k + 1.5 Q_k

POST	CORNER	STOREY	G_k kN	Q_k kN	N_k kN	N_{Ed} kN	FROM WALL ENDS
BP-BG	B	G	4.90	0.83	5.73	**7.9**	bayL end, bayF start
BP-BF	B	F	1.43	0.23	1.66	**2.3**	bayL end, bayF start
BP-CG	C	G	4.90	0.83	5.73	**7.9**	bayF end, bayR start
BP-CF	C	F	1.43	0.23	1.66	**2.3**	bayF end, bayR start

Bay lintels: loads to the supplier

BS 5977-1

LINTEL	WALL	STOREY	CLEAR MM	G_k kN	Q_k kN	TOTAL KN	ULS KN
L5	Bay side (left)	F	450	0.34	0.00	0.34	0.46
L6	Bay side (left)	G	450	0.34	0.00	0.34	0.46
L7	Bay front	F	1100	2.17	0.28	2.45	3.35
L8	Bay front	G	1100	2.20	0.77	2.97	4.13
L9	Bay side (right)	F	450	0.34	0.00	0.34	0.46
L10	Bay side (right)	G	450	0.34	0.00	0.34	0.46

The bay's corner returns (R7, R8) and the front corner R2 are outside ADA Diagram 14; they are carried by these supplier items and the panel check LW4 (sheet 10). Supplier design to be reviewed by the engineer when issued.

Bay lintels and corner posts supplier design to the loads given — **FLAG: engineer to confirm**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry	LoadTakedown (auto)	

LATERAL RESTRAINT AND WALL TIES

Lateral restraint straps

			REFERENCES
Strap	30 × 5 mm galvanised, BS EN 845-1	≥ 8 kN	ADA 2C32–2C36, Table 9, Diagrams 15, 16 ADA 2C35
Spacing	first floor and roof, all external walls > 3 m	≤ 2.0 m	ADA Table 9
Joists parallel to wall	over ≥ 3 joists with noggings		ADA 2C35, Diagram 15
Gables	at rafter and ceiling tie level	≤ 2.0 m	ADA 2C36, Diagram 16
Vertical straps at eaves	not required: tiled roof ≥ 15°, members at ≤ 1.2 m		ADA 2C36

Joists bear ≥ 90 mm onto the front and spine walls at 400 c/c; straps are provided to the gables, which are parallel to the joists.

Wall ties

ADA 2C8, 2C19, Table 5; BS EN 845-1

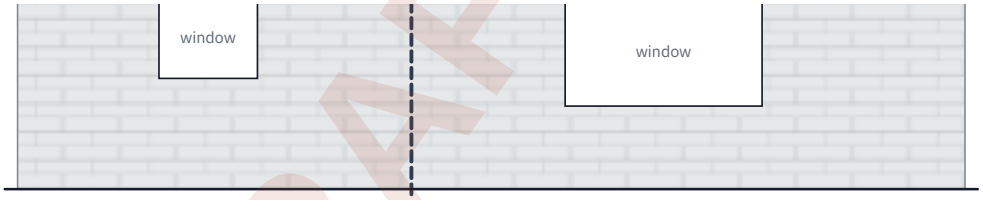
Cavity width		100 mm	
Tie length	cavity 76–100 mm	225 mm	ADA Table 5
Type, material	Type 4 (low-rise domestic), austenitic stainless		PD 6697; ADA 2C19
General spacing	900 horizontal × 450 vertical	2.5 /m²	ADA 2C8
At openings and movement joints	≤ 300 mm vertical within 225 mm		ADA 2C8
Embedment	each leaf	≥ 50 mm	ADA Table 5 note

***PASS** – Restraint and tie provisions follow Approved Document A*

Movement joints

BS EN 1996-2 2.3.4; PD 6697:2019
NHBC 6.1; PD 6697

WALL	LEAF	AT MM	JOINT AND REASON
First floor rear wall	inner	3200	**vertical movement joint, 10 mm** Block inner leaf on the rear returns and SB1b, 7.70 m > 6 m: joint 3.20 m from the left corner, between the two windows and clear of their lintel bearings.



First floor rear wall, inner leaf: joint 3200 mm from the start of the wall.

1. Brick outer leaves: longest unbroken run 9.5 m (side elevation, gable + extension) and 8.0 m (front/rear) are under the 12 m clay-brick limit (NHBC 6.1 / PD 6697), so no outer-leaf joints.
2. rearExt inner leaf (7.70 m): no joint. Its masonry is three short panels (0.85, 1.40, 0.75 m) between the bifold, window and corners; bed joint reinforcement in the two courses above the bifold and window lintels, 600 mm past the jambs. A joint in the 1.40 m pier would halve the stability pier.
3. Front inner leaf (7.70 m, medium-density block): no joint. The only solid zone clear of lintel bearings (2.9-3.9 m) is inside the 2.29 m pier the gable-direction stability relies on, and a joint there takes it from 0.67 to 1.09. Instead, bed joint reinforcement (stainless ladder type, 60 mm wide) at 450 mm centres over the full height, and in the two courses above and below every opening, 600 mm past the jambs. [Engineer's judgement: confirm the 7.7 m reinforced panel with the block maker; 6 m is the unreinforced guidance.]
4. Spine wall: 100 mm dense block, internal and heated, 7.70 m. No joint (it would split the stability piers): bed joint reinforcement at 450 mm centres control shrinkage. [Engineer's judgement: 6 m is the usual unreinforced guidance for concrete block.]

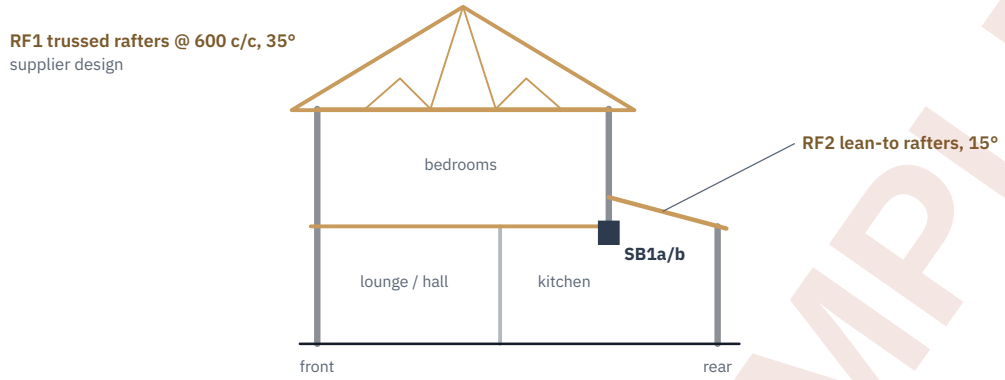
***PASS** – Movement joints within recommended spacings, clear of lintel bearings*

RAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Roof RF1	LoadTakedown (auto)	

REFERENCES

ROOF RF1: TRUSSED RAFTERS (SUPPLIER DESIGN)



Section: 35° trussed rafter main roof on the front wall and the first floor rear wall over SB1; lean-to rafters from a ledger on the house wall.

Trussed rafters are designed by the specialist supplier to BS EN 1995-1-1 and PD 6693-1:2019 (product standard BS EN 14250). The following design loads are issued to the supplier; truss reactions are used in the load takedown.

PD 6693-1:2019; BS EN 1991-1-1, -1-3, -1-4

DESIGN LOAD TO SUPPLIER	VALUE
Rafter, dead (on slope)	0.75 kN/m²
Ceiling, dead (on plan)	0.25 kN/m²
Ceiling, imposed (on plan)	0.25 kN/m²
Ceiling point load	0.90 kN
Roof imposed, Cat. H (on plan)	0.50 kN/m²
Snow, undrifted (on plan)	0.267 kN/m²
Wind, peak velocity pressure	0.73 kN/m²
Pitch / span	35° / 6.70 m

Roof imposed 0.6(60-35)/30 = 0.50 kPa exceeds undrifted snow; not combined.

Engineer's check: truss bearing on wall plate

BS EN 1995-1-1 6.1.5

Truss reaction (ULS)	$F_{c,90,d}$	**5.20** kN
Bearing stress	$\sigma_{c,90,d} = F / (b\ l_{ef})$	**1.48** N/mm²
Bearing strength	$k_{c,90}\ f_{c,90,d}$ ($k_{c,90}$ = 1.0, k_{mod} = 0.9)	**1.73** N/mm²

= 0.6 x [1.35 x 1.166 + 1.5 x 0.50 + 1.05 x 0.25] x 6.697/2

PASS* – *Bearing strength exceeds bearing stress

Wall plate bearing **0.86** **PASS**

1. Stability bracing, holding-down clips and gable straps at ≤ 2 m (ADA 2C36) by supplier and contractor.
2. Supplier design to be reviewed by the engineer when issued.

Trussed rafters supplier design to be reviewed when issued — **FLAG: engineer to confirm**

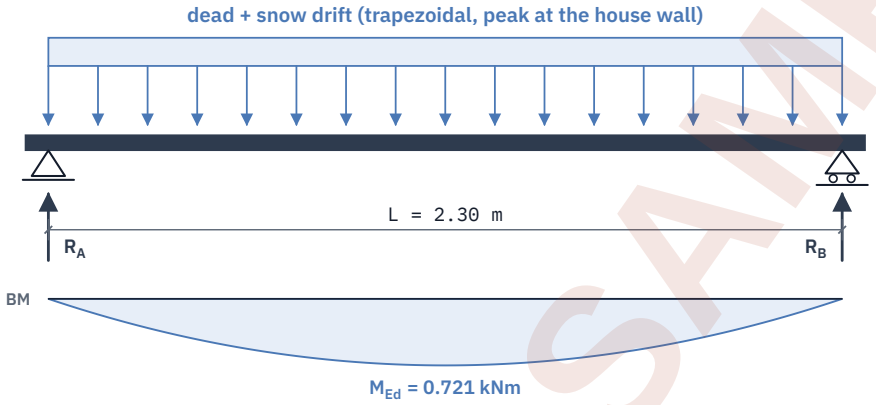
DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Roof RF2 · C24 47×125	LoadTakedown (auto)	

ROOF MEMBER RF2: LEAN-TO RAFTERS

REFERENCES

Section, grade	C24 47×125 @ 400 c/c		BS EN 338:2016
Pitch	α	**15°**	
Span (ledger to wall plate)	L	**2.30** m	
Dead load on plan	g_k = (0.55 + 0.20)/cos 15° + 0.25 (ceiling, on plan)	**1.026** kN/m²	loading schedule, sheet 1
Persistent drift (high / low end)	s = 1.085 → 0.702	kN/m²	sheet 3
Exceptional drift (high / low end)	s = 0.800 → 0.501	kN/m²	UK NA Annex B



Bending and deflection

BS EN 1995-1-1 6.1.6

Design moment, governing case	M_{Ed}	**0.721** kNm	
Final deflection	u_{fin} (limit 9.2 mm)	**4.58** mm	UK NA Table NA.4

LOAD CASE	UTIL.	
Persistent: dead + drift	0.50	PASS
Persistent: dead + roof imposed	0.44	PASS
Accidental: dead + exceptional drift	0.12	PASS

***PASS** – Bending, shear and deflection within limits for every case*

Deeper rafters may be needed to suit the insulation (Part L).

∴ PROVIDE C24 47×125 @ 400 C/C

Utilisation **0.50** PASS

DRAFT SAMPLE

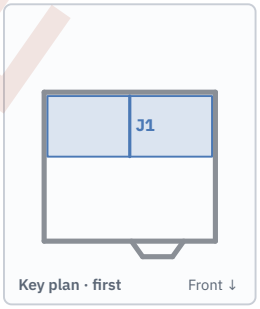
PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Timber: first floor J1 · C24 47×145 @ 400	LoadTakedown (auto)	

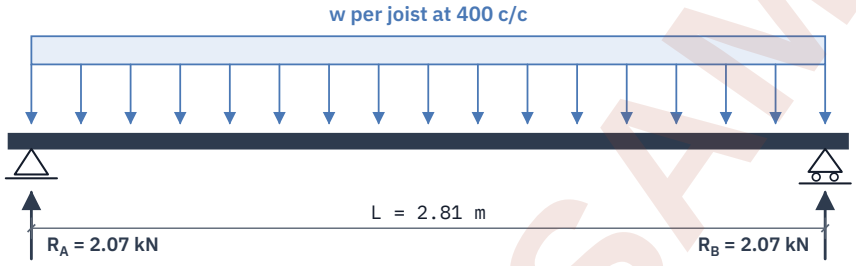
FLOOR JOISTS J1: FIRST FLOOR

Section, grade	C24 47×145 @ 400 c/c	
Design span	L	**2.814** m
Dead load	g_k	**0.50** kN/m²
Imposed incl. partitions	q_k (incl. 0.50 partitions)	**2.00** kN/m²
Modification factors	k_{mod} = 0.80, k_{sys} = 1.1, k_{def} = 0.6	

Rear bay: SB1b (joist hangers on a 47 mm timber plate bolted to the web) to the spine wall.

REFERENCES





Bending

BS EN 1995-1-1 6.1.6

Design moment	M_{Ed}	**1.456** kNm
Bending stress	$\sigma_{m,d} = M_{Ed} / W$	**8.84** N/mm²
Bending strength	$f_{m,d} = k_{mod}\, k_{sys}\, k_h\, f_{m,k} / \gamma_M$	**16.36** N/mm²

BS EN 1995-1-1 2.4.1, 6.6

***PASS** – Bending strength exceeds bending stress*

Shear

BS EN 1995-1-1 6.1.7

k_cr = 0.67

Shear stress	$\tau_d = 1.5\, V_{Ed} / (k_{cr}\, b\, h)$	**0.680** N/mm²
Shear strength	$f_{v,d}$	**2.462** N/mm²

***PASS** – Shear strength exceeds shear stress*

Deflection and vibration

UK NA to BS EN 1995-1-1 NA.2.6

Instantaneous deflection	u_{inst}	**6.47** mm
Final deflection	$u_{fin} = u_{inst,G}(1 + k_{def}) + u_{inst,Q}(1 + \psi_2\, k_{def}) \le 11.3$ mm	**8.18** mm
Domestic limit, total load	min(L/333, 14 mm) = 8.4 mm	**6.47** mm
Fundamental frequency	$f_1 = (\pi/2L^2)\sqrt{((EI)_l / m)} > 8$ Hz	**15.9** Hz
Unit point load deflection	$a \le 1.8$ mm/kN (k_{dist} = 0.338)	**1.254** mm/kN

BS EN 1995-1-1 2.2.3

BS 5268-2 2.10.7 practice

BS EN 1995-1-1 7.3.3

UK NA NA.2.6.2

***PASS** – Deflection and vibration criteria satisfied*

∴ PROVIDE C24 47×145 @ 400 C/C

Utilisation governed by legacy 14 mm / L/333 **0.77** **PASS**

DRAFT SAMPLE

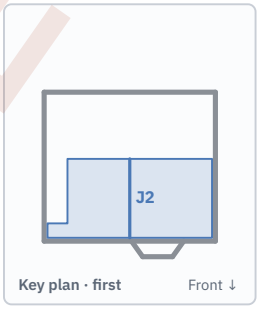
PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Timber: first floor J2 · C24 47×195 @ 400	LoadTakedown (auto)	

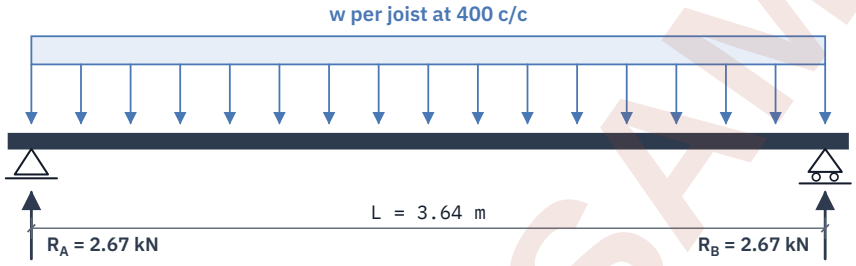
FLOOR JOISTS J2: FIRST FLOOR

Section, grade	C24 47×195 @ 400 c/c	
Design span	L	**3.638** m
Dead load	g_k	**0.50** kN/m²
Imposed incl. partitions	q_k (incl. 0.50 partitions)	**2.00** kN/m²
Modification factors	k_{mod} = 0.80, k_{sys} = 1.1, k_{def} = 0.6	

Front bay: spine wall to the front wall inner leaf (over the bay opening, on its lintel). Stair void trimmed.

REFERENCES





Bending

BS EN 1995-1-1 6.1.6

Design moment	M_{Ed}	**2.431** kNm
Bending stress	$\sigma_{m,d} = M_{Ed} / W$	**8.16** N/mm²
Bending strength	$f_{m,d} = k_{mod}\, k_{sys}\, k_h\, f_{m,k} / \gamma_M$	**16.25** N/mm²

BS EN 1995-1-1 2.4.1, 6.6

***PASS** – Bending strength exceeds bending stress*

Shear

BS EN 1995-1-1 6.1.7

k_cr = 0.67

Shear stress	$\tau_d = 1.5\, V_{Ed} / (k_{cr}\, b\, h)$	**0.653** N/mm²
Shear strength	$f_{v,d}$	**2.462** N/mm²

***PASS** – Shear strength exceeds shear stress*

Deflection and vibration

UK NA to BS EN 1995-1-1 NA.2.6

Instantaneous deflection	u_{inst}	**7.45** mm
Final deflection	$u_{fin} = u_{inst,G}(1 + k_{def}) + u_{inst,Q}(1 + \psi_2\, k_{def}) \le 14.6$ mm	**9.42** mm
Domestic limit, total load	$\min(L/333, 14\text{ mm}) = 10.9$ mm	**7.45** mm
Fundamental frequency	$f_1 = (\pi/2L^2)\sqrt{((EI)_l / m)} > 8$ Hz	**14.9** Hz
Unit point load deflection	$a \le 1.8$ mm/kN (k_{dist} = 0.338)	**1.113** mm/kN

BS EN 1995-1-1 2.2.3

BS 5268-2 2.10.7 practice

BS EN 1995-1-1 7.3.3

UK NA NA.2.6.2

***PASS** – Deflection and vibration criteria satisfied*

∴ PROVIDE C24 47×195 @ 400 C/C

Utilisation governed by legacy 14 mm / L/333 **0.68** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Timber: first floor	LoadTakedown (auto)	

REFERENCES

JOISTS: TRIMMING AND INFILL

J3 · C24 47×195

BS EN 1995-1-1 6.1.6

Bay infill, front wall to bay front; same depth as J2 for a level ceiling.

Span	L	**0.639** m
Design moment	M_{Ed}	**0.075** kNm
Bending stress / strength	$\sigma_{m,d} = 0.25 \le f_{m,d} = 16.25$	N/mm²
Final deflection	$u_{fin} \le 2.6$ mm	**0.02** mm

∴ PROVIDE C24 47×195 @ 400 C/C

Utilisation **0.05** PASS

J4 · 2 no. C24 47×195 bolted

BS EN 1995-1-1 6.1.6

Stair trimming joist; carries the 0.90 m trimmer at the void's front edge.

Span	L	**3.638** m
Trimmer reaction (ULS)	P at 0.647 m from the front wall	**0.61** kN
Design moment	M_{Ed}	**1.539** kNm
Bending stress / strength	$\sigma_{m,d} = 2.58 \le f_{m,d} = 14.77$	N/mm²
Final deflection	$u_{fin} \le 14.6$ mm	**2.46** mm

∴ PROVIDE 2 no. C24 47×195 bolted

Utilisation **0.17** PASS

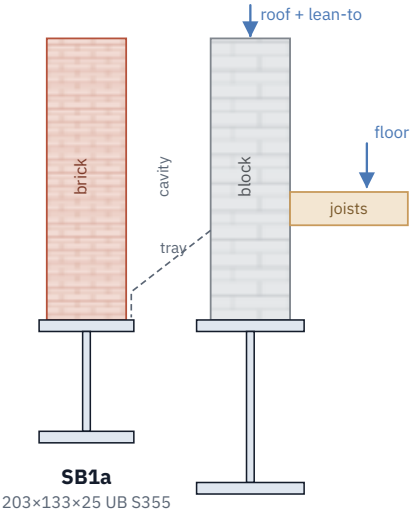
DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Steelwork SB1	LoadTakedown (auto)	

REFERENCES

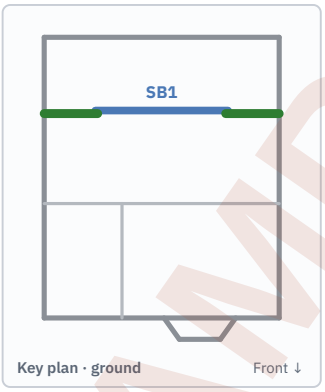
SB1: ONE BEAM PER LEAF

SB1 carries the first floor rear wall over the opening below. The cavity wall is supported on **two beams, one under each leaf**, so each leaf sits on its own flange and neither beam is loaded in torsion. Each beam is designed for its own leaf only.



SB1a
203×133×25 UB S355

SB1b
254×146×31 UB S355



Rear return walls (green) either side of the 4195 mm clear opening; each beam bears on its own leaf of the returns.

Clear opening, design span	4195 mm clear + 2 × 150 bearings → L	**4.345** m
Returns, length to jamb	1902 mm from the outside corner; 1600 mm past the side wall	sheet 8

Load split between leaves

BEAM	LEAF	CARRIES	SECTION	w_{Ed} KN/M	UTIL.
SB1a	outer	First floor rear wall outer leaf over the opening, First floor rear wall outer leaf lintel reactions, Lean-to roof dead, Beam self weight, Lean-to snow drift (persistent)	203×133×25 UB	9.93	0.86
SB1b	inner	First floor rear wall inner leaf over the opening, First floor rear wall inner leaf lintel reactions, First floor + partitions, Beam self weight	254×146×31 UB	16.94	0.82

Differential deflection, total load $|\delta_{inner} - \delta_{outer}| = |7.2 - 7.5|$ **0.3** mm — SCI P385; engineering practice

Schemes considered

SCHEME	SB1A	SB1B	DEPTH MM	UTIL.	OUTCOME
UB pair within the wall width	203×133×25 UB	254×146×31 UB	251.4	0.86	PASS **adopted**

engineer's decision

Adopted pair: downstand 91 mm below the ceiling, boxed in. UB pair between the rear return walls, 4.195 m clear opening, 4.345 m span, no post (engineer's scheme); each beam bears on its own leaf of the returns; downstand below the rear-bay ceiling boxed in

Detailing

1. M16 grade 8.8 bolts through tube spacers at both bearings and at 600 c/c, tying the pair to transfer the racking shear; not relied on to share vertical load (each beam carries its own leaf).
2. Cavity tray with stop ends and weeps over SB1a; close the cavity at the bearings.
3. Both beams fire protected to R30; SB1a also galvanised (in the cavity).

PASS – Each leaf supported on its own beam; no torsion

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Steelwork SB1a · 203×133×25 UB S355	LoadTakedown (auto)	

BEAM SB1A – TO SUPPORT OUTER LEAF OF FIRST FLOOR REAR WALL

Design span	*L* (centre to centre of bearings)	**4345** mm
Section, grade	203×133×25 UB S355	
Supports	simply supported on the rear return walls	
Restraint	fork restraint at bearings; flange unrestrained	
Combination	eq. 6.10 roof leading	
Deflection limits	imposed *L*/360; total *L*/500	

Carries the brick outer leaf of rearFirst and the lean-to roof ledger; bears in the plane of the rear return walls on their outer block leaf, on a padstone.

REFERENCES



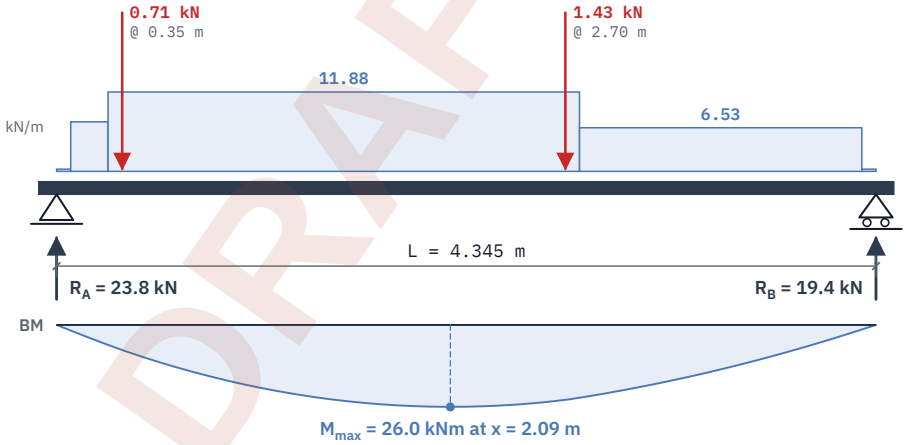
Loading, as it acts

SOURCE	FORM AND POSITION (X FROM BEARING A)	CHAR. KN	γ	ULS KN
Outer leaf over the opening (DL)	2.64 kN/m 0.07-0.27 m; 5.94 kN/m 0.27-2.77 m; 1.98 kN/m 2.77-4.27 m	18.34	1.35	24.75
Outer leaf lintel reactions (DL)	0.53 kN at 0.35 m; 1.06 kN at 2.70 m	1.58	1.35	2.14
Lean-to roof dead (DL)	1.28 kN/m 0.07-4.27 m	5.38	1.35	7.27
Beam self weight (DL)	0.25 kN/m full span	1.07	1.35	1.44
Lean-to snow drift (persistent) (LL)	1.20 kN/m 0.07-4.27 m	5.02	1.50	7.53
Total on the span	**eq. 6.10 roof leading: γ_G 1.35, floor 1.05, roof 1.50**	**31.39**		**43.13**

Loading schedule, sheet 1; takedown

Characteristic, per m of span	$g_k = 6.07$, $q_{k,floor} = 0.00$, $q_{k,roof} = 1.16$	kN/m
Equivalent UDL (information only)	$w_{eq} = (1.35 \times 6.07 + 1.50 \times 1.16)$	**9.93** kN/m

= 43.13 / 4.345; BS EN 1990 eq. 6.10; UK NA Table NA.A1.2(B)



ULS load diagram, governing combination: part UDLs in kN/m, point loads (red) at their positions; R and M_{max} from this diagram.

Supports and bearings

END	R_{Ed} KN ULS	R_k KN SLS	BEARS ON	BEARING
A	23.8	17.3	outer leaf, left return	PS1 440×215×100
B	19.4	14.1	outer leaf, right return	PS2 440×215×100

Padstones: sheet 25; foundations: sheet 32

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Steelwork SB1a · 203×133×25 UB S355	LoadTakedown (auto)	

BEAM SB1A (CONTINUED) – 203×133×25 UB S355

Section classification

REFERENCES: BS EN 1993-1-1 5.5, Table 5.2

Section class in bending	f_y = 355 N/mm², $\varepsilon = \sqrt{(235/f_y)}$	**Class 1**

Bending resistance

REFERENCES: BS EN 1993-1-1 6.2.5; sheet 21

Design bending moment	$M_{Ed} = M_{max}$ from the load diagram, at x = 2.09 m	**26.0** kNm
Bending resistance	$M_{c,Rd} = W_{pl,y} f_y / \gamma_{M0}$ = 258 × 355 / 10^3	**91.6** kNm

***PASS** – Design bending resistance exceeds design bending moment*

Shear resistance and web bearing

REFERENCES: BS EN 1993-1-1 6.2.6

Design shear force	$V_{Ed} = \max(R_A, R_B) = \max(23.8, 19.4)$	**23.8** kN
Shear resistance	$V_{pl,Rd} = A_v (f_y/\sqrt{3}) / \gamma_{M0}$	**263.4** kN
Bending and shear	$V_{Ed} < 0.5\ V_{pl,Rd}$: no reduction	6.2.8(2)
Web bearing at support	F_{Rd} (100 mm stiff bearing)	**272.1** kN — BS EN 1993-1-5 6

***PASS** – Design shear and web bearing resistances exceed design forces*

Lateral torsional buckling

REFERENCES: BS EN 1993-1-1 6.3.2.3; UK NA NA.2.17; masonry not taken as restraint

Effective length	$L_{LT} = L$ (unrestrained)	**4.345** m
Equivalent moment factor	C_1 (UDL, simply supported)	**1.13**
Destabilising load	masonry on the top flange: $z_g = +h/2$ = 101.6 mm, C_2 = 0.454.	SN003 / NCCI; masonry not restraint
Elastic critical moment	M_{cr} (C_1, C_2 method, load at top flange)	**43.9** kNm — SN003; C_1 method
Buckling curve	h/b = 203.2 / 133.2 = 1.53	**curve b** — UK NA NA.2.17
Non-dimensional slenderness	$\bar{\lambda}_{LT} = \sqrt{(W_{pl,y} f_y / M_{cr})}$ ($\bar{\lambda}_{LT,0}$ = 0.4, β = 0.75)	**1.444** — 6.3.2.3(1)
Reduction factor	χ_{LT}	**0.454** — eq. 6.57
Buckling resistance moment	$M_{b,Rd} = \chi_{LT} W_{pl,y} f_y / \gamma_{M1}$	**41.6** kNm — eq. 6.55
	$M_{Ed} / M_{b,Rd}$ = 26.00 / 41.60	**0.62**

***PASS** – Buckling resistance moment exceeds design bending moment*

Deflection

REFERENCES: BS EN 1993-1-1 7.2; UK NA NA.2.23 (imposed); E = 210 kN/mm²

Second moment of area	I_y	**2340** cm⁴
Imposed load	$\delta_Q \le$ 12.1 mm (L/360)	**1.1** mm
Total load	$\delta_{total} \le L$/500 = 8.7 mm	**7.5** mm — L/500: practice for beams carrying masonry
Span / deflection		**L/582**

***PASS** – Deflection within limits*

Summary of checks

Bending	0.28	LTB	0.62	Shear	0.09	Web bearing	0.09
Defl. imposed	0.09	Defl. total	0.86				

∴ PROVIDE 203×133×25 UB S355

Utilisation governed by deflection — **0.86** **PASS**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Steelwork SB1b · 254×146×31 UB S355	LoadTakedown (auto)	

BEAM SB1B – TO SUPPORT INNER LEAF OF FIRST FLOOR REAR WALL

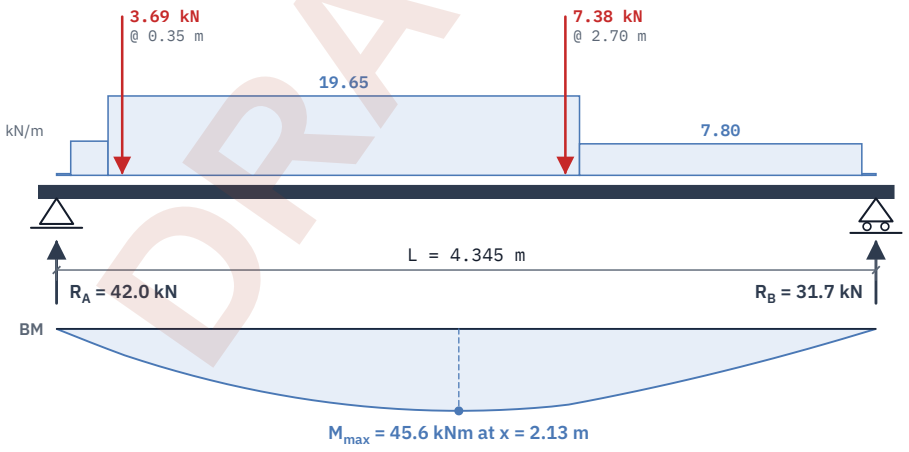
Design span	*L* (centre to centre of bearings)	**4345** mm
Section, grade	254×146×31 UB S355	
Supports	simply supported on the rear return walls	
Restraint	fork restraint at bearings; flange unrestrained	
Combination	eq. 6.10 floor leading	
Deflection limits	imposed *L*/360; total *L*/500	

Carries the block inner leaf of rearFirst, the main roof eaves and the first floor rear bay; bears in the plane of the rear return walls on their block leaf (padstone where needed).

Loading, as it acts

SOURCE	FORM AND POSITION (X FROM BEARING A)	CHAR. KN	γ	ULS KN
Inner leaf over the opening (DL)	1.95 kN/m 0.07-0.27 m; 8.29 kN/m 0.27-2.77 m; 1.46 kN/m 2.77-4.27 m	23.28	1.35	31.43
Inner leaf lintel reactions (DL)	1.95 kN at 0.35 m; 3.90 kN at 2.70 m	5.85	1.35	7.90
First floor + partitions (DL)	0.74 kN/m 0.07-0.87 m; 0.74 kN/m 0.87-4.27 m	3.09	1.35	4.17
Beam self weight (DL)	0.31 kN/m full span	1.33	1.35	1.79
Inner leaf over the opening (LL)	2.51 kN/m 0.27-2.77 m	6.28	1.05	6.59
Inner leaf lintel reactions (LL)	1.00 kN at 0.35 m; 2.01 kN at 2.70 m	3.01	1.05	3.16
First floor + partitions (LL)	2.95 kN/m 0.07-0.87 m; 2.95 kN/m 0.87-4.27 m	12.37	1.50	18.56
Total on the span	**eq. 6.10 floor leading: γ_G 1.35, floor 1.50, roof 1.05**	**55.21**		**73.60**

Characteristic, per m of span	$g_k = 7.72$, $q_{k,floor} = 2.85$, $q_{k,roof} = 2.14$	kN/m
Equivalent UDL (information only)	$w_{eq} = (1.35 \times 7.72 + 1.50 \times 2.85 + 1.05 \times 2.14)$	**16.94** kN/m



ULS load diagram, governing combination: part UDLs in kN/m, point loads (red) at their positions; R and M_{max} from this diagram.

Supports and bearings

END	R_{Ed} KN ULS	R_k KN SLS	BEARS ON	BEARING
A	42.0	31.7	inner leaf, left return	PS3 440×215×100
B	31.7	23.6	inner leaf, right return	PS4 440×215×100

REFERENCES



Loading schedule, sheet 1; takedown

= 73.60 / 4.345; BS EN 1990 eq. 6.10; UK NA Table NA.A1.2(B)

Padstones: sheet 25; foundations: sheet 32

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Steelwork SB1b · 254×146×31 UB S355	LoadTakedown (auto)	

BEAM SB1B (CONTINUED) – 254×146×31 UB S355

Section classification

			REFERENCES
Section class in bending	f_y = 355 N/mm², $\varepsilon = \sqrt{(235/f_y)}$	**Class 1**	BS EN 1993-1-1 5.5, Table 5.2

Bending resistance

Design bending moment	$M_{Ed} = M_{max}$ from the load diagram, at x = 2.13 m	**45.6** kNm	BS EN 1993-1-1 6.2.5 sheet 23
Bending resistance	$M_{c,Rd} = W_{pl,y} f_y / \gamma_{M0}$ = 393 × 355 / 10³	**139.5** kNm	

***PASS** – Design bending resistance exceeds design bending moment*

Shear resistance and web bearing

Design shear force	$V_{Ed} = \max(R_A, R_B) = \max(42.0, 31.7)$	**42.0** kN	BS EN 1993-1-1 6.2.6
Shear resistance	$V_{pl,Rd} = A_v (f_y/\sqrt{3}) / \gamma_{M0}$	**336.0** kN	
Bending and shear	$V_{Ed} < 0.5\ V_{pl,Rd}$: no reduction		6.2.8(2)
Web bearing at support	F_{Rd} (100 mm stiff bearing)	**255.2** kN	BS EN 1993-1-5 6

***PASS** – Design shear and web bearing resistances exceed design forces*

Lateral torsional buckling

Effective length	$L_{LT} = L$ (unrestrained)	**4.345** m	BS EN 1993-1-1 6.3.2.3; UK NA NA.2.17 masonry not taken as restraint
Equivalent moment factor	C_1 (UDL, simply supported)	**1.13**	
Destabilising load	masonry on the top flange: $z_g = +h/2$ = 125.7 mm, C_2 = 0.454.		SN003 / NCCI; masonry not restraint
Elastic critical moment	M_{cr} (C_1, C_2 method, load at top flange)	**67.8** kNm	SN003; C_1 method
Buckling curve	h/b = 251.4 / 146.1 = 1.72	**curve b**	UK NA NA.2.17
Non-dimensional slenderness	$\bar{\lambda}_{LT} = \sqrt{(W_{pl,y} f_y / M_{cr})}$ ($\bar{\lambda}_{LT,0}$ = 0.4, β = 0.75)	**1.434**	6.3.2.3(1)
Reduction factor	χ_{LT}	**0.459**	eq. 6.57
Buckling resistance moment	$M_{b,Rd} = \chi_{LT} W_{pl,y} f_y / \gamma_{M1}$	**64.1** kNm	eq. 6.55
	$M_{Ed} / M_{b,Rd}$ = 45.60 / 64.10	**0.71**	

***PASS** – Buckling resistance moment exceeds design bending moment*

Deflection

Second moment of area	I_y	**4410** cm⁴	BS EN 1993-1-1 7.2; UK NA NA.2.23 (imposed) E = 210 kN/mm²
Imposed load	$\delta_Q \le$ 12.1 mm (L/360)	**2.7** mm	
Total load	$\delta_{total} \le L$/500 = 8.7 mm	**7.2** mm	L/500: practice for beams carrying masonry
Span / deflection		**L/607**	

***PASS** – Deflection within limits*

Summary of checks

Bending	0.33	LTB	0.71	Shear	0.13	Web bearing	0.16
Defl. imposed	0.23	Defl. total	0.82				

∴ PROVIDE 254×146×31 UB S355

Utilisation governed by deflection **0.82** PASS

DRAFT SAMPLE

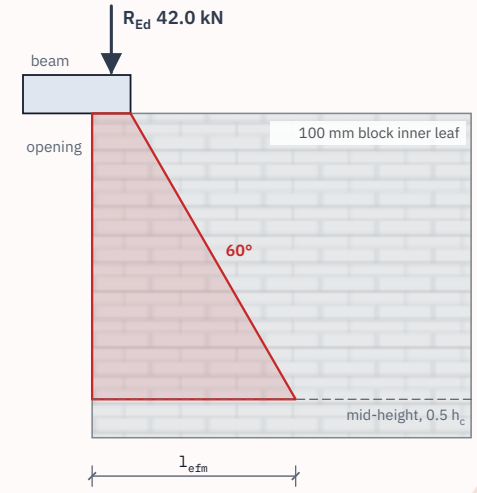
PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Padstones PS3 · SB1b	LoadTakedown (auto)	

PADSTONE PS3 – SB1B BEARING ON INNER LEAF

REFERENCES

Design reaction	R_{Ed} from *SB1b* (sheet 23)	**42.0** kN	
Masonry	medium-density aggregate concrete block, Group 1, 7.3 N/mm2		
Characteristic strength	$f_k = K f_b^{0.7} f_m^{0.3}$	**4.20** N/mm²	BS EN 1996-1-1 3.6.1.2 eq. 3.1; UK NA
Design strength	$f_d = f_k / \gamma_M = 4.20 / 2.7$	**1.555** N/mm²	UK NA to BS EN 1996-1-1 Table NA.1
Height to bearing, end distance	h_c = 2234 mm, a_1 = 0 mm (bearing at the wall end)		Fig. 6.2

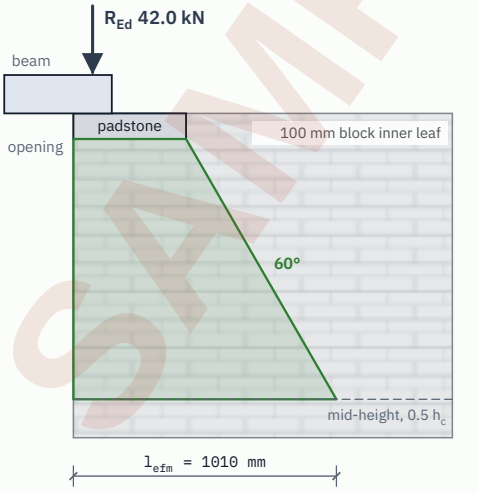
1 Beam directly on the block



A_b 15000 mm² · β 1.250 · N_{Rdc} 29.2 kN

Utilisation **1.44** FAIL

2 On 440×215×100 padstone



A_b 36500 mm² · β 1.102 · N_{Rdc} 62.6 kN

Utilisation **0.67** PASS

1 · Bearing without padstone

BS EN 1996-1-1 6.1.3, eq. 6.9 / 6.10

Bearing area (flange on leaf)	A_b	**15000** mm²	
Enhancement factor	$\beta = (1 + 0.3\,a_1/h_c)(1.5 - 1.1\,A_b/A_{ef})$	**1.250**	eq. 6.10
Resistance	$N_{Rdc} = \beta\,A_b\,f_d$	**29.2** kN	eq. 6.9

FAIL – Resistance 29.2 kN < reaction 42.0 kN (utilisation 1.44): padstone required

2 · Bearing on 440×215×100 padstone

BS EN 1996-1-1 6.1.3, eq. 6.9 / 6.10

Padstone	precast concrete C30/37, 440 long x 215 deep x leaf width		
Bearing area (padstone in leaf)	A_b	**36500** mm²	
Effective length at mid-height	l_{efm} (60° spread)	**1010** mm	Fig. 6.2
Effective area	$A_{ef} = l_{efm}\,t$	**100978** mm²	
Enhancement factor	β (cap 1.250 = min(1.25 + $a_1/2h_c$, 1.5))	**1.102**	eq. 6.10
Resistance	$N_{Rdc} = \beta\,A_b\,f_d$	**62.6** kN	eq. 6.9

PASS – Concentrated load resistance exceeds design reaction

∴ PROVIDE 440×215×100 PRECAST CONCRETE PADSTONE

Utilisation **0.67** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Padstones	LoadTakedown (auto)	

PADSTONE SCHEDULE

Every beam bearing is checked for concentrated load on the masonry (BS EN 1996-1-1 6.1.3). Where the bare bearing fails, a precast padstone is specified and the check repeated.

REF	BEAM	LEAF	R_{Ed} KN	β BARE	BARE UTIL.	PADSTONE	UTIL.	
PS1	SB1a	outer	23.8	1.25	0.82	440×215×100	0.38	PASS
PS2	SB1a	outer	19.4	1.25	0.66	440×215×100	0.31	PASS
PS3	SB1b	inner	42.0	1.25	1.44	440×215×100	0.67	PASS
PS4	SB1b	inner	31.7	1.25	1.09	440×215×100	0.51	PASS

Padstones precast concrete, bedded in M12 mortar, full width of the leaf. Beam bearing on padstone 150 mm minimum along the beam. The wall below is checked under the spread load in the takedown.

Governing bearing utilisation **0.67** PASS

REFERENCES

BS EN 1996-1-1 6.1.3, eq. 6.9 / 6.10

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Lintels L1–L18	LoadTakedown (auto)	

LINTEL SCHEDULE

Generic lintel types (no maker named) selected against a **representative** safe working load (SWL, sheet 28): an unfactored total UDL with 150 mm bearings, for the inner:outer loading ratio. The applied load is therefore **characteristic** ($G_k + Q_k$), not ULS. "Or equal": any product whose own table gives at least the SWL scheduled.

REF	WALL	STY	CLEAR	LENGTH	CODE	TYPE, RATIO	LOAD KN	SWL KN	UTIL.	OR EQUAL	
L1	Front wall	F	1100	1500	CL-S	standard duty, 19:1	8.8	14.0	0.63	yes	PASS
L2	Front wall	F	2024	2400	CL-H	heavy duty, 19:1	16.2	18.2	0.89	yes	PASS
L3	Front wall	G	950	1350	CL-S	standard duty, 19:1	6.0	14.0	0.42	yes	PASS
L4	Front wall	G	2024	2400	CL-H	heavy duty, 5:1	13.4	22.1	0.61	yes	PASS
L5	Bay side (left)	F	450	750	BAY	by bay supplier, load given	0.3	–	–	–	CALC
L6	Bay side (left)	G	450	750	BAY	by bay supplier, load given	0.3	–	–	–	CALC
L7	Bay front	F	1100	1500	BAY	by bay supplier, load given	2.5	–	–	–	CALC
L8	Bay front	G	1100	1500	BAY	by bay supplier, load given	3.0	–	–	–	CALC
L9	Bay side (right)	F	450	750	BAY	by bay supplier, load given	0.3	–	–	–	CALC
L10	Bay side (right)	G	450	750	BAY	by bay supplier, load given	0.3	–	–	–	CALC
L11	Rear extension wall	G	3500	3900	CL-XH	extra heavy duty, 3:1	15.3	24.0	0.64	yes	PASS
L12	Rear extension wall	G	1200	1500	CL-S	standard duty, 5:1	4.7	17.0	0.28	yes	PASS
L13	Left extension wall	G	900	1200	CL-S	standard duty, 1:1	1.3	23.0	0.06	yes	PASS
L14	First floor rear wall	F	800	1200	CL-S	standard duty, 19:1	6.2	14.0	0.44	yes	PASS
L15	First floor rear wall	F	1600	1950	CL-H	heavy duty, 19:1	13.1	20.3	0.65	yes	PASS
L16	Spine wall	G	850	1200	BX-S	box lintel, 100 mm, standard duty	7.9	15.0	0.52	yes	PASS
L17	Spine wall	G	1600	1950	BX-H	box lintel, 100 mm, heavy duty	15.3	18.0	0.85	yes	PASS
L18	Hall wall	G	850	1200	BX-S	box lintel, 100 mm, standard duty	0.7	15.0	0.05	yes	PASS

Load: masonry within a 60° triangle over the clear span (BS 5977-1), clipped at the wall top where the wall is shorter, plus floor and roof loads within the triangle. Bearings 150 mm minimum (ADA 2C24). Cavity tray, stop ends and weeps over all external lintels. Worked example: sheet 29.

Governing lintel utilisation (L2) bay lintels excluded: by the bay supplier **0.89** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Lintels CL-S, CL-H, CL-XH	LoadTakedown (auto)	

LINTEL TYPES: REPRESENTATIVE SWL TABLES

REPRESENTATIVE tables, not any maker's data. Generic tables (kN, unfactored total UDL, 150 mm bearings; cavity at 3:1 inner:outer, x the ratio factor), not any maker's data: the chosen product's table must give at least the SWL scheduled. Every lintel is specified by its generic type code, "or equal".

Cavity lintels, 3:1 inner : outer, 100 mm cavity

BS EN 845-2; representative

SWL kN by lintel length mm

CODE	GENERIC TYPE	1200	1350	1500	1650	1800	1950	2100	2250
CL-S	standard duty	20.0	20.0	20.0	19.0	18.0	17.0	16.0	15.0
CL-H	heavy duty	–	–	30.0	30.0	30.0	29.0	28.0	27.0
CL-XH	extra heavy duty	–	–	–	–	40.0	–	38.0	–

SWL kN by lintel length mm

CODE	GENERIC TYPE	2400	2550	2700	3000	3300	3600	4200
CL-S	standard duty	14.0	13.0	12.5	11.0	–	–	–
CL-H	heavy duty	26.0	25.0	24.0	22.0	20.0	18.0	–
CL-XH	extra heavy duty	36.0	–	34.0	32.0	30.0	28.0	24.0

Loading ratio factors on the 3:1 table 1:1 × 1.15, 3:1 × 1.00, 5:1 × 0.85, 19:1 × 0.70

Single-leaf lintels (internal walls)

representative

SWL kN by lintel length mm

CODE	GENERIC TYPE	1200	1350	1500	1650	1800	2100	2400
BX-S	box lintel, 100 mm, standard duty	15.0	14.0	13.0	12.0	11.0	9.5	8.0
BX-H	box lintel, 100 mm, heavy duty	25.0	–	23.0	–	20.0	18.0	15.0
PC-100	precast concrete lintel, 100 x 215	35.0	–	33.0	–	30.0	27.0	24.0

CL-S: cavity lintel, standard duty; CL-H: heavy duty; CL-XH: extra heavy duty. The bifold lintel L11 is CL-XH; the bifold maker must confirm the head deflection their doors need.

***PASS** – Each scheduled SWL exceeds the characteristic load (lintel schedule)*

DRAFT SAMPLE

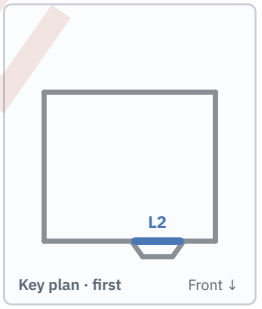
PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Lintels L2	LoadTakedown (auto)	

LINTEL L2 – FRONT WALL, FIRST STOREY

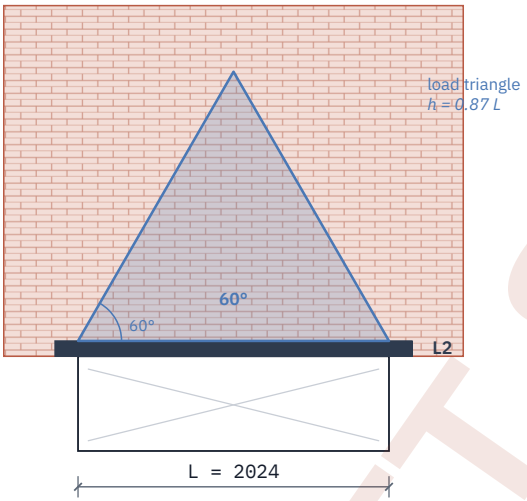
Clear span	L	**2024** mm
Lintel length	L + 2 × 150 bearing (to stock length)	**2400** mm
Type	cavity lintel, heavy duty, 19:1	
Loading ratio (inner : outer)	actual 5.97 : 1	**19:1**

60 deg triangle clipped at the wall top 0.30 m above the head.

REFERENCES



BS 5977-1:1981



Masonry within the 60° triangle bears on the lintel; loads above the apex arch onto the abutments.

Load on lintel (characteristic)

BS 5977-1 cl. 3

Masonry area in triangle	A	**0.555** m²
Masonry in triangle	$A \times w_{wall}$	**2.12** kN
First floor within triangle	$G_k + Q_k$	**0.00** kN
Roof within triangle	$G_k + Q_k$	**14.09** kN
Split	G_k = 10.69, Q_k = 5.52	kN
Inner / outer leaf	13.88 / 2.33 kN	
Total characteristic load	W	**16.21** kN

loading schedule, sheet 2

Selection

Safe working load	SWL (19:1)	**18.2** kN
	W / SWL = 16.21 / 18.2	**0.89**

representative generic SWL (unfactored total UDL), not a product

***PASS** – Safe working load exceeds characteristic load*

∴ PROVIDE 2400 MM CAVITY LINTEL, HEAVY DUTY, 19:1

Utilisation	**0.89** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: piers PR1	LoadTakedown (auto)	

PIER PR1 – FRONT WALL, GROUND STOREY



inner leaf elevation. The pier carries the masonry over it and the lintel or beam reactions either side.

Loads to pier

Tributary length of wall	0 → 1324 mm		
Characteristic	G_k = 13.50, $Q_{k,floor}$ = 4.96, $Q_{k,roof}$ = 3.33	kN	
Design load at top	$N_{Ed,top}$	**29.2** kN	BS EN 1990 eq. 6.10; UK NA Table NA.A1.2(B)
Design load at mid-height	$N_{Ed,m}$	**31.1** kN	

Vertical resistance

BS EN 1996-1-1 6.1.2; Annex G

Pier width, loaded leaf	b = 849 mm, t = 100 mm		
Design strength	$f_d = f_k / \gamma_M$ = 2.56 / 2.7	**0.948** N/mm²	BS EN 1996-1-1 3.6.1.2 eq. 3.1; UK NA 6.1.2.1(3)
Small area factor	A = 0.0849 m² < 0.1: 0.7 + 3A	**0.955**	
Effective height	$h_{ef} = \rho_2 h$, ρ_2 = 1.0 (timber floor)	**2480** mm	5.5.1.2
Effective thickness	$t_{ef} = \sqrt[3]{(t_1^3 + t_2^3)}$	**127.6** mm	5.5.1.3
Slenderness	$h_{ef} / t_{ef} \le 27$	**19.4**	5.5.1.4
Eccentricity, top	e_i (≥ 0.05t)	**10.70** mm	6.1.2.2
Capacity reduction, top	$\Phi_i = 1 - 2\,e_i / t$	**0.786**	eq. 6.4
Eccentricity, mid-height	e_{mk}	**9.60** mm	Annex G
Capacity reduction, mid-height	Φ_m	**0.542**	Annex G
Resistance	$N_{Rd} = \Phi_m\, b\, t\, f_d$ × area factor	**41.7** kN	eq. 6.2

***PASS** – Vertical resistance exceeds design load*

∴ PROVIDE 849 MM PIER, 3.6 N/MM² BLOCK, M4 MORTAR

Utilisation	0.75	PASS

REFERENCES

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Masonry: piers PR1–PR15	LoadTakedown (auto)	

PIER SCHEDULE

Every pier of masonry between openings, and between an opening and a corner, is checked for vertical load (BS EN 1996-1-1 6.1.2) in the loaded inner leaf. Worked example: sheet 30.

REFERENCES

BS EN 1996-1-1 6.1.2; Annex G

REF	WALL	STY	WIDTH MM	h_{ef}/t_{ef}	Φ_m	N_{Ed} KN	N_{Rd} KN	UTIL.	
PR1	Front wall	G	849	19.4	0.542	31.1	41.7	0.75	PASS
PR2	Front wall	F	1338	20.4	0.407	31.6	51.6	0.61	PASS
PR3	Bay side (left)	G	205	19.4	0.596	3.2	8.8	0.36	PASS
PR4	Bay side (left)	F	205	20.4	0.549	1.2	8.1	0.14	PASS
PR5	Bay side (right)	G	205	19.4	0.596	3.2	8.8	0.36	PASS
PR6	Bay side (right)	F	205	20.4	0.549	1.2	8.1	0.14	PASS
PR7	Rear extension wall	G	849	21.2	0.422	13.9	32.4	0.43	PASS
PR8	Rear extension wall	G	1400	21.2	0.424	20.5	56.3	0.36	PASS
PR9	Rear extension wall	G	749	21.2	0.432	7.9	28.4	0.28	PASS
PR10	Left extension wall	G	349	21.2	0.543	2.0	14.5	0.14	PASS
PR11	Hall wall	G	150	24.8	0.458	1.7	4.8	0.34	PASS
PR12	Rear return wall (left)	G	1600	19.7	0.595	53.8	148.0	0.43	PASS
PR13	Rear return wall (left)	G	1600	19.7	0.595	85.3	148.0	0.69	PASS
PR14	Rear return wall (right)	G	1600	19.7	0.595	52.2	148.0	0.40	PASS
PR15	Rear return wall (right)	G	1600	19.7	0.595	85.3	148.0	0.66	PASS

15 piers · governing utilisation **0.75** PASS

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Foundation loads	LoadTakedown (auto)	

REFERENCES

FOUNDATION LOADS

Characteristic line loads per wall. Each row multiplies out: kN/m² on plan (imposed includes partitions, 2.0 kN/m² on floors) × distance (the real span share: the engine's load on the wall ÷ (kN/m² × wall length), i.e. the **mean over the wall length**) × factor 1.0. The ground floor is half the span each side. The footing uses the peak along the wall where the load is not uniform.

Position **Front wall** — SLS **54.4** kN/m · ULS **73.3** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Main roof	1.166	0.50	3.349	1.0	=	3.90	1.67
Bay roof	1.166	0.50	0.076	1.0	=	0.09	0.04
Main roof loft ceiling (imposed)	0.000	0.25	3.349	1.0	=	0.00	0.84
Bay roof ceiling (imposed)	0.000	0.25	0.084	1.0	=	0.00	0.02
First floor	0.500	2.00	1.958	1.0	=	0.98	3.92
Ground floor, beam and block	3.180	2.00	1.874	1.0	=	5.96	3.75
Masonry self weight (mean less rows)					=	14.17	0.00
Sum: mean over the wall length					**=**	**25.1**	**10.2**
Footing: peak along the wall						**40.5**	**13.8**

Position **Bay side (left)** — SLS **20.0** kN/m · ULS **27.0** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Bay roof	1.166	0.50	0.175	1.0	=	0.20	0.09
Bay roof ceiling (imposed)	0.000	0.25	0.102	1.0	=	0.00	0.03
First floor	0.500	2.00	0.102	1.0	=	0.05	0.20
Masonry self weight (mean less rows)					=	15.25	0.00
Sum: mean over the wall length					**=**	**15.5**	**0.3**
Footing: peak along the wall						**19.6**	**0.4**

Position **Bay front** — SLS **15.0** kN/m · ULS **20.3** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Bay roof	1.166	0.50	0.303	1.0	=	0.35	0.15
Bay roof ceiling (imposed)	0.000	0.25	0.350	1.0	=	0.00	0.09
First floor	0.500	2.00	0.350	1.0	=	0.17	0.70
Masonry self weight (mean less rows)					=	12.21	0.00
Sum: mean over the wall length					**=**	**12.7**	**0.9**
Footing: peak along the wall						**14.0**	**1.1**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT **Foundation loads**	**CALC BY** LoadTakedown (auto)	**CHECKED BY**

REFERENCES

FOUNDATION LOADS (CONTINUED)

Position **Bay side (right)** — SLS **20.0** kN/m · ULS **27.0** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Bay roof	1.166	0.50	0.175	1.0	=	0.20	0.09
Bay roof ceiling (imposed)	0.000	0.25	0.102	1.0	=	0.00	0.03
First floor	0.500	2.00	0.102	1.0	=	0.05	0.20
Masonry self weight (mean less rows)					=	15.25	0.00
Sum: mean over the wall length					**=**	**15.5**	**0.3**
Footing: peak along the wall						**19.6**	**0.4**

Position **Right gable wall** — SLS **29.6** kN/m · ULS **40.0** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Masonry self weight (mean less rows)					=	25.13	0.00
Sum: mean over the wall length					**=**	**25.1**	**0.0**
Footing: mean + ½ apex masonry						**29.6**	**0.0**

Position **Right extension wall** — SLS **12.9** kN/m · ULS **17.4** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Masonry self weight (mean less rows)					=	11.60	0.00
Sum: mean over the wall length					**=**	**11.6**	**0.0**
Footing: peak along the wall						**12.9**	**0.0**

Position **Rear extension wall** — SLS **35.4** kN/m · ULS **47.9** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Lean-to roof	1.026	0.60	1.250	1.0	=	1.28	0.75
Ground floor, beam and block	3.180	2.00	2.724	1.0	=	8.66	5.45
Masonry self weight (mean less rows)					=	6.05	0.00
Sum: mean over the wall length					**=**	**16.0**	**6.2**
Footing: peak along the wall						**27.6**	**7.7**

Position **Left extension wall** — SLS **14.3** kN/m · ULS **19.4** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Masonry self weight (mean less rows)					=	8.71	0.00
Sum: mean over the wall length					**=**	**8.7**	**0.0**
Footing: peak along the wall						**14.3**	**0.0**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT **Foundation loads**	**CALC BY** LoadTakedown (auto)	**CHECKED BY**

REFERENCES

FOUNDATION LOADS (CONTINUED)

Position **Left gable wall** — SLS **29.6** kN/m · ULS **40.0** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Masonry self weight (mean less rows)					=	25.13	0.00
Sum: mean over the wall length					=	**25.1**	**0.0**
Footing: mean + ½ apex masonry						**29.6**	**0.0**

Position **Spine wall** — SLS **44.5** kN/m · ULS **63.0** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
First floor	0.500	2.00	3.349	1.0	=	1.67	6.70
Ground floor, beam and block	3.180	2.00	4.599	1.0	=	14.62	9.20
Masonry self weight (mean less rows)					=	5.01	0.00
Sum: mean over the wall length					=	**21.3**	**15.9**
Footing: peak along the wall						**24.8**	**19.7**

Position **Hall wall** — SLS **10.8** kN/m · ULS **14.6** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Masonry self weight (mean less rows)					=	5.47	0.00
Sum: mean over the wall length					=	**5.5**	**0.0**
Footing: peak along the wall						**10.8**	**0.0**

Position **Rear return wall (left)** — SLS **59.0** kN/m · ULS **79.1** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Main roof (via rearFirst eaves)	1.166	0.50	3.349	1.0	=	3.90	1.67
Main roof loft ceiling (imposed)	0.000	0.25	3.349	1.0	=	0.00	0.84
First floor	0.500	2.00	1.474	1.0	=	0.74	2.95
Lean-to roof	1.026	0.60	1.250	1.0	=	1.28	0.75
SB1 end reaction	34.5 kN	13.7 kN	÷ 1.751 m		=	19.67	7.84
Masonry self weight (mean less rows)					=	19.37	0.00
Sum: mean over the wall length					=	**45.0**	**14.1**
Footing: sum of the rows						**45.0**	**14.1**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Foundation loads	LoadTakedown (auto)	

REFERENCES

FOUNDATION LOADS (CONTINUED)

Position **Rear return wall (right)** SLS **57.2** kN/m · ULS **76.9** kN/m

SOURCE	DL	LL	DISTANCE	FACTOR		DL KN/M	LL KN/M
Main roof (via rearFirst eaves)	1.166	0.50	3.349	1.0	=	3.90	1.67
Main roof loft ceiling (imposed)	0.000	0.25	3.349	1.0	=	0.00	0.84
First floor	0.500	2.00	1.474	1.0	=	0.74	2.95
Lean-to roof	1.026	0.60	1.250	1.0	=	1.28	0.75
SB1 end reaction	25.0 kN	11.1 kN	÷ 1.751 m		=	14.26	6.33
Masonry self weight (mean less rows)					=	23.46	0.00
Sum: mean over the wall length					**=**	**43.6**	**12.5**
Footing: peak along the wall						**43.6**	**13.5**

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Foundations	LoadTakedown (auto)	

STRIP FOUNDATIONS

Assumed ground	firm clay (assumed), medium volume change potential	
Allowable bearing (assumed)	q_{allow}	**100** kN/m²
Foundation type	mass concrete trench fill, C25/30	
Minimum depth	medium VCP clay, no trees in influence	**1000** mm
Governing wall	Rear return wall (left)	
Line load (SLS, peak)	$w = G_k + Q_k$	**59.0** kN/m
Net weight of trench fill	Δq	**6** kN/m²
Width required	$B = w / (q_{allow} - \Delta q)$	**628** mm
ADA Table 10 width (firm clay)		**750** mm
Width adopted	B (min. practical trench width)	**750** mm
Bearing pressure	$q = w / B + \Delta q$	**84.7** kN/m²

PASS – Bearing pressure within presumed allowable

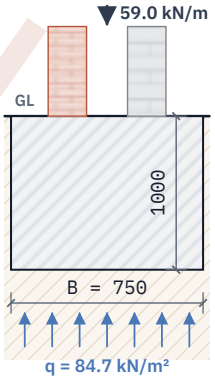
Schedule

WALL	SLS KN/M	ULS KN/M	B MM	DEPTH MM	Q KN/M²	UTIL.	
Front wall	54.4	73.3	750	1000	78.5	0.78	PASS
Bay side (left)	20.0	27.0	600	1000	39.4	0.39	PASS
Bay front	15.0	20.3	600	1000	31.1	0.31	PASS
Bay side (right)	20.0	27.0	600	1000	39.4	0.39	PASS
Right gable wall	29.6	40.0	600	1000	55.3	0.55	PASS
Right extension wall	12.9	17.4	600	1000	27.5	0.27	PASS
Rear extension wall	35.4	47.9	600	1000	65.0	0.65	PASS
Left extension wall	14.3	19.4	600	1000	29.9	0.30	PASS
Left gable wall	29.6	40.0	600	1000	55.3	0.55	PASS
Spine wall	44.5	63.0	600	1000	80.2	0.80	PASS
Hall wall	10.8	14.6	450	1000	30.1	0.30	PASS
Rear return wall (left)	59.0	79.1	750	1000	84.7	0.85	PASS
Rear return wall (right)	57.2	76.9	750	1000	82.2	0.82	PASS

Depth 1.0 m minimum on clay of assumed medium volume change potential, outside tree influence (NHBC 4.2). The engineer to confirm soil plasticity and trees; deepen where trees are within influence distance. Existing ground to be inspected by Building Control at formation level.

Governing strip foundation utilisation **0.85** PASS

REFERENCES



ADA 2E; BS 8004

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
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SUBJECT	**CALC BY**	**CHECKED BY**
Robustness and connections	LoadTakedown (auto)	

ROBUSTNESS AND CONNECTIONS

REFERENCES

Disproportionate collapse

Building Regulations A3; ADA Section 5

Consequence Class 1 (AD A Table 11): no additional measures; floors and roof strapped to walls at <= 2 m (AD A 2C35/2C36). Lateral restraint straps on sheet 14.

Connections schedule

BS EN 1993-1-8; SCI P358

CONNECTION	DETAIL	DESIGN FORCE
SB1a / SB1b pair	M16 grade 8.8 bolts through tube spacers at the bearings and 600 c/c (typical details)	–
SB1b to the rear returns	bearing on precast padstones (sheet 26)	42.0 kN
Joists to SB1b	Rear bay: SB1b (joist hangers on a 47 mm timber plate bolted to the web) to the spine wall.	2.07 kN/joist
L11 (bifold) to masonry	150 mm bearing on both leaves (PR8 inner leaf in 3.6 N/mm² block, checked)	7.7 kN char.
Lean-to ledger to house wall	ledger bolted through outer leaf over SB1a	–
Trussed rafters to wall plate	truss clips at every bearing; holding-down straps	–

No moment connections are required: stability is provided by the masonry shear walls. Fabricator to provide connection details for the engineer's review.

Fire

SB1a and SB1b are inside the house (under rearFirst, between the returns): both protected to R30 by two layers of 12.5 mm fire-rated board on noggings or an intumescent coating tested for R30 (typical details, sheet 38). No steel shows in the facing brick.

***PASS** – Class 1: robustness by normal design and tying*

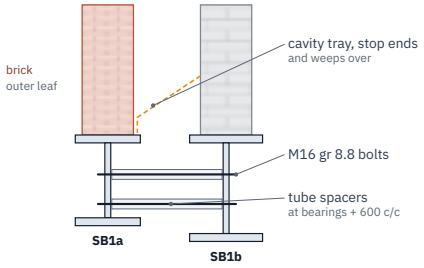
DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Typical details 5 sketches	LoadTakedown (auto)	

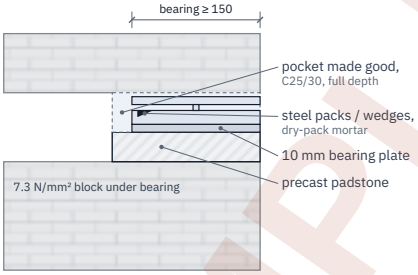
REFERENCES

TYPICAL DETAILS (SKETCHES, NOT TO SCALE)

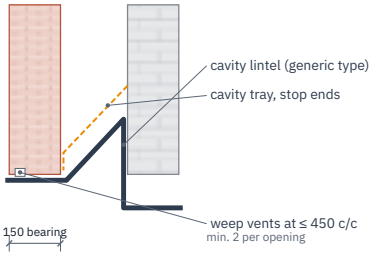
1 · SB1a / SB1b pair in section



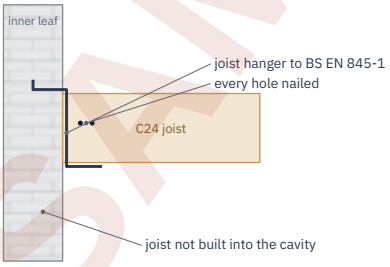
2 · Padstone bearing in a pocket



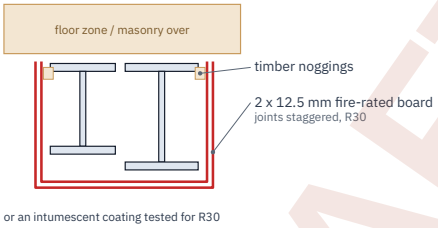
3 · Cavity tray over a lintel



4 · Joist hanger



5 · Fire boarding to the steel, R30



Sketches show intent only; dimensions and specifications are in the structural notes (sheet v) and on the element sheets.

DRAFT SAMPLE

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SUBJECT	**CALC BY**	**CHECKED BY**
CDM annex	LoadTakedown (auto)	

ANNEX: CDM 2015, DOMESTIC CLIENT DUTIES

The Construction (Design and Management) Regulations 2015 apply to domestic projects. This annex summarises the duties for the client, prepared for information.

Domestic client

1. A domestic client's duties are normally carried out by the contractor (one contractor) or the principal contractor (more than one).
2. The client may instead agree in writing that the principal designer carries out the client duties.
3. Where the client does not appoint a principal designer or principal contractor on a project with more than one contractor, the designer in control of the pre-construction phase and the contractor in control of the construction phase take on those roles.

Client duties (as carried out on the client's behalf)

1. Make suitable arrangements for managing the project, including time and resources (reg. 4).
2. Provide pre-construction information to every designer and contractor (reg. 4).
3. Ensure a construction phase plan is drawn up before work starts (reg. 4).
4. Ensure welfare facilities are provided (reg. 4, Schedule 2).
5. Ensure a health and safety file is prepared where there is more than one contractor.
6. Notify HSE (F10) if the work lasts more than 30 working days with more than 20 workers at once, or exceeds 500 person-days (reg. 6).

Designer's risk note for this design

Risk is normal for this type of project. No unusual residual hazards have been identified in the structural design. SB1a and SB1b are a two-person or mechanical lift. Temporary propping of the first floor rear wall during the SB1 installation is the contractor's responsibility.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Engineer's notes added page	LoadTakedown (auto)	

ENGINEER'S NOTES (ADDED PAGE)

Added by _____ **Date** _____

Refers to sheet(s) _____

Additional calculations, sketches or comments by the checking engineer. Insert after the sheet they refer to and list them in the revision notes.

DRAFT SAMPLE

PROJECT	JOB NO.	DATE
Example House 3 bed detached house · new build (example project)	LTD-EX-001	29 Oct 2026
SUBJECT	**CALC BY**	**CHECKED BY**
Sign-off	LoadTakedown (auto)	

Ready for your review and sign-off

61 elements · 130 checks · 128 pass · **2 supplier designs to review**

Before signing, the checking engineer should

1. Confirm every item in the assumptions and site-verification register (sheet vii).
2. Review the supplier items and the CALC items on sheet viii, and pass the site notes to the contractor.
3. Check spans, loads and member sizes against the drawings and experience.
4. Review the trussed rafter supplier design and reactions when issued.
5. Confirm founding conditions on excavation with Building Control.

CALC BY	LoadTakedown (auto) · LoadTakedown engine 2.19.0 (wall engine 1.11.0)	DATE	29 Oct 2026
CHECKED BY		**CEng MIStructE / MICE**	
NAME		MEMBERSHIP NO.	
SIGNATURE		DATE	
PRACTICE		PI INSURER	

Engineer's initials are stamped into every sheet's Checked box on sign-off.

By signing, the engineer accepts responsibility for the structural design as the designer. LoadTakedown prepares the draft calculations and check trail; it does not replace the engineer's review.

DRAFT SAMPLE