



477 New Hey Road, Huddersfield

ES1633

SCOPE

Design calculations for proposed works for Rear Single Storey Extension

FROM SITE MEASUREMENTS



RELEVANT ARCHITECTURAL DRAWINGS



RIM ARCHITECTURE

RELEVANT CODES OF PRACTICE

	BRITISH STANDARDS	EUROCODES
GENERAL	Building Regulations 2010 PP7312 :2002	EN 1990 - Eurocode 0: Basis of structural design
LOADING	BS 6399 (1:1996 ; 2:1997 ; 3:1988)	EN 1991 - Eurocode 1: Actions on structures
STEELWORK	BS 5950 (1: 2000) SCI Steelwork Design Guide to BS 5950 - 6 th Edition	EN 1993 - Eurocode 3: Design of steel structures
TIMBER	BS 5268 (2:2002 ; 3:1998)	EN 1995 - Eurocode 5: Design of timber structures
MASONRY	BS 5628 (1:1992 ; 2:2000)	EN 1996 - Eurocode 6: Design of masonry structures
CONCRETE	BS 8110 (1:1997)	EN 1992 - Eurocode 2: Design of concrete structures
FOUNDATIONS	BS 8004 (1986)	

NOT FOR BUILDERS
Builders must use drawings only

LOADINGS			Project.	
			477 New Hey Road, Huddersfield	
	Prepared by.		Project Ref.	ES1633
	Sheet No. or		Date	31/07/2026
		<u>LOADS</u>	<u>SLS</u>	<u>ULS</u>
ROOF				
Coverings (Tiles)		0.60		
Battens, Felt, Insulation		0.05		
Rafters / Trussed Rafters		0.15		
Ceiling Joists		0.25		
Ceiling				
DEAD		1.05		
IMPOSED		0.75		1.20
TOTAL		1.80		2.70
FLAT ROOF				
Chippings, 3 Layer Felt, Boards, Joists, Insulation & Ceiling		0.80		1.12
FLOOR				
Coverings		0.10		
Joists/PC Planks		0.15		
Ceiling		0.25		
Partitions generally				
DEAD		0.50		0.70
IMPOSED		1.50		2.40
TOTAL		2.00		3.10
WALLS				
Brickwork outer leaf (102 mm - fair faced)		2.00		2.80
Brickwork outer leaf (102 mm - rendered)		2.50		3.50
Brickwork inner leaf (102 mm - plastered)		2.25		3.15
Blockwork inner Leaf (100mm - plastered /1)		1.75		2.50
Blockwork partition (100mm - plastered/2)		2.10		3.00
Timber stud (75mm - plastered/2)		0.70		1.00
Lightweight stud		0.50		0.70



Project.

477 New Hey Road, Huddersfield

Prepared by.

SB

Project Ref.

ES1633

Sheet No.

02

Date

31/07/2026

R1- BIFOLD STAIR e 6000mm SPAN

LOAD

DL

LL

ROOF

$1.05 \times (3\frac{1}{2})$

$0.75 \times (3\frac{1}{2})$

WALL

0.75×2.75

W

2.51kN

1.4kN

EXT WALL

0.6kN

REF CALC SHEET
03



USE 203x203x46kg/m
UL

R2- LANTERN TRIMS I e 4000mm SPAN

LOAD

DL

LL

ROOF

$0.8 \times (3\frac{1}{2})$

$0.75 \times (3\frac{1}{2})$

W

1.2kN

1.13kN

REF CALC SHEET
05



USE THREE 175x50mm (24
ROPE JOISTS)

R3- LANTERN TRIMS II e 2700mm SPAN

LOAD

DL

LL

ROOF

$0.8 \times (4\frac{1}{2})$

$0.75 \times (4\frac{1}{2})$

W

1.8kN

1.65kN

PL (R2) e 891mm + 301mm

2.4 kN

2.3 kN

REF CALC SHEET
06



USE 178x102x19kg/m
UB

J4- Flat Roof Joists e 3700mm

LOAD

DL

LL

ROOF

0.8x0.4

0.75x0.4

W

0.32kN

0.31kN

REF CALC SHEET
08



USE 175x50mm (16
ROPE JOISTS)
e 4w d/c



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Project 477 New Hey Road, Huddersfield				Job Ref. ES1633	
Section B1				Sheet no./rev. 03	
Calc. by SB	Date 31/07/26	Chk'd by	Date	App'd by	Date

Analysis for simple beam with torsion to BS 5950 & SCI-P-057

TEDDS calculation version 1.0.02

Span length & partial factors for loading

Span (mm)	γ_{fd}	Factors for moments & forces			Factors for deflection		
		γ_{fi}	γ_{fw}	γ_{dd}	γ_{di}	γ_{dw}	
6000	1.40	1.60	0.00	1.00	1.00	1.00	

Load descriptions

Loads are applied normal to the major principal axis (x-axis) of the member.

Ref.	Category	Description
1	"Dead"	"roof+wall"
2	"Imposed"	"roof"
3	"Dead"	"ext wall"

Loading data

Ref. #	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm	Eccentricity mm
1	"Dead"	UDL	2.5	0	-	6000	0
2	"Imposed"	UDL	1.4	0	-	6000	0
3	"Dead"	UDL	0.6	0	-	6000	213

Analysis results - entire span

R_a kN (fac)	R_b kN (fac)	F_{vy} kN (fac)	M_x kNm (fac)	T_q kNm (fac)	Deflection: $\delta E I_x$		
			Sense		kNm ³	Direction	
19.8	19.8	19.8	29.7	"Sagging"	1.07	76.11	"Down"

Unfactored support reactions

Support A;	Dead load; -9.3 kN;	Live load; -4.2 kN;	Wind load; 0.0 kN;
Support B;	Dead load; -9.3 kN;	Live load; -4.2 kN;	Wind load; 0.0 kN;

LTB segment results

Seg.	x_s mm	x_e mm	L_{LT} mm	M_{LT} kNm (fac)	M_{mLT2} kNm (fac)	M_{mLT3} kNm (fac)	M_{mLT4} kNm (fac)
1	0	6000	4160	29.7	22.3	29.7	22.3

Member design checks for simple beam with torsion to BS 5950 & SCI-P-057

Tedds calculation version 1.0.05

Summary

Span & restraint	L = 6000 mm	Torsion fixed & warping free each end.
Design load effects	$F_{vy} = 19.8$ kN; $M_x = 29.7$ kNm $T_q = 1.07$ kNm; torsion from uniformly distributed loads.	
Material	Grade = "S275"	$p_y = 275$ N/mm ²
Section	"UKC 203x203x46"	"Compact"

Check;	Load;	Capacity;	Notes;	Result;
Deflection;	$\delta_{y_max} = 8.1$ mm;	$\delta_{lim} = 10.0$ mm;	Span / 360 or 10.0 mm;	Pass
Twist angle	$\phi_{sld} = 1.32$ deg	$\phi_{lim} = 2.00$ deg	$T_{qu} = 0.77$ kNm	Pass
Shear;	$F_{vy} = 19.8$ kN;	$P_{vy} = 241.4$ kN;	Low shear;	Pass;
Moment;	$M_x = 29.7$ kNm;	$M_{cx} = 136.8$ kNm;	Low shear;	Pass



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Project		477 New Hey Road, Huddersfield		Job Ref.		ES1633	
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Calc. by	Date	Chk'd by	Date	App'd by	Date		
SB	31/07/26						

LTB;	$M_{LT} = 29.7 \text{ kNm};$	M_b / m_{LT} $= 118.4 \text{ kNm};$	$L_{E_{LT}} = 4.2 \text{ m};$ $m_{LT} = 0.93;$	Pass;
Overall buckling	Index; $i_b = 0.344$	Limit = 1.0	$\sigma_{byt} = 6 \text{ N/mm}^2$ $\sigma_w = 16 \text{ N/mm}^2$	Pass
Local capacity	$\sigma_{bx} + \sigma_{byt} + \sigma_w$ $= 89 \text{ N/mm}^2$	$p_y = 275 \text{ N/mm}^2$	$\sigma_{bx} = 66 \text{ N/mm}^2$ $\sigma_{byt} = 6 \text{ N/mm}^2$ $\sigma_w = 16 \text{ N/mm}^2$	Pass
Combined shear stresses	$\tau_w = 26 \text{ N/mm}^2$ $\tau_t = 22 \text{ N/mm}^2$	$p_v = 165 \text{ N/mm}^2$	Web governs	Pass



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Project 477 New Hey Road, Huddersfield				Job Ref. ES1633	
Section R2				Sheet no./rev. 05	
Calc. by SB	Date 31/07/26	Chk'd by	Date	App'd by	Date

Analysis for a simply-supported single-span timber beam to BS 5268

TEDDS calculation version 1.0.02

Span length & partial factors for loading

Span (mm)	γ_{fd}	Factors for moments & forces			Factors for deflection	
		γ_{fi}	γ_{fw}	γ_{dd}	γ_{di}	γ_{dw}
4000	1.00	1.00	1.00	1.00	1.00	1.00

Loading data (unfactored)

Ref.	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm
1	"Dead"	"roof"				
2	"Imposed"	"roof"				

Loading data (unfactored)

Ref.	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm
1	"Dead"	UDL	1.2	0	-	4000
2	"Imposed"	UDL	1.1	0	-	4000

Analysis results - entire span

R_s kN (fac)	R_b kN (fac)	V kN (fac)	M kNm (fac)	Sense	Deflection: δEI kNm ³	Direction
4.7	4.7	4.7	4.7	"Sagging"	7.77	"Down"

Unfactored support reactions

Support A;	Dead load; -2.4 kN;	Live load; -2.3 kN;	Wind load; 0.0 kN;
Support B;	Dead load; -2.4 kN;	Live load; -2.3 kN;	Wind load; 0.0 kN;

Member design checks for a simply-supported single-span timber beam to BS 5268

Timber member design BS 5268-2:2002

Summary of results;				
Section size;	D = 175 mm;	B = 150 mm;	A= 26250 mm ² ;	
Section properties (x-x);	I _{xx} = 66992187 mm ⁴ ;	Z _{xx} = 765625 mm ³ ;	r _{xx} = 50.5 mm;	
(y-y);	I _{yy} = 49218750 mm ⁴ ;	Z _{yy} = 656250 mm ³ ;	r _{yy} = 43.3 mm;	
Grade;	"C24";	σ _c = 7.90 N/ mm ² ;		
Check;	Stress;	Capacity;	Notes;	Result;
Bending stress;	σ _{m.s,para} = M / Z _{xx} = 6.09 N/mm ² ;	σ _{m.adm,para} = 7.96 N/mm ² ;	Moment; M = 4.7 kNm;	Pass
Shear stress;	τ _a = 0.27 N/mm ² ;	τ _{adm} = 0.71 N/mm ² ;	Shear; V = 4.7 kN;	Pass
Deflection;	δ = 11.1 mm;	14 mm;		Pass
	δ / L _s = 0.00276;	0.003;		Pass



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Project 477 New Hey Road, Huddersfield				Job Ref. ES1633	
Section R3				Sheet no./rev. 06	
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Analysis for a simply-supported single-span beam to BS 5950 (with LTB)

TEDDS calculation version 1.0.02

Span length & partial factors for loading

Span (mm)	Factors for moments & forces			Factors for deflection		
	γ_{fd}	γ_{fi}	γ_{fw}	γ_{dd}	γ_{di}	γ_{dw}
3700	1.40	1.60	0.00	1.00	1.00	1.00

Load descriptions

Loads are applied normal to the major principal axis (x-axis) of the member.

Ref.	Category	Description
1	"Dead"	"roof"
2	"Imposed"	"roof"
3	"Dead"	"r2"
4	"Imposed"	"r2"
5	"Dead"	"r2"
6	"Imposed"	"r2"

Loading data (unfactored)

Ref.	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm
1	"Dead"	UDL	1.8	0	-	3700
2	"Imposed"	UDL	1.7	0	-	3700
3	"Dead"	Point load	2.4 kN	891	-	-
4	"Imposed"	Point load	2.3 kN	891	-	-
5	"Dead"	Point load	2.4 kN	3017	-	-
6	"Imposed"	Point load	2.3 kN	3017	-	-

Analysis results - entire span

R_a kN (fac)	R_b kN (fac)	F_{vy} kN (fac)	M_x kNm (fac)	Sense	Deflection: δEI_x kNm ³	Direction
16.2	17.0	17.0	14.4	"Sagging"	14.35	"Down"

Unfactored support reactions

Support A;	Dead load; -5.6 kN;	Live load; -5.2 kN;	Wind load; 0.0 kN;
Support B;	Dead load; -5.9 kN;	Live load; -5.5 kN;	Wind load; 0.0 kN;

LTB segment results

Seg. #	$x_{a\#}$ mm	$x_{e\#}$ mm	$L_{\#}$ mm	$F_{vy\#}$ kN (fac)	$M_{x\#}$ kNm (fac)	$M_{mLT2_{\#}}$ kNm (fac)	$M_{mLT3_{\#}}$ kNm (fac)	$M_{mLT4_{\#}}$ kNm (fac)
1	0	891	891	16.2	12.4	3.5	6.7	9.7
2	891	2891	2000	5.8	14.4	14.0	14.3	13.4
3	2891	3700	809	17.0	11.2	9.4	6.4	3.3

Member design checks for a simply-supported single-span beam to BS 5950 (with LTB)

Summary of results;

Material;	Grade = "S275";	$p_y = 275 \text{ N/mm}^2$;
Section;	"UB 178x102x19";	Classification; "Plastic";



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477 New Hey Road, Huddersfield				ES1633	
Section				Sheet no./rev.	
R3				07	
Calc. by	Date	Chk'd by	Date	App'd by	Date
SB	31/07/26				

Check;	Load;	Capacity;	Notes;	Result;
Deflection;	$\delta_{y_max} = 5.2 \text{ mm};$	$\delta_{lim} = 10.0 \text{ mm};$	Span / 360 or 10.0 mm;	Pass
Shear;	$F_{vy} = 17.0 \text{ kN};$	$P_{vy} = 140.8 \text{ kN};$	Low shear;	Pass;
Moment in segment 1;	$M_{x1} = 12.4 \text{ kNm};$	$M_{cx1} = 47.1 \text{ kNm};$	Low shear;	Pass
Moment in segment 2;	$M_{x2} = 14.4 \text{ kNm};$	$M_{cx2} = 47.1 \text{ kNm};$	Low shear;	Pass
Moment in segment 3;	$M_{x3} = 11.2 \text{ kNm};$	$M_{cx3} = 47.1 \text{ kNm};$	Low shear;	Pass
LTB - segment 1;	$M_{LT1} = 12.4 \text{ kNm};$	M_{b1} / m_{LT1} $= 74.8 \text{ kNm};$	$L_{E_LT1} = 0.9 \text{ m};$ $m_{LT1} = 0.63;$	Pass;
LTB - segment 2;	$M_{LT2} = 14.4 \text{ kNm};$	M_{b2} / m_{LT2} $= 34.7 \text{ kNm};$	$L_{E_LT2} = 2.0 \text{ m};$ $m_{LT2} = 0.98;$	Pass;
LTB - segment 3;	$M_{LT3} = 11.2 \text{ kNm};$	M_{b3} / m_{LT3} $= 71.4 \text{ kNm};$	$L_{E_LT3} = 0.8 \text{ m};$ $m_{LT3} = 0.66;$	Pass;



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Project 477 New Hey Road, Huddersfield				Job Ref. ES1633	
Section J4				Sheet no./rev. 08	
Calc. by SB	Date 31/07/26	Chk'd by	Date	App'd by	Date

Analysis for a simply-supported single-span timber beam to BS 5268

TEDDS calculation version 1.0.02

Span length & partial factors for loading

Span (mm)	γ_{fd}	Factors for moments & forces			Factors for deflection		
		γ_{fi}	γ_{fw}	γ_{fd}	γ_{di}	γ_{dw}	
3700	1.00	1.00	1.00	1.00	1.00	1.00	

Loading data (unfactored)

Ref.	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm
1	"Dead"	"roof"				
2	"Imposed"	"roof"				

Loading data (unfactored)

Ref.	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm
1	"Dead"	UDL	0.3	0	-	3700
2	"Imposed"	UDL	0.3	0	-	3700

Analysis results - entire span

R_a kN (fac)	R_b kN (fac)	V kN (fac)	M kNm (fac)	Sense	Deflection: δEI kNm ³	Direction
1.1	1.1	1.1	1.1	"Sagging"	1.51	"Down"

Unfactored support reactions

Support A;	Dead load; -0.6 kN;	Live load; -0.6 kN;	Wind load; 0.0 kN;
Support B;	Dead load; -0.6 kN;	Live load; -0.6 kN;	Wind load; 0.0 kN;

Member design checks for a simply-supported single-span timber beam to BS 5268

Timber member design BS 5268-2:2002

Summary of results;				
Section size;	D = 175 mm;		B = 50 mm;	A= 8750 mm ² ;
Section properties (x-x);	I _{xx} = 22330730 mm ⁴ ;		Z _{xx} = 255208 mm ³ ;	r _{xx} = 50.5 mm;
(y-y);	I _{yy} = 1822920 mm ⁴ ;		Z _{yy} = 72917 mm ³ ;	r _{yy} = 14.4 mm;
Grade;	"C16";		σ _c = 6.80 N/ mm ² ;	
Check;	Stress;	Capacity;	Notes;	Result;
Bending stress;	σ _{m.s.para} = M / Z _{xx} = 4.16 N/mm ² ;		σ _{m.adm.para} = 5.62 N/mm ² ;	Moment; M = 1.1 kNm; Pass
Shear stress;	τ _a = 0.20 N/mm ² ;		τ _{adm} = 0.67 N/mm ² ;	Shear; V = 1.1 kN; Pass
Deflection;	δ = 8.0 mm;		14 mm;	Pass
	δ / L _s = 0.00215;		0.003;	Pass



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Project				Job Ref.	
477 New Hey Road, Huddersfield				ES1633	
Section				Sheet no./rev.	
Padstones				09	
Calc. by	Date	Chk'd by	Date	App'd by	Date
SB	31/07/26				

MASONRY BEARING DESIGN TO BS5628-1:2005

TEDDS calculation version 1.0.08

Masonry details

Masonry type
Compressive strength
Least horiz dim of units
Masonry units
Partial safety factor
Leaf thickness
Wall height

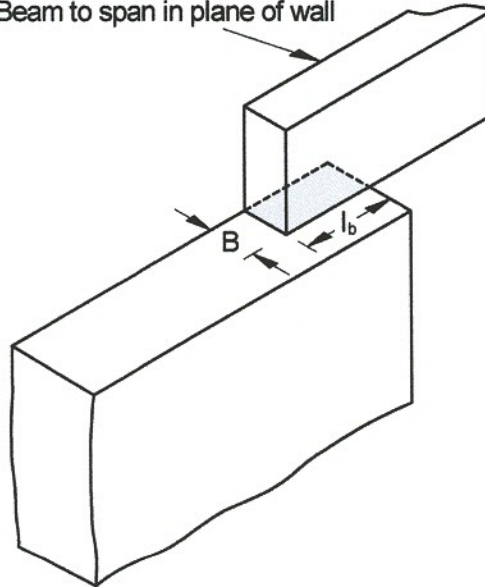
Aggregate concrete blocks (25% or less formed voids)

$p_{unit} = 7.3 \text{ N/mm}^2$
 $l_{unit} = 100 \text{ mm}$
Category II
 $\gamma_m = 3.5$
 $t = 100 \text{ mm}$
 $h = 2400 \text{ mm}$

Mortar designation
Height of units
Construction control
Characteristic strength
Effective wall thickness
Effective height of wall

iii
 $h_{unit} = 215 \text{ mm}$
Normal
 $f_k = 6.4 \text{ N/mm}^2$
 $t_{ef} = 100 \text{ mm}$
 $h_{ef} = 2400 \text{ mm}$

Beam to span in plane of wall



Bearing details

Beam spanning in plane of wall
Width of bearing

$B = 100 \text{ mm}$

Length of bearing

$l_b = 100 \text{ mm}$

Loading details

Concentrated dead load
Design concentrated load
Distributed dead load
Design distributed load

$G_k = 9 \text{ kN}$
 $F = 19.7 \text{ kN}$
 $g_k = 0.0 \text{ kN/m}$
 $f = 0.0 \text{ kN/m}$

Concentrated imposed load
Distributed imposed load

$Q_k = 4 \text{ kN}$
 $q_k = 0.0 \text{ kN/m}$

Masonry bearing type

Bearing type

Type 2

Bearing safety factor

$\gamma_{bear} = 1.50$

Check design bearing without a spreader

Design bearing stress

$f_{ca} = 1.974 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 2.743 \text{ N/mm}^2$

PASS - Allowable bearing stress exceeds design bearing stress

Check design bearing at $0.4 \times h$ below the bearing level

Design bearing stress

$f_{ca} = 0.186 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 1.106 \text{ N/mm}^2$

PASS - Allowable bearing stress at $0.4 \times h$ below bearing level exceeds design bearing stress