

PROJECT	41 LINZEE ROAD LONDON N8 7RG			Designed by BCA
DESCRIPTION	ROOF EXTENSION & DORMER VOLUME			Date 04-05-23
		REAR DORMER ROOF EXTENSION		
		MAX VOLUME FOR TERRACED HOUSE		= 40.00 M3
		SIDE SECTION AREA 3.114 x 2.385 / 2		= 3.71 M2
		WIDTH OF DORMER 5.690		
		VOLUME OF REAR DORMER		
		3.71 x 5.690		= 21.10 M3
		LESS REAR ROOF PYRAMID VOLUME		
PRISM		3.88 x 1.743/2 = 3.38 x 3.76 = 12.71 M3		
PYRAMID		3.88 x 3.76 x 1/3 x 1.743 = 8.47 M3		
BALANCE		12.71 – 8.47/2 = 2.12 21.10 – 2.12		= 18.98 M3
		BALANCE REMAINING FOR OUTRIGGER		= 21.02 M3
		TOTAL		= 21.02 M3
		CROSS SECTION AREA OF OUTRIGGER DORMER		
		3.880 x 2.538		= 9.84 M2
		LESS AREA OF PITCHED EXISTING		
		3.88 x 1.743/2		= 3.38 M2
		AREA OF OUTRIGGER 9.84 – 3.38		= 6.46 M2
		DEPTH OF OUTRIGGER 21.02 /6.46		= 3.25 M
		TOTAL VOLUME OF DORMER AND OUTRIGGER		
		18.98 + 20.99		= 39.97 M3
		REQUIREMENT UNDER CLASS B		
		TERRACED HOUSE		= 40.00 M3
		ACCEPT PROPOSED DESIGN FOR DORMER AND OUTRIGGER ROOF EXTENSION		

PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	STRUCTURE APPLIED LOADS		Date 04-05-23
	FLOOR		
	Loads : Finishes	= 0.10 Kn/M ²	
	Floor boards	= 0.12 Kn/M ²	
	Insulation	= 0.03 Kn/M ²	
	New 200 x 50 joists @ 350 c/c	= 0.15 Kn/M ²	
	Existing 150 x 50 joists	= 0.11 Kn/M ²	
	Plasterboard & skim	= 0.18 Kn/M ²	
	Live Load	= 1.50 Kn/M ²	
	Total	= 2.19 Kn/M ²	= 2.19 Kn/M ²
	WALL		
	230 brick	= 4.50 Kn/M ²	
	Plaster	= 0.20 Kn/M ²	
	Total	= 4.70 Kn/M ²	= 4.70 Kn/M ²
	ROOF FLAT		
	Asphalt/felt (or zinc)	= 0.45 Kn/M ²	
	Ply deck & insulation	= 0.16 Kn/M ²	
	150 x 50 joists & firrings	= 0.12 Kn/M ²	
	Plasterboard & skim	= 0.18 Kn/M ²	
	Live Load	= 0.75 Kn/M ²	
	Total	= 1.66 Kn/M ²	= 1.66 Kn/M ²
	ROOF PITCHED		
	Roof tiles (clay 0.62) slate 0.34	= 0.34 Kn/M ²	
	Felt & battens	= 0.05 Kn/M ²	
	Existing rafters 100 x 50 @ 350 c/c	= 0.07 Kn/M ²	
	New joists 125 x 50 @350 c/c	= 0.09 Kn/M ²	
	Insulation 2 x 50 Celotex	= 0.06 Kn/M ²	
	Gypsum Thermaline board 50mm	= 0.18 Kn/M ²	
		D. L = 0.79 Kn/M ²	
		Live Loads = 0.75 Kn/M ²	
		Total = 1.54 Kn/M ²	
	PARTITION		
	Timber studs 100 x 50 @ 450 c/c	= 0.07 Kn/M ²	
	Plasterboard & skim	= 0.36 Kn/M ²	
		Total = 0.43 Kn/M ²	

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PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	NEW PITCHED ROOF JOISTS		Date 04-05-23
	Existing rafters 100 x 50 @ 350 c/c		
	Purlin and Struts removed. Roof supported by		
	Front and rear external brick wall and Ridge Beam 1.		
	Loads/Roof : Slate roof tiles		= 0.34 Kn/M ²
	Felt/battens		= 0.05 Kn/M ²
	Existing rafters 100 x 50 @ 350 c/c		= 0.070 Kn/M ²
	New Joists 125 x 50 SC3 @ 370 c/c		= 0.10 Kn/M ²
	Insulation		= 0.06 Kn/M ²
	Gypsum Thermaline board 50mm		= 0.18 Kn/M ²
	D. L.		= 0.80
	Live Load		= 0.75
	Total		= 1.55 Kn/M ²
	Max joists span to wall		= 2764
	Load/Joists = 1.55 x 0.35		= 0.542 Kn/M
	$B_m = \frac{0.542 \times 2.764^2}{8}$		= 0.517 Kn
	$f_{bc} = \frac{0.517 \times 10^6 \times 6}{100 \times 125 \times 50 \times 2}$		= 2.48 N/mm ²
	adm P_{bc} 1.1 x 5.3 (load sharing)		= 5.83 N/mm ²
	$W_d \text{ (mid)} = \frac{5}{384} \times \frac{0.542 \times 2.7 \times 10^3 \times 2.764^3}{8800 \times 4.166 \times 8.138 \times 10^6}$		= 1.38 mm
			(accept)
	Use 125 x 50 C24 joists @ 350 c/c M10 bolted to		
	Existing 100 x 50 rafters @ 600 c/c		
	(existing rafters @ 350 c/c)		
	adm (max) $\frac{1}{333} \times 2764 = 8.30 \text{ mm}$		
	(limit to 14.0 mm BS)		

PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	BEAM 1 TO SUPPORT FRONT ROOF		Date 04-05-23
	Loads : front roof (page 05) = 1.55 Kn/M ²		
		$3.33 + 0.93 \times 1.55/2$	= 3.30 Kn/M
	Loads : partition = 0.43Kn/M ² 0.43 x 1.0		= 0.43
		Total	= 3.73 Kn/M
	Beam to span to side party brick walls (max span)		= 5300 mm
	$B_m = \frac{3.73 \times 5.30^2}{8}$		= 13.09 Kn
	$f_{bc} = \frac{13.09 \times 10^6}{450 \times 10^3}$ (try 203 x 203 x 46 kg/M UC)		= 29.08 N/mm ²
	$P_{bc} = L/r_y = 5300/51.3 = 103.3$		} P_{bc}
			} = 132.0 N/mm ²
	$D/T = 203.2/11.0 = 18.4$		
	$W_d \text{ (mid)} = \frac{5}{384} \times \frac{3.73 \times 5.3 \times 10^3 \times 5300^3}{2.1 \times 10^5 \times 4568 \times 10^4}$		= 3.99 mm
			(accept)
	$W_{d \text{ adm}} = 5300/360$		= 14.72 mm
	Concrete padstones		
	(max stress for stock brickwork = 0.42 N/mm ²)		
	$RH_r = 3.73 \times 5.30/2 = 9.88 \text{ Kn}$		
	$\frac{9.88 \times 10^3}{100 \times 0.42} = 235\text{mm}$ (limit to 100mm for party wall)		
	∴ Use 203 x 203 x 46 Kg/M UC		
	on 100 x 235 x 150 deep concrete padstone		

PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	NEW DORMER FLAT ROOF JOISTS		Date 04-05-23
	Proposed joists 150 x 50 @ 300 c/c		
	Joists to span to side dormer walls (max span)		= 3498 mm
	Loads/Roof : felted roof		= 0.45 Kn/M ²
	18 plywood		= 0.12
	Proposed joists 150 x 50 @ 300 c/c		= 0.11
	Insulation		= 0.06
	Gypsum Thermaline board 50mm		= 0.18
	D. L.		= 0.92
	Live Load		= 0.75
	Total		= 1.67 Kn/M ²
	Say joists @ 300 c/c		
	Load/Joists = 1.67 x 0.30		= 0.501 Kn/M
	$B_m = \frac{0.501 \times 3.498^2}{8}$		= 0.766 Kn
	$f_{bc} = \frac{0.766 \times 10^6 \times 6}{50 \times 150^2}$		= 4.08 N/mm ²
	adm P_{bc} 1.1 x 5.3 (load sharing)		= 5.83 N/mm ²
	$W_d \text{ (mid)} = \frac{5 \times 0.501 \times 3.4 \times 10^3 \times 3498^3}{384 \times 8800 \times 14.06 \times 10^6}$		= 7.89 mm
			(accept)
	Use 150 x 50 SC3 joists @ 300 c/c to support		
	New dormer roof		
	adm (max) $1/333 \times 3498 = 10.50 \text{ mm}$		
	(limit to 14.0 mm BS)		

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PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	BEAM 2 TO SUPPORT RIDGE		Date 04-05-23
	Loads : Roof (page 03)		= 1.55 Kn/M ²
	Loads / Roof : 1.55 x 3.33/2 front		= 2.58 Kn/M
	Loads / flat roof : 1.67 x 3.114/2 rear		= 2.60
	Total		5.18 Kn/M
	Beam to span party wall to post at spine wall (max span)		= 4930 mm
	$B_m = \frac{5.18 \times 4.93^2}{8}$		= 15.73 Kn
	$f_{bc} = \frac{15.73 \times 10^6}{252 \times 10^3}$ (try 200 x 90 x 30 kg/M RSC)		= 62.42 N/mm ²
	$P_{bc} = L/r_y = 4882/28.8 = 169.5$		} P_{bc}
			} = 105.0 N/mm ²
	$D/T = 200/14 = 14.28$		
	$W_d \text{ (mid)} = \frac{5 \times 5.18 \times 4.9 \times 10^3 \times 4930^3}{384 \times 2.1 \times 10^5 \times 1817 \times 10^4}$		= 10.44 mm
			(accept)
	$W_{d \text{ adm}} = 4930/360$		= 13.69 mm
	Concrete padstones		
	(max stress for stock brickwork = 0.42 N/mm ²)		
	$RH_r = 5.18 \times 4.93/2 = 12.76 \text{ Kn}$		
	$\frac{12.76 \times 10^3}{100 \times 0.42} = 303 \text{ mm}$		
	(limit to 100mm wide for party wall)		
	∴ Use 200 x 90 x 30 Kg/M RSC		
	on 100 x 303 x 150 deep concrete padstones		

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PROJECT	41 LINZEE ROAD LONDON N8 7RG		Designed by BCA
DESCRIPTION	BEAM 3 SUPPORT REAR DORMER WALL		Date 04-05-23
	Loads : Beam 3 W 2.97 x 1.67/2		= 2.47 Kn
	Loads / wall : 1.14 x 2.55		= 2.90 Kn/M
	Total		5.37 Kn/M
	Beam to span to party wall external wall (max span)		= 3930
	$W_{Bm} = \frac{5.37 \times 3.93^2}{8}$		= 10.36 Kn
	Try 178 x 102 x 19 Kg/M UB		
	$P_{bc} = L/ry = 3930/23.7 = 165.8$		} P_{bc}
	$D/T = 177.8/7.9 = 22.5$		} = 94.0 N/mm ²
	$f_{bc} = \frac{10.36 \times 10^6}{153 \times 10^3}$ (178 x 102 x 19 kg/M UB)		= 67.71 N/mm ²
			(accept)
	$W_{d adm} = 3930/360$		= 10.91 mm
	$W_d (mid) = \frac{5 \times 5.37 \times 3.9 \times 10^3 \times 3930^3}{384 \times 2.1 \times 10^5 \times 1356 \times 10^4}$		= 5.85 mm
	Concrete padstones		
	$RH_r = 5.37 \times 3.93/2 = 10.55 Kn$		
	$\frac{10.55 \times 10^3}{100 \times 0.42} = 251mm$		
	(limit to 100mm wide for party wall)		
	∴ Use 178 x 102 x 19 Kg/M UB		
	on 100 x 251 x 150 deep concrete padstones		

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