

	Project No: S-2930		Calc By: BC	
	Project: 161 ARLINGTON ROAD, LONDON NW1 7ET			
	Date: 1 Nov 24		Rev: Rev 01	

Title:Structural Calculations for Proposed Refurbishment of 161 Arlington Road

Section 7

Superstructure elements

clear distance between flanges =138.6 mm

depth of top notch - allow for 10mm tolerance =21.4 say 25 mm

web to toe distance =73.15

width of notch - allow 10mm tolerance =83.15 say 85 mm

h150

he115

a25

$$K_5 = \frac{h(h_e - a) + ah_e}{h_e^2}$$
for $a \leq h_e$

K5 = 1.2382

V = 0.7 kN

$\sigma_s = 0.71$ N/mm2

x K5 = 0.8791

Shear area = 5750

Shear cap = A * σ_s = 5.1 kN

Section Ok

New Extension - roof joist

To BS5268-2

From Section 1

Dead = 0.90 kN/m2

Live = 1.5 kN/m2

timber grade = C24

basic σ_b = 7.5

Factors

Duration K3 1.0

Depth K7 1.0792

Load sharing K8 1.1

σ_b = 8.9036

N/mm2

Z = bd2/6 = 187500 mm3

I = bd3/12 = 14062500 mm4

Emean = 10800

N/mm2

Bending due to UDL load on joist

w = 0.959 kN/m

M = wl2/8 = 0.5286 kNm

Gives Z reqd = 59374 mm

Section OK

(UF = 0.3167)

Deflection limit = span / 360 = 5.8 mm

Deflection due to udl = 1.60 mm

Section OK

Check shear at end notches

Beam 152UC23

D 152.2

B 152.4

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T6.8

t6.1

Check concentrated point load

pt ld applied over 300x300 area - lds one joist

ignore ld sharing

BS6399-1 gives concentrated load = 1.4 kN

apply at mid span giving M = WL/4 = 0.735 kNm

Gives Z reqd = 82551 mm

Section OK

(UF = 0.4403)

Deflection limit = span / 360 = 5.8 mm

Deflection due to udl = 1.78 mm

Section OK

150 dp joist to sit on bottom flange and be notched on top to suit flange

clear distance between flanges =138.6 mm

depth of top notch - allow for 10mm tolerance =21.4 say 25 mm

web to toe distance =73.15

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Section 7 Superstructure elements				
New extension - Wind Loading				
New extension				
New extension two storey above ground, height above ground =		2.8	m	
Restraint provided by roof - max vertical span =		2.8	m	
Wind load To BS6399-2				
Maximum height Of extension walls (above ground)				
Building type factor		H = 2.85	m	
Dynamic augmentation factor		Kb = 0.5	Tb1	
Siza effect factor		Cr = 0.01	Fig3	
		Ca = 0.97		
Ground level is at approximately				
Wind speed		29.4	mOD	
		Vb = 20.5	m/s	
Altitude factor				
Seasonal factor		Sa = 1.029		
Site is relatively level - topogrphy not significant		Ss = 1		
Directional factor				
Permanent condition		Sd = 1		
Site wind speed Vs = Vb . Sa . Sd . Ss . Sp =		Sp = 1		
Maximum height of extension walls (above ground)		Vs = 21.103	m/s	
		H = 6.2	m	
Heights of surrounding buildings				
161 AR		11		
159 AR		9		
OLoH		14		
Ort House		15		
128 Albert St		15		
				
Dominant wind direction - use SW - Ort House				
Maximum height of extension walls (above ground)		Hr = 2.85	m	
Height of building upwind		H0 = 15	m	
Distance to buildings upwind		X0 = 13.5	m	
Displacement Height		Hd = 12		
Effective Height = lesser of (Hr-Hd) or 0.4Hr				
Hr - Hd =		-9.15	m	
0.4Hr =		1.14	m	
Taking He <2 and site in town > 2km		He = 1.14	m	(C/1.7.3)
distance to sea = 55km		Sb = 1.1	Tb4	
Ve = Vs . Sb		Ve = 23.213	m/s	
Dynamic pressure qs = 0.613 Ve²		qs = 0.3303	kPa	

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Section 7 Superstructure elements				
Cpe				
Front wall		D/H < 1	0.85	
Side wall			-1.3	
Roof		A	-1.9	
		B	-1.3	
		C	-0.7	
		D	±0.2	
Cpi				
Two walls pereamble			0.2	
			-0.3	
Cp				
parapet without returns		Cp	Length	
		A	3.4	0.225 m
		B	2.1	1.5
		C	1.7	3
		D	1.2	3.7
Side Wall				
qs = 0.3303 kPa		Ca = 0.97	k = 0.7	
p = qs . Ca (Cpe-Cpi)		Cpe-Cpi =	1.15	P= 0.3685 kPa windward
			-1.5	P= -0.4806 kPa side
Parapet				
L 3.7 m <15h = 11.25		with L/h = 4.9333	gives reduction factor	
h = Hr = 0.75 m max			k = 0.7	
p = qs . Cp . Ca . K				
		A	Pa = 0.7626 kPa	start end length
		B	Pb = 0.471 kPa	0.00 0.23 0.23
		C	Pc = 0.3813 kPa	0.23 1.50 1.28
		D	Pd = 0.2691 kPa	1.50 3.00 1.50
				3.00 3.70 0.70
Roof - check for uplift				
Roof loads		Dead	0.8975	
		Live	1.5	
		Cpe	Cpi	Cpe-Cpi p
A		-1.90	0.20	-2.10 -0.67 UPLIFT
B		-1.30	0.20	-1.50 -0.48 UPLIFT
C		-0.70	0.20	-0.90 -0.29 OK
D		-0.20	0.20	-0.40 -0.13 UPLIFT
		0.20	-0.30	0.50 0.16 OK
Rear Extension Side Walls- masonry design To BS5628-1				

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