

STRUCTURAL ENGINEER'S CALCULATIONS

Bishop's Place, London Road
Albourne

FOR

Client: Geoff Zeidler

Date: October 2025

JOB NUMBER: 25208

Ellis Structures

Cloud 2925f

49b Cliffe High Street, Lewes

East Sussex, BN7 2AN

Tel: (01273) 470088 Mobile: 07760304424

www.ellisstructures.co.uk

Job Ref :

Sheet : /

Made by :

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Checked :

Approved :

Axial with Moments (Member)

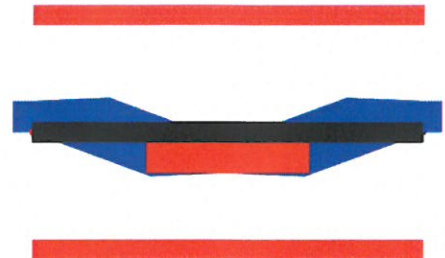
Member SC L1 Id 2 @ Level 1 in Load Case 1

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1 + 1.2 W1

D1 D 077.010 (kN/m³)

W1 PX +005.000 1.200 (kN, m)

**Member Forces in Load Case 1 and Maximum Deflection from Load Case 2**

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
2	1 3	0.139C 0.139T	2.999 -3.001	-1.560 -1.562	@ 2.039 1.200	@ 4.610 1.200

Classification and Properties (BS 5950: 2000)

Section (8.42 kg/m)

60x60x5 SHS 8.42 [S 275]

Class = Fn(b/t,d/t,py,F,Mx,My)

9, 9, 275, 0.139, 2.038, 0

(Axial: Non-Slender)

Plastic

Auto Design Load Cases

1

Local Capacity Check

Fvx/Pvx

3.001 / 88.523 =

0.034

Low Shear

Mcx = py.Sxx ≤ 1.2 py.Zxx

275 x 21.89 ≤ 1.2 x 275 x 17.75 =

5.858 kN.m

Ae = Fn(Ag,A.net,py,Us)

10.73, 10.73, 275, 410

10.73 cm²

Pz = Ae.py

10.73x275

295.075 kN

n = F/Pz

-0.139 / 295.075 =

0.000

OK

Srx = Fn(Sxx, n)

21.89, 0

21.89 cm³

Mrx = Srx.py

21.89 x 275

5.858 kN.m

(Mx/Mrx)² + (My/Mry)²(2.038/5.858)^{1.667} + (0)^{1.667} =

0.172

OK

Compression Resistance Pc

λx = Lex/rxx

100x1x2.4/2.23 =

107.6

OK

Pcx = Area.pcx

10.73x141.284/10 =

151.598 kN

Table 24 a

λy = Ley/ryy

100x1x2.4/2.23 =

107.6

OK

Pcy = Area.pcy

10.73x141.28/10 =

151.598 kN

Table 24 a

Equivalent Uniform Moment Factors mLT, mx, my and myx

mLT = 0.2 + (.15M2 + .5M3 + .15M4)/Mmax

0.2 + (.15x0 + .5x2 + .15x0)/2 ≥ 0.44

0.735

Table 18

my = 0.2 + (.1M2 + .6M3 + .1M4)/Mmax

0.2 + (.1x0 + .6x0 + .1x0)/0 ≥ .8x0/0

1

Table 26

mx = 0.2 + (.1M2 + .6M3 + .1M4)/Mmax

0.2 + (.1x0 + .6x2 + .1x0)/2 ≥ .8x2/2

0.823

Table 26

myx = 0.2 + (.1M2 + .6M3 + .1M4)/Mmax

0.2 + (.1x0 + .6x0 + .1x0)/0 ≥ .8x0/0

1

Table 26

Lateral Buckling Check Mb

Mb = Mc

Section not susceptible to lateral torsional buckling

5.858 kN.m

Simplified Approach

py.Zx

275x17.75

4.881 kN.m

F/Pcx + mx.Mx/py.Zx

0.139/151.598 + 0.823x2/4.9

0.345

OK

F/Pcy + mLT.MLT/Mb

0.139/151.598 + 0.735x2/5.9

0.257

OK

More Exact Approach

Max = Mcx/(1 + .5F/Pcx)

5.9/(1 + .5x0.1/151.6)

5.855 kN.m

F/Pcx + mx.Mx/Max

0.1/151.6 + 0.823x2/5.9

0.288

OK

F/Pcy + .5mLT.MLT/Mcx

0.1/151.6 + .50.735x2/5.9

0.129

OK

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49b Cliffe High Street, Lewes**East Sussex, BN7 2AN****Tel: (01273) 470088 Mobile: 07760304424****www.elisstructures.co.uk****Job Ref** :**Sheet** : /**Made by** :**Date** : 07 October 2025 / Ver. 2020.07**Checked** :**Approved** :**Deflection Check - Load Case 2**In-span $\delta \leq \text{Span}/360$ $4.61 \leq 2400 / 360$

4.61 mm

OK