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Site: 37 STONECROP LIVERPOOL 18	**Made by MA**
Job: SINGLE STOREEY EXTENSION	**Page 1**
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SuperBeam 4 UK Project Summary

Project started 19 Apr 2016 MA
Site address: 37 STONECROP LIVERPOOL 18
Job: SINGLE STOREEY EXTENSION
Client: BRIAN COLLIN

ITEMS:

1: Beam: KITCHEN
Span: 2.9 m. Reactions: R1: 42.49 kN R2: 42.49 kN
Use 2No 178 x 102 x 19 UB S275
Sections to be bolted together with tube spacers or suitable alternative connection at max 1.5m c/s

Beam 3.2 m Long.

Beam: KITCHEN **Span: 2.9 m.**

		Load name	*Loading w1*	*Start x1*	*Loading w2*	*End x2*	*R1comp*	*R2comp*
U	T	o.w.	0.5	0		L	0.73	0.73
U	T	Wall	5X5	0		L	36.25	36.25
U	T	Floor	2X3.8/2	0		L	5.51	5.51
							42.49	42.49

Total load: 84.97 kN

Load types: U:UDL T: Total (positions in m. from R1)

Maximum B.M. = 30.80 kNm at 1.45 m. from R1
Maximum S.F. = -42.48 kN at R2
Total deflection = 27.0 x 10^8/EI at 1.45 m. from R1 *(E in N/mm², I in cm⁴)*
Steel calculation to BS449 Part 2 using S275 steel
SECTION SIZE : 2No 178 x 102 x 19 UB S275
D=177.8 mm B=101.2 mm t=4.8 mm T=7.9 mm I_x=1,360 cm⁴ r_y=2.37 cm Z_x=153 cm³ *(per section)*

Bending: L_E/r_y = 2.90 x 100/2.37 = 122 D/T = 22.5
Permissible bending stress, p_{bc} = 114.2 N/mm² (Table 3a)
Actual bending stress, f_{bc} = 30.8 x 1000/(2 x 153.0) = 100.7 N/mm² OK
Shear: Maximum shear in web, f_s = 42.5 x 1000/(2 x 4.8 x 177.8) = 24.9 N/mm² OK
Beam web: Check unstiffened web capacity with load of 42.49/2 = 21.24 kN
Bearing: p_h = 210N/mm² (Table 9); C1 = 27.1 kN; C2 = 1.01 kN/mm
Buckling: p_c = 141N/mm² (Table 17a); C1 = 60.2 kN; C2 = 0.677 kN/mm
Unstiffened web bearing capacity, P_w = 27.1kN: no minimum stiff bearing length required
Total deflection = 27.0 x 1e8/(2 x 205,000 x 1,360) = 4.8 mm (L/599) OK

Combined bending and shear check (14.c): $(f_{bc}/p_{bc})^2 + (f_s/p_s)^2$ = 0.777 at 1.45 m. (<=1.25 OK)

Sections to be bolted together with tube spacers or suitable alternative connection at max 1.5m c/s