

Title: 9 Ackton Lane, Featherstone

Date: June 19

Proposed New Extension

Design loadings

1st floor

dead - Joists & boarding	= 0.35 wlm ²	
Partitions	= 0.70 "	
Ceiling, services, insula	= 0.25 "	
	<u>1.30 wlm²</u>	
Imposed	= 1.50 "	
	<u><u>2.80 wlm²</u></u>	

Factored loads

$$\begin{aligned} \times 1.4 &= 1.82 \text{ wlm}^2 \\ \times 1.6 &= 2.40 \text{ " } \\ &= \underline{\underline{4.22 \text{ wlm}^2}} \end{aligned}$$

Party Wall

Outer - 100 block + render	= 2.30 wlm ²	
Inner - 100 block + plaster	= 2.10 "	
	<u>4.40 wlm²</u>	

$$\begin{aligned} \times 1.4 &= 3.22 \text{ wlm}^2 \\ \times 1.4 &= 2.94 \text{ " } \\ &= \underline{\underline{6.16 \text{ wlm}^2}} \end{aligned}$$

Beam above opening to new rear wall

Spm: 5.6m

Unfactored loads/m

• Inner leaf line

$$\begin{aligned} \text{dead - 1st floor} &= 1.30 \times 3.8/2 \times 1.0 = 2.5 \text{ wlm} \\ \text{inner leaf} &= 2.10 \times 5.50 \times 1.0 = 11.6 \text{ " } \\ &= \underline{\underline{14.1 \text{ wlm}}} \end{aligned}$$

$$\text{Imposed - 1st floor} = 1.50 \times 3.8/2 \times 1.0 = \underline{\underline{2.90 \text{ wlm}}}$$

• Outer leaf line

$$\text{dead - outer leaf} = 2.30 \times 5.70 \times 1.0 = \underline{\underline{13.1 \text{ wlm}}}$$

300x150x17.5 RHS
 + 10mm thick
 mild steel
 bottom flange
 plate +
 stiffeners

See attached analysis & design

See SK 1

Project 9 Ackton Lane, Featherstone		Job no. 12169	
Calcs for Beam above opening to new rear wall		Start page no./Revision 2	
Calcs by AC	Calcs date 10/06/2019	Checked by HE	Checked date 10/6/19
Approved by HE		Approved date 10/6/19	

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)	Factors for moments & forces			Factors for deflection		
	γ_{fd}	γ_{fi}	γ_{fw}	γ_{dd}	γ_{di}	γ_{dw}
5600	1.40	1.60	0.00	1.00	1.00	1.00

Loading data

Ref. #	Category	Type	Load kN/m	Position mm	Load kN/m	Position mm	Eccentricity mm
1	"Dead"	UDL	14.1	0	-	5600	0
2	"Imposed"	UDL	2.9	0	-	5600	0
3	"Dead"	UDL	13.1	0	-	5600	200

Analysis results - entire span

R_a kN (fac)	R_b kN (fac)	F_{vy} kN (fac)	M_x kNm (fac)	Sense	T_q kNm (fac)	Deflection: δEI_x	
					kNm ³		Direction
119.6	119.6	119.6	167.5	"Sagging"	20.54	385.44	"Down"

Unfactored support reactions

Support A	Dead load	-76.2 kN	Live load	-8.1 kN	Wind load	0.0 kN
Support B	Dead load	-76.2 kN	Live load	-8.1 kN	Wind load	0.0 kN

LTB segment results

Seg.	x_s mm	x_e mm	LLT mm	MLT kNm (fac)	M_{mLT2} kNm (fac)	M_{mLT3} kNm (fac)	M_{mLT4} kNm (fac)
1	0	5600	5600	167.5	125.6	167.5	125.6

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

Tedds calculation version 1.0.05

Summary

Span & restraint	L = 5600 mm	Torsion fixed & warping free each end.
Design load effects	$F_{vy} = 119.6$ kN $M_x = 167.5$ kNm $T_q = 20.54$ kNm torsion from uniformly distributed loads.	
Material	Grade = "S275"	$p_y = 275$ N/mm ²
Section	"RHS 300x150x12.5"	"Plastic"

Check	Load	Capacity	Notes	Result
Deflection	$\delta_{y_max} = 16.1$ mm	$\delta_{lim} = 17.2$ mm	Span / 325 or 17.2 mm	Pass
Twist angle			$T_{qu} = 14.67$ kNm	Pass

Project 9 Ackton Lane, Featherstone		Job no. 12169	
Calcs for Beam above opening to new rear wall		Start page no./Revision 3	
Calcs by AC	Calcs date 10/06/2019	Checked by HE	Checked date 10/6/19
Approved by HE		Approved date 10/6/19	

	$\phi_{sls} = 0.08$ deg	$\phi_{lim} = 0.50$ deg		
Shear	$F_{vy} = 119.6$ kN	$P_{vy} = 1150.3$ kN	Low shear	Pass
Moment	$M_x = 167.5$ kNm	$M_{cx} = 257.1$ kNm	Serviceability governs	Pass
LTB	$\lambda = 92$	$\lambda_{lim} = 340$	LTB check not req'd $L_{E_LT} = 5600$ mm	Pass
Overall buckling	Index $i_b = 0.605$	Limit = 1.0	$\sigma_{byt} = 1$ N/mm ²	Pass
Local capacity	$\sigma_{bx} + \sigma_{byt}$ = 216 N/mm ²	$p_y = 275$ N/mm ²	$\sigma_{bx} = 215$ N/mm ² $\sigma_{byt} = 1$ N/mm ²	Pass
Combined shear stresses	$\tau = 35$ N/mm ²	$p_v = 165$ N/mm ²	$\tau_{bw} = 20$ N/mm ² $\tau_{vt} = 15$ N/mm ²	Pass

Title: 9 Ackton lane, Beathestone

Check bearing onto masonry

Factored reaction : 119.6 kN

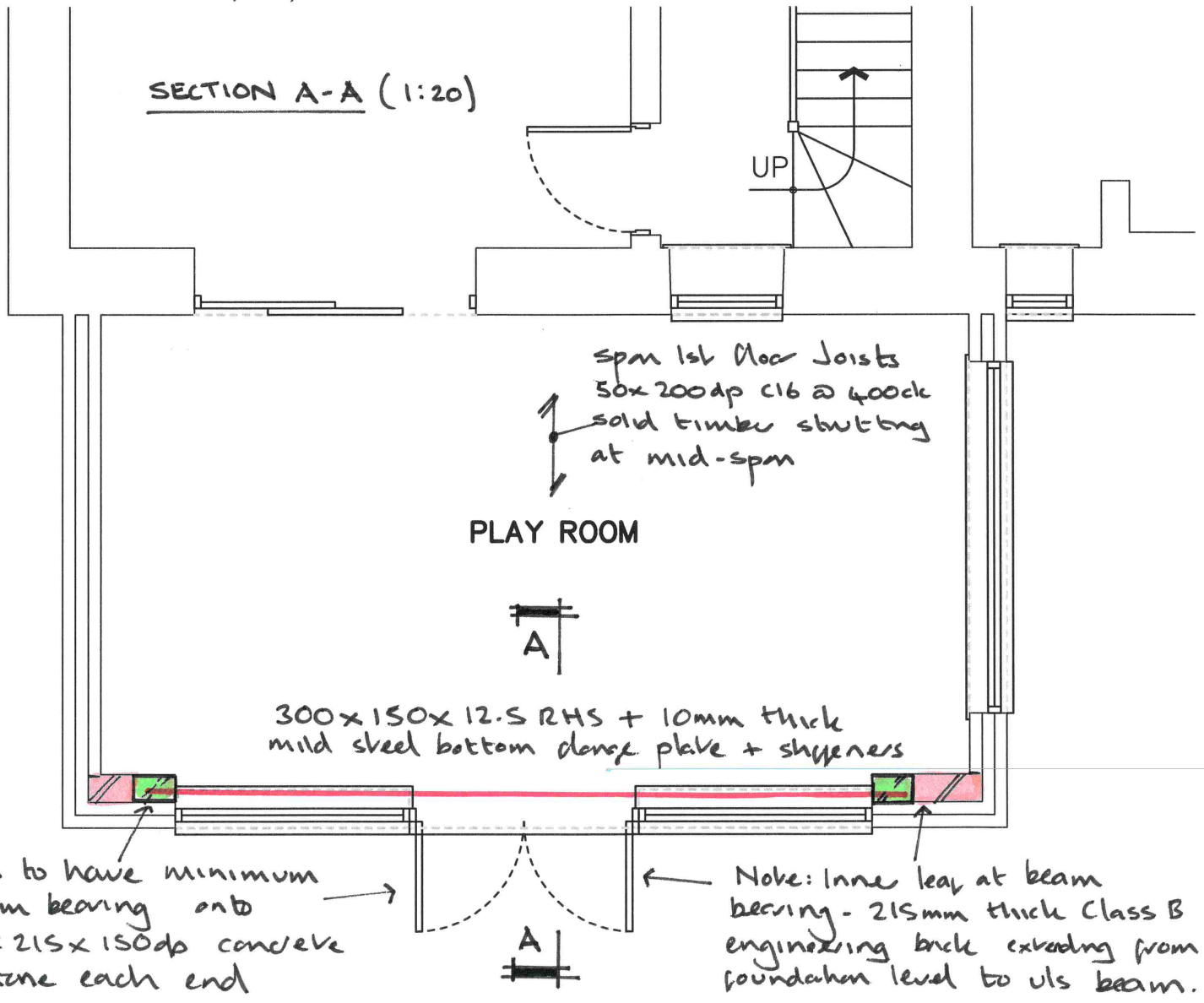
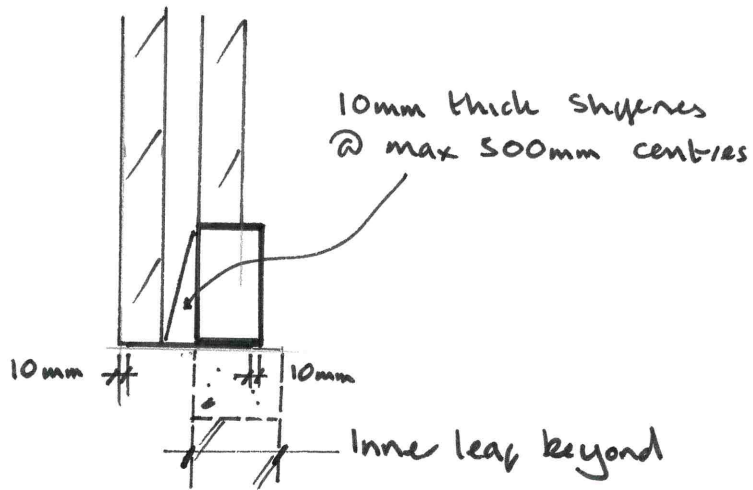
Allowable bearing stress

-102 Class B engineering brick $\cdot \frac{10.6}{3.5}$
 $\cdot 3.03 \text{ MN/m}^2$

\overline{m} 300 x 215 x 150 dp concrete padstone

Stress under $\cdot \frac{119.6 \times 10^3}{300 \times 215}$
 $\cdot 1.85 \text{ MN/m}^2 < 3.03 \text{ MN/m}^2 \text{ ok}$

At beam bearing inner leaf
 215mm Class B engineering brick
 Beam to have 200mm bearing onto 300 x 215 x 150 dp concrete padstone each end



PART GROUND FLOOR PLAN (1:50 @ A4)
showing structure/structure over

9 Ackton Lane
Featherstone

12169/SK 1