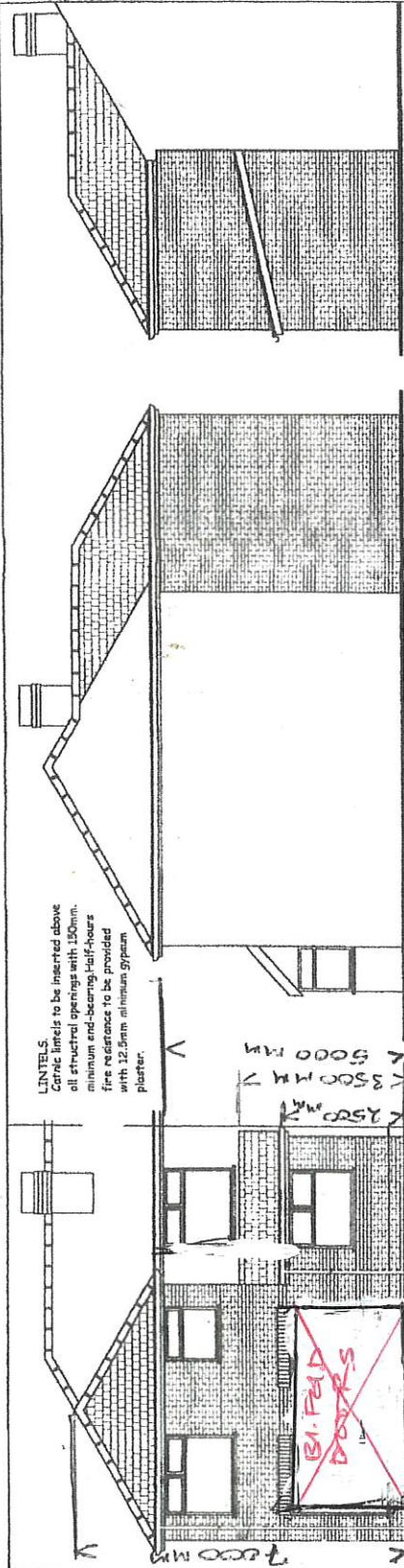


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Proposed rear elevation.

Proposed side elevation.

Proposed side elevation.

WINDOWS.

All windows are to be double-glazed with K glass and to match the clients existing with an opening light equal to one twentieth of the respective floor area and to have trickle vents incorporated within the frame.

ROOF

Roof covering to match existing tiles laid in accordance with B.S. 5534 Part 1 1978 and manufacturers recommendations on treated softwood battens on reinforced bituminous felt to B.S. 747 lapped a minimum 225mm.

Spars: 50mm x 100mm @ 400 mm c/s.
Truss: 50mm x 100mm @ 400mm c/s.
Purlins: 75mm x 225mm @ 2m c/s.
Hangers: 50mm x 50mm.
Bricks: 50mm x 50mm.
Wallplates: 75mm x 100mm.
80mm Kingspan insulation laid above ceiling and soffit to be plaster-boarded and skimmed.

Fit vent baffles between spars at soffit level and ventilating tiles at ridge position.

FOUNDATIONS

Final depth of foundations to be determined on site to suit ground conditions and irrespective of any dimension indicated.

Trench to be filled with concrete, 150mm minimum thickness, only after approval by the L.A. Building Control Officer. Where drains are within 1m distance of the foundations excavate to the invert of the drains.

FIRST FLOOR

All structural timber to be used to comply with B.S. 5268 Part 2 1991. 19mm thick tongue and grooved floor-board nailed to softwood joists at 400mm centres, double up joists below stud partition walls or around stairwell openings. Joists parallel to external walls to have Bar restraining straps at 2m centres and to be solidly built into the structure. Fix 9mm plaster-board and skim coat gypsum plaster to the underside. Joists to be 50mm x 175mm, at 400mm centres.

GROUND FLOOR

All vegetable soil and detritus matter to be stripped off site. Lay 150mm thick clean crushed stone hardcore and compact. Blind to laying 12006 Vigorcon D.P.C. laid so as to provide continuity with horizontal D.P.C. Floorboards insulation 100mm thickness, above the membrane and 150mm concrete on top, well trowelled to receive floor finish.

EAVES

Softwood fascia board with one coat primer, two undercoats and one coat full glass finish on exposed surfaces. UP.V.C. gutters and brackets sawn fixed. Soffit lining in vent baffles at the underside.

WALLS

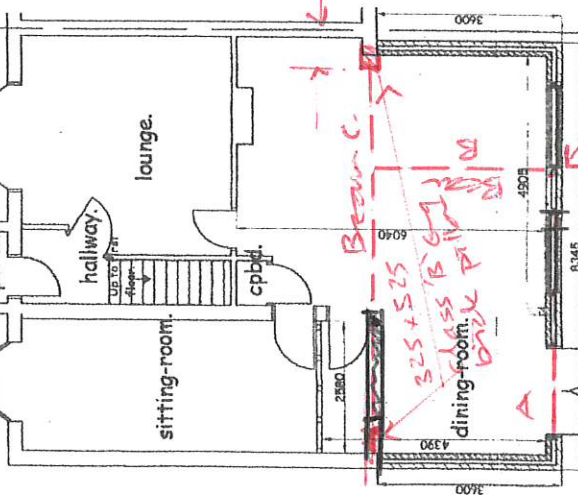
Below D.P.C. construct two separate leaves of common brick with outer skin having facing bricks two courses below final ground level. Externalised wall tied to be installed at 900mm centres horizontally and 450mm vertically, all in accordance with B.S. 1243. D.P.C. to be high level, or similar, laid 150mm above finished ground level. Above D.P.C. external leaf to be in facing brick to match existing outer leaf. Inner leaf to be 100mm concrete indicating block. Provide insulating D.P.C. at all vertical openings. Inner leaf to be plastered with Centre Bonding coat and 3mm skim coat finish. Slurring board and architraves to be to the clients choice.

DRAINAGE

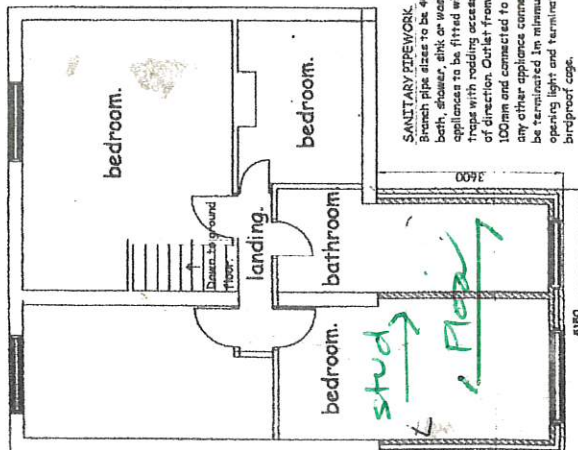
Provide 100mm diameter half-round gutter connected to 60mm downpipe to discharges below guttering. Below ground drainage to be in 100mm Super-solve with patent joints laid to a fall of 1-40. Provide bridging limit where pipes pass through walls. Soil and vent stacks to be connected to a neat band with downpipes connected to a roddable gully. Water test the whole system after backfill.

STEEL WORK

Two 100mm x 175mm R.S.J.'s to have a minimum of 100mm and bearing at each section on precast concrete pad ones with 2 no. layers of Frema plaster-board and 3mm skim coat gypsum plaster to provide 30 mins fire resistance.



Proposed ground floor.



Proposed first floor.

SANITARY PIPEWORK.
Branch pipe sizes to be 40mm for any bath, shower, sink or wash-hand basin. All appliances to be fitted with anti-siphonic traps with rodding access at any change of direction. Outlet from W.C. to be 100mm and connected to soil stack below any other appliance connection. Stack to be terminated in minimum above any opening light and terminated with a broodproof cage.

NOTES

1. The builder is to familiarise himself with the scheme and fully understand the plans and any structural details before work commences on site.
2. All dimensions indicated are to be checked on site and any discrepancies noted are to be brought to the attention of the designer.
3. Workmanship and materials are to comply with current Building Regulations and British Standards and Codes of Practices where relevant.
4. Any aspect of the work that is subject to statutory inspection is to remain uncovered until inspected and approved by the L.A. Building Control Officer.
5. Drainage and foundations are provisional and may need to be modified to suit ground conditions.
6. Concrete work is to be in accordance with any recommendations made in B.S. 5328 1981 and B.S. 5328 1989.
7. Brickwork is to be in accordance with B.S. 5328 Part 3 1989.
8. All pipework within an unheated space is to be surrounded with 40mm insulation.
9. The site is to be left clean and tidy by the contractor upon completion of the works.
10. All electrical and gas installations are to be in compliance with any relevant statutory legislation.
11. These drawings have been prepared for the purpose of obtaining Planning Permission and Building Regulations approval only. Full working drawings can be produced if required by the client.
12. Compliance with the Party Wall Act 1996 is to be sought by the client where relevant.
13. Bathrooms, kitchens and utility rooms to have Expalair fane installed capable of extracting 60 litres per second.

Do not scale from this drawing. Written dimensions are to be used at all times.

02 APR 2008

Mr. & Mrs. P. Bird,

7, Wynfield Avenue, Moss Nook.

Proposed plans and elevations for a two story rear extension.

~~March 2008~~ DEL 2018

Scale: 1-100.

PAULBIRD 5511 @ CHAIL.COM.

Manchester City Council
Technical Support Team
P O Box 532 Town Hall
Manchester
M60 2LA

6 December 2018

Dear Sir / Madam,

Application number: 121958/FH/2018

Proposal: Erection of a part single/part two story rear extension to form additional living accommodation.

Location: 7 Wynfield Avenue, Manchester, M22 5NE

Further to your 27th November 2018 letter and the 3 December 2018 directive from Mr Lawless I confirm that the heights to the eaves and ridges as shown on the enclosed Proposed Plans are:

Ground floor - eaves 2.500m and ridges 3.500m

First floor – eaves 5.000m and ridges 7.000m

thus making the Application valid.

Will you kindly progress this matter.

Yours sincerely on the behalf of Mr Paul Bird'

C.R Havercroft.
42 Trenchard Drive
Moss Nook
Manchester
M22 5 NA

Eur. Ing. Anthony Roylance C.Eng, M.I.C.E. Chartered Civil Engineers

7, Courteney Place, Bowdon, Cheshire. WA14 3QT Tel.No : 07957165324

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Site address: 7 Wynfield Avenue Moss Nook

Job: Extension

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- Span -

Bending

Maximum B.M. = 87.0 kNm (*span loaded, unfactored DLs only on cant*)

Moment capacity, $M_c = p_y \cdot S_{x, \text{eff}} = 355 \times 490/1000 = 174 \text{ kNm OK}$

Lateral-torsional buckling

Beam is laterally restrained at supports only

Restraint condition at R1 and R2: Compression flange laterally restrained. Nominal torsional restraint. Both flanges free to rotate on plan (1.0L)

Effective length = $1.0L = 5.00 \text{ m}$. [Table 13]

Bending strength, $p_b = 239 \text{ N/mm}^2$

Maximum moment within segment, $M_x = 87.0 \text{ kNm}$

Equivalent uniform moment factor, $m_{LT} = 0.851$ ($M_2 = 49.0, M_3 = 87.0, M_4 = 38.9$)

Equivalent uniform moment = $0.851 \times 87.0 = 74.1 \text{ kNm}$

Buckling resistance moment, $M_b = p_b \cdot S_{x, \text{eff}} = 239 \times 490/1000 = 117 \text{ kNm OK}$

Web buckling and crushing have not been checked

Deflection

LL deflection = $32.4 \times 1e8/(205,000 \times 4,570) = 3.5 \text{ mm (L/1445) OK}$

TL deflection = $107.4 \times 1e8/(205,000 \times 4,570) = 11.5 \text{ mm (L/436)}$

- Cantilever at R2 -

Bending

Root moment = 41.7 kNm

Moment capacity, $M_c = p_y \cdot S_{x, \text{eff}} = 355 \times 490/1000 = 174 \text{ kNm OK}$

Lateral-torsional buckling

Maximum moment within segment = 41.7 kNm

Equivalent uniform moment = 41.7 kNm ($m = 1.00$)

Buckling resistance moment, $M_b = 497 \times 189.9/1000 = 94.4 \text{ kNm (} p_b = 190 \text{) OK}$

Deflection

LL deflection = $0.00 \times 1e8/(205,000 \times 4,570) = 0.0 \text{ mm OK}$

TL deflection = $20.20 \times 1e8/(205,000 \times 4,570) = 2.2 \text{ mm (L/1252)}$

Notched beam flexible end plate connection check (based on SCI/BCSA Simple Connections 'Green Book' P212, 2002 edition)

Location:

Factored shear at support, $F_v = 53.4$ kN

Beam: S355 203x203x46 UC connects to web of S355 203x203x46 UC

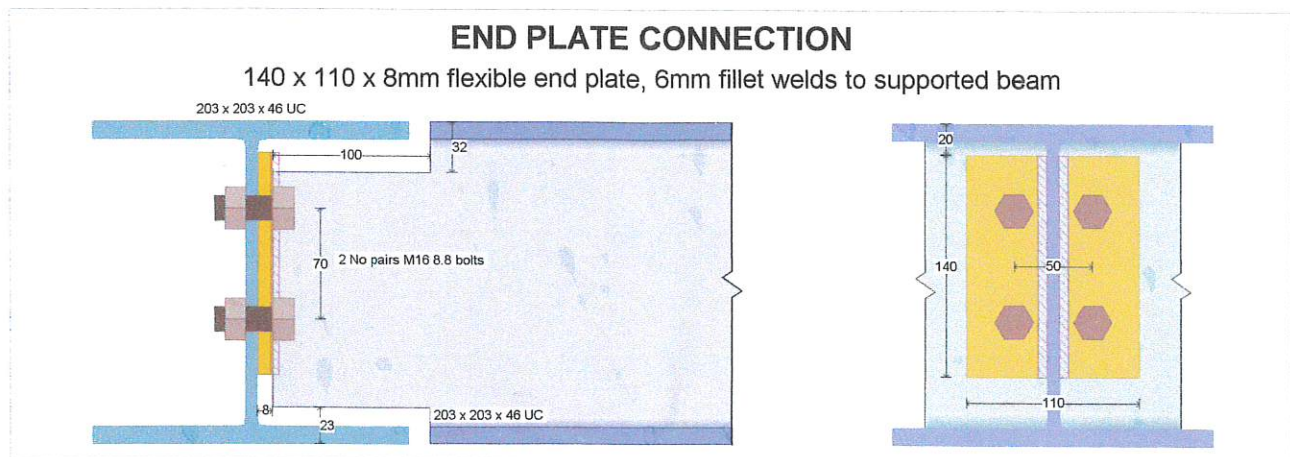
203x203x46 UC: D = 203.2 mm B = 203.6 mm t = 7.2 mm T = 11.0 mm r = 10.2 mm d = 160.8 mm A = 58.7 cm²

203x203x46 UC: D = 203.2 mm B = 203.6 mm t = 7.2 mm T = 11.0 mm r = 10.2 mm d = 160.8 mm A = 58.7 cm²

Notch dimensions: Top: 100 x 32 mm Bottom: 100 x 23 mm

Use 140 x 110 x 8mm end plate with 2No pairs of M16 8.8 bolts

Bolt centres: 70mm (v) x 50mm (h)



Check 1: Recommended detailing requirements

All requirements satisfied

Check 2: Capacity of welds connecting end plate to supported beam web

Use 6mm fillet welds $a = 0.7s = 4.2$ mm

Effective weld length, $l_{we} = 2 \times (140 - 2 \times 6) = 256$ mm

Weld capacity = $220 \times 256 \times 4.2/1000 = 237$ kN OK

Check 3: N/A

Check 4: Shear capacity of supported beam web

$A_v = 0.9 \times 140 \times 7.2 = 907$ mm²

Web capacity = $0.6 p_y A_v = 0.6 \times 355 \times 907/1000 = 193$ kN OK

Check 5: Shear and bending interaction at notch

Shear capacity at notch, $P_{vN} = 0.6 p_y A_v$

$P_{vN} = 0.6 \times 355 \times 0.9 \times (203.2 - 32 - 32) \times 7.2/1000 = 205$ kN ($F_v \leq 0.75 P_{vN}$) OK

Moment at notch = $53.4 \times (100+10)/1000 = 5.87$ kNm

Moment capacity at notch, $M_{cN} = p_y Z_N = 355 \times 26.4/1000 = 9.36$ kNm OK

Bending+shear interaction load capacity = 84.9 kNm OK

Moment at notch = $84.9 \times (100+10)/1000 = 9.34$ kNm

Moment capacity at notch, $M_{cN} = p_y Z_N = 355 \times 26.4/1000 = 9.36$ kNm OK

Check 6: Local stability of notched beam

Not checked

Check 7: Overall stability of notched beam

Not checked

Check 8: Capacity of bolt group connection to supporting beam web

Bolt shear capacity, P_s , per bolt = $157 \times 375/1000 = 58.9$ kN

Shear capacity of bolt group, $\Sigma P_s = 4 \times 58.9 = 236$ kN OK ←

Bolt bearing capacity per bolt = $16 \times 8 \times 460/1000 = 58.9$ kN

Bearing capacity of end plate at support = $2 \times 2 \times 58.9 = 236$ kN OK

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Check 9: Shear and bearing capacity of plate at supportPlain shear capacity, $P_v = 0.6 \cdot p_y \cdot A_v$

$$A_v = 0.9 \times 140 \times 8 = 1,008 \text{ mm}^2$$

$$P_v = 0.6 \times 275 \times 1,008/1000 = 166 \text{ kN (x2) OK} \leftarrow$$

Plain shear capacity, $P_{v,net} = 0.7 \cdot p_y \cdot K_e \cdot A_{v,net}$

$$A_{v,net} = 1,008 - 2 \times 18 \times 8 = 720 \text{ mm}^2$$

$$P_{v,net} = 0.7 \times 275 \times 1.2 \times 720/1000 = 166 \text{ kN (x2) OK}$$

Block shear capacity, $P_r = 0.6 \cdot p_y \cdot t_p (L_v + K_e (L_t - 0.5 D_h))$

$$P_r = 0.6 \times 275 \times 8 \times (105 + 1.2 \times (30 - 0.5 \times 18)) / 1000 = 172 \text{ kN (x2) OK}$$

Check 10: Local capacity of supporting beam webShear capacity per bolt line, gross, $P_v = 0.6 \cdot p_y \cdot A_v$

$$A_v = (55 + (2 - 1) \times 70 + 25) \times 7.2 = 1,080 \text{ mm}^2$$

$$P_v = 0.6 \times 355 \times 1,080/1000 = 230 \text{ kN (x2) OK}$$

Shear capacity per bolt line, net, $P_{v,net} = 0.7 \cdot p_y \cdot K_e \cdot A_{v,net}$

$$A_{v,net} = 1,080 - 2 \times 18 \times 7.2 = 821 \text{ mm}^2$$

$$P_{v,net} = 0.7 \times 355 \times 1.1 \times 821/1000 = 224 \text{ kN (x2) OK}$$

Bearing capacity of supporting beam web /bolt = $16 \times 7.2 \times 550/1000 = 63.4 \text{ kN}$ Bearing capacity per bolt line = $2 \times 63.4/1000 = 127 \text{ kN (x2) OK} \leftarrow$ *Further checking is needed if this web supports connections on both sides***Summary:****Check**

Check	Cap kN
1 Basic detailing requirements	OK
2 Capacity of welds connecting end plate to supported beam web	236.5
3 N/A	N/A
4 Shear strength of beam web at end plate	193.2
5 Shear and bending interaction at notch	84.9
6 Local stability of notched beam	Not checked
7 Local shear capacity of supporting member	Not checked
8 Shear capacity of bolt group connection to support	235.5
9 Shear and bearing capacity of end plate	332.6
10 Local capacity of supporting member	253.4

Critical design check: 5 - Shear and bending interaction at notch

Connection capacity = **84.9 kN OK**

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Beam: Mk C**Span: 5.0 m.
+ RH Cantilever: 2.7 m.**

	Load name	Loading w1	Start x1	Loading w2	End x2	R1comp	R2comp	SpanDef
U L	roof	0.6*1.7	0		L	2.55	2.55	8
U D	roof	1.3*1.7	0		L	5.53	5.53	18
R D	wall	4.2*2.5	2.5		7.7	-1.09	55.69	-17
R D	o.w.	0.95	0.0		7.7	1.68	5.63	2
P D	Beam: Mk B : R1	27.54 [B/F]	2.5			13.77	13.77	72
P L	Beam: Mk B : R1	9.28 [B/F]	2.4			4.83	4.46	24
Total load (unfactored, all loads applied):						115 kN	27.26	87.62
Dead/Permanent (unfactored):						101 kN	19.89	80.62
Live/Variable (unfactored):						14 kN	7.38	7.01
								32

7 miss

Worst case factored reactions:

R1: factored DL+LL on span, unfactored DL on RH cant

42.98

R2: factored DL+LL on span and RH cant

124.08

Check for uplift at R1 with worst case loading

Unfactored DL on span; factored DL+LL on RH cantilever

16.55

OK

Load types: U:UDL; R:Part UDL; P:Point load; Load positions are measured in m. from R1

Load durations: D: Dead; L: Live

Span:

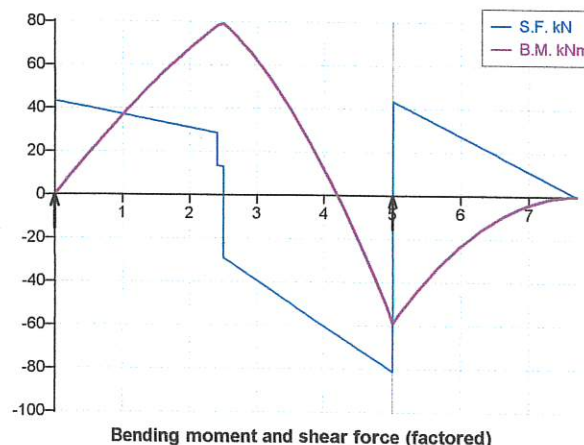
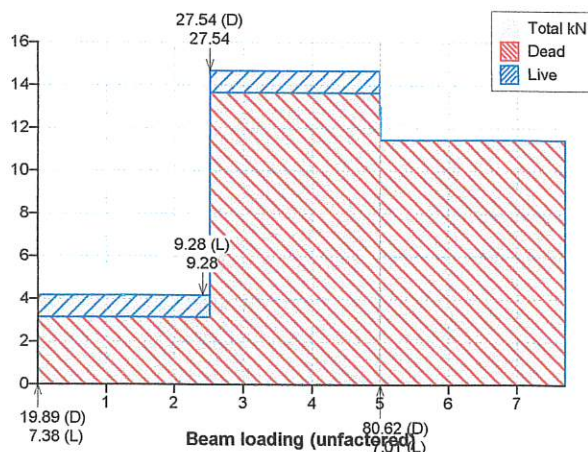
Maximum B.M. = 87.0 kNm at 2.50 m. from R1 (factored) (Cant DLs factored by 1.0, Cant LLs ignored)

Maximum S.F. = -80.8 kN at R2 (factored)

Mid-span deflections: Dead = $75 \times 10^8 / EI$ (E in N/mm^2 , I in cm^4)Live = $32 \times 10^8 / EI$ (Live loads on span only)Total = $107 \times 10^8 / EI$ **RH cantilever:**

B.M. at root = -58.4 kNm (factored)

S.F. at root = 43.3 kN (factored)

End deflections: Dead = $20.20 \times 10^8 / EI \times$ (E in N/mm^2 , I in cm^4)Live = $0.00 \times 10^8 / EI$ (Live loads on cantilever only)Total = $20.20 \times 10^8 / EI$ 

Beam calculation to BS5950-1:2000 using S355 steel

SECTION SIZE : 203 x 203 x 46 UC S355 (semi-compact)D=203.2 mm B=203.6 mm t=7.2 mm T=11.0 mm $I_x=4,570 \text{ cm}^4$ $r_y=5.13 \text{ cm}$ $S_x=497 \text{ cm}^3$ $x=17.7$ Section classification: T = 11.0mm $p_v = 355 \text{ N/mm}^2$ $\epsilon = \sqrt{275/355} = 0.88$

(Table 11)

Flange: $b/T = 101.8/11.0 = 9.25$ ($\leq 15\epsilon$: Class 3 semi-compact)Web: $d/t = 160.8/7.2 = 22.3$ ($\leq 80\epsilon$: Class 1 plastic)Section classification is Class 3, semi-compact $S_{x,eff} = 490 \text{ cm}^3$ **Shear**

Maximum S.F. = 81 kN

Shear capacity = $0.6 p_v t D = 0.6 \times 355 \times 7.2 \times 203.2 / 1000 = 312 \text{ kN}$ OK

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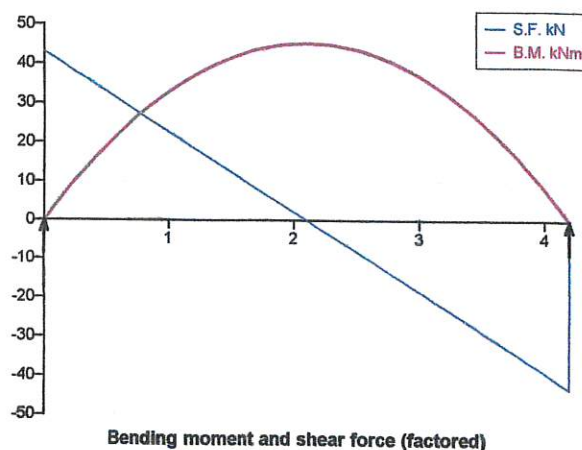
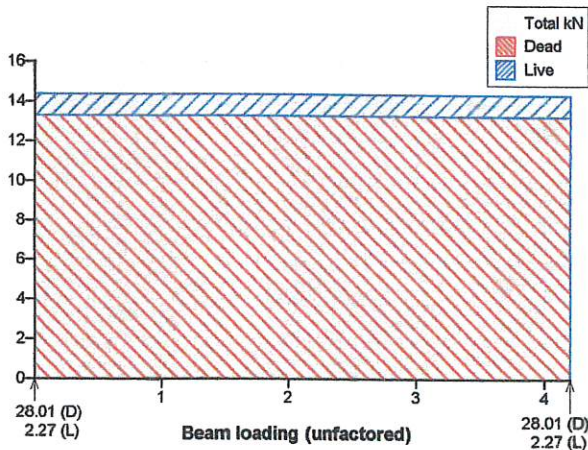
Beam: Mk A**Span: 4.2 m.**

	Load name	Loading w1	Start x1	Loading w2	End x2	R1comp	R2comp	Defl.
U D	wall	4.2*2.5	0		L	22.05	22.05	42.5
U L	roof	0.6*1.8	0		L	2.27	2.27	4.4
U D	roof	1.3*1.8	0		L	4.91	4.91	9.5
U D	o.w.	0.5	0		L	1.05	1.05	2.0
Total load (unfactored): 60.6 kN						30.28	30.28	58.4
Dead/Permanent (unfactored): 56.0 kN						28.01	28.01	54.0
Live/Variable (unfactored): 4.5 kN						2.27	2.27	4.4
Total load (factored): 85.7 kN						42.85	42.85	

Load types: U:UDL; Load positions are measured in m. from R1; Load durations: D: Dead; L: Live

Maximum B.M. = 45.0 kNm (factored) at 2.10 m. from R1

Maximum S.F. = 42.8 kN (factored) at R1

Mid-span deflections: Dead: $54.0 \times 10^8 / EI$ (E in N/mm^2 , I in cm^4)Live: $4.4 \times 10^8 / EI$ Total: $58.4 \times 10^8 / EI$ 

Beam calculation to BS5950-1:2000 using S355 steel

SECTION SIZE : 200 x 150 x 10 HF RHS S355 (50.9kg/m) (compact) $I_x = 3,570 \text{ cm}^4$ $r_y = 5.91 \text{ cm}$ $S_x = 436 \text{ cm}^3$ $Z_x = 357 \text{ cm}^3$ $A = 64.9 \text{ cm}^2$ Section classification: $T = 10.0 \text{ mm}$ $p_y = 355 \text{ N/mm}^2$ $\varepsilon = \sqrt{275/355} = 0.88$ (Table 12) Flange: $b/T = 120.0/10.0 = 12.0 (<=28\varepsilon)$ Class 1 plasticWeb: $d/t = 170.0/10.0 = 17.0 (<=64\varepsilon)$ Class 1 plastic

For design purposes section classification is Class 2, compact

Shear

Maximum S.F. = 43 kN

Shear capacity = $0.6 p_y A_D / (D+B) = 0.6 \times 355 \times (100 \times 64.9 \times 200) / (200+150) / 1000 = 790 \text{ kN OK}$ **Bending**

Maximum B.M. = 45.0 kNm

Moment capacity, $M_c = 1.2 p_y Z_x = 1.2 \times 355 \times 357 / 1000 = 152 \text{ kNm OK}$ **Lateral-torsional buckling**

Beam is laterally restrained at supports only

Restraint condition at R1 and R2: Compression flange laterally restrained. Nominal torsional restraint. Both flanges free to rotate on plan (1.0L)

Effective length = $1.0L = 4.20 \text{ m}$. [Table 13]Slenderness $(L_E/r_y) = 4.20 \times 100/5.91 = 71.1$ Check for lateral torsional buckling not required when $L_E/r_y <= 449$ (Table 15)

Web buckling and crushing have not been checked

[illegible]

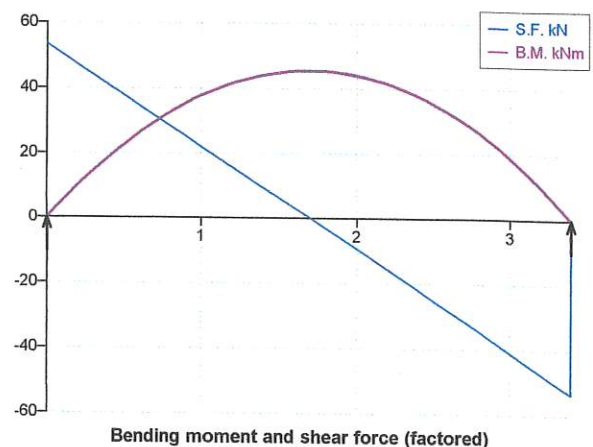
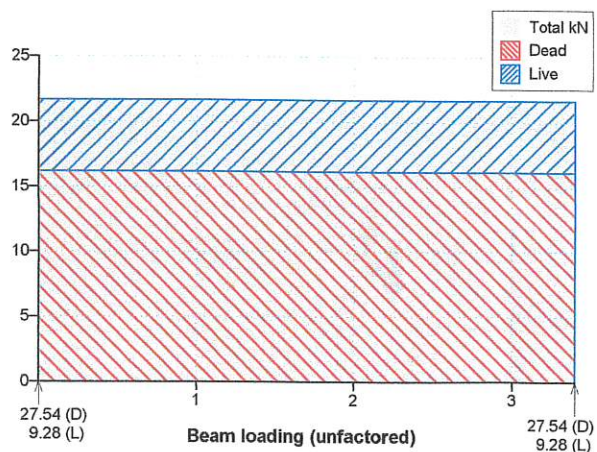
Beam: Mk B**Span: 3.4 m.**

	Load name	Loading w1	Start x1	Loading w2	End x2	R1comp	R2comp	Defl.
U D	floor dead	0.7*2.6	0		L	3.09	3.09	3.2
U L	Floor live	1.5*2.6	0		L	6.63	6.63	6.8
U L	Pitched roof live	0.6*2.6	0		L	2.65	2.65	2.7
U D	Pitched roof dead	1.3*2.6	0		L	5.75	5.75	5.9
U D	wall	4.2*2.5	0		L	17.85	17.85	18.3
U D	o.w.	0.5	0		L	0.85	0.85	0.9
Total load (unfactored): 73.6 kN						36.82	36.82	37.7
Dead/Permanent (unfactored): 55.1 kN						27.54	27.54	28.2
Live/Variable (unfactored): 18.6 kN						9.28	9.28	9.5
Total load (factored): 106.8 kN						53.41	53.41	

Load types: U:UDL; Load positions are measured in m. from R1; Load durations: D: Dead; L: Live

Maximum B.M. = 45.4 kNm (factored) at 1.70 m. from R1

Maximum S.F. = 53.4 kN (factored) at R1

Mid-span deflections: Dead: $28.2 \times 10^8/EI$ (E in N/mm^2 , I in cm^4)Live: $9.5 \times 10^8/EI$ Total: $37.7 \times 10^8/EI$ 

Beam calculation to BS5950-1:2000 using S355 steel

SECTION SIZE : 203 x 203 x 46 UC S355 (semi-compact)D=203.2 mm B=203.6 mm t=7.2 mm T=11.0 mm $I_x=4,570 \text{ cm}^4$ $r_y=5.13 \text{ cm}$ $S_x=497 \text{ cm}^3$ $x=17.7$ Section classification: T = 11.0mm $p_y = 355 \text{ N/mm}^2$ $\varepsilon = \sqrt{275/355} = 0.88$ (Table 11) Flange: $b/T = 101.8/11.0 = 9.25 (<15\varepsilon)$: Class 3 semi-compactWeb: $d/t = 160.8/7.2 = 22.3 (<80\varepsilon)$: Class 1 plasticSection classification is Class 3, semi-compact $S_{x,eff} = 490 \text{ cm}^3$ **Shear**

Maximum S.F. = 53 kN

Shear capacity = $0.6 p_y t D = 0.6 \times 355 \times 7.2 \times 203.2/1000 = 312 \text{ kN OK}$ **Bending**

Maximum B.M. = 45.4 kNm

Moment capacity, $M_c = p_y S_{x,eff} = 355 \times 490/1000 = 174 \text{ kNm OK}$ **Lateral-torsional buckling**

Beam is laterally restrained at supports only

Restraint condition at R1 and R2: Compression flange laterally restrained. Nominal torsional restraint. Both flanges free to rotate on plan (1.0L)

Effective length = $1.0L = 3.40 \text{ m}$. [Table 13]Bending strength, $p_b = 296 \text{ N/mm}^2$ Maximum moment within segment, $M_x = 45.4 \text{ kNm}$ Equivalent uniform moment factor, $m_{LT} = 0.925$ ($M_2 = 34.0$, $M_3 = 45.4$, $M_4 = 34.0$)Equivalent uniform moment = $0.925 \times 45.4 = 42.0 \text{ kNm}$