

Amendments/Additional Information

- Amended layout of buildings/outside areas
- Additional background information
- Amended design
- Revised access arrangements
- Change of description of proposed development
- Change in site boundaries
- Other (as specified below)

.....Dormer window amended to Yorkshire SS.
.....Updated structural survey
.....
.....

STRUCTURAL & BUILDING DESIGN
LITTLE COTE BARN,
ARRAM, BEVERLEY,
EAST YORKSHIRE, HU17 7NR

JOB NO
2479

SHEET NO
1A

DATE
OCT 2016

STRUCTURAL CALCULATIONS FOR

PROPOSED INTERNAL ALTERATIONS TO
HOLLINGTON,
THE SQUARE,
ROBIN HOODS BAY

NVMNPA
03 OCT 2017

CLIENT

MS SALLY MALLARD

AMENDED

Notes

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

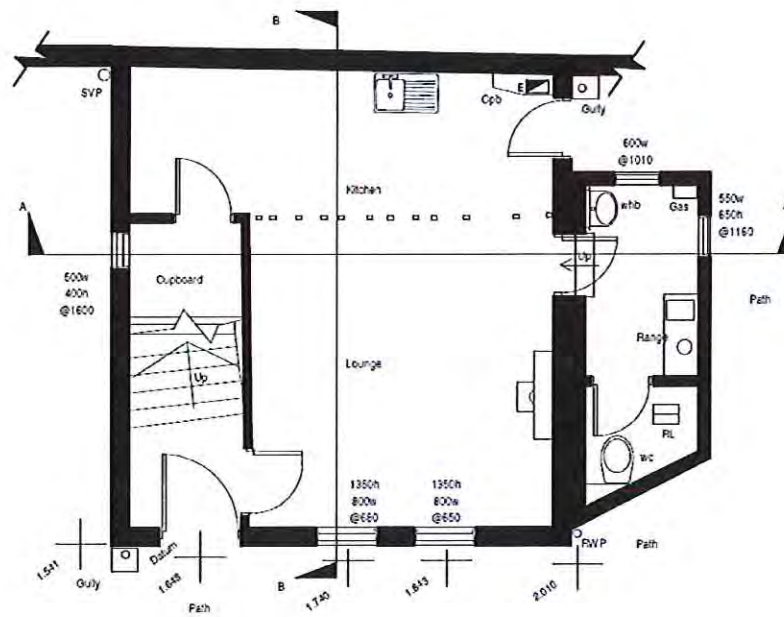
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STRUCTURAL
DETAILS

DESIGN SUBJECT
EXISTING GROUND FLOOR

DATE

OCT 2016



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Notes

Existing Ground Floor

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

3A

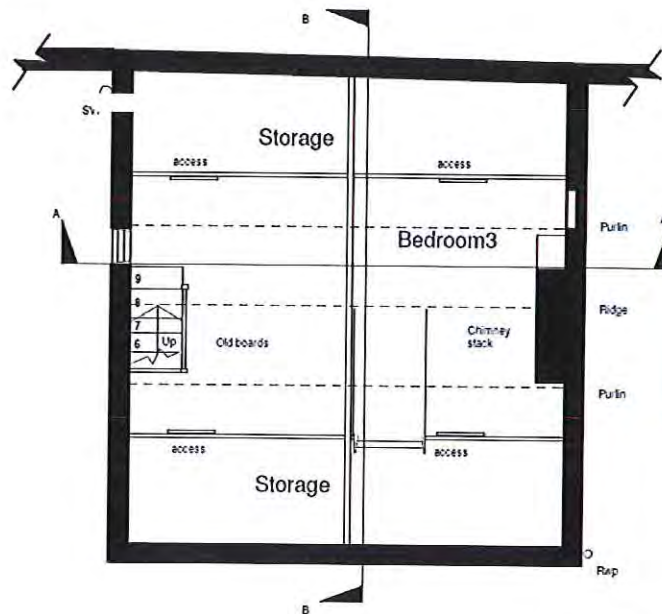
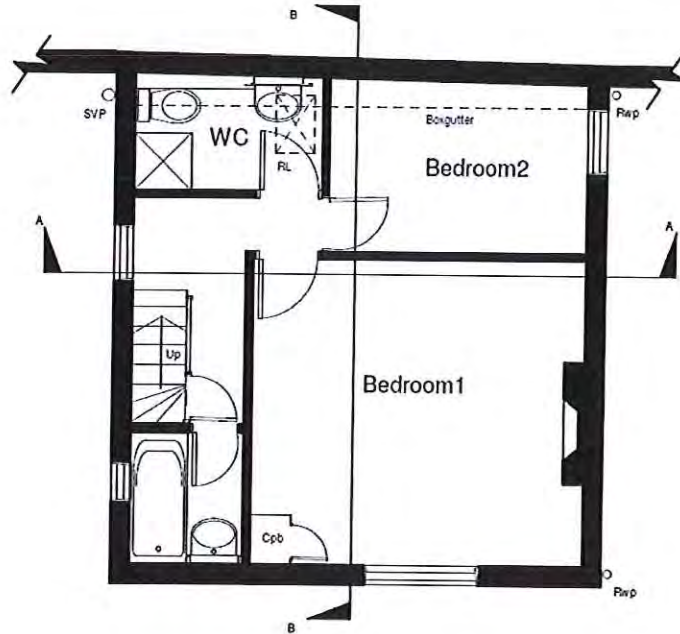
STRUCTURAL
DETAILS

DESIGN SUBJECT

EXISTING FIRST & SECOND FLOOR

DATE

OCT 2016



NYMNDIA
03 OCT 2017

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Existing First & Second Floor

Notes

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

4A

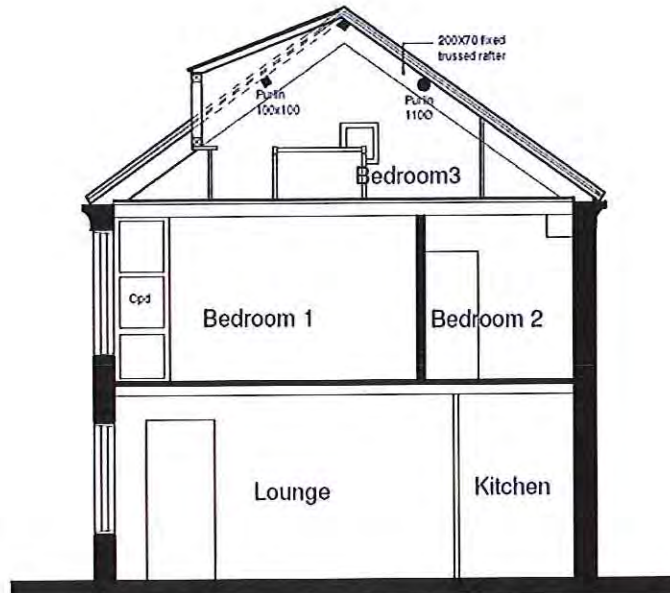
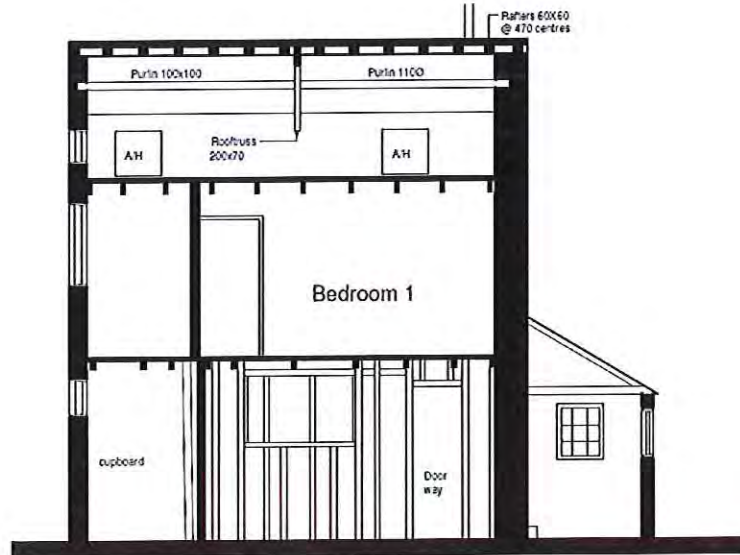
STRUCTURAL
DETAILS

DESIGN SUBJECT

EXISTING SECTIONS

DATE

OCT 2016



Existing Sections

AMENDED

Notes

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

5B

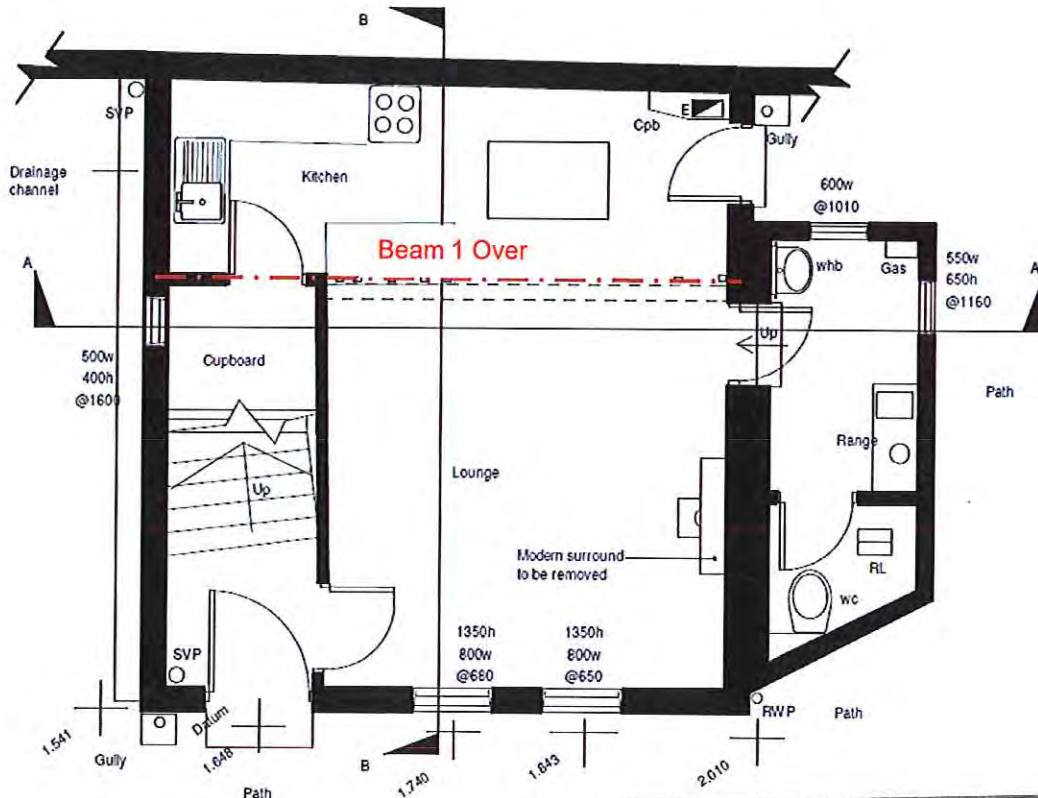
STRUCTURAL
DETAILS

DESIGN SUBJECT

PROPOSED GROUND FLOOR

DATE

OCT 2016



AMENDED

Notes

Proposed Ground Floor

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STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

6A

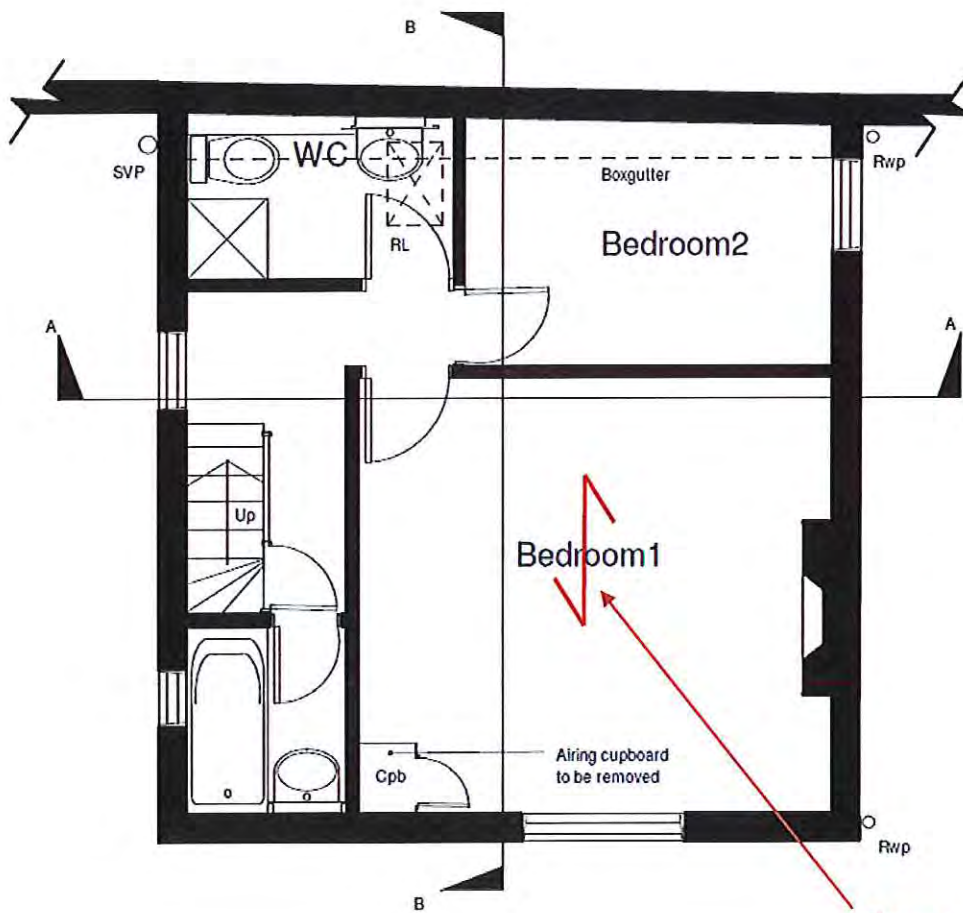
STRUCTURAL
DETAILS

DESIGN SUBJECT

PROPOSED FIRST FLOOR

DATE

OCT 2016



1st floor joists – see
flitch plate design in
calculations.

AMENDED

Notes

Proposed First Floor

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

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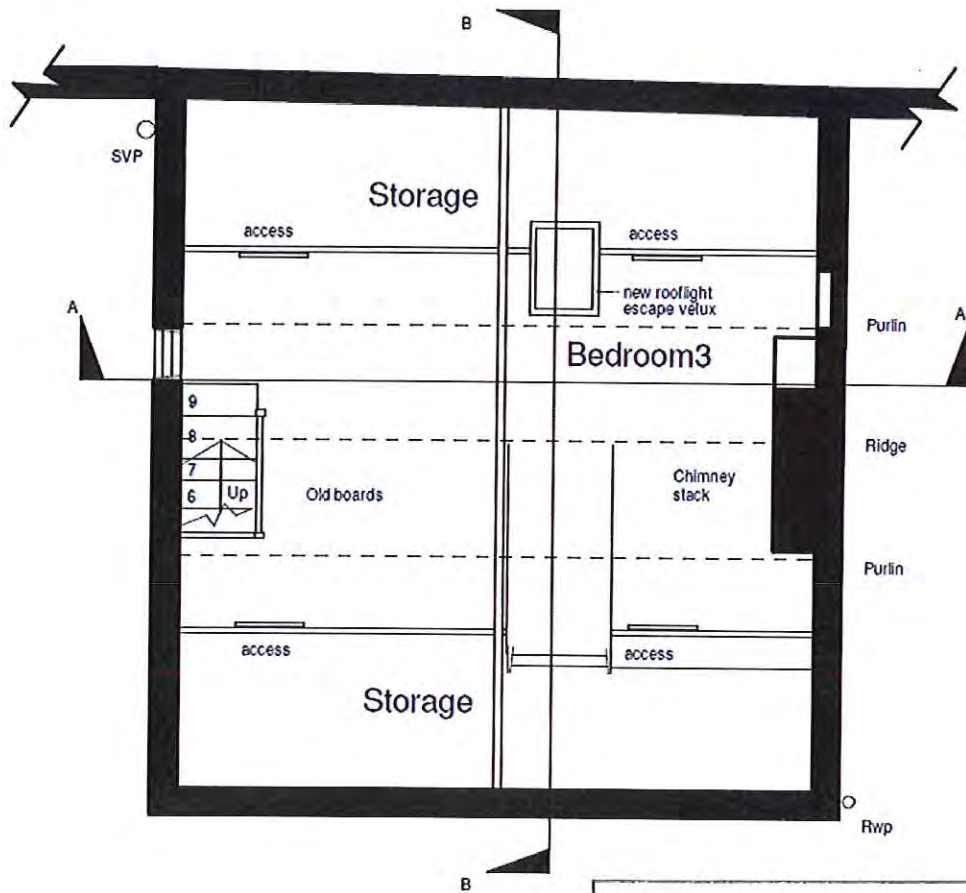
STRUCTURAL
DETAILS

DESIGN SUBJECT

PROPOSED SECOND FLOOR

DATE

OCT 2016



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Notes

Proposed Second Floor

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STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET N

8B

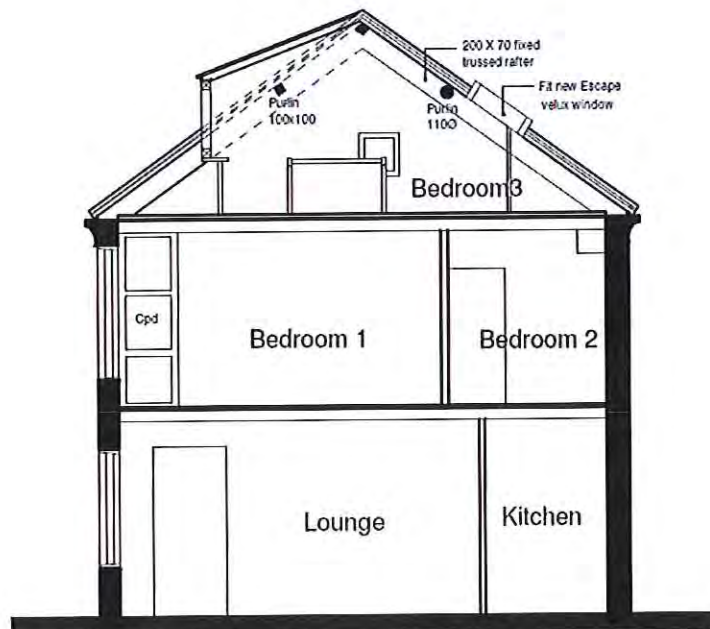
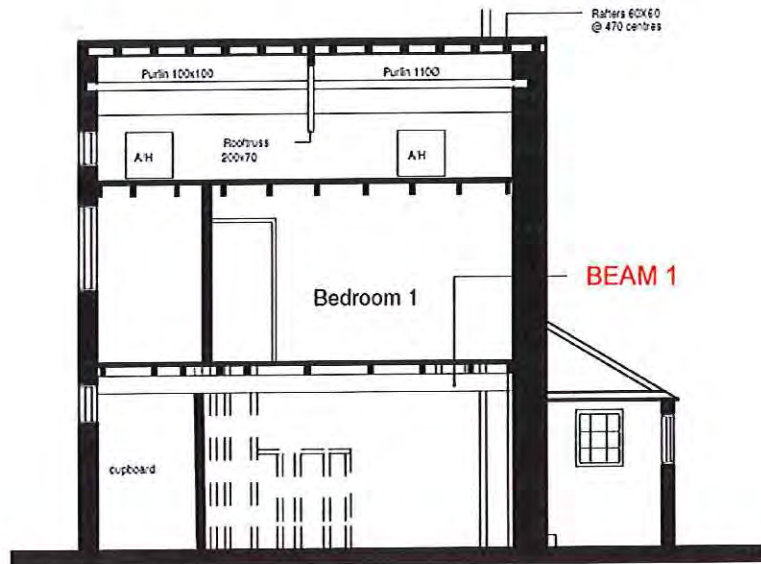
STRUCTURAL
DETAILS

DESIGN SUBJECT

PROPOSED SECTIONS

DATE

OCT 2016



Proposed Sections

AMENDED

Notes

STRUCTURAL & BUILDING
DESIGN
LITTLE COTE BARN,
ARRAM,
BEVERLEY,
EAST YORKSHIRE,
HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO

2479

SHEET NO

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STRUCTURAL
CALCULATIONS

DESIGN SUBJECT

GENERAL LOADINGS / M2

DATE

OCT 2016

GENERAL LOADINGS / M2

Pitched roof (non standard) i.e. felt, battens & boarding applied below tiles.

Superimposed		0.75 kn / sq.m
Tiles	0.55 kn / sq.m	
Cross battens	0.01 kn / sq.m	
Battens	0.01 kn / sq.m	
Felt x 3	0.03 kn / sq.m	
Sheathing	<u>0.08 kn / sq.m</u>	
Sub total	0.68 x 1 / cos 30°	0.78 kn / sq.m
Rafters or trusses		<u>0.11 kn / sq.m</u>
Total		1.64 kn / sq.m
		(Comprising 0.75 Super & 0.89 Dead)

First/Second Floor - Timber

Superimposed	1.50 kn / sq.m	
T & g boards	0.08 kn / sq.m	
Joists	0.12 kn / sq.m	
Plasterboard & skim	<u>0.20 kn / sq.m</u>	
Total	1.90 kn / sq.m	
		(Comprising 1.50 Super & 0.40 dead)

Stud Wall

Softwood studding	0.10 kn / sq.m	
Plasterboard & skim x 2	<u>0.40 kn / sq.m</u>	
Total (Dead)	0.50 kn / sq.m	

AMENDED

Notes

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03 OCT 2017

STRUCTURAL & BUILDING DESIGN
 LITTLE COTE BARN,
 ARRAM,
 BEVERLEY,
 EAST YORKSHIRE,
 HU17 7NR

CALCULATIONS FOR

HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB
 NO
 2479

SHEET
 NO
 10A

CALCULATIONS

DESIGN SUBJECT

STEELWORK

DATE

OCT 2016

BEAM 1 – FLOOR BEAM

THIS DESIGN DOES NOT COMPLY WITH THE REQUIREMENTS OF THE BUILDING REGULATIONS IN TERMS OF DEFLECTION, SO A RELAXATION WILL BE REQUIRED. THE INTENTION OF THE STEEL BOX SECTION BEAM IS TO RELIEVE THE EXISTING TIMBER STUD WALL WHICH IS TO BE MODIFIED & REQUIRES A DEGREE OF REPAIR.

SPAN = 5850mm

WORKING LOADS

UDL – FIRST FLOOR – SUPER – $(6.3/2) \times 1.50$ = 4.73 kN/m

UDL – FIRST FLOOR – DEAD – $(6.3/2) \times 0.40$ = 1.26 kN/m

UDL – STUD – AVERAGE 1.40×0.50 = 0.70 kN/m

REFER TO PROSTEEL CALCULATIONS.

AMENDED

Notes

STRUCTURAL & BUILDING DESIGN
 LITTLE COTE BARN,
 ARRAM,
 BEVERLEY,
 EAST YORKSHIRE,
 HU17 7NR

CALCULATIONS FOR
HOLLINGTON, THE SQUARE, ROBIN HOODS BAY

JOB NO
 2479

SHEET NO
 11A

CALCULATIONS

DESIGN SUBJECT
 STEELWORK

DATE
 OCT 2016

CONSIDER DESIGN OF STEEL FLITCH PLATE TO BE ADDED TO SIDE OF LONGER SPAN FIRST FLOOR JOISTS.

FLITCH PLATE - EXISTING JOISTS VARY IN SIZE & SPACING HOWEVER AVERAGE 110mm WIDE x 140mm DEEP AT 750 c/c.

THIS DESIGN DOES NOT COMPLY WITH THE REQUIREMENTS OF THE BUILDING REGULATIONS IN TERMS OF DEFLECTION, SO A RELAXATION WILL BE REQUIRED. THE INTENTION OF THE STEEL FLITCH PLATES IS TO ASSIST THE EXISTING FLOOR JOISTS, WHICH HAVE BEEN IN PLACE FOR MANY YEARS WITHOUT FAILURE, ALBEIT DISPLAYING EXCESSIVE DEFLECTION IN USE.

SPAN = 3800mm

WORKING LOADS / m

UDL – FIRST FLOOR – SUPER – 0.75 x 1.50 = 1.13 kN/m
 UDL – FIRST FLOOR – DEAD – 0.75 x 0.40 = 0.30 kN/m

REFER TO SUPERBEAM FLITCH PLATE CALCULATIONS

AMENDED
 Notes

AMANDA
 03 OCT 2017

Structural & Building Design

Little Cote Barn, Arram, Beverley, HU17 7NR

Site: HOLLINGTON, THE SQUARE, ROBIN HOODS BAY
 Job: PROPOSED INTERNAL ALTERATIONS
 Job number: 2479

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Beam: BEAM 1

Span: 5.85 m.

Load name	Loading w1	Start x1	Loading w2	End x2	R1comp	R2comp
U L FIRST FLOOR	4.73	0		L	13.84	13.84
U D FIRST FLOOR	1.26	0		L	3.69	3.69
U D STUD WALL	0.70	0		L	2.05	2.05
Unfactored reactions (kN) Total:					19.57	19.57
Dead:					5.73	5.73
Live:					13.84	13.84
					30.16	30.16

Total load: 39.14/60.33 kN Unfactored/Factored

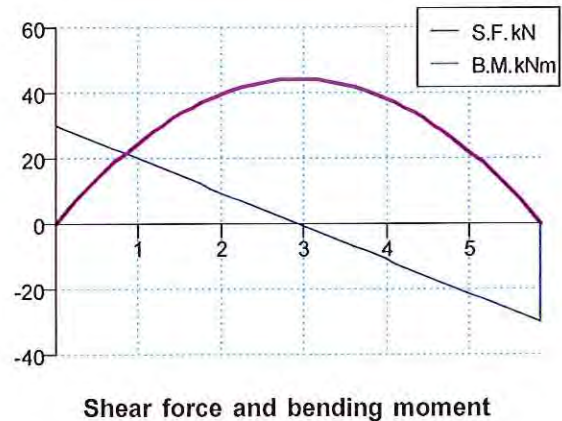
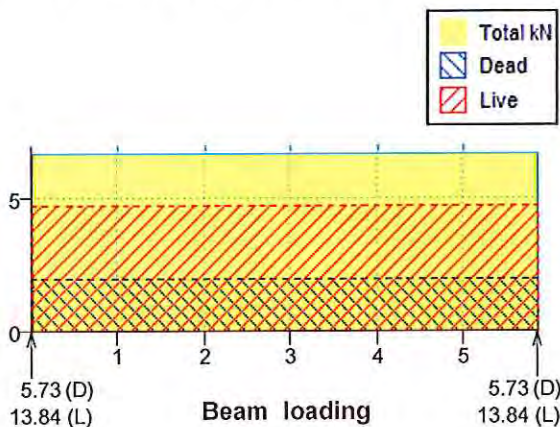
Load types: U:UDL D: Dead; L: Live (positions in m. from R1)

Maximum B.M. (factored) = 44.1 kNm at 2.92 m. from R1

Maximum S.F. (factored) = 30.2 kN at R1

Live load deflection = $72.1 \times 1e8/EI$ at 2.92 m. from R1 (E in N/mm², I in cm⁴)

Total deflection = $102.0 \times 1e8/EI$ at 2.92 m. from R1



Beam calculation to BS5950-1:2000 using S355 steel

SECTION SIZE : 120 x 120 x 8 HF SHS S355 (27.6kg/m)

$I_x = 726 \text{ cm}^4$ $r_y = 4.55 \text{ cm}$ $S_x = 147 \text{ cm}^3$ $Z_x = 121 \text{ cm}^3$ $A = 35.2 \text{ cm}^2$

Section classification: T = 8.0mm $p_y = 355 \text{ N/mm}^2$ $\epsilon = \sqrt{275/355} = 0.88$

(Table 12) Flange: $b/T = 96.0/8.0 = 12.0$ ($\leq 28\epsilon$: Class 1 plastic)

Web: $d/t = 96.0/8.0 = 12.0$ ($\leq 64\epsilon$: Class 1 plastic)

For design purposes section classification is Class 2, compact

Shear capacity = $0.6 p_y AD/(D+B) = 0.6 \times 355 \times (100 \times 35.2 \times 120)/(120+120)/1000 = 375 \text{ kN}$ (≥ 30.2) OK

Maximum moment = 44.11 kNm at 2.92 m. from R1

Beam has full lateral restraint

Moment capacity, $M_c = 1.2 p_y Z_x = 1.2 \times 355 \times 121/1000 = 51.55 \text{ kNm}$ OK

Web buckling and crushing have not been checked

LL deflection = $72.12 \times 1e8/205,000 \times 726 = 48.5 \text{ mm}$ (L/121) OK

TL deflection = $102.0 \times 1e8/205,000 \times 726 = 68.5 \text{ mm}$ (L/85)

Bearing details

Local design strength of masonry (factored) = 1.00 N/mm² (User-entered value)

R1 (30.16kN factored): 440 x 200mm padstone

Factored stress under padstone = $30.16 \times 1000/440 \times 200 = 0.34 \text{ N/mm}^2$

AMENDED

Notes

Structural & Building Design
Little Cote Barn, Arram, Beverley, HU17 7NR

Site: HOLLINGTON, THE SQUARE, ROBIN HOODS BAY
Job: PROPOSED INTERNAL ALTERATIONS
Job number: 2479

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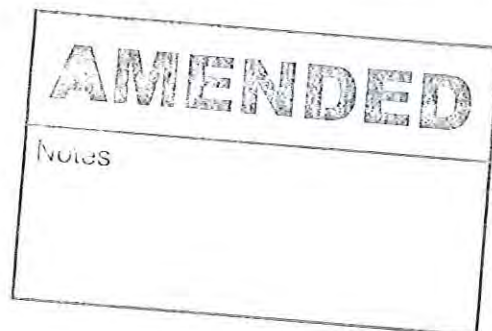
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R2 (30.16kN factored): 440 x 200mm padstone
Factored stress under padstone = $30.16 \times 1000 / 440 \times 200 = 0.34 \text{ N/mm}^2$
PADSTONE DEPTH 200mm

JOISTS - THIS DESIGN DOES NOT COMPLY WITH THE REQUIREMENTS OF THE BUILDING REGULATIONS IN TERMS OF DEFLECTION, SO A RELAXATION WILL BE REQUIRED. THE INTENTION OF THE STEEL FLITCH PLATES IS TO ASSIST THE EXISTING FLOOR JOISTS, WHICH HAVE BEEN IN PLACE FOR MANY YEARS WITHOUT FAILURE, ALBEIT DISPLAYING EXCESSIVE DEFLECTION IN USE.

BEAM - THIS DESIGN DOES NOT COMPLY WITH THE REQUIREMENTS OF THE BUILDING REGULATIONS IN TERMS OF DEFLECTION, SO A RELAXATION WILL BE REQUIRED. THE INTENTION OF THE STEEL BOX SECTION BEAM IS TO RELIEVE THE EXISTING TIMBER STUD WALL WHICH IS TO BE MODIFIED & REQUIRES A DEGREE OF REPAIR.



Structural & Building Design

Little Cote Barn, Arram, Beverley, HU17 7NR

Site: 208 WESTERN WAY, PONTELAND, NE20 9ND
 Job: PROPOSED REAR EXTENSION
 SuperBeam 4.50g 440564 Job number: 2498

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Beam: FIRST FLOOR JOISTS - FLITCH PLATE DESIGN

Span: 3.8 m.

Load name	Loading w1	Start x1	Loading w2	End x2	R1comp	R2comp
U L FIRSTFLOOR	1.13	0		L	2.15	2.15
U D FIRSTFLOOR	0.30	0		L	0.57	0.57
Total load: 5.43 kN					2.72	2.72
					Dead: 0.57	0.57
					Live: 2.15	2.15

Load types: U:UDL D: Dead; L: Live (positions in m. from R1)

Maximum B.M. = 2.58 kNm at 1.90 m. from R1

Maximum S.F. = 2.72 kN at R1

Live load deflection = $3.07 \times 1e8/EI$ at 1.90 m. from R1 (E in N/mm², I in cm⁴)

Total deflection = $3.88 \times 1e8/EI$ at 1.90 m. from R1

Timber beam calculation to BS5268 Part 2: 2002 using C16 timber

Use 110 x 140 C16 + 8 x 60 flitch plate

$z = 359.3 \text{ cm}^3$ $I = 2515 \text{ cm}^4$ Flitch plate $z = 4.8 \text{ cm}^3$ $I = 14 \text{ cm}^4$

Timber grade: C16 Load sharing system: $K_8 = 1.1$

K_3 (loading duration factor) = 1.00 K_7 (depth factor) = 1.087 K_8 (load sharing factor) = 1.1

Loading will be carried by the timber members and flitch plate in proportion to their EI values. Checks are made using the mean and minimum E-values for timber to produce worst case stresses on timber and steel members respectively.

Flitch plate EI = $205000 \times 14 = 30 \times 1e9 \text{ Nmm}^2$

Check timber members:

Using E_{mean} Timber EI = $8800 \times 2515 = 221 \times 1e9 \text{ Nmm}^2$

Timber carries $221/(221+30) = 0.882$ of total load (in worst case)

Permissible bending stress, $\sigma_{m,adm} = \sigma_{m,g} \cdot K_3 \cdot K_7 \cdot K_8 = 5.3 \times 1.00 \times 1.087 \times 1.1 = 6.34 \text{ N/mm}^2$

Applied bending stress, $\sigma_{m,a} = 0.882 \times 2.58 \times 1000/359.3 = 6.34 \text{ N/mm}^2$ OK

Permissible shear stress, $\tau_{adm} = 0.67 \times 1.1 = 0.74 \text{ N/mm}^2$

Applied shear stress, $\tau_a = 0.882 \times 2.717 \times 1000 \times 3/(2 \times 110 \times 140) = 0.23 \text{ N/mm}^2$ OK

Check flitch plate:

Using E_{min} Timber EI = $5800 \times 2515 = 146 \times 1e9 \text{ Nmm}^2$

Flitch plate carries $30/(146+30) = 0.168$ of total load (in worst case)

Flitch plate $f_{bc} = 0.168 \times 2.58 \times 1000/4.8 = 90.50 \text{ N/mm}^2$ OK

Deflection:

Using $E_{\text{min}} \times K_9$ (2 members) Timber EI = $6611 \times 2515 = 166 \times 1e9 \text{ Nmm}^2$

Timber carries $166/(166+30) = 0.849$ of total load (average case)

Bending deflection = $0.849 \times 3.88 \times 1e8/(6611 \times 2515) = 19.83 \text{ mm}$

Mid-span shear deflection = $0.849 \times 1.2 \times 2.58 \times 1e6/(E/16) \times 110 \times 140 = 0.41 \text{ mm}$

Total deflection = $19.83 + 0.41 = 20.24 \text{ mm}$ (0.0053 L) OK

Bolting:

Use M12 4.6 bolts. Bolt numbers are calculated assuming worst case load on flitch plate

Load capacity per bolt in double shear = 4.46kN (BS5268 eq. G.9 - limiting value)

(G.7: 6.62kN; G.8: 24.0kN; G.9: 4.46kN; G.10: 5.98kN)

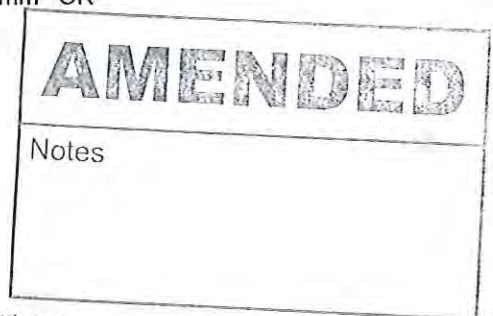
$F_d=1350$; $M_{y,d}=82,944\text{Nmm}$; $p_k=310\text{kg/m}^3$; $K_{90}=1.53$; $f_{h,0,d}=10.37$; $f_{h,1,d}=6.775$; B and K_a taken as 1.0

Bearings: R1 (2.72kN): Required number of bolts = $0.168 \times 2.72/4.46 = 0.10$ i.e. 1 bolt min.

R2 (2.72kN): Required number of bolts = $0.168 \times 2.72/4.46 = 0.10$ i.e. 1 bolt min.

For load transference a minimum of 1 bolt is also required across the span

To ensure structural integrity consider providing bolts spaced at 600mm max c/s, bolt centres alternately min. 65mm from top and bottom of beam



Structural & Building Design
Little Cote Barn, Arram, Beverley, HU17 7NR

Site: 208 WESTERN WAY, PONTELAND, NE20 9ND

Job: PROPOSED REAR EXTENSION

SuperBeam 4.50g 440564 Job number: 2498

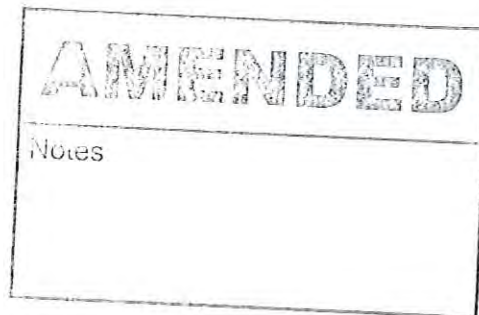
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FIX TO SIDE OF EXISTING JOIST USING M12 BOLTS OR COACH BOLTS AT 450 c/c



Structural & Building Design
Little Cote Barn, Arram, Beverley, HU17 7NR

Site: HOLLINGTON, THE SQUARE, ROBIN HOODS BAY
Job: PROPOSED INTERNAL ALTERATIONS
Job number: 2479

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ProSteel 5 Project Summary

Project started OCT 2016
Site address: HOLLINGTON, THE SQUARE, ROBIN HOODS BAY
Job: PROPOSED INTERNAL ALTERATIONS
Client: MS SALLY MALLARD
Job number: 2479

ITEMS:

- 1: Beam: BEAM 1
Span: 5.85 m.
Reactions (unfactored/factored): R1: 19.57/30.16 kN R2: 19.57/30.16 kN
Use 120 x 120 x 8 HF SHS S355 (27.6kg/m)
Bearing R1: 440 x 200mm padstone
Bearing R2: 440 x 200mm padstone
PADSTONE DEPTH 200mm

JOISTS - THIS DESIGN DOES NOT COMPLY WITH THE REQUIREMENTS OF THE BUILDING REGULATIONS IN TERMS OF DEFLECTION, SO A RELAXATION WILL BE REQUIRED. THE INTENTION OF THE STEEL FLITCH PLATES IS TO ASSIST THE EXISTING FLOOR JOISTS, WHICH HAVE BEEN IN PLACE FOR MANY YEARS WITHOUT FAILURE, ALBEIT DISPLAYING EXCESSIVE DEFLECTION IN USE.

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AMENDED

Notes

Structural & Building Design
Little Cote Barn, Arram, Beverley, HU17 7NR

Site: 208 WESTERN WAY, PONTELAND, NE20 9ND

Job: PROPOSED REAR EXTENSION

SuperBeam 4.50g 440564 Job number: 2498

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SuperBeam 4 UK Project Summary

Project started OCT 2016

Site address: HOLLINGTON, THE SQUARE, ROBON HOODS BAY

Job: PROPOSED INTERNAL ALTERATIONS

Client: MS SALLY MALLARD

Job number: 2479

ITEMS:

- 1: Beam: FIRST FLOOR JOISTS - FLITCH PLATE DESIGN
Span: 3.8 m. Reactions: R1: 2.72 kN R2: 2.72 kN
Use 110 x 140 C16 + 8 x 60 flitch plate

FIX TO SIDE OF EXISTING JOIST USING M12 BOLTS OR COACH BOLTS AT 450 c/c

