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STRUCTURAL DESIGN
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MERRYFIELD
50 WHADDON LANE
HILPERTON
BA14 7RN



STRUCTURAL REPORT
ON
STABLES OUTBUILDING

Date of inspection

27 June 2023

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JGB Birdwood MA CEng MICE MIStructE

Registered in England – number: 4605547 address: as Head Office

1. Introduction

We were appointed by Charlie & Poppy Ball of Merryfield, Whaddon Lane, Hilperton, BA14 7RN, to report on the structural condition of a stables outbuilding on land adjacent to the property, and its suitability for conversion to residential use.

Our report is concerned only with this structural issue, all other aspects of the property are outside our report.

Our report is prepared for the use of the above named client in connection with a planning submission only and is not to be relied upon by third parties without our specific written authorisation.

No exposing work was carried out. Our report is based on a visual inspection.

A site visit was carried out in the afternoon of 27th June 2023. Weather conditions were dry and overcast.

Our report contains photographs of the buildings taken on the day of inspection, and calculations to justify the existing roof structure.

2. General Description

This is an L-shaped single storey stable building with overall dimensions about 13.5m x 12m. The two legs of the L project NE and NW, and are each about 4.5m wide.

The roof is double pitched, covered with interlocking pantiles, and overhanging by about 1.0m on the internal faces, to shelter the stable doors. The roof covering is intact and weathertight.

External walls are of rendered blockwork construction typically 100mm in thickness, with stiffening piers at doorways.

The internal dividing walls are also of 100mm block.

There is a concrete floor.

In general the stables are well built and in reasonably good condition.

3. Observations

Walls

External walls are of 100mm blockwork rendered externally, and in good condition, standing vertical and with no significant cracks. There are stiffening piers (450mm x 225mm) at stable door positions.

Internal walls are also of 100mm block, and in good condition.

Roof Structure

This is a ‘cut’ roof with overhanging rafters along the front elevations. The roof structure is symmetrical, with the projecting eaves being at the same level as the rear wall plate. Because of the overhang, the front wall plate is higher, and this sets the level of the collars.

Common rafters are 125x50mm @ 400mm c/c. Collars on each pair of rafters are 175x50mm.

At the corner the roofs meet to form a valley on the inner slopes and a hip on the outer. The collars are trimmed to maintain the lateral tie to the rafters, and this arrangement appears satisfactory.

We have analysed the structure and calculations are attached to this report. The analysis shows that the structure is adequate under present loading and can accommodate the addition of insulation and light ceiling boarding.

As with many outbuildings the calculated deflections are a little higher than we would want in a house, and so we would recommend the use of non-brittle ceiling finishes such as timber boarding.

Floor slab

This is partly covered with stored materials but where visible appears sound.

4. Comments & Conclusions

Existing Structure

The stables are sturdily built and in good structural condition.

Some ivy is growing into the building through the eaves. This should be removed, but apart from this no repairs are required at the present time to keep the building in good structural order.

Proposed conversion

To convert the building to residential use the necessary works would include:

- Upgrading of walls by provision of internal insulation, vapour barrier and finishes. This work can be done from inside without taking down the blockwork.

- Upgrading of roof by provision of insulation, vapour barrier and finishes. This can also be done from inside without removing the existing covering or structure. The calculations attached to this report show that the structure can accommodate this small increase in loading.

- Upgrading of the ground floor by provision of damp proof membrane, finishes and insulation. This can be done from above without removal of the existing floor slab.

The conversion of this building can therefore be carried out without significant reconstruction of the structural elements.

We will be pleased to answer any questions on this report.

James Birdwood MA CEng MICE MIStructE
1067/JGBB

Photographs 27 June 2023



NW Facing Wall



NE Facing Wall



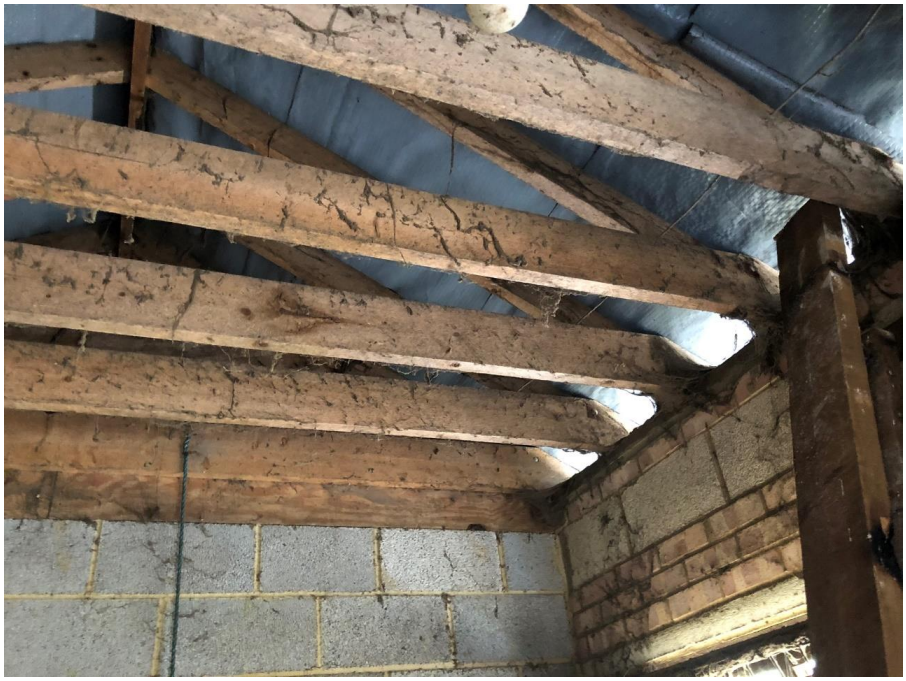
Overhanging Eaves



NE Gable with Overgrowing Vegetation



General View of Roof Structure



Bearing on North Facing Wall



Corner Roof Structure



Ingrowing Ivy

MERRYFIELD STABLES

APPENDIX A

CALCULATIONS FOR ROOF STRUCTURE

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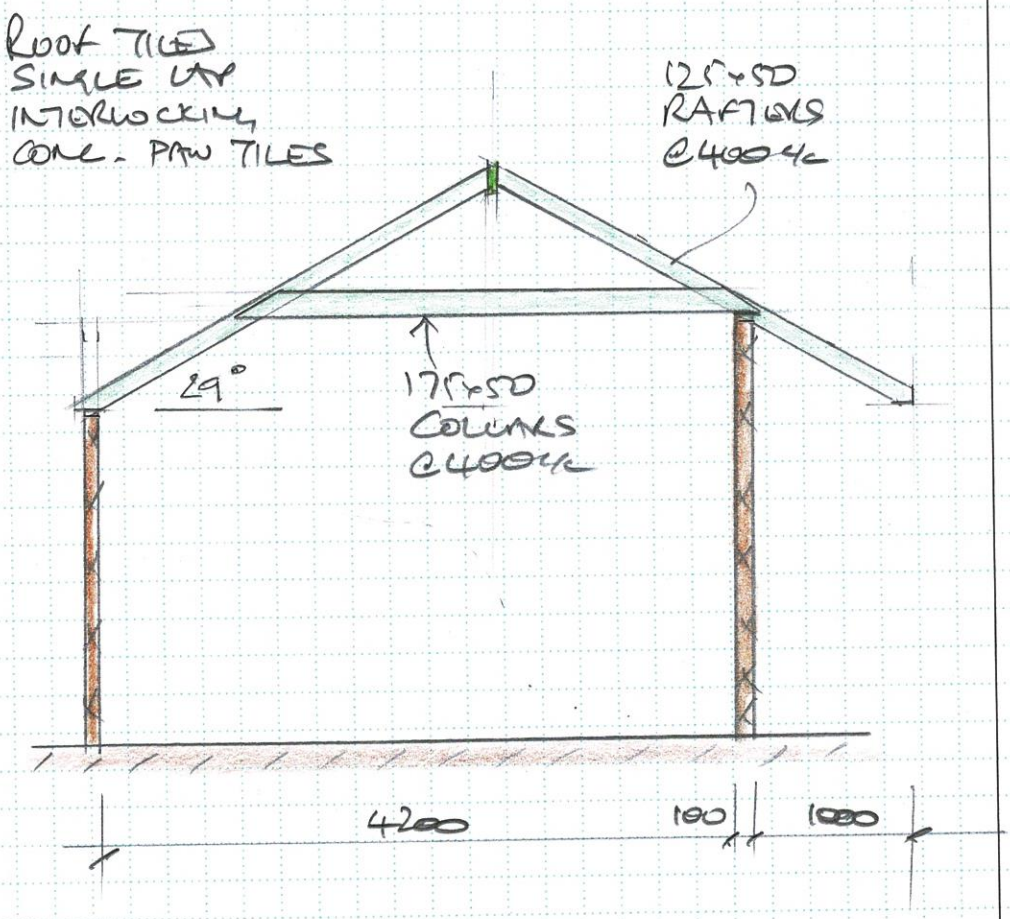
JOB NO	1067	
SHEET NO	MS/01	REV
DRG REF	MADE BY DB	CHD

PROJECT	LOCATION	DATE
MERRYFIELD STABLES	ROOF STRUCTURE	7/23



ROOF WEIGHT

TILES 50kg/m² (REDLAND LINCOLN 46.8)

RAFTERS 10kg/m²

Other 5kg/m²

65kg/m² ⇒ 0.64 on slope

÷ cos 29 ⇒ 0.73 kN/m²

ROOFLOADS

0.75 kN/m² DEAD

0.60 kN/m² LIVE

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SHEET NO	MS/02	REV
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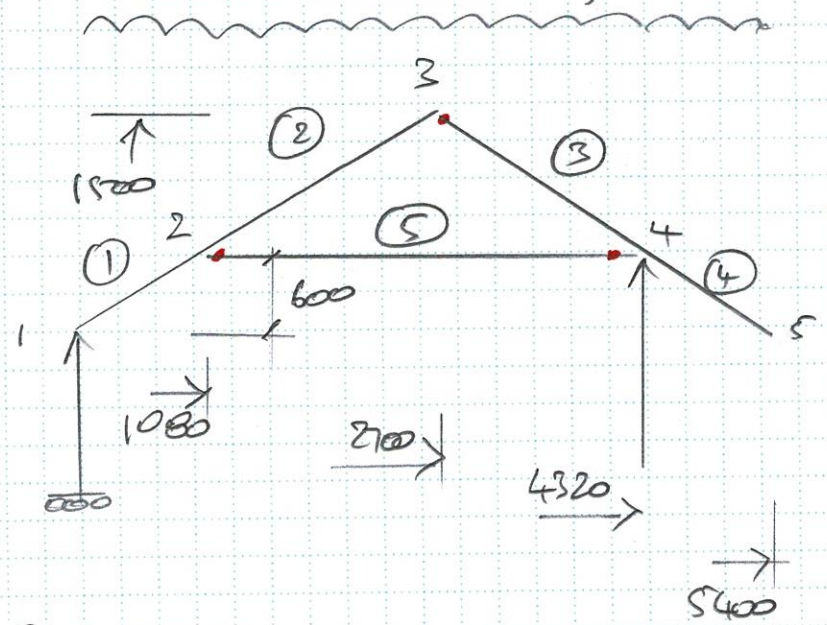
PROJECT	LOCATION	DATE
MERRYFIELD	ROOF	7/23

NL-STRESS MODEL

W: 0.4 x (0.75+0.60) = 0.54 kN/m



① - ④ 125 x 50

⑤ 175 x 50

See Output

Max Stress: 7.3 N/mm²

Permissible (MT-C16): 1.1 x 1.25 x 5.3

= 7.3 N/mm² OK

Max Δ = 13 mm at NODE 2

Span/207 on valve

Span/390 on overall span.

All within acceptable limits

(Avoid brittle ceiling finishes)

```
TABULATE ALL
PRINT DATA RESULTS FROM 1
TYPE PLANE FRAME
METHOD ELASTIC
NUMBER OF JOINTS 5
NUMBER OF MEMBERS 5
NUMBER OF SUPPORTS 2
NUMBER OF LOADINGS 1
JOINT COORDINATES
1 0 0 SUPPORT
2 1.08 0.6
3 2.7 1.5
4 4.32 0.6 SUPPORT
5 5.4 0
JOINT RELEASES
1 MOMENT Z
1 FORCE X
4 MOMENT Z
MEMBER INCIDENCES
1 1 2
2 2 3
3 3 4
4 4 5
5 2 4
MEMBER RELEASES
3 START MOMENT Z
5 START MOMENT Z
5 END MOMENT Z
CONSTANTS E 8.8E6 ALL G 550000 ALL DENSITY 3.7 ALL
MEMBER PROPERTIES
1 THRU 4 RECTANGLE DY 0.125 DZ 0.05
5 RECTANGLE DY 0.175 DZ 0.05
LOADING case 1
MEMBER LOADS
1 THRU 4 FORCE Y PROJECTED UNIFORM W -0.54
MEMBER SELF WEIGHTS
1 THRU 5 1
SOLVE
```

LOADING case 1
JOINT DISPLACEMENTS

JOINT	X DISPLACEMENT	Y DISPLACEMENT	Z ROTATION
1	-0.007360457	0.000000000	-0.015139848
2	-0.000049259	-0.013179935	-0.005987112
3	-0.003678320	-0.006720763	0.009522995
4	0.000000000	0.000000000	0.002825159
5	0.000787124	0.001409952	0.000925422

LOADING case 1
MEMBER FORCES

MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
1	1	0.5762	1.0371	0.0000
	2	-0.2791	-0.5023	0.9510
2	2	1.2769	-0.1121	-0.9510
	3	-0.8313	0.9142	0.0000

MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
3	3	1.2154	0.2228	0.0000
	4	-1.6611	0.5793	-0.3304
4	4	-0.2971	0.5348	0.3304
	5	0.0000	0.0000	0.0000
5	2	-1.1707	0.0524	0.0000
	4	1.1707	0.0524	0.0000

LOADING case 1
ELASTIC STRESSES: POSITIVE≡COMPRESSION FOR AXIAL AND Y POSITIVE BENDING

MEMBER	JOINT	AXIAL STRESS	AV.SHEAR STRESS	BENDING STRESS
1	1	92.1871	199.1241	0.0000
	2	44.6508	-96.4457	7303.3842
2	2	204.3115	-21.5144	7303.3842
	3	133.0070	175.5321	0.0000
3	3	194.4651	42.7827	0.0000
	4	265.7696	111.2350	-2537.1341
4	4	-47.5363	102.6784	-2537.1341
	5	0.0000	0.0000	0.0000
5	2	-133.7910	7.1928	0.0000
	4	-133.7910	7.1928	0.0000

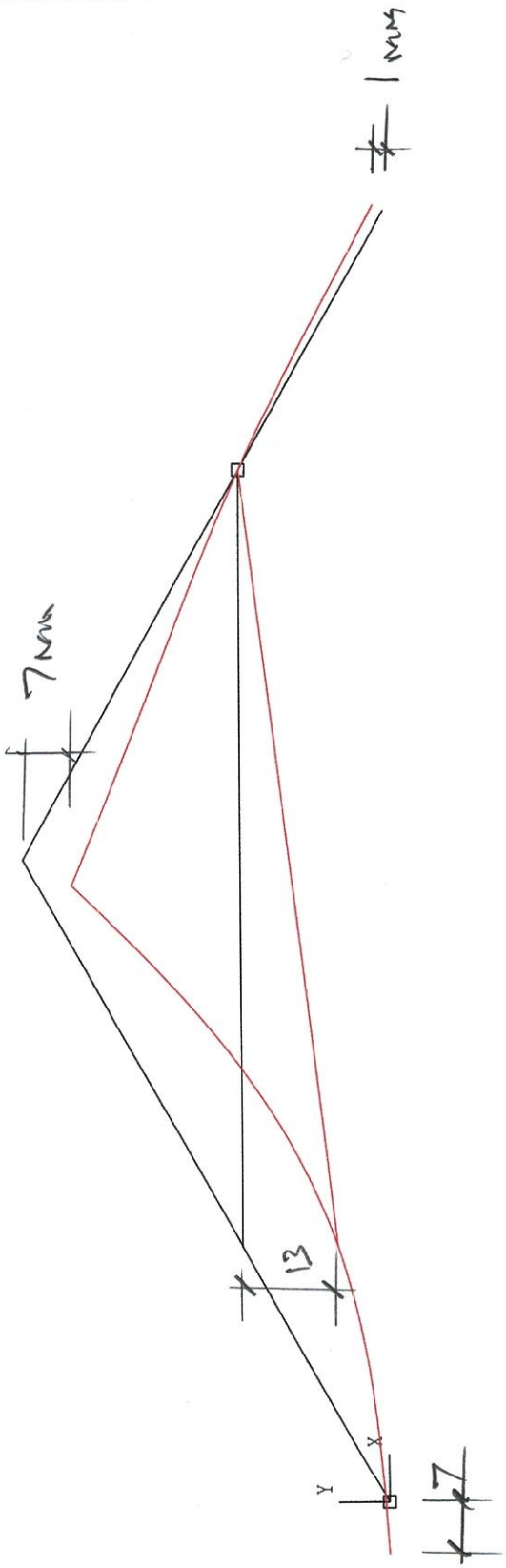
LOADING case 1
SUPPORT REACTIONS

JOINT	X FORCE	Y FORCE	Z MOMENT
1	0.0000	1.1864	0.0000
4	0.0000	1.9773	0.0000

EQUILIBRIUM CHECK	SUM OF FORCES	REACTION
FORCES IN DIRECTION X	0.0000	0.0000
FORCES IN DIRECTION Y	-3.1637	3.1637
MOMENTS ABOUT AXIS Z	-8.5367	8.5334

Structure scale 1 cm = 0.300 □ = supports

Deflectn scale 1 cm = 0.01000 LOADING case 1



BTA Structural Design
Tetbury GL8 8PN
Merryfield
Stables Roof

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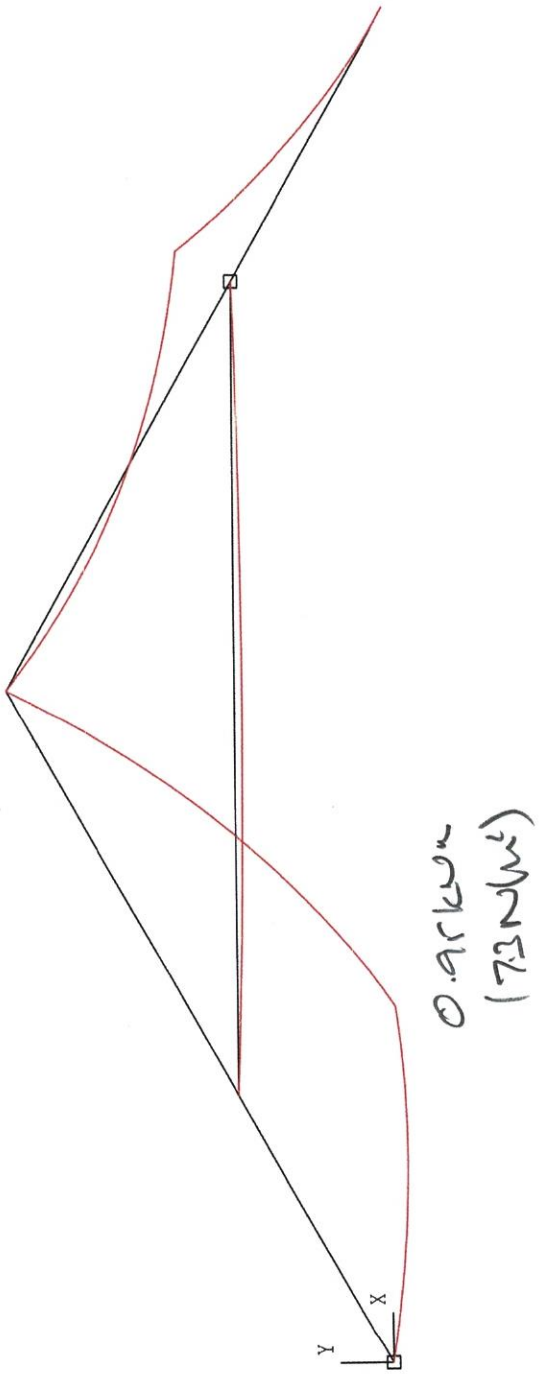
Date: 26/7/23
Ref No: 1067

Structure scale 1 cm = 0.300 □ = supports

Moment Z scale 1 cm = 0.40 LOADING case 1



SCALE 5.65 Office 6323 NL-STRESS