



TUTTON HILL BARN

WASHMERES FARM

COLERNE

SN14 8DQ



**STRUCTURAL REPORT
on
CONCRETE FRAMED BARN**

Date of inspection

5 March 2026

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JGB Birdwood MA CEng MICE MStructE

Registered in England - number 4605547 address as Head Office

1. Introduction

We were appointed by George Batterham of Washmeres Farm, Colerne, SN14 8 DQ to report on the structural condition of a concrete framed barn at 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.

A site visit was carried out by James Birdwood of BTA Structural Design Ltd on 5th March 2026. Weather conditions were dry and sunny.

No exposing work was carried out, apart from a couple of trial holes as noted. Our report is based on a visual inspection.

Our report contains photographs of the existing building taken recently.

Calculations to justify the concrete frames are also attached.

2. General Description

The building is a concrete framed agricultural barn approximately 14 m long by 12 m wide, manufactured by Atcost Ltd, and possibly dating from the 1960's.

The barn has a double pitch roof with precast concrete portal frames supporting precast purlins and a corrugated cement sheet roof.

The barn is in 3 bays of about 4.5m width. Double pitched portal frames span about 7m, and there is a 4.5m lean-to to the south.

The west gable is clad with corrugated steel sheets supported on precast concrete sheeting rails. The north elevation has vertical timber cladding. The other elevations are open apart from corrugated cement sheeting at the top of the east gable and lean-to.

The barn has an earth floor, sloping down to the south by about 750mm. There is a Hawthorn hedge to the east, about 4m away at its closest.

3. External Observations

The east and south elevation are open and unclad. The concrete columns stand reasonably plumb. They have been patched in a few places where spalling had occurred, but are generally in good structural condition.

The corrugated cladding to the west elevation is in reasonably good condition, with no evidence of movement. The timber cladding to the north elevation is in good condition.

The roof structure and covering are in reasonably good condition with no undue deflection, movement or distortion in the roof profile.

4. Internal Observations

The space is divided into three equal bays by four concrete portal frames.

The portal frames consist of 250x150mm columns. These are bolted to the 150mm wide rafters, which have a haunch depth of about 800mm, tapering down to 300mm, and then continuing to taper down to about 250mm at the apex, where there is a simple pinned connection.

The lean-to columns and rafters are the same size as the main frames. At the upper end the rafters have a pinned connection to the main frame columns.

Calculations are attached for the portal frames.

Between the frames there are precast concrete purlins spanning approximately 4.5m. These are 200mm deep, tapering in width between about 125mm and 50mm with a rebate at the side to take the roof sheet hook bolts. The purlins taper to a smaller depth at the supports.

At the eaves is a different precast section about 200mm deep x 175mm wide set vertically on the outer face, and with a sloping top surface to suit the roof slope. These have rebates for hook bolt fixing to the roof sheets and to allow for wall sheets also.

Sheeting rails are about 150mm deep, with width tapering from 120mm to 30mm. These have bolted connections to the sides of the columns.

These secondary precast elements are original components of the Atcost system. They have had a few patches on spalled areas but are generally in good structural condition with no indication of failure or undue deflection.

5. Comments & Conclusions

Existing Structure

This is a typical well-built agricultural barn built to a well-established system, using standardized components, which have performed well up and down the country.

The concrete frames are in good structural condition. A few localized repairs have been done where concrete has spalled. There are no signs of significant cracking or movement.

The frames have been analysed in the attached calculations, which show them to be properly designed for the current use, and with some additional capacity for conversion.

At present no repairs are needed to maintain the building in good structural condition.

Proposed conversion

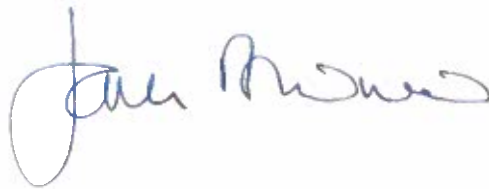
The proposed conversion will include the following elements:

- Provision of insulated timber clad walling, including internal finishes, and glazed areas to the external elevations.
- New roof cladding including insulation and ceiling finishes, to be supported on the existing roof structure. As justified in the attached calculations.
- PV panels to the south roof.
- Roof lights set between purlins.
- Concrete ground floor slab including insulation underfloor heating and floor finishes.
- New first floor structure, with timber joists and steel beams, to be supported on new internal columns and walls, and on existing external columns.
- Staircase and handrails to be supported on the new ground floor slab.
- Construction of non-loadbearing ground floor partitions supported on the new floor slab.
- Construction of new non-loadbearing first floor studwork partition supported on the new floor structure.

It should be noted that deflections in long span framed buildings can be higher than would typically be encountered in a residential building, and we recommend that plastered ceilings should be avoided as these might crack. Timber boarding is a better option.

The conversion of this building can, in our opinion, be carried out with the existing structural elements remaining in place, and without the need for significant reconstruction of these elements.

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



James Birdwood MA CEng MICE FStructE
1052/ JGBB

Photographs



South Elevation



East Elevation



North Elevation



West Elevation



West Gable



Interior View



Central Column Head



Lean-to Column Head



Apex Connection



Sheeting Rail Connection



Purlin Support



Eaves Beam



TUTTON HILL BARN

01

Structural Calculations

for

Concrete Frame

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Calculations for Concrete Frame

The concrete framed barn has been checked for the structural adequacy of the portal frames and their foundations, under existing loads and with additional loading from finishes and insulation.

In conjunction with an inspection of the frame the calculations show that the frame is structurally adequate and suitable for conversion.

These calculations are issued for inclusion with a report for planning purposes. They are to be read with Architect's planning drawings.

Design Criteria

<u>Loading</u>	<u>Dead</u>	<u>Live</u>	<u>Total</u>
Roof	0.60	0.60	1.20
Wind pressure	-	0.60	0.60 kN/m ²

Design Codes

Concrete BS8110

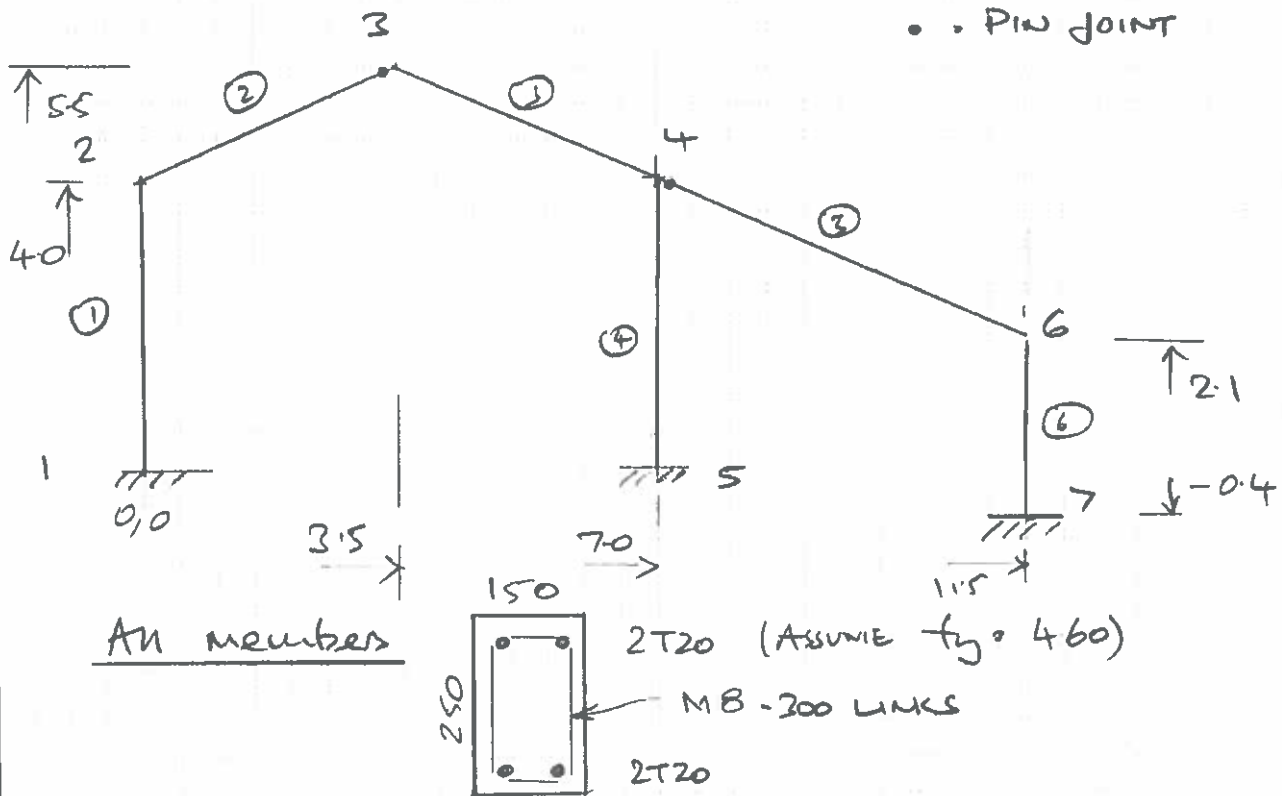
Foundations

Assume allowable bearing pressure: 100kN/m²

JOB NO 1052		
SHEET NO TH/01	REV	
ORG REF	MADE BY JB	CHD
DATE 3/26		

PROJECT TUTTON HILL BARN	LOCATION CONCRETE FRAME	DATE 3/26
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FRAMES @ 4.5m 4c



(Measured at an area of spalling, since repaired)
I ignore shortening effect of haunches.

Assume Grade 30 Concrete

Loading (excl SW)

Roof Assume DL 0.6 kN/m^2 } 5.4 kN/m
LL 0.6 kN/m^2 }

WIND Assume o/a $0.6 \text{ kN/m}^2 \rightarrow 2.7 \text{ kN/m}$

FRAME IS ANALYSED FOR DEAD LOAD ONLY, ASSUMING LONG TERM E-VALUE, AND FOR D+L+WIND WITH SHORT TERM E-VALUES. -SEE NL-STRESS OUTPUT.

BTA Structural Design
Tutton Hill Barn
Concrete Portal Frames
Dead Load Only

Page: TH/OL
Made by: JB
Date: 5/3/26
Ref No: 1052

TABULATE ALL
PRINT DATA RESULTS FROM 1
TYPE PLANE FRAME
NUMBER OF JOINTS 7
NUMBER OF MEMBERS 6
NUMBER OF SUPPORTS 3
NUMBER OF LOADINGS 1
JOINT COORDINATES
1 0 0 SUPPORT
2 0 4
3 3.5 5.5
4 7 4
5 7 0 SUPPORT
6 11.5 2.1
7 11.5 -0.4 SUPPORT
MEMBER INCIDENCES
1 1 2
2 2 3
3 3 4
4 4 5
5 4 6
6 6 7
MEMBER RELEASES
2 END MOMENT Z
5 START MOMENT Z
CONSTANTS E 8.67E6 ALL G 3.47E6 ALL DENSITY 24 ALL
MEMBER PROPERTIES
1 THRU 6 RECTANGLE DZ 0.15 DY 0.25
LOADING Case 1
MEMBER LOADS
2 THRU 3 FORCE Y PROJECTED UNIFORM W -2.7
5 FORCE Y PROJECTED UNIFORM W -2.7
MEMBER SELF WEIGHTS
1 THRU 6 1
SOLVE

(GRADE 30 RC LOW TERM)

LOADING Case 1

JOINT DISPLACEMENTS

JOINT	X DISPLACEMENT	Y DISPLACEMENT	Z ROTATION
1	0.000000000	0.000000000	0.000000000
2	-0.021944274	-0.000191258	-0.000561595
3	-0.010939043	-0.026153548	0.006387145
4	0.000057224	-0.000232522	0.005123112
5	0.000000000	0.000000000	0.000000000
6	0.000034191	-0.000096732	0.002510640
7	0.000000000	0.000000000	0.000000000

LOADING Case 1

MEMBER FORCES

MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
1	1	17.3457	-7.2392	-14.2407
	2	-13.7457	7.2392	-14.7162
2	2	12.0686	9.7826	14.7162
	3	-6.9961	2.0533	0.0000

BTA Structural Design
Tutton Hill Barn
Concrete Portal Frames
Dead Load Only

Page: **TH103**
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MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
3	3	6.3117	3.6501	0.0000
	4	-11.3843	8.1858	-8.6359
4	4	17.0997	3.2335	8.6359
	5	-20.6997	-3.2335	4.2982
5	4	1.7099	6.2484	0.0000
	6	-8.1459	8.9948	-6.7077
6	6	11.4550	4.0057	6.7077
	7	-13.7050	-4.0057	3.3066

LOADING Case 1

ELASTIC STRESSES: POSITIVE=COMPRESSION FOR AXIAL AND Y POSITIVE BENDING

MEMBER	JOINT	AXIAL STRESS	AV.SHEAR STRESS	BENDING STRESS
1	1	462.5526	-231.6559	9114.0782
	2	366.5526	231.6559	-9418.3923
2	2	321.8299	313.0443	-9418.3923
	3	186.5623	65.7052	0.0000
3	3	168.3133	116.8023	0.0000
	4	303.5810	261.9472	-5526.9540
4	4	455.9911	103.4728	-5526.9540
	5	551.9911	-103.4728	2750.8676
5	4	45.5984	199.9479	0.0000
	6	217.2253	287.8339	-4292.9403
6	6	305.4670	128.1831	-4292.9403
	7	365.4670	-128.1831	2116.2153

LOADING Case 1

SUPPORT REACTIONS

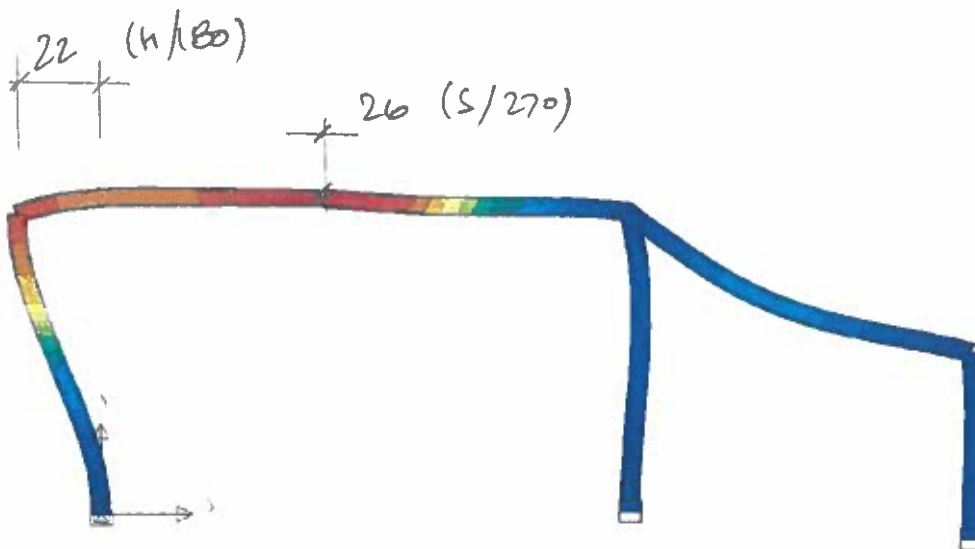
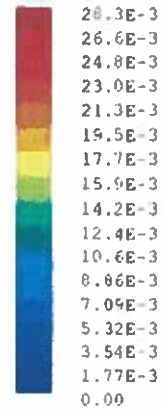
JOINT	X FORCE	Y FORCE	Z MOMENT
1	7.2392	17.3457	-14.2407
5	-3.2335	20.6997	4.2982
7	-4.0057	13.7050	3.3066

EQUILIBRIUM CHECK

	SUM OF FORCES	REACTION
FORCES IN DIRECTION X	0.0000	0.0000
FORCES IN DIRECTION Y	-51.7504	51.7504
MOMENTS ABOUT AXIS Z	-293.9467	294.2671

Displaced Shape, displacements magnified 50 times.

Key: DS



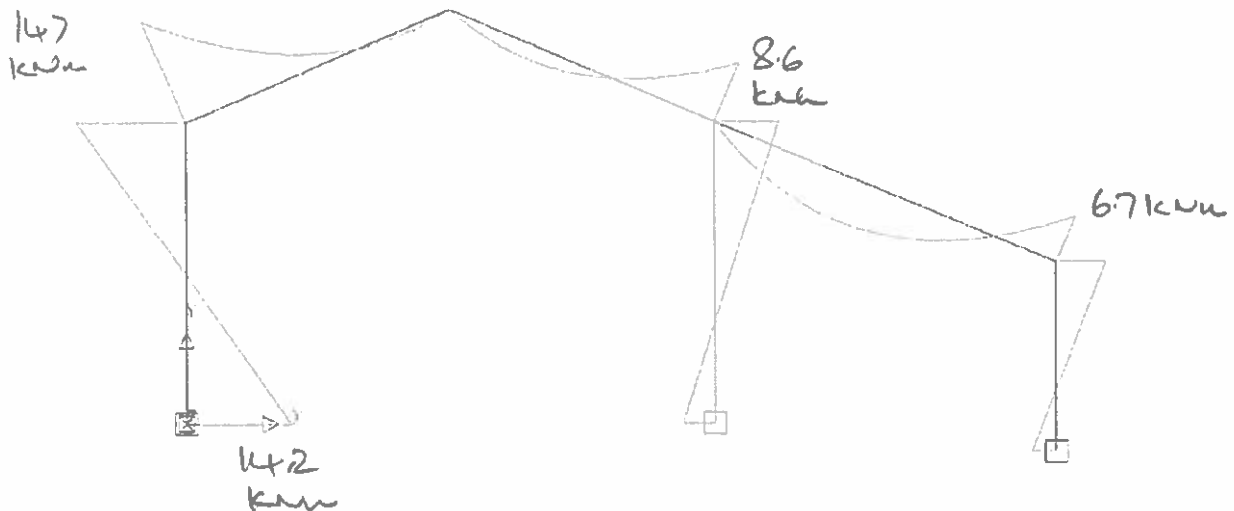
NOTE

ACTUAL DEFLECTION OBSERVED ON SITE
IS LESS THAN THIS, AFTER MANY DECADES
OF APPLIED DEAD LOAD

BTA Structural Design
Tutton Hill Barn
Concrete Portal Frames
Dead Load Only

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Bending Moment MZ.
LOADING Case 1
UNFACTORED



BTA Structural Design
Tutton Hill Barn
Concrete Portal Frames
Dead + Live + Wind Load

Page: TH106
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Date: 5/3/26
Ref No: 1052

TABULATE ALL
PRINT DATA RESULTS FROM 1
TYPE PLANE FRAME
NUMBER OF JOINTS 7
NUMBER OF MEMBERS 6
NUMBER OF SUPPORTS 3
NUMBER OF LOADINGS 1
JOINT COORDINATES

1 0 0 SUPPORT
2 0 4
3 3.5 5.5
4 7 4
5 7 0 SUPPORT
6 11.5 2.1
7 11.5 -0.4 SUPPORT

MEMBER INCIDENCES

1 1 2
2 2 3
3 3 4
4 4 5
5 4 6
6 6 7

MEMBER RELEASES

2 END MOMENT Z

5 START MOMENT Z

CONSTANTS E 26E6 ALL G 10.4E6 ALL DENSITY 24 ALL CTE 13E-6 ALL (SHORT TERM)

MEMBER PROPERTIES

1 THRU 6 RECTANGLE DZ 0.15 DY 0.25

LOADING Case 1

MEMBER LOADS

3 FORCE X PROJECTED UNIFORM W -2.7
5 THRU 6 FORCE X PROJECTED UNIFORM W -2.7
2 THRU 3 FORCE Y PROJECTED UNIFORM W -5.4
5 FORCE Y PROJECTED UNIFORM W -5.4

MEMBER SELF WEIGHTS

1 THRU 6 1

SOLVE

LOADING Case 1

JOINT DISPLACEMENTS

JOINT	X DISPLACEMENT	Y DISPLACEMENT	Z ROTATION
1	0.000000000	0.000000000	0.000000000
2	-0.016274950	-0.000110700	0.000577729
3	-0.010442106	-0.013905093	0.002634697
4	-0.004600862	-0.000131862	0.003859637
5	0.000000000	0.000000000	0.000000000
6	-0.004596504	-0.000048592	0.003410872
7	0.000000000	0.000000000	0.000000000

LOADING Case 1

MEMBER FORCES

MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
1	1	28.7832	-14.2293	-29.1919
	2	-25.1832	14.2293	-27.7251
2	2	22.9989	17.5419	27.7251
	3	-14.2038	2.9800	0.0000

BTA Structural Design
Tutton Hill Barn
Concrete Portal Frames
Dead + Live + Wind Load

Page: **Tn107**
Made by: JB
Date: 5/3/26
Ref No: 1052

MEMBER	JOINT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
3	3	11.9537	8.2304	0.0000
	4	-17.0262	13.8868	-10.7695
4	4	30.3413	2.9348	10.7695
	5	-33.9413	-2.9348	0.9697
5	4	2.4457	12.8322	0.0000
	6	-8.8817	15.5996	-6.7589
6	6	17.8258	2.1145	6.7589
	7	-20.0758	4.6355	-9.9103

LOADING Case 1

ELASTIC STRESSES: POSITIVE=COMPRESSION FOR AXIAL AND Y POSITIVE BENDING

MEMBER	JOINT	AXIAL STRESS	AV.SHEAR STRESS	BENDING STRESS
1	1	767.5532	-455.3361	18682.8473
	2	671.5532	455.3361	-17744.0377
2	2	613.3043	561.3401	-17744.0377
	3	378.7690	95.3588	0.0000
3	3	318.7641	263.3725	0.0000
	4	454.0318	444.3784	-6892.4979
4	4	809.1015	93.9136	-6892.4979
	5	905.1015	-93.9136	620.5878
5	4	65.2183	410.6304	0.0000
	6	236.8452	499.1869	-4325.6957
6	6	475.3559	67.6625	-4325.6957
	7	535.3559	148.3375	-6342.5711

LOADING Case 1

SUPPORT REACTIONS

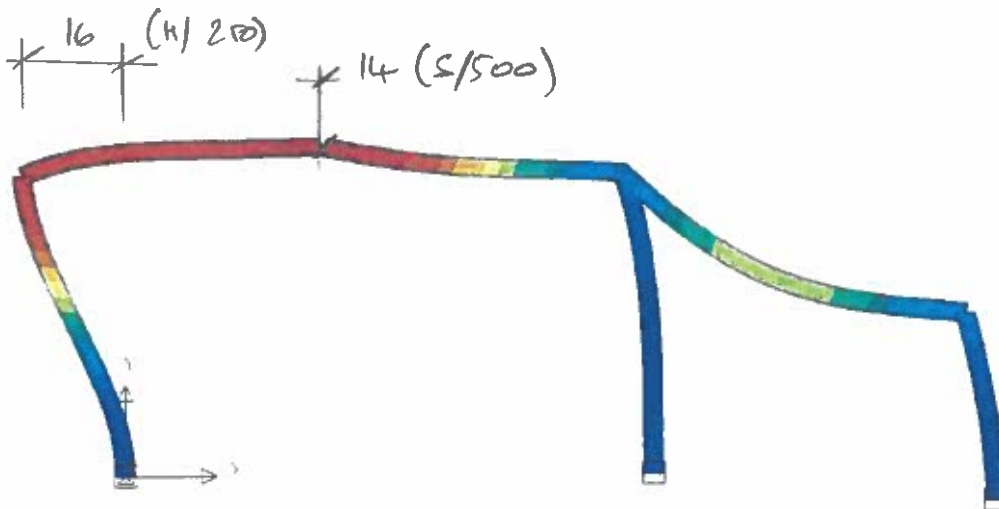
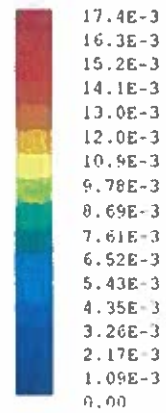
JOINT	X FORCE	Y FORCE	Z MOMENT
1	14.2293	28.7832	-29.1919
5	-2.9348	<u>33.9413</u> KN	0.9697
7	4.6355	20.0758	-9.9103

EQUILIBRIUM CHECK

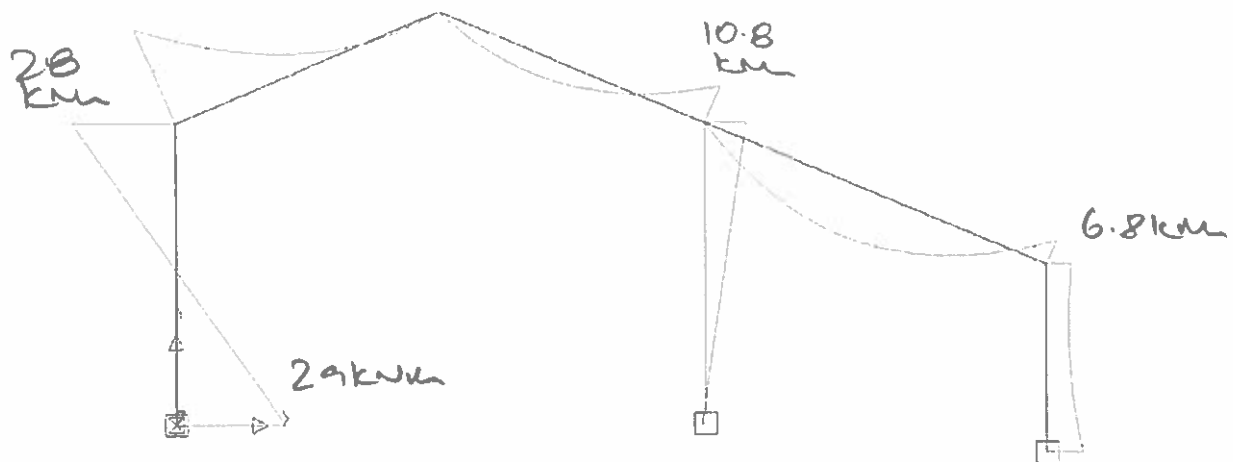
	SUM OF FORCES	REACTION
FORCES IN DIRECTION X	-15.9300	15.9300
FORCES IN DIRECTION Y	-82.8004	82.8004
MOMENTS ABOUT AXIS Z	-431.5713	432.1831

Displaced Shape, displacements magnified 82 times.

Key: DS



Bending Moment MZ.
——— LOADING Case 1



JOB NO 1052		
SHEET NO TH/10		REV
DRG REF	MADE BY JB	CHKD
DATE 3/26		

PROJECT TUTTON HILL BARNS	LOCATION CONCRETE FRAME
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CHECK ON RC SECTION

$$M_{max} = 29 \text{ kNm (working)} \\ \times 1.45 \rightarrow 42.0 \text{ (FACTORED)}$$

$$250 \times 150 \quad d = 210 \quad M_{uc} = 0.15 \times 30 \times 150 \times 210^2 / 106 \\ = \underline{30 \text{ kNm}}$$

$$A_{st} = 42.0 / (0.87 \times 460) = 0.75 \times 210$$

$$= 606 \text{ mm}^2$$

$$A_{s \text{ prov}} = 2 \times \pi \times 10^2 = 628 \text{ mm}^2 \\ (2 \times T20 \text{ BARS})$$

(SEE HAUNCH
ANALYSIS
BELOW)

$$M_{tx} \quad V = 17.5 \text{ kN (from Mx - stress)} \times 1.5 \rightarrow 26.3 \text{ kN} \\ v = 26.3 \text{ E3} / (150 \times 210) = 0.83 \text{ N/mm}^2$$

$$100 A_{st} / b d = 2.$$

Nominal links required

$$@ 300 \text{ mm} \quad A_{sv} = \frac{0.4 \times 150 \times 300}{0.87 \times 270} = 82 \text{ mm}^2$$

$$2 \text{ MB} \rightarrow 100 \text{ mm}^2 > 82 \text{ OK.}$$

NOTE

REINFORCEMENT IS THE SAME T+B,
SO SAME CONTRIBUTION IN COMP. ZONE



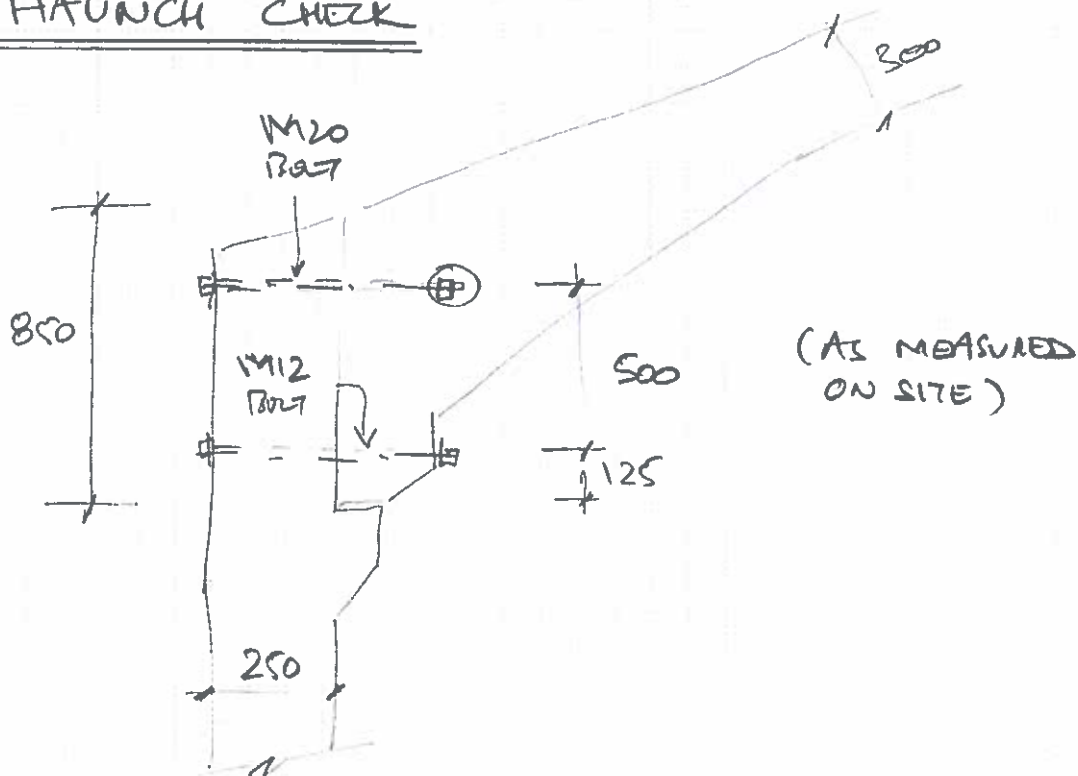
JOB NO	1052	REV
SHEET NO	TH/11	
DRG REF	MADE BY	CHD
	DATE	3/26

PROJECT TUTTON HILL A&W

LOCATION CONCRETE FRAME

DATE 3/26

HAUNCH CHECK



$M_{max} = 28 \text{ kNm}$

TENSION IN TOP BAR: $28 / 0.6 = 47 \text{ kN}$
(UNFACTORED)

From BS447 TABLE

DELT CAPACITY: 68.8 kN (UNFACTORED)

NOTE RELATIVELY STIFF HAUNCH WILL ATTRACT
BENDING FROM BOTTOM CONNECTION
 $\therefore$ MEMBER OK ALLOWING FOR $\sim 6\%$
REDISTRIBUTION



JOB NO 1052		
SHEET NO TH/12	REV	
DRG REF	MADE BY OB	CHD
DATE 2/26		

PROJECT TUTTON HILL FARM

LOCATION FOUNDATIONS

MAX FOUNDATION LOAD = 33.94kN

PAD AREA = $1.2 \times 0.9 = 1.08 \text{ m}^2$

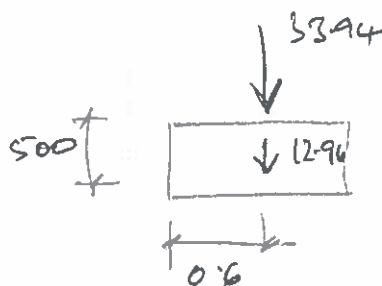
PAD WEIGHT: $1.08 \times 0.5 \times 24 = 12.96 \text{ kN}$

BP = 43.4 kN/m² < 100.

MAX DL BM @ base: 14.24 kNm

"Z" = $0.9 \times 1.2^2 / 6 = 0.216 \text{ m}^3$

M/Z = 66 N/m²



RESTORING M: 28 kNm
(> 14.2)

FOUNDATIONS OK FOR VERTICAL LOADS +
BENDING (PASSIVE SIDE RESISTANCE IGNORED)