White Royall Dixon
Chartered Civil & Structural Engineers

WRD12010.100422 (1/4)
22nd April 2010

The Stables
Rear of 60 The Avenue
SOUTHAMPTON
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tel: 023 8072 0770
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Mr C Thornton
Thornton Building Contractors
115 Drift Road
Clanfield
Waterlooville
PO8 0PD

HAVANT BOROUGH COUNCIL
27 MAY 2010
RECEIVED

Att: Clive Thornton
Ref:

Dear Mr Thornton

Saffron House, 6 South Street, Emsworth.

Further to our recent site visit, please find enclosed details and calculations to allow the existing timber valley beam to be retained and re-supported at the above mentioned property by means of hanging from a new steel section along with our invoice for this work.

As discussed the valley gutter will need to be rebuilt and all rafter / ceiling joist connections in both roof areas inspected and repaired as necessary.

Should you wish to discuss any aspect of the details further please do not hesitate to contact this office..

Yours sincerely

[redacted]
CE
for and on behalf of White Royall Dixon LLP

tel: 01962 883 290
email: Philippa.dixon@whiteroyall.co.uk

Enc.

White Royall Dixon
Chartered Civil & Structural Engineers

WRD\12070\00422 (2'4)
27th April 2010

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Ref:

STRUCTURAL CALCULATIONS

Saffron House
6 South Street
Emsworth

Mrs P J Dixon BSc CEng MICE
for and on behalf of White Royall Dixon LLP

tel: 01962 883 290
email: Philippa.dixon@whiteroyall.co.uk

1.0 DESIGN NOTES

1.1 The proposed works comprise "Support to existing timber valley beam".

1.2 These calculations relate only to the proposed works and their effect on the building structure. We have not considered the structural adequacy of other parts of the building except those affected by the proposed alterations, or those parts where the calculations specifically include design checks.

1.3 The structural design has been reviewed in accordance with the Construction (Design and Management) Regulations, Regulation 11. In addition to the usual risks associated with building works and materials, of which a competent builder should be aware, the following site and work specific health and safety risks have been identified:-

- Demolition, excavation drilling and cutting into existing structure or materials should be carried out carefully in case there are any unknown services hidden in the area.
- All walls, beams, slabs, floors etc. which are to be demolished or removed should be assessed for any loadbearing or stability function and temporary propping provided as necessary.
- Any existing structure or materials to be drilled, cut or otherwise interfered with should be assessed for asbestos content and appropriate action taken.

1.4 Where new beams are to be installed to support existing structure, temporary support will be required. When the new beams are installed, and before removing temporary supports, steel or hardwood wedges should be driven into the gap between the top of the beam and the underside of the structure above to transfer the load onto the beam. The gap should then be packed with a 1:3, dry sand:cement mortar, or otherwise permanently filled to carry the load. Even with these precautions, some deflection of the beams may occur and this may result in cracking to the structure above. Such works should be carried out by an experienced and competent builder.

1.5 Where new foundations are required, the allowable bearing pressure of the proposed founding depth should be assessed against the values assumed in the calculations.

1.6 Building Regulations apply to all works of a structural nature. Unless you have already done so, or have made alternative arrangements, you should contact your local Building Control Office and make the necessary applications for approval before the work commences. Full Plans approval can take up to eight weeks. If you commence work without Full Plans approval you do so at you own risk and we will not accept any liability for any requirements, alterations, costs or delays resulting from this.

1.7 Planning consent may be required for the works. Unless you have already done so, or have made alternative arrangements, you should contact your local Planning Office, before the work commences, to determine if planning consent is required.

1.8 The Party Wall etc. Act 1996 may apply if any works to a party wall are to be undertaken, or if there are any excavations to be made within six metres of a neighbouring building. You are advised to take professional advice on the matter if any of these circumstances apply.

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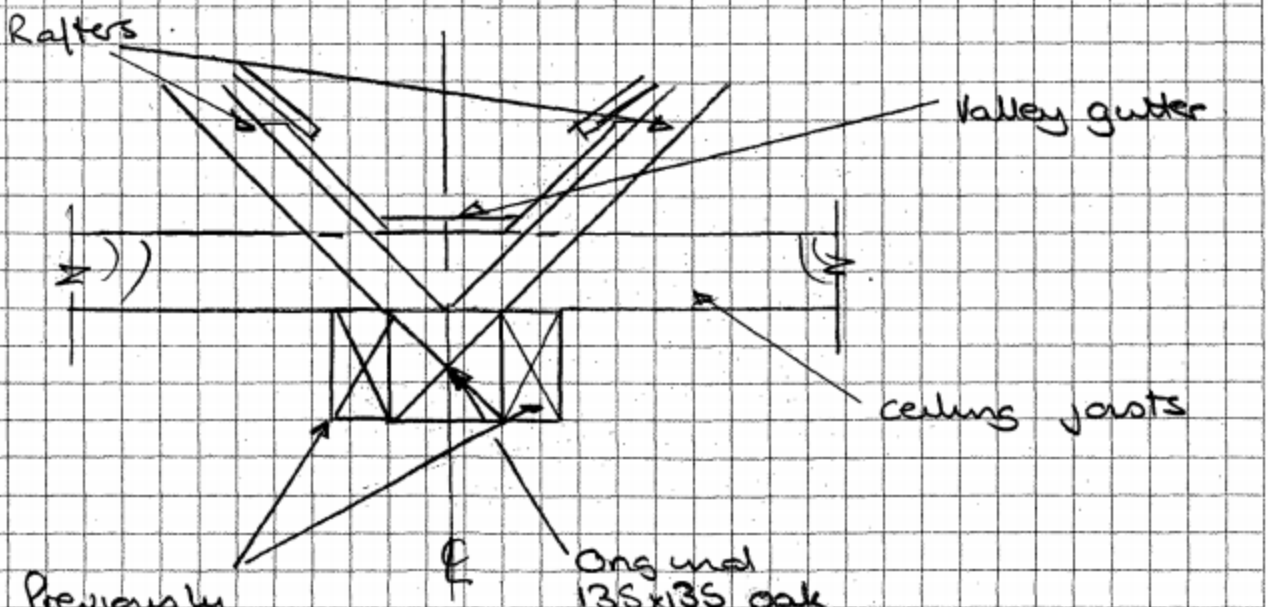
Support to existing timber valley beam

Loading

		factored
D.L roof	1.3 KN/m²	1.8KN/m²
I.L roof	0.6	1.0
D.L ceiling	0.25	0.3
I.L roof space	0.25	0.4
I.L gutter	0.6 KN/m	0.7KN/m

Section thru existing roof valley.



Proposals.

Existing deteriorated beam to be chemically treated to prevent further rot.

New steel beam to be installed above existing, roof structures & existing beam to be hung off new beam.

Valley gutter to be rebuilt ontop of new beam

New beam to bear onto existing timber post internally and gable masonry externally.

Valley Support Beam

L : 4.3m clear span, L_E : 5.0m.

$$w = (\overset{\text{roof}}{1.3} + \overset{\text{loft}}{0.6} + \overset{\text{ceiling}}{0.25} + 0.25)(5.2 + \frac{2.9}{2})$$

= 9.7 KN/m service

& 14.2 KN/m factored

$M = 14.2 \times 4.3^2/8 = 32.8$ KNm

$R_{service} = 9.7 \times 4.\frac{3}{2} = 20.9$ kN

$R_{factored} = 14.2 \times 4.\frac{3}{2} = 30.5$ KN

For 200x100x10 RHS laid flat, $M_R = 57.5$ KNm.

Valley beam - cont'd.

Check defl^{n}. $\delta = \frac{5}{384} \times \frac{9.7 \times 4300^4}{2.1 \times 10^5 \times 881 \times 10^4}$

$= 23.3\,mm$

∴ Increase to 152×152 UC 37

$\delta = 9.3\,mm$ ∴ ok.

Masonry bearing onto stone ∴ ok

Provide 152×152 UC 37

10mm mortar bed on stone gable masonry and seasoned oak make up or existing beam end on existing timber post internally

For MS hanger @ 800 c/c

Vertical load on hanger

$= 14.2 \times 0.8 = 11.4\,kN$.

Shear capacity 2N° M16 bolts

$= 2 \times 7.9 = 15.8\,kN > 11.4\,kN$ ∴ ok.

Hangers to be 6mm plate with M16 (8.8) bolts at max 800mm c/c

Welds to be 6mm FWs.

Check support plate

L = 285mm max.

$\omega = 14.2 \times 10^{-3}$ KN/m/mm width

$M = 14.2 \times 10^{-3} \times 0.285^2/8 = 0.14 \times 10^{-3}$ KNm/mm

$t_{plate} = \left(\frac{0.14 \times 10^3 \times 6}{275}\right)^{1/2} = 1.8$mm

Provide 5mm thick plate.

Check side plates supported @ 800 c/c.

L = 0.8m , d = 50mm.

$\omega = \frac{14.2}{5} = 7.1$ KN/m

$M = \frac{7.1 \times 0.8^3}{8} = 0.57$ KNm

For 5mm Thk plate

$\sigma = \frac{0.57 \times 10^6 \times 6}{5 \times 50^2} = 273$ N/mm²

< 275 N/mm² .. Ok

Side plates to be 50x5 with 6mm FWs, 150 mm hit & miss

For hangers.

$P_{bs} = 0.46 \times 5 \times 6 = 13.8$ KN > 5.712

.. Ok

Plate to be 5mm thk throughout.

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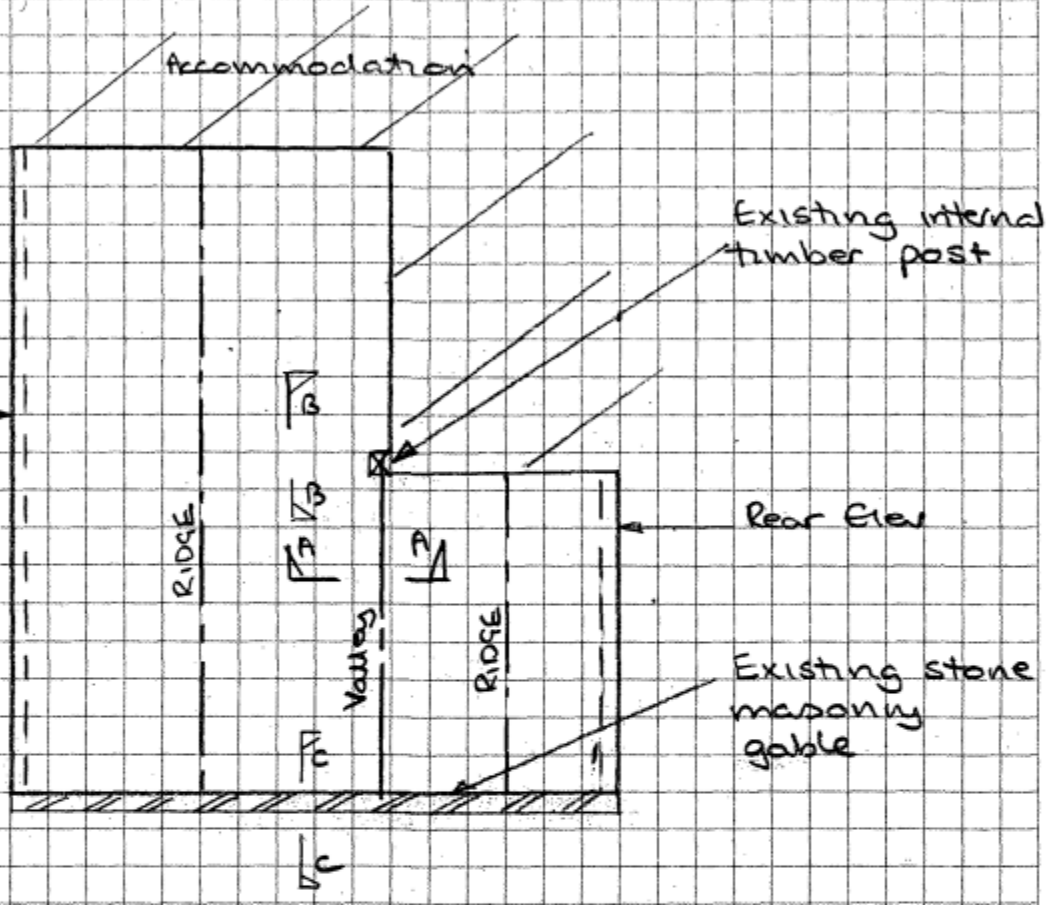
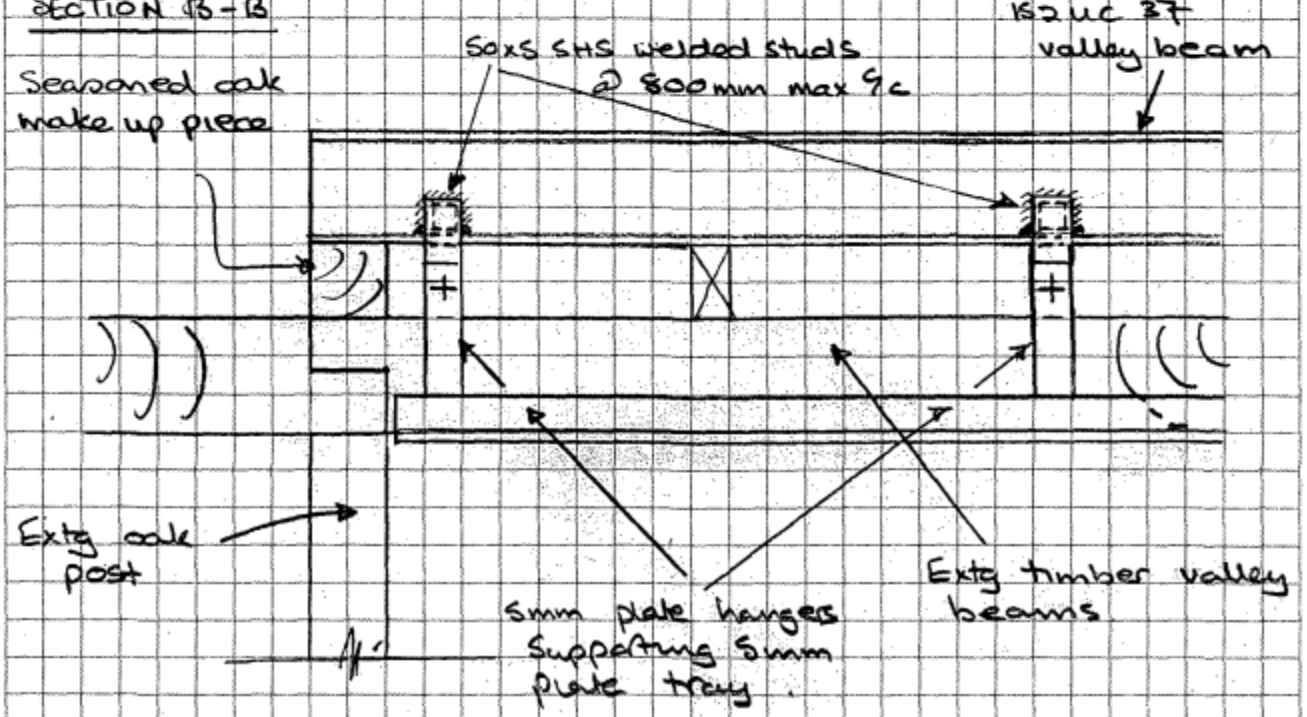
Plan on roof



SECTION B-B



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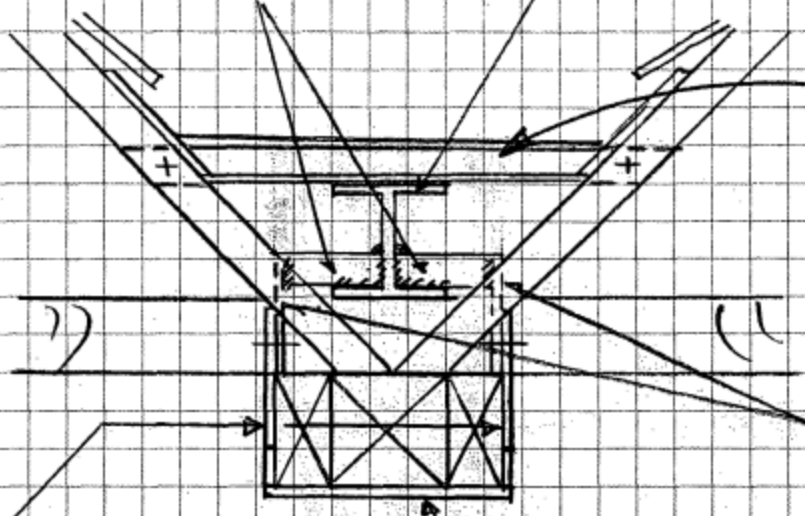
SECTION A-A.



Rafter ends, ceiling joist bearings to be repaired & replaced as necessary

Ceiling joist / rafter connections to be bolted by M10 bolts with toothed connecters where possible

Vertical pack to MS tray to be installed as necessary.

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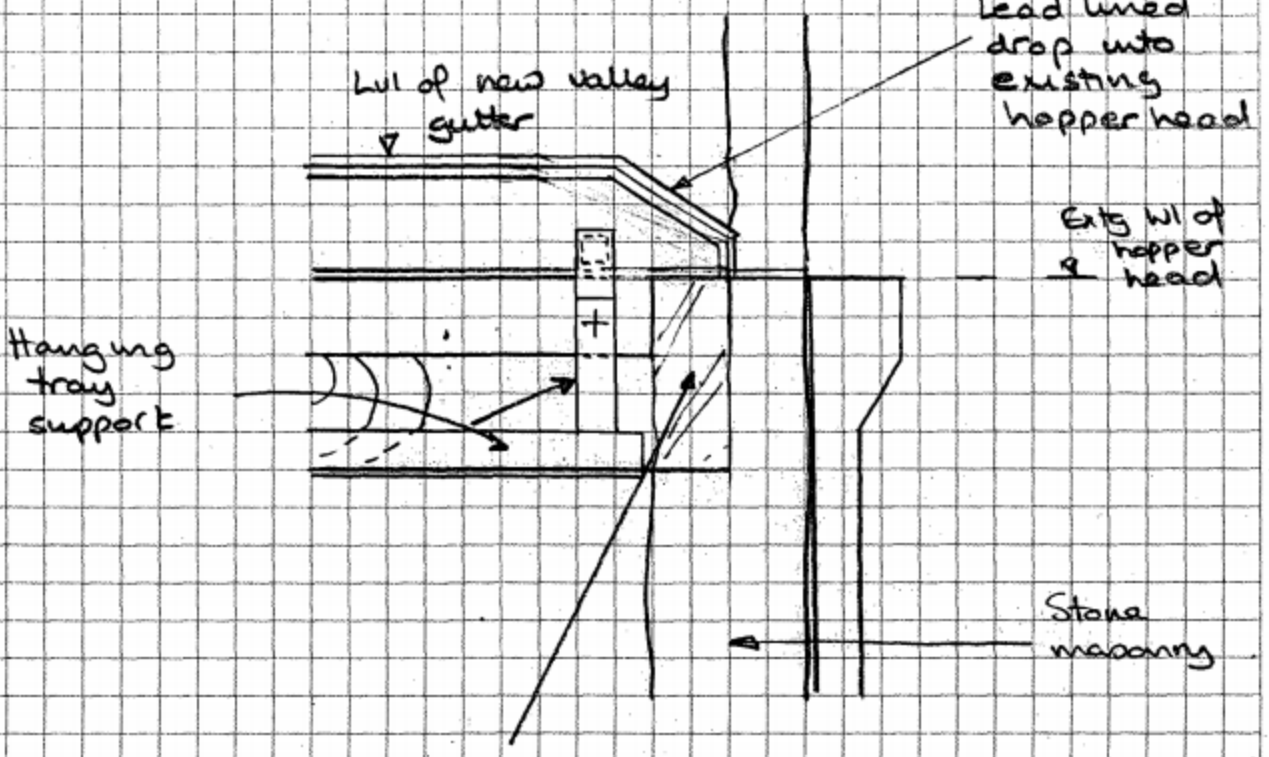
SECTION B-B



Make good bearing below new beam & replace deteriorated timber beam bearing on eng bwk.