REPORT ON ROOF LEAKS
@ Frogmore Day Care Centre Potley Hill Road Yateley GU46 6AG

17th April 2015
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1. **Brief**
   
   As set out in John Elson’s email to Martin De Weid dated 15th August 2014 (copy attached).

   The building was constructed approximate 15 years ago but has suffered from roof leaks for a number of years. The scope of the inspection and report is limited to that required to identify the cause of the problem and recommend possible solutions together with estimated costs.

   Remedial repairs have been undertaken by others recently consisting of using a self adhesive flashband type material to seal over the through roof ventilators although this has not resolved the problems.

2. **Construction**
   
   The roof structure consists of double timber principle rafters supported by steel lattice beam purlins with further timber purlins between the principle rafters supporting 150x50mm timber rafters @ 450mm approx. centres with BS747 1F bituminous sarking felt, timber battens and Redland Cambrian interlocking slates. A more detailed description of the roof coverings can be found in the Redland reports.

3. **Site Investigations**
   
   Site investigations were carried out on two separate occasions the first one (26th January 2015) was of limited value due to restricted access caused by a wet / slippery roof surface. The second one took place on the 17th March 2015 Both were attended by Redland after sales Manager Andy Stewart and operatives from Salnor Roofing Ltd. Slates were removed in a number of different locations across the roof. Two separate reports prepared by Redland record the findings (copies attached).

4. **Summary of Findings**
   
   Inside the building areas of brownish staining to plaster finishes indicating water penetration were evident along the length of the main room at the junction between sloping ceiling and walls but with no particular pattern which would suggest a specific location for the leaks except that the start of the staining appeared to coincide with the line of the through roof ventilators (this makes sense given the lack of underlay seals to the through roof vents, see attached product literature for details of underlay seals). Staining was also visible to the suspended ceiling tiles in the centre managers office.

   Externally the investigations revealed that the Redland Cambrian slates had not been installed in accordance with manufacturers recommendations. Numerous defects were noted:

   1. A number of tile courses towards the apex of the roof did not have the recommended minimum head lap i.e. 65 and 70mm instead of 75mm
   2. The maximum rafter length has been exceeded i.e. 11.5m instead of 11.0m (this increases the risk of sidelock flooding and therefore potential water ingress)
3. A number of slates near the apex could be lifted along their leading edges indicating that the slates had not been twice nailed and clipped as required
4. Away from the valley area a number of slates had broken cover locks which could compromise the slates weather tightness
5. In the areas around the vent slates it was noted that adhesive had been used to secure the slate this also could compromise the slates weather tightness
6. Adhesive had also appeared to have been used to secure slates following previous investigation / repair works
7. Underlays seals had not been fitted to the slate vents
8. The sarking felt is very basic quality and has become brittle / fragile
9. Various rips and tears were noted to the sarking felt
10. The sarking felt in one area did not have sufficient head lap i.e. 75mm instead of 150mm
11. The over facia ventilation is insufficient 10mm instead of 25mm
12. Valley slate vents had not been installed
13. No high level ridge vents to the dual pitch sections of the ridge

5. Conclusions
It was not possible to positively identify one specific defect which was responsible for the leaks however it seems likely that the numerous workmanship and other defects listed above coupled with the relatively low pitch @ 17 deg (the minimum recommended is 15 deg) and rafters which exceed the maximum permissible length allows heavy wind driven rain to be blown into the void under the slates.

The felt underlay which is of very basic quality has numerous holes and tears, lacks sufficient laps in some areas and crucially the waterproofing sleeves have not been fitted where roof vents penetrate the felt. This means that any water that does get under the slates will very quickly find its way into the building.

The investigations also revealed that the roof is inadequately ventilated which means that interstitial condensation make be a contributory factor.

6. Options for Repairs
1. To attempt to correct the numerous defects – This option is not recommended due to the high number of defects, the difficulty in carrying out repairs without damaging the other slates and also the fact that the roof has defects which could not be corrected without stripping the entire roof ie the poor quality felt and excessive rafter length for Cambrian Slates
2. To remove the existing slates replace/upgrade the sarking felt and then re-fix the existing slates This option is not recommended since a high proportion of breakages could be expected and the new slates would not colour match the existing slates and also the excessive rafter length could not be resolved.
3. To remove the existing slates and replace them a different type of covering system for example lightweight metal tiles such as “icopal decra" or similar. This type of system will not impose any additional loads on the existing roof structure and should therefore be a relatively cost effective solution. Counter battening may be required to accommodate additional insulation to meet current building regulations. A budget cost for this option is included below.
4. Another possible solution would be to remove the existing slates and replace with a composite insulated profiled metal sheet (Kingspan or similar). A budget cost for this option is included below.
5. Note: Options 4 and 5 may need planning approval.
7. **Budget Costings**

**Option 1 – Profiled Metal Sheet (Kingspan or similar)**

<table>
<thead>
<tr>
<th>Item</th>
<th>COST</th>
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<tr>
<td>Construction Phase Management</td>
<td>£ 5,457.00</td>
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<td>Priced Schedule</td>
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<td>1 Preliminaries</td>
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<td>2 Schedule of Works</td>
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<td><strong>Sub Total</strong></td>
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<td>Confirm OH&amp;P from Core Section</td>
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<td><strong>Total</strong></td>
<td>£ 55,252.76</td>
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Notes on costings

1. Costs exclude VAT
2. Costs are based at 2nd quarter 2015
3. Costs exclude professional fees and building regs/planning fees
4. Costs are based on using the Hampshire and Surrey Local Areas Construction Framework to procure the works
5. Costs are based on normal working hours
6. Costs exclude making good finishes/decorations internally
7. Costs exclude any possible asbestos removal
8. The price specifically excludes a temporary roof
9. Costs includes 5% contingency allowance

**Option 2 – Lightweight Metal Tiles (decra or similar)**

Estimated budget cost = £69,000.
Appendix 1 - Redland Report dated 26th January 2015

Hampshire County Council
Property Services
Three Minsters House
76 High Street
Winchester
SO23 8UL

For the attention of Mr A Fellingham

26th January 2015

Our Ref: 4004001

Dear Sirs,

RE: Frogmore Day Centre, Potley Hill Road, Yateley
Redland Cambrian Slates

Following on from our meeting at the above school we would like to provide you with our initial findings based on our very limited inspection that was carried out on a small section of roof on the front elevation.

The roof comprises of Cambrian Slates fixed to battens laid on Bituminous 1F Felt, the rafter depth was 150mm, which had 50mm foil faced insulation boards fixed in between and an air gap above of approximately 100mm.

- We measured the pitch of the roof and found it to be 14 degrees, however this measurement was only taken on one rafter adjacent to the RH Side of the valley (fig1), we would have taken more measurements on different rafters if the roof had been dry. Therefore we would recommend that further measurements are undertaken to determine the overall roof pitch.

- The headlap of the Cambrian Slate courses up to the valley intersection were measured and all were found to be 75mm, which is the correct headlap for Cambrian Slates on a 15 degree roof pitch. However due to the slippery surface of the roof at the time of this inspection no headlap measurements of the courses above this point were measured.

- The rafter length was measured at its longest point and we found it to be approximately 11.50m. We stipulate a maximum rafter length for Cambrian Slates on a 15 degree roof pitch of 10m.
A number of attempts have been made to resolve the water ingress problem, and in doing so has resulted in slates not being adequately mechanically fixed back into place, it would appear that some form of adhesive has been used instead. Fig 2

A 10mm vent had been installed along the top of the fascia board; unfortunately for a roof of this type a 25mm fascia vent must be fitted in accordance with high level ventilation to allow air movement from eaves to ridge in order to ventilate the space between the underlay and insulation boards.

In this instance at high level, there was a Dry Ventilated Ridge System on three ridgelines and a mortar bedded system on one ridgeline. As no ridge tiles were removed during this inspection, it could not be determined if the felt along the apex had been kept short from the top of the rafter to allow a ventilation path into the Dry Ridge System.

There were Slate Vents installed, at approximately 450mm centres, in a slate course approximately mid-point within the roof slope, however their vent caps had been removed and their openings fully covered with a Flashband type waterproofing membrane, preventing them from allowing any ventilation into the small air gap below the felt. Fig 3.

Adjacent to the valley there was a rip within the bituminous 1F felt. Fig 4

As no slates were removed during this inspection it was difficult to determine if the water ingress issue was down to condensation or rainwater or a combination of both, if required we would gladly attend a further site meeting where a more intrusive inspection of the roof system can be undertaken.

However what we need to be conscious of is that the rafter at its longest length on this building is too long for the permitted use of Cambrian Slates, by doing so increases the risk of sideloak flooding and therefore potential water ingress onto the underlay.

If you need us to attend any further inspection or require any further clarification on this matter please do not hesitate to contact the undersigned.

Yours faithfully

Andy Stewart
After Sales Manager
Monier Redland Ltd

Encs: Photographs
Hampshire County Council
Property Services
Three Minsters House
76 High Street
Winchester
SO23 8UL

For the attention of Mr A Fellingham

17th March 2015

Our Ref: 4004001

Dear Sirs,

RE: Frogmore Day Centre, Potley Hill Road, Yateley
Redland Cambrian Slates

Following on from our meeting at the above building we would like to provide you with our findings in addition to those detailed in our report dated 26th January 2015.

• After areas of slating were removed, we measured the pitch of the roof on the top of a number of rafters and found on average a pitch of 17 degrees.

• The headlap of the Cambrian Slate courses up to the valley intersection were measured and all were found to be 75mm, however we did find a number of courses with headlaps of 65mm and 70mm from this point up to the apex. The Minimum headlap for Cambrian Slates on roof pitches between 15 to 25 degrees is 75mm.

• The rafter length was measured at its longest point and we found it to be approximately 11.50m. We stipulate for Cambrian Slates on this roof pitch of 17 degrees, in this location, a permissible maximum rafter length of 11m.

• There were a number of slates near to the apex of the roof that could easily be lifted up along their leading edges, which is an indication that they have not been twice nailed and clipped. Also the cut slates down the sides of the valleys were not clipped as per our recommendations.

• A 10mm vent had been installed along the top of the fascia board; unfortunately for a roof of this type, BS5250 states that a fascia vent equivalent to 25mm must be fitted in conjunction with high level ventilation to allow air movement from eaves to ridge in order to ventilate the space between the underlay and insulation boards.
• For effective roof void ventilation to and in addition to the provision of low and high level ventilation, slate vents need to be installed down the line along both sides of the valley.

On this particular roof structure there is high level ventilation installed on two duo pitch ridgelines and along the apex of the mono-pitch ridgeline, however a mortar bedded ridge system has been used on the remaining duo pitch ridge line which is not providing the high level ventilation requirement for this section of the roof.

• Slate were removed adjacent to a number of slate vents which enabled us to reach up towards the spigot of the vent where we found the underlay seals have not been fitted. These are an important item to ensure the area around the spigot of the vent through the underlay remains weathertight.

• In the area around the vents there was evidence of adhesive being applied within the sideloops on a number of the slates. It’s difficult to determine if this adhesive is causing a blockage within the channels, but it’s our recommendation that adhesive must not be used in this area of the slate.

• Along with a number of rips and tears within the bituminous felt, we found a section of the underlay system with a head-lap between each layer that was only 70mm. The minimum head-lap for an underlay as per BS 5534 is 150mm.

• Away from the valley area on the front elevation we found a number of slates with broken cover locks which in certain weather conditions will compromise the affected slate’s weathertightness.

Looking at all of our observations, we recommend that consideration should be given to address them all and not just address a number in isolation, however due to the amount of issues would result in large scale remedial works, which may leave the option of full re-roof as the more appropriate course of action.

If a decision is made to re-roof this building, we would gladly provide our assistance in product selection and providing a Specification for the works; in the meantime if you require any further clarification on anything we have raised in this letter then please do not hesitate to contact the undersigned.

Yours faithfully


Andy Stewart
After Sales Manager
Monier Redland Ltd
Appendix 3 - Technical data sheet on “thru vent”

ThruVent - Interlocking

The ThruVent Tile is a means of incorporating roof space ventilation within the roof slope where alternative eaves and ridge ventilation systems are not appropriate. It can also be used for mechanical extraction and soil pipe ventilation.

1. Marking position for ThruVent
   a. Place underlay seal over space in which ThruVent is to be laid, ensuring that the arrows above the wording “ThruVent” are pointing towards the ridge.
   b. Line up edge of tile with the line marked on the profile.
   c. Position the corresponding marked tile profile with the top edge of the battens. Cut slot to fit right up to the edge of the underlay seal between points indicated.

2. Fitting Underlay Seal
   a. Slip underlay seal under the lower and upper battens, slipping the tip centre up into the slat in the latter.
   b. Cut a small fillet into the felt, ensuring the cut area is in the centre of the hole.
   NOTE: In the case of rigid tiling, or boarding a suitable wood stop must be used to provide a clear path to the roof space.

3. Nailing and Clipping
   Place ventilation tile in position ensuring the pipe passes through the hole in the underlay.

Pack Contents

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<td>7933</td>
<td>Double Roman 8.8K ThruVent</td>
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<td>Stonewall 8.8K ThruVent</td>
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<td>7935</td>
<td>Hi-Row ThruVent</td>
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<tr>
<td>7946</td>
<td>Flexible Pipe (125/0mm) for 8.8K ThruVent</td>
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If tiles are laid at minimum gauge, there may be some interference with the ThruVent cap and the tile above - in this instance, push the tile in the course above the ThruVent up until it clears the cap. Fix in position via a re-drilled nail hole and by nailing to the batten.

Hi-Row ThruVent requires a non-Standard Adaptor to connect to a pipe.
Appendix 4 - Photographs

**Frogmore Day Centre**

**Fig 1** Roof Pitch measured on rafter adjacent to lead valley

**Fig 2** Interlock on slate with adhesive in water channels
Fig 3 Slate Vents

Fig 4 Tear in underlay, plus not sufficient mechanical fixing of the slates, plus one broken slate
Fig 5 Headlap

Fig 6 Headlap 2
Fig 7 General view of roof

Fig 8 Example of slate damage
Fig 9 Example of slate damage 2

Fig 10 Felt head lap
From: Fellingham, Andrew
Sent: 14 April 2015 15:39
To: Fellingham, Andrew
Subject: FW: Frogmore Day Care Centre

From: John Elson [mailto:john.elson@hart.gov.uk]
Sent: 15 August 2014 16:41
To: de Lacy, Martin
Subject: Re: Frogmore Day Care Centre

Hi Martin,

I wondered if you could help me out with this one?

We have got problems with a leaking roof at Frogmore Day Care Centre. The building was constructed by Hart about 15 years ago and leased on a full repair and maintenance basis to the Trustees. Whilst responsibility for repair of the roof rests with the trustees they do not have the funds to undertake this work, and are suggesting the problem is as a result of a design fault.

I would therefore be grateful if you could please ask someone at HCC to provide me with a quote to carry out a survey and prepare a report identifying the cause of the problem and recommending a possible solution together with an estimated cost.

If needed the centre manager is Verónica Sinyey telephone 01252 876055, and Terry Hogg who has previously carried out some repairs to the roof can be contacted on 07885291678.

The centre is still being used but the manager is concerned as water is getting into the light fittings and part of the ceiling has been damaged.

Regards

John

John Elson
Head of Technical & Environmental Services
Hart District Council
Oxshott Offices
Hartington Way
Plano
Hampshire
GU51 4AB