



24 Botanic Grove, Durban, 4001
P O Box 51113 Musgrave 4062
Tel: 27 31 2025703/5/6
Fax: 086 522 0008
Email: gavbrown@global.co.za

Gavin R Brown & Associates cc

Consulting Civil, Structural Engineers, Project Managers & Timber Roof Truss Designers

c/k 2007/016191/23

62 Railway Street, Kokstad, 4710
P O Box 410 Kokstad 4700
Tel: 039 727 3514/1603
Fax: 086 522 0008

Our ref: 7324_a/05/06/2012_ub

05 June 2012

KZN Children's Hospital Trust
155 Juniper Road
Overport
4091

Attention: Dr Arthi Ramkissoon

Dear Madam

Timber Roof Construction, Nurses Home, KZN Children's Hospital, Durban.

Terms of Reference

Gavin Brown and Associates were appointed by KZN Children' Hospital Trust, to carry out an urgent investigation of the Timber roof construction over the Nurses Home at the KZN Children's Hospital in Durban.

Information Supplied

Architectural drawings of the Nurses Home Building had not been prepared at the time of the investigation.

G R Brown Pr. Eng. B.Sc. (Eng.) M.S.A.I.C.E & U Brahmadu (Associate)
Level 2 BEE Contributor

Scope of report

- Record findings of site investigation.
- Make recommendations for remedial measures.

Site Work

The site investigation was carried out on the 30th and 31st of May 2012. The Inspection team was headed by senior ITC inspector Mr Bobby Bejai, assisted by our M Zane Essack.

Nurses Home

The Nurses Home roof construction comprises Marseilles clay tiles on 38mm x 38mm SA Pine timber battens on site-made roof trusses spaced at 760mm centres. The roof framing comprises hip ends with hip valley intersections that link the North and South wings.

An inspection of the exterior of the roof construction revealed areas where there are noticeable deflections in the plane of the roof tiles, in instances parts of the roof have collapsed.

Access into the ceiling void was gained through the lift shaft.

The roof structure over the Nurse's Home comprises of site made trusses spaced at 760mm centres, and constructed from 38x152 Oregon Pine material. The truss joints comprise either a single M10 bolt or 3 wire nails. The truss configuration resembles a double "Howe". The 38mm x 38mm tiling battens are fixed directly to the rafters of the trusses. No under-tile membrane has been used.

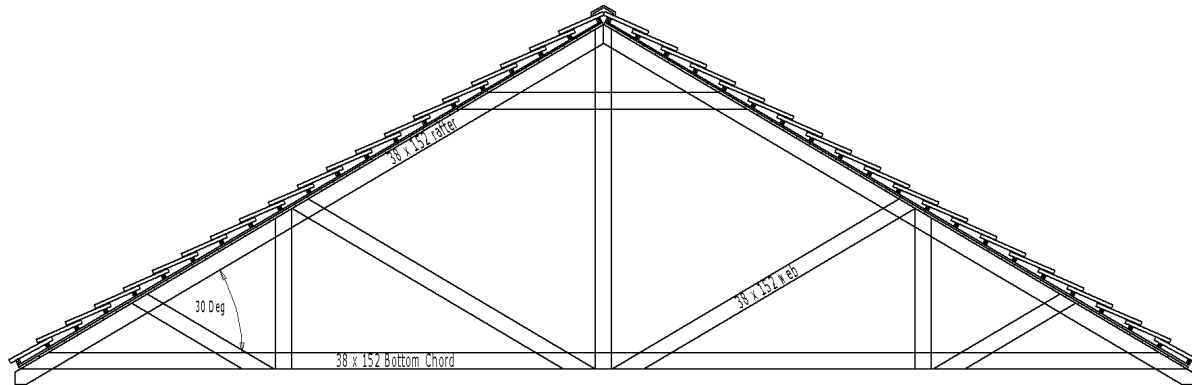


Figure 1- Typical truss

Large amounts of borer dropping were noticed on the ceilings boards. The timber was tested by tapping on its surface with a welders hammer. The surface of timber that appeared sound gave way when struck with the hammer, indicating severe damage from wood borer infestation. This was evident in both the truss timbers and the ceiling joists.

It was noticed that the majority of the tiling battens have been severely affected by wet and dry rot. In instances the timber has become fibrous and can be broken up by applying hand pressure. There are areas of roof where the battens have collapsed completely, causing the tiles to slide off the roof. This is especially evident in and around the valleys and the chimneys. It would appear that the metal valley gutters and headwall flashing had been removed from the roof causing the ingress of storm water. This continuous damp climate promotes the growth of the fungi that causes wet rot which weakens the timber. There are areas on the sea facing slopes of the roofs where the tiling battens have slid off the truss rafters. It appears that the marine environment has caused the wire nails connecting the battens to the rafters, to rust and fail.

The truss construction at present does not comply with Part L of SABS 0400-1990 The Application of The National Building Regulations. According to Table 1 the 38 x 152 timber members are only suitable for use for spans up to 8.5 metres. The truss spans for the Nurse's home are all in excess of 10 metres. This is to allow an adequate number of bolts at the heel and apex for ultimate design conditions. The single bolt connections at the joints are also inadequate to transfer the

forces between connecting members under full design load design conditions. The trusses are also overstressed when checking the truss configuration under the current timber design codes.

Summary and Recommendations

The timber trusses and tiling battens over the nurse's home has been severely damaged by either wood borer or rot. The rot has been caused by the roof not being watertight as a result of the theft of the valley gutters and headwall flashings. The lack of an under-tile membrane has also contributed to this.

We are of the opinion that the trusses over the Nurse's Home cannot be repaired, and recommend that they be replaced with nail plated engineered trusses.

The area adjacent to all overhangs should be cordoned off to protect workers from possible falling tiles off the unstable roof especially during windy conditions.

Should you require further assistance or information please do not hesitate to contact the writer.

Yours faithfully

Gavin R Brown & Associates



Gavin R. Brown PrEng 820275

PHOTOGRAPH



Figure 2-Truss Tie beam damaged by wood borer



Figure 3- Ceiling joist damaged by wood borer

**G R Brown Pr. Eng. B.Sc. (Eng.) M.S.A.I.C.E & U Brahmada (Associate)
Level 2 BEE Contributor**



Figure 4- Buckling Webs



Figure 5- Wood borer damage on ceiling brandering



Figure 6- Wood borer damage on truss



**G R Brown Pr. Eng. B.Sc. (Eng.) M.S.A.I.C.E & U Brahmada (Associate)
Level 2 BEE Contributor**





**G R Brown Pr. Eng. B.Sc. (Eng.) M.S.A.I.C.E & U Brahmada (Associate)
Level 2 BEE Contributor**