



CONDITIONAL ASSESSMENT REPORT



UKZN Chemistry Building,
Golf Road,
Pietermaritzburg,
Kwa-Zulu Natal,
South Africa

MAY 2023

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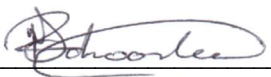
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1. INTRODUCTION

ART Consulting Enterprise (Pty) Ltd were appointed on the 15th February 2023 for the professional structural engineering services pertaining to the following aspects of the Re-roofing of UKZN Chemistry Building:

- Structural Engineering Services (Conditional Assessment)

Subsequent to appointment, the briefing meeting was held on the 16th February 2023 on site. A site inspection was conducted on the 21st April 2023 to establish the condition of the existing roof trusses.

2. LOCATION OF THE SITE

The UKZN Chemistry Building is located on Golf Road, Pietermaritzburg, Kwa-Zulu Natal, South Africa. The GPS coordinates of the site are 29°37'18.84"S, 30°23'44.03"E.



Figure 1: Locality Layout

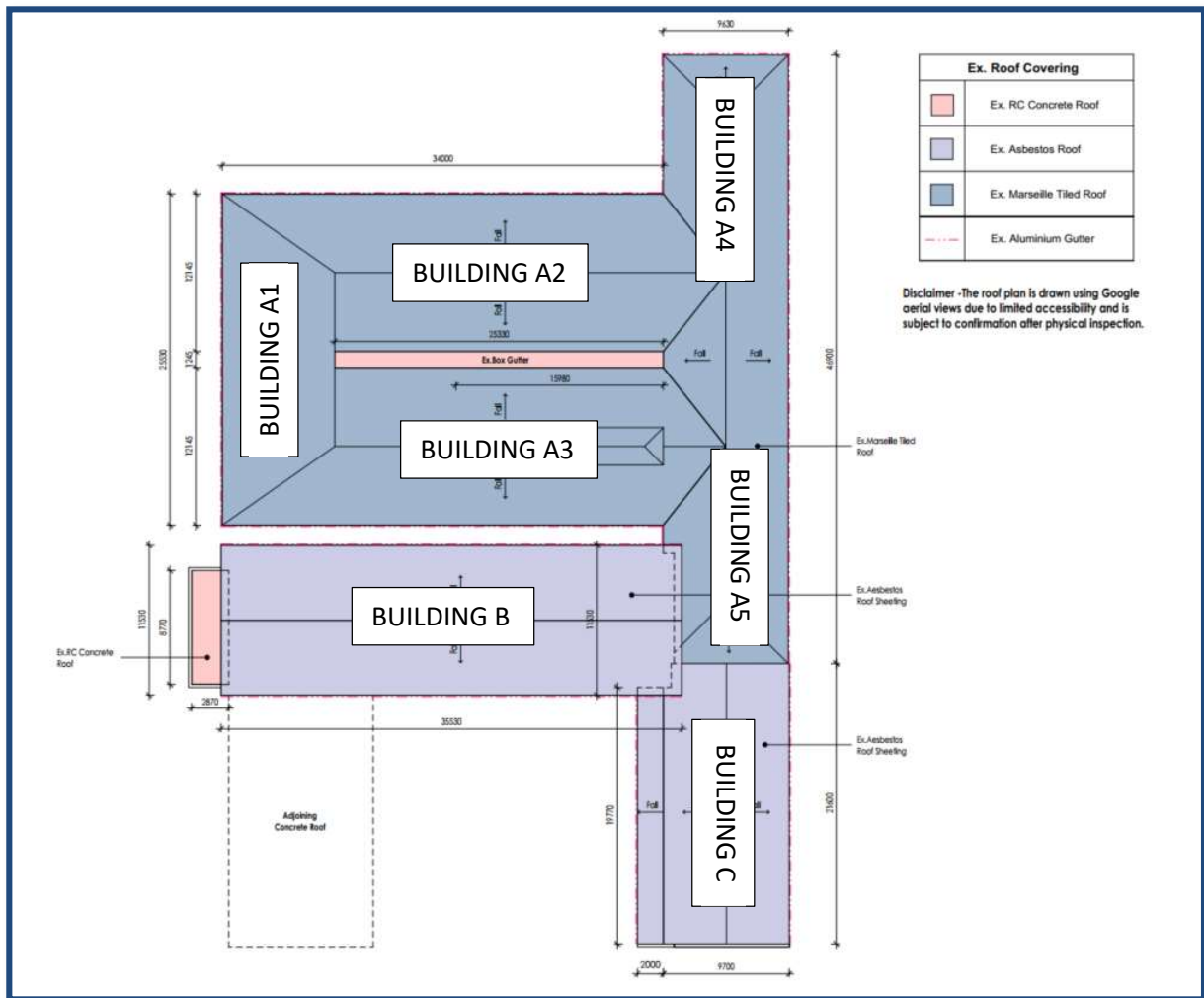


Figure 2: As-Built Layout

3. SCOPE OF WORK

The scope of the structural engineering works entails the assessment, repairs and replacement of existing roof trusses.

4. ENTOMOLOGIST REPORT

It was recommended that an Entomology Report be carried to determine if there is any insect activity in the roof trusses. The findings and recommendations were as follows:

4.1 Building A

Findings:

- Isolated Activity Of Wood Borer in Main Roof Timbers – 4 Beams Have Mild Activity. No Fumigation Required
- Room 12 Laboratory Instrument – has Visible Termite Activity in Door Frame. Laboratory has Carpenter Ant Activity & furniture has Non Active Wood Borer.
- Canteen: Active Termites Noted

Recommendations:

- The Roof Trusses that have been identified with Wood Borer Activity be Drilled
- And Injected with approved Timber Preservative (CTX 103), Thereafter all roof Timbers be sprayed to Drip Of Rate Of Application as A Preventative Treatment. Laboratory Furniture be Sprayed as preventative. (No Active Infestation). Termites Treatment: To Drill & Inject concrete slab from External thereafter Inject a High residual Termite Barrier. Entry points to the sealed to match existing surface finish. Upon completion of Termite Treatment, A minimum guarantee of 5 years to be issued against Re-Infestation

4.2 Building B & C

Findings:

- Isolated Activity Of Wood Borer in Main Roof Timbers – 5 Beams Have Mild Activity. No Fumigation Required.
- Laboratory Stores (Room 21), Have Active Termite Infestation in Door Frame

Recommendations:

- The Roof Trusses that have been identified with Wood Borer Activity be Drilled
- And Injected with approved Timber Preservative (CTX 103), Thereafter all roof Timbers be sprayed to Drip Of Rate Of Application as A Preventative Treatment. Laboratory Furniture be Sprayed as preventative. (No Active Infestation). Termites Treatment: To Drill & Inject concrete slab from External thereafter Inject a High residual Termite Barrier. Entry points to the sealed to match existing surface finish. Upon completion of Termite Treatment, A minimum guarantee of 5 years to be issued against Re-Infestation

A copy of the Entomology Report has been included as Annexure 1.

5. VISUAL CONDITION ASSESSMENTS AND REMEDIAL MEASURES

The following findings are based on our visual inspections conducted on 21st April 2023.

5.1 Building A1

Modified “Double Howe” truss with 2 central panels removed to create a rectangular space in the centre. This section of the building has raked ceilings with the timber tie beams, timber vertical posts and timber diagonal members exposed. The rafters are partially exposed. The purlins were inaccessible to be assessed.

The trusses comprise of the following:

- Tie beam – 290mm X 50mm
- Vertical struts – 150mm X 70mm
- Diagonal members – 105mm X 70mm
- Truss centres – 3000mm c/c
- Approximate truss height – 3948mm

Roof Covering

- Clay roof tiles – these are to be replaced as there are a number of cracked and damaged tiles, and finding replacement tiles are very difficult due to the age of the building.

Carpentry and Joinery

A total of 7 Full trusses and 2 short span jack trusses were assessed and the following were observed:

- All tie beams showed creep stress cracks. Evidence of repairs in the form of splicing using steel plates, timber and bolts were observed in an attempt to reduce the spread of further cracking.
- Approximately 40% of the tie beams are cracked.
- Approximately 20% of the diagonal members are separating from the joints at the vertical struts.
- There is evidence of water marks on the ceiling and walls and indicates that the box gutters and roof are leaking.

5.2 Building A2, A3 and A4

These sections of the roof space were inaccessible.

5.3 Building A5

This section of the building has a timber “Double Howe” truss. In general approximately 80% of the timber members are cracked.

Access into the roof space was difficult due to air conditioning ducts and the changes in the roof truss configuration.

The trusses comprise of the following:

- Tie beam – 224mm X 38mm
- Rafter - 224mm X 38mm
- Vertical struts – 118mm X 34mm
- Diagonal members – 118mm X 34mm
- Purlins – 75mm X 75mm
- Truss centres – 1472mm c/c
- Approximate truss height – 1500mm

Roof Covering

- Clay roof tiles – these are to be replaced as there are a number of cracked and damaged tiles, and finding replacement tiles are very difficult due to the age of the building.

5.4 Building B

This section of the building has a timber “Double Howe” truss. In general approximately 80% of the timber members are cracked.

The trusses comprise of the following:

- Tie beam – 224mm X 38mm
- Rafter - 224mm X 38mm
- Vertical struts – 118mm X 34mm
- Diagonal members – 118mm X 34mm
- Purlins – 75mm X 75mm
- Truss centres – 1472mm c/c
- Approximate truss height – 1500mm

Roof Covering

- Asbestos roof sheeting – these are to be replaced.

5.5 Building C

This section of the building has a timber “Double Howe” truss. In general approximately 80% of the timber members are cracked.

Access into the roof space was limited.

The trusses comprise of the following:

- Tie beam – 224mm X 38mm
- Rafter - 224mm X 38mm
- Vertical struts – 118mm X 34mm
- Diagonal members – 118mm X 34mm
- Purlins – 75mm X 75mm
- Truss centres – 1472mm c/c
- Approximate truss height – 1500mm

Roof Covering

- Asbestos roof sheeting – these are to be replaced.

6. RECOMMENDATIONS AND CONCLUSION

The age of the trusses and the extent of stress cracking are indications that these trusses need to be replaced. Furthermore, the removal of the roof covering will cause damage to the purlins. It is therefore recommended that all trusses be replaced in the event of upgrading the roof coverings.

Due to the age of the building, remedial work to the trusses will be inevitable and therefore the upgrading of the roof covering is an ideal opportunity to replace the roof structure, so that disruptions to the operation of the affected laboratories is minimized.

The existing clay tiles have become brittle and are susceptible to hail damage.




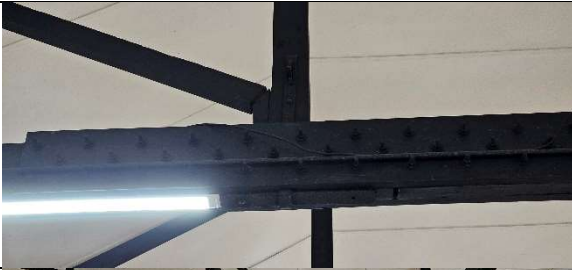


The asbestos roof covering is a health hazard and will need to be replaced in terms of the relevant health and safety acts.




It is of utmost importance to engage with a heritage specialist during the remedial proposals.




Consideration to be given to the high pitch of approximately 33° in Block A when redesigning the roof.




7. ANNEXURE 1 – ENTOMOLOGY REPORT

8. ANNEXURE 2 – PHOTOGRAPHS

Building A1		
No	Photo	Comments
1		<ul style="list-style-type: none"> • Clay tile roof covering • Roof has warps
2		<ul style="list-style-type: none"> • Modified "Double Howe" truss
3		<ul style="list-style-type: none"> • All tie beams showed creep stress cracks. Evidence of repairs in the form of splicing using steel plates, timber and bolts were observed in an attempt to reduce the spread of further cracking. • Approximately 40% of the tie beams are cracked.
4		<ul style="list-style-type: none"> • Approximately 20% of the diagonal members are separating from the joints at the vertical struts.
5		<ul style="list-style-type: none"> • There is evidence of water marks on the ceiling and walls and indicates that the box gutters and roof are leaking.
6		<ul style="list-style-type: none"> • There is evidence of water marks on the ceiling and walls and indicates that the box gutters and roof are leaking.

Building A5		
No	Photo	Comments
1		<ul style="list-style-type: none"> • Clay tile roof covering
2		<ul style="list-style-type: none"> • "Double Howe" truss • Approximately 80% of the timber members are cracked
3		<ul style="list-style-type: none"> • There is evidence of water marks on the ceiling and walls and indicates leaks

Building B		
No	Photo	Comments
1		<ul style="list-style-type: none"> Asbestos roof covering
2		<ul style="list-style-type: none"> "Double Howe" truss Approximately 80% of the timber members are cracked
3		<ul style="list-style-type: none"> There is evidence of water marks on the ceiling and indicates roof leaks

General Photos		
No	Photo	Comments
1		<ul style="list-style-type: none"> • Trap door to access roof space into Building A2 was located above a 380V Distribution Board
2		<ul style="list-style-type: none"> • Trap door to access roof space into Building A3 was located in the middle of the laboratory. • The ladder provided was not able to be used safely here.
3		<ul style="list-style-type: none"> • Building A3 - There is evidence of water marks on the ceiling and indicates roof leaks.