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STRUCTURAL INSPECTION REPORT

Blackpool Victoria Hospital, RAAC units

Abstract

This document details the findings of the inspections carried out between December 2019 and January 2022 with regard to the Reinforced Autoclaved Aerated Concrete (RAAC) roof units in various locations

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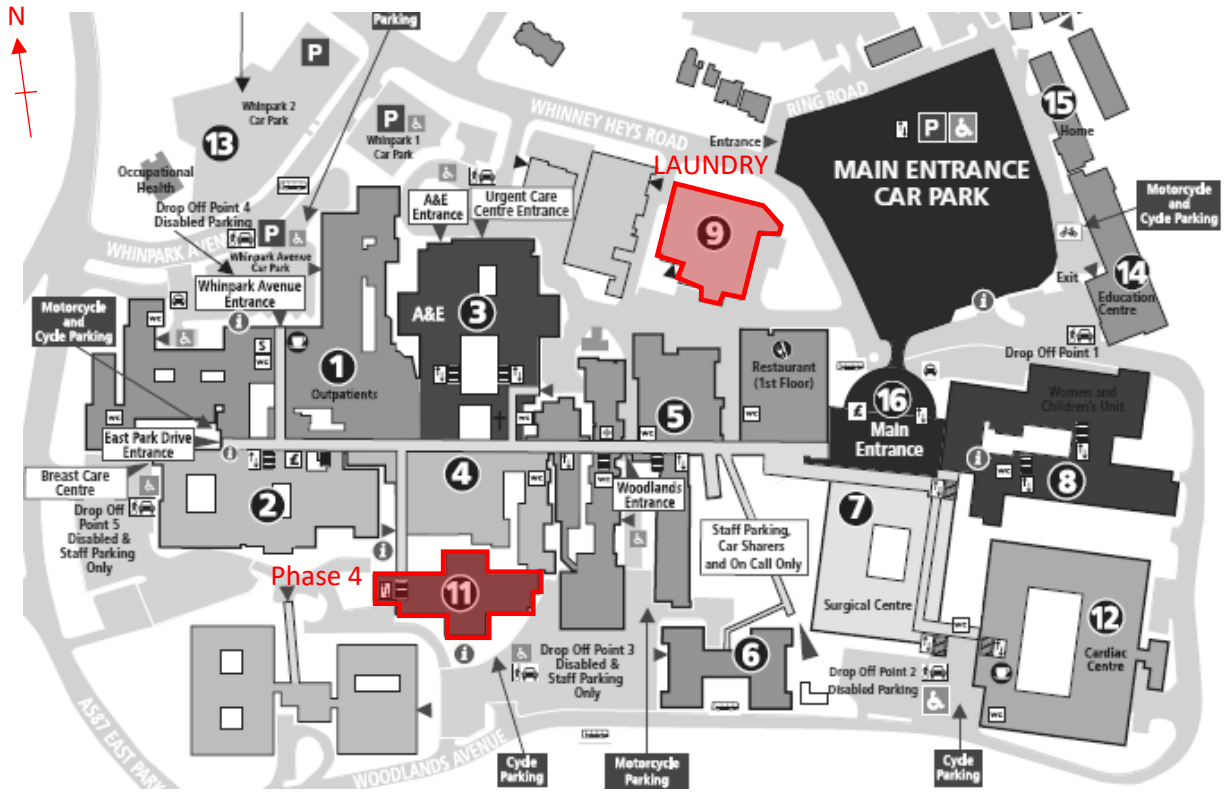
PREFACE

The Alan Johnston Partnership LLP have been appointed to undertake a structural review of all buildings within the hospital estate to identify the use of RAAC units in their construction. Following a discovery of such units in the laundry building and in phase 4, an inspection of the roof panels was undertaken. Based on historical maps, it is estimated that the laundry building was originally constructed circa 1970. Although the building use may have changed over time, it is currently used as a laundry processing/storage area for the hospital. The phase 4 wards were constructed during the 1980's and provide areas for patients and medical record storage.



BUILDING LOCATIONS WITHIN THE SITE

Both buildings have roofs constructed from Reinforced Autoclaved Aerated Concrete (RAAC), a construction which has been identified as problematic in certain circumstances and is subject to a checking instruction from the NHS. This report details the findings of the inspections carried out, and outlines various recommendations in managing the risks identified.

REINFORCED AUTOCLAVED AERATED CONCRETE

Autoclaved aerated concrete is different from normal dense concrete. There are no coarse aggregates and the concrete is filled with chemically induced gas bubbles to reduce its weight. It is relatively weak and was used widely in the 1960's -1980's for roof construction. Many instances of sudden collapse have been attributed to RAAC, which has a useful lifespan estimated to be around 30 years.

In late 2019, the Local Government Association (LGA) drew attention to the potential structural issues surrounding RAAC roof planks and made recommendations relating to maintenance and

inspection regimes. This was followed for a publication by the Standing Committee on Structural Safety (SCOSS) which highlights the findings of testing/case studies, refer to Appendix A.

The common causes of failure were identified by the report are as follows:

- Incorrect/insufficient cover to reinforcement
- Creep (continued deflection over time) due to a low stiffness
- Insufficient anchorage of reinforcement at support points
- Water ingress and the associated reinforcement corrosion, particularly at support points
- Failed waterproofing membranes
- Insufficient bearing at supports

STRUCTURAL ASSESSMENT METHOD

Inspections were undertaken during normal daytime operation hours with assistance from the hospital estates department, the weather was particularly rainy and typical for the time of year.

The inspection was visual, and allowed the general condition of the roof planks to be assessed collectively. The following signs of deterioration were checked for:

- Excessive deflection
- Signs of water ingress or rusting of reinforcement
- Cracking
- Spalling
- Discolouration/staining

The following criteria were also assessed:

- Condition of concrete in areas of high shear (at supports)
- Bearing width
- Evidence of roof resurfacing or levelling works
- Susceptibility of roof to unusual loading

LAUNDRY ROOF INSPECTION

Refer to revision 03 of this report. The laundry building is to be demolished and is not relevant going forward

PHASE 4 INSPECTION

The roof in this area is pitched in all areas and finished with tiles. AJP were able to readily access the roof space and assess each RAAC unit without hindrance. The apparent signs of deterioration were very limited, none giving rise for concern. Previous inspections had shown that the tiled roof and associated waterproofing had failed in several key areas as follows:

- Head of main access stair
- Above the medical records store
- Above the disused mechanical plant to the West of the main access stair

It appears that these leaks have now been addressed following roof repairs following the recommendations of revision 2 and 3 of this report.

INTERNAL ROOF SPACE IN PHASE 4

MATERIAL STAINING DUE TO ROOF LEAK

WATER INGRESS DUE TO ROOF LEAKING

WATER INGRESS AT HEAD OF PHASE 4 STAIR

ADDENDUM – FURTHER SURVEY OF PHASE 4 (MARCH 2020)

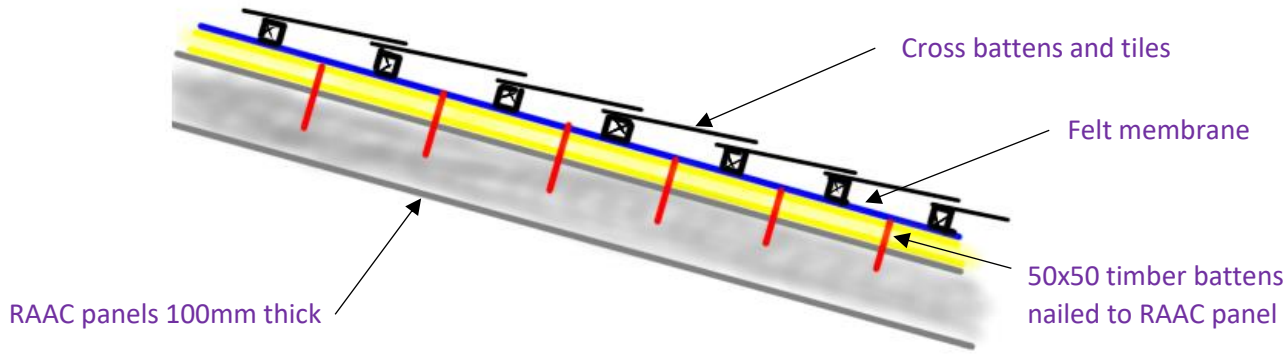
In order to alleviate concerns regarding the potential for inadequate concrete cover in the roof panels, a covermeter survey was undertaken. The Hilti PS38 Multidetector was employed to assess concrete cover in various locations within the phase 4 roof space. Approximately 10% of the panels were tested using calibrated equipment to determine the range of concrete cover.

The spacing and general arrangement of the reinforcement was found to be uniform in all panels tested. Cover was measured to be a minimum of 20mm and a maximum of 30mm, typical of precast concrete and giving no cause for concern.

HILTI PS38 MULTIDETECTOR TAKING SITE MEASUREMENTS

ADDENDUM – FURTHER SURVEY OF PHASE 4 (JANUARY 2022)

Following the erection of 2no. scaffolding towers, AJP were able to assess the panel condition from above by locally removing small sections of roof finishes to expose the RAAC surface. The build-up above the panels generally consists of 50mm deep timber battens at regular centres nailed down to the RAAC surface, these are overlain with a felt membrane and further cross battens which carry the roof tiles.



TYPICAL ROOF BUILD-UP

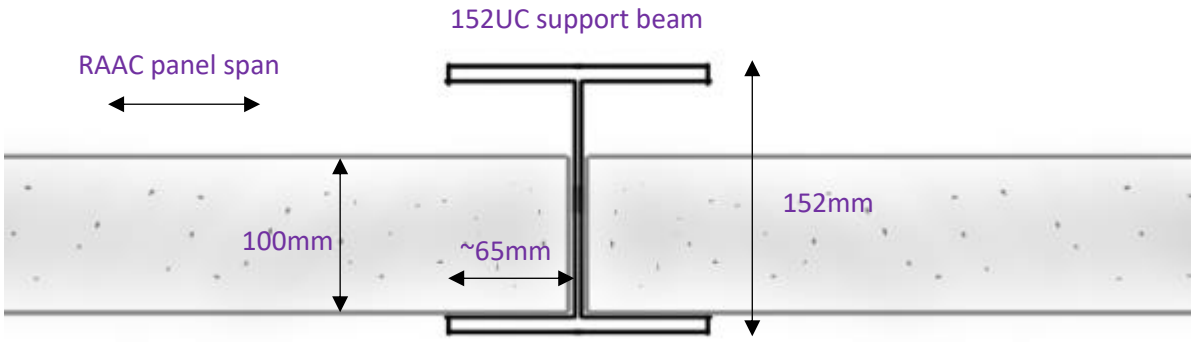
The felt and timber at the eaves was in poor condition due to water damage caused by splashback from the gutter immediately adjacent. The roofing contractor in attendance commented that the workmanship was sub-standard in the observable locations.

CONDITION OF BUILD-UP AT EAVES

The observable RAAC panel surface was free of defects and appeared to be in good condition.

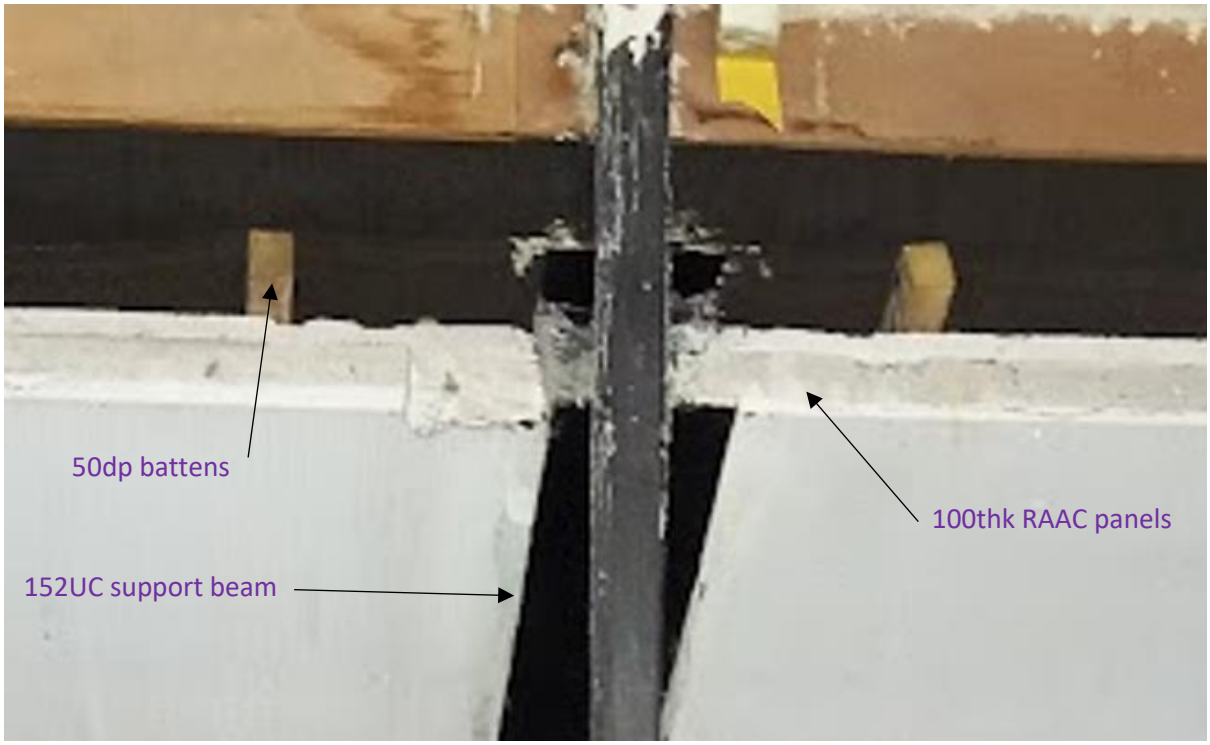
CONDITION OF RAAC PANEL

The unit was exposed at the bearing location, the support beam appears to be a steel 152UC section with the panel being supported on the bottom flanges. Investigations indicated that a bearing of at least 65mm had been achieved (greater than the 45mm acceptable minimum).



TYPICAL SUPPORT CONDITIONS FOR RAAC PANELS

The above arrangement was also verified from within the roof void



SUPPORT CONDITIONS WITHIN THE ROOF VOID