RISK REGISTER ENTRY 16th October 2023

Reinforced Autoclaved Aerated Concrete (RAAC)

Paper prepared by GIC for submission to HMP Glenochil Risk Register

Background

Reinforced Autoclaved Aerated Concrete (RAAC) is a lightweight cementitious material. It is aerated and has no coarse aggregate, meaning the material properties and structural behaviour differ significantly from 'traditional' reinforced concrete. RAAC has been used in building structures in the UK and Europe since the late1950's, most commonly as precast roof panels in flat roof construction but occasionally in pitched roofs, floors and wall panels in both loadbearing and non-loadbearing arrangements.

SPS Estates Inspections

Inspections have been carried out across all SPS Sites and RAAC has been identified at HMP Glenochil. A detailed inspection on Friday 29th September, it has been found that the RAAC panels, located in the workshed movement link corridor, also extend into the worksheds by around 3.5m (covering the toilet and office areas). The attached plan shows the extent of RAAC discovered.

RAAC - Glenochil Updated 29-09-23.p

The inspections at HMP Glenochil were carried out by a Chartered Building Surveyor from HQ Estates and **there is no immediate health and safety risk to people using the link corridor under the RAAC panels identified**. The defects found are minor in nature, and there was no identification any of the major risk factors such as deflections/sagging of the panels or cracking in the key panel support areas. There is nothing identified to date which would necessitate recommending actions like temporary closure of areas, containment or emergency works.

A structural engineer has now been identified and will carry out their initial inspection of the areas on Wednesday 8th November, this is to implement the next and more detailed stages of the Institute of Structural Engineers (IStructE process. After this inspection there will be reporting, more inspection work and possibly some initial intrusive work to prove findings and confirm or revise risk assessments already undertaken.

Inspection Process Followed and Resultant Findings

In terms of overall process on RAAC, SPS is following Scottish Government's recommended guidance from the IStructE (attached) on the identification and condition assessment process for RAAC panels.


IStructE_RAACs-v3.pdf

This inspection consisted of the following:
Part 1. Identification and Condition Assessment

The first inspection which took place on the 22th September was part of a survey inspection of all relevant buildings in the SPS estate to determine if we had any RAAC or suspected RAAC to be present.

The second and more detailed inspection at HMP Glenochil was on the 29th September was **the process of condition assessment** of the identified RAAC. This sequence of assessment is outlined in Section 4 of the SG Recommended Guidance and consisted of 1 and 2 below with further checks planned by a Structural specialist.

1. Visual inspections – crack and defect recording. **(Completed by SPS on 29th September – confirmation surveys by Structural Engineer to follow)**
2. Surveys – vertical deflection measurement and condition assessment. **(Visual deflection check completed 29th September and confirmation surveys by Structural Specialist to follow in October)**
3. Non-destructive testing (NDT) - cover meter and radar techniques to determine reinforcement location on reinforcement positioning. (To be carried out if required or identified as required by the Structural Specialist)
4. Intrusive surveys – verification of reinforcement position at panel bearings, exposure of reinforcement to identify corrosion, electrochemical testing for reinforcement corrosion. (To be carried out if required or identified as required by the Structural Specialist)

Part 2. Categorisation of Defects

RAAC panel defects are classified in the IStructE document in the following manner (Excerpt from section 5 Summary of Latest Experience):

Performance Defects	Manufacturing Defects	Construction Defects
• High in-service deflections • Cracking and spalling in the soffit of panels • Corrosion of reinforcement • Deterioration in condition • Panel distress caused by overloading • Panels acting independently with limited load sharing	• Misplaced transverse reinforcement • Insufficient anchorage of longitudinal steel • Voidage around reinforcement • Incorrect cover to tension steel	• Cutting of panels post manufacture • Short bearing lengths • Missing reinforcement e.g. linking dowel anchorage • Structurally damaging builders work

Structural Engineer Inspection

Structural Engineer will carry out the initial inspection on Wednesday 8th November and SPS Estates have reiterated that **there is no immediate health and safety risk to people using the link corridor under the RAAC panels identified**.

HMP Glenochil Findings

The specific defects found during the inspections at HMP Glenochil were mainly located along the link corridor area and were:

1. Minor cracking and spalling in the soffit of panels
2. Cutting of panels post manufacture
3. Drilled holes for the structural support of the roof installed over the top of the corridor

These **minor defects** have been found all along the length of the link corridor. It is important to note that they are not cumulatively suggestive of problems with the structural integrity of the panels in themselves. HQ Estates are taking the precautionary measure of appointing a Structural Specialist to inspect them and report separately in order to also provide independent assurance to both SPS and SG.

The risk factors that have taken into account for the link corridor at HMP Glenochil, are as follows:

1. The history of roof leaks in this area. (Leaks can lead to corrosion of the reinforcement in the panels, which can lead to deflection of the panels. **Note there was no obvious deflection of the panels at HMP Glenochil.)**

2. The installation of a pitched roof on top of the RAAC panels in 2016. (Additional loading could be of concern, but given the length of time this additional load has been present, and the nature of the construction of the over-roof system, some reassurance can be taken from the fact that **there is no visible significant deflection in the panels** and the supports for the roof could in-fact help with the support of the RAAC panels because the structure spans perpendicular to the span of the panels).

Local Monitoring Regime – Preventive Maintenance Inspections

To ensure that there are no significant changes in the structural integrity of the RAAC panels a **fortnightly local preventive maintenance inspection (Commenced on Friday 27th October).**

This will be recorded on a standardised format and results will be shared by local estates with HQ Estates, GIC/ SMT, HQ Health & Safety, Local H&S Coordinator and local PLRs.

Inspection process

1. A fortnightly visual inspection will commence for the entire RAAC panelled roof area. This will take place on Friday afternoons (for ease of access).

2. In the corridor, a zoning / identification system will be generated. This will allow inspection of the underside of each portal frame bay of the RAAC panels.
3. The tiles to be lifted for inspection will have a “dot” on them to allow consistency.
4. SPS Inspections will monitor for any changes to the structure such as visible sagging, any new staining, any new cracks, which can then be investigated by specialists. This will trigger assessment of the risk assessments and may require remedial action.
5. Things of importance otherwise are roof leaks and any leaks will be reviewed/ inspected with immediacy and will not wait for the fortnightly inspection.
6. The same estates maintenance staff will carry out the inspections (where possible) to ensure a consistency of inspection checks and visuals for any deterioration.
7. The staff will record all inspections on a standardised format, record no change as well as any defects/changes with photos and advise HQ Estates, GIC/ SMT, HQ Health & Safety, Local H&S Coordinator and local PLRs.
8. A photographic record will be kept on sharepoint of the inspections. This will be logged in the RAAC folder and local HMP Glenochil Risk Register.

Inspection Review

The local monitoring regime and inspection process, including the frequency of inspections will only be reviewed once the structural inspection survey is completed.

End of Report