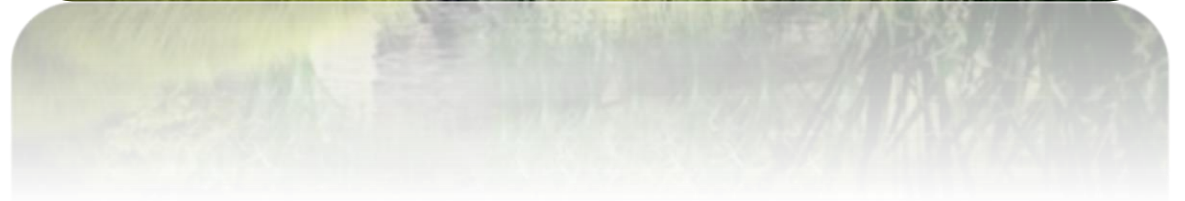




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# **RAAC Reinforced autoclaved aerated concrete**

**29<sup>th</sup> September 2023**





## **Introduction:**

RAAC (Reinforced Autoclaved Aerated Concrete) was commonly used in the construction of Local Authority properties from circa 1950 – 1990. RAAC are planks designed to span large distances of up to 6.0m and are typically 0.6m wide. Where larger spans are required, it is common to have deep Castellated beams breaking the span. Collapses have occurred for the following reasons: -

1. Structural failure through over-loading. E.g. The roof may have been upgraded to add insulation and have been turned into an Inverted or 'Green' Roof. Or the addition of Photo Voltaic (PV) Panels for Energy Production. These being loadings that the original roof was never designed to take.
2. Structural failure due to poor construction methodology. All beams (RAAC planks) are designed to be adequately supported at each end or where these bear upon an intermediate support, such as a mid-span castellated beam. These end bearings should be not less than 150mm (6"). It has been known that inadequate end bearings were provided or potentially that the bearing was not formed of a suitable material for the loads imposed.
3. Structural failures due to poor manufacture and structural degradation. Where the tensile steel reinforcement is cast into the RAAC planks, tolerances for 'Cover' (the distance/depth the reinforcement is covered by the concrete. This can lead to carbonisation, where the alkali nature of Concrete to acid will cause deterioration and corrosion; this or other chemical and/or water ingress will lead to fractures in the concrete; corrosion will then accelerate and eventually fail through bending, visible as deflection, and eventually collapse.



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## **Reference images and Identification: -**

The aerated texture of RAAC plank. This is the same as a 'Breeze block' and the same manufacturers typically made RAAC as lightweight aerated concrete block work, such as Durox, Celcon and other manufacturers.

Appearance of RAAC 0.6m wide planks above suspended ceiling. Note Castellated Beam at mid-span.

RAAC planks at advanced levels of deflection with spalled aerated concrete from steel reinforcement which are in danger of collapse.





**The Survey: -**

ECFRS Property Services: a Building Surveyor with 26 years' experience in Building Pathology and prior experience in RAAC usage in Schools and structural remediation projects in ECC Educational premises.

The Survey was carried out on 04 and 05 September 2023 in warm and dry conditions. This was limited to being a visual survey to identify the roofing structure and building fabric/construction methodology and to ascertain whether RAAC is present within the following ECFRS assets: -

- 1.Great Baddow Fire Station.
- 2.Leigh-on-Sea Fire Station.
- 3.Witham Fire Station and STC.
- 4.Dovercourt Fire Station.
- 5.Waltham Abbey Fire Station.
- 6.Loughton Fire Station.



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## **Great Baddow Fire Station.**

The roof to all areas of the building accessible were found to be of reinforced cast concrete. No RAAC was detected.



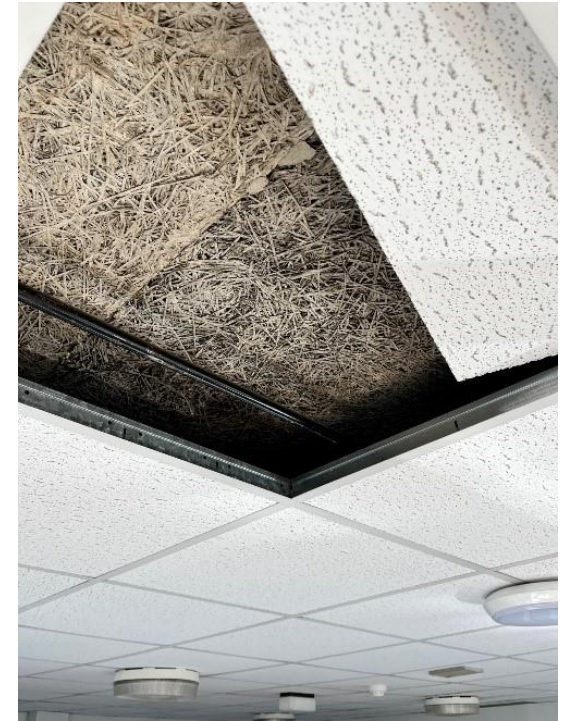


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### **Leigh-on-Sea Fire Station.**

The Main Fire Station roof comprises reinforced cast concrete. The Appliance Bay and 1<sup>st</sup> floor roof is formed of 'Woodwool' slabs on castellated beams. No RAAC was detected.





## **Witham Fire Station and STC.**

The roof to the main Fire Station where accessible for inspection comprises Pre-Cast reinforced Concrete Beams with block infill. The presence of expanded metal lathes and steel beams show that roof strengthening works have already been carried out, this was undertaken circa. 2016 as evidenced by Structural Engineers Reports as prepared by Messrs. Ingleton Wood. The STC roof comprises Woodwool slabs on castellated beams. No RAAC was detected.





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## **Dovercourt Fire Station.**

All areas of ceiling accessible showed the roof is formed on reinforced concrete beams with block infill. Unlike Loughton and Witham Fire Stations there was no evidence of any roof strengthening works, and I would recommend a detailed survey be carried out in early course by a suitably qualified Structural Engineer to check for deflection, loading, bearings and spans. No RAAC was detected.







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### **Waltham Abbey.**

The roof is formed of reinforced cast concrete to all areas accessible for inspection. No RAAC was detected.





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## **Loughton Fire Station.**

The roof to the Fire Station where accessible for inspection comprises Pre-Cast reinforced Concrete Beams with block infill. The presence of expanded metal lathes and steel beams show that roof strengthening works have already been carried out, this was undertaken circa. 2016 as evidenced by Structural Engineers Reports as prepared by Messrs. Ingleton Wood. No RAAC was detected.





The ECFRS property team has used a combination of evidence, as outlined below, to ascertain the roof construction types within our property assets for identification of RAAC. From the evidence, expertise, and knowledge within Property Services, we are pleased to be able to report that no RAAC has been identified at any of our Fire Stations.

1. Historical Annual Condition Survey reports.
2. Construction H&S Files and O&M Manuals.
3. As-built drawings.
4. Asbestos Surveys.
5. Structural Engineer's reports (many were completed prior to PV installations).
6. Historical Asset Protection Project Files.
7. Vast Photographic Library.
8. Visual Inspections of nine Fire Stations, Training Centres and Garages where further clarification was required.

We are currently in the process of obtaining a fee quotation for professional services to undertake a detailed report via Chartered Structural Engineers.

It is important to acknowledge that the evidence and summary findings, whilst positive, do have some limitations. We have not inspected any minor ancillary structures; we have not carried out fully invasive surveys above fixed ceilings and voids; some buildings have been extended, modernised, and refurbished which means they may have four or so different roof types. This is why a full Structural Survey is required to physically inspect every section of the roof and ensure its structural integrity.



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# Car Park



Home Office



Microsoft Excel  
Worksheet



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Chiefs Council