CIVIC




# Marlsbro House

## Existing Structure Capacity Appraisal

**FEBURARY 2026**

PREPARED FOR

**Alco Assets Ltd**

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Existing Structure Capacity Appraisal

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# 1. Introduction

Civic are appointed as Structural Engineers for the refurbishment of Marlsbro House for use as offices (1st- 4th floors) and retail/restaurant at ground floor and basement. This report looks at the loading capacity of the building to accept these uses. More detail on the history and structural form of the building can be found in Civic's Structural Appraisal Report.

# 2. Methodology

The original design loading and the loads to which the structure has been subjected are variable and inconclusive so the main structural elements of the building have been appraised to consider if they have sufficient strength and stiffness to perform under the applied loads. To do this we have relied on testing and investigations including:

- Hutton & Rostron reports (Masonry moisture survey and Timber condition report);
- Cast iron column sizes undertaken by Socotec;
- Robertson Elliot survey drawings.

In general, current Eurocodes have been used for the assessment as these represent the most up-to-date approach available. However, Eurocodes do not adequately deal with cast iron, so the columns have been appraised using the approach recommended in the IStructE appraisal of existing structures. Therefore, the Rankine-Gordon formula has been used from BD21

The building is required to achieve 60minuites fire resistance. Generally, this will be provided by applied finishes to the architect's details. However the ambition is that the underside of the timber floors should be exposed, and so a charring – rate calculation has been carried out to determine whether the timber boards and beams can withstand fire for the required period.

# 3. Design criteria

The following criteria have been used in assessing the structure:

## 3.1. Material Properties

It is not specified in the H+R report whether the beams and millboards are of Special Structure (SS) Grade of C24 or General Structure (GS) Grade of C16. H+R has undertake visual timber strength grading of select floor beams, which concluded that

> *"The rate of growth, knots, slope of grain, fissures, and distortion in the 10 no. accessible truss tie beams and floor beams were within the permissible limits of the upper SS grade. On the balance of probability, the majority of the truss tie beams and floor beams are unlikely to be downgraded or rejected due to knots"*

A conservative assumption of C16 has been taken for both floorboards and millboards.

***Timber Millboards Species & Grade***

- 4th Floor: Spruce, C16
- 3rd to Ground Floor: Scots pine, C16

Based on site observations, the millboards span over two bays between timber beams. The assessment has been undertaken on this basis (double-span continuous).

***Timber Beams Species & Grade***

- 4th Floor: Scots pine, C24 (but 1 sample rejected due to knots, GS)
- 3rd to 1st Floor Scots pine, C24 (all graded beams classed SS)
- Ground Floor Eastern white pine, C24 (all graded beams classed SS)

Based on site observations, the timber beams span continuously over the central column support. The assessment has been undertaken on this basis (double-span continuous).

## 3.2. Loading

***Live load***

- Office (Ground Floor): 3.0kN/m$^2$ + 1kN/m$^2$ for partitions
- Office (L01-L04): 2.5kN/m$^2$ + 1kN/m$^2$ for partitions
- Restaurant / lounge: 2.0kN/m$^2$ + 1kN/m$^2$ for partitions

***Dead load***

- Floor build-up: 0.4kN/m$^2$
- 'Ceiling' & services: 0.15kN/m$^2$

***Deflection***

- Live load: Span/360
- Total load: Span/250

## 4. Findings

The findings of the analysis are presented in the table below and diagrammatically in figure 1.

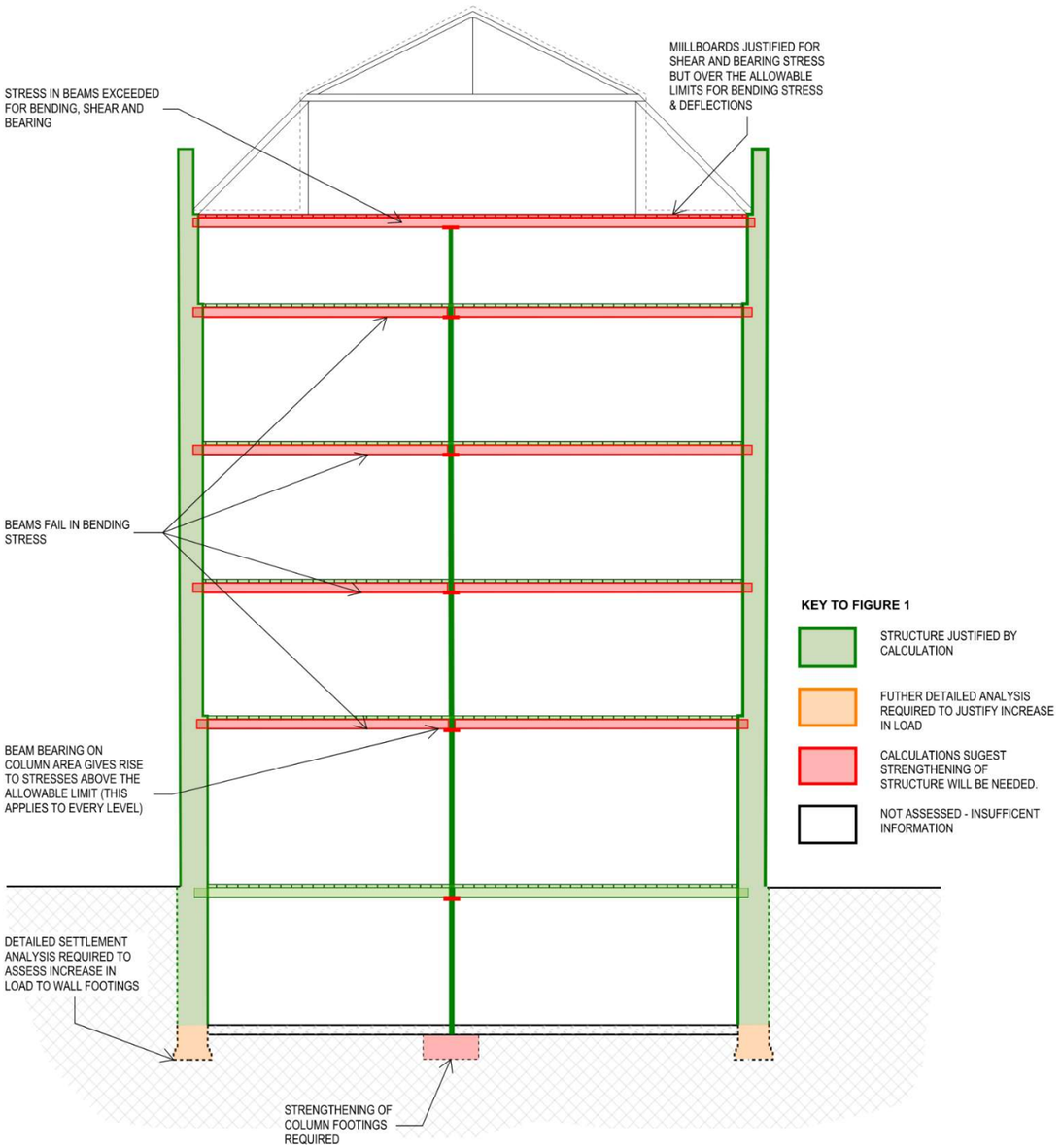



*Figure 1: Summary of findings*

| Element | | Pass? | | Comments |
|---|---|---|---|---|
| | | Normal | Fire | |
| **4th floor millboards** | Bending | FAIL | FAIL* | *In fire condition the wood is entirely burnt |
| | Shear | PASS | | |
| | Bearing | PASS | | |
| | Deflection | FAIL | | |
| **G-3rd floor millboards** | Bending | PASS | FAIL | |
| | Shear | PASS | PASS | |
| | Bearing | PASS | PASS | |
| | Deflection | PASS | N/A | |
| **4th floor beam** | Bending | FAIL | FAIL | |
| | Shear | FAIL | FAIL | |
| | Bearing on wall | PASS | PASS | |
| | Bearing on column | FAIL | FAIL | |
| | Deflection | FAIL | N/A | |
| **3rd floor beams** | Bending | FAIL | PASS | |
| | Shear | PASS | PASS | |
| | Bearing on wall | PASS | PASS | |
| | Bearing on column | FAIL | FAIL | |
| | Deflection | PASS* | N/A | * Pass but with slightly larger than desirable deflections (u/r 1.06) |
| **2nd floor beams** | Bending | FAIL | PASS | |
| | Shear | PASS | PASS | |
| | Bearing on wall | PASS | PASS | |
| | Bearing on column | FAIL | FAIL | |
| | Deflection | PASS* | N/A | * Pass but with slightly larger than desirable deflections (u/r 1.11) |
| **1st floor beams** | Bending | FAIL | PASS | |
| | Shear | PASS | PASS | |
| | Bearing on wall | PASS | PASS | |
| | Bearing on column | FAIL | FAIL | |
| | Deflection | PASS* | N/A | * Pass but with slightly larger than desirable deflections (u/r 1.10) |
| **G floor beams** | Bending | PASS | PASS | |
| | Shear | PASS | PASS | |
| | Bearing on wall | PASS | PASS | |
| | Bearing on column | FAIL | FAIL | |
| | Deflection | PASS | N/A | |
| **Masonry** | Local bearing | PASS | N/A | |
| | Global stress | PASS | N/A | |
| **Columns** | B-G | PASS | N/A | |
| | G-1st | PASS | N/A | |
| | 1st-2nd | PASS | N/A | |
| | 2nd-3rd | PASS | N/A | |
| | 3rd-4th | PASS | N/A | |
| **Foundations** | To columns | FAIL | N/A | |
| | To walls | TBC | N/A | A detailed settlement analysis is to be undertaken to assess additional loads to wall footings |

## 5. Key uncertainties and unknowns

At present, full details of the existing structure are not known and only limited opening up has been undertaken Therefore in the analysis undertaken to date some assumptions have been made which will need ratifying at the next stage. The key points needing further consideration are:

- The building is currently in poor condition with many structural defects. These are described in more detail in Civic's Structural Appraisal report. For the purpose of this analysis the defects have been ignored, assuming that they will be mitigated/repaired as part of the works.
- The detail of how the cast iron columns meet the main timber beams is not yet fully understood. This is a key detail which will affect whether strengthening of the connection will be needed. Based on our best estimate of how this connection works we expect some enhancements to be needed locally.
- The foundation details have been determined from trial pitting within the building, with geotechnical data taken from the external window-sample. The loads down the masonry external walls have increased and a detailed analysis is to be undertaken to understand if the resultant settlements are predicted to be within acceptable limits.
- The bearing of the beams into the walls is not known. We have assumed the beams extent approximately halfway through the wall. This assumption will need to be verified.
- The roof structure is unusual and structurally complex. The full details of its configuration are not known and it has not been appraised at this stage. For the purposes of assessing the 4$^{th}$ floor beams we have ignored any loads the roof may impose on the beam.

## 6. Conclusions

The detailed analysis undertaken using details of the building recently gathered has shown that generally it is able to accept the proposed uses. However some areas of the structure will need a helping hand. The key aspects are likely to be:

- The 4$^{th}$ floor boards, without supplementary support, are far too thin to act properly as a floor for any use.
- The bearing of the timber beams onto the cast iron columns need enhancing.
- The floor beams will need further strengthening if the "special structure" grade cannot be justified.
- The floor beams need further work to justify them for 60 minutes fire resistance.

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