

Low House
Quaker Bottom
Penistone Road
High Flatts

**STRUCTURAL DESIGN STATEMENT
PROPOSED NEW ATTIC (SECOND) FLOOR**

20_031
August 2020

Low House
Quaker Bottom
Penistone Road
High Flatts

STRUCTURAL DESIGN STATEMENT

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1.0 Introduction

- 1.1 Low House, Quaker Bottom, High Flatts is a Grade II listed building, listed under entry 1185010. The property owners are proposing to carry out significant refurbishment works on the property, to carry out essential maintenance and repairs, and to make sympathetic alterations to the property to make the property more comfortable for 21st century living.
- 1.2 As part of significant refurbishment of Low House, Quaker Bottom, High Flatts, it is proposed to extend the habitable accommodation of the dwelling into the existing roof space.
- 1.3 Sawyer Consulting Engineers have carried out a Structural Engineers survey on the property to help investigate the need for structural remedial repair that may be necessary as part of the refurbishment work, and also to help inform the structural design of alterations proposed to the property. Reference should be made to the report prepared by Sawyer Consulting Engineers, ref 20_031 SR_01, first issued 17 August 2020 for further information on the survey.
- 1.4 The Structural Engineers report has highlighted a number of areas requiring intrusive investigation in order to determine the extent of structural remedial repair that may be necessary and to help further inform the structural design of proposed alterations. This design statement and the outline design presented in Appendix A has been prepared ahead of the further intrusive investigations taking place. The intrusive investigations are not anticipated to alter the design approach of the proposed attic space presented in this statement, but will help inform detailed structural design.

2.0 Existing Attic Structure

- 2.1 Reference to the Structural Engineers report prepared by Sawyer Consulting Engineers should be made for detailed description of existing structure and form of construction of Low House.
- 2.2 The existing roof structure at Low House is of traditional construction comprising timber common rafters and timber purlins spanning between load bearing walls and intermediate Queen Post Trusses. The attic 'floor' is set below the ceiling tie members of the Queen Post trusses, and is believed to be completely independent of the roof trusses – comprising small section timber joists spanning between load bearing walls and down stand beams. Further investigation is to be carried out to investigate the existing attic 'floor' in construction in some more detail – however, the initial visual inspections suggest that the existing attic 'floor' was intended only for use to support the ceiling and light access only – not to support modern domestic loading.
- 2.3 There is a need to raise the level of the existing attic 'floor' in order for the new, habitable floor to be level with or raise above the ceiling tie of the main truss members. The ceiling ties of the trusses currently project above the boarded surface of the attic 'floor' and would cause trip hazard and inconvenience in a useable, habitable room.
- 2.4 At the time of our inspections the existing attic 'floor' was covered in insulation material, but local parting of the insulation did suggest that existing deck levels are uneven and out of level.
- 2.5 First floor ceiling supported by the existing attic 'floor' structure do have some evidence of cracks and previously filled/decorated cracks in local areas.

3.0 Proposed Attic Structure – Design Approach

- 3.1 To make the existing roof space into habitable accommodation, a new floor is required throughout the roof space – designed to bring finished floor level just above existing truss ceiling tie member and to carry loadings to suit modern day domestic use.
- 3.2 Existing queen post trusses currently support existing roof loads only. To use the trusses for support of new floor loads, significant remedial strengthening of existing structure would be required – including remedial stiffening of truss members, truss connections, and structure providing support to existing trusses (for example, beams over existing bay windows).
- 3.3 Remedial strengthening of existing roof trusses would be labour intensive, and, importantly, would involve irreversible alteration of existing historic structure.
- 3.4 Accordingly, it is proposed to provide a new floor structure that is completely independent of the existing roof and ceiling structure. Outline design proposals are shown on Sawyer Consulting Engineers drawings 20_031 SK102 and 103 included in Appendix A of this Design Statement. The approach will require minimal intervention to existing structure, and new structure could, if required, be removed at a future date to leave existing historic structure largely unaffected by these proposed alterations.
- 3.5 The proposed structural design of the new attic (second floor) floor construction involves installing new steel channels to each side of the existing truss ceiling tie member, which in turn span between new beams installed to span in a left to right direction between load bearing walls, as described on sketch SK102. Timber joists span between the new channels, and notch into the web of the channel to provide a new floor construction within the depth of the existing truss ceiling tie zone.
- The channels are typically designed to clear span between new support beams without intermediate support from internal walls – this is intended to minimise intervention with structure below attic floor level, and to avoid additional load on openings at ground and first floor levels.
- The channels are offered intermediate support on the ‘right bay’ of the attic – it is necessary to introduce intermediate support in this area in order to provide reduced depth of construction to suit the slightly reduced available structural zone in this location. However, proposals to install a platform access lift in this location do require significant local intervention of existing

structure at ground and first floor levels in any case, and the requirements to provide intermediate support to the new attic floor structure can readily be accommodated as part of these interventions.

- 3.6 The existing ceiling structure is to be investigated further as part of ongoing intrusive investigations. At this stage it should be considered to have limited structural capacity for support of imposed loads, and accordingly allowance for temporary propping of the ceiling structure, spreading of load and necessary protection measures should be made for whilst considering construction of the new floor structure and particularly installation of the new and relatively heavy steel components.
- 3.7 To assist with installation of structural steel members, steel elements may be spliced to help reduce handling lengths and weights. Suggested splice positions have been indicated on sketch SK102, but additional splice positions may be incorporated subject to further discussion with the contractor. Structural designs for beam splices will be provided once positions of splices have been finalised.

4.0 Design Loadings

- 4.1 The outline design presented in Appendix B has been designed for the following loading, and detailed design is proposed to be developed using these design loads:-

DEAD LOADS

Finishes (allowance, 50kg/m ²)	=	0.5 kN/m ²
Structure Self Weight (Floor)	=	0.5 kN/m ²
DEAD LOAD TOTAL	=	1.0 kN/m²

IMPOSED LOADS

Domestic Occupancy	=	1.5 kN/m ²
Partitions	=	1.0 kN/m ²
IMPOSED LOAD TOTAL	=	2.5 kN/m²

Appendix A

Sketches – Outline Designs

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|-----------------|---|
| 20_031_SK102 P1 | Conversion of Attic Space into Habitable Accommodation –
Schematic Structural Detail (1) – Plan |
| 20_031_SK103 P1 | Conversion of Attic Space into Habitable Accommodation –
Schematic Structural Detail (2) - Section |