

**Ivy Lodge
Mirfield, W. Yorks**

Mr & Mrs Hodgeson



**Updated Structural Report
on Gable Wall**

August 2021

Ref: T2360

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Structural & Civil Consultants Ltd
7 South Parade
Northallerton
North Yorkshire
DL7 8SE

1. AUTHORITY AND BRIEF

Authority

- 1.1 Structural & Civil Consultants Ltd was instructed by Adam and Clare Hodgeson, who own the property.

Brief

- 1.2 The brief was set out in an email from Richard Turner, who is advising the owners. Following works to the property, an updated report on the front gable has been requested, as the ongoing works have uncovered additional issues, and previously recommended repairs have not been able to be fully carried out.
- 1.3 The inspections by S&CC concentrated on structural issues that could be readily seen. No trial holes were excavated and no specialist equipment was used to report on elements that were concealed or covered by the fabric of the building. Non-structural issues such as damp were only investigated where they impinged on the structural fabric. S&CC cannot take liability for defects that were not visible.

Personnel

- 1.4 The property was inspected by Iain Thew MEng CEng MStructE.
- 1.5 This report was prepared by Iain Thew MEng CEng MStructE, under supervision of S&CC director and CARE accredited engineer, Robert Thorniley-Walker MA(Oxon) CEng CEnv FICE FStructE CIHT IHBC FRSA.

2. INTRODUCTION

Orientation

- 2.1 The building faced south, with the entrance located in the east wing of the building. The gable wall to be inspected was located in the west wing of the building, which was the oldest part of the building, and noted as C17 or C18 in the Listing.

Historical Significance

- 2.2 The property has a Grade II Listing. The Official Description is as follows:

Detached house. Mainly mid C19 but incorporating evidence of C17 or early C18 timberwork. C18 altered wing to left. Hammer dressed stone. Quoins to wing. Part rendered. Stone slate roof with tall brick gable stacks and moulded stone brackets to gutter. Two storeys. 3-bay main front with large C19 sashes with glazing bars. Central door with 4 panels. Continuous outshot to rear with two, altered, 2-light double chamfered windows.

Interior: Evidence of some early timberwork at rear of house. Two large cambered tie-beams to trusses are evident in upper rooms. Mainly modernised. Joseph Ismay, vicar of Mirfield, used the house as his vicarage from 1740 until his death in 1778. Also used by later vicars.

- 2.3 Although it has not been noted in the listing, there is a carved stone that has been used as a quoin stone in the SW corner of the west wing. The stone is likely much older than C17th date for the west wing, and could be a C12th gravestone (Photograph 1).



Photograph 1. Location of carved stone on SW corner

Engineer's Visits

- 2.4 S&CC visited the house several times during 2020, to provide structural advice on the ongoing construction works. S&CC also visited at the end of June 2021.

3. FINDINGS

- 3.1 The external masonry walls were around 700mm thick. It was assumed that the walls consisted of two leafs of masonry with a rubble core.
- 3.2 During works to the property, a scaffold was installed to the outside of the gable wall. This scaffold allowed a much closer view of the external stonework.



Photograph 2. Area of severely perished stonework

- 3.3 As identified previously, there was considerable bowing to the gable wall, with the worst bowing to the east of the two central windows. A maximum slope outwards of 1:13 was measured to the east of the ground floor bay window externally. The wall bowed out in both the horizontal and vertical plain, with stonework above the eaves then bowing back inwards.
- 3.4 There had been previous historic efforts made to stabilise the gable wall, through the introduction of a large buttress on the east corner of the gable. The extent of the bowing suggests this had not been successful in stopping movement.
- 3.5 The side walls had also bowed outwards, with outwards movement at eaves level, and bowing on the west side wall.
- 3.6 The squared rubble stonework above the first floor window was in very poor condition, with many of the stones almost completely perished (Photographs 2 and 3). This triangular area of masonry had also been built over to raise the level of the roof, and the upper stonework of larger blocks did not align with the lower masonry.
- 3.7 The bowing to the wall also meant that squared rubble masonry above the first floor window was on an incline. Water appears to have been penetrating the outer leaf of the masonry through old doveholes and failed stones (Photograph 3),

accelerating decay of the stones.



Photograph 3. Close-up of perished stones around doveholes

- 3.8 The relatively recent ribbon pointing in a cement mortar also appears to have accelerated the decay to the stones. Damage to the older squared rubble masonry was even more significant than initially anticipated.
- 3.9 S&CC understand that the poor condition of the stonework, along with the bowing in the wall had made installation of the recommended sock anchor into the front gable impractical at eaves level.

4. DISCUSSION

Bowing Walls

- 4.1 As discussed in the previous report, there are a number of factors that could be contributing to the significant bowing in the gable and west side walls:
- a) The lack of ties between the roof rafters causes significant horizontal thrust at the eaves level, which causes eaves spread. The bowing west side wall has now been buttressed with the addition of masonry extension walls to the west side.
 - b) The insertion of larger windows in the gable wall, which weakened the gable wall at the centre.
 - c) Discontinuities in the masonry walls, where previous openings have been filled in.
 - d) Possible differential settlement between the gable foundations and the side walls.
 - e) High external ground levels causing horizontal forces to be applied to the external walls at the base.
 - f) The construction of additional stonework above the original gable to raise the roof level, which has added further dead weight to the wall, and due to the bowing outwards is eccentrically loading the top of the wall.
- 4.2 The very poor condition of the masonry above the first floor window will necessitate the reconstruction of a significant portion of the gable wall.
- 4.3 The significant bowing to the gable wall means that the area above the first floor window to be reconstructed is well outside the line of the wall below, creating an instability in the wall. If this area was reconstructed in isolation, it would put the gable wall at risk of continued movement, and ultimately collapse.
- 4.4 Reconstructing areas of the gable wall will be extremely difficult without a wider reconstruction of the entire gable wall.

Historical Significance

- 4.5 The west wing gable is the part of oldest section of the house. Previous historic changes, including the insertion of the larger windows through the squared rubble walls, and the raising of the wall level, have significantly weakened the wall.
- 4.6 There is an anomaly in the Listing. Although Ivy Lodge is noted as C17th or C18th in date, a stone used as a quoin and embedded in SW corner of the wall appears to be much older, perhaps C12th. Particular care will be needed to ensure this stone is not damaged in the rebuilding.

5. CONCLUSIONS AND RECOMMENDATIONS

- 5.1 The gable wall is in a poor condition, and significant areas of the wall require rebuilding.
- 5.2 There is no obvious safe method to carry out the significant localised rebuilding required without building in defects that will put the gable wall at risk of continued movement into the future.
- 5.3 It is recommended that the gable wall is carefully taken down, and rebuilt. There are several different options for the rebuild that should be explored:
- a) Option 1: Carefully take down the gable wall, leaving the quoins in place, and rebuild with them left insitu. The corners of the gable wall are considerably straighter than the central portion of the wall, however they are not perfectly plumb, so care would need to be taken by the mason, to work with the existing construction lines. Bed-joint reinforcement could be built into the courses, to strengthen areas of wall that are not perfectly plumb.
 - b) Option 2: Carefully take down the gable wall, including the quoins, rebuild the corners straight, and then rebuild the gable. If this option is taken, the original quoins should be saved and reused.



Photograph 4. Close-up of carved quoin at SW corner

- 5.4 As discussed in paragraph 4.6, whichever option is taken; particular care should be taken with the carved quoin on the SW corner, so that it is preserved and replaced in its original position. A mason experienced in working with historic fabric should carry out the conservation of this stone.
- 5.5 Once the gable wall has been taken down, the foundations should be investigated to check they are in good condition, and suitable for the new wall.
- 5.6 Both options will require the internal floors and roof to be temporarily propped, and

the roof to be stripped back, to allow deconstruction of the gable wall.

- 5.7 S&CC would recommend that the new wall is rebuilt as a cavity wall, with an inner leaf of blockwork. Laying the inner leaf of blocks flat would provide a greater width of wall, to match the existing side wall widths.
- 5.8 The outer leaf should be constructed in a stone to match the property. Most of the lower squared rubble stone is perished, but the upper stones that were used to raise the wall level could be reused. The existing stone lintels, sills and jambs should also be reused.
