
Alan Wood & Partners

**FEBRUARY 2021**

# STRUCTURAL REPORT ON MORTIMER'S WAREHOUSE, RIVER HEAD, DRIFFIELD, YO25 6BA

**PROJECT NO.**
**MGC/SJH/HW/45057-Rp001**

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# STRUCTURAL REPORT ON MORTIMERS WAREHOUSE, RIVER HEAD, DRIFFIELD, YO25 6BA

Prepared by: S Hearst, BSc (Hons) MCIOB

Signed: ……

Date: 26th February 2021

Approved by: M Coates, BSc, MRICS, C.Build E, MCABE
Director

Signed: ……

Date: 26th February 2021

| Issue | Revision | Revised by | Approved by | Revised Date |
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For the avoidance of doubt, the parties confirm that these conditions of engagement shall not and the parties do not intend that these conditions of engagement shall confer on any party any rights to enforce any term of this Agreement pursuant of the Contracts (Rights of third Parties) Act 1999.

The Appointment of Alan Wood & Partners shall be governed by and construed in all respects in accordance with the laws of England & Wales and each party submits to the exclusive jurisdiction of the Courts of England & Wales.

## CONTENTS

## 1.0 INTRODUCTION

1.1 Details

**Client** This report has been prepared at the request of Ms Jayne Briggs, in consequence of the structural condition of the property prior to proposed renovations.

**Property** Mortimer's Warehouse
River Head
Driffield
YO25 6BA


**Weather** Initially bright and clear, cloud and snow showers, -2°C

1.2 This report is intended to record the general condition of the building and to make any recommendations for remedial works which we consider necessary.

## 2.0 BACKGROUND

**Location Plan**


2.1 This large three storey semi-detached warehouse property is situated on eastern side of River Head and is thought to have been constructed between the late eighteenth and early nineteenth centuries.

2.2 The property Grade II listed and is described in the listing as follows: -

"*Warehouse. Late C18/early C19. Brick, timber, pan tiled roof. Rectangular plan. 3 storey's, 6 bays 2:1:3. Carriage entrance under segmental arch, partly infilled in later C19, with double boarded door. All other openings have square pivoted boarded shutters under segmental arches. Paired eaves brackets, plain close verges. Painted panel between first and second floors extending from second to sixth bay: 'Mortimer's Warehouse'".*

2.3 No detailed information is available for the foundations, but it is anticipated they comprise stepped brick footings laid directly on the natural sub-soils.

2.4 The sub-soils beneath the property are not known precisely but from records obtained from the British Geological Society of the local area, they appear to consist of made ground, firm light brown silty sandy clay and gravel, soft to firm brown very silty very sandy clay, firm brown silty sandy gravelly clay with occasional cobbles, over structureless chalk composed of light brown and cream silty sandy clay with occasional angular flint.

## 3.0 INSPECTION

### General

3.1 An inspection of the building was made on 10th February 2021 covering both external and internal aspects and a detailed record was made of the state of the building. This, together with photographs, is being retained on the file for the property.

### External

Front Elevation (West)

3.2 Our inspection noted some slight cracking below the right hand ground floor window to the mortar joints and brickwork of approximately 2.5mm at sill to 0mm sixteen courses below, none of which appears to be recent. See Photograph No. 1.

3.3 Between the arched head of the right hand ground floor window opening and sill of the first floor window we noted some slight generally vertical cracking to the mortar joints of approximately 2.5 – 5mm in width, which does not appear to have occurred recently. See Photograph No. 2.

3.4 Between the arched head of the first floor right hand window and the sill of the second floor window, we noted some slight generally vertical cracking to the mortar joints of approximately 3 – 10mm, which does not seem to be recent, plus some sections of the perpendicular mortar joints have fallen out at some point in the past. See Photograph No. 3.

3.5 We noted some slight generally vertical cracking to the mortar joints between the first floor arched window head, which is second from the left and the window sill above of approximately between 2-6mm, none of which appears to be of recent origin. See Photograph No 4.

3.6 The outer face of the elevation was measured with a spirit level at ground level and found to be generally plumb at the time of inspection.

Right Hand Elevation (South)

3.7 There is an apparent slight outward lean of the wall to the south. When measured for plumb, there is an apparent lean of 25mm in a 1200mm long spirit level from the base at ground level. The wall is approximately 10917mm high, therefore when extrapolated to the full height of the wall it is assumed that the top of the wall is approximately 225mm off being vertical, assuming the same line is followed.

3.8 Given the apparent slight lean of the wall, we feel that it is stable. As CIRIA Report 111 – Figure 12 (a), a copy of which is in Appendix B, the lean of the wall should not exceed 0.85 x thickness of the wall, which is approximately 500mm thick at ground level, and 400mm thick at first floor and above. Therefore, the allowable lean before the wall becomes unstable is 500mm x 0.85 = 425mm, or 400 x 0.85 = 340. As previously measured, the wall is approximately 225mm out of plumb and does not exceed the allowable lean and can be considered to be stable at the time of inspection.

3.9 At the time of inspection we did not note any significant defects to the area.

Rear Elevation (East)

3.10 We undertook a limited inspection of this elevation, as it was viewed from the other side of the river bank, as the river abuts the buildings elevation. We did not note any significant defects or structural distortions to the area at the time of inspection.

Roof External

3.11 Whilst undertaking the inspection there was a layer of snow fall on the roof which may have impeded our view of any defects that may be present. The ridge line appears to be straight and level. As viewed from a distance no cracked, broken, loose or missing tiles could be detected. The mortar pointing to the verges appears to be in reasonable condition. The gutters and fallpipes appeared to be in reasonable condition, although no specific inspection has been made of these items as they are deemed to be non-structural. We noted that there is a build-up of vegetation in the gutter on the rear elevation. It is understood from the Client's representative that the roof covering was renewed approximately 6-7 years ago. See Photograph No's. 5 – 8.

**Internal**

Southern Third, Ground to Second Floor

3.12 This section of the building comprises ground floor to second floor is filled with galvanised profile metal sheeting and framing and is believed to have formed part of the mill workings. At the time of inspection we did not note any significant defects to the area. See Photograph No's. 9 – 13.

3.13 There is a pit in the floor adjacent to the right hand elevation door opening which appears to be in reasonable condition. See Photograph No. 14.

Ground Floor

3.14 During the inspection we noted that the wall to the left of the double doors to the east (river) elevation had a slight outward lean. When measured for plumb, there is an apparent lean of 25mm in a 1200mm long spirit level from the base at floor level. The wall is approximately 2200mm high, therefore when extrapolated to the full height of the wall it is assumed that the top of the wall is approximately 46mm off being vertical, assuming the same line is followed.

3.15 Given the apparent slight lean of the wall, we feel that it is stable. As CIRIA Report 111 – Figure 12 (a), a copy of which is in Appendix B, the lean of the wall should not exceed 0.85 x thickness of the wall, which is approximately 500mm thick. Therefore, the allowable lean before the wall becomes unstable is 500mm x 0.85 = 425mm. As previously measured, the wall is approximately 46mm out of plumb and does not exceed the allowable lean and can be considered to be stable at the time of inspection.

3.16 The timber beam which supports the first floor which is adjacent to the north end of the building appears to have been replaced at some time in the past, as the timber does not have a surface coating like the assumed original timbers, and appears in good order. See Photograph No's. 15 & 16.

3.17 The suspended timber floorboards appear to have been replaced some time in the past. A small section of the under floor void could be seen, which revealed there to be modern blockwork sleeper walls, plus some of the floor joists have been replaced with modern treated timber joints. See Photograph No's. 17 – 20.

First Floor

3.18 Our inspection noted some fine cracking to the right of the window on the front elevation adjacent to the top of the staircase of approximately 2-3mm in width, which does not appear to be recent. See Photograph No. 21.

3.19 On the front elevation we noted some slight cracking and dropping of the brick arch above the window which is second from the north (left) elevation, the cracking is approximately 2-3mm in width, whilst the arch appears to have dropped around 20mm, none of which appears to be of recent origin. See Photograph No's. 22 & 23.

3.20 Above the window on the front elevation adjacent to the corner with the north elevation we noted some slight cracking to the mortar joints of approximately 3-5mm in width, which does not appear to be of recent origin. See Photograph No. 24.

3.21 When measured with a spirit level, both the front and left hand (north) external walls appeared to be generally plumb and vertical.

3.22 The inspection we noted that the wall to the left of the double doors to the east (river) elevation had a slight outward lean. When measured for plumb, there is an apparent lean of 60mm in a 1200mm long spirit level from the base at floor level. The wall is approximately 2200mm high, therefore when extrapolated to the full height of the wall it is assumed that the top of the wall is approximately 110mm off being vertical, assuming the same line is followed.

3.23 Given the apparent slight lean of the wall, we feel that it is stable. As CIRIA Report 111 – Figure 12 (a), a copy of which is in Appendix B, the lean of the wall should not exceed 0.85 x thickness of the wall, which is approximately 400mm thick. Therefore, the allowable lean before the wall becomes unstable is 400mm x 0.85 = 340mm. As previously measured, the wall is approximately 110mm out of plumb and does not exceed the allowable lean and can be considered to be stable at the time of inspection.

3.24 We noted that some of the original second floor joist have cracked, however, additional timbers have been bolted in place to provide support. See Photograph No. 25.

Second Floor

3.25 When measured with a spirit level, the front external wall appeared to be generally plumb and vertical.

3.26 On the front elevation above the left of the second window from the north elevation we noted some slight cracking of approximately 1-5mm in width which does not appear to be recent. See Photograph No. 26.

3.27 Above the left of the window on the front elevation adjacent to the north elevation we noted some slight cracking to the mortar joints of approximately 2-5mm in width, none of which appears to be recent. See Photograph No. 27.

3.28 During the inspection we noted that the north elevation wall had a slight outward lean. When measured for plumb, there is an apparent lean of 25mm in a 1200mm long spirit level from the base at floor level. The wall is approximately 5325mm high, therefore when extrapolated to the full height of the wall it is assumed that the top of the wall is approximately 111mm off being vertical, assuming the same line is followed.

3.29 Given the apparent slight lean of the wall, we feel that it is stable. As CIRIA Report 111 – Figure 12 (a), a copy of which is in Appendix B, the lean of the wall should not exceed 0.85 x thickness of the wall, which is approximately 400mm thick. Therefore, the allowable lean before the wall becomes unstable is 400mm x 0.85 = 430mm. As previously measured, the wall is approximately 111mm out of plumb and does not exceed the allowable lean and can be considered to be stable at the time of inspection.

3.30 During the inspection we noted that the north elevation wall had a slight inward lean. When measured for plumb, there is an apparent lean of 40mm in a 1200mm long spirit level from the base at wallplate level. The wall is approximately 2250mm high, therefore when extrapolated to the full height of the wall it is assumed that the top of the wall is approximately 75mm off being vertical, assuming the same line is followed.

3.31 Given the apparent slight lean of the wall, we feel that it is stable. As CIRIA Report 111 – Figure 12 (a), a copy of which is in Appendix B, the lean of the wall should not exceed 0.85 x thickness of the wall, which is approximately 400mm thick. Therefore, the allowable lean before the wall becomes unstable is 400mm x 0.85 = 430mm. As previously measured, the wall is approximately 75mm out of plumb and does not exceed the allowable lean and can be considered to be stable at the time of inspection.

Roof Internal

3.32 The accessible sections of the roof space was inspected and no signs of serious movement could be detected in the roof timbers, which appeared to be in reasonable condition given their age. It was also noted that it appears the rafters have been renewed in modern saw cut treated timbers and have been packed of the original purlins. See photographs No's. 28 – 35.

Floors

3.33 The suspended timber floors throughout the property were seen to have some slight slopes, all of which appear to be consistent with long term historic settlement.

## 4.0 CONCLUSIONS

4.1 We are of the opinion, as a result of our inspection, that the cracking noted to the building is as a result of long term historic settlement.

4.2 We do not believe that the building is structurally unstable due to any of the movement which has taken place and we believe that the situation has stabilised, although it must be pointed out that we cannot guarantee that future movement will not occur.

4.3 Therefore, as a result of our inspection, we believe that the existing elements of the property can be refurbished and renovated for the proposed use without the need for significant structural demolition, alteration, rebuilding or underpinning, but that generally and overall, the existing structure is anticipated to be structurally adequate when viewed in light of the proposals.

## 5.0 RECOMMENDATIONS

5.1 As there are no major structural defects evident, with no apparent signs of significant wall or foundation movement, we consider that the property appears to be in structurally stable condition at this time of our inspection.

5.2 On the above basis, our recommendations are for repairs and maintenance.

5.3 Externally and internally as necessary, all cracked and severely weathered mortar joints should be raked out to a minimum depth of 30mm and be repointed with a lime mortar, which will give some degree of flexibility and match the original materials used when constructed. Any cracked, broken or severely weathered bricks should be cut out and new units, of a similar pattern and material, be built in using a mortar similar to that as used in the repointing. When work is carried out adjacent to the damp proof course, great care should be taken to ensure that no damage is done to it or that no mortar bridges across it. All broken or severely weathered bricks below the damp proof course should be cut out and be replaced with a good dense matching brick built in cement mortar and the work is to be carried out in short lengths, so that the stability of the brickwork above is not impaired.

5.4 To the front elevation where the vertical cracking is present install stainless steel helical tie bars within the mortar bed joints bedded in resin and spaced as per the manufacturer's instructions, allowing a minimum length of 500mm each side of the cracking and repoint with lime mortar to match the existing.

5.5 As required clear all gutters and fallpipes, ensuring these are free flowing on completion.

5.6 As part of any conversion works, we would recommend that any new significant structural element added to the building are supported from ground level on columns and beams and not fixed into the existing exterior walls i.e. all new loadings should be transferred back to ground level. Also any alterations to the roof loading, existing load patterns or general arrangement as part of any renovation works should be fully considered and designed appropriately to maintain (as a minimum) existing form of restraint and prevent overloading or concentrating load on foundations.

5.7 Please note that alterations and improvement works may lead to additional structural strengthening not within the scope of this report.

## 6.0 LIMITATIONS

6.1 Our inspection and report are concerned with the structural aspects of the building, such as foundations, walls, floors and roof but we have not concerned ourselves with details of other elements such as doors, windows and other fittings. Similarly we have not commented on dampness or timber infestation or services such as electricity, plumbing, heating or drainage.

6.2 We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

6.3 No comment is made in the report as to the presence of new or old mine workings or tunnelling, heavy metals, chemical, biological, electromagnetic or radioactive contamination or pollution, or radon methane or other gases, underground services or structures, springs and water courses, sink holes or the like, noise or vibratory pollution, mould, asbestos and asbestos products.

6.4 Similarly, we make no comment on flood risk or previous flood events, invasive species of vegetation such as Japanese Knotweed, vermin or protected species, boundary conditions or materials, landscaping or any non-permanent structure.

6.5 The space under the ground floor has not thoroughly been examined and therefore we cannot give any opinion on the condition of materials under the floor which could not be seen.

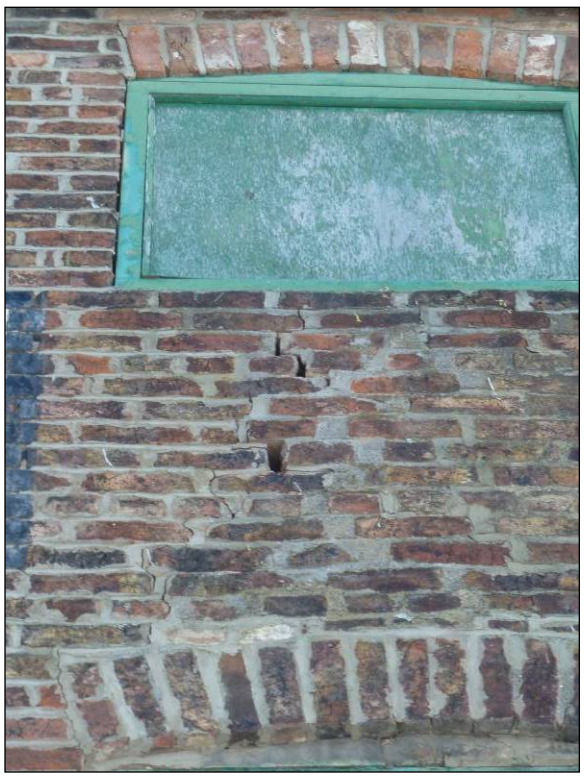
6.6 For the avoidance of doubt, the Contracts (Rights of Third Parties) Act 1999 shall not apply to this contract.

# APPENDIX A

## Photographs

**Photograph No. 1**

**Photograph No. 2**



**Photograph No. 3**

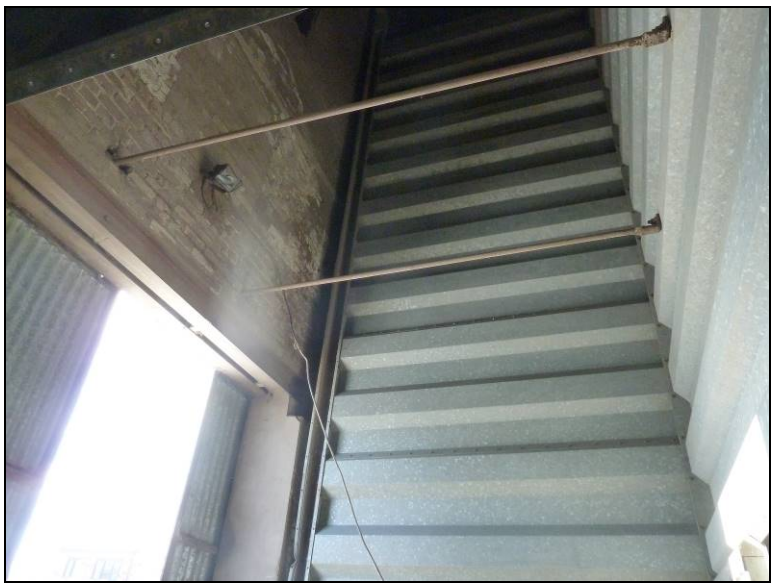

**Photograph No. 4**


**Photograph No. 5**


**Photograph No. 6**

**Photograph No. 7**

**Photograph No. 8**



**Photograph No. 9**

**Photograph No. 10**

**Photograph No. 11**

**Photograph No. 12**

**Photograph No. 13**

**Photograph No. 14**


**Photograph No. 15**

**Photograph No. 16**

**Photograph No. 17**

**Photograph No. 18**

**Photograph No. 19**

**Photograph No. 20**

**Photograph No. 21**

**Photograph No. 22**

**Photograph No. 23**

**Photograph No. 24**

**Photograph No. 25**

**Photograph No. 26**

**Photograph No. 27**

**Photograph No. 28**

**Photograph No. 29**

**Photograph No. 30**

**Photograph No. 31**

**Photograph No. 32**

**Photograph No. 33**

**Photograph No. 34**

**Photograph No. 35**

# APPENDIX B

## CIRIA Report 111 – Figure 12

The principal cause of in-plane deformation of walls is foundation settlement, most commonly arising from inadequate original sizing, or from moisture changes in the soil, or, occasionally, as a result of altered patterns of loading. Ground heave can also be a problem, where, say, mature trees and their roots are removed from a clay subsoil which slowly expands (and softens) as its moisture content increases.

Such movements result in characteristic crack patterns (Figure 13) which may vary in size across a wall surface. Indeed, it is often these crack patterns which provide the clue to the origin of the movement. However, settlement cracking should not be confused with cracking resulting from shrinkage (particularly of sand-lime bricks in more modern buildings).

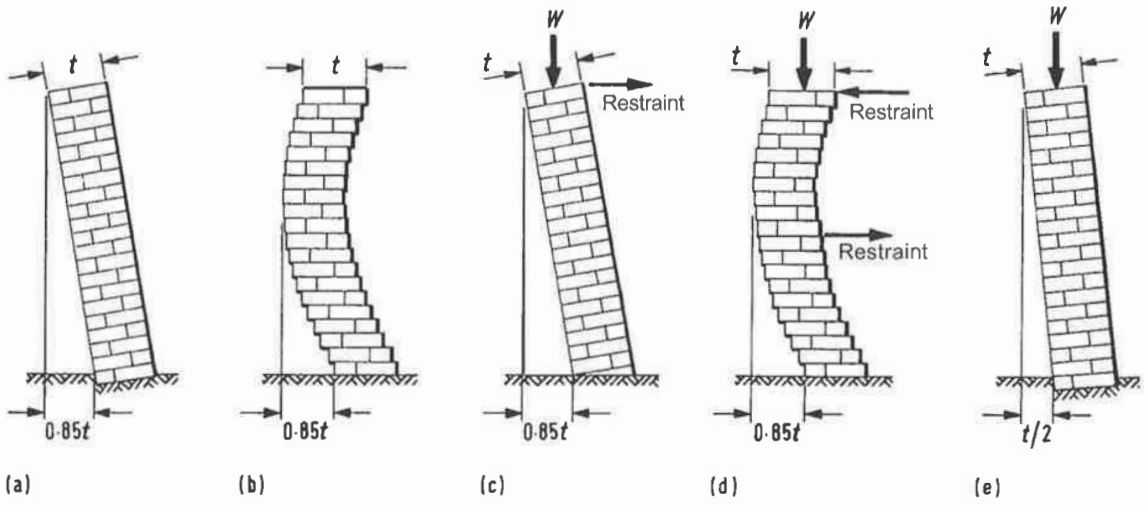



**Figure 12** *Stability of free-standing and restrained walls*


**Figure 13**
***Cracking caused by foundation movement***

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