Intelligent Solutions
for Working at height.



2025 inspection report

Asset:	40m redundant brick boiler chimney
Client:	Zenith Management Ltd
Site:	Murrays Mill - Manchester
Job No:	10872
Inspector:	John Breen
Date:	27.01.2024

Rigg-Tech Ltd, Unit E3 Springfield Industrial Estate Failsworth, Manchester, M35 0GA.
Tel: +44 (0)161 684 7800, Email: info@rigg-tech.com, Web: www.rigg-tech.com

Zenith Management Ltd
NQ Building
47 Bengal Street
Manchester
M4 6BB

11.02.2025

For the attention of Serena Montisci

MURRAY'S MILL, 40m BRICK CHIMNEY – 2025 INSPECTION REPORT.

We are pleased to confirm that the above inspection is now complete and we attach herewith our report, with photographs, for your records and consideration.

We trust all the attached is self-explanatory and sufficient for your needs at this time, however, if you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully,
For and on behalf of
Rigg Tech Ltd

NIGEL MATTHEWS
Technical Director.

Encs: Report
Lightning conductor test certificate
Inspection drawing
Photographs

11.02.2025

Zenith Management Ltd
NQ Building
Bengal Street
Manchester
M4 6BB

MURRAY'S MILL, 40m BRICK CHIMNEY – 2025 INSPECTION REPORT.

1. INTRODUCTION.

In line with your Purchase Order 59683 dated 10th January 2025 a visual inspection was undertaken to the external fabric of the redundant 40m brick chimney located at your Murray's Mill site in Manchester.

The scope of the inspection was to conduct a laddered/rope access visual inspection of all external features throughout the height of the chimney. In addition, the lightning conductor system was electrically tested in accordance with BSEN 62305.

Access to the chimney summit was gained by installing temporary steeplejack ladders throughout its N.W. elevation. Ladders were installed in compliance with ATLAS code; Safe use of ladders in the specialist access industry. Rope access carried out to the South elevation was done in compliance with BSEN ISO 22846.

No inspection was carried out to the chimney interior.

The following report is compiled based on the requirement of BSEN 13084-9: 2022.

Throughout this report all height references were taken Above Ground Level (AGL), with ground level being classed as +0.0m.

2 CONTENTS

1. INTRODUCTION. 2
2 CONTENTS 3
3. POINTS OF REFERENCE. 4
4. REMEDIAL HISTORY 4
5. COPYRIGHT AND LIMITATIONS. 5
6. STRUCTURAL DESCRIPTION. 6
7. REPORT. 7
7.1 Brick barrel. 7
7.2 Post-tensioning bands. 7
7.3 Cornice. 8
7.4 Terminating capping. 8
8. CONCLUSION. 9
9. RECOMMENDATIONS. 10
10. LIGHTNING CONDUCTOR TEST CERTIFICATE 11
11. 2025 INSPECTION DRAWING 112
12. PHOTOGRAPHS 113-26

3. POINTS OF REFERENCE.

The following documents were used during the compilation of this report.

- Cotton Mills of Greater Manchester.
- Manchester City Council, planning and highways committee, listed building conservation consent 1058567/LO/2015/N2, July 2015.
- BSEN 13084-9: 2022; Free-standing chimney, Lifetime management.
- BSEN 62305-1: 2011; Protection against lightning, general principals.
- Delta International; 2012 inspection report.

4. REMEDIAL HISTORY.

Due to the age of the chimney, formal knowledge as to its remedial history is unknown. However, from the visible features present throughout the chimney exterior, the following timeline is assumed to apply to relatively recent remediation:

1798-1802	Chimney constructed.
1950 (circa)	Installation of the current hanger band to the sandstone cornice.
1988	Historic England grade II* listed status.
1990 (circa)	Installation of post tensioning bands to the central region of the chimney. Installation of internal tie rods and external pattress plates to the head section of the chimney. Reconstruction of the head section of the chimney. Installation of lead capping to the chimney summit.
2003	Site compulsory purchase ordered by the Northwest Regional Development Agency.
2008	Initial redevelopment of the site halted due to the global financial crash.
2016	Major refurbishment of the chimney including the following: Installation of a roof covering the chimney summit. Installation of additional steel post-tensioning bands Re-pointing of external brickwork Extensive brickwork replacement Helifix crack stitching Replacement of the lightning conductor system

5. COPYRIGHT AND LIMITATIONS.

This document has been prepared by Rigg Tech Limited for the titled project (or named part thereof) and should not be relied upon or used for any other project without prior written authorization being obtained from Rigg Tech Limited. Rigg Tech Limited accepts no responsibility or liability for the consequences of the use of this document, wholly or in part, for any other purpose than that for which it was commissioned. Any persons so using or relying upon this document for such other purpose do so at their own risk.

This report was prepared for the sole use of the Client named above, and shall not be relied upon or transferred to any other party without the express written authorisation of Rigg Tech Limited.
The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources.

The findings and opinions presented in this report are relevant to the dates when the assessment was undertaken, but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, Rigg Tech Limited reserves the right to modify the opinions expressed in this report. Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by Rigg Tech Limited for the effects of any future changes to such guidelines and legislation.

The limitations of liability of Rigg Tech Limited for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

6. STRUCTURAL DESCRIPTION.

Murrays' Mills is the world's earliest surviving urban steam powered cotton spinning factory. The 13,000 square metre complex was begun in 1797 and by 1805 had become the largest factory in the world. The buildings remained in textile production until the late 1950s from which time they declined into dereliction.

As part of the Manchester City Council planning consent, the chimney stack was repaired and restored as part of the works to avoid long term maintenance issues. This work being conducted in 2016 as part of the overall Murrays Mill redevelopment.

Standing 40m tall, the chimney comprises of an octagonal cross section with a tapered vertical profile. This shape is typical for most brick chimneys built prior to 1820. The base of the chimney adopts a base dimension of 4.58m A/F which reduces to 3.63m A/F at its summit.

A series of 19x 150x5mm flat carbon steel bands post tension the lower 25.0m of the chimney to resist crack development. Circumferentially, each band segment is joined to its neighbour via a single M20 threaded rod.

The chimney is constructed from clay brick laid using an English garden wall bond set in lime mortar. A Staffordshire blue brick stringcourse is located around the +34.6m level of the barrel. By design, the summit of the chimney incorporates a clay brick oversail with a sandstone cornice.

A recently reconstructed 0.85m tall Staffordshire blue brick head section terminates the chimney. This is currently capped with a polymeric membrane. The substructure of the capping is unknown at this time.

Lightning protection is given to the chimney via 2x PVC coated copper conductors which sequentially bond the terminating hanger band.

7. REPORT.

7.1 Brick barrel.

The brick barrel received extensive internal and external repair during the 2016 refurbishment works. As a result, the material condition of the masonry typically remains in a good serviceable state. Localised spalling was found within several bricks located within the lower 3.6m of the chimney. Although this is of no immediate consequence to the durability of the masonry, this does pose a hazard to pedestrian traffic at the base of the chimney and therefore should be repaired at the earliest opportunity.

Throughout the height of the chimney, heavily deteriorated corner bricks have been cut out and replaced with new squinted facing brick. All new brickwork remains in good order. No evidence of historic or new crack development is present throughout the chimney exterior. During the 2016 works, Helifix reinforcement was added to the brickwork which indicates vertical cracking has been present. However, repointing of the masonry has since hidden all traces of this.

As part of the above, the exterior of the chimney was totally repointed using lime-based mortar. The material condition of the pointing remains in a good serviceable condition. However, localised joints remain open where the original pointing was ground out and never reinstated. This is captured within images 6-12 which accompany this report.

The 0.85m tall octagonal head section has been reconstructed in recent years using Staffordshire blue brick. The material condition of the brickwork remains in good order with no visible deterioration or movement.

7.2 Post-tensioning bands.

In recent years post-tensioning bands have been added to the chimney over 3x separate phases. Naturally, the head section and external perimeter of the cornice has been restrained by carbon steel hanger bands. The hangers are 'L' shaped brackets welded to the band section to prevent potential vertical slippage.

By inspection, the uppermost band located around the perimeter of the head section if fabricated in 8x segments with each segment fabricated from 150x6 flat carbon steel plate. Each segment is connected to its neighbour using 3xM16 bolts. It would appear that the band was cleaned and painted during the 2016 works. The durability of the coating is starting to deplete enabling minor rust development on unprotected surfaces.

The 150x12 carbon steel hanger band located around the sandstone cornice was found to be in a poor structural condition with severe section loss reducing its wall thickness from its original 12mm to 2mm (83% loss). Lateral pressure from expansive blistering corrosion to the rear of the band has caused outward displacement imposing additional tensile stress. This is evidenced by bending deformation of the lug connections and associated 2-M20 bolts. By inspection, this band appears to be quite old and it is assumed to have been installed circa 1950s. Due to the heavy material decay and deformation within the band, it is apparent that its serviceability is compromised to the extent that its structurally unstable and needs urgent replacement.

Throughout the lower half of the chimney, a vertical array of 150x4 flat plate bands have been installed over 2x phases. Prior to 2016, 12x bands were installed between +9.8m and +22.4m AGL. During the 2016 works 5x additional bands were installed between +2.5m and +8.6m, along with 2x bands installed between +23.6m and +25.0m AGL.

Design of these bands is somewhat unconventional primarily due to their underspecified cross sectional area. CICIND model codes specifies a band cross section of 75mm deep x 10mm thick which gives a cross-sectional area of 750mm^2. The current 150x4 bands adopt a cross-sectional area of 600mm^2. However, due to bolt connection tubes located at the ends of each band segment, the 2016 bands have been notched to enable fitting of the nuts. This 50mm notch reducing the effective cross section area to 400mm^2.

The M20 threaded rods used to tension the bands typically remain in a relatively stable condition. No concerning areas were detected within the sherardised 2016 rods although light surface corrosion is present throughout the rods installed pre-2016. No notable sectional losses were observed within any of the lower 19x bands.

7.3 Cornice.

The cornice located +39.15m AGL comprises of 2x layers sandstone blocks with a composite thickness of 0.35m. Each layer comprises of 16x blocks. As stated earlier, compressive restraint is given to the external edge of the cornice via a post tensioning band.

The material condition of the top layer of blocks remains in a stable condition throughout the Northerly elevation of the chimney although conversely, the South side is heavily spalled and cracked.

Vegetation growth is present within mortar joints along with a bush growing within the N.W. elevation.

7.4 Terminating capping.

In 2016, the top of the chimney was blanked off to protect the chimney interior against rainwater ingress. The material condition of the polymeric membrane remains in a good condition with no visible defects. The form and material condition of the underlying capping structure is unknown at this time.

It is usual in capping design to allow for natural ventilation, especially for a chimney which has been left open to the elements for a significant period of time. This capping has no provision for ventilation which could accelerate deterioration of the inaccessible substructure elements. In addition, ventilation also needs to be installed to the base of the chimney to enable air flow within the chimney interior.

8. CONCLUSION.

Due to extensive remedial works having been conducted to the chimney in 2016, its overall material condition largely remains stable. Apart from several spalled areas of exfoliated brick located within the lower 3.6m of the chimney, the remainder of the brickwork remains stable and fully serviceable. Similarly, the lime pointing applied throughout the entire surface area of the chimney remains stable. Throughout the chimney, localised areas of open joints are present. These areas are where the joints were ground out and missed during the 2016 pointing works. This defect is purely due to workmanship and should not be misconstrued as failure of the pointing itself.

Heavy deterioration to the cornice post tensioning band located +39.0m AGL renders it structurally unstable and, as a result, requires urgent replacement before its pending failure. Although replacement of these bands is straight forward, execution of the works is aggravated by heavy spalling within the cornice sandstone blocks. This needs to be considered when embarking on the remedial works. On completion of the band replacement, all loose and friable sandstone should be removed along with all vegetation growth and the affected sandstone reprofiled and pointed using a suitable hydraulic lime-based mortar.

The array of 19x post tensioning bands located throughout the lower 25m of the chimney are under-designed, with site modifications to the 7x bands installed during the 2016 works being particularly affected. From the geometry of the bands, it is evident that they have been designed by an organisation with no experience in industrial chimney design/maintenance.

In accordance with BSEN 62305, all steelwork (bands) should be sequentially bonded to the lightning conductor. No bonding is present between the bands and the lightning conductor.

Currently no cracks are present within the banded portion of the chimney, although the necessity to install masonry reinforcement in 2016 indicates that cracking has been a problem leading up to this time. Repointing of the chimney has hidden all evidence of crack formations.

The capping arrangement to the top of the chimney remains in a good stable condition. However, unconventionally, the installation of the capping fails to make allowance for natural ventilation which will potentially cause deterioration to the capping subframe in the long-term.

9. RECOMMENDATIONS.

Based on the inspection findings, we would strongly recommend that remedial attention is given to the following areas:

Remedial requirement.

1. Replace the hanger band located around the exterior of the +3 9.15m sandstone cornice.
   New band to be fabricated in 8x equally sized segments.

   New band to be bonded to the existing lightning conductor.

   New band to be shop painted 1x coat of Interplus 256 and 1x coat of Interthane 990 (black)

   All fasteners to be galvanised coated.

2. During the above hanger band replacement, remove all vegetation and friable material from the sandstone cornice.

   Repoint all joints within the cornice and reprofile the spalled stonework using a St Astier One Stone repair system or similar approved.

3. Remove all exfoliated brickwork from the lower 3.6m of the chimney. Approx 4x areas.

4. Carry out patch repairs to the pointing using lime base mortar. Approx 2sq.m

5. Replace all bands located throughout the lower 25m of the chimney.

   All new bands to be fabricated from 75x10 (minimum) carbon steel plate with double reinforced lugs.

   New bands to be shop painted 1x coat of Interplus 256 and 1x coat of Interthane 990 (black)

   All bands to be sequentially bonded to the existing lightning conductor system in accordance with BSEN 62305.

   All fasteners to be galvanised coated.

6. Install 1x 150mm diameter ventilation hole and stainless steel weatherproof cover to the current capping arrangement.

   Change the current door at the chimney base with new. Door to incorporate a louvered opening to promote air flow within the chimney interior.

RAG LEGEND

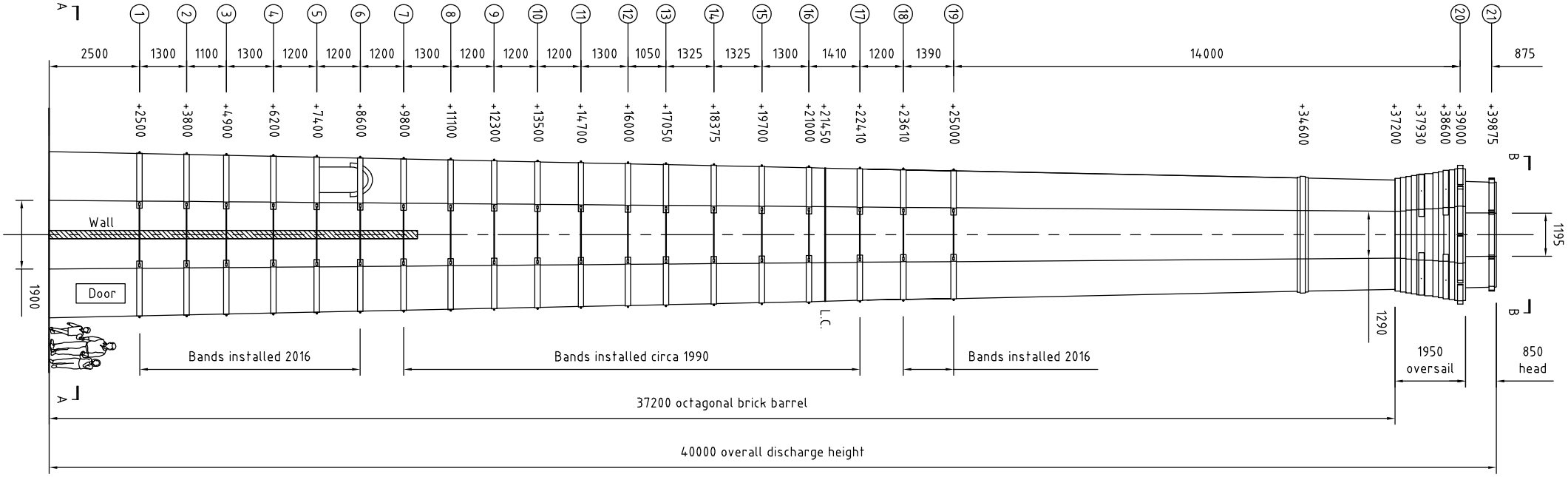
- (R) High probability of failure, high risk of serious injury to public
- (A) Danger of detachment, risk to public.
- (G) Requires planned repair. Low risk to public.

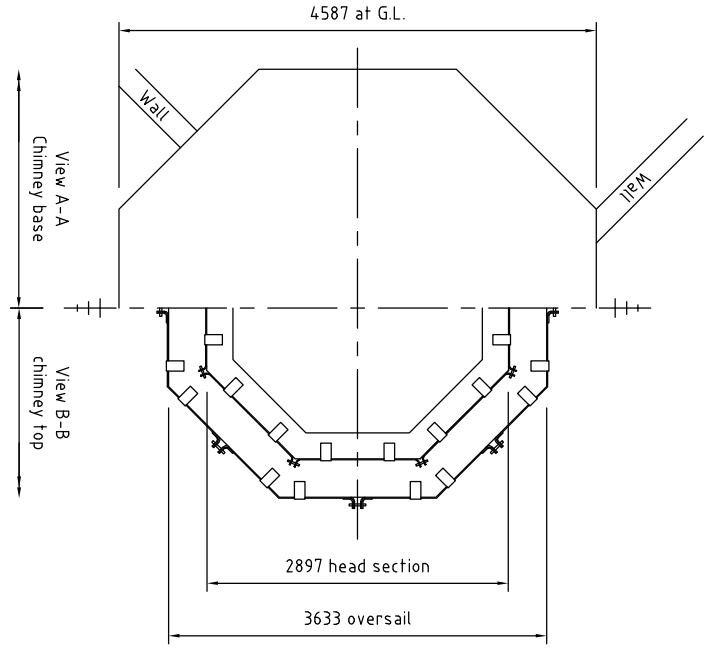
10. LIGHTNING CONDUCTOR TEST CERTIFICATE

Client/Site:	Zenith management Ltd, Murray's Mill Manchester.		
Structure:	40m brick chimney		
Job No:			
Brief Description of System:	2x earth bonding between the chimney summit and ground.		
INSPECTION AND TESTING CARRIED OUT IN LINE WITH BSEN 62305: 2011			
Test Date: 23.01.2025	Weather: Dry	Retest Date: ANNUALLY	
Issue Date: 12.02.2025			
EARTH ELECTRODE POSITION/NO:	READING OBTAINED IN OHMS	MAXIMUM PERMITTED	COMMENTS
North	1.5 ohms	10.0 ohms	Compliant
South	2.3 ohms	10.0 ohms	Compliant
Collective Reading:		Continuity Reading:	
Comments:	All in good order.		
Recommendations:	No sequential bonding to the multiple carbon steel post tensioning bands.		
Test Instrument:	Model 4105A	Manufacturer:	
Calibration No:	E803997/7005	Calibration Date:	1st July 2024

Testing Engineer: John Breen Issued by: N. Matthews

RevNo	Revision note	Date	Signature	Checked





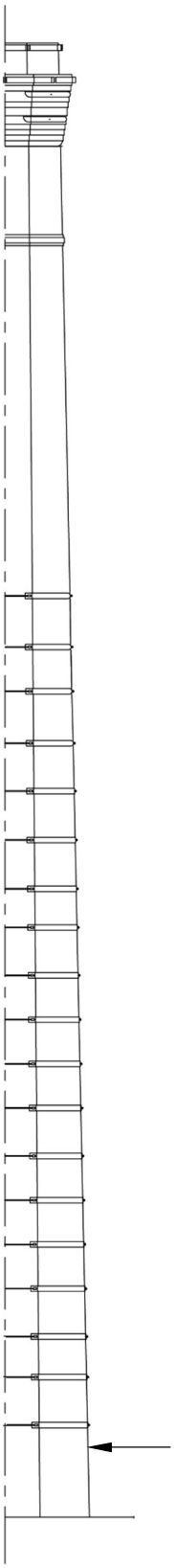
Drawing Status:	SS = Sketch scheme	P = Proposal	C = Construction	F = Fabrication	AS = As-built	S = Survey
Print size A4	Designed by Nigel Matthews	Checked by John Breen	Approved by - date J.B. - 24.01.2025	File name RT-DWG-001-S 24.01.2025		Date of issue do not scale

RIGG TECH Ltd
Unit E3 Springfield Industrial Estate
Samuel Street, Manchester, M35 0GA
Tel: 0161 684 7800, E-mail: info@rigg-tech.com

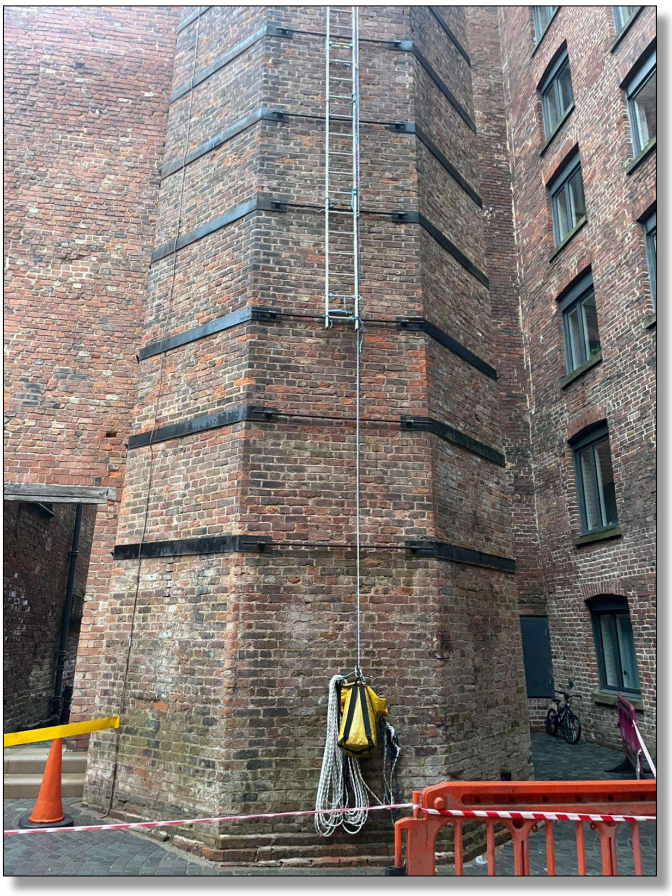
2005 inspection drawing

Murrays Mill, Manchester | Rev A | Sheet 1/1

This drawing is the property of Rigg Tech Ltd and should not be used or copied without written permission







↑ Image 1.

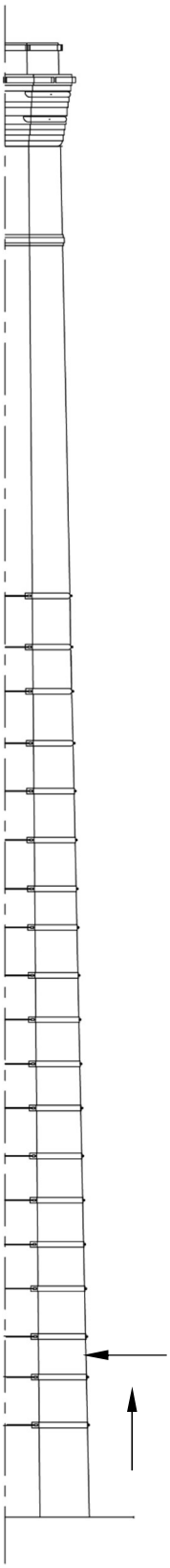
General view of the chimney.

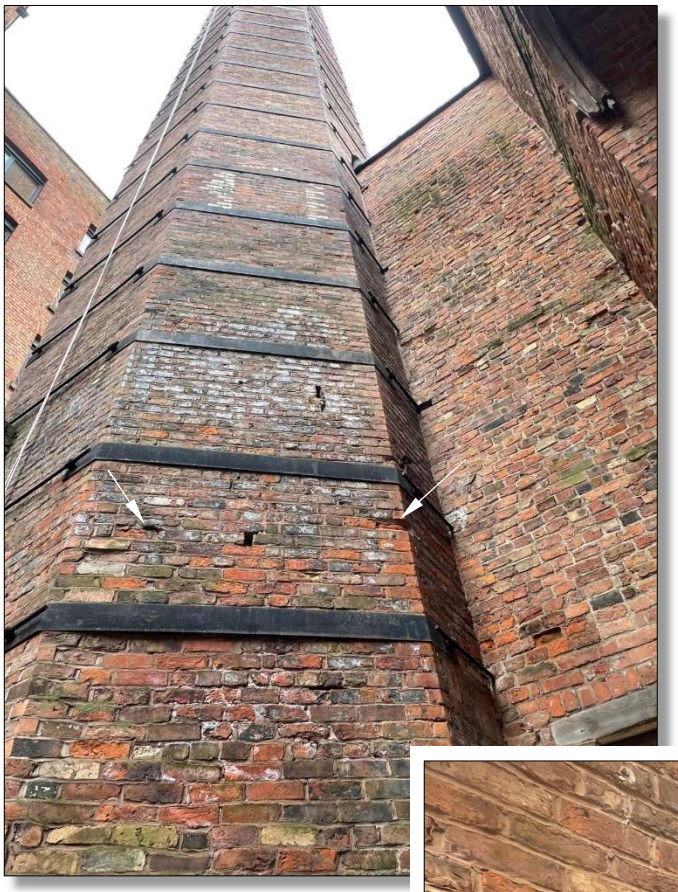
North elevation.

← Image 2.

General view of the chimney base showing the post tensioning band layout.

+1.0m AGL.





← Image 3.

Fragmentation of isolated bricks within the chimney base.

+3.6m AGL.

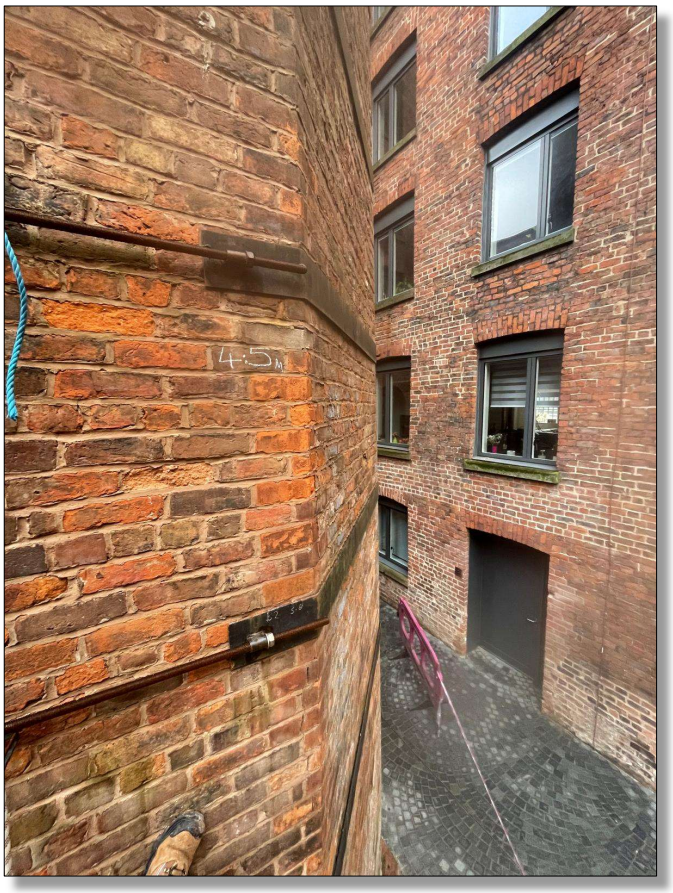
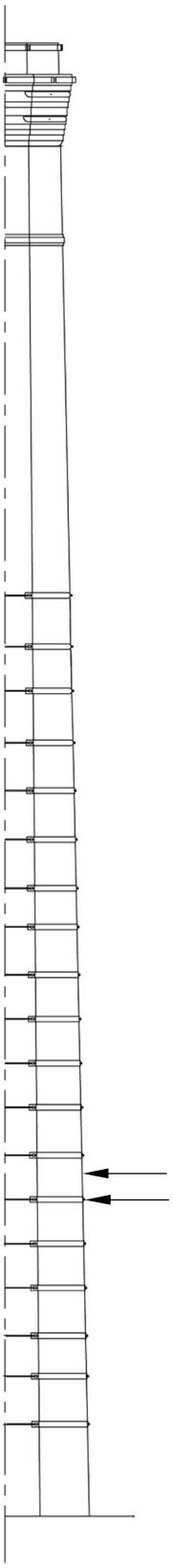


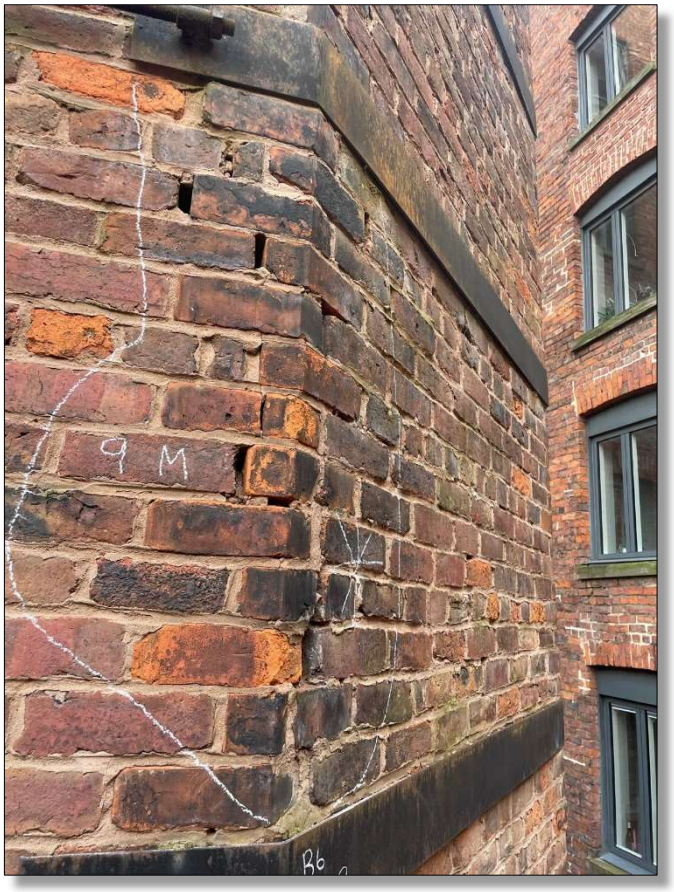
Image 4. →

General view of the masonry within the base region of the barrel. Pointing and brick fabric typically in good order.

+4.5m AGL.







↑ Image 5.

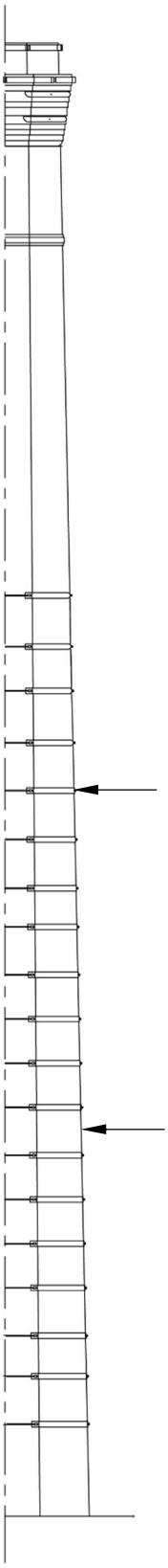
View of the structurally inadequate band bolt connection detail common throughout all barrel bands.

+8.6m AGL.

← Image 6.

Isolated areas of painting failure.

+9.0m AGL.





← Image 7.

Isolated areas of pointing failure.

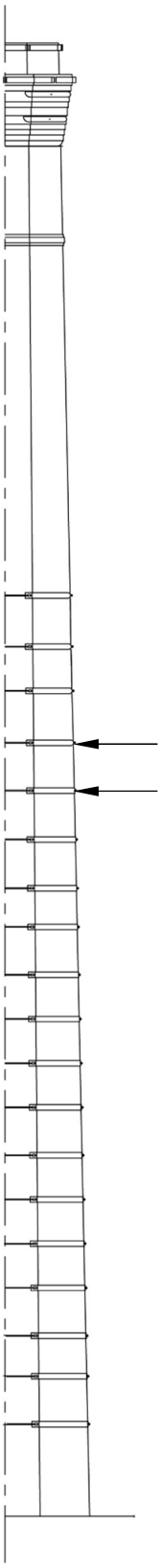
+10.0m AGL.



Image 8. →

View of the masonry around the central region of the barrel showing no areas of concern. Note the coating depletion of the band.

+19.7m AGL.





← Image 9.

View of the unconventional 150x5 carbon steel bands common throughout the brick barrel.

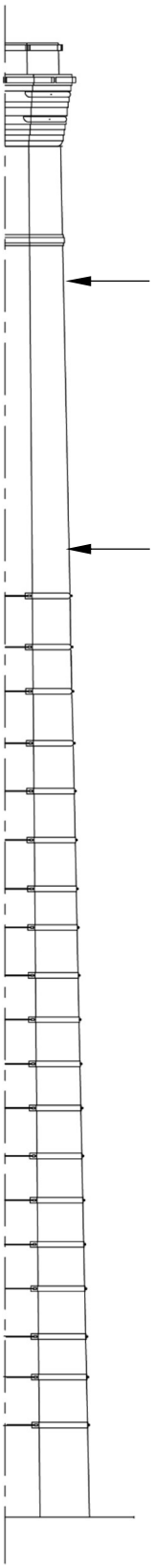
+21.0m AGL.

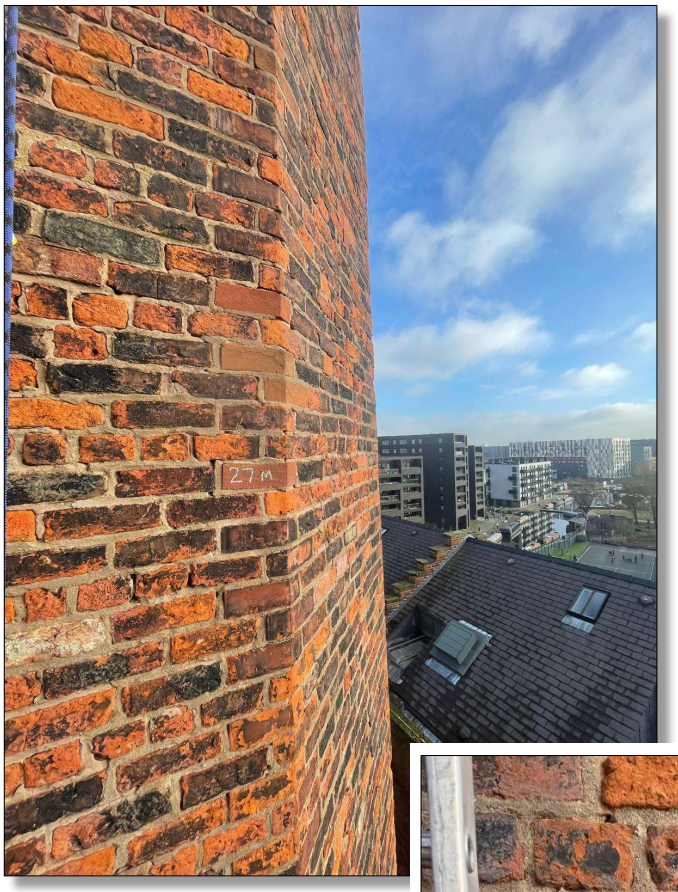
↓ Image 10.

Notching of the band to permit tightening of the M20 threaded bars.

+22.4m AGL.







← Image 11.

Typical view of the masonry around the central region of the chimney showing no areas of immediate concern.

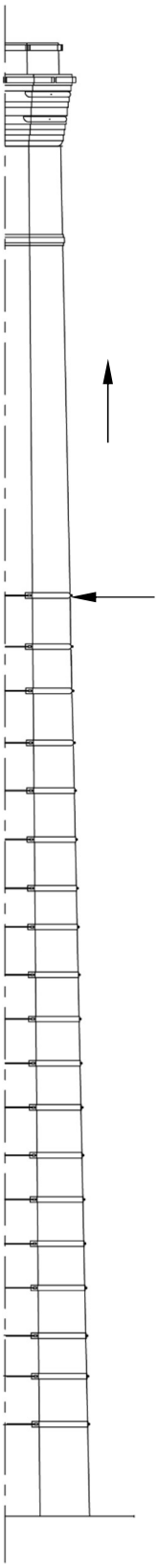
+27.0m AGL.

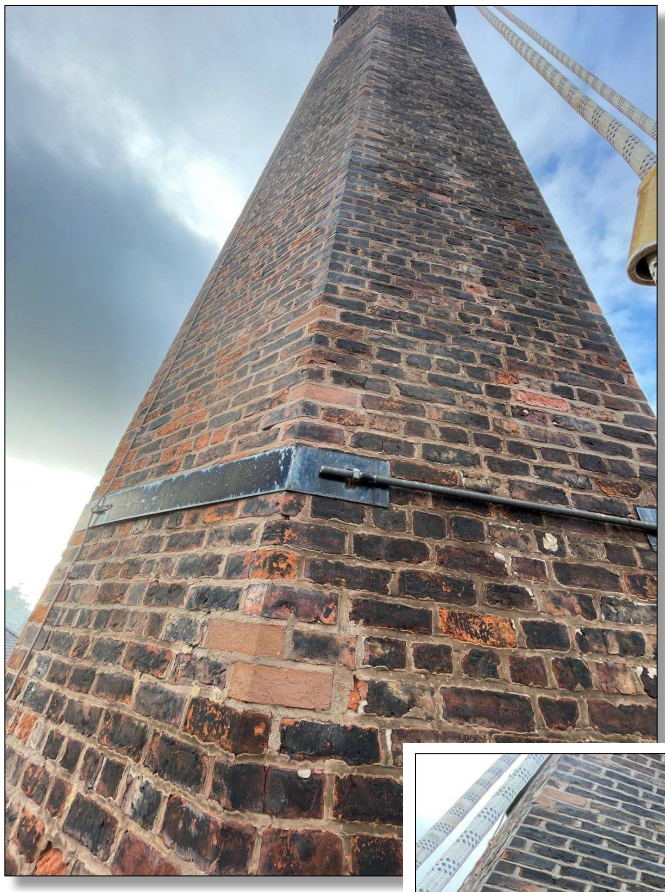


Image 12. →

Isolated defective pointing.

+33.0m AGL.





← Image 13.

Localised brick replacement to the corners of the barrel. Masonry in good order.

+25.0m AGL.

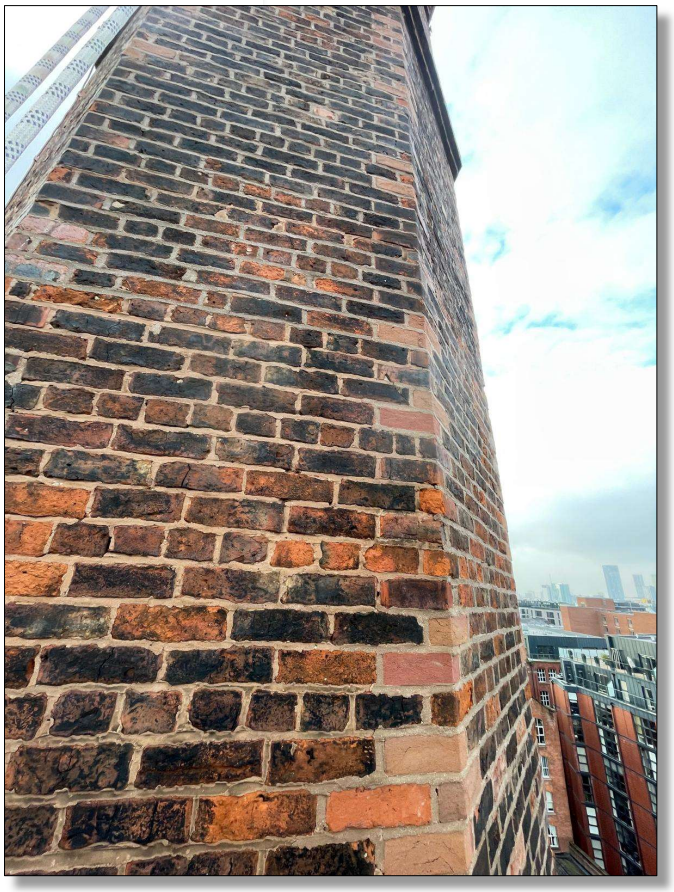
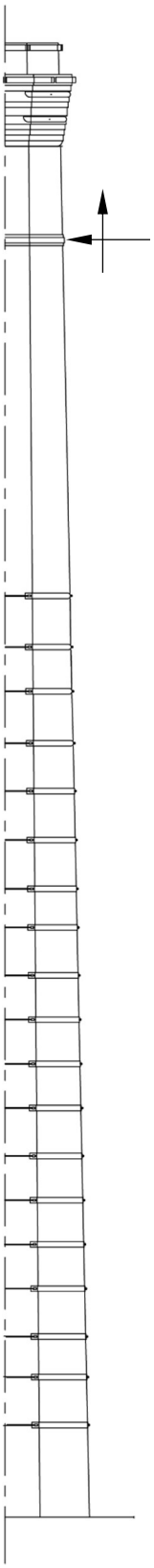
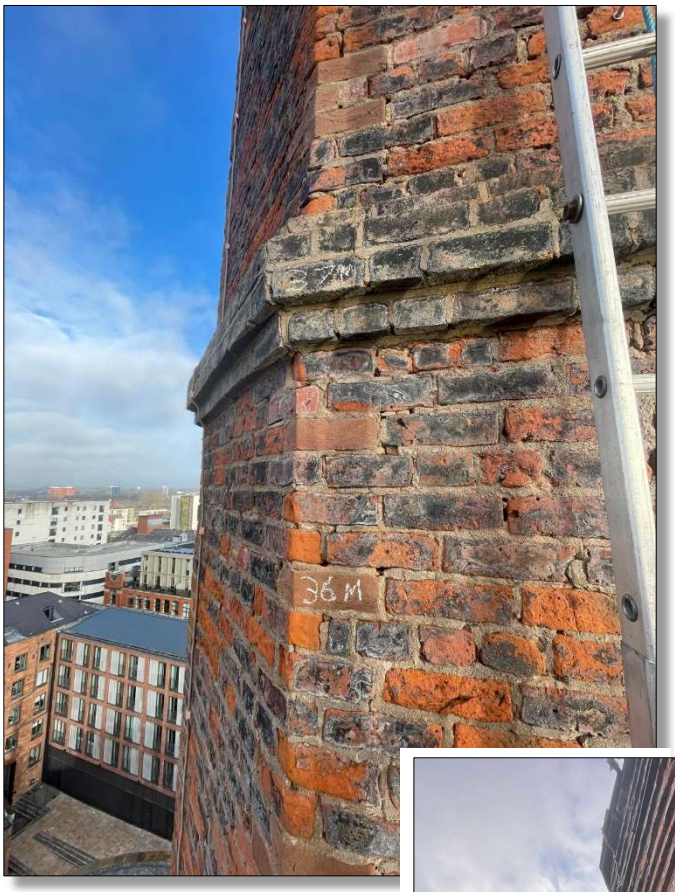


Image 14. →

General view of the masonry within the upper barrel section of the chimney showing no areas of concern.

+31.5m AGL.





← Image 15.

General view of the masonry around the stringcourse level of the chimney. All in good order.

+34.6m AGL.

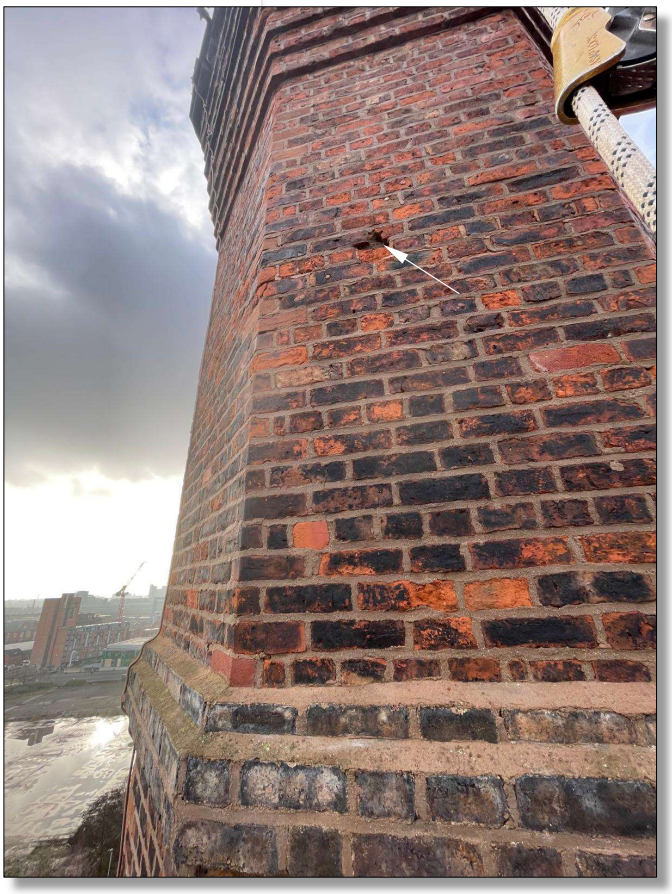
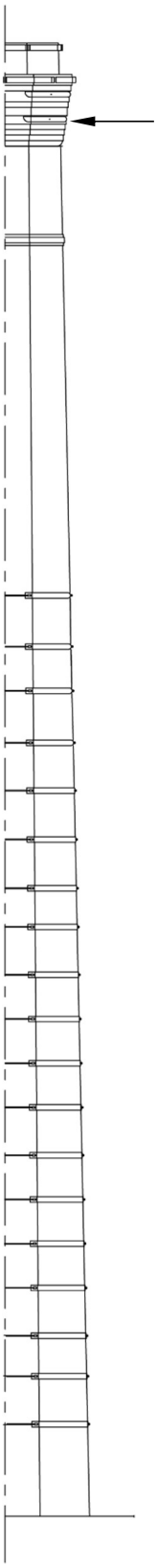


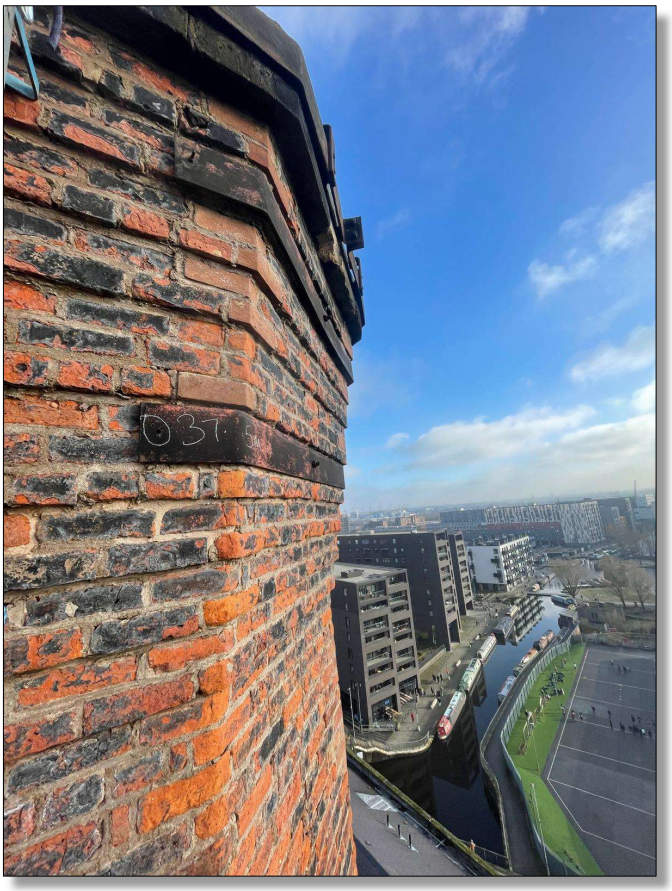
Image 16. →

Isolated fragmentation of a brick located within the neck section of the chimney.

+35.0m AGL.







↑ Image 17.

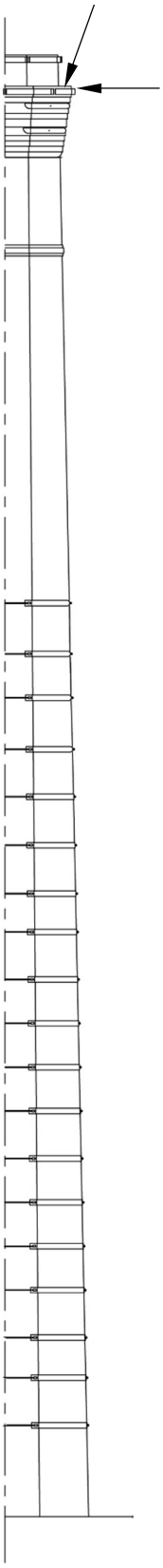
Paint depletion to the carbon steel pattress plates which connect to the internal tie rods.

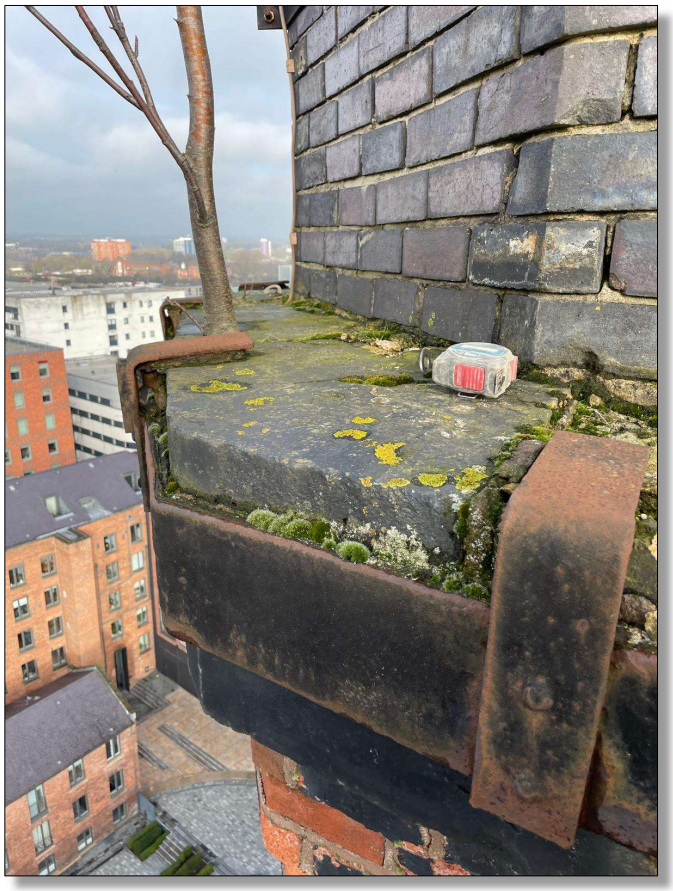
+37.9m GAL.

← Image 18.

View of the masonry common to the head section. All in good order.

+37.9m AGL.





← Image 19.

Paint loss to the cornice hanger band.

+39.1m AGL.

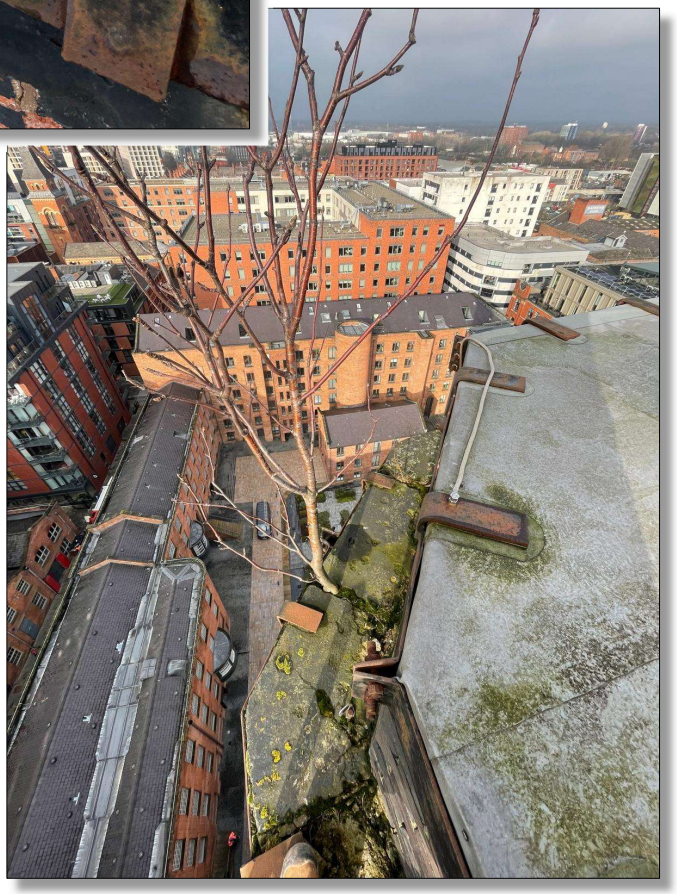
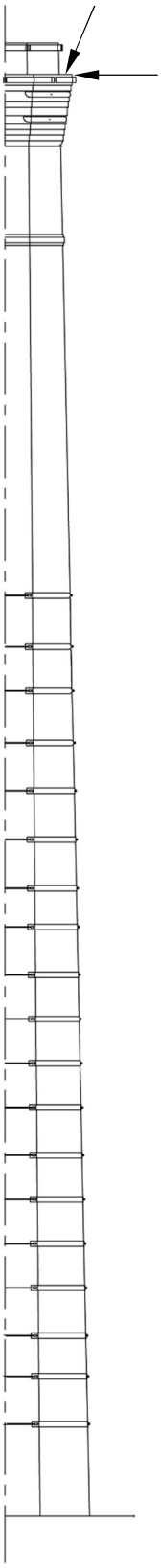


Image 20. →

Bush growing within the open joint of the cornice.

+39.1m AGL.

RIGG TECH Ltd. Unit E3, Springfield Industrial Estate, Failsworth, Manchester, M35 0GA, United Kingdom.
Tel: +44 (0)161 684 7800 | E-mail: info@rigg-tech.com | Web: www.rigg-tech.com

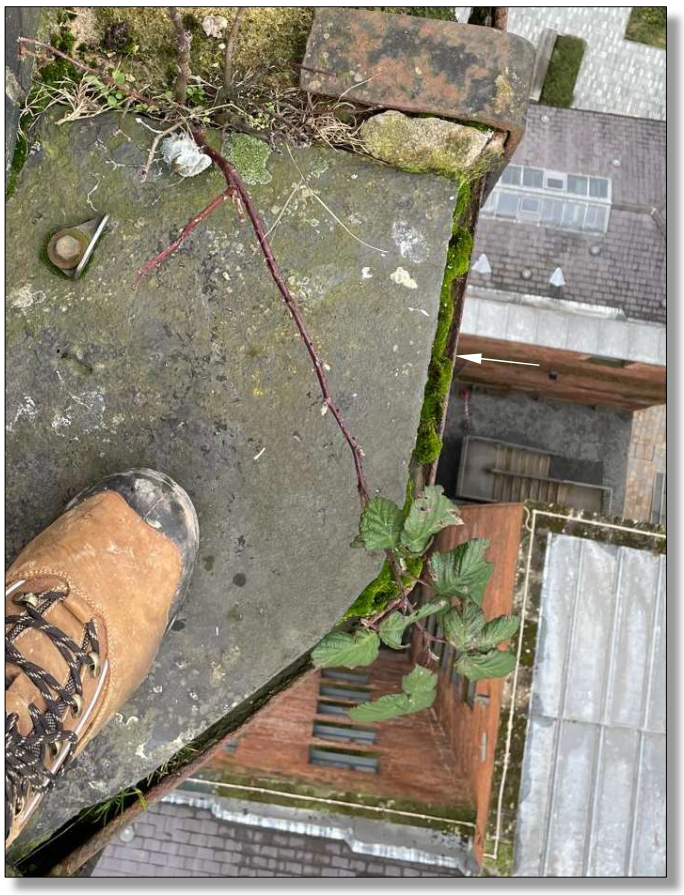




↑ Image 21.

Severe thinning (A) of the cornice hanger band. Note the tensile deformation of the bolts (B) and fragmentation of the sandstone cornice.

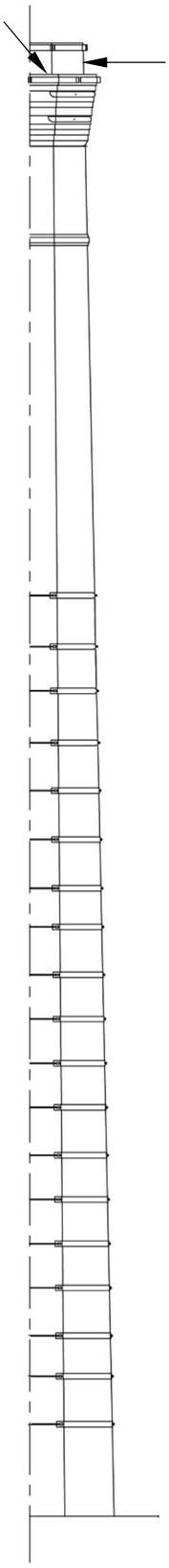
+

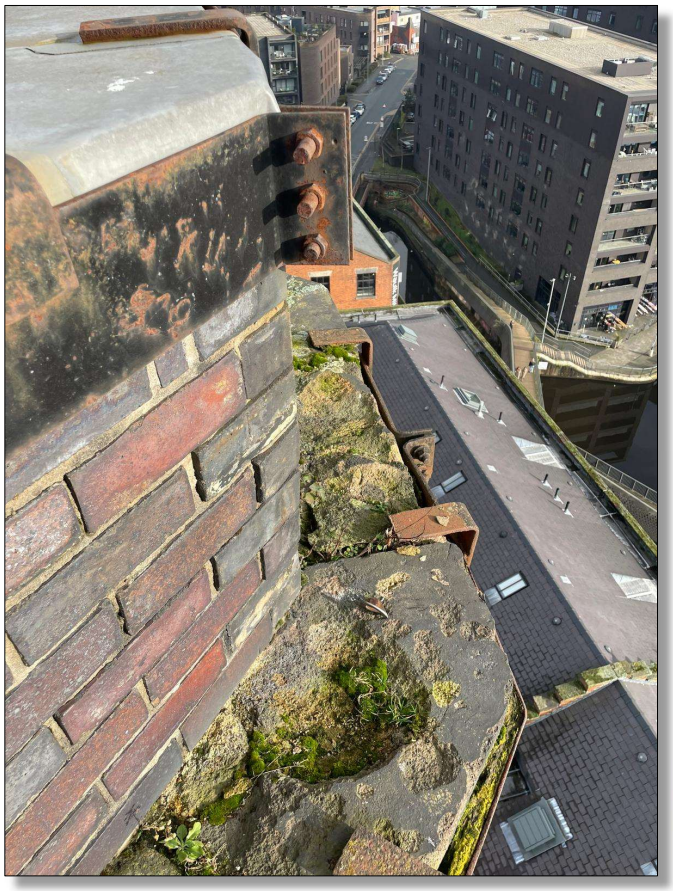


← Image 22.

85% section loss to the cornice hanger band.

+





← Image 23.

Fragmentation of the sandstone cornice.

+39.1m AGL.

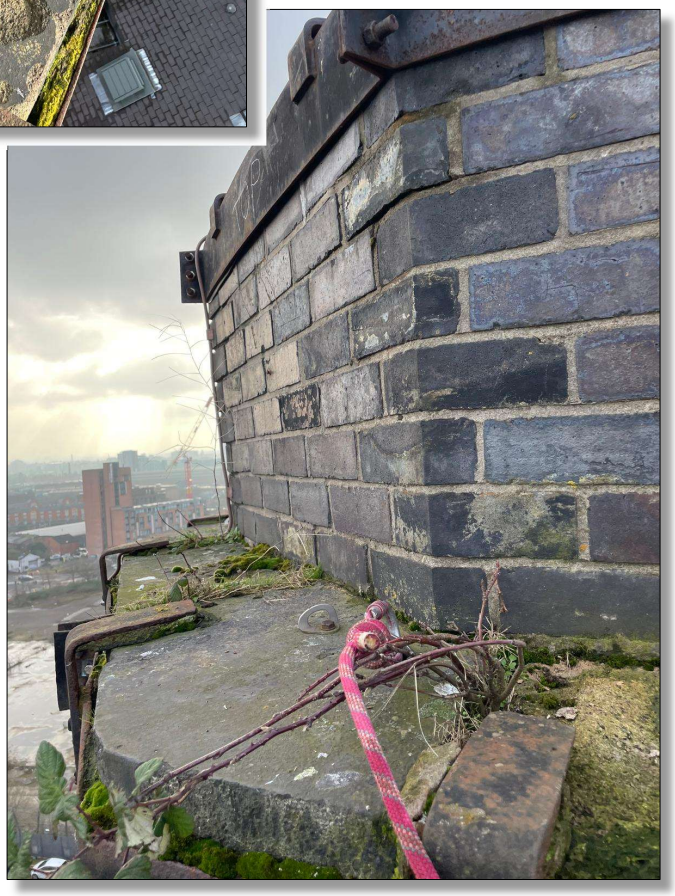
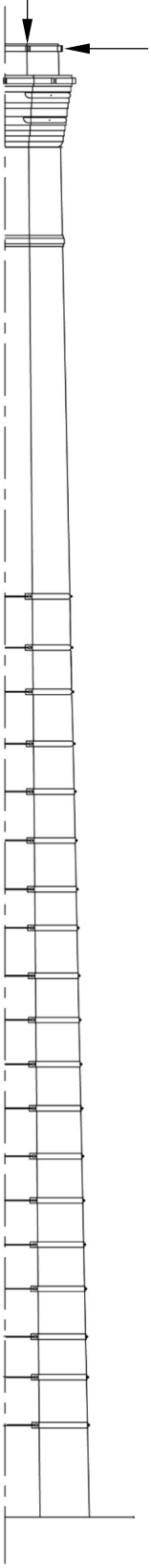


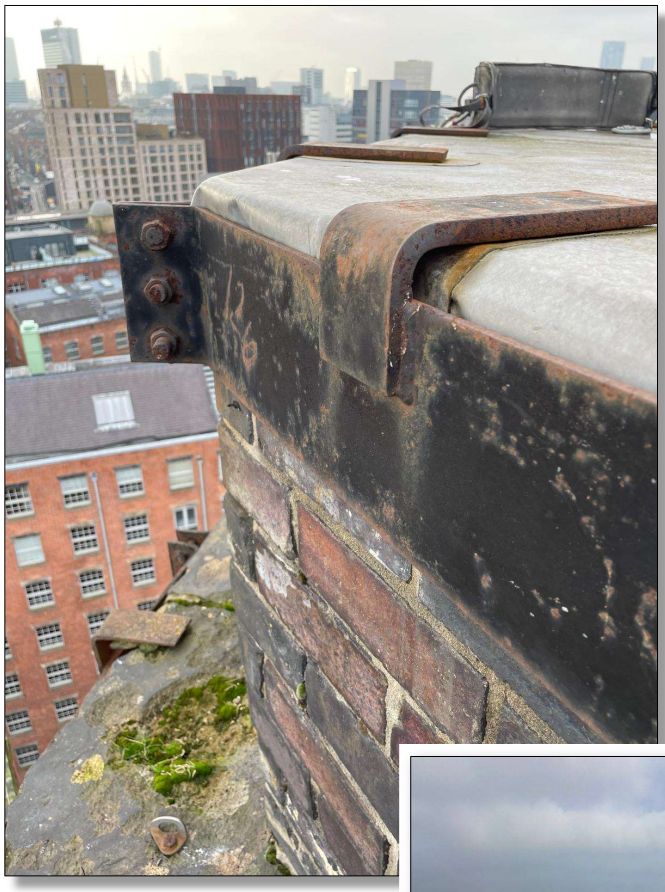
Image 24. →

View of the Staffordshire blue brickwork to the recently reconstructed head section.

All in good order.

+39.5m AGL.





← Image 25.

Coating depletion to the top hanger band.

+39.9m AGL.

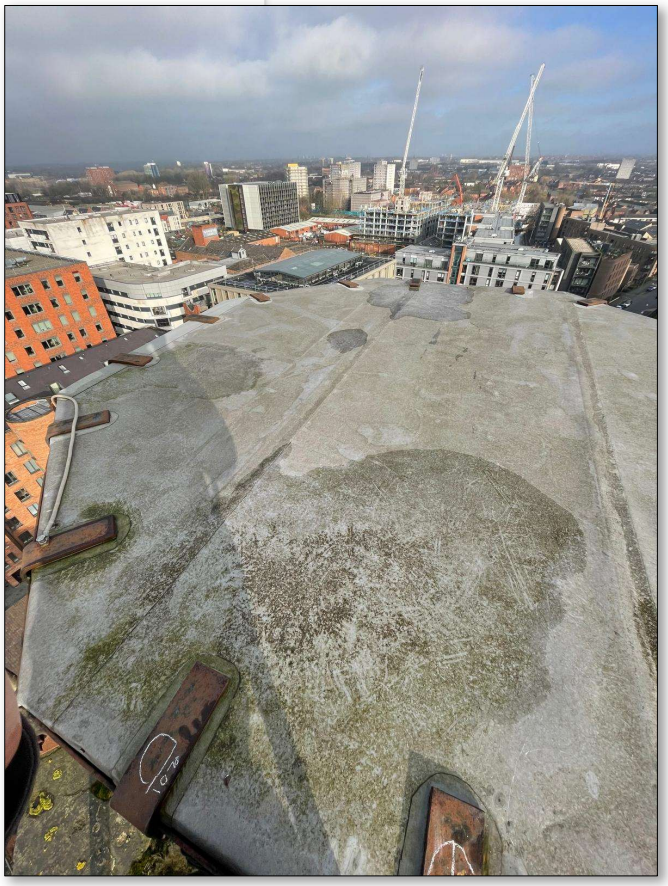
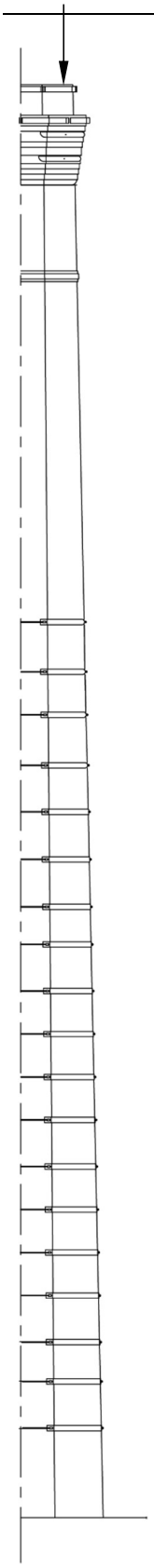
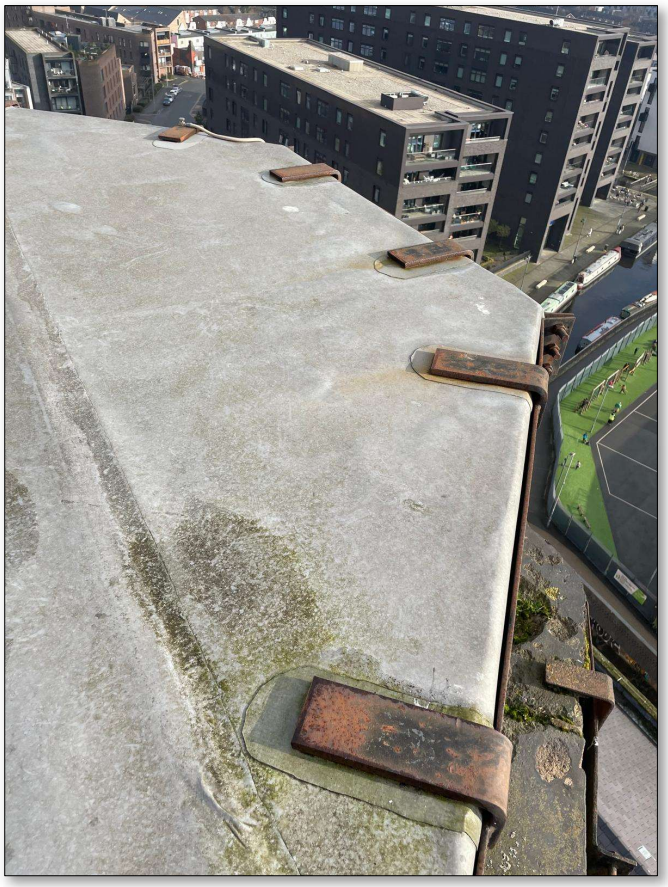


Image 26. →

General view of the polymeric roof covering. All in good order. Note the lack of natural ventilation to the chimney interior.

+40.0m AGL.





← Image 27.

General view of the terminating hanger band showing suitable retention of the roof covering.

+40.0m AGL.



Image 28. →

Sequential bonding of the roof plate hanger band.

+40.0m AGL.