



Victoria Mill in 2009, prior to the urgent repair works and development

UNIVERSITY TECHNICAL COLLEGE, VICTORIA MILL, BURNLEY, LANCASHIRE

Archaeological Building Investigation



Oxford Archaeology North

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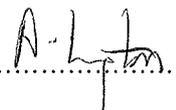
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SUMMARY

Victoria Mill was erected in 1854 as a cotton-spinning mill in an industrial sector of Burnley that became known famously as the 'Weavers' Triangle' (centred on NGR SD 83362 32609). In 1991, on account of its special historic and architectural interest, Victoria Mill was designated a Grade II Listed Building. However, the buildings have been vacant for several years and, until most recently, were in a very poor condition. Following the collapse of a private sector application to promote a mixed-use commercial development on the site in 2008, Victoria Mill was acquired by Burnley Borough Council to secure the buildings for future refurbishment. In the first instance, a programme of urgent works was implemented to stabilise the buildings, secure them from vandalism, and make the structures watertight. In April 2012, following the completion of the urgent repairs work, a planning application was submitted to develop the Victoria Mill complex as a new University Technical College (UTC). This major scheme is being led by Training 2000, with private sector partners in the aerospace industry, and aims to create a facility focusing on training in engineering and construction. The project is being delivered by Barnfield Investment Properties in partnership with Burnley Council.

Whilst the proposed conversion of the mill complex will secure the long-term future of the site, the scheme necessitates a major refurbishment of the buildings. In order to secure archaeological interest, Burnley Council advised that an appropriate level of archaeological investigation should accompany the proposed development. Following consultation with the Lancashire County Archaeology Service, it was recommended that a building investigation commensurate with an English Heritage Level II/III-type survey of the entire Victoria Mill complex was carried out in advance of development work. The development proposals also allow for the demolition of a disused single-storey structure on the opposite bank of the Leeds and Liverpool Canal, known as the Wiseman Street Works. It was recommended that this site was subject to archaeological recording to an English Heritage Level I standard.

The survey revealed detailed evidence for the layout of the original mill complex, including the north-western wall of the four-storey spinning block, and part of its return to an extant three-storey attached beam engine house. The engine house was extended subsequently on its western side. This is likely to have post-dated the erection of a building to the north, which appears to have been constructed as a primary processing area, but was remodelled subsequently to form a boiler house for two Lancashire boilers, with an associated economiser and large chimney.

Following a devastating fire in the 1880s, the spinning block was rebuilt as a large double-depth block fronting Trafalgar Street. This retains many original elements, including a hoist on the top floor. A two-storey weaving shed/preparation block was added shortly afterwards, along with a six-storey stair tower, which retains an early, and almost complete example of an automated sprinkler system. The two-storey weaving shed comprised distinct structural elements, but had continuous fireproof vaulting between the two floors. Whilst this had previously been assumed to be of rendered brick construction, as the structure it replaced to the north, detailed examination revealed it to be of complex concrete construction, representing an early and rare example of such a feature.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) is grateful to Daniel Gaunt for commissioning and supporting the project on behalf of Barnfield Construction Ltd. Thanks are also expressed to Mike Riley, also of Barnfield Construction Ltd, for considerable logistical support during the course of the fieldwork. OA North is also grateful to Doug Moir of the Lancashire County Archaeology Service for his advice and guidance, and to Cecilia Whitaker, the Weavers' Triangle THI Project Officer for Burnley Council, for her support and assistance with the documentary research. OA North is also grateful for the support afforded by Councillor Andy Tatchell, the Executive Member for Regeneration and Economic Development for Burnley Council, and Bernice Lim, Project Manager from Burnley Council's Property Consultancy Team.

The building survey was undertaken by Chris Wild. The report was written by Chris Wild and Ian Miller, and the drawings were prepared by Mark Tidmarsh and Chris Wild. The report was edited by Ian Miller, who was also responsible for project management.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 Victoria Mill was erected in 1854 as a cotton-spinning mill in an industrial sector of Burnley that became known famously as the 'Weavers' Triangle'. By the end of the nineteenth century, the mill incorporated a significant capacity for weaving cotton goods in addition to spinning yarn. Whilst the mill had ceased to be used for manufacturing cotton goods by the 1940s, the buildings survive largely intact and now form one of the most important historic textile-manufacturing sites in Burnley. In 1991, on account of its special historic and architectural interest, Victoria Mill was designated a Grade II Listed Building, representing an important component of the Canalside Conservation Area. However, the buildings have been vacant for several years and, until recently, were in a very poor condition. Following the collapse of a private sector application to promote a mixed-use commercial development on the site in 2008, Victoria Mill was acquired by Burnley Council to secure the buildings for future refurbishment. In the first instance, a programme of urgent works was implemented to secure and stabilise the buildings, and make the structures watertight. This scheme of works included underpinning of the principal buildings, the removal of the roof and upper floor of the engine house, the provision of new roof coverings, and the over-boarding of windows and doors.
- 1.1.2 In April 2012, following the completion of the urgent repairs work, a planning application was submitted to develop a new University Technical College (UTC) in Burnley, utilising the vacant Victoria Mill. This major scheme is being led by Training 2000, with private sector partners in the aerospace industry, and aims to create a facility focusing on training in engineering and construction for 14-19 year olds. The project is being delivered by Barnfield Investment Properties in partnership with Burnley Council.
- 1.1.3 Whilst the proposed conversion of the mill complex for use as a UTC will secure the long-term future of Victoria Mill, the scheme will inevitably necessitate a major refurbishment of the buildings, with the potential loss of some historic fabric, fixtures and fittings. In order to secure archaeological interest, and as a condition to both listed building and conservation area consents, Burnley Council advised that an appropriate level of archaeological investigation should accompany the proposed development. Following consultation with the Lancashire County Archaeology Service, in their capacity as archaeological advisors to Burnley Council, it was recommended that a building investigation commensurate with an English Heritage Level II/III-type survey of the entire Victoria Mill complex was carried out in advance of development work. The development proposals also allowed for the demolition of a disused single-storey structure on the opposite bank of the Leeds and Liverpool Canal, known as the Wiseman Street Works. It was recommended that this site was subject to archaeological recording to an English Heritage Level I standard.

1.1.4 In June 2012, Oxford Archaeology North (OA North) was commissioned by Barnfield Construction Ltd to carry out the specified programme of archaeological building investigation. The work was undertaken between June and September 2012.

1.2 SITE LOCATION AND GEOLOGY

1.2.1 The study area lies on the western fringe of Burnley town centre (centred on NGR SD 83452 32551), at a height of 131m above Ordnance Datum (Fig 1). It is bounded by Trafalgar Street to the south-west, and the Leeds and Liverpool canal to the north-west (Plate 1). This part of Burnley is known as the 'Weavers' Triangle', and forms the central part of the Canalside Conservation Area.

1.2.2 The Canalside Conservation Area incorporates some 34 hectares along the canal corridor, and is widely recognised as one of the most important historic industrial areas in the North West on account of the well-preserved group of historic textile mills, engineering works, and canalside architecture (Burnley Borough Council 2009, 5). Victoria Mill is the dominant industrial building at the north-western gateway to the Conservation Area.

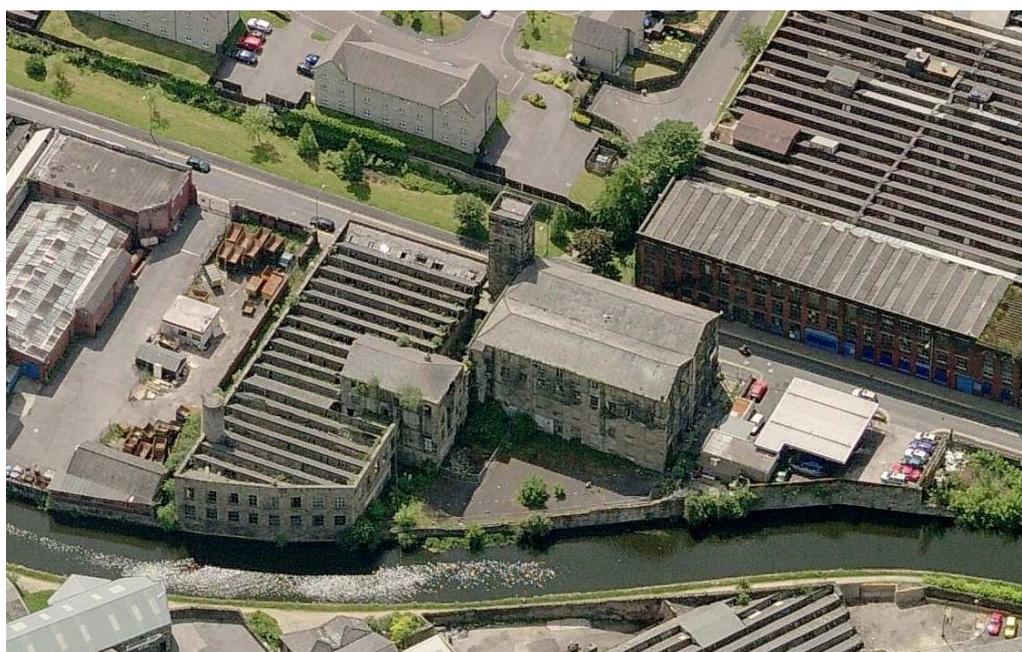


Plate 1: Recent aerial view of Victoria Mill, prior to any development works, looking south

1.2.3 The solid geology of the area comprises mostly sedimentary rocks of the Lower Westphalian coal measures. These are Carboniferous period deposits, which date to between 290 and 345 million years ago, and include sandstone and Millstone grits. The overlying drift geology is essentially post-glacial deposits, predominantly boulder clay with some areas of sands or gravels (Countryside Commission 1998). The soils of the surrounding area, as mapped by the Ordnance Survey Soil Survey of England and Wales (1983), are predominantly of the Brickfield 3 series, which are cambic stagnogley soils, deriving from the underlying geology.

2. METHODOLOGY

2.1 BUILDING INVESTIGATION

- 2.1.1 The building investigation of Victoria Mill was carried out in several phases, which commenced in 2010 with an initial assessment and English Heritage Level I-type survey of the entire complex (OA North 2010a), followed by a Level II survey of the privy tower, prior to its removal in 2011 (OA North 2011). Following a planning proposal by Barnfield Construction Ltd and other stakeholders to convert the remainder of the complex into a University Technical College, it was agreed that such work should be preceded by an archaeological survey commensurate with English Heritage Level II/III standard.
- 2.1.2 The Level II/III survey aimed to provide a photographic and descriptive record of the historic fabric and key architectural features of the site, and to provide an archive record of the structure and location prior to its remodelling. Records were made of all external and internal elements, as well as any features of historical or architectural significance. These records are essentially descriptive, although interpretation was carried out on site as required. All work was carried out was consistent with the relevant standards and procedures provided by the Institute for Archaeologists (IfA), and generally accepted best practice. The work was carried out in accordance with a Written Scheme of Investigation (*Appendix 1*), which was approved by the Lancashire County Archaeology Service prior to the commencement of the survey.
- 2.1.3 **Photographic Survey:** a photographic archive of the structure was compiled, consisting of both general and detailed photographs, which were captured using a high-resolution digital format.
- 2.1.4 **Site Drawings:** architects drawings of the site were supplied by Barnfield Construction Ltd, and these were enhanced manually, with the resulting drawings then digitised using AutoCAD software, to produce plans at each floor level. This was coupled with a written description, maintained to English Heritage (2006) Level II standard. These records are essentially descriptive, and provide a systematic account of the origin, development and use of the building structure.

2.2 ARCHIVE

- 2.2.1 A full archive of the work has been prepared to a professional standard in accordance with current English Heritage guidelines (1991) and the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990). The archive will be deposited with the Lancashire Record Office on completion of the project. In addition, a copy of the report will be forwarded to the Lancashire Historic Environment Record (HER).

3. BACKGROUND

3.1 HISTORICAL DEVELOPMENT OF VICTORIA MILL

- 3.1.1 Victoria Mill was erected in 1854 for the Massey family as a cotton-spinning mill. The original form of the mill is poorly documented, although its layout is shown on a plan of 1861 (Plate 2), and replicated on Walsh's *Plan of the Municipal Borough of Burnley*, which was published in 1882. These plans show the mill complex to have comprised a rectangular range on the northern side of Trafalgar Street, with two smaller structures to the north, adjacent to the canal. Additional detail was provided during a recent assessment of the buildings, which concluded that the original complex included a ten-bay long, four-storey block, placed perpendicular to Trafalgar Street (OA North 2010a). This building had incorporated an integral engine house at its northern end, and had almost certainly been a spinning block. The survey also demonstrated that the structure to the north of the spinning block shown on historic plans represented an earlier structure than the present weaving shed, whilst the other building perhaps formed a warehouse with an associated canal wharf. However, a devastating fire wrought considerable damage to the mill in 1882, and led ultimately to the reconstruction of large elements of the complex.



Plate 2: Extract from a Plan Showing the Line of Water and Gas Pipes dated 1861, with the arrow marking the position of the original spinning block

- 3.1.2 Victoria Mill is mentioned in a newspaper article of 1881, which reported that the throstle spinners had gone on strike over a wage dispute (*Huddersfield Chronicle*, 3 September 1881). Further labour unrest was reported in 1886, when the weavers at Victoria Mill went on strike, causing the mill to close (*Manchester Times*, 6 November 1886). This indicates that the mill was in use as an integrated spinning and weaving complex by that date. During the 1880s, eight of the large spinning firms in Burnley ceased trading, and this included ES Massey at Victoria Mill (Bennett 1951, 96).
- 3.1.3 In 1888, the Victoria Mill Company Ltd was registered, with a capital of £3000, to acquire the cotton-spinning business and mill of Edward Massey (*Liverpool Mercury*, 12 March 1888). The change of ownership seemingly failed to quell unrest amongst the workers, however, with a strike at the mill being reported in December 1892 (*Blackburn Standard*, 17 December 1892).
- 3.1.4 The next detailed plan of the mill complex is provided by the Ordnance Survey's 1:500 map of 1892, which was surveyed in 1888-9 (Plate 3). This shows the mill complex to have been remodelled and expanded relative to the footprint depicted on the earlier plans. The principal newly constructed buildings formed an L-shaped plan, with the longer range running parallel and adjacent to the northern side of Trafalgar Street. This 10 x 7 bay, four-storey block was of double-depth construction with paired gables at its western end, and contained carding engines and roving frames on the ground floor, and spinning mules on the upper floors; the mill had a capacity of 19,000 spindles (Worrall 1891, 77). The privy tower was attached to the eastern corner of the spinning block. A seven-stage tower was added to the southern corner of this block in 1889, and housed an automatic fire-sprinkler system.

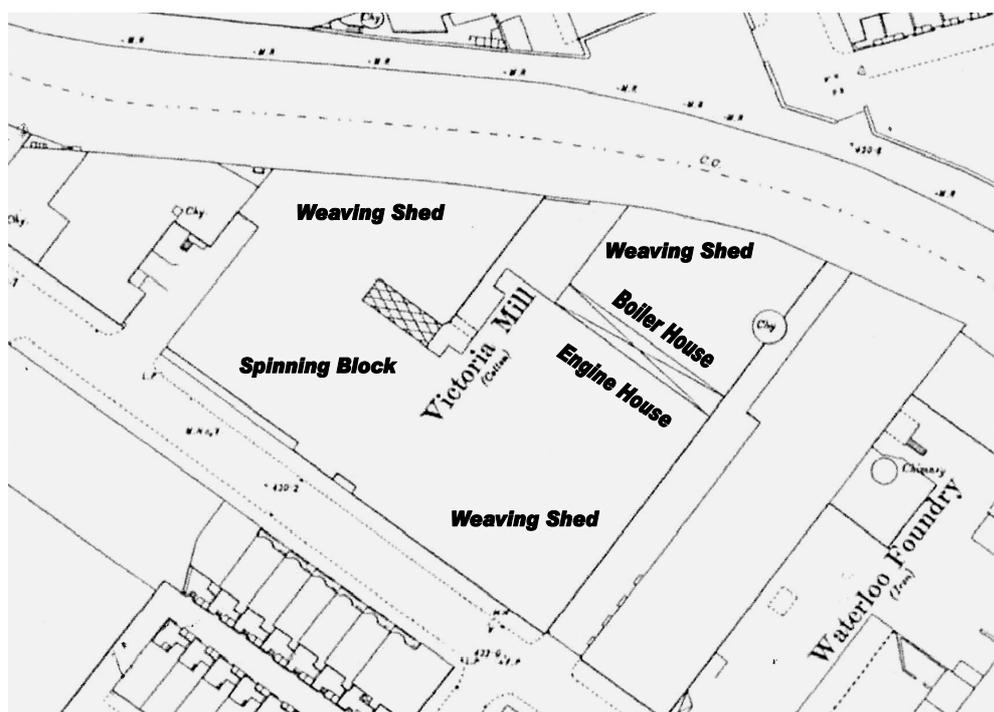


Plate 3: Extract from the Ordnance Survey 1:500 map of 1892, with annotation for the principal elements of the site

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- 3.1.5 The return range occupied the eastern boundary of the site, and comprised a two-storey weaving shed that incorporated the original engine house, albeit in a remodelled form, at its northern end. This weaving shed occupied much of the footprint of the original four-storey spinning block. Another two-storey weaving shed and warehouse was also erected to the north of the engine house. Access to a small, central yard was afforded via a covered passage that ran between the engine house and the north-eastern weaving shed.
- 3.1.6 The Victoria Mill Company Ltd is listed in a trade directory for 1896 as 'cotton spinners and manufacturers' (Barrett 1896, 182). However, by 1900, the company was dealing only in cotton waste.
- 3.1.7 In 1935 the mill was owned by RJ Patchett of Bradford, who advertised for let 2420yds of floor space in the mill. In the mid-1940s, the mill was in use by mattress-maker Hammond and Company, and later tenants may have included Leyfield Products, Victoria Tannery and Boldsworth Holdings (Nadin 2008, 87-8).

4. RESULTS

4.1 INTRODUCTION

- 4.1.1 The Victoria Mill complex incorporates several distinct elements, including an extant multi-storey spinning block, the shell of an earlier spinning block, a six-storey stair tower, an engine house, two weaving sheds, a preparation and boiler house, and a chimney. The mill complex occupies a roughly triangular site bounded by the Leeds and Liverpool Canal, Trafalgar Street, and Sandygate Mill to the south-east.
- 4.1.2 The Level I archaeological assessment of Victoria Mill concluded that the complex, when viewed in conjunction with the neighbouring structures to the south, was of outstanding significance (OA North 2010a). Within the Victoria Mill complex, the original spinning block, despite only surviving as a single elevation, was also of outstanding significance, as was the stair tower, which housed well-preserved remains of a fine example of an automated fire-fighting system, which survives extensively throughout the extant spinning block to the north. The remaining elements of the complex were all concluded to individually be of great significance (*ibid*).

4.2 ORIGINAL SPINNING BLOCK (1854)

- 4.2.1 The earliest surviving fabric comprises a nine-bay spinning block, placed perpendicular to Trafalgar Street, and of at least four-storey height. Only the north-western wall of this block survives (Plate 5), being incorporated into the later, double-depth spinning block, for the majority of its length. To the north, the final two bays of the original structure were reduced in height to equal that of the attached transverse three-storey beam engine house (Plate 5).
- 4.2.2 The exposed section of the external face is of dressed sandstone block construction, with vertical 5' (1.52m) wide windows with projecting sandstone sills, and apparently diminishing in size on the upper floors. The taller, western bay is of rubble construction, representing an internal wall into an original privy tower, which was removed in 2011. Doorways at each level provided access from the spinning block, which was of similar sandstone rubble construction on its inner face, with a 4'6" (1.37m) dressed plinth to each floor (Plate 6).
- 4.2.3 Following the partial demolition of the spinning block in the wake of a devastating fire of 1882, it appears to have been re-used as a narrow single-storey preparation area or store. A central row of three columns was inserted to carry the channel-section valley of a double-span roof, which had a down-pipe into an internal drain at its eastern end (Plate 7). A corresponding row of joist sockets survive in the south-eastern wall (Plate 7), whilst the north-western wall retains only the wall scar of the felt flashing that appears to have been inserted into the mortar bed of the wall slightly below first-floor window sill level (Plate 6).



Plate 5: Fragment of the original spinning block (centre) and attached engine house (left), following the removal of the privy tower in 2011



Plate 6: Internal north-west elevation of the original spinning block



Plate 7: Interior of original spinning block, with inserted columns carrying the valley of a double-span roof

4.3 ENGINE HOUSE

- 4.3.1 The engine house originally comprised only the northern 24' of the block (Figs 2 and 4; Plate 5). It housed a vertical beam engine, and was enlarged subsequently on its south-western side, into the eastern bay of the spinning block, with all but the western 12' (3.66m) of the south wall being removed and displaced 8'6" (2.59m) to the south. Following the removal of the engine and its bed, the structure was remodelled to form a three-storey workshop, with concrete floors supported on a frame of I-section rolled steel joists.
- 4.3.2 Although the ground floor is heavily rendered many features remain visible internally, including the scar of return at the southern end of the original south-western wall. This appears to have included a doorway at the wall junction, where the engine house projected beyond the spinning block, with the 6'6" high dressed sandstone jamb projecting from the demolished wall core, complete with two pintels on the inner face (Plate 8). The engine house was extended subsequently to the west, with a doorway inserted in a corresponding position at the southern end of the south-west wall (Fig 4; Plate 8). The south-east wall appears to have had a pair of original windows, each 4' (1.22m) wide, and with large sandstone lintels positioned 8' (2.44m) above floor level. These were subsequently cut for the lowering of the window to 4'6" (1.37m) above floor level and 6' (1.83m) high, with the eastern example then being remodelled to form a doorway into the later weaving shed. The north-east wall has doorways at either end, that at the northern end probably representing a later insertion, whilst that at the southern end appears to have formed the original access to the engine bed. This had a blocked aperture above, which is unlikely to have been a fanlight, more probably representing the bottom of a doorway affording access to deck level within the engine house.

- 4.3.3 A 6' (1.83m) wide window of 7' (2.13m) height was inserted during the remodelling, and is of brick construction within the window bay, below the sill, and has a large area of rebuild wall, bonded in black sooty mortar, above the internal timber lintel. A 2' (0.61m) wide, 9'6" (2.90m) high wall scar, 7'8" (2.34m) from the south-east wall appears to relate to an internal partition within the engine house, which at bed level suggests that the southern end of the structure was not related to the engine, and therefore perhaps housed a wagon boiler, which would have easily have fitted within this space.
- 4.3.4 Within the south-west wall of the enlarged engine house the sandstone surround for a bearing box survives at a similar height to the windows in the south-east wall (Plate 8). This formed the primary shaft into the ground floor of the later shed to the west. However, it was blocked subsequently, with a small end-bearing box inserted into its external face, with a taller rectangular bearing box inserted through the wall face at a similar height (Plate 8). This almost certainly replaced the earlier cylindrical iron drive shaft with a steel rope.



Plate 8: Southern corner of the engine house, showing scar of the original wall return, and bearing boxes in the extension

- 4.3.5 The remodelling of the engine house following the removal of the engine, probably in the mid-twentieth century, also included the insertion of an internal stairwell in the north-west corner of the structure (Figs 4-6). This comprised a half-turn stair, with concrete steps and landings and a big spine wall of full-brick thickness. The stairs afforded the principal access to the newly inserted floors, although doorways were also inserted to both floors of the weaving shed, and also access onto the roof.

- 4.3.6 At present first-floor level, the north-west wall of the engine house has the sill of the large round-headed window immediately above floor level, demonstrating that the present ground floor housed the engine bed. The window was remodelled subsequently to form two vertical rectangular windows (Plate 5). A blocked, roughly rectangular aperture to the south probably represents a socket for the frame of the original engine, although any matching pair to the north of the window was obscured by heavy render, as is the original element of the south-western wall. Further along the north-western wall, the plinth of the north-western wall of the spinning block survives at landing level, and has a return, forming the stub of the internal north-east wall of the spinning block (Plate 9) with the inserted floor also consistent with that in the weaving shed to the north and east.
- 4.3.7 The original window of the eastern bay of the spinning block was remodelled subsequently, being infilled in brick to form the casing for a bearing box. This housed a drive shaft, and a bevel gear on the external wall face, the scar for which still survives (Plate 5), translating the power through 90°, where it ran along the external face of the original spinning block. A corresponding 29 x 28" (0.74 x 0.71m) aperture was inserted crudely at first-floor level in the north-east-facing elevation of the privy tower, with a similar aperture in its south-west wall (OA North 2011). These represented the apertures for further bearing boxes for a driveshaft, transferring power from the engine house into the 1880s spinning block.



Plate 9: Extant elements of the original spinning block within the remodelled stairwell of the engine house

- 4.3.8 A central doorway in the north-east wall of the engine house facilitating access into the northern section of the first-floor weaving shed was not a contemporary feature, being inserted. This presumably occurred when the earlier doorway to engine deck level from an external stair at the southern end of the wall was blocked (Fig 5).

4.3.9 The window at the opposite end of the north-east wall of the engine house was also almost certainly inserted. Several small areas of rebuilding, in both stone and brick, probably represent apertures relating to the framing of the original engine (Plate 10). The western I-section steel ceiling joist was placed in the upper corner of a much larger rectangular blocking, probably of an approximately 2'6" x 4' (0.76 x 1.22m) window. A circular aperture of approximately 2' (0.61m) diameter is partially obscured by the inserted ceiling, and is brick blocked below, probably at the same time that the floor was inserted (Plate 10). A 6" (0.15m) wide blocking, which is almost the full height of the present first floor, widens to 2'6" (0.76m) one course above floor level, and has a projecting dressed sandstone sill (Plate 10). This has decoration on its exposed face, suggesting its reuse as a pad for the modified engine.



Plate 10: Blocked and inserted apertures in the north-east wall of the engine house, first floor

4.3.10 A vertical window at the southern end of the south-east wall reused the butt joint between the original engine house and its extension as its northern jamb (Plate 11). It was remodelled with brick jambs subsequently, before being externally brick blocked. The south-west wall of the enlarged engine house has a relatively recently inserted doorway towards its western end, presumably replacing an earlier doorway that was 3' (0.91m) from the opposite end of the wall. This was brick blocked flush with a large projecting sandstone lintel (Plate 11), which actually formed the sill for a large bearing box for the primary drive shaft. This was also similarly blocked with engineering brick (Plate 11). The bearing box almost certainly also incorporated a bevel gear for a shaft which ran along the wall face through an aperture in the west wall of the original spinning block, where an external bevel gear powered a drive shaft into the later spinning block fronting Trafalgar Street.



Plate 11: Blocked window, door and large bearing box, first floor, engine house

- 4.3.11 At second-floor level, within the inserted stair tower, the original internal wall of the spinning block bore the angled scar of the single-pitched roof of a two-storey structure placed against the south-western side of the engine house (Plate 12). This projected slightly beyond the angle between the spinning block and the enlarged engine house (Fig 6), and whilst it utilised the earlier stone walls on three of its faces, its south-western wall was of brick construction, in five-stretcher English Garden Wall bond (Plate 7). The roof was evidently removed during the insertion of the stairwell, and the building was extended to the wall height of the adjacent engine house in random sandstone rubble (Plate 7).
- 4.3.12 With the exception of the large round-headed window in the north-western elevation, all other windows appear inserted, with the possible exception of a tall central window in the north-east wall (Fig 6). This was flanked by two large sockets for beams associated with the engine. (Plate 13). That to the west was possibly the housing of the entablature beam, and measured 39 x 27" (0.99 x 0.69m), with a central 4" (0.10m) diameter holes for tying-down bolts in the lintel and sill (Plate 14). The smaller 19 x 20" (0.48 x 0.51m) aperture set slightly higher in the wall to the east (Plate 13), appears to have been placed above the flywheel, and may have housed a beam used for lifting gear, associated with the installation and maintenance of the engine.



Plate 12: Scar of roof line within remodelled stairwell, engine house



Plate 13: Large apertures associated with the engine, with dressed sandstone surrounds



Plate 14: Detail of tying down bolt hole within second floor engine housing

4.4 SECONDARY SPINNING BLOCK

- 4.4.1 The spinning block was rebuilt in an expanded form on the Trafalgar Street frontage, almost certainly following a fire in 1882. The new building was of double-depth construction with paired gables at its north-western end (Plate 15), and a hipped roof to the earlier spinning block to the south-east. Its 10 x 7 bay plan form is unusual for a spinning block, with its 71' (21.7m) width being exceptional for the period; spinning blocks more typically being 10-15m wide, and considerably longer relative to their width. The probable reason for this short but wide spinning block is probably two-fold: first, it incorporated the existing wall of the earlier spinning block, the reversed window apertures, having their inner recessed embrasures on the outer, courtyard face of the extant building; and second, it probably reflects the intended use of the lower floors of the structure for carding and roving machinery.
- 4.4.2 Externally, the construction of the block reflects that of the earlier buildings to the east. It is of dressed coursed sandstone block, with projecting sandstone sills, each with diagonally incised decoration. The lintels, which are of similar style, have further dressed blocks between, forming a continuous string band to each floor (Plates 15 and 16). The windows of the upper two floors diminish in both height and width, with accompanying decreased wall thickness, saving on construction cost, and giving architectural proportion to the structure.



Plate 15: Double-depth spinning block fronting Trafalgar Street, with later stair tower and weaving shed beyond

- 4.4.3 In the northern five bays of the rear (north-eastern) elevation, the lower two floors differ in their construction, as they formed an internal partition to a contemporary perpendicular two-storey structure with a triple-span roof (Plate 16). Each bay had full-height apertures between the two structures on both floors, but these were subsequently reduced to windows matching those elsewhere, following the removal of the smaller structure. Whilst the ground-floor string band in this part of the façade projects similarly to that to the south-east, it is only decorated in parts, whilst that to the first floor is flush with the wall face and incomplete, and all of the projecting window sills are plain, rather than decorated.
- 4.4.4 In the third bay from the north-western end of the façade, a low-level door was inserted into the first-floor aperture, with dressed and decorated sandstone surround and a smaller window above (Plate 16). Pairs of pintels on both jambs suggest that it had external, outward opening double doors. Immediately above, the space below the second-floor window has machine-made brick infilling, framing a timber lined hatch and panel door.
- 4.4.5 The north-western elevation has a parapet to its two gables, and a 3'4" (1.02m) wide ground- and first-floor scar at its northern corner for the perpendicular two-storey structure that originally extended further to the north. The second bay housed a diminished loophole, the ground floor of which appears widened, retaining steel joist lintels, infilled with frogged machine-made brick, bonded in black sooty mortar.



Plate 16: North-eastern façade of the secondary spinning block

- 4.4.6 The chamfered quoins of the entrance are also bonded in a grey cement-based mortar, with coal and grit inclusions, as opposed to the sandier lime based mortar used elsewhere. The adjacent window was also remodelled into a doorway, but thus was not undertaken until after wrought-iron protective bars had been added to all the ground-floor windows on this elevation, their insertion causing cracking of the sandstone.
- 4.4.7 **Ground Floor:** at ground-floor level, all but the bays of the south-eastern wall comprise 5' (1.52m) wide windows, recessed 15" (0.38m) between 5' (1.52m) piers with rounded embrasures (Plate 17). The piers at the northern end of the long walls are only 3'4" (1.02m) wide, and are very crudely keyed into the north-west elevation. The south-eastern bay of the structure butts the privy tower of the earlier spinning block, and is only 3' (0.91m) wide, comprising a 7'5" (2.26m) high, brick-blocked doorway, with thin flagstone lintel and a further clinker-block blocked doorway above (Plate 18).
- 4.4.8 The south-eastern wall is of different construction, again comprising 5' wide windows, but between similar width walls of dressed sandstone block. Only the narrower, 2'10" (0.86m) wide, northern window, placed immediately adjacent to the privy tower, retains its 8" (0.20m) high dressed and diagonally decorated sill, which projects 1¾" (0.04m) from the wall face (Plate 18). Elsewhere the sills were removed, and the apertures extended to floor level, with those in the second and fourth bays being widened slightly below this level. All were brick blocked subsequently, with the exception of the southern bay, which included a 3'4" (1.02m) wide, 7'3" 2.21m high doorway into the stair tower within the brick blocking. Elsewhere, the walls are internally of random sandstone rubble construction, with roughly-tooled, rounded quoins to the window embrasures (Plate 17). The lowest 4'6" (1.37m) of these three walls also have five courses of dressed sandstone blocks above a 7" (0.18m) high sandstone plinth, which projects 1" (0.03m) from the internal wall face (Plate 17).



Plate 17: Detail of internal wall construction, and possible original window frames



Plate 18: Detail of the south-east corner of the ground floor, with original projecting sill of the earlier spinning block

- 4.4.9 In the north-western wall, the second and third bays (from the north) were modified to make entrances. In the latter, the window aperture was simply extended to plinth level, with a concrete ramp inserted internally to floor level. In the second bay, which formed part of a loading loophole, and probably housed an original doorway, the aperture appears to have been widened to 11' (3.35m) for the insertion of a wider folding timber door, and with chamfered external reveals added at this time.
- 4.4.10 The south-west wall, which forms the main facade to Trafalgar Street, has a two-bay wide projection, placed one bay from its eastern end (Plate 15). The bays are of unequal size, divided by a full-brick thickness wall, constructed in five-stretcher English Garden Wall bond, in hand-made brick using a pale lime mortar. The eastern bay houses a straight timber stair to the first floor, the base of which is supported on a machine-made brick wall, also of full-brick thickness, but with only a single course of headers (Plate 19). Valves relating to the sprinkler system were accessed within an alcove on its eastern side. The western bay has a blocked window and a column of similar style to those elsewhere (but without the crush box) carrying a large timber pad to the jointed ceiling beam above (Plate 19). Two bays further along the street frontage, the ground floor window was remodelled to form a doorway, with a projecting rendered brick porch added externally. Partition scars in the floor demonstrate the position of the associated stair down from street level, which is approximately 4' higher on this side of the building.



Plate 19: Projecting tower of south-west elevation with inserted stair and associated column

- 4.4.11 The ground-floor ceiling is carried on three rows of hollow cylindrical cast-iron columns of 7" (0.18m) diameter (Fig 4; Plate 20). These have a 9" (0.23m) high, 8" (0.20m) diameter section at the foot, above a chamfer to a 10" (0.25m) diameter base (Plate 21). This was cast onto a rectangular base plate, 20 x 11 $\frac{1}{8}$ " (0.50 x 0.28m) with 3" (0.08m) diameter circular bolt holes either side of the column. These housed 1 $\frac{1}{2}$ " (0.04m) square nuts, presumably on bolts inserted from below during construction (Plate 21).

4.4.12 Each column head was ribbed above a simple astragal, below a crush box of similar dimensions to the base plate. These were open channel-section boxes, with the base plate of the column above, placed directly onto the channel-section casting below. The central row of columns has line shaft bolting plates on the north-eastern faces of each column. The hangers were bolted through the thickness of the column, their position being adjustable by differential tensioning of the upper and lower bolts (Plate 22). Pairs of bolts extending through the ceiling immediately above this line shaft position in the centre of the southern seven bays suggest the position of further hangers, and a much larger pair of bolts to the east of the southern pair, appear to represent a mounting for a bevel gear, translating the power from a shaft placed immediately to the west of the privy tower at ceiling height



Plate 20: General view of ground floor of extant spinning block



Plate 21: Detail of ground floor column foot



Plate 22: Detail of ground floor ceiling construction

- 4.4.13 The rectangular-section timber beams each spanned half the width of the structure, and were jointed above the central column, where the crush box included a pair of bolt holes in either face. These fixed the joint between the two, presumably butt-ended timbers, using round-headed bolts and hexagonal nuts on alternating faces of each column. The beams, which are apparently of North American softwood, were stop-chamfered to each column. Most are significantly deflected, with late I-section props added adjacent to the south-western row of columns (Plate 20), and with three earlier timber props and a brick pier also supporting the beams at ground-floor level (Fig 4). The fourth and fifth beams from the western end of the ground floor also had bolted iron fitch plates added between the south-western and central columns. The beams carried 7½" (0.19m) x 3" (0.08m) joists, lap jointed onto the beams on 16" (0.41m) centres.
- 4.4.14 In the south-eastern corner of the ground floor, the penultimate two bays had transverse trimmers, of similar scantling to the ceiling beams, placed 5'6" (1.68m) from the north wall. These were housed in simple cast-iron channel-section hangers attached to the beam face with square-headed bolts. These do not appear to have extended into the end bay, where the floor was recently replaced, as there is no evidence for a hanger on this face of the eastern ceiling beam.
- 4.4.15 Whilst the majority of the ground-floor flooring comprises a concrete skim, evidence for earlier flagstones were observed in all but the third of the eastern eight bays. Whilst the flooring is by no means complete in this area, the exposed sections of flagstones suggest transversely aligned rows of irregular-sized flags of between 2 and 3½" (0.05-0.09m) thickness. Further flagstones almost certainly survive below much of the concrete elsewhere.

- 4.4.16 Only two of the ground-floor windows are not modern replacements, surviving in the third and fourth bays from the eastern end of the north wall. Both were clinker blocked externally, but retain 42-light timber frames, with tapering glazing bars and rectangular-section central mullion and transom, below a centrally hung 12-light tilt opening above (Plate 17).
- 4.4.17 Evidence for the sprinkler system also survives on the ground floor, stemming from the south-west corner of the ground floor. An approximately 6" (0.15m) diameter pipe enters the spinning block in the second bay at column head level, from the main supply pipe in the newel of the adjacent stair tower. Unfortunately, a section of the almost complete system had a section removed immediately adjacent to the south-east wall for the insertion of a late steel beam (Plate 23). It is hung from both the ceiling and the ceiling beam in the first bay (Plate 23), whereas in the remaining bays it is hung only from the ceiling beams, on cast-iron brackets. In the second bay, the pipe has a dog-leg, displacing it from the western to the central column (Plate 23). The pipe diminishes along its length in the fifth and eighth bays (Plate 20) to approximately 3" (0.08m) diameter. In the western two bays, where the floor above has been replaced, the pipe was also removed. Within each bay, this feed pipe has either a top or side spur to a T-piece, from where pipes of approximately 1½" (0.04m) diameter span across each bay. In the sixth bay (from the south-eastern end) the main pipe also has a T-piece junction to an additional spur, of approximately 2" (0.05m) diameter, running west between the northern two column rows, but removed subsequently in the western two bays. This was presumably included for specific machinery within this bay, which was possibly of greater fire risk, and demonstrates the mixed use of the ground floor. In the south-west corner of the ground floor, a 2½" (0.06m) diameter vertical water pipe has a square-section spanner on a control rod, possibly representing a major control valve (Plate 24).



Plate 23: Main sprinkler pipe at ground floor level



Plate 24: Control rod attached to water pipe at ground-floor level

- 4.4.18 A short, straight timber stair in the south-western corner currently affords access to the stair tower, and appears to be of mid-twentieth-century date, although modified (Plate 24). It enters the stair tower through a remodelled window aperture from the original spinning block, and although there was probably some communication between the ground floor and the stair tower, its form remains unclear. Principal access to the stair tower was from the courtyard within the ground floor of the earlier spinning block, and it is possible that access from the preparatory processes of the ground floor to the spinning floors above was not generally required for personnel.
- 4.4.19 A stair of apparently similar mid-twentieth-century date also survives adjacent to partitions added by the principal entrance in the north-east wall. This has a replaced half-landing, and has very little headroom to the first floor, suggesting that it did not form regular access between the two floors. The clinker block partitions inserted below formed two late toilet cubicles adjacent to the north-east wall.

- 4.4.20 **First Floor:** the first floor is of similar construction to floor below, with 5' (1.52m) diameter windows. However, in the north-eastern elevation, the north-eastern four bays have blocked window openings, with a doorway incorporating a rectangular stone surround inserted in the third bay from the end. This afforded access into a later, and subsequently demolished, two-storey structure (Plate 16).
- 4.4.21 The columns were of similar design, but of only 6" (0.15m) diameter and with the central row having the line shafting bolting plates on the south-western face. Remarkably, the south-western row of columns was repositioned 4' (1.22m) towards the centre of the building (Fig 5), the stop chamfers in the ceiling beams clearly showing their original position (Plate 25). Partial removal of a section of flooring above the ground-floor column also revealed that the foot of the first-floor column was secured to the column below by being bolted into the beam below, rather than any form of jointing of the ironwork (Plate 26). An additional 5" (0.13m) diameter column was inserted in the south-eastern corner of the first floor, at the first bay division, and was centred 2'6" (0.76m) from the wall. It had a rolled chamfer to a simple flat head, below a timber pad, and had been inserted to support the end of the beam, which had a section removed adjacent to the wall face (Plate 27).



Plate 25: Stop-chamfers and bolt holes relating to original column position, first floor



Plate 26: Detail of crush box of ground-floor column and jointing to original position of column above



Plate 27: Additional column inserted at first-floor level to carry cut ceiling beam

4.4.22 The fourth column from the eastern end of the central row had a cast-iron corbel attached to its bolting plate, supporting a footstep plate for the main sprinkler pipe, which rose to the second floor in this position (Plate 28). It entered the first floor immediately adjacent to the column to the west, and had a junction at its top, forming a feed to a longitudinal pipe between the central and north-western column rows (Plate 28). This had similar spurs to each bay as at ground floor level, with an additional spur on the northern side in the penultimate bay from the western end. Recessed within the window bay at the southern end of the north-western wall was a valve relating to the sprinkler system. This almost certainly fed an external alarm bell.



Plate 28: Detail of sprinkler system at first floor level

- 4.4.23 Above the doorway in the southern bay of the north-east wall, the 8¼" deep sill and western jamb of an apparent 2'6" (0.76m) square aperture survive. This probably represents the housing for a bearing box relating to a primary drive shaft from the engine house to the north-east. A brick-blocked 2' (0.61m) square aperture within a 6" (0.15m) wider, rebated section of wall in the adjacent south-eastern elevation is almost certainly associated, with a vertical shaft almost certainly being placed in this position (Plate 29). A 6'5" x 3" (1.96 x 0.08m) doorway beneath was blocked with later engineering brick, whilst a doorway into the privy tower, at the southern end of the north-east wall was more recently clinker blocked (Plate 29).
- 4.4.24 A ceiling level 2' (0.61m) wide, relatively ornate end bearing box survives in the south-east wall, one bay to the north of the central column line (Plate 30). This aligned with pairs of bolt holes, placed only 6" (0.15m) apart through each ceiling beam, 2' (0.61m) to the south of the north-eastern column row (Fig 5; Plate). Similar bolt hole pairs were observed following the cleaning of the beams, 2'3" (0.68m) from the north-eastern wall, and 6 and 13' (1.83 and 3.96m) from the north-west wall. Whilst several line shafts would have been used to power the relative small throstle frames, it is likely that one of the two lines in the western bay represents a replacement. Several of the ceiling beams also had cut-outs in their face or soffit (Plate 25), but as no patterns were identified, it is difficult to interpret their function.



Plate 29: Bearing boxes in south-east corner of first floor



Plate 30: Ornate end bearing box at first floor level

- 4.4.25 The projecting two-bay structure towards the southern end of the south-western façade has two I-section beams across the internal wall face, each 10 x 4" (0.25 x 0.10m), and with no discernible rolling stamp. These carry a pair of smaller 8 x 4" (0.20 x 0.10m) steel joists, carrying a similar thickness wall above, and supported by a one-brick square pier at the offset bay division. A twentieth-century straight stair rises from ground-floor level immediately to the north, with a series of scars within a bitumen and felt covering to the floor in the eastern five bays of this area (Plate 26), suggesting office partitions. An early or mid-twentieth-century safe adjacent to the north-west wall between the fourth and fifth bays suggests that the manager's office was placed in this position. Original access was from the stair tower in the south-eastern corner, although it remains unclear why additional internal access was required in such a relatively close position. A further straight stair of similar style afforded access directly from Trafalgar Street to the inserted first-floor offices.
- 4.4.26 Elsewhere, the floor comprises longitudinally placed 9½" x 16' (0.24 x 4.88m) planks (Plate 26). These were grooved in either edge for a 7⁄8" x 3⁄8" (0.02 x 0.01m) loose tongue. These overlay a double layer of ¾" (0.02m) thick, 4 to 9" (0.10–0.23m) wide boards, the lower of which were laid transversely.
- 4.4.27 **Second Floor:** the second floor is very similar to that below, being of non-fireproof construction, and having had the north-western row of columns repositioned 4' (1.22m) towards the centre-line of the mill. However, there are subtle differences; the columns are more slender, being only 5" (0.12m) diameter, the outer rows of columns have flat, rather than channel-section heads, with the central row columns not including bolting plates for line shaft hangers within the castings. The windows are also more slender, being only 4'6" (1.37m) wide between larger piers (Fig 6). Two additional columns were placed in the south-eastern corner of the floor, at the second and third bay divisions (Fig 6). These are also of 5" (0.12m) diameter, but are not ribbed, with simple astragals below a 10" (0.25m) flat cap, with square-section bolt holes. Whilst the southern of the two beams is cut adjacent to the north wall, the columns appear to relate primarily to an inverted T-section cast-iron beam in the third bay, placed 3' from the north-east wall (Plate 31). This has a 20" mounting at its western end, with four rectangular-section bolt holes, typical of a shafting hanger. An infilled aperture with sandstone surround in the adjacent north-east wall housed the end bearing for this shaft, the hanger almost certainly housing a bevel gear. At the opposite side of the building, the adjacent ceiling beam has been spliced, and has an additional beam below, bolted from above, and supported at its end by an ornate chamfered timber post (Plate 32). A rebate in the soffit of the original beam above, almost certainly mark the position of an end bearing for a horizontal line shaft. These are replicated along the length of the floor, with two pairs of bolt holes, 19" (0.48m) apart, placed 3' from the column row, with a similar arrangement of bolt holes on each beam placed 2' (0.61m) inside the north-eastern column row (Fig 6). Evidence for a blocked bearing box aperture, presumably similar to that on the first floor, was observed following the cleaning of the south-east wall. Further bolt hole pairs, on similar spacings to the floor below, were also placed 6' (1.83m) from either long elevation, with a final set, spaced 9" (0.23m), 7' (2.13m) to the south-west of the central column row (Fig 6).



Plate 31: Cast-iron beam with bolting plate for line shaft hanger above blocked end bearing box in wall



Plate 32: Spliced and propped beam at second-floor level

- 4.4.28 The projecting bays towards the southern end of the north-west elevation are sub-divided by an L-shaped, hand-made brick wall of full-brick thickness. The main sprinkler pipe rises vertically from the first floor, and continues up to the third floor, with a simple T-piece junction for the second floor off-take. Only its spur to the east survives.
- 4.4.29 In the north-eastern three bays adjacent to the north-east wall, a 2'6" (0.76m) width of replaced floorboards at second- and third-floor level suggests some form of communication between the two. A paint scar on the eastern jamb of the third bay window rises at approximately 60° from the east, possibly representing the only surviving evidence for the original internal stair, prior to the construction of the fireproof stair tower in 1889. Two areas of raised flooring in the eastern two bays demonstrate the position of relatively late offices.
- 4.4.30 **Third Floor:** the third floor differs considerably from those below, having only a central row of 5" (0.12m) diameter columns (Fig 7: Plate 33). These retain the channel section heads, not only supporting the jointed beams above, but also the valley between the two roof spans. The bay to the north-east of the column row has edge-set trimmers in cast-iron brackets, to each bay (Plate 34), although that in the south-eastern bay has been lost. In the third bay (from the south-east) a further trimmer, placed adjacent to the columns, is laid on its opposite axis. A final edge set trimmer, has been removed from the second bay, adjacent to the south-east wall. The beams have many irregular bolt hole pairs in their faces, but a row of pairs, centred approximately 5' (1.52m) from the north-east wall in the north-western five beams align with a small indent in the soffit of the adjacent beam, an 18" (0.46m) wide cut-out in the soffit of the eastern beam, and a blocked aperture in the south-east wall, which probably represents an infilled end bearing box. This strongly suggests the position of a line shaft, and that spinning was also undertaken on this floor.

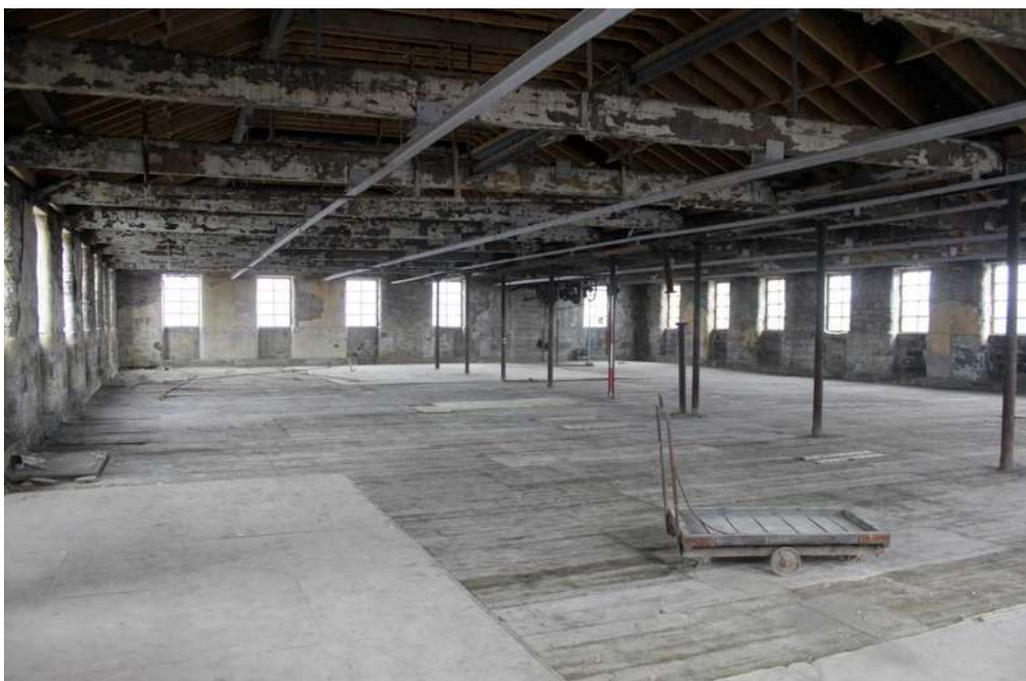


Plate 33: General view of third floor of extant spinning block



Plate 34: Trimmers between tie beams, housed in cast-iron brackets

4.4.31 The beams form ties to composite king tie trusses, with approximately 2" (0.05m) diameter wrought-iron king ties with cast-iron housings at the apex with castings for 8 x 3" (0.20 x 0.08m) ridge purlins in either face (Plate 35). Similar scantling collars are bolted onto the eastern face of each truss (Plate 35). The roof above has been renewed, although the principal rafters were retained, and these bear no evidence for purlins (Plate 35). Each bay of the south-east wall has two projecting cast-iron corbels, with a 3" (0.08m) housing for a transverse timber beam above (Plate 36). This was replaced latterly with laminate timber beams, but appears to have also originally housed the wall plate for the hipped roof. This is a most unusual arrangement, but appears to have been part of the solution of joining the roofs of the earlier and later spinning blocks. The north-west wall of the earlier structure was slightly higher, and had an internal sandstone gully behind parapet coping stones (Plate 37). It seems likely that a similar channel was added to the external face, forming a drainage channel for the lower roof of the newer structure.

4.4.32 The upper-floor windows are only 4' (1.22m) wide, between 6' (1.83m) piers, with the loading bay in the north wall retaining what appears to be an original doorway and associated hoist gear (Plate 38), converted subsequently for use with an electric motor. The hoist was locally manufactured by 'Samuel Baldwin & Heap Ltd, Makers, Burnley, (England)', and hung from the north-western beam, although it appears to have been transferred latterly to inserted rolled steel joists (Plate 38). It also retains gearing, connected by a rope to a gear wheel on the adjacent beam, which is connected on a fixed axle to a smaller, wider wheel that transferred power from a line shaft via a leather belt drive (Plate 38).



Plate 35: Detail of spinning block roof structure



Plate 36: Corbel housing wall plate against south-east wall



Plate 38: Detail of guttering above original spinning block



Plate 39: Original hoist on third floor of spinning block

4.4.33 The projecting bays in the south-western corner of the floor retain an L-shaped wall, similar to the floor below, but with two I-section steel joists supporting both the tie beams to the west, and the valley of the pitched roof of the projecting bays. Joist sockets 1' above floor level in the western face of the dividing wall suggest further internal partition was removed subsequently. The floor comprises only a single layer of transverse 12' x 9" x ¾" (0.30 x 0.23, 0.02m) boards, with several areas of repair or replacement. A vertical water pipe in the south-western corner of the floor retains a square spanner and pulley similar to that at ground-floor level.

4.5 STAIR TOWER

4.5.1 The later 1889 stair tower is of sandstone and brick fireproof construction, with flag floors. It was constructed to a height of six storeys, two higher than the adjacent spinning blocks, and has a greater degree of architectural detailing (Plate 15). This includes round-headed windows (Plate 40) and decorated plasterwork internally, augmenting dressed and decorated stonework to the hollow newel, and the lowest 4'7" (1.40m) of each quarter turn landing (Plate 41). The lower three floors of the tower are constructed internally in random rubble, with later blocking / rebuilding of the window aperture in the west wall of the earlier spinning block. At third-floor height, all but the west wall are of brick construction internally (Plate 40), as is the north wall on the remaining floors of the tower, where it projects above the height of the earlier structure. Each of the lower floors have projecting convex sandstone corbels below ceiling level in the north-west wall to support an I section beam which carries the western edge of the three sandstone flags of each landing.



Plate 40: Round-headed windows in brick elevations on fifth floor of stair tower, with valve and spur on dog-legged main sprinkler pipe



Plate 41: Decorative ashlar stonework below rubble construction within stair tower

- 4.5.2 The central newel is of dressed and decorated ashlar block (Plate 42), measuring 5 x 3' (1.52 x 0.91m) to third-floor landing height, where it widens to 4' (1.22m), and is capped with a two piece 63 x 39" (1.6 x 0.99m) rolled sandstone lid of 3½" (0.09m) thickness (Plate 42). A later brick box of similar dimensions sits on a raised timber floor to the south and has a metal sheet lid (Plate 42). The newel housed the supply pipe for the automated sprinkler system, manufactured by Witter & Son of Bolton.
- 4.5.3 'The 'Witter' automatic sprinkler gained a reputation for reliability and robustness, and was one of the earliest such systems developed, following the introduction of sprinkler systems into Britain during the early 1880s. Indeed, by 1888, the year prior to the installation of the system at Victoria Mill, only 233 cotton mills in England had working automated sprinkler systems (Wormald 1923). On each floor, the newel has an access hatch comprising a 19 x 20" (0.48 x 0.51m) iron housing for a sliding metal sheet door (Plate 42). Each had a handle at its base allowing it to be raised to gain access to the sprinkler feed pipe when required.
- 4.5.4 The main valve is located within the earlier spinning block to the east (Plate 43). From the main valve, sometimes referred to as a 'Christmas tree', the water supply entered the spinning block, before being transferred between floors in vertical pipes placed adjacent to columns. The system, including the glass bulb sprinklers themselves (Plate 44), appears to survive almost completely intact.



Plate 42: Top of dressed central newel in stair tower



Plate 43: 'Christmas tree' valve of Witter automated sprinkler system



Plate 44: Glass sprinkler bulb

- 4.5.5 A 6" (0.15m) diameter pipe and a smaller 1" (0.03m) pipe rise through the floor above to an S-bend, with valve and spur (Plate 40), deflecting the pipe to the north, before it rises through the cast-iron base of the water tank, housed on the upper floor below a single-pitch roof. The tank measures 15'9" x 10' (4.80 x 3.04m) and is 5' (1.52m) deep, and comprises five rows of two 5 x 3' (1.52 x 0.91m) base panels and five 4 x 3' (1.22 x 0.91m) side panels (Plate 45), each with decorated outer face (Plate 46). The tank has two transverse, and one longitudinal wrought-iron rod braces, within cast iron housings (Plate 45). A secondary pipe rises to almost the top level within the tank, demonstrating its use to fill the tank (Plate 45), with a 2½" (0.06m) diameter pipe entering from below, but truncated within the fourth floor level.
- 4.5.6 The tank is carried on two 1' x 6" (0.30 x 0.15m) I-section beams, with the remainder of the upper floor comprising four loose 11 x 1½" (28 x 0.04m) planks and a 21" (0.53m) wide raised section of 4" (0.10m) tongue and grooved boards on joists adjacent to the south wall (plate 46). The floor below comprises longitudinal 4½- 5" (0.11-0.13m) tongue and grooved boards above 9 x 3" (0.23 x 0.08m) joists on 16" (0.41m) centres. The upper two floors are accessed by steep timber stairs, only 26½" (0.67m) wide, with open tenoned treads of 6 x 1¾" (0.15 x 0.04m) and chamfered rectangular section handrails and newel posts.
- 4.5.7 Below ceiling level on the third floor, attached to the north wall, is a timber water gauge for the tank above. It retains red painted full and half unit measures, with the numerals 1 to 4 and the word FULL down the left side (Plate 47).

- 4.5.8 At ground- and first-floor level the tower had ornate doorways into the weaving shed to the east, with a further doorway into the reduced two-storey block to the north at ground-floor level. The entrances into the spinning block were far plainer, having only a simple rolled jamb on the southern side, and a square rebate on the north, presumably originally housing fireproof doors.



Plate 45: Construction of sprinkler system header tank



Plate 46: Decorative panelling of sprinkler system header tank



Plate 47: Water level gauge for sprinkler system header tank

4.6 WEAVING SHEDS

- 4.6.1 The tower was of a broadly contemporary date to a two-storey weaving shed and warehouse along the eastern boundary of the mill complex. This was of red brick construction (Plate 48), with the exception of the Trafalgar Street façade, which is of stone, and may be a remnant of an earlier structure, as are sections of the north-east elevation.
- 4.6.2 The lower floor of the weaving shed is of fireproof construction, with wide-spanning vaulting. It is punctuated by a passageway through the building (Fig 4; Plate 49), placed immediately north of, and parallel to the engine house. To the south-west, the warehousing is divided by an inserted transverse wall, which encloses a row of columns, and marks a change in the present floor level.



Plate 48: Southern aspect of the late nineteenth-century weaving shed



Plate 49: Passageway with apertures into earlier structure and fireproof vaulted ceiling below first-floor weaving shed

- 4.6.3 The smaller, irregularly-shaped ground floor to the north of the passageway, follows the line of the Leeds and Liverpool Canal, and is also of fireproof construction, and with high arched ceilings of concrete construction. The concrete appears original and mainly comprises angular pebbles of 1 to 2" (0.03-0.05m) diameter, bonded in a grey matrix with charcoal inclusions (Plate 50). This was sealed on the underside with a ¼" (0.01m) thickness of plaster, which previously had given the illusion of covering brick. The concrete appears to have been formed in two stages, firstly forming the ceiling arch, with a subsequent layer forming the weaving shed floor above (Plate 50). Strengthening bars also run laterally through the concrete, placed between columns, which are vertically interlocking above the I-section ceiling beams (Plate 51). These I section beams are 14" (0.36m) thick at their junction with the columns, around which they are moulded, and appear to be whale backed in profile (Plate 51). Above this joint the column has a 6" (0.15m) high bolting plate cast on its western face. This houses the rods joining the beams either side (Plate 51). The upper 1½" (0.04m) diameter rod, from the west, has a round washer and a hexagonal nut, whilst the lower bolt has a moulded washer, curved around the column on its inner face with a flat 3½ x 2½" (0.09 x 0.06m) outer face for the 2½ x 1½" (0.06 x 0.04m) hexagonal nut (Plate 51). The 6" (0.15m) diameter first floor column has a 3½" (0.09m) deep, 8" (0.20m) diameter foot, which appears socketted onto the column below, without any form of fixing (Plate 51). The concrete itself has a maximum thickness of 2' (0.61m), adjacent to the column (Plates 50 and 51). The lower 11¼" (0.29m), infilling the ceiling beam web, is hard, but the remainder, below a 2" (0.05m) thick fine aggregate flooring layer, comprises very loose aggregate and clinker (Plates 50 and 51). This may have been incorporated to reduce vibration.



Plate 50: Detail of concrete ceiling arch construction



Plate 51: Detail of column jointing between floors of the weaving shed

- 4.6.4 The east and west bays have longitudinally aligned arches, with those in the eastern bay irregularly spaced either side of a tapering stone chimney (Plate 52), whilst the central six bays have transverse arches. These are carried on 7" (0.18m) diameter columns placed 9'6" (2.90m) and 19' (5.79m) apart, the southern row being obscured at its western end by a later full-brick thickness partition in English bond.



Plate 52: General view of the northern preparation area, ground floor, weaving shed

- 4.6.5 The triangular bay in the north-western corner of the building has a flat ceiling, whilst that to the south had no ceiling at the western 5' (1.52m) of the bay, suggesting the position of an internal hoist to the floor above. This hole in the ceiling was infilled subsequently with concrete. The end of the I-section beam to the south is carried on a 20" (0.51m) square stone pillar within the west wall, which also forms the jamb to an 8' (2.44m) wide doorway.
- 4.6.6 The north-east wall follows the line of the canal, and has tall windows of approximately 5'8" (1.73m) width, except from that in the fourth bay from the east end, which is narrower. The south-east wall had similar windows, with that in the second bay from the southern end retaining a damaged nine-light timber frame. A doorway (with blocked fan light above) on its northern side afforded access, whilst the chimney to the north was incorporated into the building and was flanked by narrower windows (Plate 52).
- 4.6.7 The partitioned room in the south-western corner represents the remains of an earlier boiler house, constructed originally in sandstone, and with the remnant of flues in its south-eastern wall (Plate 53). Pulley wheels, relating to damper control rods for the butterfly valves of the boiler flues also survived *in-situ*, attached to the southern transverse ceiling beam. It presumably served the engine house immediately to the south of the passage, with the flues leading to a tapering stone chimney, which was incorporated into the east external wall of the weaving shed. Recent subsidence within the warehouse by the canal-side revealed structural remains below floor level, suggesting that culverts and features relating to earlier processing within this part of the site survive.



Plate 53: Blocked, refractory brick-lined flue in south east wall of boiler house, with pulley wheels for dampers on the ceiling beams above

- 4.6.8 The south-east wall of the earlier boiler house was 18" (0.46m) thick and incorporated dressed sandstone blocks in its external face. Its northern end was reduced to form an apparent buttress to a partition wall, but still retained a brick-blocked 3' (0.91m) wide aperture that would have housed the flue from the northern boiler (Plate 54).
- 4.6.9 The brick partition between the boiler house and the remainder of the building incorporated earlier 6" (0.15m) diameter hollow cylindrical columns placed 9' (0.23m) apart, and not below the beams of the vaulting, which were supported on sandstone pads set within the brick wall (Plate 55). This suggests that the vaulting was not part of the original construction of the two-storey building. The vaulting in this part of the structure was also brick, rather than concrete (Plate 55), also suggesting a different date of construction. It is therefore probable that both the columns and the brick vaulting relate to the original structure, prior to its incorporation into the later building. This may also explain the reduction in height of the stone-built south-east wall of the boiler house at an approximate 45° angle (Plate 54). The north-west elevation also appears original, with its internal stone piers no longer carrying longitudinal ceiling beams, and with the south-eastern two set too close to allow the insertion of a 8' diameter Lancashire boiler, requiring carving to facilitate the process (Plate 56).



Plate 54: Reduced stone wall within later weaving shed, with blocked flue bottom left



Plate 55: Earlier columns concealed within brick partition, with brick vaulting above



Plate 56: North-western face of preparation block / weaving shed, with enlarged doorway for insertion of Lancashire boiler

- 4.6.10 The south-west wall has a projecting external plinth (Plate 49), matching that of the engine house to the south, and has 4' wide doorway at its north-western end, with dressed and decorated sandstone surround (Plate 49), and rolled internal embrasure. A lower (4'6") doorway at the eastern end if the original boiler house wall was of only 3' width and appears crudely inserted, with brick jambs and a metal lintel, and late rough brick blocking.
- 4.6.11 A further inserted aperture at the base of the southern end of the south-east wall is 26" wide, and is of refractory brick construction below a cast-iron lintel. This housed the flue from the southern of two Lancashire boilers, and was brick blocked subsequently following the removal of the boilers. A 28" square aperture immediately to the north, and placed higher in the elevation, had a timber lintel above refractory brick blocking, and represents an original window. Five higher-level windows in the south-west wall were each 3' wide and of semi-circular design with dressed sandstone surrounds and apparently with external metal shutters (Plate 49), allowing light into the original structure. Brick rebuilding above relates to the addition of the two-storey weaving shed, obscuring the aperture housing the steam pipe to the engine.
- 4.6.12 Beyond the original stone structure, in the southern corner of the ground floor to the north of the passageway, a 3½ x 1 bay room housed a further structure relating to the power plant. Its north-west wall comprises a mixture of wire-cut red and yellow refractory bricks, laid in four and five stretcher English Garden Wall bond (Plate 57). The south-west wall was of dressed sandstone externally, but was internally faced with similar brick to the north-west wall, laid in three stretcher English Garden Wall bond. All but the eastern 9' (2.74m) of the wall was lined with a further keyed skin of refractory brick, to a height of 6'2" (1.87m) above present earth floor level, where a course of edge set brick supported a course of 6" (0.15m) thick 9" (0.23m) wide refractory tiles,

which projected up to 7" (0.18m) beyond the wall face (Plate 57). These represented the roof of a structure, almost certainly an economiser, which was fed by the flue in the southern corner of the boiler house to the immediate west. At the eastern end of the refractory lining, above a height of 2' (0.61m), and level with the flue top from the boilers, the broken return of its eastern wall is visible, although there is no associated scar in the north-east wall. The lower part of the wall continues along the wall face for a further 34" (0.86m) where it has the remains of a concrete skirt. This forms the edge of a very rough floor, the slight cleaning of which revealed below-ground remains of an edge-set sandstone structure and a brick-lined flue. A 2½" (0.06m) diameter hollow steel pipe spanning the room at this point, 7' (0.18m) above the rough floor, presumably relates to the framing of the structure within the building.



Plate 57: Probable economiser structure within ground floor of the weaving shed

- 4.6.13 The passageway to the south also has a concrete-arched ceiling, on a similar alignment to the building to the south, although carried on narrower I-section beams (Plate 49). Although the corridor extends beyond the southern extent of both the engine and boiler houses, it was faced with similar dressed stone on both sides. A doorway with rubbed quoins was included at the southern end of the passage in an angled return to the weaving shed (Plate 48), at which point the wall became faced with engineering brick, constructed in three-stretcher English Garden Wall bond (Plate 48).
- 4.6.14 The ground floor of the structure comprised two rooms, separated by a partition of full-brick thickness. This represents a remodelling of the structure, clearly demonstrated by the retention of the original columns within the partition (Fig 4; Plate 58). The floor level of the western room was also raised by 6" (0.15m) at this time, possibly when it was converted into Victoria Skating Rink Prior to 1912, when the room is marked on the Ordnance Survey 1:2500 edition (Fig 3).

- 4.6.15 A “Hunter & Bennie, Partick, Glasgow” Codd bottle was recovered from beneath this floor, when it was removed during the present renovation scheme. Whilst Codd bottles were introduced in 1872, prior to the erection of the structure, they became less common in the first decades of the twentieth century, suggesting that the floor was raised around this time at the latest. Elements of the original flagstone floor survived in the eastern part of the shed, comprising relatively small 3 x 2' (0.91 x 0.61m) flagstones.



Plate 58: Columns incorporated within inserted brick partition in the weaving shed

- 4.6.16 The ceiling throughout the structure was continuous and comprised concrete vaulting, identical in structure to that to the north-east, and also carried on 7" (0.18m) diameter columns (Plate 58). The majority of the vaulting was placed on a north-west/south-east alignment (Plate 58), although the outer bays and that on the western side of the engine house had transversely aligned vaulting (Fig 4; Plate 59). Line shaft hangers were mounted directly onto the inverted T-section ceiling beams, their subsequent removal leaving only four small scars (Plate 59). Two *in-situ* hangers survived approximately midway between the south-eastern column and the main loading doors, presumably providing power for a hoist that was removed subsequently (Plate 60). The hoist carriage remained within the debris in the shed, along with a Singer sewing machine, the hoist being manufactured by ‘The Lift & Hoist C^o Premier Ironworks, Deptford, London’. Further shafts appear to have been placed midway between the other column rows, and to the north-west wall. These shafts do not align with either the bearing box or vertical aperture in the west wall of the engine house (Plate 59), suggesting that the transversely laid beams adjacent to the engine carried a bevel gear. The inserted brick partition incorporated a bearing box in its north-eastern face (Plate 58), place at the midpoint between the two northern columns, demonstrating that power was retained within this part of the building following its partition.



Plate 59: Vaulting alignments, scars for line shaft hangers, and blocked bearing boxes in engine house wall



Plate 60: In-situ line shaft hanger in the weaving shed

- 4.6.17 The north-west wall of the shed was of random rubble construction, and had a wide doorway into the original spinning block. A further man door was blocked, and had a decorated lintel, suggestive of an external face. A further doorway affording access to a passageway on the southern side of the stair tower, had rolled render reveals, and was inserted at street level, significantly above original floor level within the shed.
- 4.6.18 The first floor of the structure comprises a large weaving shed (Plate 61), with north-light, saw-toothed roofing, supported on joists that are probably of wrought iron. These are carried on 5" (0.13m) diameter cylindrical cast-iron columns, each with a line shaft hanger bolting plate on its eastern face, with through-bolt holes on the reverse (Plate 62). To the east of the engine house, however, only alternate valleys were supported by columns, with the intervening valleys carried on transverse, whale-backed cast-iron beams (Fig 5; Plates 61 and 62). Each of these had a casting for an additional bolting plate for a line shaft hanger below each unsupported valley (Plate 62). Within this part of the shed, to the east of the chimney in the south-east wall, and to the west of the engine house in the north-west wall, all bays have 8' high vertical windows (Plates 61 and 63). This strongly suggests that weaving was not undertaken in this part of the shed.



Plate 61: General view of the first-floor weaving shed



Plate 62: Whale-backed beams carrying roof valleys between column rows



Plate 63: Chimney incorporated in weaving shed, with stub of line shaft hanger to right

4.6.19 Elsewhere, the south-eastern wall has 6' wide, 9½" deep arched alcoves within each bay (Fig 5). The third from the west end is overlain by a 2' (0.61m) square hand made and refractory brick flue, presumably for a late stove inserted at ground floor level and removed subsequently. Four bays to the south of the chimney, around which the brick wall is constructed (Plate 63), the south-east wall has a 9' (2.74m) wide loading door with I-section lintel, and an inserted motorised hoist, housed on a framework of I-section steel beams, attached to the bolting plates of the earlier line-shaft hangers at either side (Plate 64). The broken foot of a single line shaft hanger survives *in-situ*, immediately adjacent to the chimney, against the south-east wall (Plate 63).



Plate 64: Inserted hoist, attached to line shaft hanger bolting plate

4.6.20 The southern five bays of the Trafalgar Street wall have similar alcoves, but with a continuous projecting sandstone plinth, 6" (0.15m) high at the base of the wall. To the north the wall is plain except for projecting bolt triplets for line shaft bevel gears (Plate 65), which extend along the length of the wall to an extant 10" (0.25m) square end bearing box for the line shaft adjacent to the southern column row (Fig 5; Plate 66). This suggests that the two line shafts to the south were powered by a belt from this shaft.



Plate 65: Bolting face for bevel gear in south-west wall of weaving shed

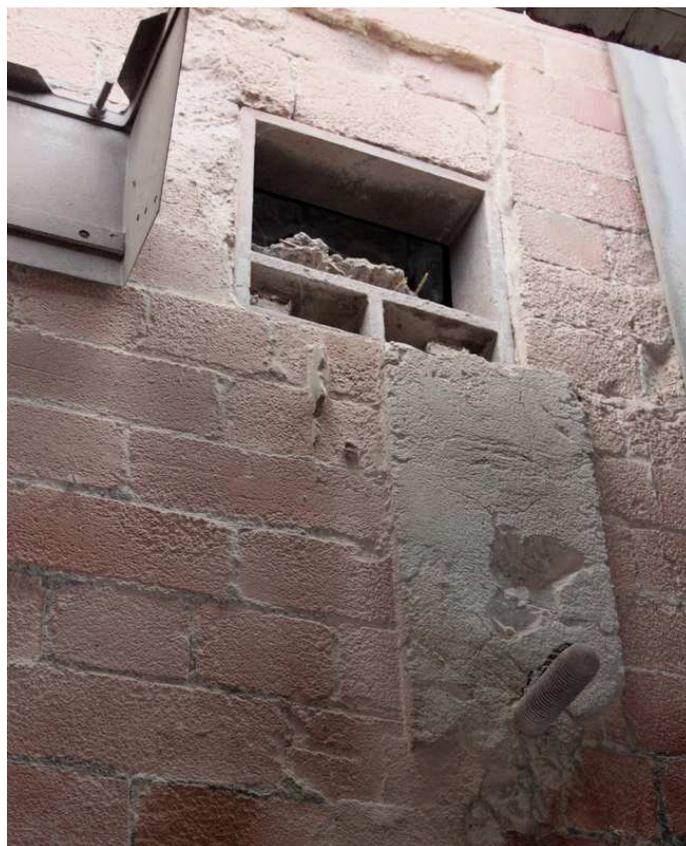


Plate 66: Bearing box above bevel gear in south-west wall of weaving shed

4.6.21 The north-light roof comprises 18½" (0.47m) wide beams with 13" (0.33m) wide, 7" (0.18m) high central channels for drainage (Plate 67). Each beam section spans the 20' (6.09m) length between columns, where they are butt jointed with two bolts either side, and with an additional U-section base plate, forming part of the casting of the column capital (Plate 68). The beams were laterally braced with tensioning rods, bolted through the face of the valley channels (Plate 68). 3¼" (0.08m) wide, T-section cast-iron rafters were also bolted to the face of the valley channels (Plate 67), placed on 80" (2.03m) centres to form the frame of the glazed north-eastern pitch. At their upper end, they had a jowled head with four bolts to an edge-set timber ridge board, which were butt-jointed in this position (Plate 69). The gentler sloping south-west pitch was formed of similar edge set, 5¼ x 1½" (0.13 x 0.04m) timber rafters, placed on 15" (0.38m) centres (Plate 67). Each ridge also has a 6' x 6" (1.83 x 0.15m) timber vent with circular openings, adjacent to the ridge on the south-western pitch within each bay (Plate 67).

4.6.22 The engine house has an infilled window in its south-eastern wall at first-floor level, blocked with brick when the weaving shed was constructed. Three apertures in the south-western wall were also blocked with brick, The southern of these was 3' (0.91m) wide, and had a dressed stone surround (Plate 70), representing the housing for the primary drive shaft into the shed. It was remodelled subsequently to form a narrower 2' (0.61m) aperture immediately to the north. The remaining square apertures were each approximately 1' (0.30m) square, and appear to represent the position of end bearings for the northern two line shafts (Fig 5; Plate 70).

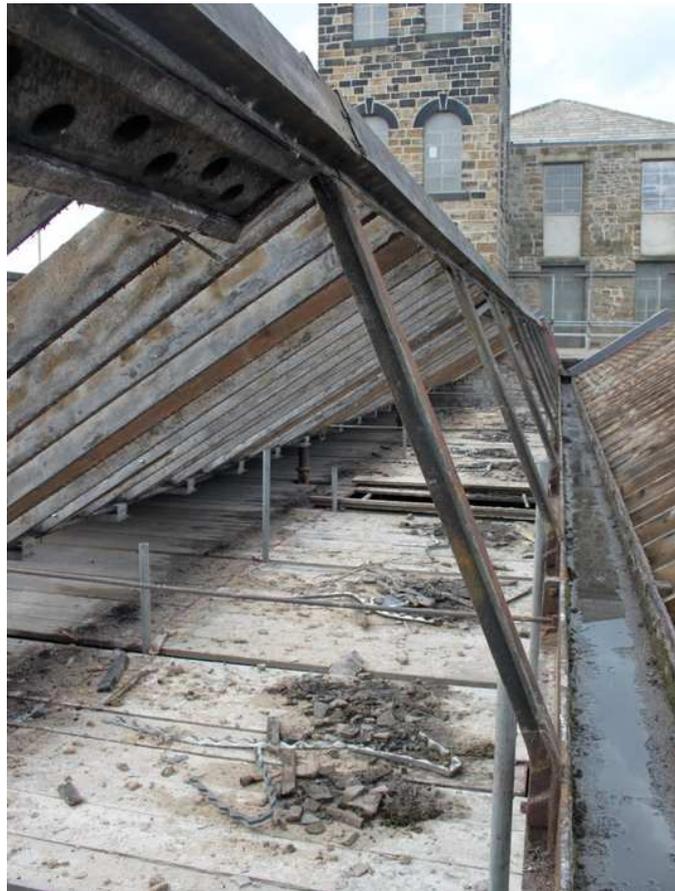


Plate 67: Detail of north-light roof construction



Plate 68: Jointing of valley gutter at column capital



Plate 69: Head of cast-iron rafter in the weaving shed



Plate 70: Columns incorporated within inserted brick partition in the weaving shed

4.7 WISEMAN STREET WORKS

- 4.7.1 As part of the remodelling of the Victoria Mill complex, landscaping on the opposite side of the Leeds and Liverpool Canal led to the proposal to demolish a single-storey structure, known as the Wiseman Street Works (Fig 1; Plate 71). Although heavily remodelled, the structure pre-dates the Victoria Mill complex, and is shown on the first edition Ordnance Survey map of 1851, and was therefore incorporated within the recording survey, but at a reduced English Heritage Level I-type survey.



Plate 71: Wiseman Street Shed from the south

- 4.7.2 The structure appears to have originally been a four by three bay structure with a wide entrance on its western façade, which was of dressed sandstone block, as were the other external walls (Plate 71). The doorway had an I-section lintel, suggesting that it had been enlarged, but formed the principal access from the courtyard of the Oak Mount Mill complex, within which the building was placed. The doorway, which was stone blocked subsequently, was flanked by vertical windows to each bay, with projecting sandstone sills. All were brick blocked as part of a re-roofing of the structure in the late twentieth century (plate 71).
- 4.7.3 The building almost certainly served as a warehouse, with a nearby gate in the boundary wall of the complex, depicted on the Ordnance Survey plan of 1851, affording good access to the canal towpath. It was extended to the east, prior to 1892, with the demolition of the original return wall (Plate 72). The scar of a stone stair in the north wall of the extension (Plate 73) demonstrated the new structure was originally two-storey. By 1892 the Oak Mount Mill complex had condensed to the east (Fig 2), almost certainly following a fire in 1884 (OA North 2010b), and the building now lay beyond its boundary wall. Its extension is therefore likely to have coincided with a change of ownership, with the expanded structure becoming an independent concern, possibly occupied in 1896 by Henry Eckersall, a textile-machinery maker and smith (Barrett 1896, 230).
- 4.7.4 A bearing box immediately to the east of this demolished wall demonstrated that powered operations were being undertaken within the building (Plate 73), suggesting that the wider site also had a power plant. A corresponding aperture for the transverse line shaft was observed in the opposite wall, but the bearing

box had been removed and the aperture blocked with brick (Plate 72). Both phases of the building comprise dressed and coursed sandstone external elevations (Plate 71), with random rubble interiors (Plates 72 and 73). The eastern part of the structure differs, being internally dressed below window sill height (Plates 72 and 73). Five apertures in the east wall were all blocked, except the southern example, which was remodelled to form a doorway. This replaced an earlier doorway in the north wall, which was brick-blocked (Plate 73), but predated an inserted roller-shutter door in the south wall. The extant upper few courses of brickwork throughout the building were contemporary with the four extant L-section steel trusses (Plate 73).



Plate 72: South internal elevation, showing butt joint in wall, and infilled bearing box



Plate 73: North internal elevation, showing butt joint in wall, extant bearing box, and removed stair

5. DISCUSSION

5.1 INTRODUCTION

- 5.1.1 The building investigation has added considerably to the existing body of information gathered by earlier rapid surveys of the complex, and has provided a detailed record of the structures prior to their remodelling for future use as a college campus. Whilst the majority of evidence upon which this report is based will remain *in-situ*, many elements will be obscured.
- 5.1.2 The complex retains many elements, broadly defined by three main phases of expansion prior to the cessation of cotton spinning and weaving in the first half of the twentieth century. A final phase documents the sites transformation for later use.

5.2 PHASE 1: 1854 – 1880s

- 5.2.1 The oldest extant fabric comprises a small part of the original four-storey spinning block, and three of the external walls of an associated attached three-storey engine house. The extant fabric of the spinning block demonstrates that the architectural style of the extant later structures was almost identical to that of the original build, with diminishing windows to each floors, projecting string bands, and internally dressed plinths to the rubble walls. Floor levels were also consistent between the two spinning blocks, even though it appears that the Phase 1 structure was demolished during the same approximate period as the replacement structure was erected.
- 5.2.2 The survey of the original engine house has raised several questions about its layout. Whilst it was assumed previously that the extant boiler house on the opposite side of the passageway beneath the weaving shed was the original steam-raising plant, this represents a very unusual siting of such a structure. Boiler houses were almost always attached to the engine house where site layout permitted, and the position of the extant boiler house, offset 12' (3.65m) away from the engine house, and approximately 30' (9.1m) from the chimney, appears unlikely. The engine was almost certainly a single-cylinder, vertical beam engine, with its sandstone bed occupying the ground floor level of the engine house. The flywheel was almost certainly placed at the southern end of the engine, probably against the south-western wall, which perhaps explains its removal at a later date. The original spinning block must have been wider than the present size of the courtyard, as it would be very unlikely that the primary motion shaft of the engine did not pass directly into the spinning block at ground-floor ceiling level. The present northern stone wall of the weaving shed lies beyond the presumed placement of this primary motion shaft, strongly suggesting that it was rebuilt in a more northerly position. It is also unlikely that the south-eastern wall would have been devoid of apertures, when so many were provided in the extant north-western wall.

5.2.3 The inclusion of a substantial partition wall at ground-floor level within the engine house appears unlikely to have been for any purpose other than the inclusion of a boiler. Although the Victoria Mill engine house is not exceptionally early on a regional scale, it is one of the earlier examples in Burnley. Early engine houses generally incorporated the boiler within their walls, minimising the loss of heat and pressure between the boiler and the engine, whilst detached boiler houses, completely separate from the engine house, were a later development. The small room created by the internal partition would have easily housed a single wagon boiler, which would almost certainly have provided sufficient power for the original complex. It is likely that if this were the case, the structure would have had a small attached chimney, for which there is no physical or documentary evidence. The large door jamb within the return at the southern corner of the building might suggest that the charging platform was located on this side of the boiler, closest to Trafalgar Street, to which the mill was oriented. This suggests the possibility that the vertical joint of an apparent entrance and window loophole at the southern end of the north-east wall represents the infilling of a removed chimney, but this is somewhat speculative.

5.3 PHASE 2: 1880-90s

5.3.1 The demolition of the original spinning block, and the construction of its replacement on the southern side of the privy tower in the 1880s, required remodelling of the original structure. The internal wall of the retained north-east wall became the external face of the new building, although the lower floors were possibly internal to a new, probably single- or two-storey narrowed structure occupying the footprint of the original spinning block.

5.3.2 The new spinning block was of similar non-fireproof construction to the earlier building, which is somewhat surprising given that the earlier structure was destroyed by fire. This is likely to reflect financial considerations rather than any great confidence of the avoidance of further outbreaks of fire. However, it appears that a slightly earlier structure located on the canal side, occupying the footprint of the majority of the northern part of the later weaving shed was extant by the time of the construction of the second spinning block. This structure was of fireproof brick-vaulted construction and apparently of two-storey height, given the survival of the north-western elevation. The ground floor is likely to have contained the primary processing area for the baled cotton, which presumably arrived directly from a wharf on the canal. By moving this highly combustible process further away from the spinning block, the risk of fire would have been reduced significantly. It is unclear whether this structure incorporated the large tapering cylindrical chimney, or whether this was added when the southern part of the structure was partitioned and converted to a boiler house. A large doorway in the north-western wall was apparently not quite large enough, and both jambs had to be cut in order to allow the installation of two 8' (2.44m) diameter Lancashire boilers, probably of 30' (9.14m) length. An economiser placed to the south-west is likely to have been of a contemporary date, being positioned on the most plausible route for the original flue to the chimney.

- 5.3.3 Further preparatory work, most probably carding and roving, was undertaken on the ground floor of the new spinning block, with throstle frames driven by longitudinal line shafts on the floors above. Power was supplied from the engine by a drive shaft aligned along the outer face of the earlier spinning block at first-floor level. This passed through the projecting privy tower (OA North 2011) before entering the spinning block, and had a large bevel gear on the external face of the end bay of the original spinning block.
- 5.3.4 It is unclear whether the engine house was expanded at this time; the new spinning block was certainly larger than the original structure, and the preparation block to the north would also have require power but, depending on the size of the original engine, the increased quantity and pressure of steam provided by the new boilers may well have supplied this increased demand. The engine house was certainly expanded whilst it was still functional, rather than following its removal, as shown by the inclusion of several phases of bearing box in its new south-western wall. This suggests that it is likely that the enlargement predated the weaving sheds, which were not only of different fabric, but that the modifications to the power supply from the engine house related to the differing requirements of the new building.
- 5.3.5 It is unlikely that the expansion of the engine house included the installation of a brand new engine, as this would have proved very costly, not only in terms of its purchase, but also the time lost to installing it. In circumstances where complexes had new engines installed, these were generally erected in completely new structures, and often supplemented the existing engine. Beam engines were relatively simple machines and could generally be repaired and maintained in working order, only becoming redundant as a function of technological innovation. Thus, they could often just be supplemented, rather than replaced, leading to no loss of production time, and cheaper outlay. In this instance it was probably that the original beam engine had an additional high-pressure cylinder added, by the process of 'McNaughting'. William McNaught was a Scottish engineer, who patented the design for a compound steam engine in 1845. Four years later, he relocated to Manchester, at the heart of the textile industry, and began a business mainly comprising the retrospective fitting of high-pressure cylinders to existing steam engines, and exhausting them into the original cylinder, which was retained as a low-pressure cylinder (Giles and Goodall 1992). Not only did this increase the power of the cylinder, it also reduced its fuel consumption, leading to a saving in running costs. Adding this additional cylinder would not require a large structural expansion, perhaps explaining why only the southern part of the western side of the engine house was widened, and that only by 8' (2.44m).
- 5.3.6 The second major episode of construction within this phase comprised the construction of a two-storey brick weaving shed to the south-east of the original spinning block. The northern part of the structure appears to replace the majority of an earlier preparation block, extending it to the bank of the canal (Fig 2; Plate 3). The exact date of construction remains unclear, but the Ordnance Survey map of 1892, surveyed in 1888-9, shows the completed structure, which was probably the first part of an enlargement of the complex that included the construction of a stair tower in 1889 (*Section 5.3.9*, below).

- 5.3.7 The structure is of fireproof construction, with a metal-framed north-light roof, and fireproof vaulted ceilings to the ground floor. Whilst it had been assumed previously that these were rendered brick arches, exploratory works for the refurbishment of the structure revealed them to be of relatively complex concrete construction. Not only does this represent an early, and rare use of concrete to replicate jack-arched style construction, it also gives an early insight into the development of an understanding of the structural qualities of concrete. The outer skins of hard concrete appear to give the floor its strength, whilst the loose aggregate matrix appears to act as a damper, preventing the concrete from shattering. The discovery of the nature of this floor is of especial importance.
- 5.3.8 The weaving shed was not constructed to simply house power looms throughout both floors, and although it is often referred to as a very rare example of a two-storey weaving shed, this is somewhat of a misnomer, as power loom weaving was only undertaken on the upper floor, and possibly within the western 13 bays. The different roof structure to the north, allowing far fewer columns to be used, appears original, and the inclusion of windows within the side, both suggest to a different process occurring in the eastern eight bays, probably relating to finishing, rather than warehousing, given the large number of line shafts provided within this part of the structure. An original loading doorway in the south-east wall between the two areas was therefore more likely used for the transfer of finished goods, rather than for the intake of part-processed materials. The ground floor also included windows, providing a very poor quality of light for weaving. This suggests that other processing was being undertaken here, possibly the primary process of scutching, which may have been moved from the northern part of the ground floor, the southern two bays of which were converted to a boiler house, housing two 30' Lancashire boilers, and an economiser.
- 5.3.9 The final improvement within the complex was the construction of a six-storey stair tower, at the southern end of the Trafalgar Street frontage of the spinning block. This relatively expensive undertaking would have reaped no financial rewards, other than providing a greater insurance against loss by fire. The tower was of relatively standard fireproof construction, comprising flagstone floors and iron beams. Its main benefit was its role in the installation of an automated sprinkler system, the water for which was provided by an iron sheet tank atop the tower. Its height also provided the pressure, allowing sprinklers to be installed throughout the complex. The automated sprinkler system was manufactured by Witter & Son of Bolton, with 'The Witter' gaining a reputation for reliability and robustness, and was one of the earliest such systems developed, following the introduction of sprinkler systems into Britain during the early 1880s. Indeed, by 1888, the year prior to the installation of the system at Victoria Mill, only 233 cotton mills in England had working automated sprinkler systems (Wormald 1923). The main valve is located within the original spinning block, immediately to the north of the tower. From the main valve, sometimes referred to as a 'Christmas tree', the water supply entered the spinning block, before being transferred between floors in vertical pipes placed adjacent to columns. The system, including the glass bulb sprinklers themselves, survived almost completely intact.

5.4 PHASE 3: EARLY TWENTIETH CENTURY

5.4.1 The main improvement during the early twentieth century appears to be an upgrading of the mill's power-transmission system. This was seemingly converted from vertical shafting to a more efficient rope drive system. At first-floor level, the driveshaft from the engine house to the spinning block was replaced with cables forming the rope drive. This was placed below the existing driveshaft, which could continue to operate whilst the new system was being installed. Further evidence for a rope drive survives at ground-floor level in the dividing wall between the engine house and the weaving shed. This may have coincided with the conversion of the western six bays of the ground floor to a skating rink, shown on the Ordnance Survey edition of 1912 (Fig 3). The inserted brick wall includes the end bearing of a line shaft on its eastern face, matching one within the blocking of the original primary motion shaft.

5.5 PHASE 4: MID-TWENTIETH CENTURY

5.5.1 This phase relates to the post-spinning and weaving use of the structure, and comprises the partitioning of the spinning floors, with the insertion of offices, and staircases. Very little earlier fabric was removed at this time, allowing the survival of many significant features, with the exception of the engine and its associated bed, which were removed from the engine house to allow its conversion into a three storey structure. It is possible that the boilers were removed at this time, although Lancashire boilers were often retained to heat large complexes, long after the associated power plant had been removed.

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APPENDIX 1: WRITTEN SCHEME OF INVESTIGATION

May 2012

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Archaeology
North**

**UNIVERSITY TECHNICAL
COLLEGE,
VICTORIA MILL,
TRAFALGAR STREET,
BURNLEY**

**ARCHAEOLOGICAL WRITTEN SCHEME
OF INVESTIGATION**

Planning Application 2012/0134 & 2012/0135

Proposals

The following Written Scheme of Investigation is offered in response to a request from Barnfield Construction Ltd for archaeological investigation in advance of the proposed redevelopment of former industrial sites in the Weavers' Triangle area of Burnley.

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Burnley Borough Council has granted planning permission for the development of a University Technical College on former industrial sites in the Canalside Conservation Area of Burnley (centred on NGR 383452 432551). The development proposals allow for the change of use of Victoria Mill, a Grade II listed building on Trafalgar Street, from class B2 to D1, and the erection of a multi-function hall to provide a Visions Learning Trust University Technical College. The works will necessitate the sympathetic refurbishment of Victoria Mill, and the demolition of buildings that occupy the site of the Waterloo Foundry, immediately to the south-east of Victoria Mill (Figs 1 and 2). A brick-built structure abutting the Sandygate Mill engine house, and the derelict remains of a former machinery works on Wiseman Street, will also be demolished.

1.1.2 The historic importance of Victoria Mill is reflected in its Grade II listed designation, and its inclusion in the Canalside Conservation Area. The mill was built in 1855 for the Massey family as a throstle cotton mill, but was expanded during the late 1880s to include capacity for weaving. The earliest part of the site forms an L-shaped plan, the longer range (running parallel to the street) double depth with paired gables to west. This part of the mill contained carding engines and roving frames on the ground floor, and mules on the upper floors. The return range contained an integral engine house, marked by a tall round-headed window opening. A seven-stage tower, to the south-east of the original building, and two-storey weaving sheds to the east were added in 1889. The Waterloo Foundry was established in the second half of the nineteenth century, and was occupied by the firm of TE Pemberton, a loom manufacturer and repairer. Whilst most of the historic foundry buildings have been demolished, there is potential for buried remains of archaeological interest to survive *in-situ*.

1.1.3 In order to secure archaeological interests, and to satisfy the requirements of listed building and conservation area consents, Burnley Borough Council has attached a condition to the planning consent that allows for an appropriate scheme of archaeological investigation to be carried out in advance of development works. Following the guidance provided by Lancashire County Archaeology Service (LCAS) in their capacity as archaeological advisor to Burnley Borough Council, the condition states:

‘No development shall take place until the applicant, or their agent or successors in title, has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved by the Planning Authority.’

1.1.4 This document presents the required written scheme of investigation for the approval of the Local Planning Authority. It has been produced by OA North at the request of Barnfield Construction Ltd, and in consultation with LCAS.

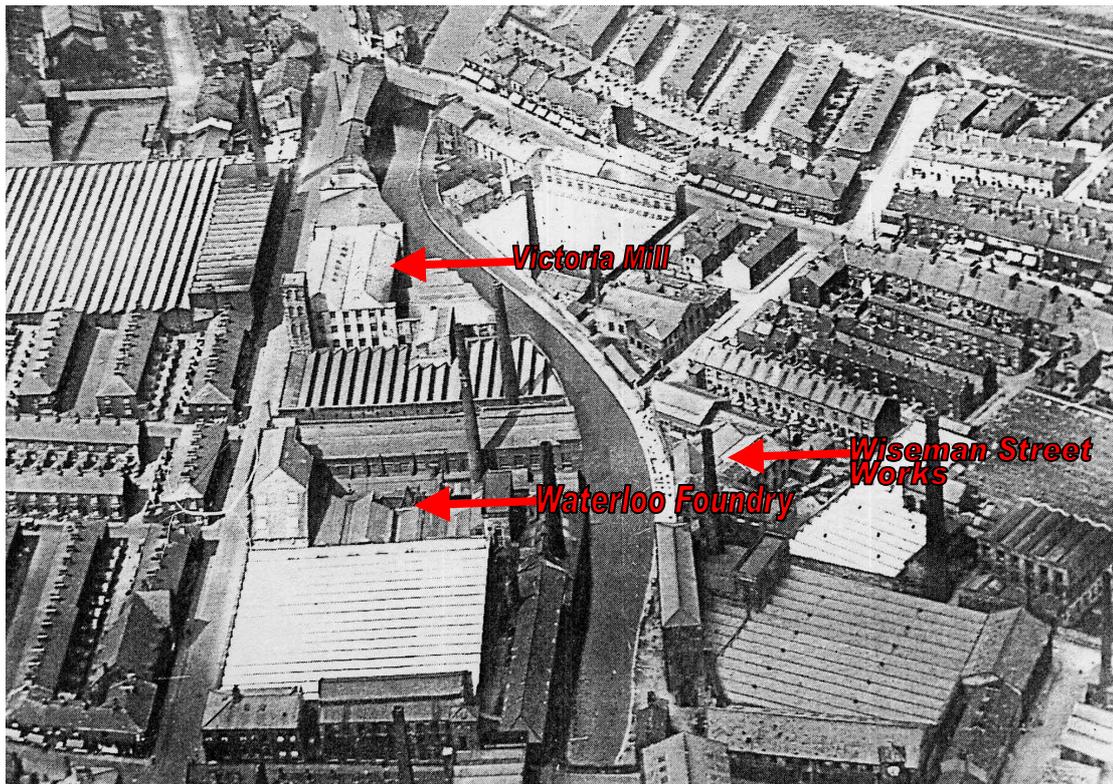


Figure 1: Aerial view of Trafalgar Street in the 1930, showing the outline of the study area



Figure 2: Recent aerial view of the study area

1.2 OXFORD ARCHAEOLOGY NORTH

- 1.2.1 OA North is the largest archaeological contractor in north-west England, with unsurpassed experience of working in the region. OA North has the professional expertise and resource to undertake the project to a high level of quality and efficiency. OA North is **an Institute for Archaeologists (IfA) registered organisation, registration number 17**, and all its members of staff operate subject to the IfA Code of Conduct.
- 1.2.2 OA North has established itself as one of the country's leading practitioners in the field of industrial archaeology, and has generated an impressive portfolio of projects that include those completed at the Derwentcote Steel Furnace in County Durham (Cranstone *et al* 1997), the Carlton Alum Works in North Yorkshire (Miller 2002), the Pilkington's Sheet Glass Works in St Helens (Krupa and Heawood 2002), Thomas Telford's Holyhead Road in North Wales (Quartermaine *et al* 2003), and the Percival, Vickers Flint Glass Works in Manchester (Miller 2007). A large proportion of the industrial archaeology projects carried out by OA North, however, have been focused on the development of textile-manufacturing sites. In 2007, for instance, OA North completed a four-year project of conservation-based research, building survey and excavation at the Grade II Listed Murrays' Mills spinning complex in the Ancoats area of Manchester. This project culminated in the publication of a monograph on the history, development, and fabric of Manchester's oldest surviving steam-powered cotton mill (Miller and Wild 2007).
- 1.2.3 Building assessment and recording has always formed a substantial part of OA North's work, and industrial buildings have constituted a major part of the work carried out in this field. Recent projects have included the survey and recording of Pecket Well spinning and weaving mill near Hebden Bridge (OA North 2007b), the early twentieth-century Gem Mill in Chadderton (OA North 2007c), Lyons Lane Mill in Chorley (OA North 2010d), the Sandygate Mills in the Weavers' Triangle area of Burnley (OA North 2010e), Victoria Mill, also in the Weavers' Triangle (OA North 2011a), Pendle Street Shed and Reedyford Mill in Nelson (OA North 2011b), and Victoria Mill in Sabden (OA North 2011c). OA North is presently carrying out the second stage of a major English Heritage-funded project that is assessing the condition of all the surviving textile-manufacturing sites in Lancashire, and carrying out detailed research and survey of a selected sample of 50 mill sites.
- 1.2.4 All work on the project will be undertaken in accordance with relevant professional standards, including:
- IfA's *Code of Conduct*, (1999); *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology*, (1999); *Standard and Guidance for Archaeological Evaluations*, (1999); *Standard and Guidance for Archaeological Watching Briefs*, (1999);
 - English Heritage's *Management of Archaeological Projects (MAP2)*, 1991.
 - *The European Association of Archaeologists Principles of Conduct for Archaeologists Involved in Contract Archaeological Work* (1998).

2 AIMS AND OBJECTIVES

- 2.1 The required scheme of archaeological works comprises two principal elements of fieldwork: an archaeological building investigation of Victoria Mill, the brick-built structure adjacent to Sandygate Mill engine house, Trafalgar House/Waterloo Works, and the remains of the Wiseman Street Works; and the intrusive investigation of those parts of the site that may contain buried archaeological remains and that will be destroyed as part of the development.
- 2.2 The main research aims of the investigation will be to provide an appropriate record of the historic buildings prior to their refurbishment or demolition, and to ensure the long-term preservation of the archaeological information by the production and deposition of a report and an ordered project archive. This stage of the project will also aim to assess the presence or absence of any archaeological remains across the site, and specifically those of the former Waterloo Foundry.
- 2.3 The required stages to achieve these ends are as follows:
- **Building Investigation:** to provide a drawn, photographic and textual record of all the buildings to English Heritage (2006) standards, which will provide a lasting record of the structures in their present state. In addition, the investigation will ascertain if further archaeological investigation will be necessary, prior to or during any demolition work;
 - **Strip, Map and Record:** the initial stage of the works will comprise the mechanical removal of modern hard-standing, followed by manual excavation, to determine the presence or absence of any buried remains of archaeological interest. The strip and record is also intended to establish the extent of any further work, if any, which will be required in advance of the groundworks associated with the proposed development. Where significant buried remains are found to survive, and will be destroyed during the proposed development, further excavation will be required. This will aim to provide a detailed record of the remains of the foundry;
 - **Post-excavation Assessment and Reporting:** a programme of post-excavation work, leading to the production of a fully illustrated report and project archive will be carried out on completion of the fieldwork. The report will include information about the buildings' age, fabric, form and function. This will be followed by a discussion of the sequence of development, process layout and use over time, and their relationship with other buildings in the vicinity, in terms of architecture and function. The report will also provide an assessment of the significance of any buried archaeological remains that are found to survive beneath the modern ground surface.

3. METHOD STATEMENT

3.1 BUILDING INVESTIGATION

- 3.1.1 **Historical Research:** a sufficient level of research will be carried out to place the results obtained from the building investigation in an appropriate historical context. The research will be collated from OA North's extensive archive of previous archaeological investigations in the Weavers' Triangle, supplemented by an examination of available cartographic sources and any relevant documents relating to the buildings.
- 3.1.2 The various buildings within the study area merit different levels of survey appropriate to their significance. The most basic record, commensurate with an English Heritage Level 1 type survey, is considered an appropriate means of recording Trafalgar House and the building to its rear, and the remains of the Wiseman Street Works. The archaeological record for the Level 1 survey will principally be photographic, with images linked to a block plan of the buildings.
- 3.1.3 The buildings within the Victoria Mill complex, including a multi-storey spinning block, engine house, two weaving sheds, and chimney, merit an English Heritage Level 2/3 type survey. The brick structure adjacent to the Sandygate Mill engine house similarly merits a Level 2 type survey. In addition to a detailed photographic record, this level of survey will allow for the production of measured survey drawings that capture all archaeological detail. A visual inspection of the buildings will also be undertaken utilising the OA North building investigation *pro-forma* sheets, and a description will be maintained to English Heritage (2006) Level 2/3 standard. The records will be essentially descriptive and provide a systematic account of the origin, development and use of the building, which will include a description of the plan, form, fabric, function, age and development sequence of the complex.
- 3.1.4 **Photographic Archive:** a photographic archive for both levels of survey will be produced utilising a digital camera with a resolution of at least 12 mega pixels, using RAW format files for image capture, saved as 8 bit TIFFs for archive purposes. A full photographic index will be produced, and the archive of images will comprise the following:
- (i) the external appearance and setting of the buildings, including a mixture of general shots and detailed views taken from perpendicular and oblique angles;
 - (ii) general shots of the surrounding landscape;
 - (iii) the general appearance of principal rooms and circulation areas;
 - (iv) any external or internal detail, structural or architectural, which is relevant to the design, development and use of the buildings, and which does not show adequately on general photographs;
 - (v) any internal detailed views of features of especial architectural interest, fixtures and fittings, or fabric detail relevant to phasing the buildings.

- 3.1.4 In addition to the digital files, hard copies of the images will be created on paper of appropriate archival quality, and deposited as part of the paper archive.
- 3.1.5 **Site Drawings:** architects' plans (supplied by the client) will be annotated on site to produce the drawings. These drawings will then be used as the basis of CAD drawings, which will be included within the final report as figures:
- (i) floor plans for each building;
 - (ii) a cross-section through the short axis of the spinning block, the weaving sheds, and the engine house;
 - (iii) an elevation of the spinning block;
 - (iv) an elevation of the engine house.
- 3.1.6 Where architects drawings are not available (*eg* for cross-sections and elevations), the following survey techniques will be applied as appropriate:
- 3.1.7 **Reflectorless Electronic Distance Measurer (REDM) survey:** the proposed elevations and cross-sections will be surveyed by means of a reflectorless electronic distance measurer (REDM). The REDM is capable of measuring distances to a point of detail by reflection from the wall surface, and does not need a prism to be placed. The instrument to be used will be a Leica TCR805. This emits a viable laser beam, which can be visually guided around points of detail. The digital survey data will be captured within a portable computer running TheoLT software, which allows the survey to be directly inserted into AutoCAD software for the production of final drawings.
- 3.1.8 Detail captured by the instrument survey will include such features as window and door openings, evidence for power transmission, outline of decorative detail, evidence for machinery, an indication of ground and ceiling level, and changes in building material.
- 3.1.9 The drawings will usually be produced at a scale of 1:50. The existing drawings will be scanned or digitised into an industry standard CAD package for the production of the final drawings.
- 3.1.10 **Manual Survey Techniques:** hand-measured survey techniques will be utilised to record areas that are not accessible for instrument or photographic survey. The drawings will be tied into the remained of the survey through the use of a survey control established by the instrument survey.
- 3.1.11 **CAD System:** the drawings will be manipulated in AutoCAD software. The advantage of a CAD system is that it allows for efficient manipulation and editing of drawings. The adoption of a layering system has significant benefits during the analysis stage as it allows for the display of information such as feature types, fabric and phasing as necessary to the requirements of the analysis, without the necessity to produce further drawings. Finished drawings can be plotted at the required scale or sheet sizes.

4. OTHER MATTERS

- 4.1 **Health and Safety:** archaeological staff and visitors will respect Health and Safety provisions and site-specific safety regulations. It is the policy of OA North ('the Employer') to conform fully with the requirements of the Health and Safety at Work Act (1974), and all site procedures will be in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). Attention will also be paid to the requirements of more recent legislation, including the provision and use of Work Equipment Regulations (1992), the Management of Health and Safety at Work Regulations (1992), and the Construction (Design and Management) Regulations (1994).
- 4.2 In furtherance of the duty of care imposed by the Health and Safety at Work Act (1974), the Employer shall make available to his employees whatever reasonable facilities are required by particular circumstances, *eg* appropriate protective clothing, safety equipment, rest breaks for specialised tasks, etc. A written risk assessment will be undertaken in advance of project commencement, and copies will be made available on request.
- 4.3 **Insurance:** evidence of Public Liability Insurance to the minimum value of £5m, and Professional Indemnity Insurance to the minimum of £2m, will be provided prior to the commencement of the archaeological works.
- 4.4 **Project Monitoring:** the aims of monitoring are to ensure that the archaeological works are undertaken within the limits set by the Written Scheme of Investigation, and to the satisfaction of the curatorial archaeologist at the Lancashire County Archaeology Service (LCAS). The curatorial archaeologist will be given at least five days' notice of when work is due to commence, and will be free to visit the site by prior arrangement with the project director. It is anticipated that there will be at least one formal monitoring meeting during the course of the archaeological works, which should also be attended by the Client or his representative.
- 4.5 **Contingencies:** if there are more complex or generally deeper deposits than can be anticipated from the evidence available, there may need to be a corresponding increase in costs, which will be subject to agreement with the Client and the archaeological curator. Similarly, there will be recourse to a contingency if there is any requirement to fully excavate any human remains that may be present. These contingency costs are in accordance with the Institute for Archaeologists' guidance.
- 4.6 **Confidentiality:** the report is designed as a document for the specific use of the Client, for the particular purpose as defined in the project design, and should be treated as such; it is not suitable for publication as an academic report, or otherwise, without amendment or revision. Any requirement to revise or reorder the material for submission or presentation to third parties beyond the project design, or for any other explicit purpose can be fulfilled, but will require separate discussion and funding.

5 WORK TIMETABLE

- 5.1.1 **Building Investigation:** approximately one week in the field will be required to complete the Level 1 and Level 2/3 type building investigations.
- 5.1.2 **Report/Archive:** the report and archive will be produced within six weeks of completion of the fieldwork. OA North can execute projects at very short notice once a formal written agreement has been received from the client.

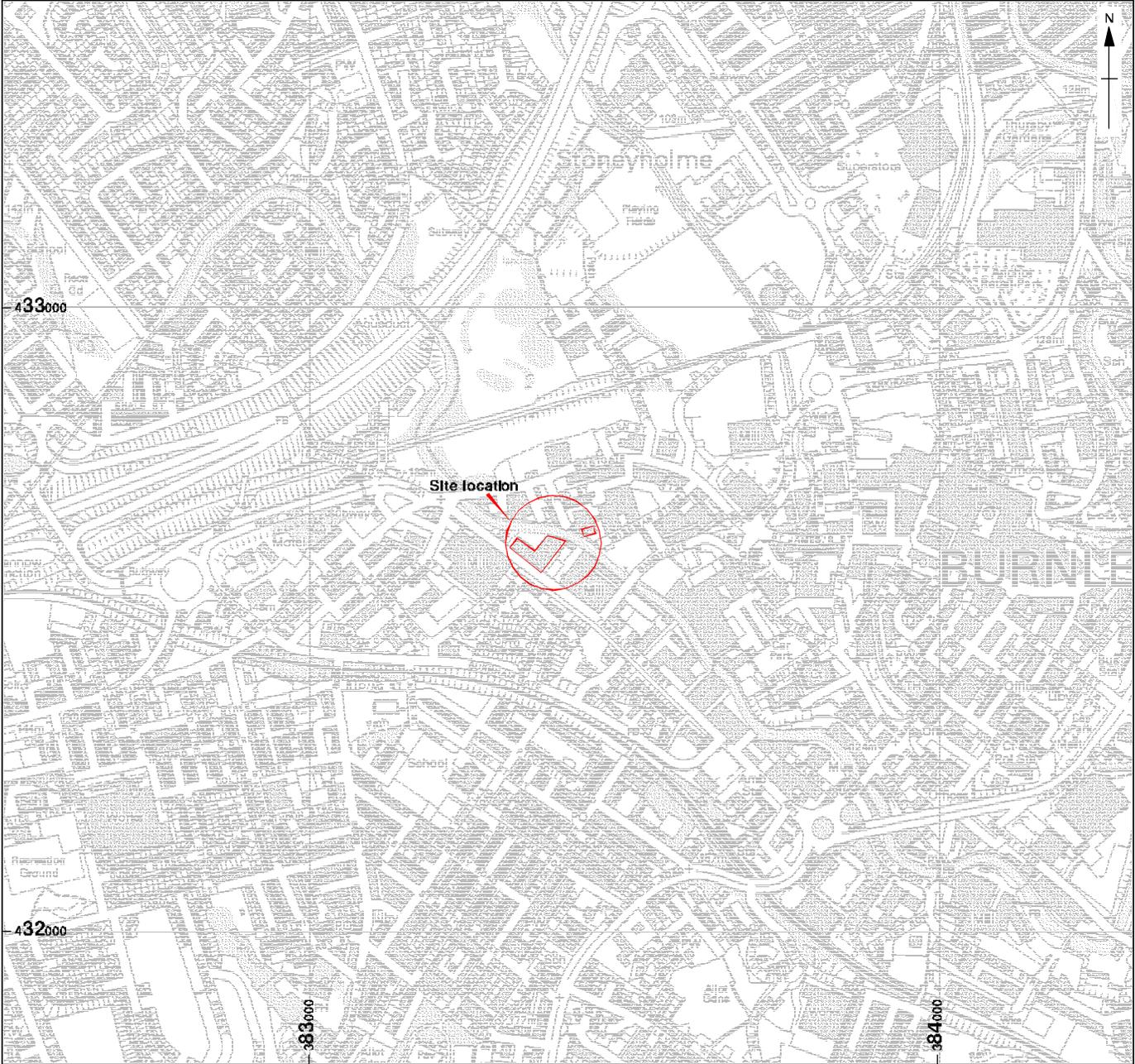
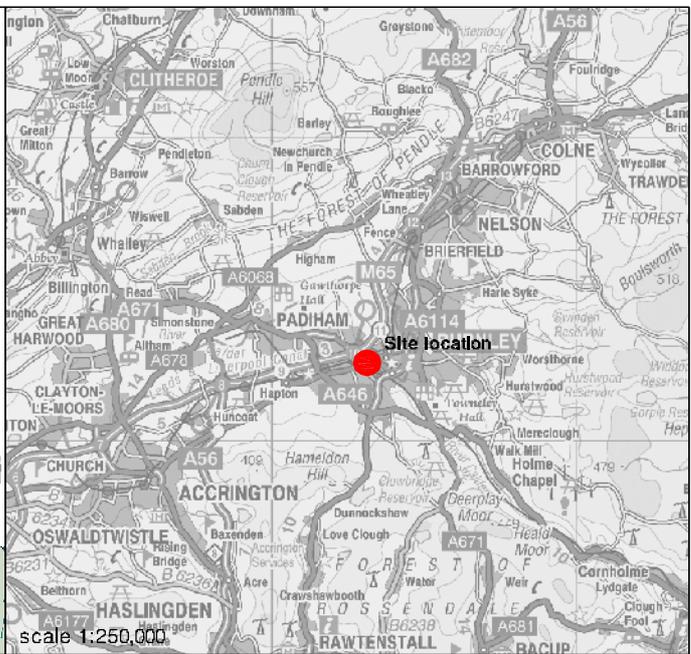
6 STAFFING

- 6.1 The project will be under the overall charge of **Ian Miller BA FSA** (OA North Senior Project Manager) to whom all correspondence should be addressed. Ian has considerable experience and particular research interests in Lancashire's textile industries. Ian managed the archaeological fieldwork, analysis and ultimate publication at Murrays' Mills (Miller and Wild 2007), and has managed numerous excavations of former textile mills throughout Greater Manchester. He is presently managing the Lancashire Textile Mills Survey, a strategic research project funded by English Heritage.
- 6.2 The archaeological investigation is likely to be directed by **Chris Wild BSc** (OA North Project Officer). Chris is an highly experienced field archaeologist, who has a particular interest in Industrial Archaeology, and has carried out numerous surveys and excavations of former textile-manufacturing sites.

ILLUSTRATIONS

LIST OF FIGURES

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- Figure 2: Plan of Victoria Mill, superimposed onto Ordnance Survey map of 1892
- Figure 3: Plan of Victoria Mill, superimposed onto Ordnance Survey map of 1912
- Figure 4: Ground-floor plan of Victoria Mill
- Figure 5: First-floor plan of Victoria Mill
- Figure 6: Second-floor plan of Victoria Mill
- Figure 7: Third-floor plan of Victoria Mill



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Figure 1: Site location



Figure 2: Components of Victoria Mill, superimposed on the Ordnance Survey map of 1894

- door
- window
- blocking
- column
- power

0 5 m
1:250 @ A3

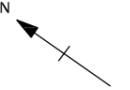


Figure 4: Ground floor plan

- door
- window
- blocking
- column
- power

0 5 m
1:250 @ A3

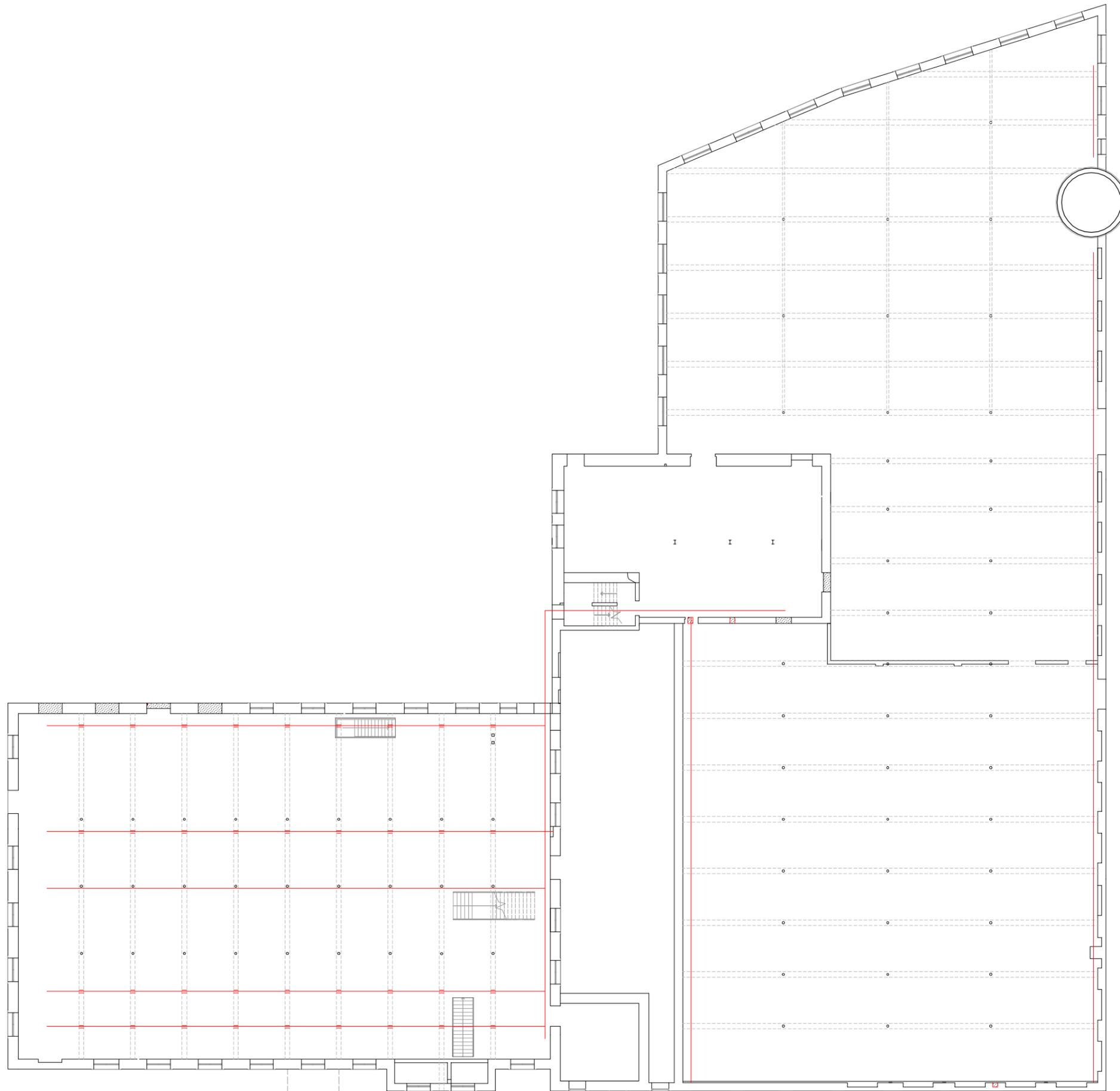


Figure 5: First floor plan

- door
- window
- blocking
- column
- power

0 5 m
1:250 @ A3

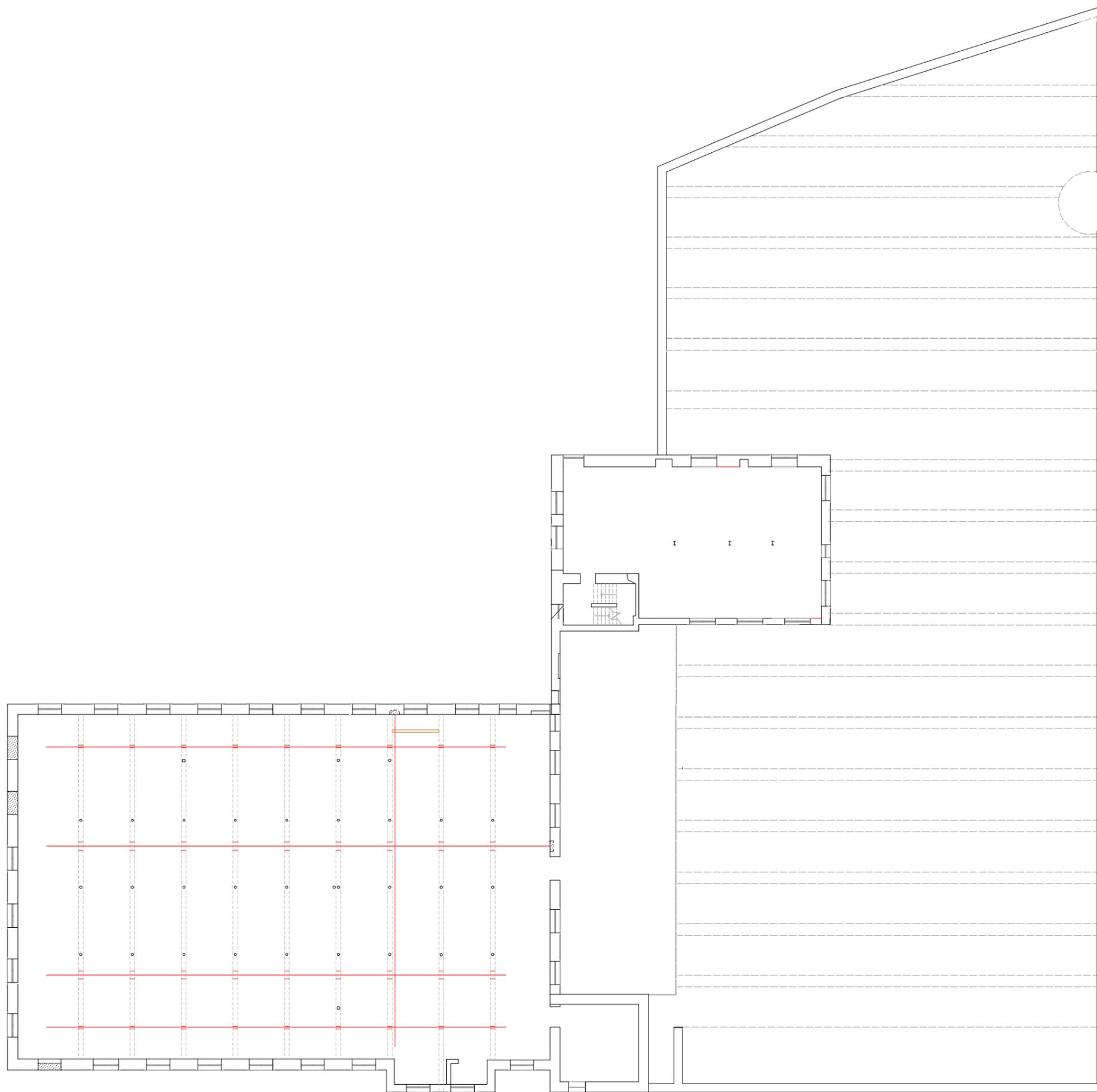
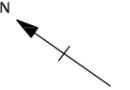
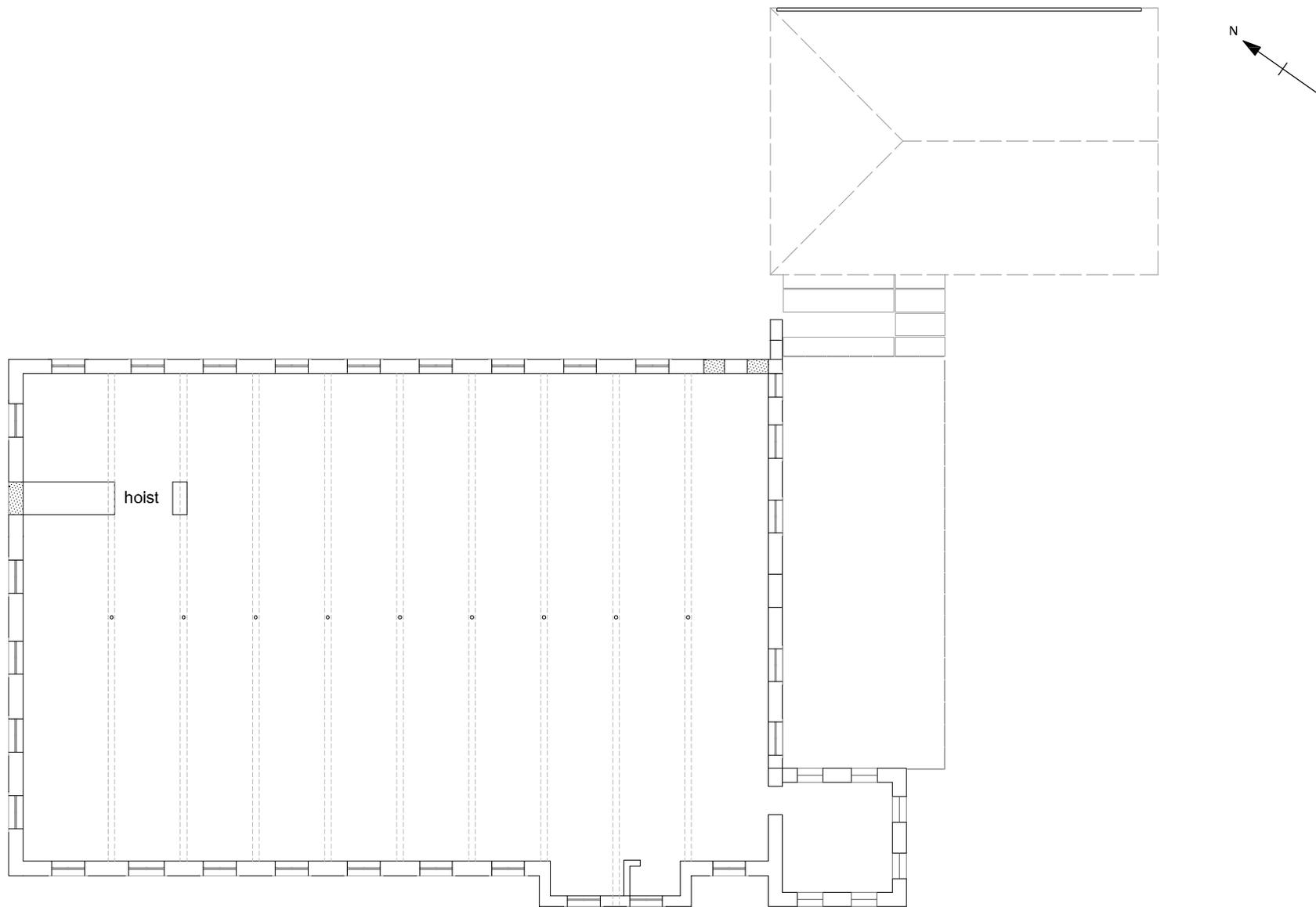


Figure 6: Second floor plan



-  door
-  blocking
-  window
-  column

0 5 m
1:250 @ A 3

Figure 7: Third floor plan



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