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Goodyear Tyre Factory, Wolverhampton  
Historic Building Record  
2007



**GOODYEAR TYRE FACTORY  
STAFFORD ROAD  
WOLVERHAMPTON  
WEST MIDLANDS**

**Historic Building Record  
2007**

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| Checked by           |           |
| Supervisor.....      | date..... |
| Project Manager..... | date..... |



**Project No. 1673**

**Goodyear Tyre Factory, Stafford Road**

**Wolverhampton, West Midlands**

**Historic Building Recording**

**August 2007**

by

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## **SUMMARY**

*Birmingham Archaeology undertook a programme of historic building recording in August 2007 at the Goodyear Tyre Factory, Stafford Road, Wolverhampton in advance of demolition works associated with the redevelopment of the site for mixed-use purposes.*

*A total of 20 buildings were examined, ranging in date from the early 20<sup>th</sup> century to the early 1990s, tracing the development of the factory site from its acquisition by Goodyear in the mid-1920s. The phasing of the site has been greatly enhanced by a series of dated design drawings and photographs held at the Wolverhampton Archives and Local Studies collection.*

*A number of the recorded structures were found to be remnants of a former enamelware manufactory, established on the site by the Scottish company of Macfarlane and Robinson in the early years of the 20<sup>th</sup> century, and included a four-storey clock tower which is to be retained within the proposed development of the site.*

*The site was chosen by Goodyear, when it decided to set up a British manufacturing plant in 1927, both for its central geographical location and due to the pre-existence of suitable factory buildings. Phases of rapid expansion are evident in the early years of Goodyear ownership, in the period following the Second World War, and again in the late 1960s and 1970s. The complex developed using a fairly repetitive, modular pattern of factory ranges, adopting what appears to be a consistent site 'style'. Expansion continues down to the recent past, with the latest recorded building dating to the middle 1990s; the later buildings becoming increasingly utilitarian in nature.*

## **GOODYEAR TYRE FACTORY, STAFFORD ROAD, WOLVERHAMPTON, WEST MIDLANDS**

### **Historic Building Recording, August 2007**

#### **1 INTRODUCTION**

- 1.1 Birmingham Archaeology was commissioned by Halcrow Group Limited of Worcester, on behalf of St Modwen Developments Ltd., to undertake a programme of historic building recording at the Goodyear Tyre factory, Stafford Road, Wolverhampton.
- 1.2 Planning permission (ref: 04/1407/OP/M) has been granted for the mixed-use redevelopment of the Goodyear site and the programme of building recording has been required by Wolverhampton City Council as a condition of consent, to be undertaken in advance of associated demolition works.
- 1.3 Recording work was carried out in accordance with an *Archaeological Specification: Standing Building Recording*, prepared by Halcrow (September 2006) and approved by the archaeological advisor to Wolverhampton City Council, and with a Written Scheme of Investigation (WSI) prepared by Birmingham Archaeology (August 2007).
- 1.4 Survey work was carried out between the 13<sup>th</sup> and 23<sup>rd</sup> August 2007.

#### **2 SITE LOCATION**

- 2.1 The site of the Goodyear Tyre Factory is located approximately 3km north of Wolverhampton city centre, centred upon NGR: SJ 9150 0175 (Figure 1). The development area extends to approximately 28 hectares (Figure 2).
- 2.2 The site is bounded to the west by the main Stafford Road (A449), to the south by School Lane and to the east by Bushbury Lane and the Wolverhampton-Stafford railway line. The northern part of the site is occupied by a sports field and associated pavilion.
- 2.3 The site comprises numerous industrial structures of diverse form, function and age, the earliest dating to the early years of the 20<sup>th</sup> century, though the majority are of more recent origin. None of the buildings within the development area are included on the DCMS *Statutory List of Buildings of Special Architectural or Historical Interest*, nor are they locally listed.

#### **3 AIMS AND OBJECTIVES**

- 3.1 The principal aim of the project, as stated in the *Archaeological Specification*, was to ‘record the buildings specified by the Black Country archaeologist’, as follows:
  - Buildings 1, 8, 9B, 10 and 21A to ‘Level 3’, as defined by English Heritage in *Understanding Historic Buildings: A Guide to Good Recording Practice* (EH, 2006).
  - Buildings 8A-12 and 17 to ‘Level 2’, as defined by English Heritage (*ibid.*).

- To make a 'rapid assessment', including outline photographic coverage, of all the remaining post-1945 structures within the development area as identified by the *Archaeological Specification* viz. Buildings 13, 18, 21F, 22, 28, 31/75, 44, 45 and 82.

## **4 METHODOLOGY**

### **4.1 The Written Record**

- 4.1.1 A written record of the buildings was made, externally on an elevation-by-elevation and internally on a room-by-room basis, using *pro-forma* building and room recording sheets.

### **4.2 The Drawn Record**

- 4.2.1 Drawn survey comprising plans, elevations and cross-sections was made at a level appropriate to the significance and complexity of the buildings under consideration.

### **4.3 The Photographic Record**

- 4.3.1 The photographic survey comprised monochrome print accompanied by high-resolution digital photography. Where possible, photographs included a graduated photographic scale. Details of photographs were recorded on *pro forma* index sheets, and included location, subject and orientation.

### **4.4 Laser Scanning**

- 4.4.1 The readily accessible exterior elevations of Buildings 1, 9B, 10 and 21 were recorded by means of high resolution laser scanner.

### **4.5 Documentary Research**

- 4.5.1 A map regression exercise was undertaken, reference being made to all available historic Ordnance Survey maps, which are listed in Appendix A. In addition, a review of a sizeable collection of original planning design drawings and historic photographs was undertaken at the Wolverhampton Archives and Local Studies (WALS); these are again listed in Appendix A below.

## **5 HISTORICAL BACKGROUND**

### *Company Origins*

- 5.1 The 'Goodyear Tire and Rubber Company' was founded by Frank Sieberling in Akron, Ohio, USA in 1898, named in honour of though unconnected with Charles Goodyear, inventor of the vulcanisation process. Initially the company was involved in the production of bicycle tyres, carriage tyres and horseshoe pads, though with the advent of the automobile, the company grew rapidly and by 1926 it was the largest rubber company in the world.
- 5.2 Though the company was active in the United Kingdom from 1913 onwards, importing and distributing American made goods, it was readily apparent that in order to make significant inroads into the UK and European markets, it would be necessary to set up a production plant in the UK.



- 5.3 The Wolverhampton site was chosen due both to its central location and because of the pre-existence of suitable industrial buildings, being the former enamelware manufactory of Glasgow based Macfarlane and Robinson Ltd, indicated on early Ordnance Survey maps (see Figure 5). The 'Bushbury Works' site was purchased for the sum of £75,000 on 11<sup>th</sup> July 1927<sup>1</sup> and production began in December of the same year, with construction work on the original plant continuing into 1928 (Halcrow 2005, 8).

#### *Map Regression*

- 5.4 A general overview of the development of the Goodyear site can be gained from a review of historical Ordnance Survey maps of the area (Figures 3 - 10). Early editions show that the site comprised open fields and allotment gardens up until the turn of the 20<sup>th</sup> century with the exception of limited domestic development along the northern side of Bushbury Lane (Leicester Terrace; Figures 3 and 4). By 1902, small scale industrial development is evident in a 'brickworks' located to the far south end of the site (Figure 4), but it was in the years immediately prior to the First World War that the first significant development took place with the founding of an enamelware factory by Macfarlane and Robinson on the land to the north-west of Leicester Terrace. The buildings of this factory are first shown on the Ordnance Survey 1:10,560 2<sup>nd</sup> revision of 1920-24 (Figure 5) and comprise two long parallel ranges aligned NNE-SSW, with a rail connection to the Wolverhampton-Stafford line at Bushbury sidings.<sup>2</sup>
- 5.5 The Ordnance Survey 1:10,560 3<sup>rd</sup> revision of 1938 (Figure 6) shows the factory buildings following their acquisition and expansion by Goodyear in the years after 1927. The ranges have been extended to the west (Figure 11b), almost doubling their ground area, and a building added to the north on the footprint of the present Building 13, while to the west the core of the general office building (Building 1) is evident. Interestingly, although the factory site had been in the ownership of Goodyear for approximately 10 years by the time of this map, it is still labelled as an 'enamelware manufactory'. This discrepancy arises from the fact that the 1938 edition updated only tangible features such as roads and buildings from the previous (1920) edition (N Wilson, Ordnance Survey, *pers. comm.*); in the case of new or altered buildings, only the building outline was amended while the building stipple of the previous edition was not modified, resulting in the rather strange effect of an amended building that is clear apart from a strip of stipple relating to its earlier footprint. Building descriptions, in this case '*Enamelware Manufactory*', would not have been amended. This piecemeal revision process was due to financial constraints upon the Ordnance Survey imposed by post First World War cutbacks, compounded by the depression, and was not, as has previously been suggested (Halcrow 2005, 8), a deliberate attempt to suppress the true function of the building in the years immediately prior to the Second World War (*ibid.*).
- 5.6 Limited development would appear to occur between the Ordnance Survey editions of 1938 (Figure 6) and 1955 (Figure 7), the principal additions being Ranges 4 and 5 of Building 12 (necessitating the truncation of the general office building) and a series of smaller outbuildings. However, upon examination of a number of dated historic photographs and drawings, it is apparent that the 1955 edition map makes a number of significant omissions and its use as a historical record of the extent of the plant at that date is thus brought into question. These omissions derive from the fact that the 1955 edition 1:10,560 map was

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<sup>1</sup> Original sale agreement, dated 11<sup>th</sup> July 1927. Wolverhampton Archives and Local Studies Cat. No. DB/20/2/1/19.

<sup>2</sup> The rail line is traceable on maps down to the OS edition of 1967 (Figure 8) and remains partly *in-situ* to the present day, to the east of the Boiler House (Building 17).

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based upon larger scale survey data collected in 1946 (N Wilson, Ordnance Survey, *pers. comm.*).

- 5.7 By contrast, the expansion of the factory complex evident from a comparison the Ordnance Survey editions of 1955 and 1967, predominantly to the north-west corner of the site, is considerable. In the light of the above, however, this development can be seen to have occurred over a longer timespan than the historic maps would at first appear to suggest. Ranges 6-11 of Building 18 were added along with the western four bays of Building 44 (south block). Building 28 is first shown to the north of Building 13 as is the cement house (Building 17), Building 31/75 and the eastern range of Building 45.
- 5.8 Later additions to the complex, seen on the Ordnance Survey edition of 1989 (Figure 9) were focussed on the north end of the factory site. The southern block of Building 44 was extended eastwards with the addition of Ranges 1 – 3, while to the north, the floor area of the plant was doubled with the addition of the ‘northern block’, arranged over two levels. Building 28 was extended by one range northwards and Building 45 by one range westwards. The two-storey extension to the west elevation of Building 17 also dates to this period; these developments are clearly depicted on the Ordnance Survey 1:2500 editions of 1961-73 and 1973-75, Figure 10).

## 6 BUILDING DESCRIPTIONS

### LEVEL 3 RECORDS

#### 6.1 Building 1

- 6.1.1 Building 1 (the General Office) is located to the western side of the site, west of Building 12 and south of Building 18, and is centred on NGR SJ 9130 0160. The current building is a fairly extensive range of buildings, representing a multi-phase development; only the northern part, which represents the original build of 1927, is scheduled for demolition and has been recorded as part of the present project.
- 6.1.2 Building 1 is a single-storey brick-built structure with hipped roof; the recorded section has overall dimensions of 24m (N/S) x c.40m (E/S). The building is aligned ENE / WSW, though, to avoid overly long orientational descriptions, it will here be assumed to be aligned east-west, with the principal elevation to the west facing Stafford Road. The principal front presents a long elevation of uniform height in orange/red brick laid to Flemish stretcher bond above a splayed red-brick plinth and is capped by a brick parapet with concrete coping. Central to the recorded section of the elevation, access to the office range is via a set of double doors set within a projecting section of brickwork (Plate 01). The doorway is protected by a projecting concrete hood supported on four brackets, and is surmounted by the distinctive Goodyear company logo and winged foot motif, enclosed by a band of redder, slightly glazed brick; the concrete coping is extended above the doorway projection so as to emphasize the entrance. The entranceway projection is flanked by cast-iron rainwater hoppers and downpipes, the hoppers being enhanced with fleur-de-lys decoration.
- 6.1.3 To each side of the principal entrance, large rectangular window openings house modern UPVC frames. Immediately above the window openings two courses of red, glazed brick extend the full length of the building, accentuating the horizontality of the elevation.
- 6.1.4 The northern elevation of Building 1 (Plate 02) has been much altered, again principally by the insertion of modern UPVC window frames which are here set within area of patching

implying that the original openings may have been somewhat larger. To the western end of the elevation is a single-storey extension (Plate 03) of recent date (?1970s).

- 6.1.5 Internally, Building 1 comprises a central open plan office space (G5; Plate 06) with smaller enclosed offices arranged around the exterior walls (Figure 14, Plate 05). The continued use of the building as the general office for the factory up until the recent past has resulted in periodic refurbishment of the office interiors and the loss of much original fabric. However, some of the dividing walls of the side offices and a number of the  $\frac{3}{4}$  height partitions which subdivide the central area (Plate 07) appear to be survivals from the original, or at least from an early layout; the extent of early partitions is shown on Figure 14; the remainder of the partitions are of simple studwork and plywood construction dating most probably to the 1970s. A feature of particular interest is the brickwork wall separating the western front offices from the open plan area (Plate 09); this wall is in brick laid to Flemish stretcher bond above a stretcher bond dado section in glazed brick (painted over) with integral, moulded rail profile (Plate 10).<sup>3</sup> To the southern end of this wall, the door between G.5 and office G.1 has rounded and stopped jambs and a segmental arched head (Plate 08). Further segmental brick arches were observed to the north end of this wall, at the west end of the south wall and the north end of the east wall. In all cases, the arches were located immediately above the level of the inserted ceiling, making detailed recording difficult.
- 6.1.6 The roof structure of the office building is complex, comprising steel trusses of modified double-fink pattern and fairly steeply cambered, tripartite lower chords (Figure 15). The complexity of the roof is heightened at the hips, where five, end half-trusses of similar design are employed. The roof is supported on a total of ten tiers of timber purlins and has longitudinal skylight-glazing to the northern and southern slopes; a number of the lower purlins are stop chamfered, suggesting that the roofspace was once fully open to the office area below, an arrangement confirmed by an early photograph of the interior (Figure 18)<sup>4</sup>. The office space is currently ceiled by a suspended ceiling of relatively recent date (1980s?).
- 6.1.7 Analysis of historic maps indicates that Building 1 originated soon after the acquisition of the site by Goodyear, and is first shown on the Ordnance Survey edition of 1938 (Figure 6). By this time, the office building had already been extended beyond its original plan, which is shown in It is of particular interest that Building 1 does not respect the alignment of the remainder of the pre-existing factory buildings, but was rather laid out parallel to a small lane running WSW-ENE, evident as a track as far back as 1902 (Figure 4) and reflecting a former field boundary (Figure 3). This presumably reflects a change of orientation of the factory complex, formerly accessed from the south via School Lane to a more prominent entrance from Stafford Road to the west. The building was soon expanded to the south onto an area formerly laid out to tennis courts (Figure 17), maintaining its original exterior character, and developed over a number of phases to reach its current extent.

## 6.2 Building 8

- 6.2.1 Building 8 forms the south-eastern part of a larger multi-phase block (8-12; see Figure 13) and is centred on NGR: SJ 9148 0140. It is flanked to the east by Buildings 21 and 22 and to the west by the eastern range of Building 12; to the north it abuts Buildings 9B and 10. Building 8 comprises two symmetrical 20.5m wide ranges of 15 bays (here numbered 1-15 from south to north), and measures *c.*99 m long, standing 9.5m tall to ridge level (Figure 19).

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<sup>3</sup> The moulded rail profile is also evident on the northern wall of G.12.

<sup>4</sup> Wolverhampton Archives and Local Studies, Cat. No. P/3560.

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- 6.2.2 The southern and eastern exterior walls only of the building survive, to the north it abuts buildings 9B and 10, while to the west, the building has been extended resulting in the loss of any original exterior fabric. The surviving walls are of red-brick construction throughout, laid to English bond. The south wall of each range displays a wide, vehicular access door to the west. These are more recent introductions however, and of particular interest are a series of blocked windows with segmental-arched heads (Plate 13) and two high-level circular vent holes within the gables (Plate 14). Each range also retains a central blocked door.
- 6.2.3 The eastern elevation (Plates 17/18) is in brick with exterior projecting piers of brickwork demarcating the internal bay divisions, and large multi-pane rectangular windows above a low brick plinth, one per bay (Plate 17). An early (undated) photograph of the interior of Building 8<sup>5</sup> (Figure 20), indicates that the western elevation was originally furnished with smaller windows with segmental heads, of a similar design to those in the south wall, two per bay. This pattern was presumably reflected in the east elevation, though a photograph (Figure 21) documenting demolition of an early brick stack prior to the construction of the new boiler house (Building 21) in 1927, clearly shows the brickwork infill between the bays had been removed at this date. The wide window openings were presumably introduced at this stage, though the majority have since been infilled (Plate 18) and survive to Bays 9 and 10 only. The northern end of the east elevation has been truncated by the erection of Building 22.
- 6.2.4 The roof structures of both ranges comprise modified forms of double-fink trusses with tripartite, cambered bottom chords (Figure 19b, Plates 11/12), one per bay plus intermediate trusses. Trusses are supported to the east by RSCs encased in brickwork which project externally as piers (Plate 17/18), and to the centre by circular section cast-iron columns supporting paired RSJs encased in concrete (Plate 15). To the west side of the west range, the trusses are carried by simple RSJ supports (Plate 16).
- 6.2.5 It is clear from historical Ordnance Survey maps and from early Goodyear proposal drawings that Building 8 represents a survival from the early 20<sup>th</sup>-century enamelware factory buildings indicated on the 1924 edition map (Figure 5), forming the double width core of the NNE – SSW aligned ranges.

### 6.3 Building 9B

- 6.3.1 Building 9B (the *Clock Tower*) is located within the complex of buildings formed by 8, 9, 10, 11 and 12, and is centred upon NGR. SJ 9150 0143. The tower is square in plan, measuring 8.2m x 8.2m and is arranged over 4 levels standing to a maximum height of c.20.5m (Figure 22) terminating in a low-pitched ‘pagoda’ style roof (Plates 19/20) and tall flag pole. The lower two levels of the tower are enclosed to the north and west by Building 9, to the south by Building 8 and to the east by Building 10. Levels 3 and 4 project above the roofs of the surrounding buildings though the expansion of the factory complex, particularly to the west, has served to obscure views of the tower from many directions. It is presently best viewed from the east (Plate 19) or from the north. Where the unrendered exterior elevations are clearly exposed, at levels 3 and 4, they are of red brick, laid to English bond. At level 3, each elevation displays symmetrically spaced rectangular window openings at high level, with flat arches of rubbed brick and housing 12-pane metal casements (Plate 20). At level 4, each elevation displays a clock face, enclosed by a circular moulded brick surround, above which the walls are set back by c.1m beneath the low-pitched roof. The upper six courses of brickwork to either side of the clock face on each elevation are in a

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<sup>5</sup> Wolverhampton Archives and Local Studies ,Cat. No. DB/20/F82.

distinct type of brick, more orange in colour than the body of the tower, the exterior faces of which are uniformly blown (Figure 22f); this presumably originally formed a decorative band at the head of the tower.

- 6.3.2 At ground floor (Level 1; Figure 22b), the tower is enclosed by and accessed from within Buildings 8, 9 and 10 (Plate 21). Walls are of brick construction, laid to English bond, and have wide vehicular doorways in the north, south and west walls. The western wall has a smaller, central pedestrian doorway. Segmental, brick-arched windows (blocked), similar to those recorded within Buildings 8 and 10, survive within the west (x 2) and east (x 1) elevations (Plate 22). Internally, the tower comprises a single, uninterrupted space with doorways leading to Buildings 8, 9 and 10.
- 6.3.3 Level 2 (Figure 22c) is accessed via a metal stair rising within Building 10 against the exterior of the east wall of 9B (Figure 24). At level 2, the clock tower is again incorporated into Building 10 to the east, from where it is accessed via a doorway in the east wall. Level 2 has been subdivided by a series of breezeblock walls to form shower, toilet and locker room facilities. The interior walls are for the most part obscured, though a blocked window is evident in the south end of the west wall (also visible at high level from Building 9, where a matching window is also visible to the north). A void in the ceiling in the south-east corner was originally furnished with ladder access to Level 3 though this has been removed/lost.
- 6.3.4 Level 3 (Figure 22d) is accessed solely via a doorway in the east wall from the roof of the adjacent Building 10, though it was originally also accessible internally (see above). It forms a single space, c.6m tall, and is dominated by a large metal water tank measuring 4.5m square and 4m tall (Plate 23). Square headed, rectangular window openings are arranged symmetrically to all four walls at high level. A straight-flight wooden stair rises against the north wall giving access to Level 4.
- 6.3.5 Level 4<sup>6</sup> (Figure 22e) again forms a single space, measuring 5m x 5m, the walls at this level being recessed and standing to a maximum height of c.5m to the underside of the roof. Central to each elevation, a clock face projects to the exterior face of the lower level walls.
- 6.3.6 The fact that Building 9B is enclosed by adjacent structures means it leaves no distinct footprint on historic maps which are thus of limited use in attempting to establish its date of origin. However, the evidence of the original sale agreement<sup>7</sup> of 1927 is categorical: *'the sale shall include the Clock as now fixed within the Clock Tower of the said works'*. The upper levels of the tower, with their rectangular window openings and low-pitched 'pagoda' style roof with projecting eaves, are stylistically distinct and this has previously been used to propose a later date of the 1920s or 30s for the construction of the tower as a whole (Halcrow 2005, 15). However, the survival of window openings of an early form at the lower levels, in conjunction with the incontrovertible evidence of the sale deeds, make it clear that the core of the tower represents a pre-Goodyear structure. It may be that the early structure was raised after Goodyear's acquisition of the factory, and that the upper level windows were adapted from smaller segmental-headed openings.

## 6.4 Building 10

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<sup>6</sup> Access to Level 4 was restricted due to Health and Safety concerns regarding the stability of the access stair and the state of the upper level.

<sup>7</sup> Wolverhampton Archives and Local Studies, Cat. No. DB/20/2/1/19.

- 6.4.1 Building 10 is located to the northern end of Building 8, enclosed to the north by Building 11 and to the west by Building 9, and is centred on NGR. SJ 9150 0148. It is a two-storey brick-built range, rectangular in plan measuring 25m (E/W) x 30m (N/S) – see Figures 23/4.
- 6.4.2 The east elevation (Plate 27), as observed from the exterior, has been subject to much alteration, evidenced by extensive brick patching, particularly at ground floor level. To the south end of the elevation, however, a series of segmental headed windows survive (Plate 28) at ground and first floor level, and further openings on the same model are visible behind pipework in the section of external wall visible from within Building 22 to the south (Plate 29). Northwards of these features are a series of large rectangular windows (Plate 27) which appear to be either insertions or adaptations of earlier openings. An early, undated photograph<sup>8</sup> (Figure 21) of demolition works prior to the construction of Building 21 (1927) seems to show that the windows of the east elevation were originally all of similar height to those of the south elevation (see below), but is inconclusive as regards the original form of the northern windows due to the oblique view.
- 6.4.3 Within the south wall, further blocked windows with segmental arched heads, and a circular vent-hole were recorded at ground (Plate 31) and first floor levels; these features are again more clearly visible in the ‘exterior’ face of the wall, again visible from within Building 22 (Figure 22f, Plate 65). A further undated historic photograph<sup>9</sup> shows this elevation unhindered, prior to the construction of Building 21 to the south (Figure 21b). This photograph also shows a stack rising above or immediately beyond Building 10, and gives a glimpse of the early structures to the north. It also appears that the level 3 windows of Building 9B have segmental heads at this time
- 6.4.4 Internally, at ground floor level, the building comprises a single open space, with a grid pattern of columns supporting the upper floor (Figure 24a, Plate 30). The majority of these columns at ground floor level are circular in section and of cast-iron construction, somewhat similar to those within Building 8, though with a variant headplate detail (Figure 22, inset).
- 6.4.5 The first floor of Building 10 is reached via a stair, which rises against the eastern exterior elevation of Building 9B (Figure 24). The first floor has been subject to extensive modification, many of the cast-iron columns having been replaced by RSCs, and the fabric of the exterior walls has been obscured by lining with breeze blocks. Five cast-iron columns survive, however, suggesting that the original layout at this level originally mirrored that at ground floor.
- 6.4.6 Building 10 falls within the footprint of the early factory buildings illustrated on the Ordnance Survey map of 1924 (Figure 5) and early photographs confirm that it represents a pre-Goodyear era survival. The use of characteristically early features (round section, cast iron columns, segmental arched windows) appears diagnostic of this phase of work.

## 6.5 Building 21A

- 6.5.1 Building 21A (the *Boiler House*) is located directly east of Building 8, to the eastern side of the development site, and is centred on NGR. SJ 9151 0138. The building is rectangular in plan, aligned approximately north-south and measures 27m (N/S) x c. 8m (E/W), standing 19m tall to the ridge of its shallow-pitched roof. It is dominated by the 48m tall brick-built chimney, which rises above the centre of the range, painted blue and bearing the Goodyear

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<sup>8</sup> Wolverhampton Archives and Local Studies, Cat. No. DB/20/F82.

<sup>9</sup> *ibid.*

name and logo (Plates 32-4). Exterior walls are in brick throughout, laid to English bond and include generous fenestration of three levels of multi-pane rectangular windows to the eastern elevation (Plate 32), with the exception of Bay 3, which is fully in brick with a blocked doorway at high level (Plate 39). A change in the quality of the brickwork to the south side of Bay 3 indicates a two phase development, confirmed by the evidence of historic photographs and drawings (see §.6.5.5). The building has been extended to the south with the addition of an extra two bays (Building 21F), while to the north the building is abutted by Building 22 (Pump House).

- 6.5.2 The tri-partite division of the exterior façade is not reflected internally, where the building forms a high, single space (Plate 38), the upper levels being accessed by a series of raised, gantry walkways. It is of seven uneven bays, here numbered 1-7 from south to north (Figure 25); Bays 4-7 are uniform at 6.5m wide, Bay 3 measures 9.5m, while the southern two bays (1 and 2) are c.9m wide. Internally, the building houses a series of boilers, all of which are replacements of original coal-fired boilers, being introduced in the late 1960s and early 1970s. At high level, the traces of a series of hoppers were recorded (Plates 36-7) which indicate that the building was originally furnished with six coal-fired boilers within Bays 1 and 2 and 4 – 7 (Figure 21). These boilers were superseded with the change over from coal to oil- and dual-fired boilers from the 1970s onwards. The hoppers were formerly fed from a conveyor, partially surviving within building 21F (see §.6.12, Plate 42), bringing coal from the northern end of the building where it was delivered by rail (the rail tracks survive within the tarmac road surface to the east of the building).
- 6.5.3 The roof is formed of a series of steel, double-Howe trusses with knee braces supporting three tiers of substantial purlins and a ridge piece (all formed of RSJs) which carry a heavily constructed, shallow-pitched roof of reinforced concrete slabs (Plate 35). Such a form of construction most probably originated as a fire-prevention measure in a building where formerly seven coal-fired boilers were in operation.
- 6.5.4 A 3.5m high basement runs the full length of Building 21A/F and is accessed via straight flight stairs within 21F and Bay 3 of 21A. This basement formerly functioned for the collection of ash from the boilers above, which was then raised by a hoist within Bay 3 and evacuated, via the blocked door in the east elevation, into a collection hopper external to the building.
- 6.5.5 Reference to historic documents indicates that Building 21 originates as one of the first buildings erected by Goodyear after acquisition of the site in 1927, and was extended in two phases during the 1950s. A series of design drawings 1927 and 1928<sup>10</sup> detail the proposed construction of Bays 3-7, including the main stack with alternative designs for brick and reinforced concrete construction being submitted for approval by Monolithic & General Construction of London SW1<sup>11</sup>. Interestingly, the 1926 drawings highlight the area south of Bays 3-7 for ‘future’ extension. A plan of 1937<sup>12</sup> indicates three boilers, while this has been extended to four by 1945<sup>13</sup>. Bays 1-2 were appended to the southern end of the boiler house in the early 1950s, and can be seen in the process of erection on an aerial photograph of 1952<sup>14</sup> (Figure 12), while a further aerial photograph dating to 1959<sup>15</sup> shows the full boiler house including Building 21F to the far south end.

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<sup>10</sup> Wolverhampton Archives and Local Studies, Cat. No. WTON/9495; 14421-1, 14520-1 and W69.

<sup>11</sup> *Ibid.* Cat. No.: WTON/9266.

<sup>12</sup> *Ibid.* Cat. No. WTON/9515; W525.

<sup>13</sup> *Ibid.* Cat. No. WTON/414-48; W3327.

<sup>14</sup> *Ibid.* Cat. No. P/3557.

<sup>15</sup> *Ibid.* Cat. No. P/3573.

## **LEVEL 2 RECORDS**

### **6.6 Building 9**

6.6.1 Building 9 comprises a single range of 15 bays, aligned approximately north-south, located to the west of Buildings 10/11 and to the east of Building 12, centred on NGR. SJ 9150 0145. It measures *c.*90m (N/S) by 22.5m (E/W) and stands 7.7m tall to the apex of its shallow-pitched roof. It is of steel frame construction with simple, low-pitched trusses of Warren configuration supported on paired C-section columns to east and west (Figure 22, Plate 43). The southern two trusses are truncated to the east, where the range wraps around the lower brickwork walls of the clock tower, Building 9B (Plate 21).

6.6.2 Although Building 9 falls within the area of Plant 1 established by the time of the Ordnance Survey edition of 1938 (Figure 6), the continued development of this area of the complex will have effectively removed any early fabric. Further, the form of the roof, being similar to those recorded within the later parts of Plant 2 (Building 44), would appear to suggest that the structure has been re-roofed relatively recently. A roofscar partially visible within the exterior north wall of Building 9, indicates an original roof profile similar to that of Building 8 to the south.

### **6.7 Building 11**

6.7.1 Building 11 forms a part of the larger complex (8-12) that encloses Building 10 and the clock tower (Building 9B), within the central, eastern area of the development site, and is centre upon NGR SJ 9150 0150. It comprises two ranges of unequal width, aligned approximately north-south, with pitched roofs gabled to north and south (the south end of the west range abuts Building 10). The ranges are of equal length (*c.*61m, ten bays), though the western range is wider (23 m) and taller (10.3 m) than the eastern range (9 m and 7.4 m respectively). The eastern range projects eastwards of the line of Building 10 to the south.

6.7.2 The eastern range of Building 11 is of metal-framed construction comprising standard, fan-type trusses with tie and principals formed of paired RSAs, one per bay plus intermediate trusses, totalling 19 trusses with zig-zag longitudinal bracing between trusses along the eastern (exterior) wall (Plate 46). To the east, the trusses are supported on RSCs encased in brickwork, which projects externally to form small piers on the line of the bay divisions (Plate 45). Save the southernmost bay and the three northern bays, the exterior aspect of each bay comprises large tri-partite, 60-pane windows above a low brick wall in English bond (Plate 45). At its southern end, the range is abutted by a single-storey brick-built office extension (Plate 44), while a further extension is appended to the eastern wall within the northern three bays. To the west, trusses sit upon a longitudinal RSJ supported by RSCs at each bay division. The eaves level of the east range is set somewhat above that of the west range, the edge beams of the two roofs being tied together by a vertical strengthening piece at each post.

6.7.3 The western range of Building 11 is substantially wider than the east range and varies structurally (Plate 47). It is again of ten bays, sharing the divisions of the east range, though the trusses are here of a similar design to those within Building 8 comprising a modified form of double-fink truss with tri-partite, cambered bottom chord and originally having knee-braces to east and west (those to the east have been removed).



6.7.4 Reference to historical Ordnance Survey maps indicates that the western range of Building 11 may represent a survival from the early enamelware buildings, being within the footprint of the buildings illustrated on the 1924 edition (Figure 5), though in a much modified form having lost any exterior fabric during later phases of expansion. The eastern range represents an addition of 1951.<sup>16</sup>

## 6.8 Building 12

6.8.1 Building 12-18 (*Plant 1*) form an expansive, open space comprising a total of 12 ranges (here numbered 1 to 12 from east to west) aligned approximately north-south, situated to the west of Buildings 8 and 9 and 8 and to the south of Buildings 17 and 44, being centred on NGR SJ 9150 0135. Building 12 comprises the five easternmost ranges and represents three definable phases of the westward expansion of Plant 1 (Figure 13).

6.8.2 All ranges share similarities of construction and are characterised by their use of superimposed low-pitched steel trusses of modified Warren configuration, the upper truss being narrower and providing clerestory lighting to the space below (Plate 49, Figure 22a). Bays 1-3 are c.185m long and of 30 bays, while 4 and 5 are shorter at 138m and 22 bays. The steelwork employed within Bays 1-3 is of a larger gauge than within the bays to the west, and employs double as opposed to single rows of bolts at key joints, but is otherwise similar. The exterior elevations to north and south are in red-brick laid to English bond, with a heightened parapet accentuating the clerestory level; a clear change in brickwork can be seen to the west side of Range 4 in the south elevation (Plate 48), the western brickwork representing infill building, post-dating the Ordnance Survey edition of 1967 (Figure 8).

6.8.3 The extension of Plant 1 occurred over several phases from the late-1920s to the mid-1940s, a development that can be traced through historic drawings and photographs. The eastern three ranges (1-3) are evident on the Ordnance Survey map of 1938 (Figure 6). Bay 4 is slightly later and is first indicated on the Ordnance Survey edition of 1955, though the similarity of its constructional details to the eastern bays suggests it formed a part of an ongoing campaign of expansion, and an early date is suggested by the detailing of the small porch appended to the south elevation of Range 4 (Plate 48). Ranges 6-9 (Building 18) were added as a separate building to the west, separated by a wide access road occupying the area of Range 5 (see §.6.11 below).

## 6.9 Building 17

6.9.1 Building 17 (the *Cement House*) is located towards the central area of the site, to the east of Building 44 and to the west of Building 28, and is centred upon NGR. SJ 9144 0166. It comprises a single range of 20 bays (here numbered 1-20 from south to north - Figure 26), and is aligned on an approximately north-south axis. The range is predominantly of a single storey (Plates 50-1), though with a flat roofed, two-storey section above Bays 5 to 7 (Plate 52). A primary, low single-storey range is appended to the east elevation between Bays 4 and 14.

6.9.2 Exterior walls are in brick throughout, laid to English bond and, to the northern and southern ends are/were generously fenestrated with large rectangular, multi-pane windows set between brick piers on the line of the internal bay divisions (Plate 50). The northern elevation displays a central, raised brick parapet closing off the northern end of a clerestory roof.

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<sup>16</sup> Wolverhampton Archives and Local Studies, Cat. No. WTON/27-51.

- 6.9.3 Internally, the range is divided by a series of original brick constructed walls, through access being via wide doorways with rounded bullnose brick jambs. Additional breeze block partitions date to the early 1970s. The northern bays are single-storey with clerestory roof; the steel frame is simple comprising RSC uprights and heavy, horizontal steel beams (Plate 54); the clerestory is likewise formed of simple uprights and horizontal beams, the slight slope of the roof being achieved through the insertion of graded 'spacer' blocks beneath the longitudinal purlins. The western third of bays 18 to 20 comprise a two-storey block, while a small office is formed in studwork to the north-east corner (Plate 54). The central section of the range (Bays 10 to 14) is unfenestrated, being exclusively top-lit, and retains machinery for the production of rubber 'cement' (Plate 56), from which the building takes its name.
- 6.9.4 The two-storey block occupies Bays 5 to 7 and is accessed via an internal stair within Bay 7, and via an external fire-escape stair which rises over the single-storey side range to the east of Bay 7 (Plate 52). The upper storey is well fenestrated to the east with window details matching those of the ground floor; to the west, walling is of solid brick with a wide doorway within Bay 5, formerly served by an external hoist.
- 6.9.5 The southern end of the range (Bays 1-4) is again single-storey with clerestory roof (ceiled over internally) supported on substantial transverse beams (Plate 55). The windows have here been infilled in brick and smaller openings inserted, though original, multi-pane windows survive (partly adapted) in the south elevation (Plate 51).
- 6.9.6 Building 17 is first depicted on the Ordnance Survey plan of 1967, and is missing from the earlier 1955 edition. The accuracy of the 1955 edition has however been brought into question (see §.5.6) and dated aerial photographs clearly show Building 17 in place in 1952<sup>17</sup> and original design proposal drawings<sup>18</sup> are dated to 1946. A large two-storey extension, of red-brick construction laid to English garden wall bond and clad in corrugated metal sheets, is appended to the western elevation of Bays 10-13 (Figure 26, Plate 53); this structure dates to the early 1970s and is first depicted on the Ordnance Survey 1:2500 edition of 1973-5 (Figure 10b).

## **RAPID ASSESSMENTS**

### **6.10 Building 13**

- 6.10.1 Building 13 comprises a large, single-range rectangular warehouse building, aligned east-west and located immediately north of Buildings 8-12, centred on NGR: SJ 9150 0158. It measures c.118m long (E/W) x 51m wide (N/S) and is of 20 uniform bays, with shallow-pitched trusses of simple 'Pratt' configuration (Plate 58). The interior forms a single, open warehouse space with the exception of the westernmost bay, which contains two-storey office accommodation. Externally, the walls and roof are clad in corrugated metal sheeting (Plate 57). The present building dates from the early-mid 1990s, although it broadly reflects the footprint of an earlier structure, evident on Ordnance Survey maps as early as 1938 (Figure 06) and surviving up until the edition of 1989 (Figure 09).
- 6.10.2 The earlier structure represented one of the first buildings to be erected by Goodyear on the site, design drawings<sup>19</sup> being submitted as early as 1930 for the extension of the building to

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<sup>17</sup> Wolverhampton Archives and Local Studies, Cat. No. P/3557.

<sup>18</sup> *Ibid.* Cat. No. WTON/545-46.

<sup>19</sup> *Ibid.* Cat. No. WTON/A544.

the west. The building occupied a rectangular footprint, aligned east-west, and was of four storeys to the east and two to the west, with basement level throughout. The structure was in brick with characteristic, generous fenestration of large rectangular windows. An aerial photograph of 1960<sup>20</sup> shows the structure at its maximum extent (Figure 27).

## 6.11 Building 18

6.11.1 Building 18 forms a part of the larger complex (8-12, *Plant 1*) that encloses Building 10 and the clock tower (Building 9B), within the central, eastern area of the development site, and is centred upon NGR SJ 9150 0150. It comprises the western seven ranges (here numbered 6-12 from east to west), 15m wide (E/W) x c.138m long (N/S) of a larger block, which extends to include Building 12 to the east, with which it shares structural similarities (Figure 13).

6.11.2 Ranges 6-8 are all similar, comprising superimposed low-pitched steel trusses of modified Warren type configuration, the upper truss being narrower and providing clerestory lighting to the space below. Ranges 9 and 10 are double-height, standing c.12.5m tall to ridge level. The roof is again supported on shallow pitched trusses of modified Warren configuration (see Figure 28, Plates 62), carried by paired C-section columns, rising above the level of the adjoining ranges with glazed clerestory. Set within the line of the main frame columns, RSCs carry longitudinal rails for gantry cranes formerly serving the full length of the ranges. Range 11 repeats the pattern of Ranges 6-8, while the westernmost range is of a similar style, though shorter (80m/13 bays) and wider (18m) than the ranges to the east.

6.11.3 Exterior walling is in red brick, laid to English bond, generously fenestrated with large, multi-pane rectangular windows set between piers of brickwork on the line of the bay divisions (Plates 59-61). The floor is in concrete throughout and includes three long plant pits within Ranges 6, 7 and 8.

6.11.4 Building 18 originated with the construction of Ranges 6-9 as a stand-alone building separated from Building 12 by a wide access roadway on the line of Range 5. Although they are not marked on the Ordnance Survey edition of 1955, original design drawings<sup>21</sup> are dated to 1947, and the building is clearly visible on the aerial photograph of 1952 (Figure 12). Ranges 10 and 11 were added during the 1950s and the 'infilling' of Range 5 occurred in two stages during the late 1950s – late 1960s. Finally, Range 12 was added between the Ordnance Survey editions of 1967 (Figure 8) and 1973 (Figure 10b).

## 6.12 Building 21F

6.12.1 Building 21F is a southerly, two-bay extension of the Boiler House (21A), centred upon NGR. SJ 9150 0136, whose form, scale, and external appearance it closely mirrors; it is brick built and generously fenestrated to the east and south elevations (Plates 22-3). It measures 13m (N/S) x 20m (E/W), the eastern elevation projecting slightly forward of the line of Building 21A and abutting Building 8 to the west. Internally, the structure differs from the main boiler house range, however, and while it maintains the heavy steel framing of the earlier structure, it is of flat-roofed form, standing 17m tall.

6.12.2 Building 21F retains its original, single large boiler (Boiler 7; Plate 40), which was decommissioned approximately 15 years ago. Originally coal fired, a large hopper (Plate 41) is located to the east of the boiler proper, fed by a conveyor (Plate 42) at high level which

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<sup>20</sup> Wolverhampton Archives and Local Studies, Cat. No. P/3140.

<sup>21</sup> *Ibid.*, Cat. No. WTON/414-48, W3532.

originally ran the full length of the eastern side of the Boiler House feeding a total of seven boilers (see §.6.5.2, Figure 21).

- 6.12.3 The extension of the Boiler House took place in *c.*1956 (T. Dickens *pers.comm.*); the structure is clearly visible on an aerial photograph of 1960<sup>22</sup> and is first depicted cartographically on the Ordnance Survey map of 1967 (Figure 8).

### 6.13 Building 22

- 6.13.1 Building 22 (The *Pump House*, Plates 65/6) is located immediately north of Building 21A, truncating slightly the eastern elevation of Building 8 to the west and encloses the south-east corner of Building 10 to the north-west (Plate 67). It is centred on NGR SJ 9152 0143. It is a steel framed structure, clad externally in brick, measuring 16,5m square in plan and of one tall storey, standing 9.5m tall to the underside of its roof, which includes three asymmetrical, glazed top-lights, aligned north-south (Plate 68). The building is built around the head of bore-hole 1 (Plate 69), which is sunk to a depth of *c.*200m, and includes a large sump beneath floor level. The building is still functional as a pump house and contains active machinery including three tower feed pumps (which extract water from the sump and feed it to the coolers east of Building 22), and five-low pressure water pumps and filter (Plate 70) which supply water to the plant. To the north side of the building are a series of redundant compressor bases. A roof scar with in the south wall provides evidence of an earlier structure on the same site as the present building, presumably that depicted in design drawings for the boiler house itself<sup>23</sup>.

- 6.13.2 At the north-west corner, the building is constructed around the south-eastern exterior angle of Building 10, where a series of early features are visible (see §.6.4, Plates 29 and 67). The Pump House in its current form is identifiable on an aerial photograph of the factory complex dating to 1960<sup>24</sup>, though it is not clearly indicated on Ordnance Survey maps until the edition of 1989.

### 6.14 Building 28

- 6.14.1 Building 28 is located to the north of Building 13 and to the east of Buildings 17 (cement house) and 45, and is centred on NGR. SJ 9150 0165. It comprises seven parallel ranges, aligned E/W, the southern six of which are of similar form, the northern range representing a later addition (Plate 71).

- 6.14.2 The southern six ranges of the building share a common construction technique, using pre-fabricated modular steel units similar to those used in the construction of 'Bailey' bridges, a form of temporary military bridge designed by Sir Donald Bailey of the British War Office during the Second World War and first used in Italy in 1943. The wall supports, comprising two cross-braced units (Plate 74) supported on 1m tall concrete pillars, extend onto the slope of the roof where they form a pitch with no need for a tie, thus maximising the internal space. This unusual manner of construction has led to the building being commonly known as the '*Bailey Building*'. It is possible that the use of Bailey bridge components represents exploitation of available and cheap surplus in the period following the end of the Second World War, though the structural advantage of requiring no tie and thus maximising the

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<sup>22</sup> Wolverhampton Archives and Local Studies, Cat. No. P/3140.

<sup>23</sup> *Ibid.* Cat. No. WTON 9495 14421-2 (dated 22<sup>nd</sup> March 1927).

<sup>24</sup> *Ibid.* Cat. No. P/3140.

internal space (Plate 73) most probably played an equally important part in the choice of the construction technique.

- 6.14.3 The six ranges are 11.2m wide and stand 7m tall to their ridge. The southern and three northern ranges are each 58m long, ranges 2 and 3 (from the south) being longer at c.98m. The exterior walls are in brick, laid to English bond above a low plinth of stretcher bond. Internally, the ranges are subdivided by a series of breeze block walls. The building is lit by a series of large, 20-pane windows in the south wall and by rooflights in the northern slope of each range. Each range has a large roller door central to the southern, gabled elevation (Plate 71). Gables and roof are clad in corrugated asbestos sheets (Plate 72).
- 6.14.4 The northernmost range of the building is a secondary addition, 57m long x 22.9m wide with pitched roof, gabled to east and west, comprising eight bays of steel, rigid frame-construction. The exterior walls are of brick, laid to English garden wall bond. The building comprises a large, open store to the east and is subdivided to form single-storey office accommodation to the west.
- 6.14.5 Reference to historic Ordnance Survey maps indicates that the southern ranges date to the period between the National Grid 1<sup>st</sup> edition 1:10,560 map of 1955 (Figure 7) and the 1<sup>st</sup> revisions of 1961-3 (Figure 10a), the northern range being first indicated on the National Grid 1:1250 2<sup>nd</sup> revision map of 1973-5 (Figure 10b).

## 6.15 Building 29

- 6.15.1 Building 29 is located towards the south-east corner of the site, directly opposite the main entrance to the site from Bushbury Lane, and is centred on NGR SJ 9150 0143.
- 6.15.2 The northern part of Building 29, described in the *Cultural Heritage Assessment* of December 2005 as an amalgamation of red-brick structures of varying height, predominantly flat-roofed, though with a series of wedge-roofed sheds to the north, had been demolished prior to the current study. The remaining, southern block measures 16m (N/S) by 30m (E/W). It is brick-built, of three storeys generously lit by large, rectangular windows throughout, set between projecting brick piers on the line of the interior bay divisions and with heavy concrete lintels (Plates 75/6). At the south-west corner a stairwell and lift shaft, also of brick construction, rises through the three floor levels and extends to serve the roof of the building (Plate 76). The lower section of the north elevation, representing the former link with the northern part, now demolished, is closed in corrugated metal sheeting (Plate 73).
- 6.15.3 Internally, the building is steel-framed, of five bays and is arranged over three floors, each of which comprises essentially a single space. The upper levels each have a central row of RSJs supporting transverse beams (Plate 78), while at ground floor level, which is double height (9m) the use of especially deep girders in the ceiling negates the need for central support thus creating a single open space (Plate 77).
- 6.15.4 The recorded section of Building 29 dates to the later 1950s; it is absent from an aerial view of 1952<sup>25</sup> and is not shown on the Ordnance Survey edition of 1955, though it has been erected by the time of an aerial photograph of 1959<sup>26</sup>.

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<sup>25</sup> Wolverhampton Archives and Local Studies, Cat. No. P/3557.

<sup>26</sup> *Ibid.* Cat. No. P/3573.

## 6.16 Building 31/75

- 6.16.1 Building 31/75 is located to the western side of the development site, west of Building 18 and to the south of Building 44, and is centred on NGR SJ 9128 0158. It is formed of an amorphous group of buildings which utilise a number of distinct types of construction (Figure 29).
- 6.16.2 To the north are two ranges of steel frame construction, aligned east-west and utilising distinctive bowstring trusses resulting in curved roof profiles (Figure 29b). The ranges are of equal width at c.10.5m, though the northern range is somewhat taller (6.85m to ridge) and shorter (6 bays/19m) than that to the south (5.3m to ridge, 10 bays/32m). Exterior walls are in red brick laid to English bond and the gables and roof are clad in corrugated metal sheeting. Access is via three large doors in the north elevation.
- 6.16.3 To the south of these ranges are two further parallel ranges with pitched roofs, 14.5 m long x c.11.5m wide of 'Bailey' style construction. The form of construction is identical to that used in the southern six ranges of Building 28 (see §.6.14), with which they are presumably contemporary.
- 6.16.4 The area between the two northern and two southern ranges is infilled by a small, flat roofed bay (Plate 79), while to the south-west corner of the building are two modern extensions (Plate 82), both of redbrick construction, one single-storey with flat roof, the second of two storeys with shallow-pitched roof.
- 6.16.5 Reference to historic Ordnance Survey maps and historic photographs indicates that Building 31/75 dates to the period between the 1:10,560 map of 1955 (Figure 7) and the aerial view of 1959<sup>27</sup>, being first indicated on the Ordnance Survey 1<sup>st</sup> revision 1:1250 map of 1961-3 (Figure 10a). The south-west extensions represent recent additions.

## 6.17 Building 44

- 6.17.1 Building 44 (*Plant 1*) is an expansive, rectangular structure, located to the north-west corner of the development site, centred on NGR: SJ 9135 0180 (Figures 30 and 31). The structure is arranged over three levels stepping up from north to south, being partially terraced into a slope in the natural topography. It can be broken down into two major sections, the southern and northern blocks, representing distinct phases of development which post-date in their entirety the Ordnance Survey National Grid 1<sup>st</sup> edition 1:10,560 map of 1955 (Figure 7). The northern block occupies the lower levels (1 and 2) and the southern block occupies Levels 2 and 3.

### *Southern Block*

- 6.17.2 The southern block comprises eight parallel ranges (here numbered 1-8, from east to west; Figure 30) of 22 bays (1-22, from south to north) and has overall dimensions of c.134m (E/W) x 170m (N/S). The building is arranged over two storeys (Levels 2 and 3), the lower level (2) extending to bays 11-22 only. The earliest part of the building is represented by the western ranges (4 to 8), which are 15m wide and are formed of superimposed low-pitched steel trusses, with sub-divided Warren configuration strutting, the upper truss being narrower and glazed to the sides, providing clerestory lighting to the space below (Figure 30, inset). These ranges are stylistically similar to the western ranges of Building 18, with which they

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<sup>27</sup>

Wolverhampton Archives and Local Studies, Cat. No. P/3573.

are presumably contemporary. Externally, the western ranges are brick-built, laid to English garden wall bond, with generous fenestration of large multi-pane windows (Plate 83).

- 6.17.3 The eastern ranges (1 to 3) are wider (18m), and are structurally distinct from the western ranges in their use of simple, low-pitched Warren-configuration trusses (Figure 30, inset), similar to those employed within the northern block, and within Building 9. Externally, Ranges 1-3 are of brick construction, laid to stretcher bond, the upper part and roof being clad in corrugated metal sheets. The south elevation displays a single blocked vehicular access door and pedestrian fire-door to Range 1 (Plate 84), while the eastern elevation comprises continuous glazing at Levels 3 and 2 (Plate 85/6 respectively).
- 6.17.4 The lower level (Level 2) is accessed via a stair leading off the west side of Bay 10 and via two fire-escape stairs within Range 4. It measures *c.*134m (E/W) x 92m (N/S), the Level 3 floor being supported on a grid of square section concrete columns (Plate 91). A void in the Level 3 floor is located within Bay 16 of Range 3.
- 6.17.5 Reference to historic Ordnance Survey maps indicates that the western 5 ranges (4-8) of the southern block were constructed before 1961 (they are indicated on OS 1:1250 1<sup>st</sup> revisions of 1961-73, Figure 10a, and on the aerial photograph of 1960, Figure 32), while the eastern three ranges (1-3) were added after the 1:10,560 1<sup>st</sup> revision map of 1967 (Figure 8) and before the 1:1250 2<sup>nd</sup> revision map of 1973-5 (Figure 10b).
- 6.17.6 The upper level of the southern block was formerly used for the production of 'green' tyre, the outline of the machine bases are still visible in the floor. Level 2 of the northern block was formerly used for the curing (vulcanisation) and finishing processes.

#### *Northern block*

- 6.17.7 The northern block comprises seven full ranges and one half-range (1-8, from east to west), aligned north south, of 19 bays (1-19, from south to north) and has overall dimensions of *c.*140m (E/W) x 150m (N/S); Figure 31. A basement level (Level 1) extends to the northern seven bays only. All ranges are here 18m (59 ft) wide and the bays maintain the 7.6m (25 ft) module of the southern block. The roof is supported on shallow-pitched trusses with warren pattern web strutting (as per Ranges 1-3 of the southern block, Level 3; Figure 31, inset). The floor is in concrete throughout and includes four long plant pits occupying bays 1-12 of ranges 3, 4, 6 and 7. The space is lit by windows in the west wall and the east wall includes a number of loading bays within bays 1 to 11 (2 per bay). To the south, wide doorways within ranges 2 and 7 give access to Level 2 of the south range.
- 6.17.8 Reference to historic plans indicates that the northern block was constructed after the Ordnance Survey edition of 1967 (Figure 8) and is first shown on the 1973-75 edition (Figure 10b) and is contemporary with the eastern part (Ranges 1 to 3) of the southern block, reflected in the similarity of their construction (Figure 11d/e).

### **6.18 Building 45**

- 6.18.1 Building 45 is located towards the northern end of the site, north of Building 17 and to the east of Building 44, centred on NGR SJ 9145 0174. It comprises a single-storey double range, aligned approximately north-south, with pitched roofs, gabled to each end (Plates 92/3). The ranges are of equal length (37m), while the western range, at 18.5m wide and 7.5m tall (to ridge), is wider and taller than the eastern range, which measures *c.*10m wide x

6.2m tall. Both ranges are of steel, rigid-frame construction. Externally the ranges are clad in corrugated asbestos sheeting above a low base wall in red brick, laid to English garden wall bond. A straight joint is clearly visible between the two ranges in the brickwork of the north and south elevations. The roofs of both ranges are clad in corrugated asbestos.

- 6.18.2 Internally, both ranges are of ten bays defined by nine rigid-frames with tapering, posts and beams both with Warren-pattern strutting (Plates 94/5). The ranges are divided internally by a wall of breeze-block construction with wide connecting doorway within bay 2 (from the north). The building is generously lit by large, 20-pane windows in the east and west walls, and is accessed via single, pedestrian fire-doors in the south elevation (Plate 92). Large sliding doors are located central to the southern gables (the western door survives, that to the east has been blocked, though the sliding mechanism survives; Plate 92), while a further roller door occupies the north elevation of the east range (Plate 93).
- 6.18.3 The building is clearly of two phases of construction, evidenced by the straight joint in the brickwork of the north and south elevations, though both ranges are essentially of similar form. The narrower east range is visible on an aerial photograph of 1960<sup>28</sup> (Figure 27) and is first shown on OS maps of 1961 and 1967 (Figures 10a and 8); the enlarged building is first indicated on OS edition of 1973 (Figure 10b).

## 6.19 Building 82

- 6.19.1 Building 82 is located towards the eastern side of the development site, immediately east of Building 11, and is centred on NGR: SJ 9153 0148. The building comprises a simple, utilitarian single-storey range, aligned approximately north-south, of red-brick construction (stretcher bond) with pitched roof, gabled to north and south, clad in corrugated asbestos sheeting and including a total of seven skylights (Plate 96). Principal access to the building is via a series of pedestrian fire-doors and large roller and sliding doors in the east elevation (Plate 94). Internally, the roof is supported by modified double fink-type trusses, which rest on projecting piers of brickwork. The range is divided into a series of workshops and, to the northern end, fire station and offices. The north elevation includes two large windows, the eastern of which has been modified, and a single pedestrian fire door, set within a former larger doorway (Plate 97).
- 6.19.2 The building is first indicated in its current form on the Ordnance Survey edition of 1989 (Figure 9), replacing two earlier structures on a similar alignment, evident on the 1967 edition (Figure 8, see also Figure 11d/e).

## 7 CONCLUSIONS

- 8.1 The buildings as recorded trace the expansion of the Goodyear factory from its origins in the 1920s through to its most recent developments. With the added evidence of historic plans and photographs it has been possible to define this development in fairly close detail (Figure 33).
- 8.2 The core of the original complex, purchased by Goodyear in the mid 1920s, is represented by Buildings 8, 9, 9B, 10 and the western range of Building 11. Subsequent phases of expansion have, in certain instances, effectively removed most original fabric; for example Building 9, where the exterior walls were removed in the 1930s and the roof replaced in the

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<sup>28</sup>

Wolverhampton Archives and Local Studies, Cat. No. P/3140.



more recent past (1960/70s), such that the present Building 9 simply occupies the space of an original range. In the case of Building 8, more original fabric survives (compare Figure 19 and Plate 11), though reference to historic photographs clearly shows the degree of alteration involved in the physical expansion of the factory site.

- 8.3 The earliest buildings dating to the period immediately following the purchase of the site by Goodyear are Buildings 1 (General Office) and 21A (Boiler House). Building 21 in particular illustrates the phased development of a building over time, and it is particularly interesting in this case that the later, 1950s phases of extension to the south were foreseen from the date of conception, being indicated as 'future' developments on the original 1920s design drawings. Building 1 survives relatively intact from its original layout, again evidenced from historic photographs, and while changing tastes for and requirements of office accommodation have resulted in certain cosmetic and minor structural alterations to the interior, the superstructure survives essentially unchanged. Perhaps the most detrimental alteration to the building has been the more recent introduction of UPVC double glazed window units. The series of segmental arches, observed at high level immediately above the suspended ceiling, are of particular interest representing the only use of this construction technique within a building definitively post-dating the acquisition of the enamelware factory by Goodyear.
- 8.4 The expansion of the factory workshops and storehouses during the 1930s-1950s, particularly in the period following the Second World War, was rapid and utilised a standard range of industrial, modular construction techniques, based more on the utilitarian than the aesthetic. The repeated use of large areas of glazing between projecting brick piers does, however, seem to represent a consistent site 'style' from the 1940s through to the later 1960s, and includes occasional details such as the south porch to Building 12 (Plate 48). The similarity of construction employed in successive campaigns of expansion makes the identification of breaks within the fabric of the standing structures difficult from a rapid physical inspection alone, and the establishment of a phased development has been greatly helped by the evidence of historic design proposals and photographs held at the Wolverhampton Archives and Local Studies resource (see Appendix A).
- 8.5 The most recent phases of development, for example Buildings 13 and 82, are purely utilitarian in nature and of no particular architectural interest or merit.

## **8 ACKNOWLEDGEMENTS**

- 8.1 The building recording was undertaken by Ric Tyler and Shane Kelleher of Birmingham Archaeology and was managed by Dr. Malcolm Hislop. The current report was written by Ric Tyler and edited by Malcolm Hislop. The illustrations were prepared by Ric Tyler and Nigel Dodds of Birmingham Archaeology. Thanks are due to Simon Griffin of Halcrow Group for supplying copies of the original sales agreement for the site, and to Neil Wilson, Technical Advisor of the Ordnance Survey, for information regarding early OS coverage.

## **APPENDIX A:** List of Sources

### *Cartographic Sources*

- Ordnance Survey County Series 1:2500 1<sup>st</sup> edition of 1884-7.
- Ordnance Survey County Series 1:10,560 map, 1<sup>st</sup> edition of 1888-9.
- Ordnance Survey County Series 1:2500 1<sup>st</sup> revision of 1902.
- Ordnance Survey County Series 1:10.560 map, 1<sup>st</sup> revision of 1902-3.
- Ordnance Survey County Series 1:2,500 2<sup>nd</sup> revision of 1918-23.
- Ordnance Survey County Series 1:10560 map, 2<sup>nd</sup> revision of 1920-24.
- Ordnance Survey County Series 1:10,560 map, 3<sup>rd</sup> revision of 1938.
- Ordnance Survey National Grid 1:10,560 map, 1<sup>st</sup> Imperial edition of 1955.
- Ordnance Survey National Grid 1:10,560 map, 1<sup>st</sup> revision of 1967.
- Ordnance Survey National Grid 1:10,560 map, edition of 1989.
- Ordnance Survey National Grid 1:1250 edition of 1961.
- Ordnance Survey National Grid 1:1250 edition of 1973.

### *Archive Sources*

Wolverhampton Archives and Local Studies

### Drawings

- WTON/9495: Design drawings for Boiler House (Building 21, Bays 3-7), dated 1927.
- WTON/9266: Alternative proposal drawings for brick and reinforced concrete stacks for Building 21. Dated 7<sup>th</sup> September 1927. Includes general plan of site at this date.
- WTON/A544: Plans for extensions to Warehouse (structure pre-dating Building 13), Dated 1<sup>st</sup> May 1930, approved 8/9/1930.
- WTON/D797: Extension to works – single range north of Building 8 . Dated 1935, approved 28/8/1936.
- WTON/9515: Design drawings for ‘new garage’ in southern site area. Includes plan of site at this date. Dated 1937.
- WTON/545-46: Location plan and detailed design drawings for proposed new workshop; ‘*Pliofilm Building*’ (Building 17). Dated 1946.
- WTON239/49: Extension to General Office (Building 1), dated 1947.
- WTON/414-48: Plan for new drainage etc., January 1949, marked on base plan of 1945. Includes design drawings for Building 18, Bays 6-9.
- WTON597/50: Design drawings for extension to Boiler House (Building 21, Bays 1-2), dated 1950.
- WTON/27-51: Proposal drawing for eastern range of Building 11. Dated 17/11/1950, Approved 26.01.1951.

### Photographs

- P/3140: Aerial view of factory site from north-west. Dated 1960.
- P/3573: Aerial view of factory site from the south-west. Dated April 1959.
- P/3557: Aerial view of factory site from the south-east. Dated 1952.
- P/3559: Excavation of basement to new boiler house (Building 21) from the north. Dated 17<sup>th</sup> October 1927.

P/3560: Interior view of general office (Building 1). Dated October 1929.  
DB/20/F82: Demolitions prior to construction of Building 21. Undated. c.1927.  
DB/20/F82: Demolitions prior to construction of Building 21. Undated. c.1927.  
DB/20/F82: Interior of Building 8. Undated. c.1926.

Other

DB-20/2/1/19: Agreement for sale and purchase of Bushbury Works, 11<sup>th</sup> July 1927.  
DB-20/6/2/15: Typewritten account of Goodyear Wolverhampton during early years of WWII, sent to conference in Akron, Ohio, dated 1941.

*Published Sources*

Allen H 1936. *The House of Goodyear*.

*Unpublished Sources*

Birmingham Archaeology, 2007: 'Goodyear Tyre Factory, Wolverhampton: Written Scheme of Investigation for Historic Building Recording'.

Halcrow, September 2006: 'Goodyear, Stafford Road, Wolverhampton: Archaeological Specification: Standing Building Recording and Watching Brief'.

Halcrow, December 2005: 'Redevelopment of Goodyear, Wolverhampton: Cultural Heritage Assessment'.



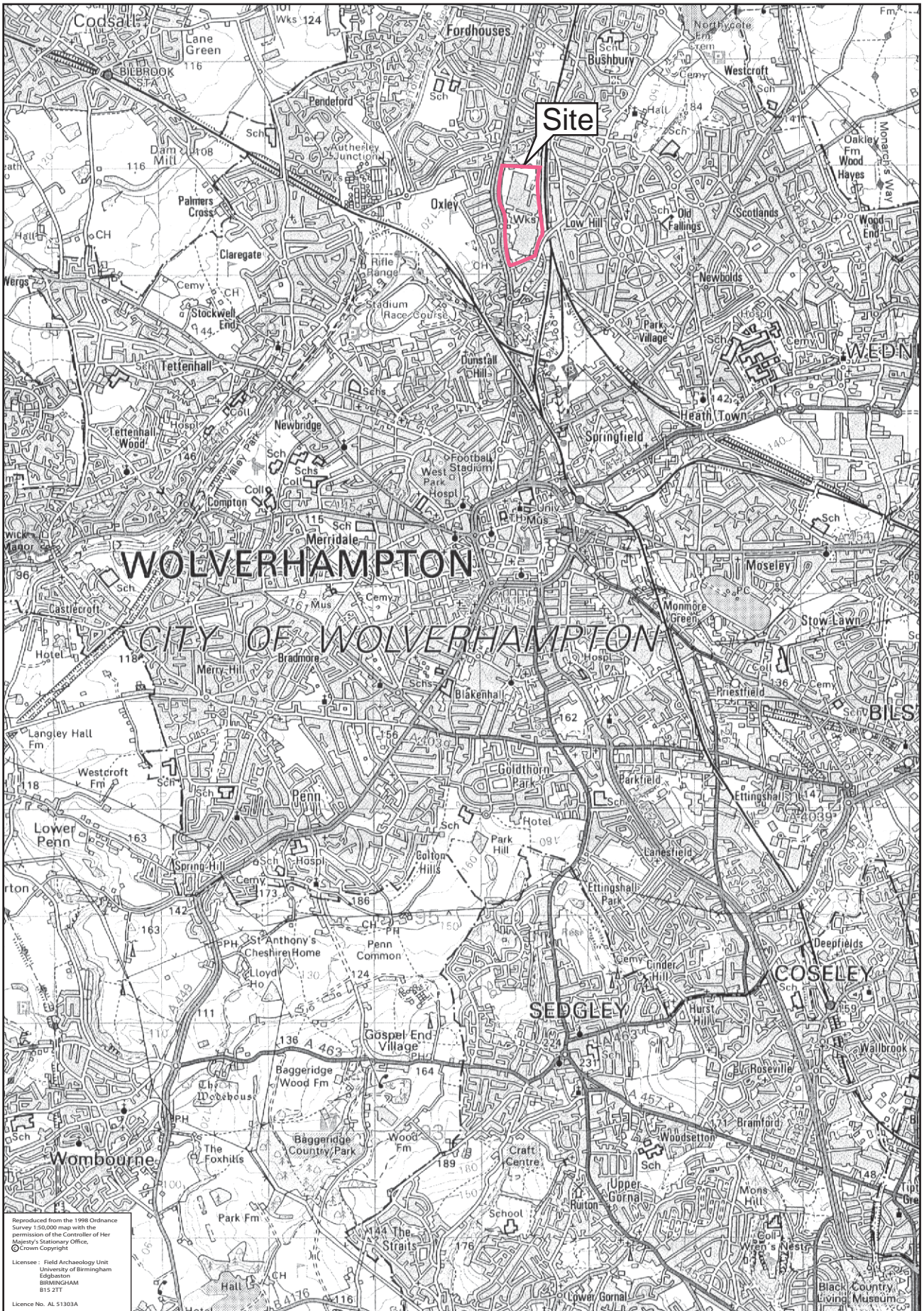


Fig.1



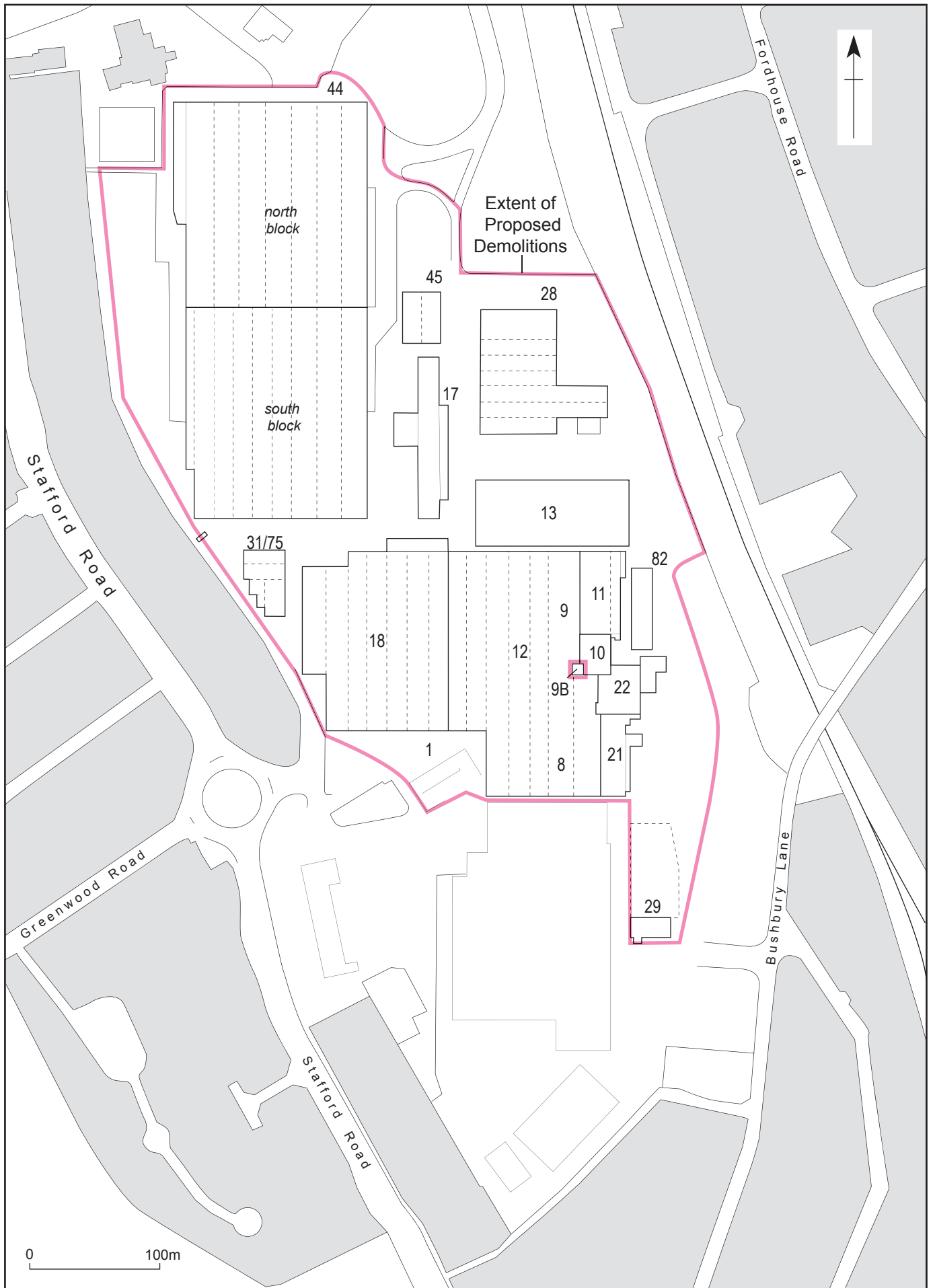


Fig.2

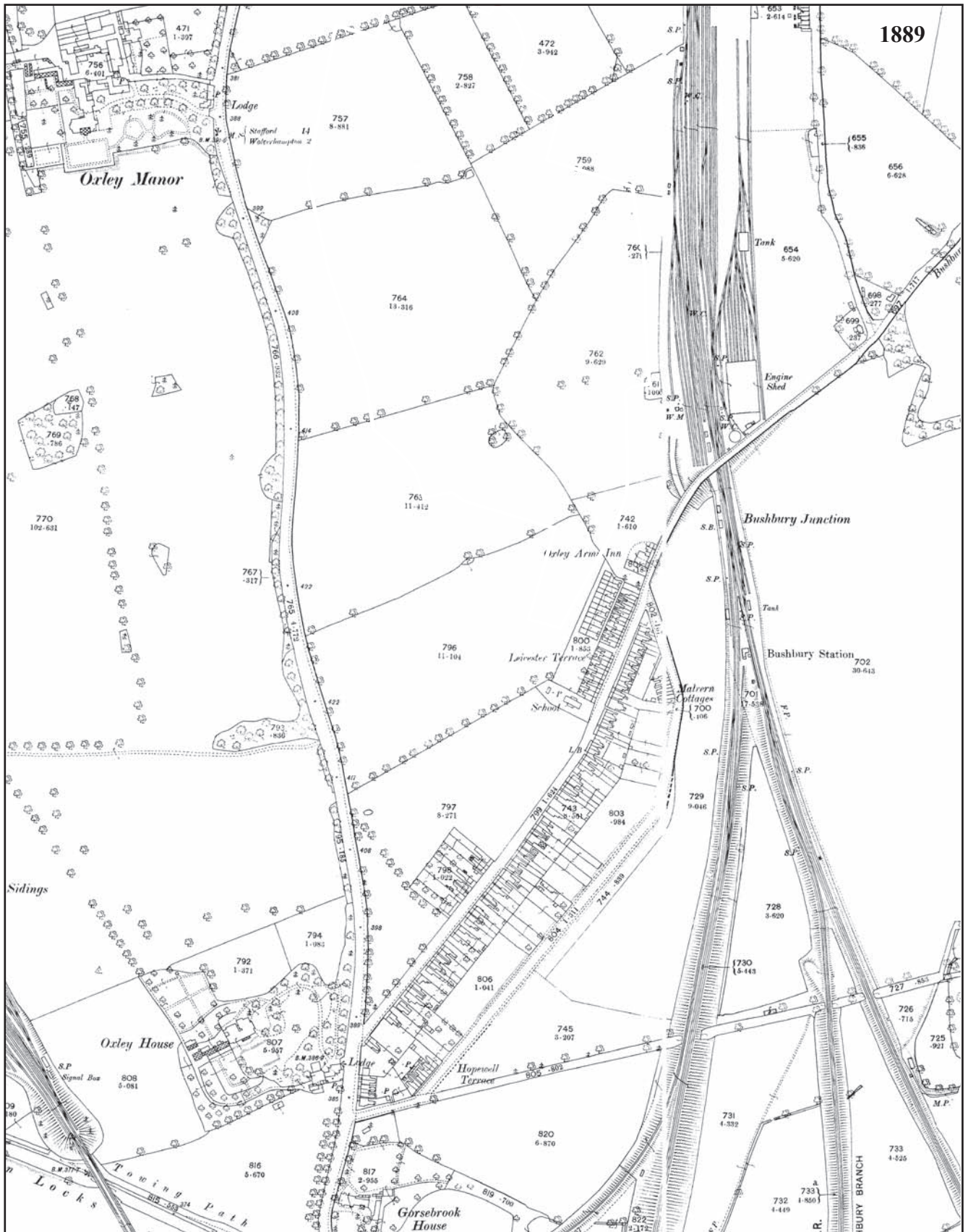


Fig.3



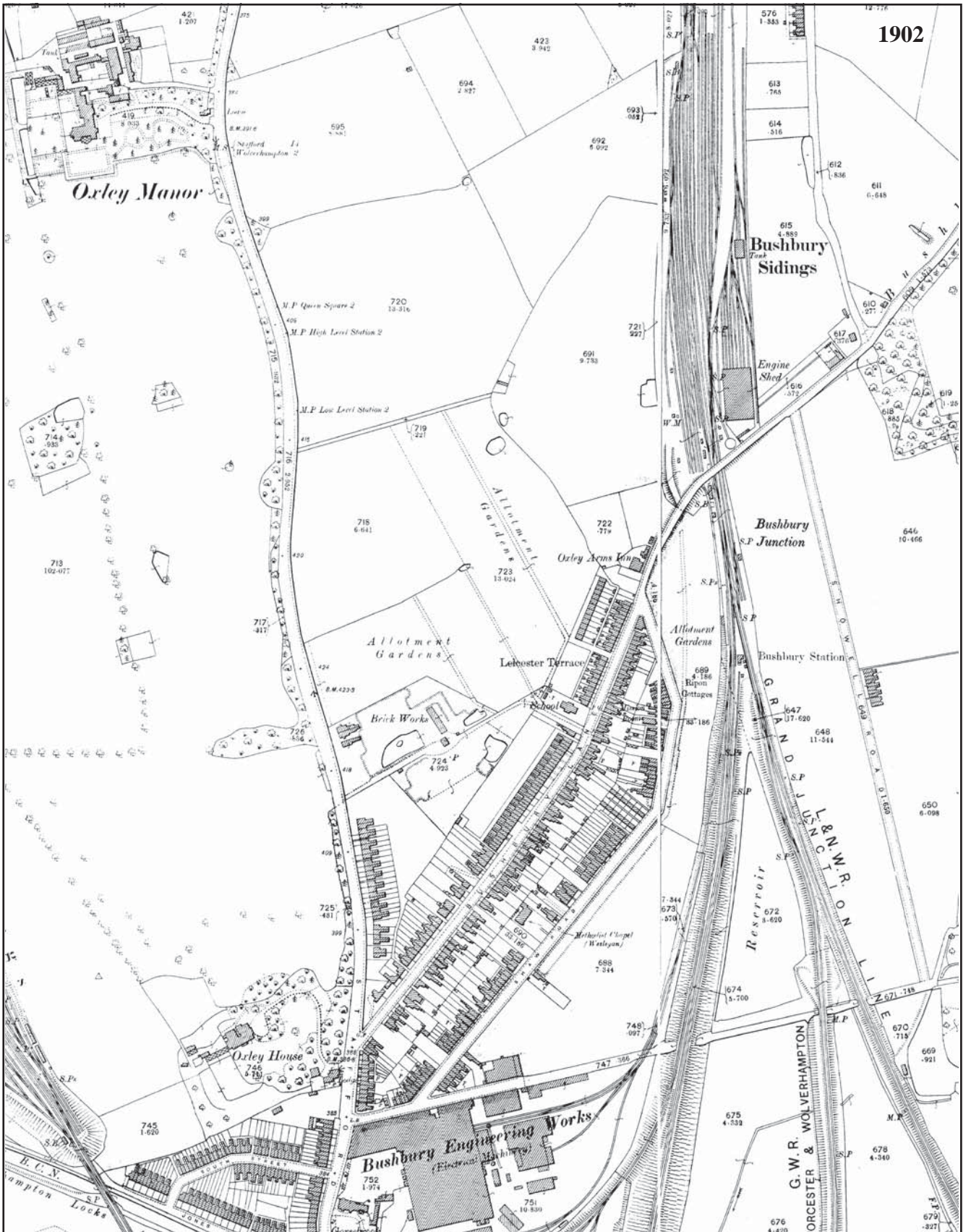


Fig.4





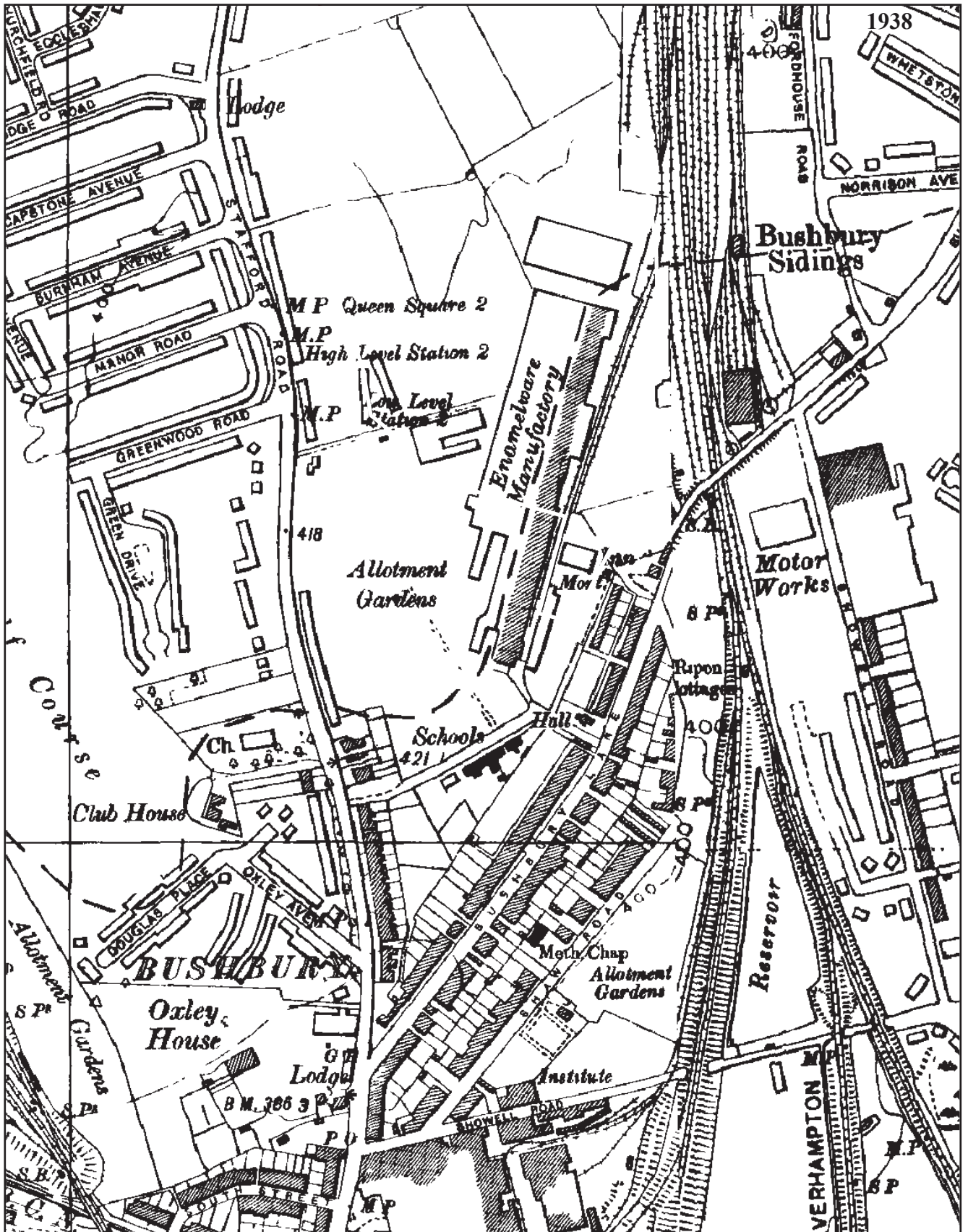


Fig.6

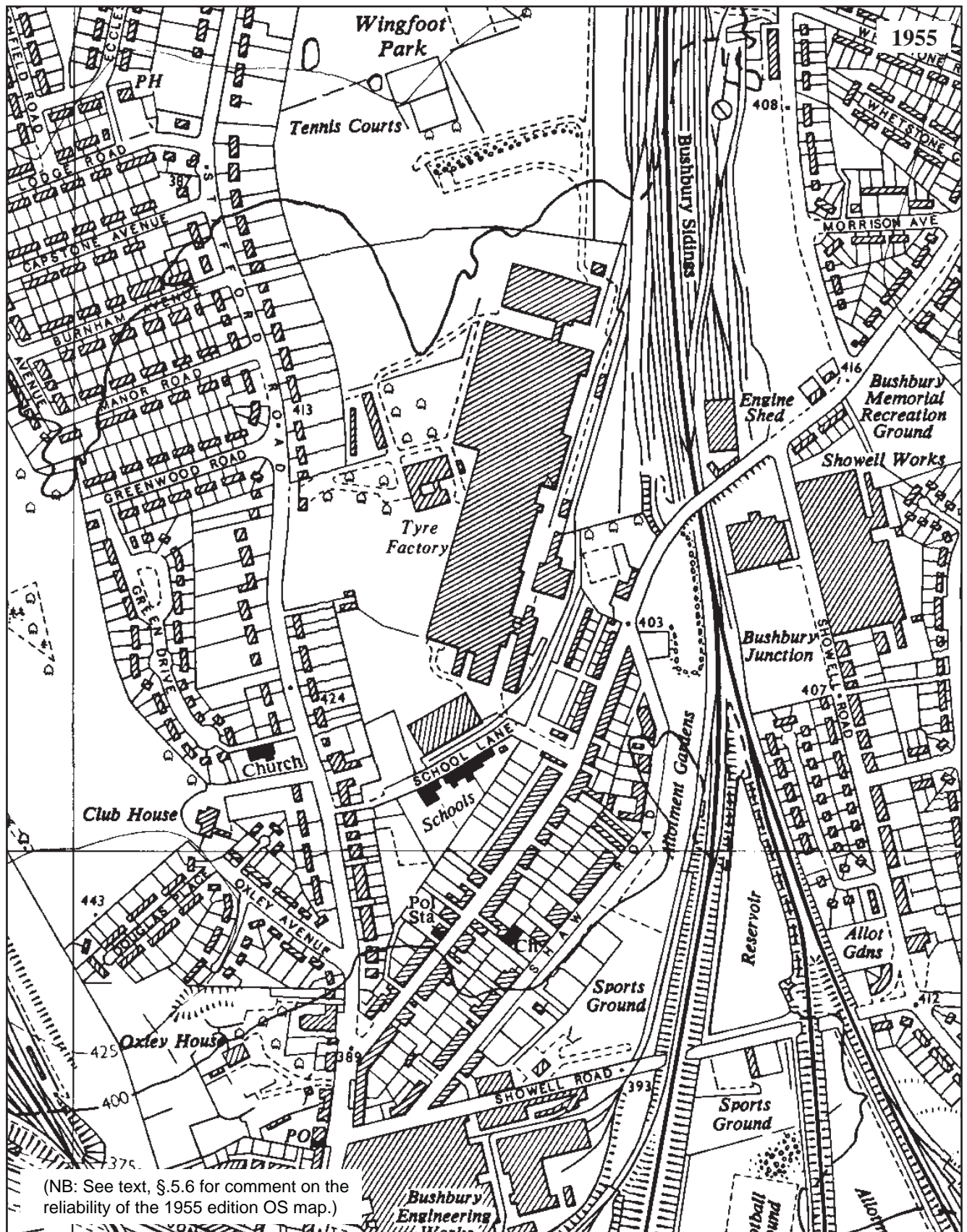


Fig.7



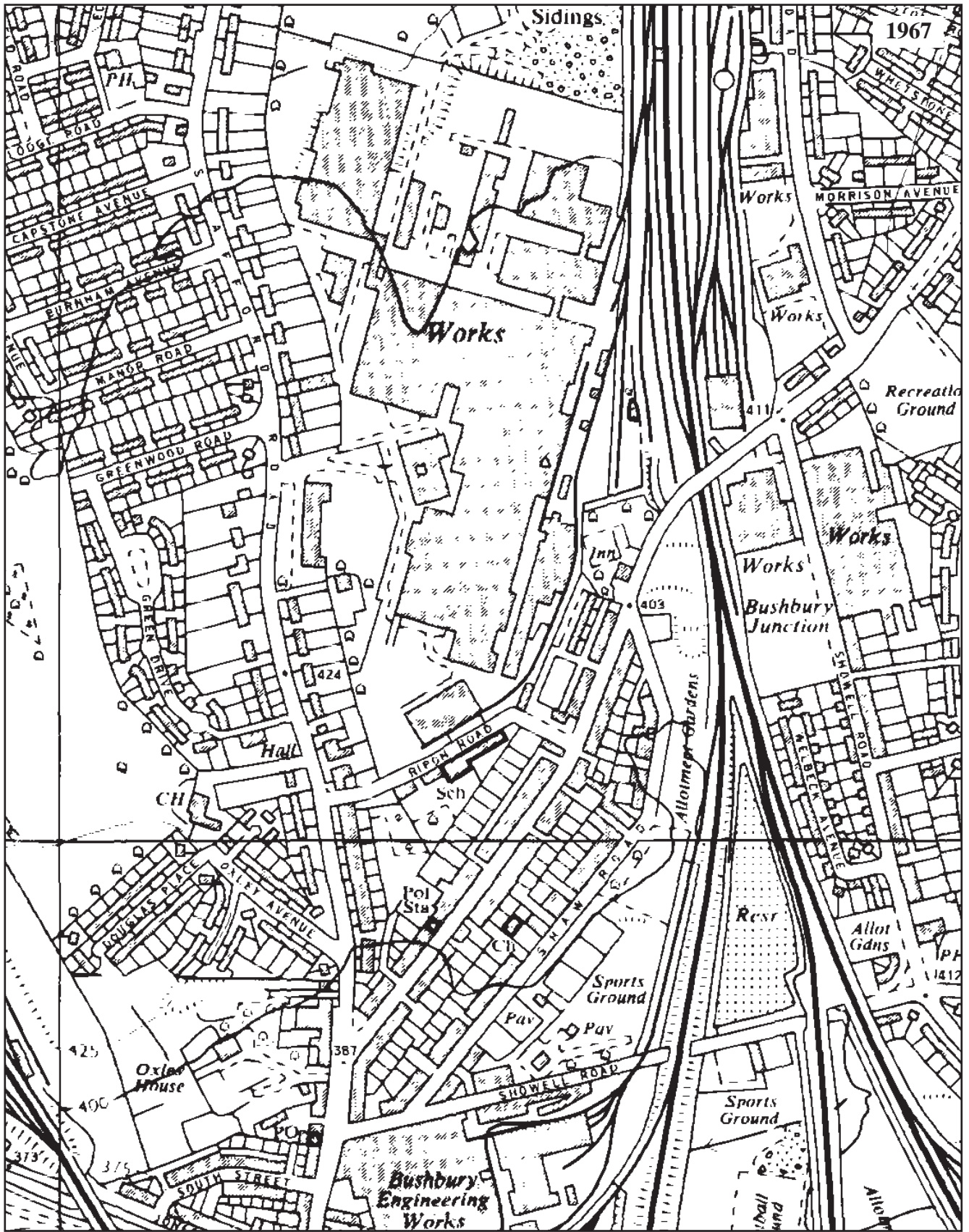


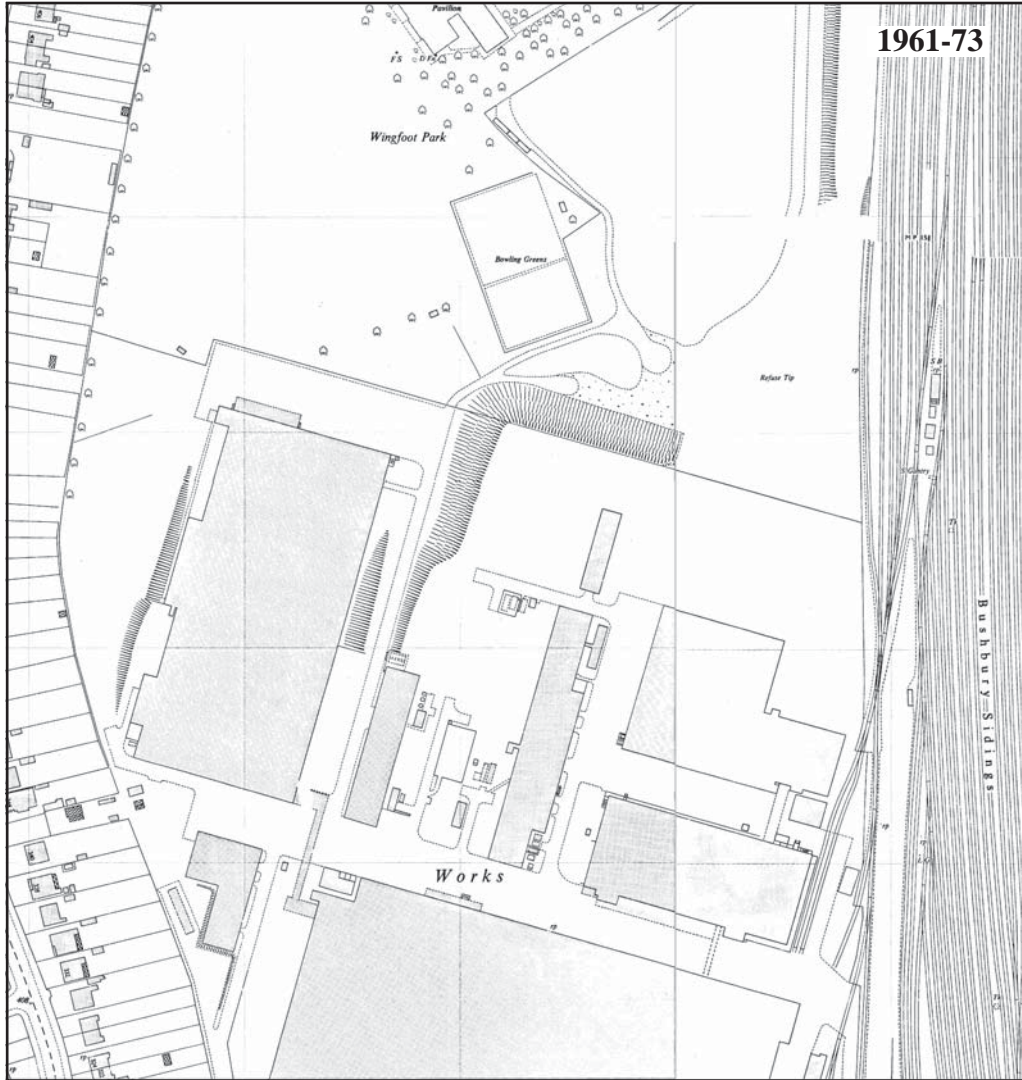
Fig.8



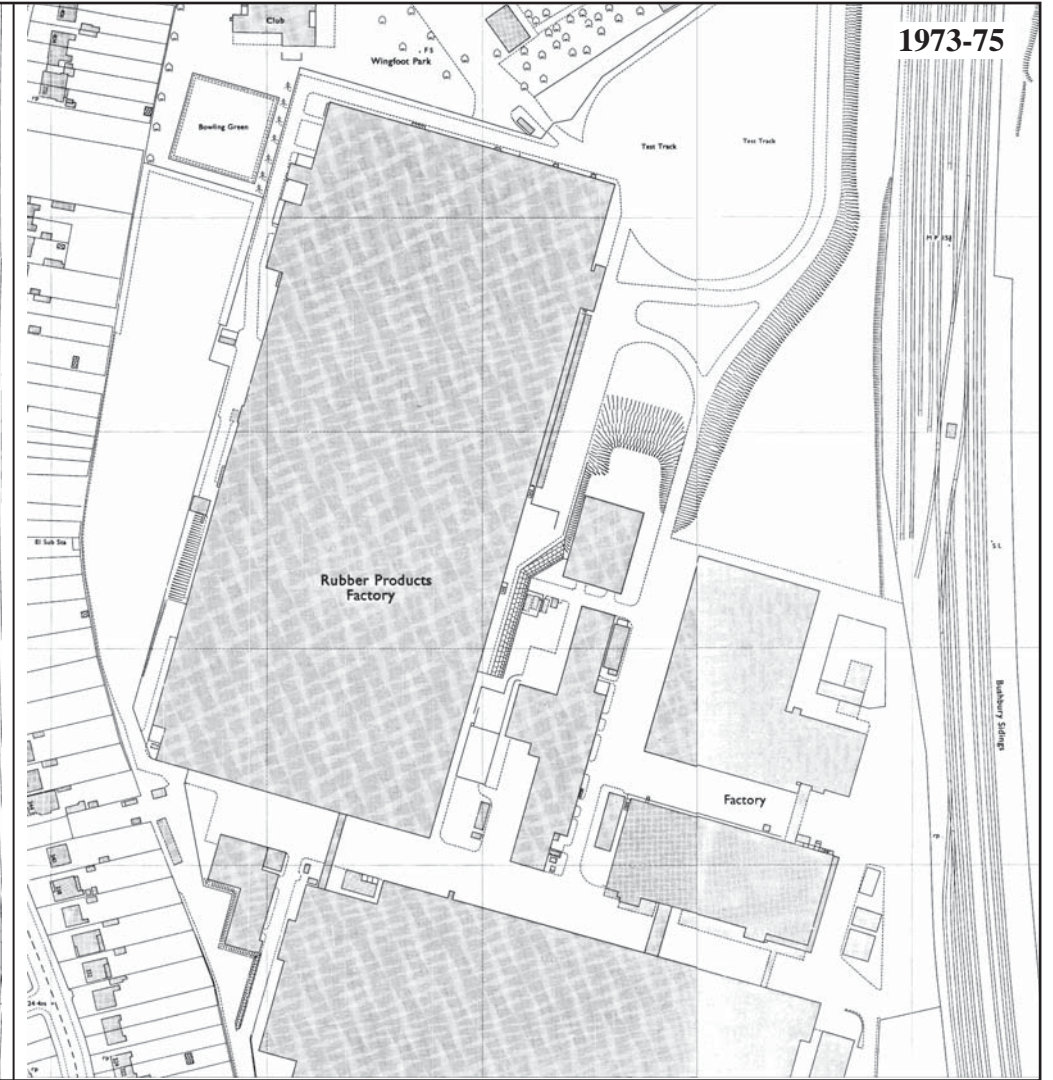


Fig.9





1961-73



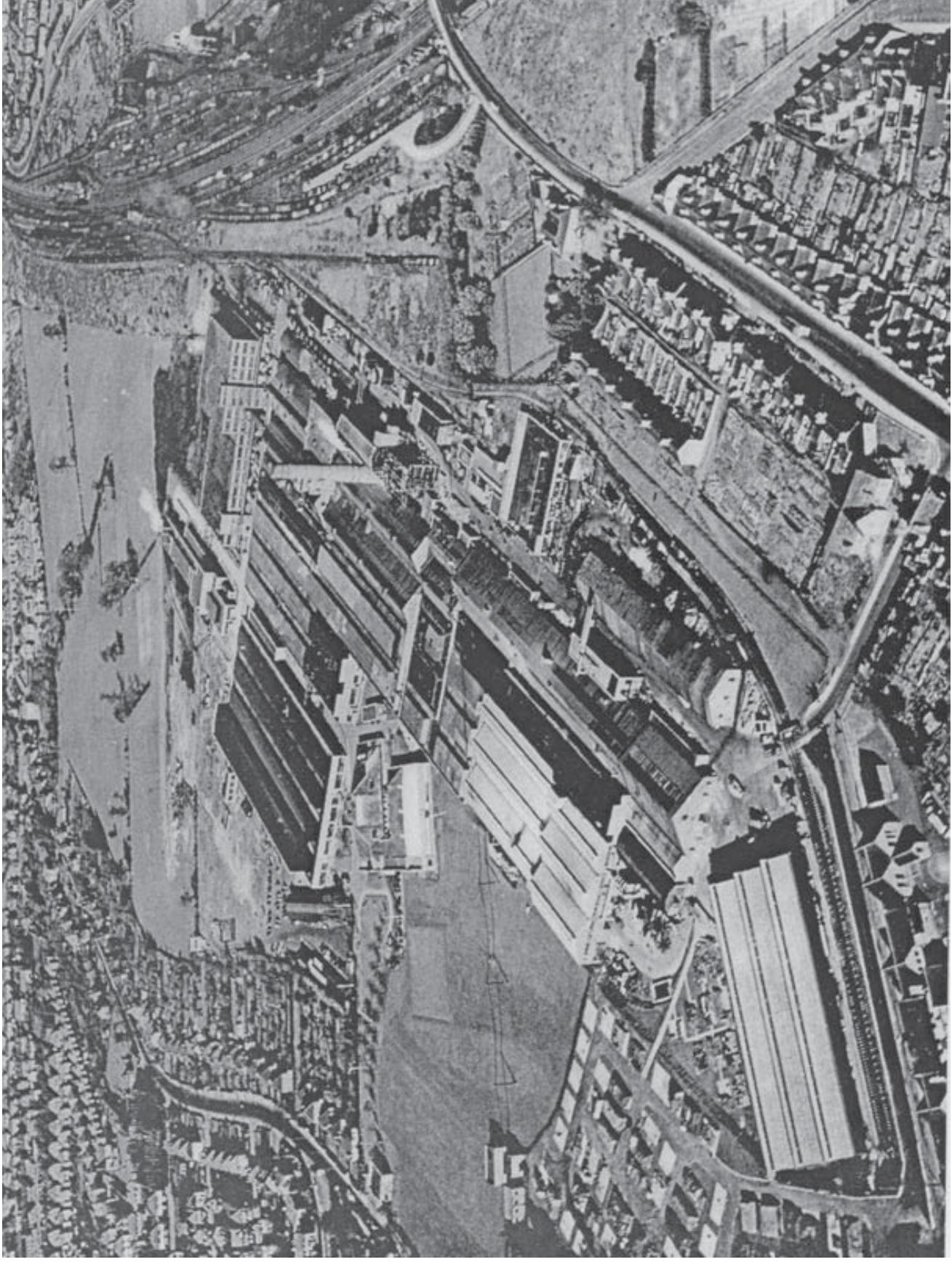
1973-75

Fig.10



Fig.11

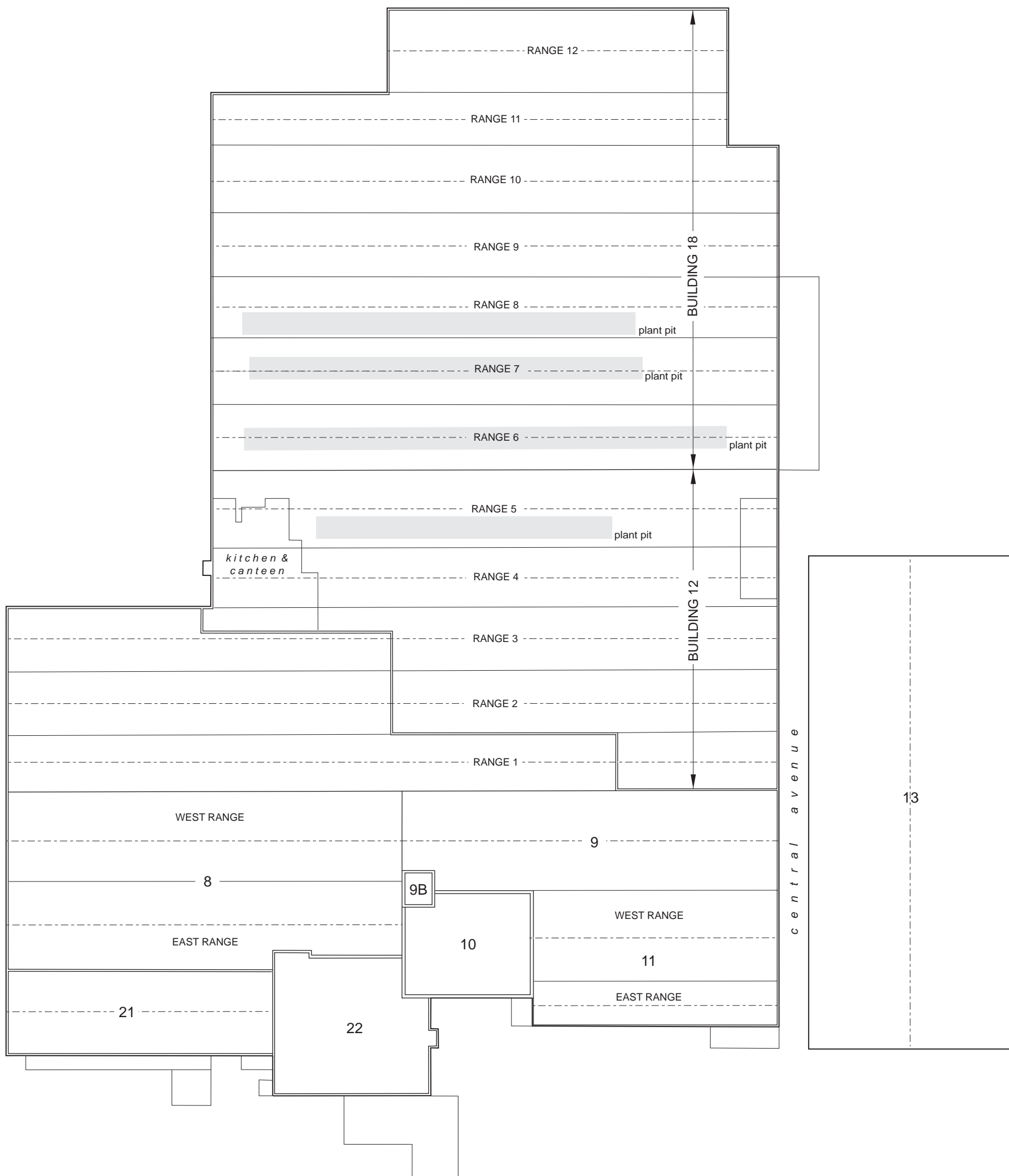




**Figure 12:** Aerial view of site from south-east (1952). Source: WAL5 P/3140.



north  
(indicative)



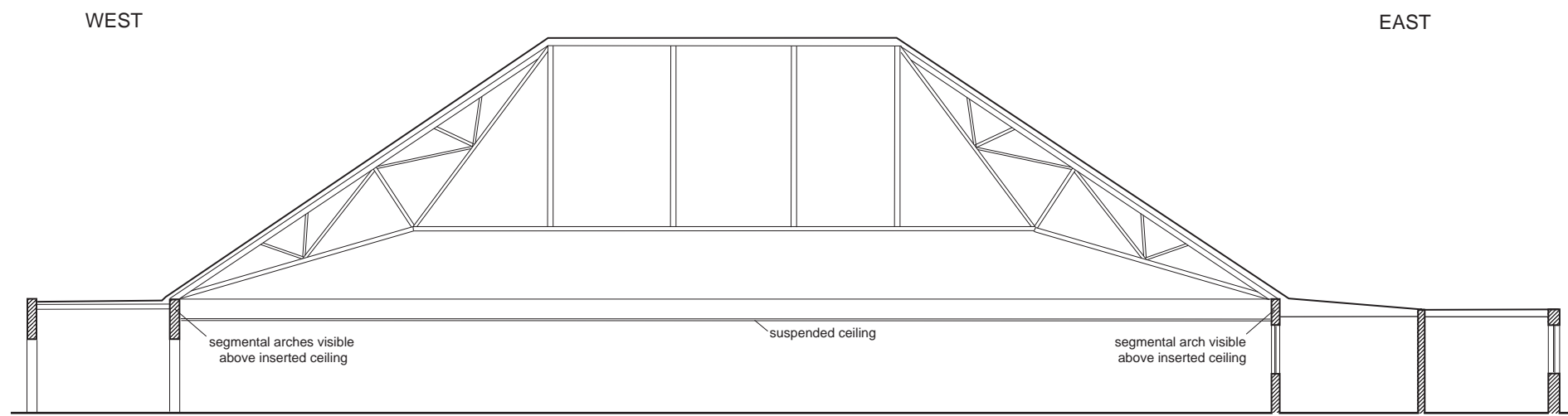
0 50 100 m  
Scale 1:1000

Figure 13: Central Block, Key Plan

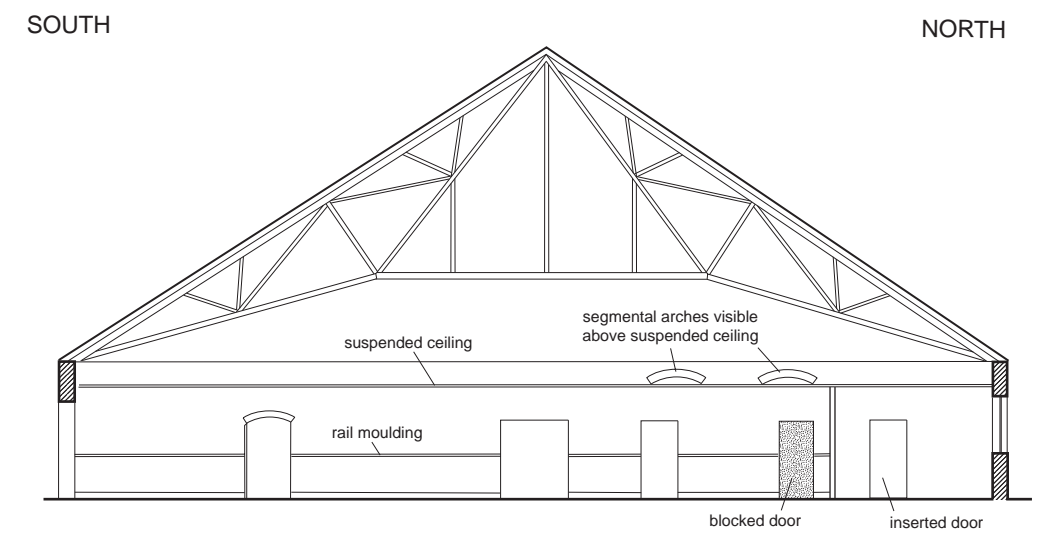




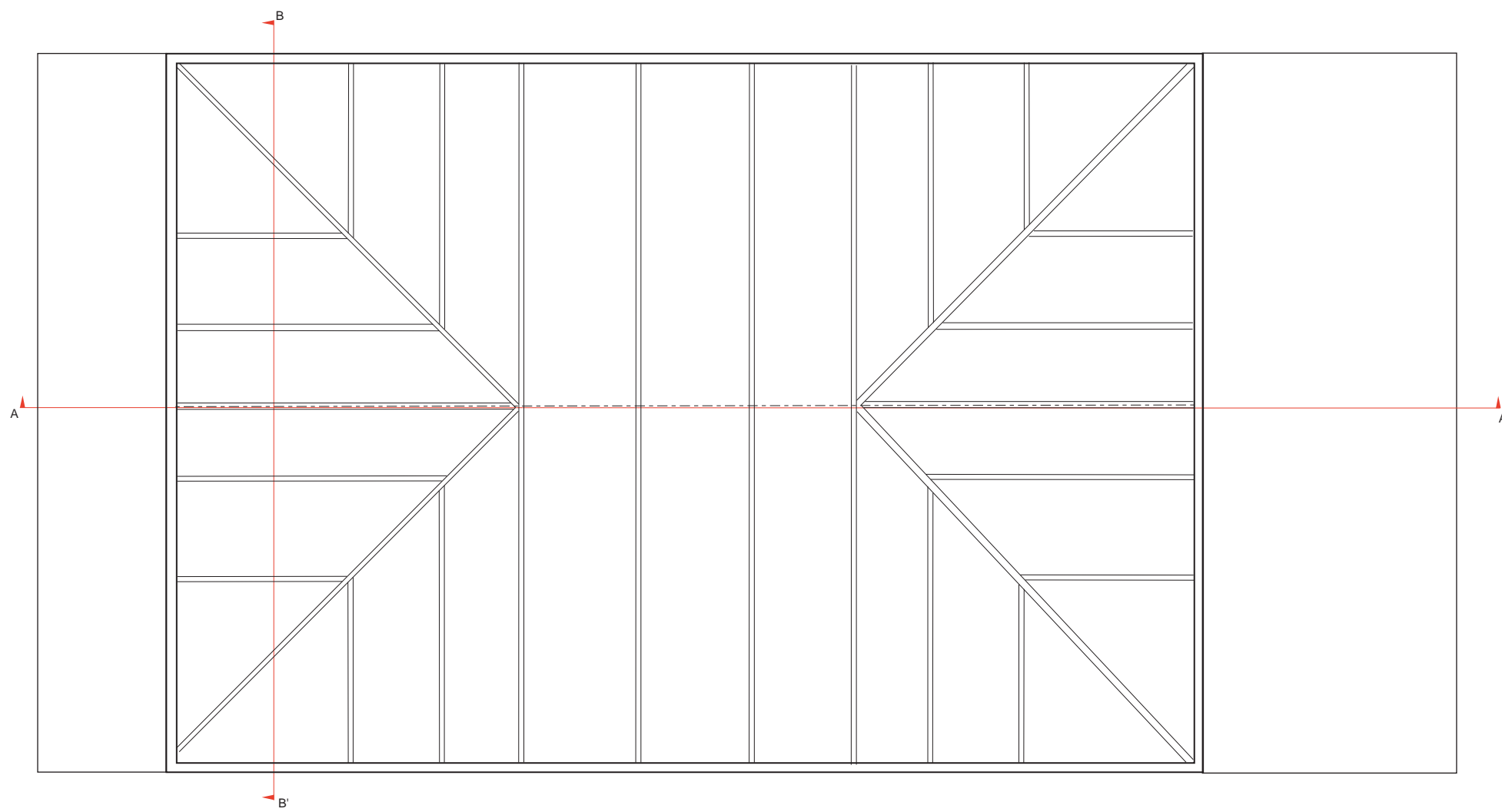
Figure 14: Building 1, floor plan



(a) Longitudinal cross-section A-A'



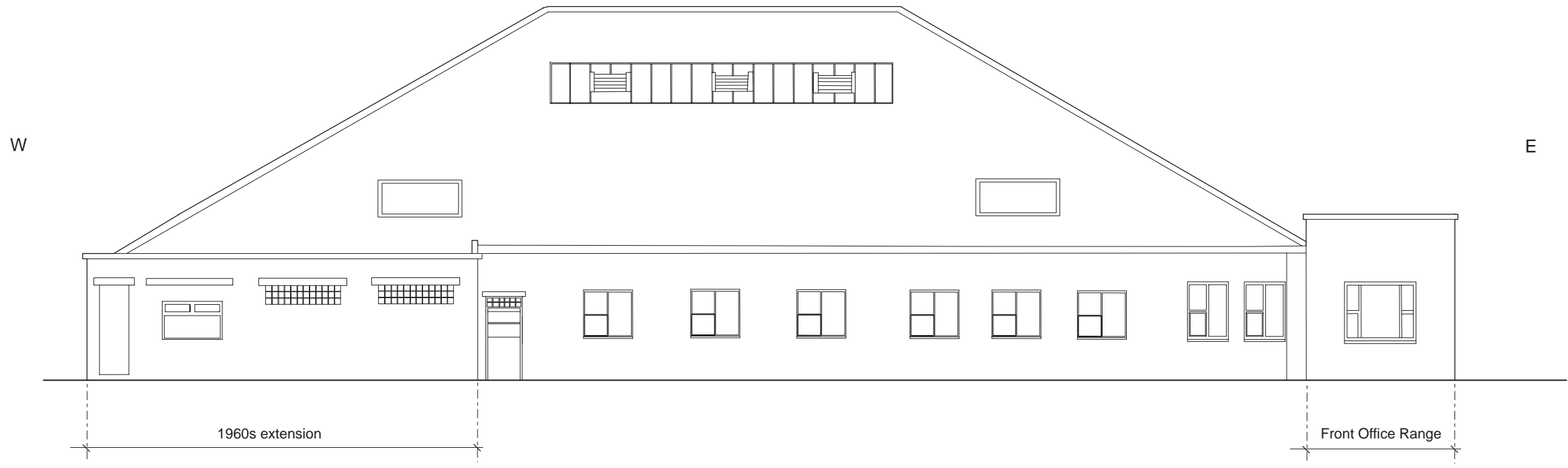
(c) Transverse cross-section B-B'



(b) Roof plan

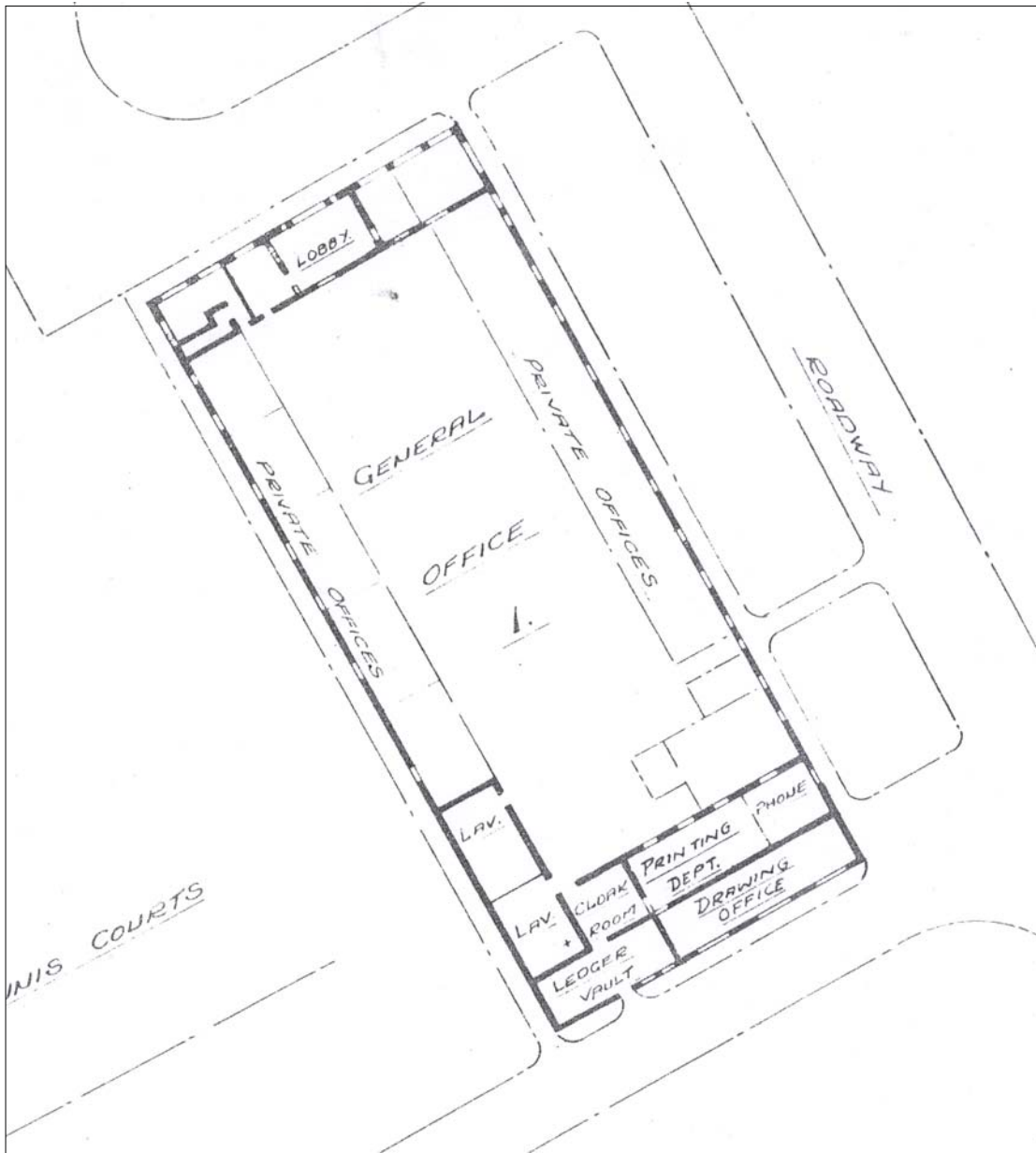


Figure 15: Building 1, Roof plan and sections

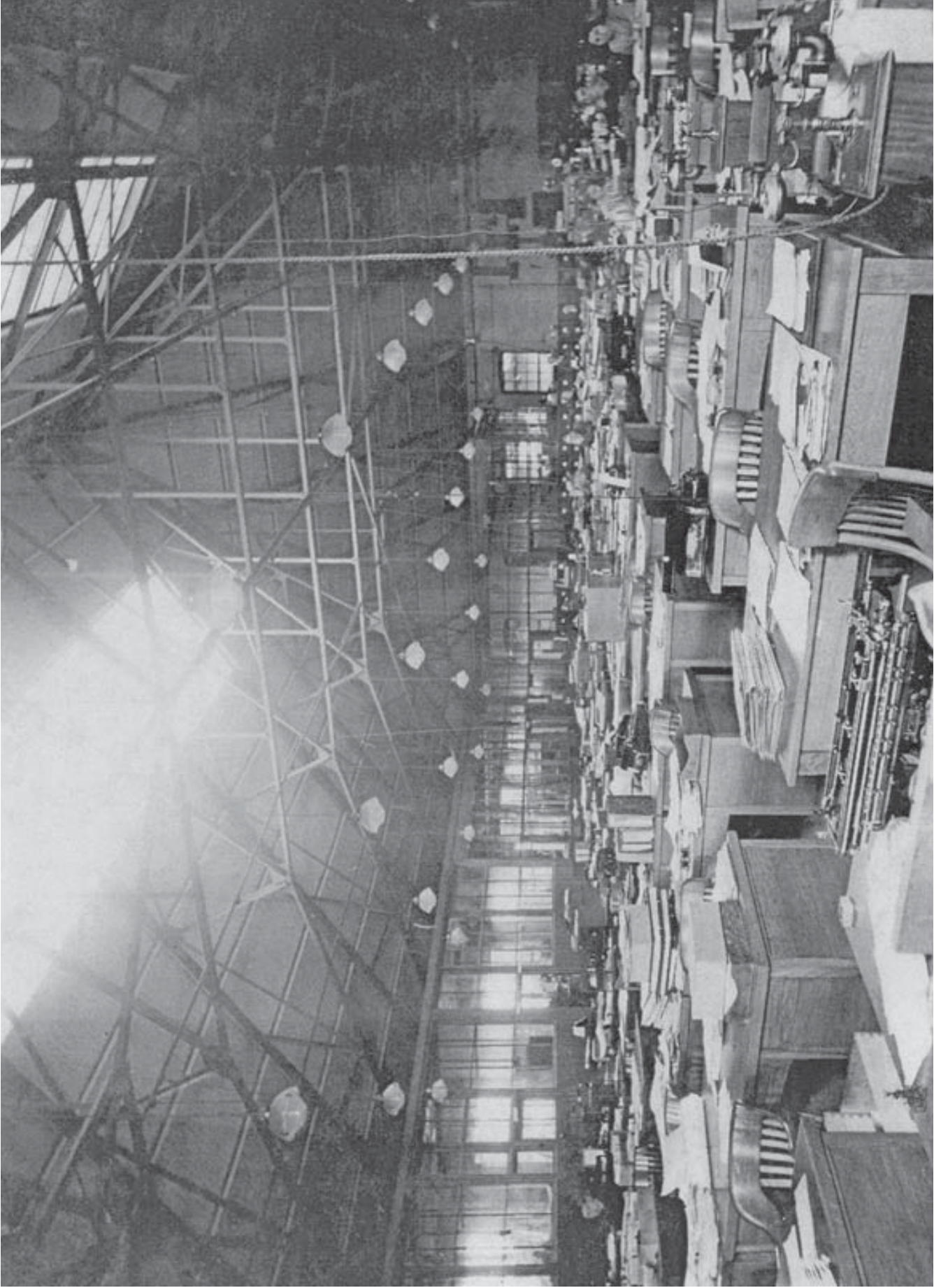


0 5 10 m  
Scale 1:150

Figure 16: Building 1, exterior elevations



**Figure 17:** Original section of Building 1 as existing in 1935.  
(Source WALS Cat. No. WTON D/797).



**Figure 18:** Interior of General Office (Building 1), 1929, looking north-east. Source WALS P/3560.



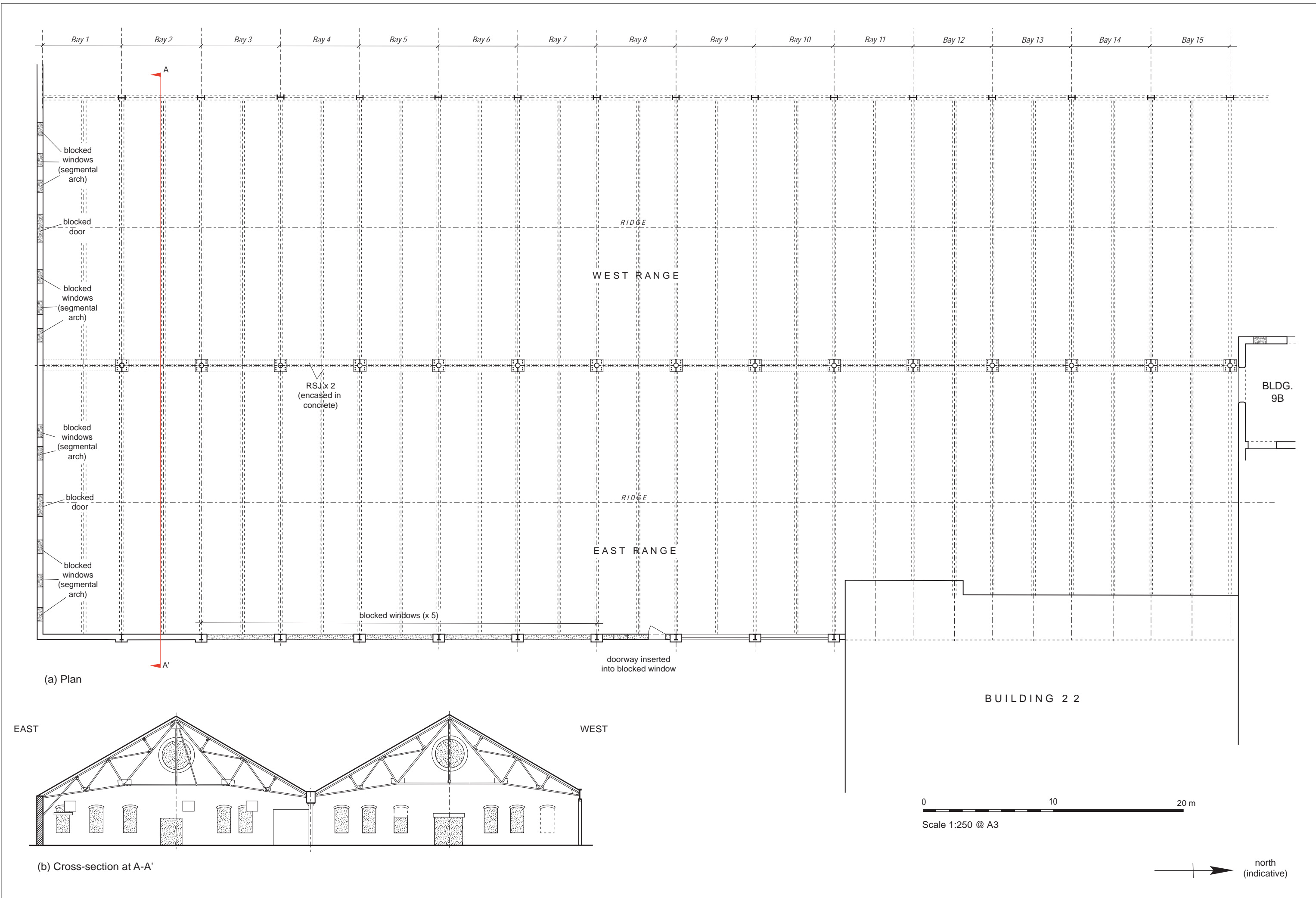
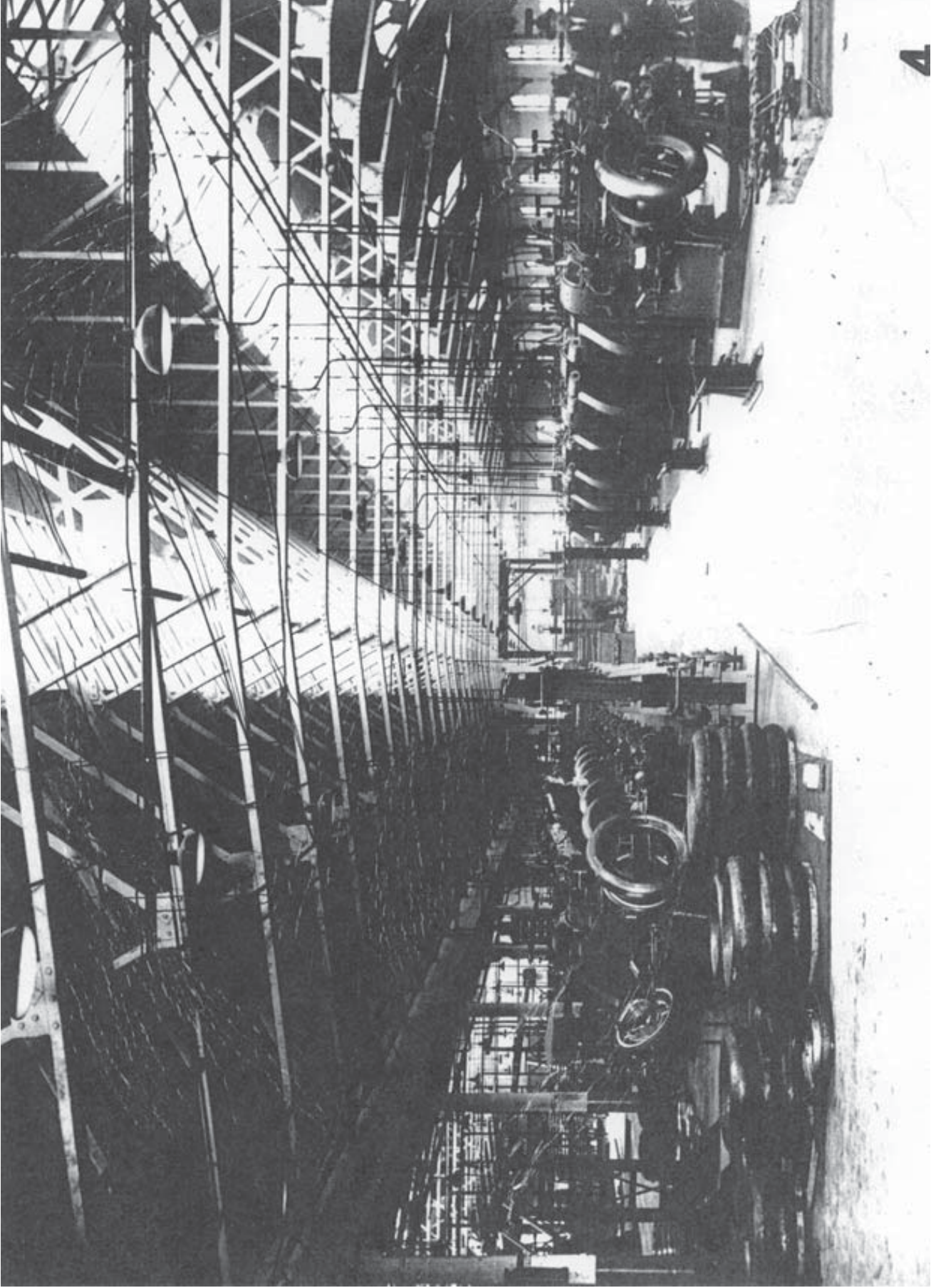


Figure 19: Building 8, plan and cross-section



**Figure 20:** Interior of Building 8, west range, looking south, undated c.1926?. Note form of windows to exterior elevation (right).  
Original photo: C A Eisenhofer, Arcade Studios. Source WAL5 ref. DB/20/F82





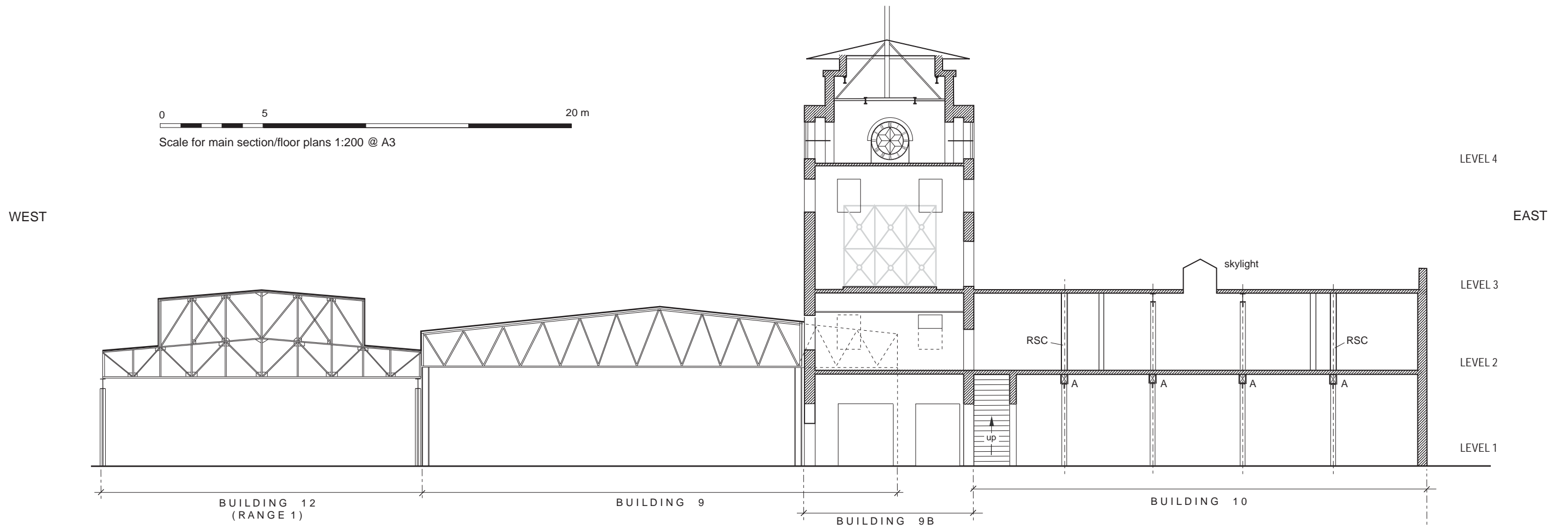
(a)



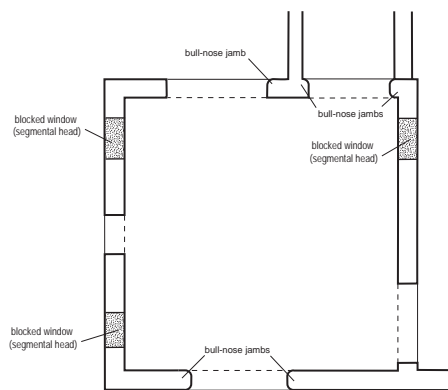
(b)

**Figure 21:** Two undated (c.1926?) photographs showing demolition of former stack prior to erection of Building 21 (Boiler House) in 1927. Note removal of brickwork to Building 8, east elevation. Also details of Building 10 to north.  
Original photographs C A Eisenhofer, Arcade Images. Source WAL5 DB/20/F82.

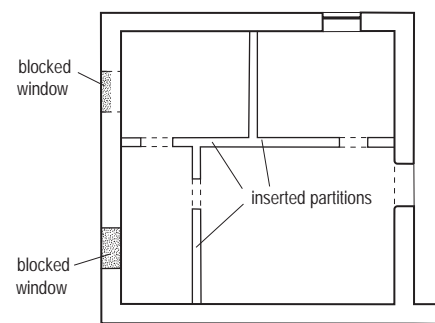




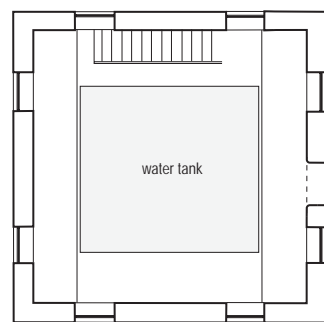
(a) Cross section



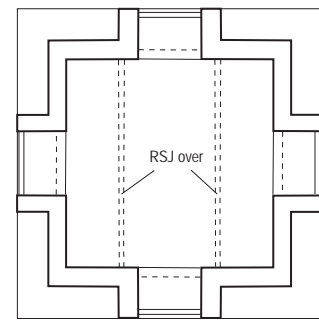
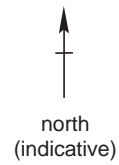
(b) Level 1 plan



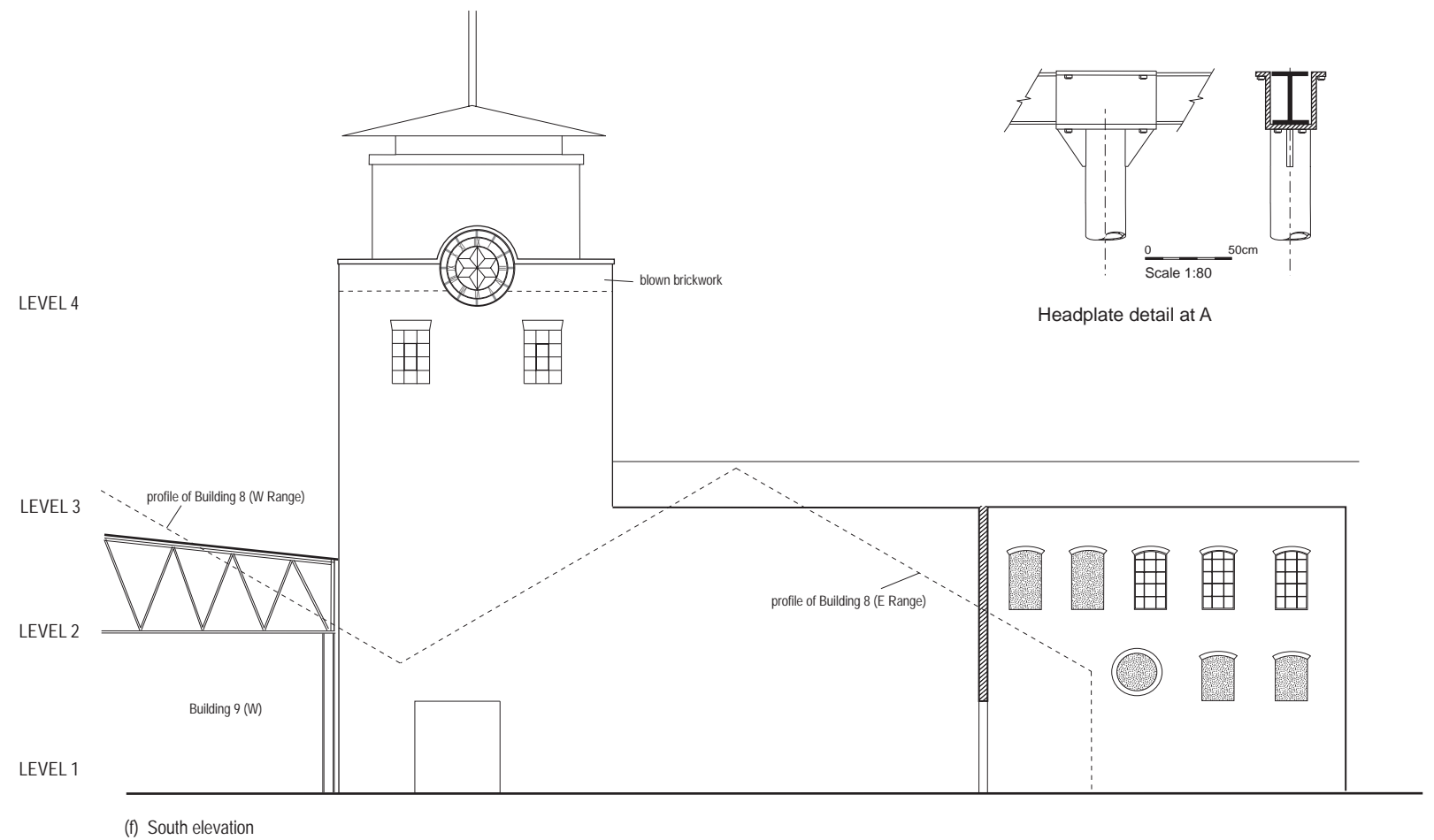
(c) Level 2 plan



(d) Level 3 plan



(e) Level 4 plan



(f) South elevation

Figure 22: Building 9B; Floor plans, south elevation and section (relative to Bldgs 9 and 10)



Figure 23: Building 10, east elevation

north  
(indicative)

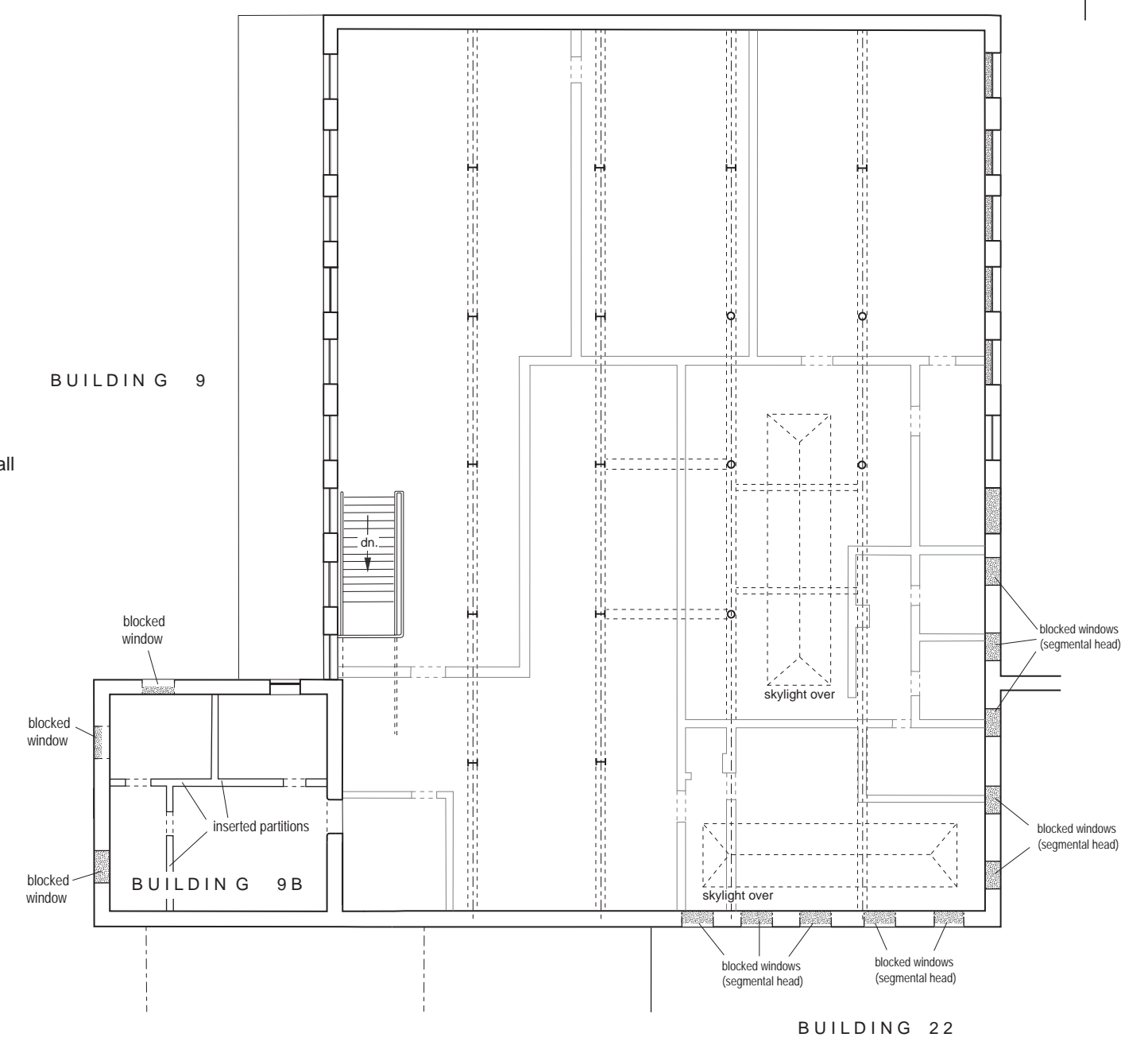
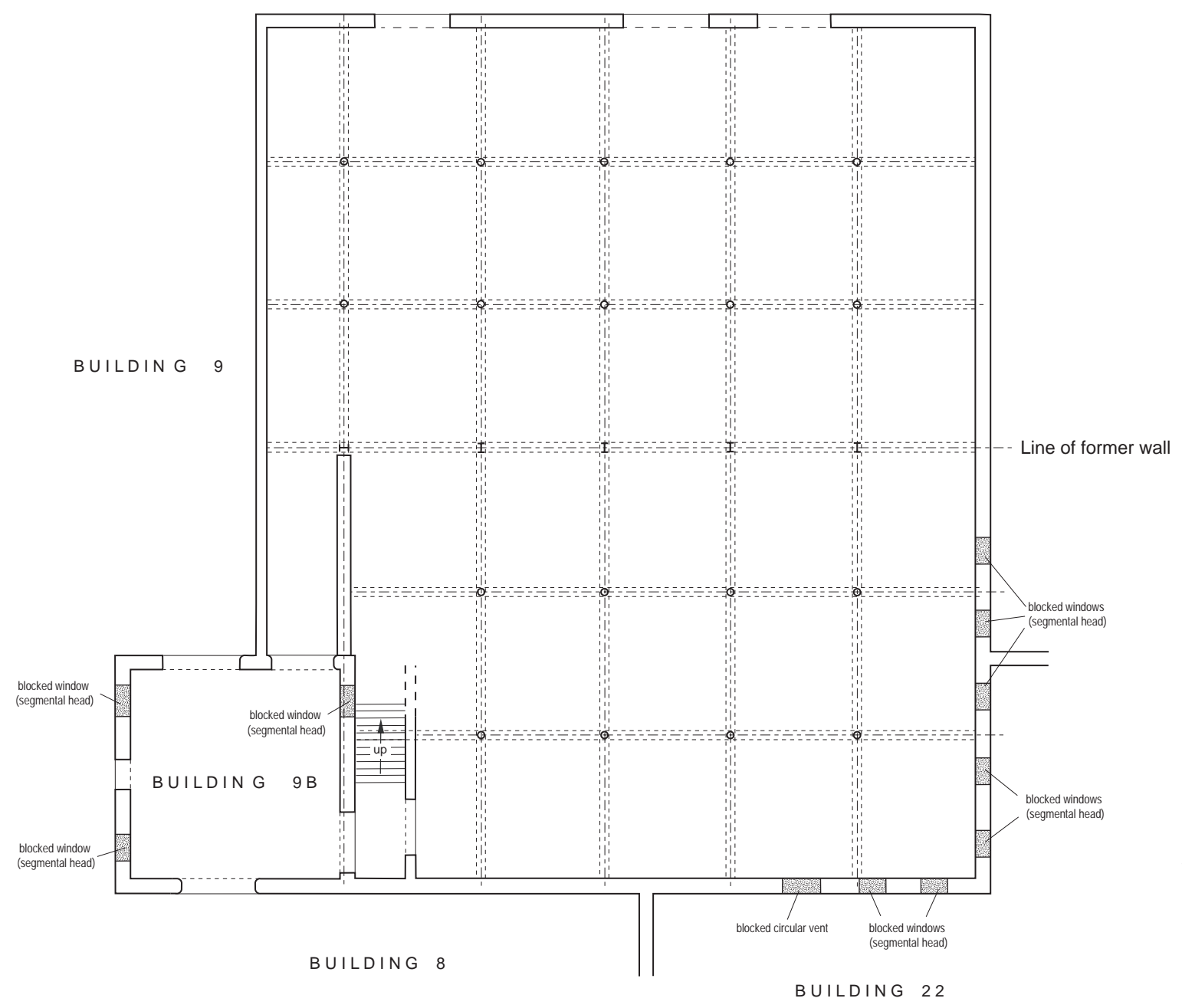


BUILDING 11

BUILDING 11

BUILDING 9

BUILDING 9



(a) Ground floor

(b) First floor

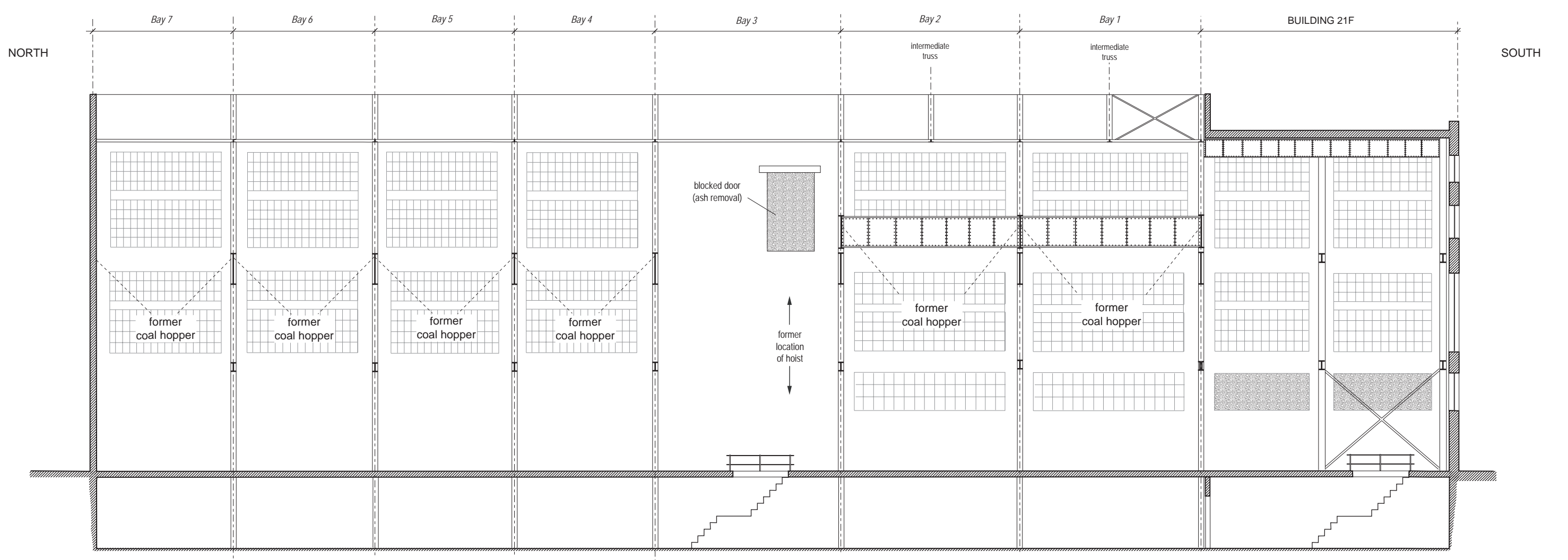
NB: all internal partitions at 1F level of breezeblock construction

- cast iron column
- H RSC

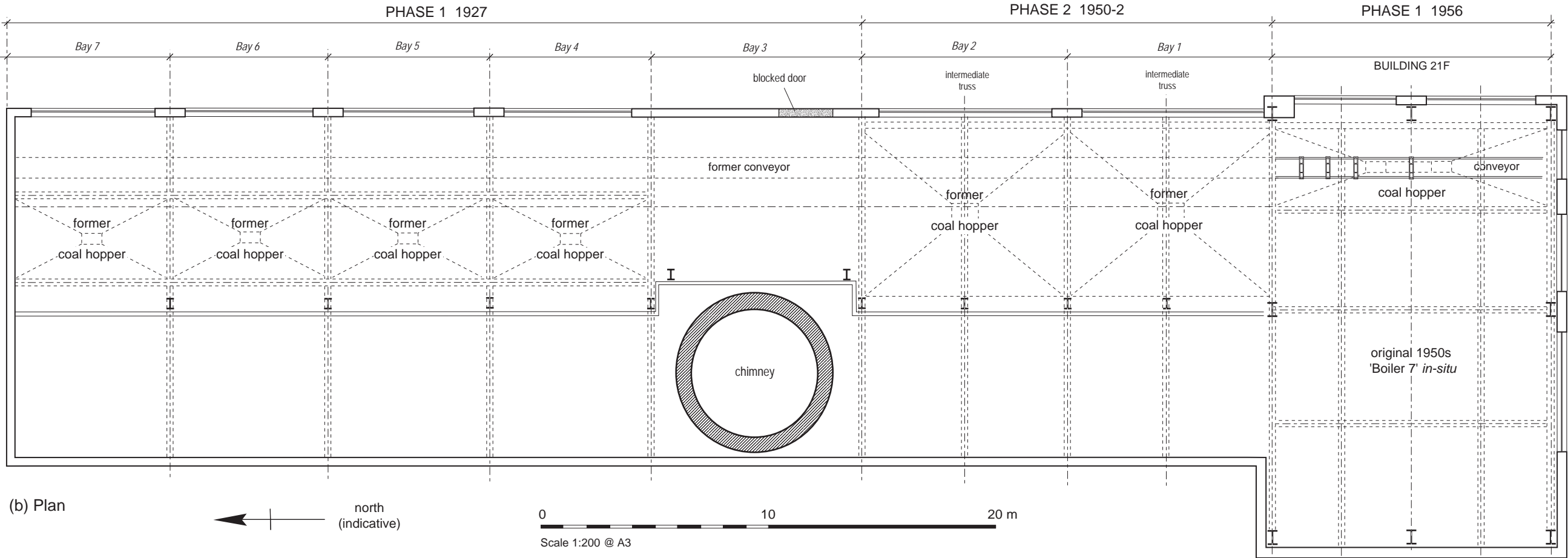
- cast iron column
- H RSC



Figure 24: Building 9B/10; Floor plans



(a) Representative longitudinal cross-section



(b) Plan

Figure 25: Building 21 (Boiler House)

Bay No.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Primary 2-storey section

2-storey 1970s extension

primary brick wall

primary brick wall

primary brick wall

no access

inserted breezeblock wall

inserted breezeblock wall

A

A'

0 10 50m

Plan scale 1:500 @ A4

WEST

EAST

glazed

glazed

parapet

north (indicative)

0 5 10m

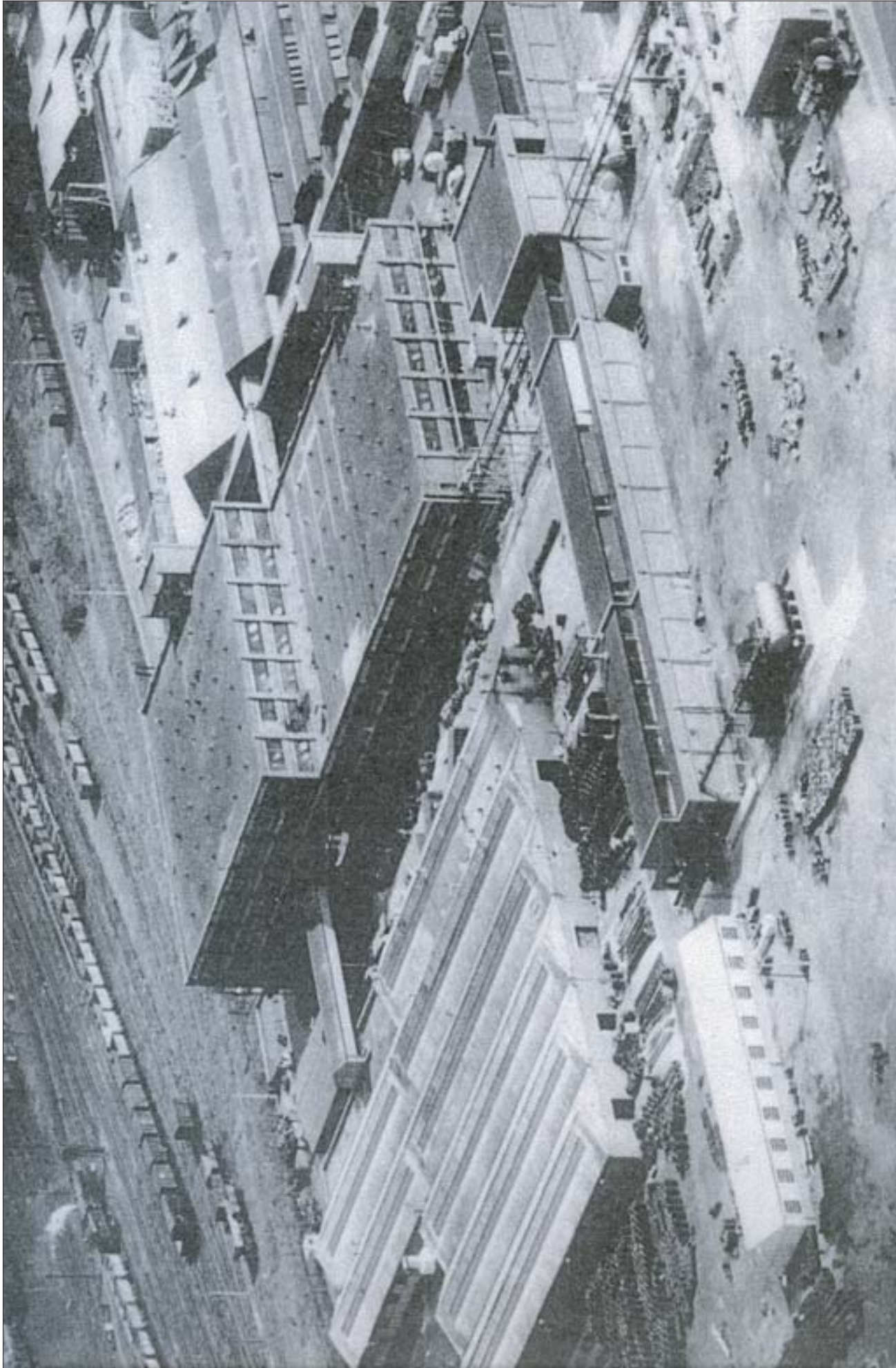
Section scale 1:200

Representative cross-section at A-A'

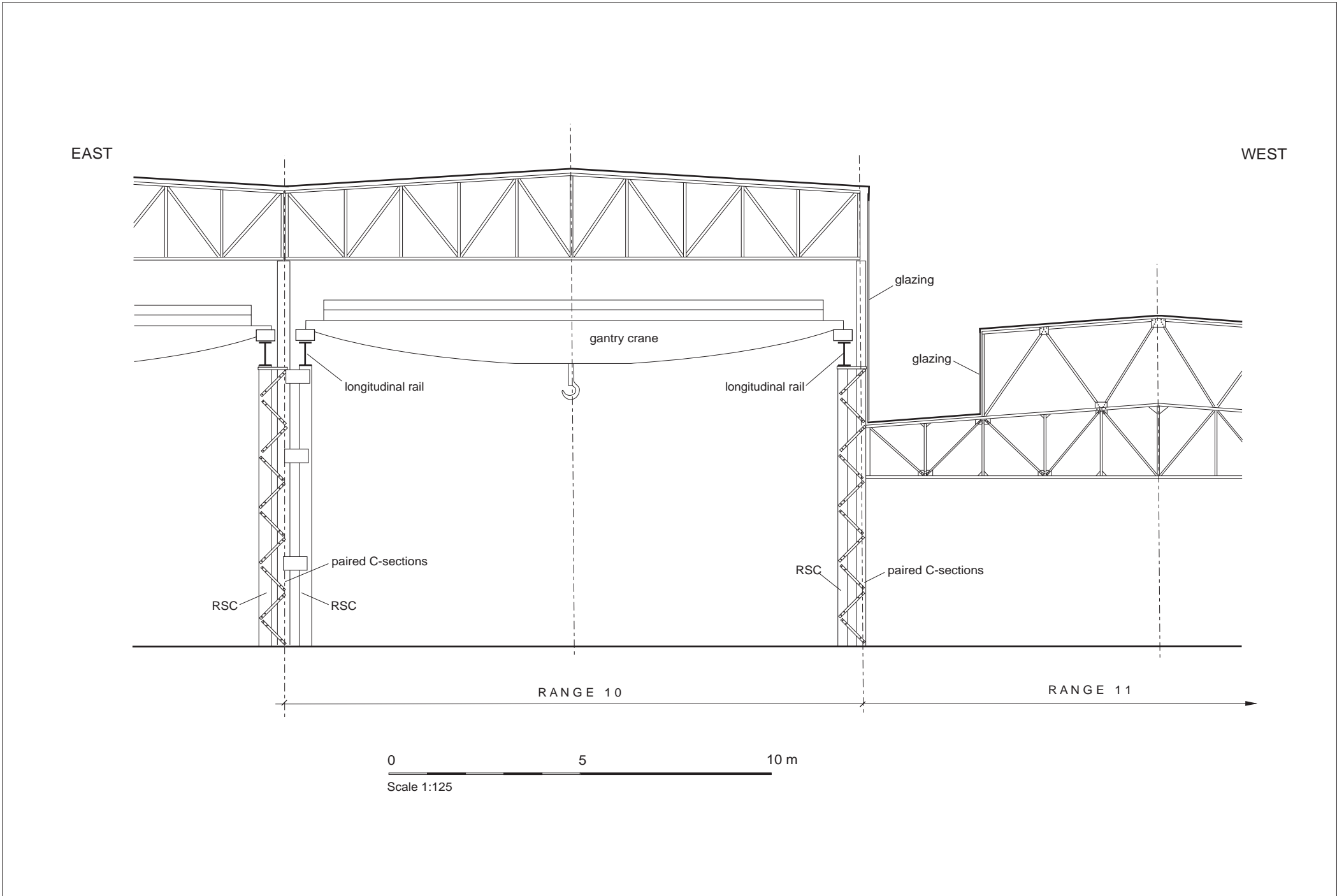
NB: inner partitions omitted for clarity

Figure 26: Building 17 plan and cross section

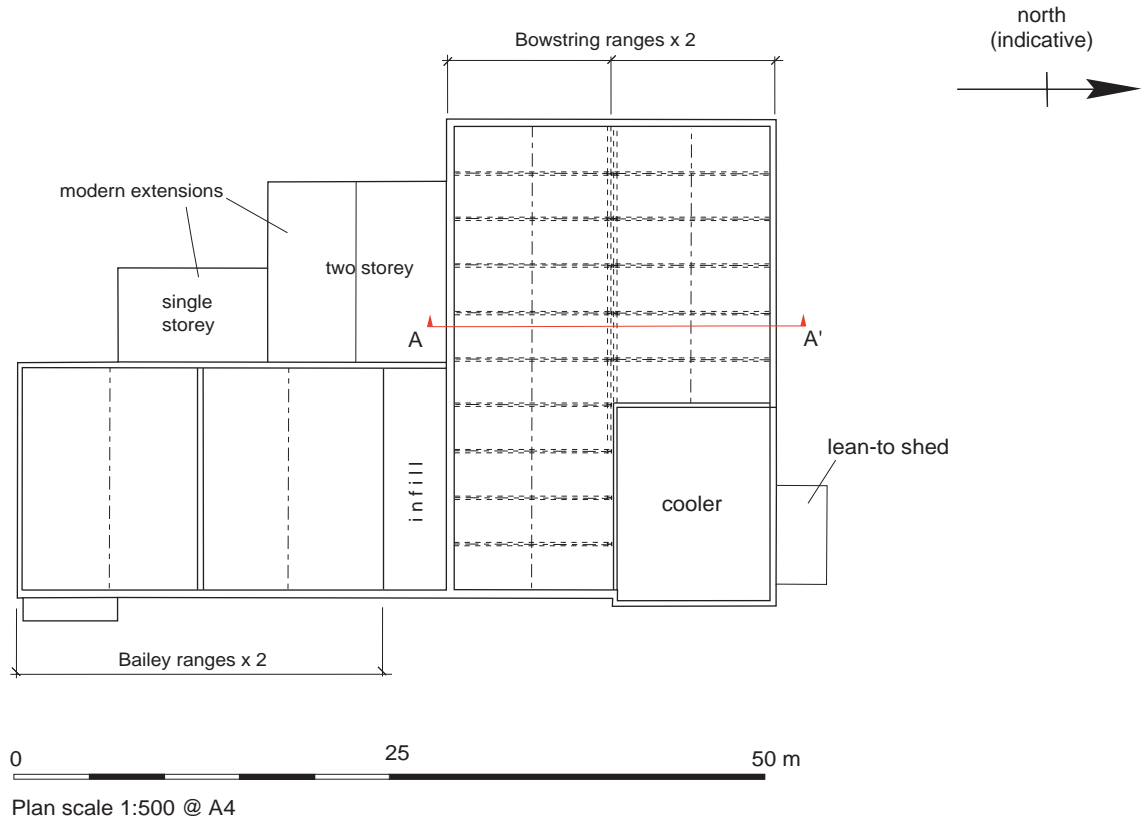




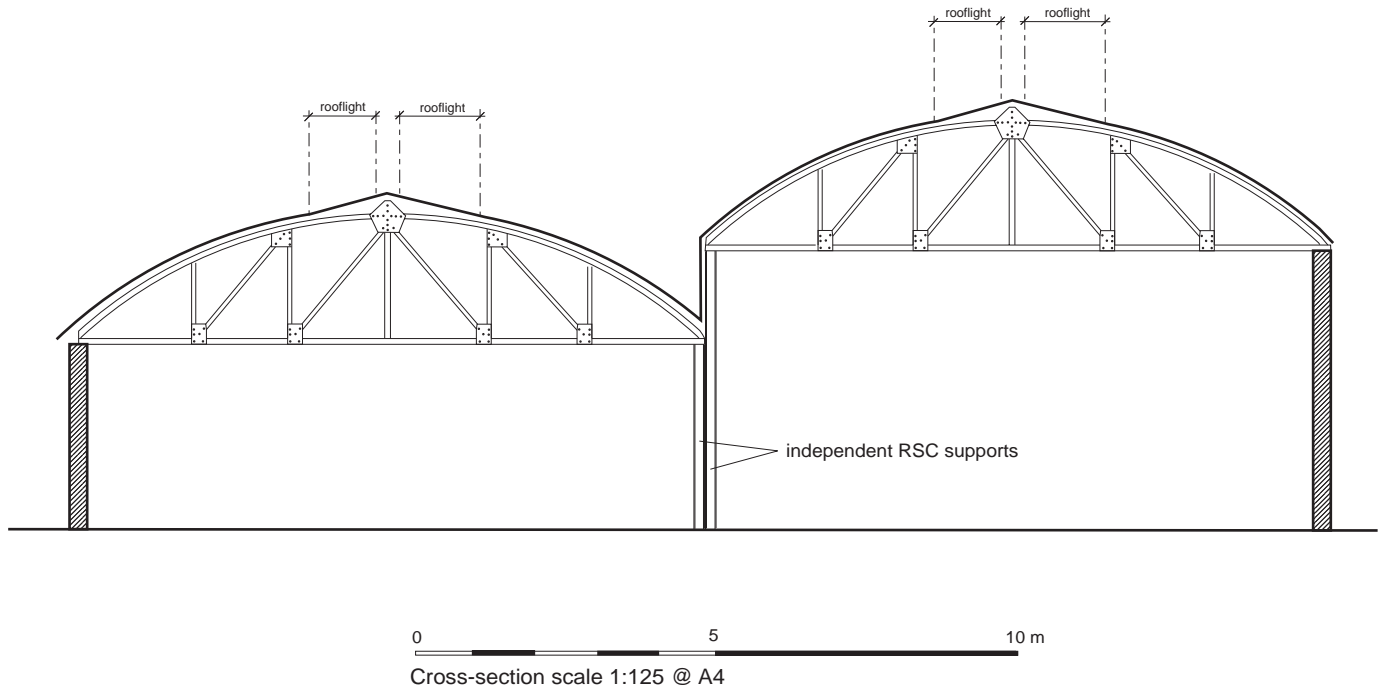
**Figure 27:** Structure pre-dating present Building 13; aerial view from 1960. Source WALS P/3140.



**Figure 28:** Building 18, roof truss details



(a) Sketch plan

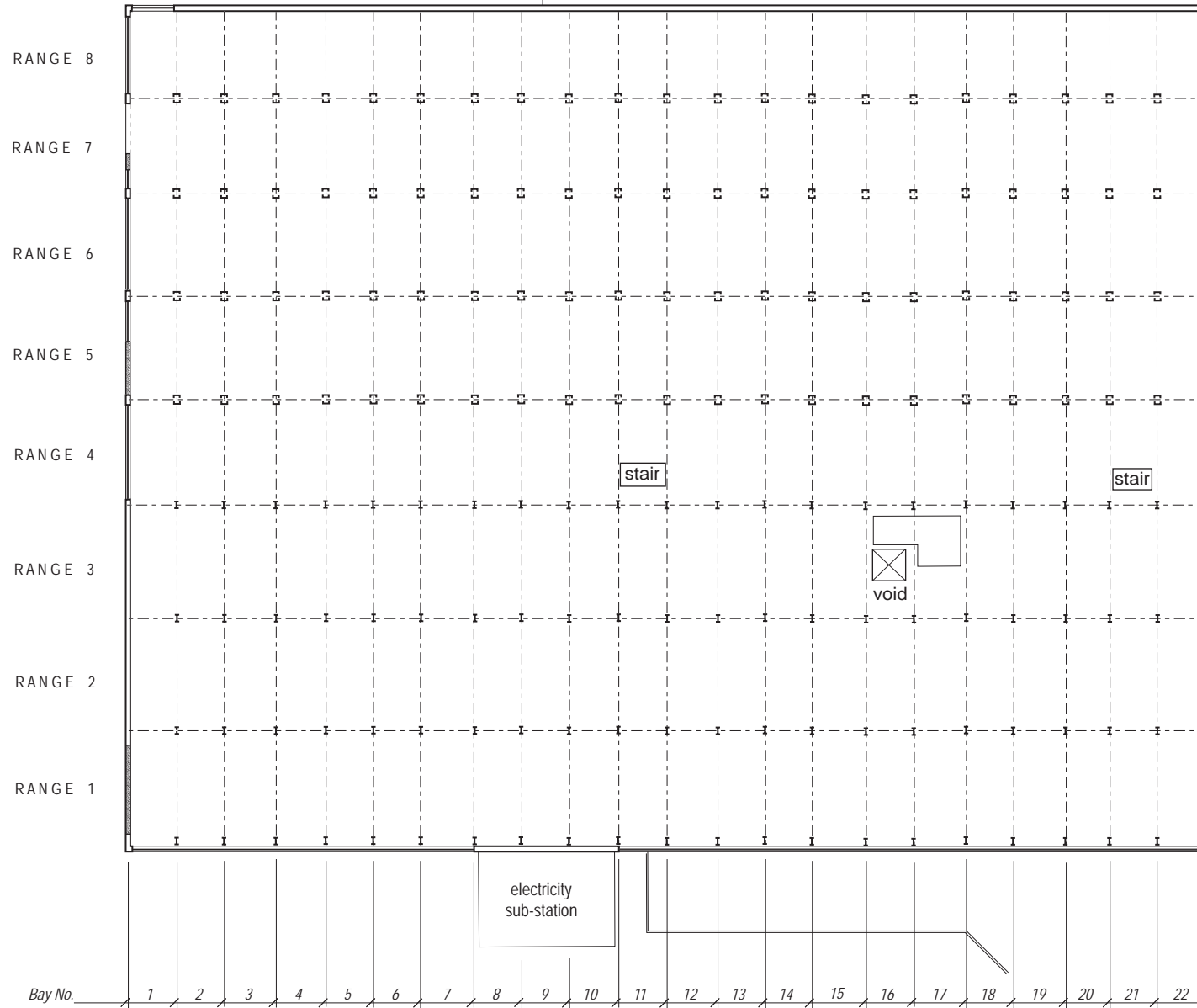


(b) Detail of bowstring ranges at A-A'

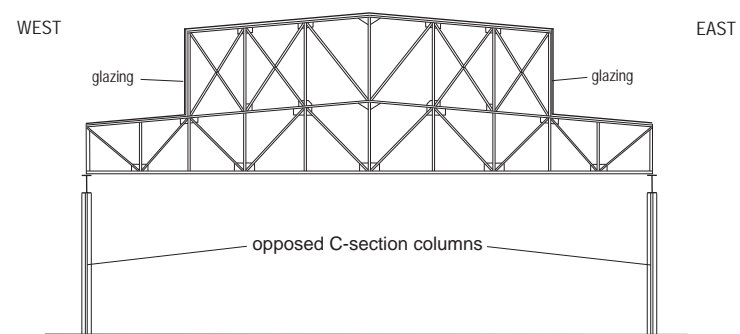
Figure 29: Building 31/75, plan and part cross-section



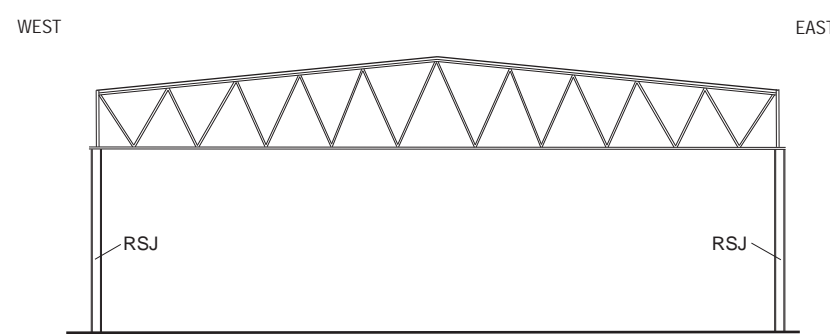
north  
(indicative)



see Figure 31



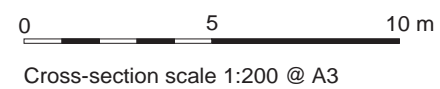
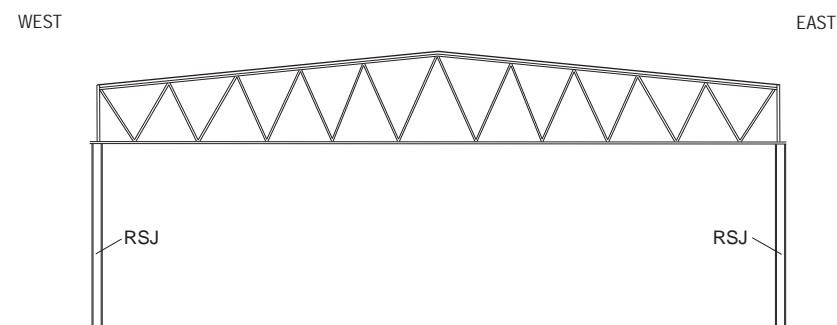
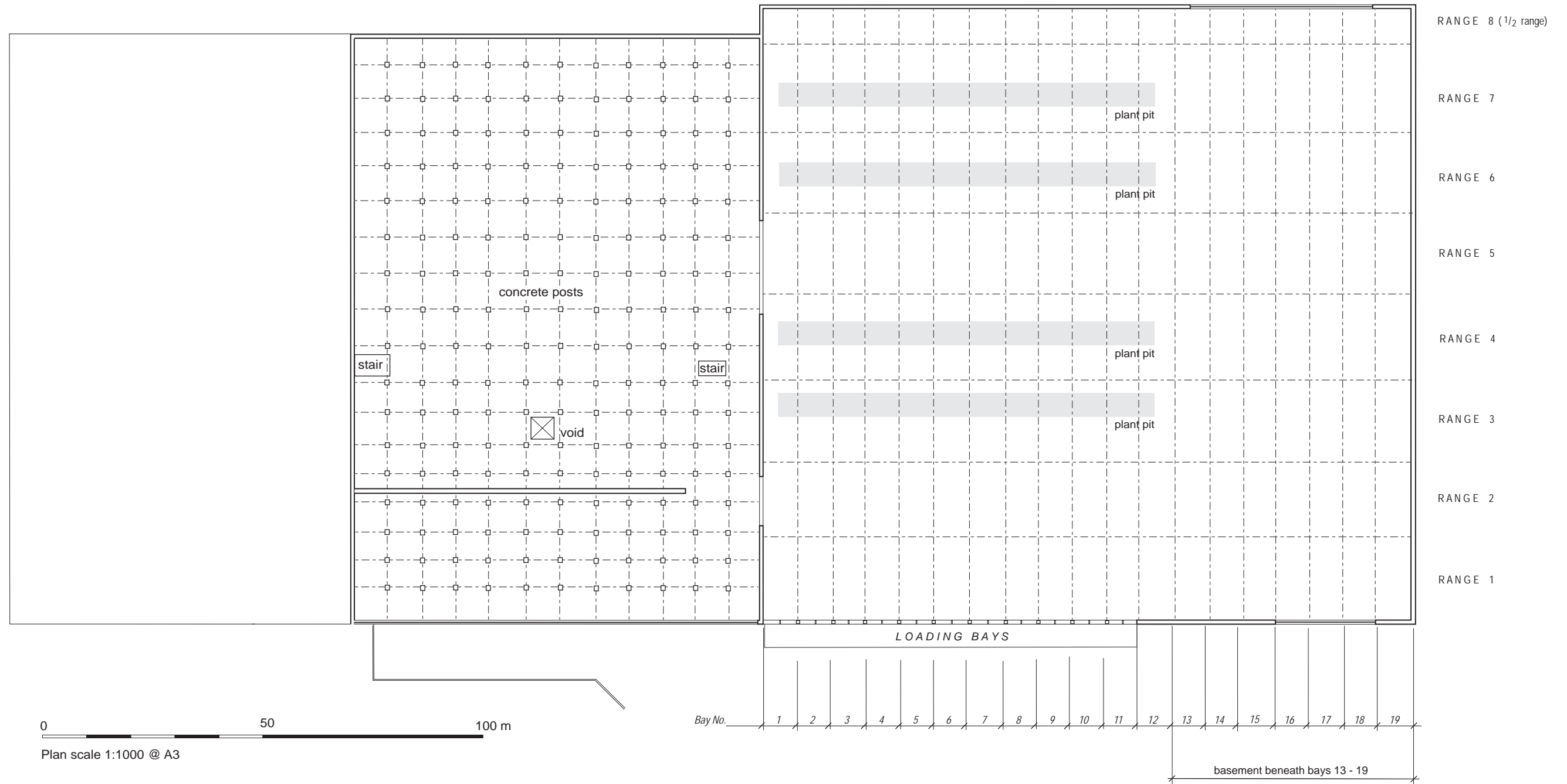
Super-imposed, modified Warren truss with clerestory glazing, Ranges 4 - 8



Simple Warren type truss, Ranges 1 - 3

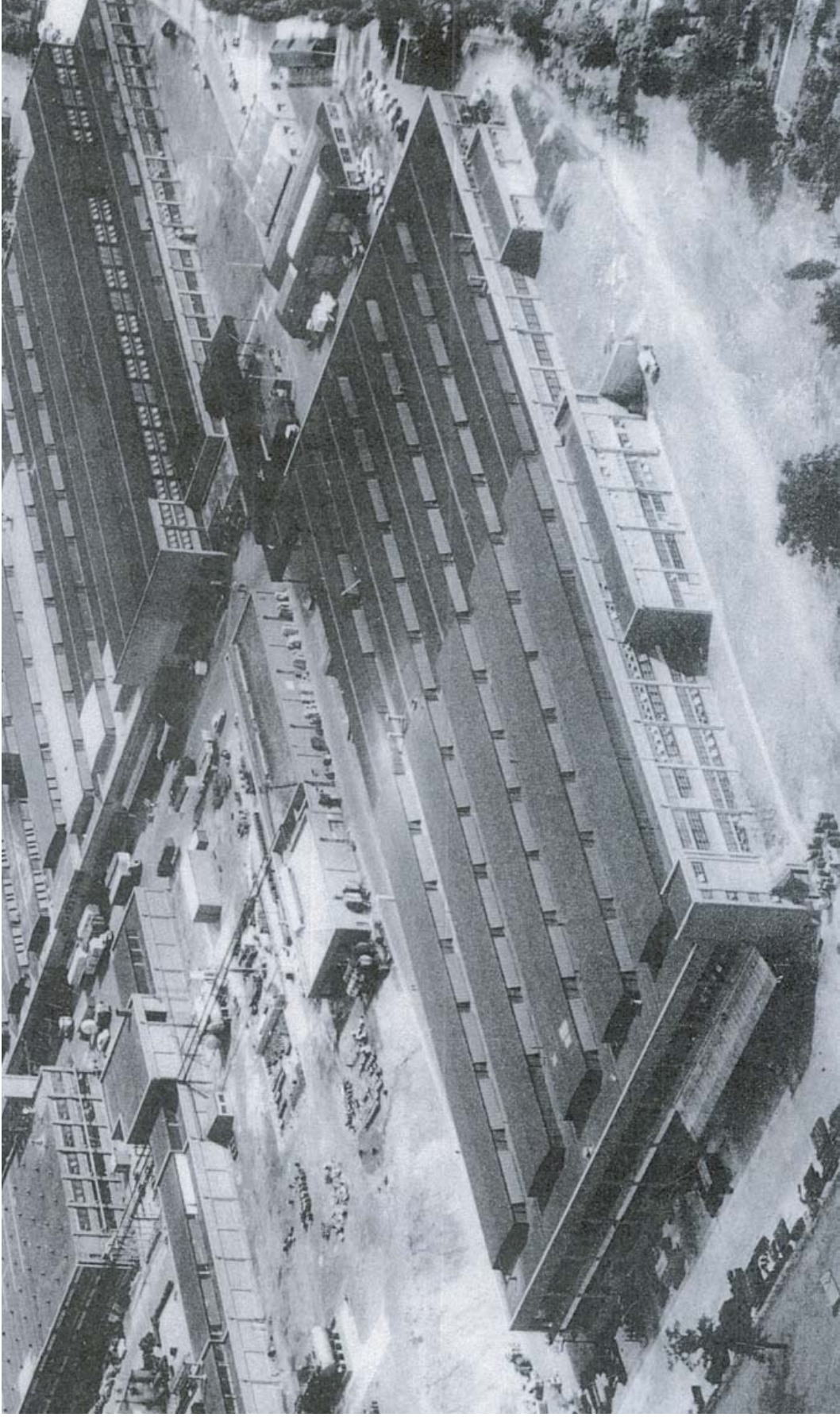
0 5 10 m  
Cross-section scale 1:200 @ A3

Figure 30: Building 44, upper level plan and truss details



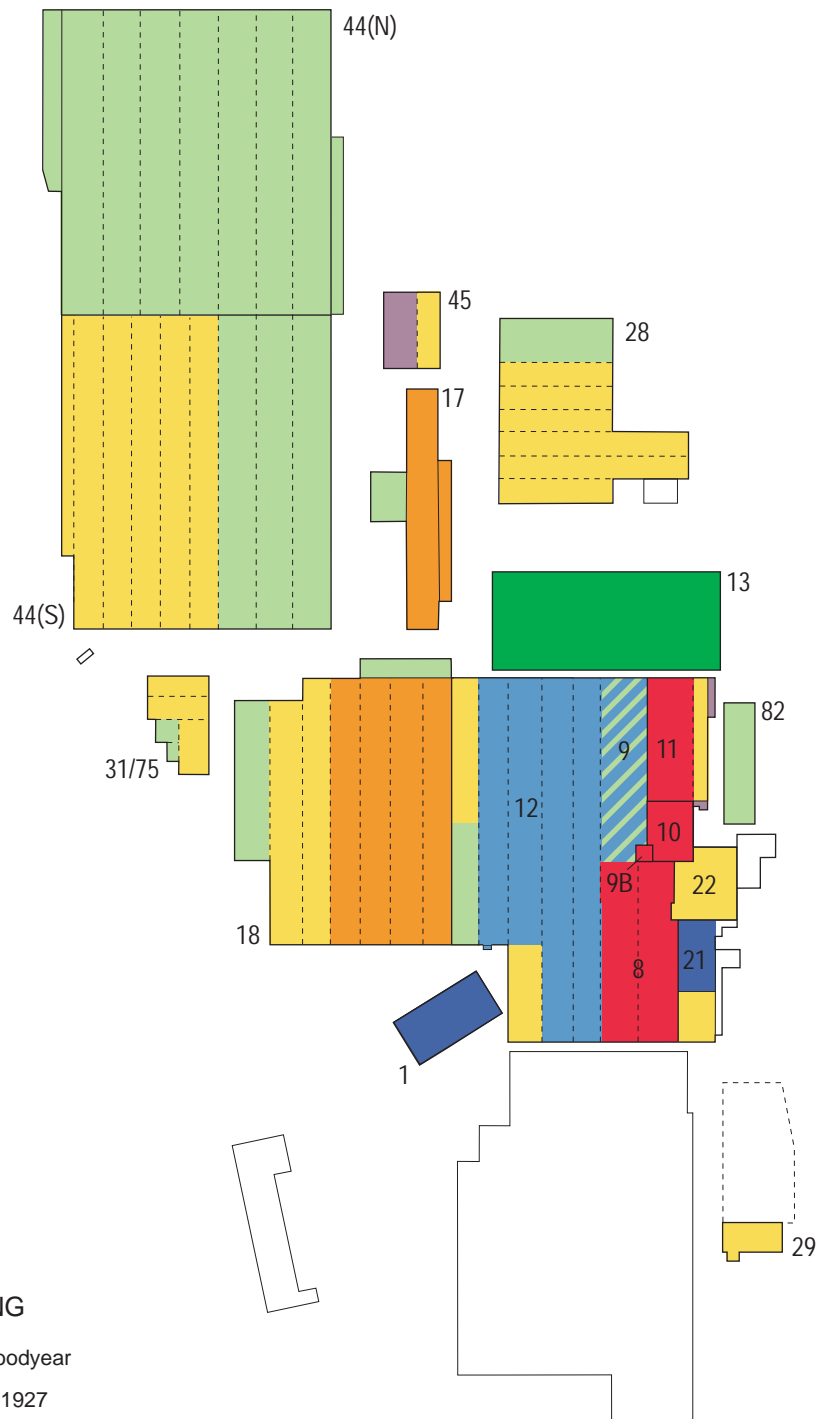
Simple Warren type truss, Ranges 1 - 8

Figure 31: Building 44, lower level plan and truss detail



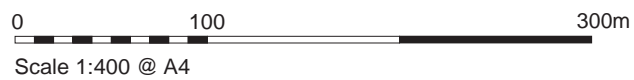
**Figure 32:** Extent of Building 44 in 1960, aerial view from the north-west. Source WALS P/3140.

north  
(indicative)



**KEY TO PHASING**

- PHASE I: pre Goodyear
- PHASE II: 1926-1927
- PHASE III: 1930s
- PHASE IV: 1940s
- PHASE V: 1950s
- PHASE VI: 1960s
- PHASE VII: 1967-1989
- PHASE VIII: post 1989



**Figure 33: Summary phasing**





**Plate 01:** Building 1, south-west elevation.



**Plate 02:** Building 1, north-west elevation.





**Plate 03:** Building 1, north-west extension (boiler house chimney in background).



**Plate 04:** Building 1, north-east elevation.





**Plate 05:** Building 1, interior; front office range (G4).



**Plate 06:** Building 1, interior; main open-plan office area (G5).





**Plate 07:** Building 1, interior: early partitioning.



**Plate 08:** Building 1, interior: segmental arch over G1 door.





**Plate 09:** Brick dado with moulding (G5).



**Plate 10:** Detail of moulded brick dado.



**Plate 11:** Building 8; east range looking north.





**Plate 12:** Building 8; west range looking north.



**Plate 13:** Building 8; east range south elevation, blocked segmental headed windows.





**Plate 14:** Building 8; east range south elevation gable, blocked circular opening.



**Plate 15:** Building 8, central support column.



**Plate 16:** Building 8, western support column.





**Plate 17:** Building 8, east elevation looking N.



**Plate 18:** Building 8; east elevation looking S.



**Plate 19:** Building 9B from the east.



**Plate 20:** Building 9B, upper levels from NE.

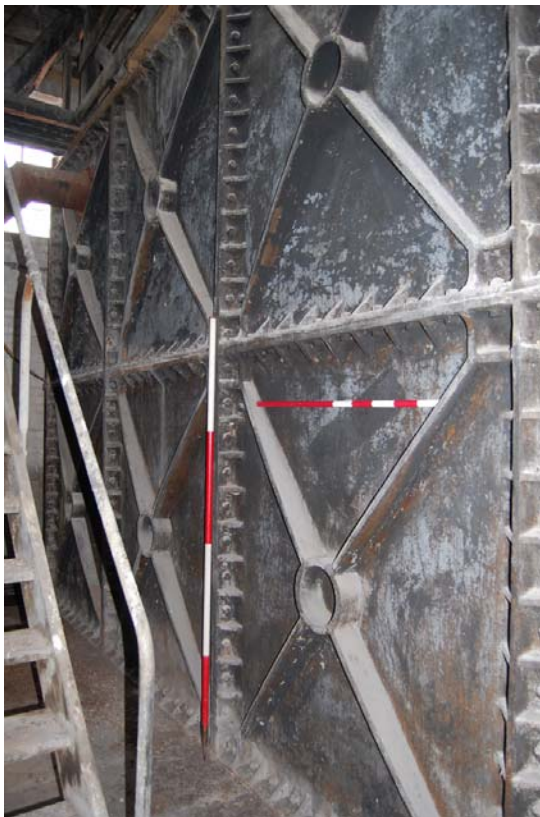




**Plate 21:** Building 9B, lower level walls.



**Plate 22:** Blocked segmental headed window.



**Plate 23:** water tank at Level 3.



**Plate 24:** stair access, Levels 3 to 4.





**Plate 25:** Building 9B; detail of clock (east elevation).



**Plate 26:** Building 9B; surviving clock mechanism at Level 4.





**Plate 27:** Building 10, east elevation.



**Plate 28:** Bldg 10, detail of segmental windows.



**Plate 29:** Windows visible from Bldg 22.





**Plate 30:** Building 10; interior, ground floor looking north.



**Plate 31:** Building 10; south wall, blocked windows and circular vent.





**Plate 32:** Building 21; exterior view from the south-east.



**Plate 33:** Building 21 from the south.



**Plate 34:** Building 21 from the north-east.



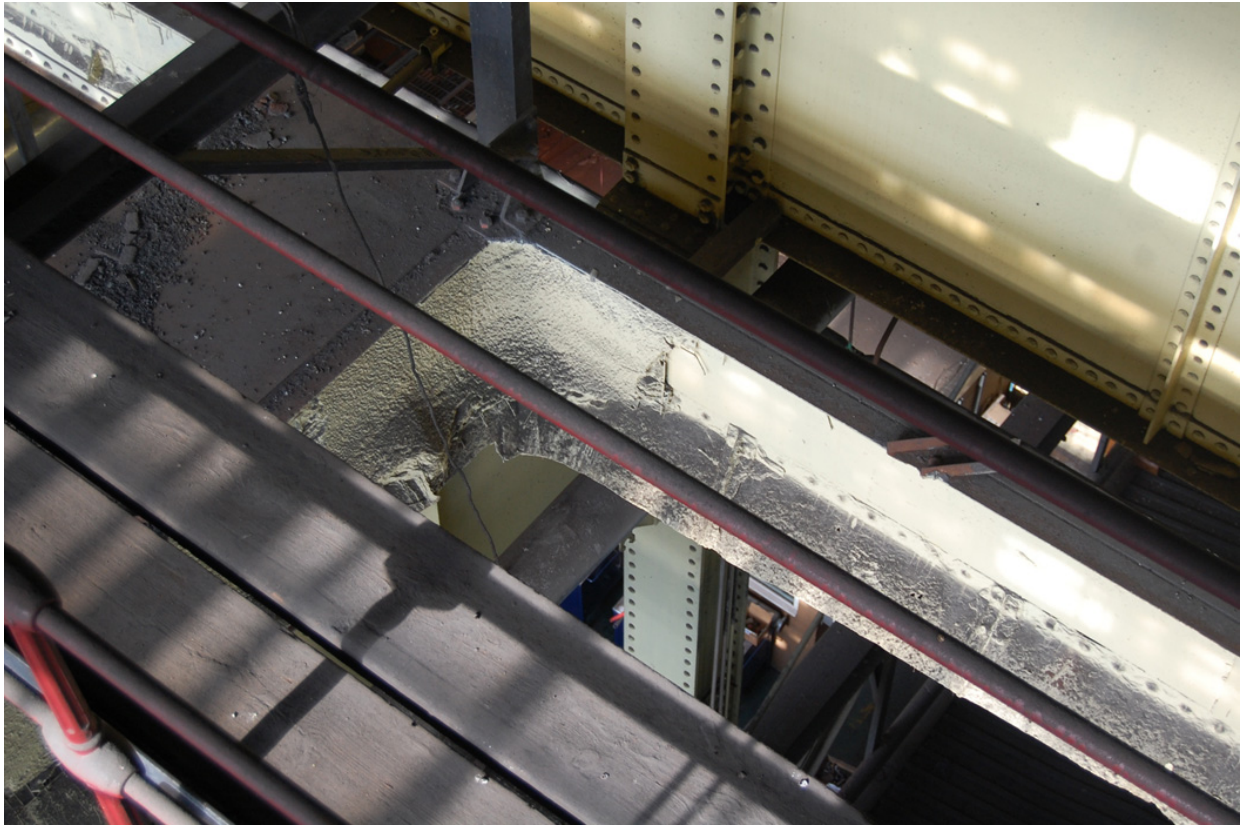


**Plate 35:** Building 21A; Roof structure over Bays 4 – 7.



**Plate 36:** Building 21A: Evidence for former coal hoppers, Bay 2.

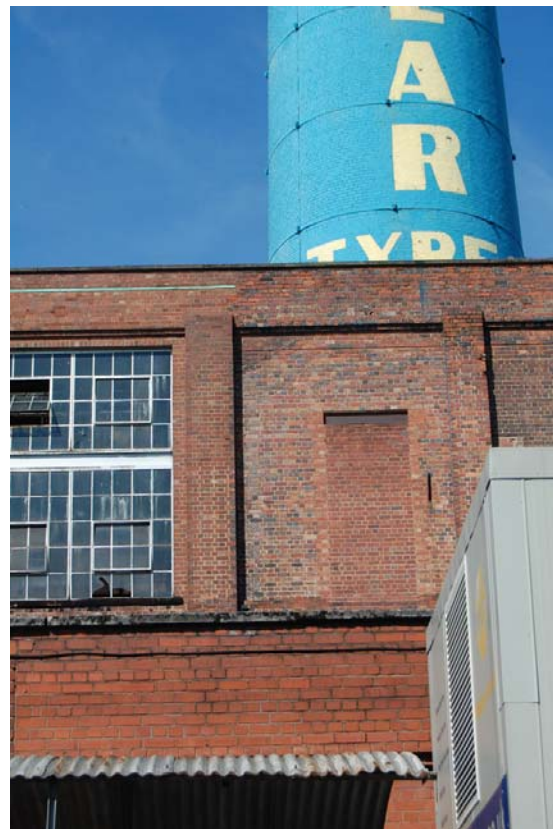




**Plate 37:** Building 21A: Evidence for former coal hoppers, Bay 5.



**Plate 38:** Building 21A; interior looking north.



**Plate 39:** Building 21A; east elevation. Bay 3.





**Plate 40:** Building 21F; Boiler 7.



**Plate 41:** Building 21F; hopper feeding Boiler 7.



**Plate 42:** Building 21F; surviving section of conveyor system formerly feeding coal hoppers.





**Plate 43:** Building 9, interior view looking north.



**Plate 44:** Building 11; exterior view from the south-east.





**Plate 45:** Building 11, exterior view from the north-east.



**Plate 46:** Building 11; east range interior view looking north.





**Plate 47:** Building 11; west range interior view looking north.



**Plate 48:** Building 12, exterior, south elevation with porch.





**Plate 49:** Building 12, interior Range 4 looking south.



**Plate 50:** Building 17; exterior view from the north-east.





**Plate 51:** Building 17; exterior view from the south-west.



**Plate 52:** Building 17; 2-storey section from the north-east.





**Plate 53:** Building 17; 1970's western extension, from the south.



**Plate 54:** Building 17; interior, north end looking north.





**Plate 55:** Building 17; interior, south end looking north.



**Plate 56:** Building 17; Bay 13 'cement' machinery.





**Plate 57:** Building 13; eastern gable elevation.



**Plate 58:** Building 13; interior view looking west.





**Plate 59:** Building 18; south elevation oblique view.



**Plate 60:** Building 18, west elevation.





**Plate 61:** Building 18; north elevation.

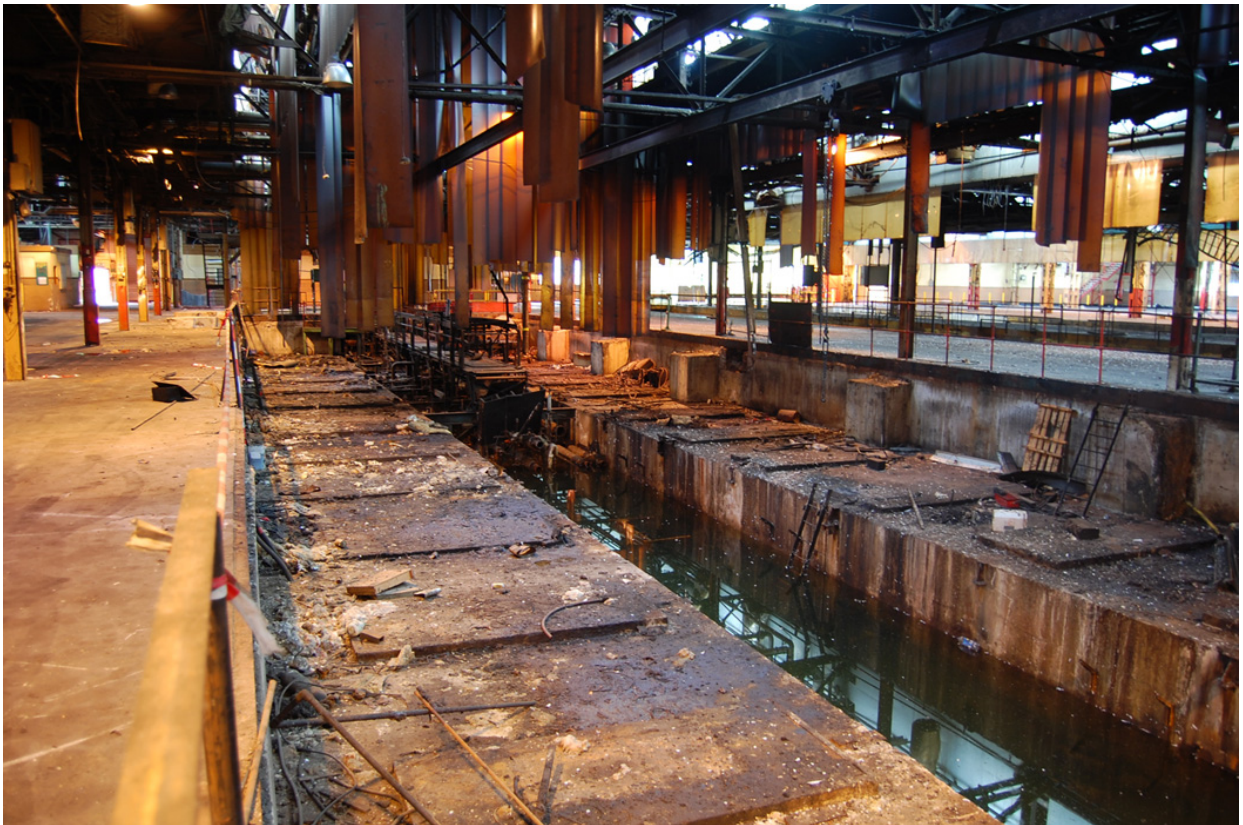


**Plate 62:** Building 18; interior, Range 9 (double height), looking south.





**Plate 63:** Building 18, Range 10 looking south-east.



**Plate 64:** Building 12/18; plant pit, Range 5.





**Plate 65:** Building 22, exterior view from the south-east.



**Plate 66:** Building 22, exterior view from the north.



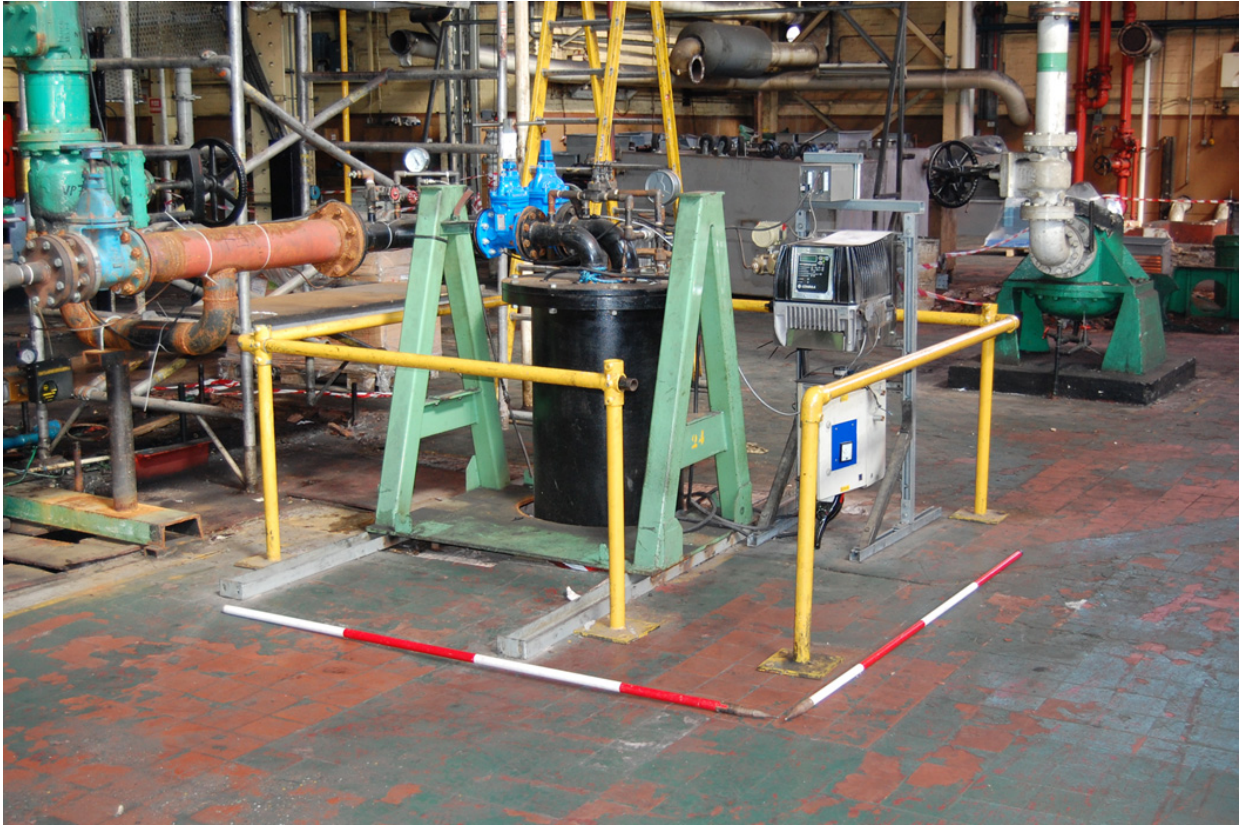


**Plate 67:** Building 22; exterior windows of Building 10 visible in north-west corner.



**Plate 68:** Building 22; interior view looking SE.





**Plate 69:** Head of bore-hole No.1 within Building 22.



**Plate 70:** Low pressure water pumps (foreground) and filter (blue) within Building 22.





**Plate 71:** Building 28; exterior view from the south-west (from roof of Building 17).



**Plate 72:** Building 28; exterior view from the north-east.





**Plate 73:** Building 28, Range 1; interior view looking west.



**Plate 74:** Building 28, detail of 'Bailey' construction.





**Plate 75:** Building 29, exterior view from the north-east.



**Plate 76:** Building 29, exterior view from the south-east.





**Plate 77:** Building 29, Ground floor looking east.



**Plate 78:** Building 29, first floor looking west.





**Plate 79:** Building 31/75; exterior view from the south-east.



**Plate 80:** Building 31/75; exterior view from the north-west.





**Plate 81:** Building 31/75; exterior view from the north-east.



**Plate 82:** Building 31/75; exterior view, infill buildings at south-west corner.





**Plate 83:** Building 44; south elevation, west (Ranges 4 – 8).



**Plate 84:** Building 44; south elevation, east (Ranges 1 – 3).





**Plate 85:** Building 44; south-east corner.



**Plate 86:** Building 44, south block, E elevation.



**Plate 87:** Building 44; north block, east elevation loading bays.





**Plate 88:** Building 44, north block west elevation, oblique view.



**Plate 89:** Building 44, south block west elevation, oblique view.





**Plate 90:** Building 44; south block, level 3 interior looking north.



**Plate 91:** Building 44; south block, level 2 interior looking south.





**Plate 92:** Building 45 south gable elevation.



**Plate 93:** Building 45, north gable elevation.





**Plate 94:** Building 45, east range interior looking south.



**Plate 95:** Building 45, west range looking south.





**Plate 96:** Building 82; exterior view from the south-east.



**Plate 97:** Building 82, north gable elevation.