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Salvage recording on the site of the former gasworks, Gas Street, Birmingham, West Midlands

by
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Contents

List of figures

List of plates

Salvage recording on the site of the former gasworks, Gas Street, Birmingham, West Midlands

Summary

A programme of salvage recording was undertaken by Birmingham University Field Archaeology Unit on behalf of Crosby Homes on the site of an early gasworks at Gas Street, Birmingham, West Midlands (NGR: SP 0625:8647). The work consisted of two main elements. The first comprised architectural recording of walls that had to be rebuilt as part of the overall refurbishment of the grade II listed Retort House and Retort House Extension. The second element of work consisted of a watching brief of groundwork for several new blocks of flats located over three former gas holders situated on land to the south of the Retort House. The work was performed over an extended period between April and October 2000. This programme of salvage recording has provided much additional information concerning the form of the early gasworks. In particular, our knowledge of the original layout of the 1822-1828 gasworks has been greatly enhanced, including the topography of the site and the design of the Retort House. The survival of buried remains of the gasworks was demonstrated to be high, largely due to the dumping of material on the site after the gasworks had closed. The mitigation programme sought to ensure that, where feasible, significant archaeological remains have been preserved in situ, or alternatively, have been preserved by record where disturbance or alteration was unavoidable. However, the survival of any plant associated with gas production was demonstrated to be minimal, mainly because there was extensive reclamation of portable materials after gas production ceased or the design of the gasworks was changed.*

Introduction

Salvage recording was undertaken by Birmingham University Field Archaeology Unit on behalf of Crosby Homes in mitigation of development on the site of an early gasworks at Gas Street, Birmingham (NGR: SP 0625:8647; fig. 1). The work was carried out over an extended period between April and October 2000 in accordance with a series of briefs prepared by Birmingham City Council Department of Planning and Architecture.

The work consisted of two main elements. Architectural recording was carried out during controlled demolition of the east wall of the main Retort House facing Gas Street and the south wall of an extension to the Retort House (Building A and Building C respectively, fig. 1). Further recording was also carried out when the foundation trench for the rebuild of the south wall of the Retort House was excavated around the bases of a series of cast-iron columns here. The aims of the recording were to ascertain the original build of these parts of the grade II* listed structures and to understand more about the successive alterations to both buildings over a period of over 170 years.

The watching brief comprised monitoring of the cutting of foundations for a series of new apartment blocks. These were located over the position of three gas holders, depicted on the Piggott-Smith map of *c.*1855, and subsequently located by five evaluation trenches excavated in February 2000 (Halsted 2000). The ground works involved the removal of several large brick and concrete foundations of the former garage (Area III, fig. 1) and warehouse (Area IV, fig. 1), together with the selective observation of the piling operation across the site. The location of the piles was designed to minimise any disturbance to the brick bases of the gas holders. This was to "*ensure that foundation piling does not damage archaeological remains and to ensure that all archaeological remains are protected during development*" (Condition 22 of planning application C/04297/98/FUL).

The following report is a summary of the results of the salvage recording outlined above. It is based upon the detailed contents of the archive that will ultimately be deposited with Birmingham City Council upon the completion of all archaeological work. Discussion of the results is preceded by a listing of previous archaeological research on the site, an historical summary and method statements. The results are then presented in two main sections. The first deals with the Retort House complex, followed by a discussion of the gas holders. The emphasis of the interpretation is on the gasworks phase as this is the most archaeologically significant period, rather than the later industrial phases of development.

Previous work

Toni Demidowicz (1993) has extensively researched the documentary evidence for the development of the early gasworks. In addition, the Royal Commission for Historic Monuments (England) carried out surveys of the 1822 Retort House (Williams and Donald 1993) and the 1828 Retort House Extension (Williams and Stoyel 1993). These surveys identified the significance of the relatively early use of cast-iron roof trusses in both buildings. Lancaster University Archaeological Unit then produced an archaeological assessment that outlined the significance of the gasworks as a rare survivor from the early pioneering phase of the gas industry (Trueman and Krupa 1994).

Further stages of archaeological work were carried out by the Ironbridge Institute and BUFAU, involving building survey, test pitting and limited evaluation trenching to understand the survival, nature and significance of the archaeological remains. This information was then used to frame a mitigation strategy whose aim was to understand and preserve as much as was feasible of the archaeological remains of the gasworks (Linnane 1998, Halstead & Breedon 1999, and Halsted 2000). A watching brief in mitigation of development upon the site of the Berkley Street gas holder was also reported on in 1999 (Bellavia 1999). Details contained in these earlier reports are not repeated here.

Historical summary

The gasworks was built in 1818 by John Gostling, an early investor in the gas industry, to supply street lighting for the Board of Birmingham Commissioners. The site was leased from the Governors of King Edward School and gas plant installed by Samuel Clegg, the first specialist gas engineer. The Retort House installed by Clegg was at the lower end of the site, adjacent to Holliday Street. The company was floated as a joint stock company called the Birmingham Gas, Light and Coke Company in 1819, and an inventory of that date listed the plant installed by Clegg. Only three years later, in 1822, the works was remodelled by Alexander Smith, the Company's engineer. A new fireproof Retort House (Building A) was built with cast-iron roof trusses and a third gas holder constructed on the site of the earlier Retort House. The gasworks expanded further in the 1820s, including the purchase of a dry lime purifying system in 1827. Land fronting Berkley Street and the canal basin to the north of the 1822 Retort House were leased in 1828, and an extension to the 1822 Retort House, a Coal Store, and an additional gas holder were constructed shortly afterwards. Demand for gas continued to rise during the 1830s and 1840s and the Company built other gasworks in Birmingham to cope with the demand. Production at Gas Street, using by then out-dated equipment, ceased in 1850, but the gas holders remained in use until the private gas industry was taken over by the City Corporation in the 1878. The tapping of natural gas from the North Sea in the mid-20th century led to the demolition of most coal gas plants. Consequently, the survival of buildings and plant relating to the pioneering era of the early-19th century is extremely rare.

Building recording

The 1822 Retort House

Method

The east wall of the 1822 Retort House facing Gas Street was dismantled brick-by-brick by a team of demolition contractors under pro-active archaeological observation. This included careful dismantling of sensitive areas of walling by the archaeologist and the compilation of written notes and sketches supplemented by a photographic record, using colour print film. The cutting of the foundation trench for the rebuild of the south wall of the 1822 Retort House was also observed. The trench was manually cleaned and recorded, and sample areas were excavated to answer questions concerning the foundations of the row of cast-iron columns here and the wall upon which they were built.

Results

East wall (fig. 2)

The first phase of building recording (Linnane 1998) highlighted the need for further work to clarify the form and provenance of this wall. This led to limited sample stripping of the exterior render, which confirmed that the large, three-centre arch visible in the northern side of the wall was repeated to the south (Halsted 2000, plate 1). However, neither of these arches was visible on the internal face of the eastern wall of the Retort House (Linnane 1998). Salvage recording determined that the two arches were symmetrically arranged, and that each arch originally framed a half-brick-deep blind recess panel. Smaller, half-moon arches were built into the centre of the blind recess panel of the each of the larger arches (plates 2 and 3). These smaller arches also framed a further half-brick-deep blind recess that gave the wall solidity and depth. The smaller recesses followed the design of the surviving arches in the north wall of the 1822 Retort House and were clearly original. The original build was in clamped red brick in English Garden Wall bond, the frog-less bricks measured 8½ long by 4½ wide by 2½ inches tall, and were bonded with white lime mortar. The wall varied in thickness between one brick within the smaller recess, up to two bricks within the main panels.

Two pairs of large sandstone blocks with iron hinges braised with lead into the stones were set into each end of the east wall (plates 4 and 5). These stones would originally have supported gates giving access to each side of the Retort House from Gas Street in 1822. The height at which the hinges were set implied that the ground level to the north of the Retort House was approximately 0.5m lower than the existing ground surface. The hinge-supports set within the southeast corner of the Retort House were both heavier and lower and set much closer together. Therefore, it is likely that these stones formed the upper pair of a set of three, or even four hinges, designed to carry a much bigger and heavier gate. However, it was not possible to confirm this through excavation because there was a number of service connections next to the Gas Street frontage.

South wall (fig. 3)

The southern wall of the 1822 Retort House was eleven bays long. These bays were defined by the cast-iron roof trusses noted by the RCHME survey (Williams and Donald 1993). A series of cast-iron columns supported the first eight-roof trusses running back from the Gas Street frontage, although the fifth column had subsequently been removed (plate 6). There was evidence of a series of semicircular arched openings within the earliest phase of brickwork to survive between the iron columns of Bays 3 to 8, and similar openings within the wholly brick build of Bays 9 and 10. This brickwork was similar to that of the original phase of brickwork described above for the east wall. Later disturbance had removed any evidence for openings within Bays 1 and 2, but it is likely that there were some here in common with the other bays.

The frequency of the openings meant that the south wall of the Retort House was relatively open. However, protection from the elements was provided by a slate-roofed

canopy that extended approximately 3m or 10 feet from the front of the Retort House. The evidence for the canopy was an empty slot about 2.5m from the top of each cast-iron column with a right-angled support beneath. This slot would originally have housed a horizontal support for the canopy. An inventory of 1825 listed the area under the canopy as the 'Coke Shade'. Gas was distilled from coal by heating coal to a red heat within retorts. The volatile content of the coal was driven off as gas and the residual carbon was gas coke. The coke was emptied from the retorts and then sold as a relatively light and smokeless fuel. The 'Coke Shade' would have provided cover for this operation.

The bases of the columns rested directly upon a clamped red brick footing that was generally two-bricks-wide (plate 7). This wall incorporated four strong semi-circular arches each having three courses of voussoirs (plate 8). The bases of the arches were not found within the limits of safe-excavation within the trench. The arches closely resemble the retort bases illustrated by Accum in 1819 (fig. 4). Retorts were usually mounted in groups of five and an inventory of 1825 recorded that 25 retorts were purchased for the gasworks. Therefore, it is logical that there should be a set of five supporting arches along the frontage of the southern wall. However, the presence of a fifth arch under Bays 9 and 10 can only be suggested, because this area had been concreted over before the watching brief began.

There was no trace of any continuation of the retort bases inside the Retort House. However, this area was extensively disturbed, and it is probable that this part of the retort assembly was removed when the retorts were dismantled. The back-filled material here contained a number of firebricks manufactured in Stourbridge for use in furnaces. There were also several roof slates with two holes stamped into them within this backfill. These slates were originally attached to the iron 'lathe-type' fixings of the fireproof-roof assembly with copper wire.

The original internal floor level within the Retort House was level with the base of the cast-iron columns, 1.25m beneath the present floor level inside the building. However, only a heavily truncated mortar bed for this floor survived on top of the south wall because the paviours were subsequently robbed. The floor level inside the building stands in marked contrast to that outside, which was about 4m beneath the present ground level.

Two distinct groups of brick-lined culverts were exposed within the foundation trench for the south wall. The function of these culverts is unclear, but both groups post-date gas production, and are probably related to the subsequent phases of brass and galvanising on the site. Therefore, the culverts are not illustrated within this summary report. Instead, they are recorded on the south-facing elevation of the foundation trench and upon photographs contained within the overall site archive. The earliest pair of culverts had segmental-arched heads and ran back from the south wall inside the Retort House. The larger culvert was situated just to the west of the third cast-iron column from the Gas Street frontage and was 1.2m wide. The smaller culvert was 0.45m wide and was situated half way between the seventh and eighth cast-iron columns from the frontage. The top of each culvert was higher than the base of the cast-iron columns. The floor level above these culverts, although heavily truncated, could still be seen as a layer of blue

engineering brick, approximately 0.9m beneath the modern floor surface of the Retort House.

A further pair of even later brick culverts cut the south wall of the Retort House. These culverts were associated with another internal floor level situated 0.45m beneath the modern one. The easternmost culvert was situated between the third and fourth cast-iron column from the Gas Street frontage. It was entirely brick lined and had a flat instead of an arched head. After emerging through the south wall of the Retort House, it turned sharply eastwards towards Gas Street. The second culvert was also entirely brick lined, and had an arched head and thicker walls. The bricks lining the culvert appeared to have been burnt.

West wall (not illustrated, elevation drawing and photographs in site archive)

A quick visual inspection and photographic record was made of the upper courses of this wall before the northern end of it was dismantled. Apart from several areas of later patching and repair, the wall was substantially of one build. This was comparable to the earliest build recorded in the Retort House, comprising clamped red brick in English Garden Wall bond, with four courses of stretchers between each course of headers. A series of four brick pillars was bonded into the wall and appeared to be part of the original build.

The 1828 Retort House Extension, (Building C)

South wall (fig. 5)

The Retort House extension, which was built in 1828, clearly abuts the west wall of the 1822 Retort House. The wall was recorded prior to, and during, demolition. The wall was rebuilt utilising information derived from the survey. The original external face of the wall was plain and whitewashed, but had been adapted later to become the internal wall of an adjoining building first shown on the Piggott-Smith map of *c.*1855. The wall was nominally one-and-a-half brick thick. A series of four internal buttresses supported a set of cast-iron roof trusses. The trusses were similar in design to those of the 1822 Retort House (plate 9).

Only a small part of the original wall survived. This was sandwiched in a band above a series of steel lintels that had been inserted to create doorways through the wall, and beneath a later extension to the height of the wall. However, sufficient evidence had survived to be able to reconstruct the probable form of the wall. The original build was of frog-less, clamped, red brick in English Garden Wall bond, with three courses of stretchers between the header courses. The bricks measured 9 by 4¼ by 2⅞ inches. Two arches, made of single headers on edge, survived in situ above the inserted steel lintels of the easternmost two bays. There was also evidence of openings within the next two bays to the west. This consisted of, either, scars left by the robbing of the arches (plate 10), or,

vertical joints representing the former jambs of openings. At some point in the early life of the building, the westernmost bay was rebuilt in clamped brick that measured 8¾ by 4¼ by 3 inches, but it is likely that there was an opening here originally.

In comparison to what is known about the 1822 Retort House, much less can be discerned with confidence about the original form of the 1828 extension. There is documentary evidence for the provision of the cast-iron roof trusses, which were clearly designed, like their neighbours, for fire prevention. However, any evidence for an external canopy has been erased by later disturbances to the wall and the absence of any cast-iron columns. Indeed, it is unlikely that there were either columns or a canopy here. The building was clearly smaller in height and overall scale, which may reflect various improvements in retort design. However, there was no evidence for the original ground levels inside, or outside the building, because, unlike the 1822 Retort House, no foundation trench was excavated here.

The number and arrangement of the openings within the south wall suggest that an extra pair of retort assemblies was housed in the extension. The provision of these extra retorts was related to the overall redesign of the gasworks that accompanied expansion onto Berkley Street and the construction of a fourth gas holder there in 1828. The details of this expansion are outlined by Bellavia (1999). It is possible that the retort assembly nearest Gas Street became redundant as part of these broader changes. This would account for the early blocking of the two bays of the 1822 Retort House nearest Gas Street suggested by the structural evidence and confirmed on the *c.*1855 Piggott-Smith map, which shows a set of buildings in this position (fig. 6).

The later development of the building may be summarised within two further phases. The second phase involved the construction of four regularly spaced buttresses on the inner face of the wall and the raising of the roof by approximately 1m. This build was in slightly darker red, frog-less clamped brick, measuring 8⅜ by 4⅛ by 2⅞ inches, bonded with a dark brown lime mortar. The third involved the insertion of a series of steel I-beams to create slightly lower and wider openings within the wall and the additional raising of the height of the roof by approximately 0.5m. This build used machine-cut bricks and very hard black cement-based mortar that was identical to the build used within the 'factory gables' at the east and west ends of the building. Both phases post-date the production of gas here. The second phase may best be associated with the mid-19th century brass and galvanising works, while the later modifications occurred some time in the last century.

Watching brief

Method

The watching brief element of the salvage recording covered ground adjacent to Gas Street and to the south of the 1822 Retort House. This can be subdivided into two distinct areas (III and IV, following Trueman and Krupa 1994; fig. 1). Area III lay adjacent to the

Retort House. When the gasworks was in operation it comprised an open yard to the south of the 'Coke Shade' overlooked by a terrace of buildings fronting Gas Street, but by 1870 it lay within the footprint of the Anchor Tube Works (fig. 7). In contrast Area IV was dominated by three gas holders, although the terrace of buildings fronting Gas Street continued southwards into this area. Archaeological observation consisted of two main elements. This comprised selective monitoring of the piling operation (plate 11) over both areas, the removal of substantial foundations for the former garage that occupied Area III (plate 12), and clearance of obstructions to the piling operation using a 360 excavator with a toothed bucket (Plate 13).

Results

Area III

Excavations within Area III revealed that in places there was substantial survival of the lower storey of the terrace of buildings fronting Gas Street. The location of the building depicted in plate 14 is given on fig. 6 (Building a). In plan the east wall fronting Gas Street measured 28 feet and the north and south gable walls 16 feet. The walling was made of clamped brick that measured 9 by 4¼ by 2¾ inches, and was bonded with white lime mortar in Flemish Garden Wall bond. Within the east wall were two blocked openings that measured 4½ feet in width and 5 feet in depth. The blocking was in larger clamped brick and the southernmost opening incorporated a smaller opening for a coal chute. The outline of this building is clearly visible on the *c.*1855 Piggott-Smith map, and may even be part of the terrace depicted on his earlier map of 1825. When first built it was clearly meant to be the ground storey of a structure that subsequently became buried as the ground level around it rose substantially, but which continued to function as a cellar. This scenario was confirmed by observations of the natural ground level elsewhere within Areas III and IV between 4 and 5m beneath the present-day ground level. The south wall of the building comprised the main boundary wall that separated the gas holders from the Retort House. To the north of Building a, the remains of an adjacent, slightly wider, building (Building b) was the last survival of the terrace adjacent to Gas Street. Building b was constructed of clamped red brick that measured 8¾ by 4½ by 2¾ inches, bonded with white lime mortar in English Garden Wall bond, but appeared to be contemporary with Building a, because there was no vertical break in the build of the eastern wall they both shared. The remains of the northern end of this terrace had been truncated by the insertion of three fuel tanks, presumably associated with the later phase of use of this area as a garage.

Area IV

Lower down the site of the gasworks, but at a roughly similar height to the floor of Building a, the remains of a clamped brick built tank containing a coal tar residue (Building c; fig. 6 & plate 13) were located during piling. This had to be cleared from the site and the feature was recorded prior to its removal. The tank was adjacent to the central gas holder and may have been part of the purifying system. Recording was limited for health and safety reasons due to the highly toxic nature of the coal tar. Further recording

within Area IV was limited to the observation of the piling holes (plate 15). Information concerning the relative depth of the natural ground surface and back-filled deposits was logged across this area. The results of these observations are presented in schematic form in fig. 8, which attempts to reconstruct a general profile through the gasworks showing how the location of the works was chosen to maximise the slope of the site to aid the production process. In addition, the figure also shows the extent to which the ground level has altered since the gasworks was abandoned in the 1870s.

Conclusions

This programme of salvage recording has provided much additional information concerning the form of the early gasworks. In particular, our knowledge of the original layout of the 1822-1828 gasworks has been much enhanced, including the topography of the site and the design of the Retort House. The survival of buried remains of the gasworks was demonstrated to be high, largely due to the dumping of material on the site after the gasworks had closed. The mitigation programme sought to ensure that, where feasible, significant archaeological remains have been preserved in situ, or, alternatively, preserved by record where disturbance or alteration was unavoidable. However, the survival of any plant associated with gas production was demonstrated to be minimal, mainly because there was extensive reclamation of portable materials after gas production ceased or the design of the gasworks was changed.

Acknowledgements

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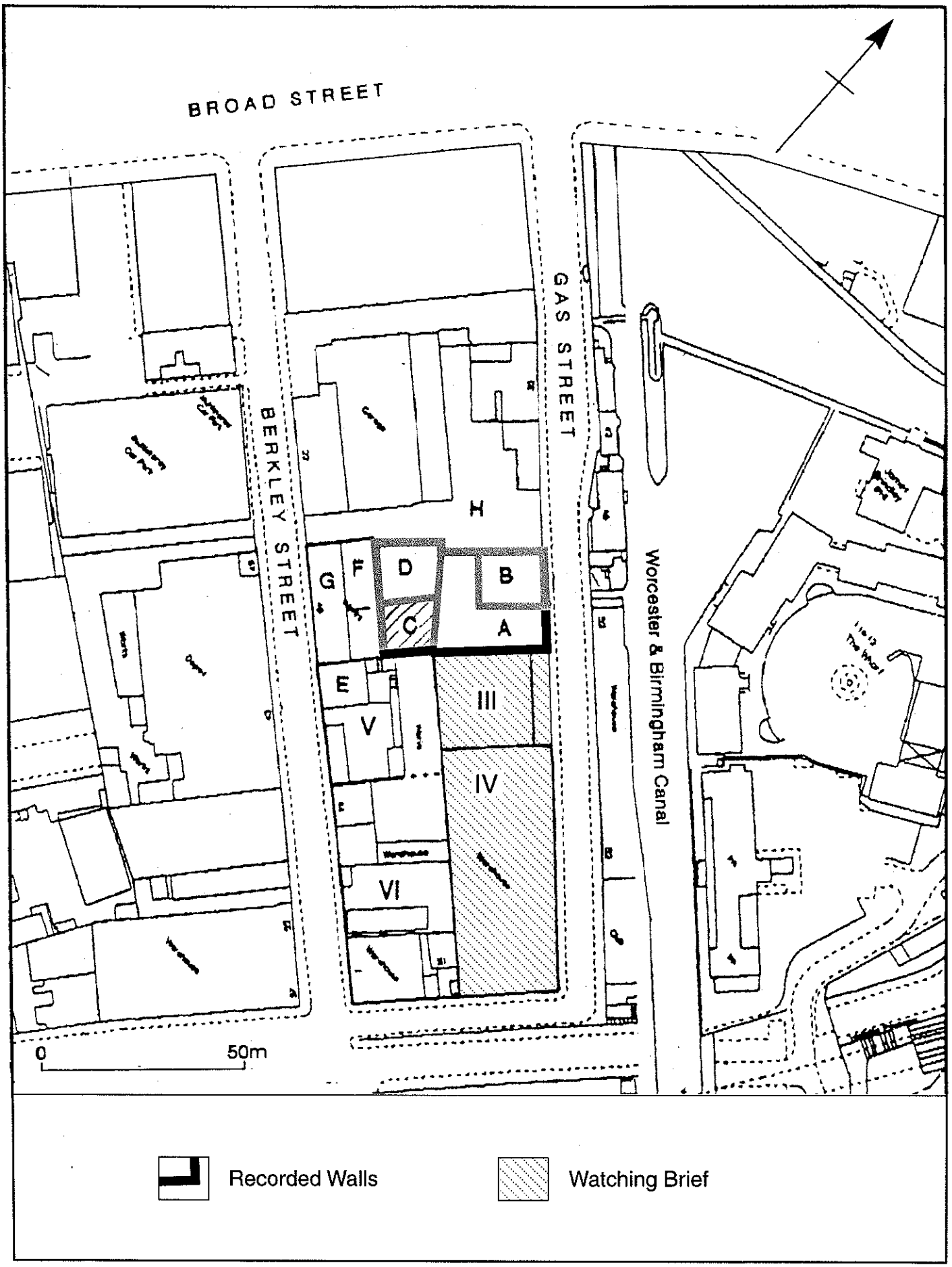

BROAD STREET
BERKLEY STREET
GAS STREET
Worcester & Birmingham Canal
H
G
F
D
B
C
A
E
V
III
IV
VI
0
50m
Recorded Walls
Watching Brief

fig.1

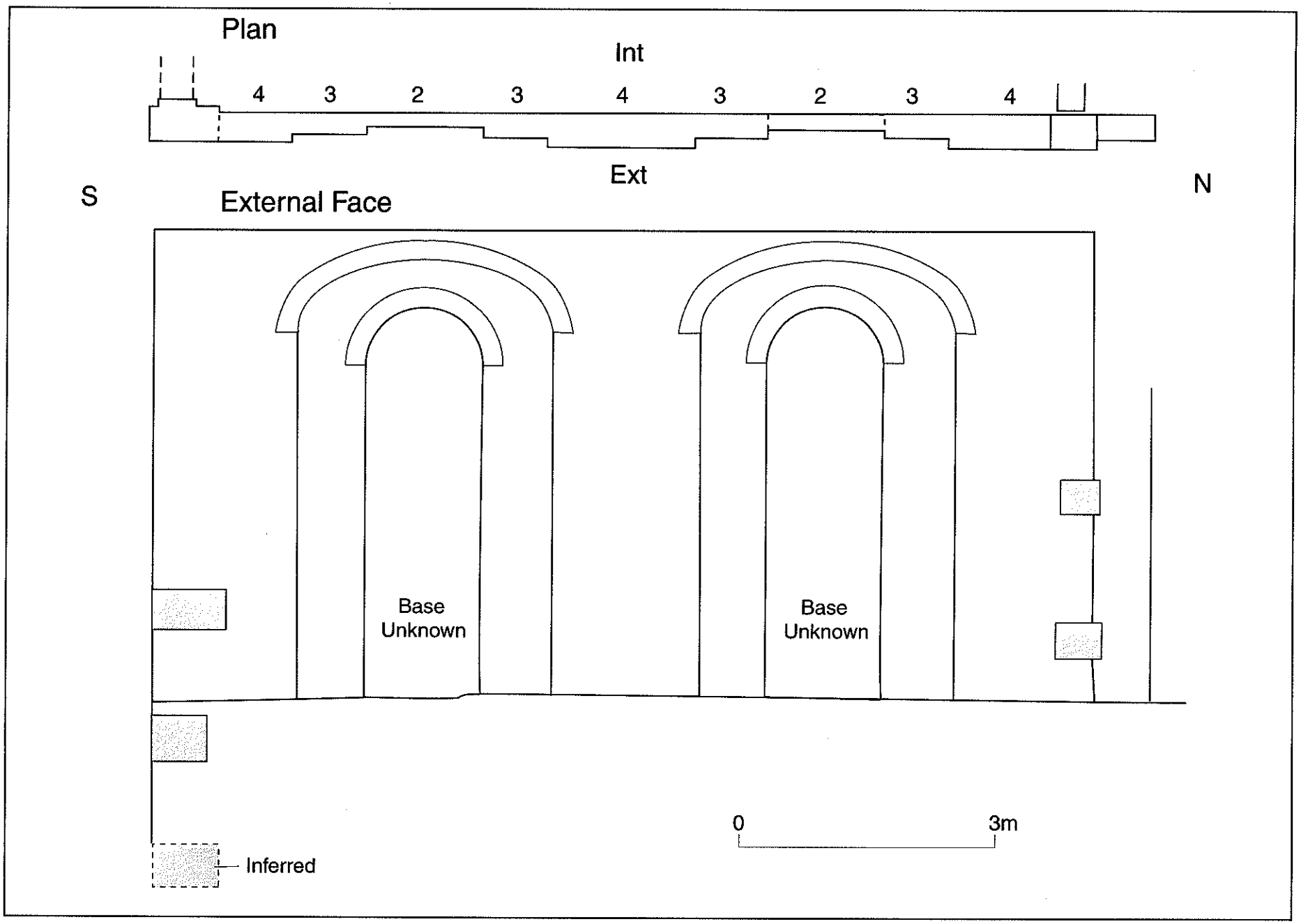

Plan
Int
4
3
2
3
4
3
2
3
4
Ext
S
N
External Face
Base
Unknown
Base
Unknown
0
3m
Inferred

fig.2

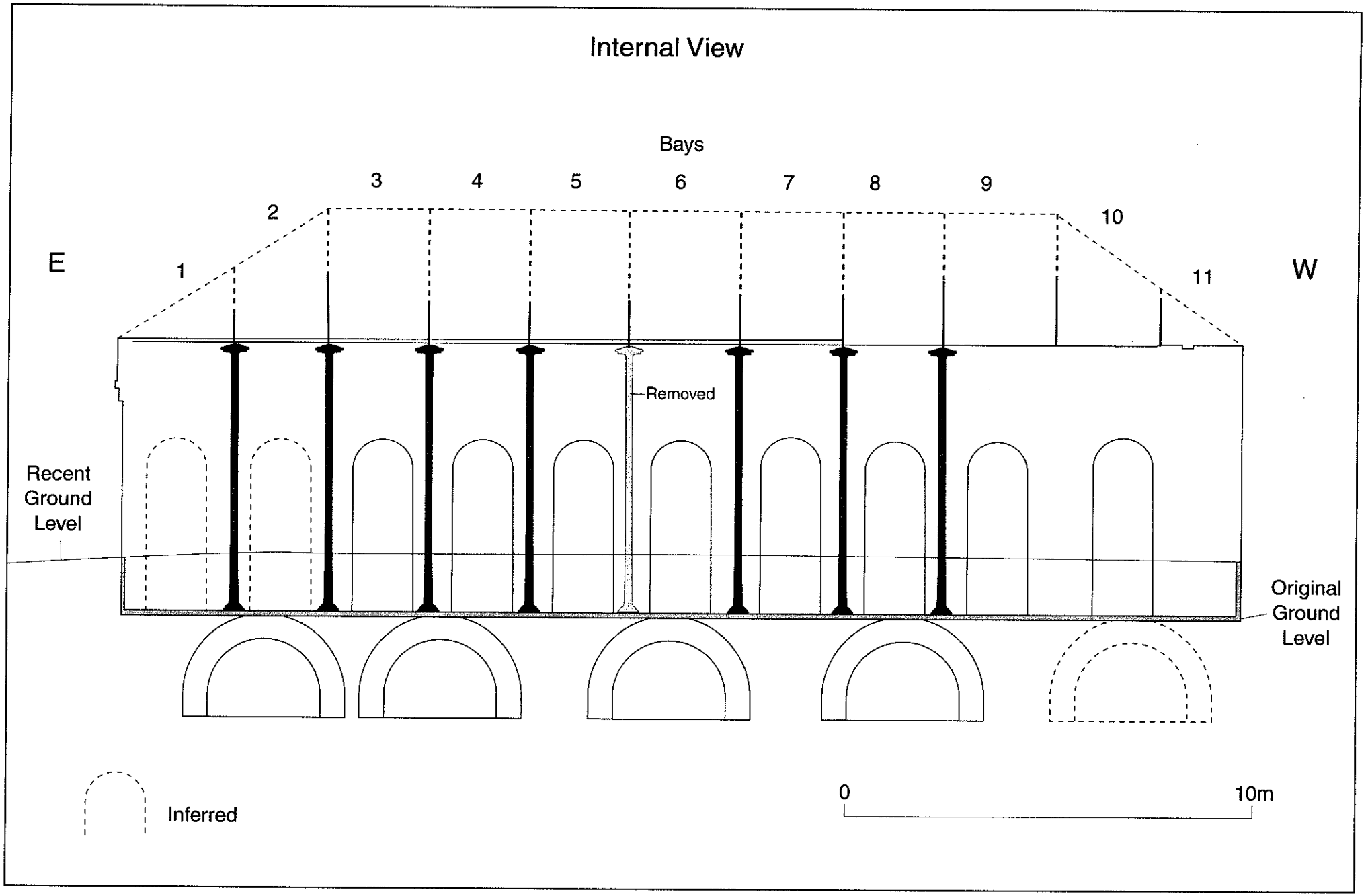
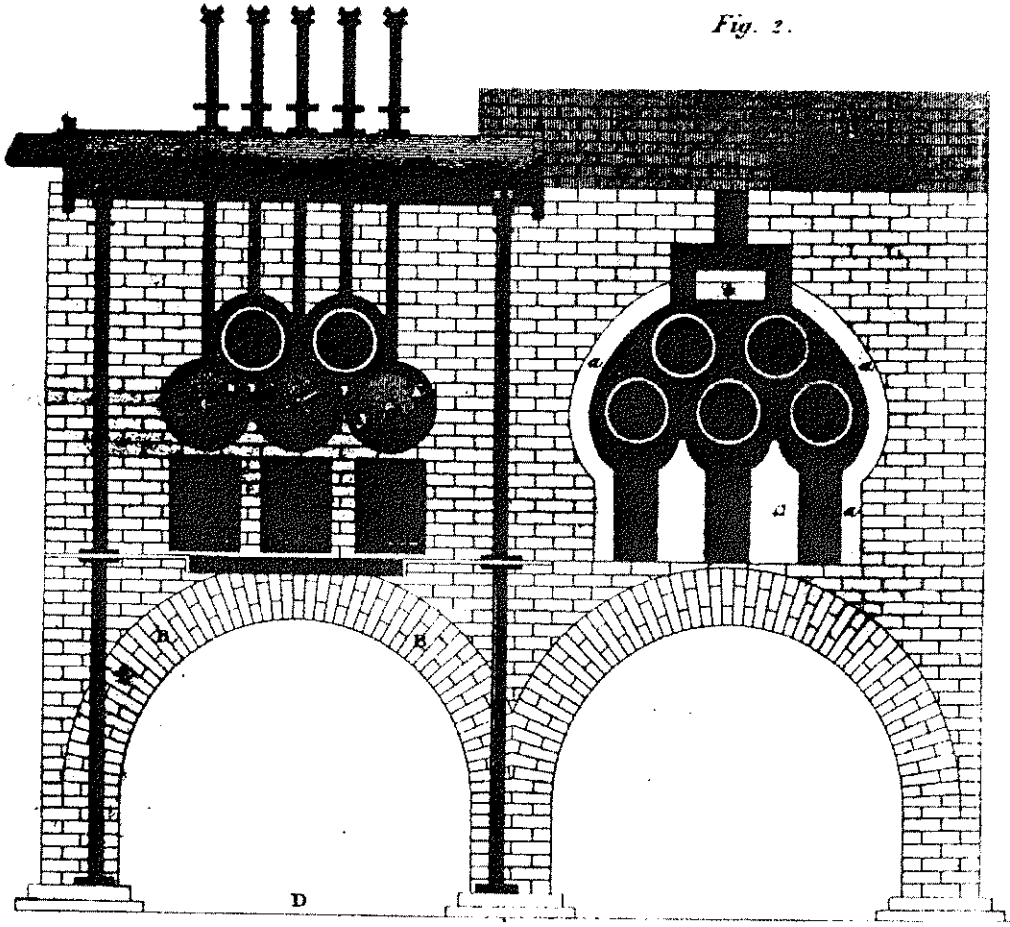

Internal View
Bays
1
2
3
4
5
6
7
8
9
10
11
E
W
Removed
Recent Ground Level
Original Ground Level
Inferred
0
10m

fig.3



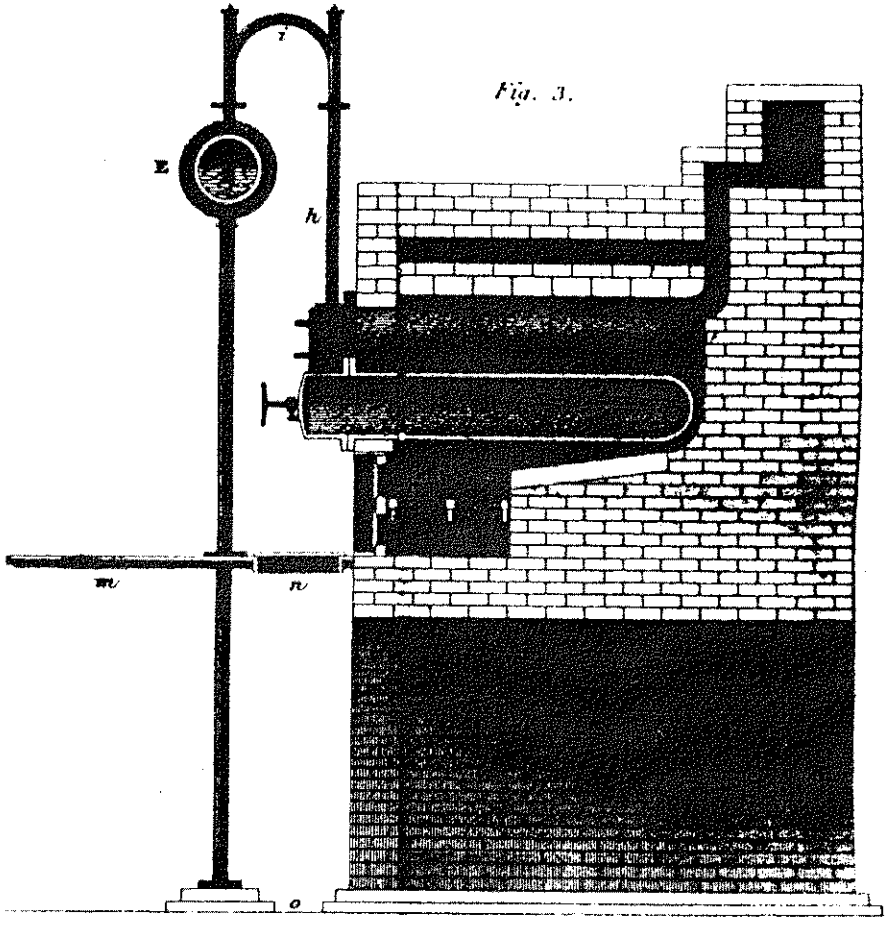


fig.4

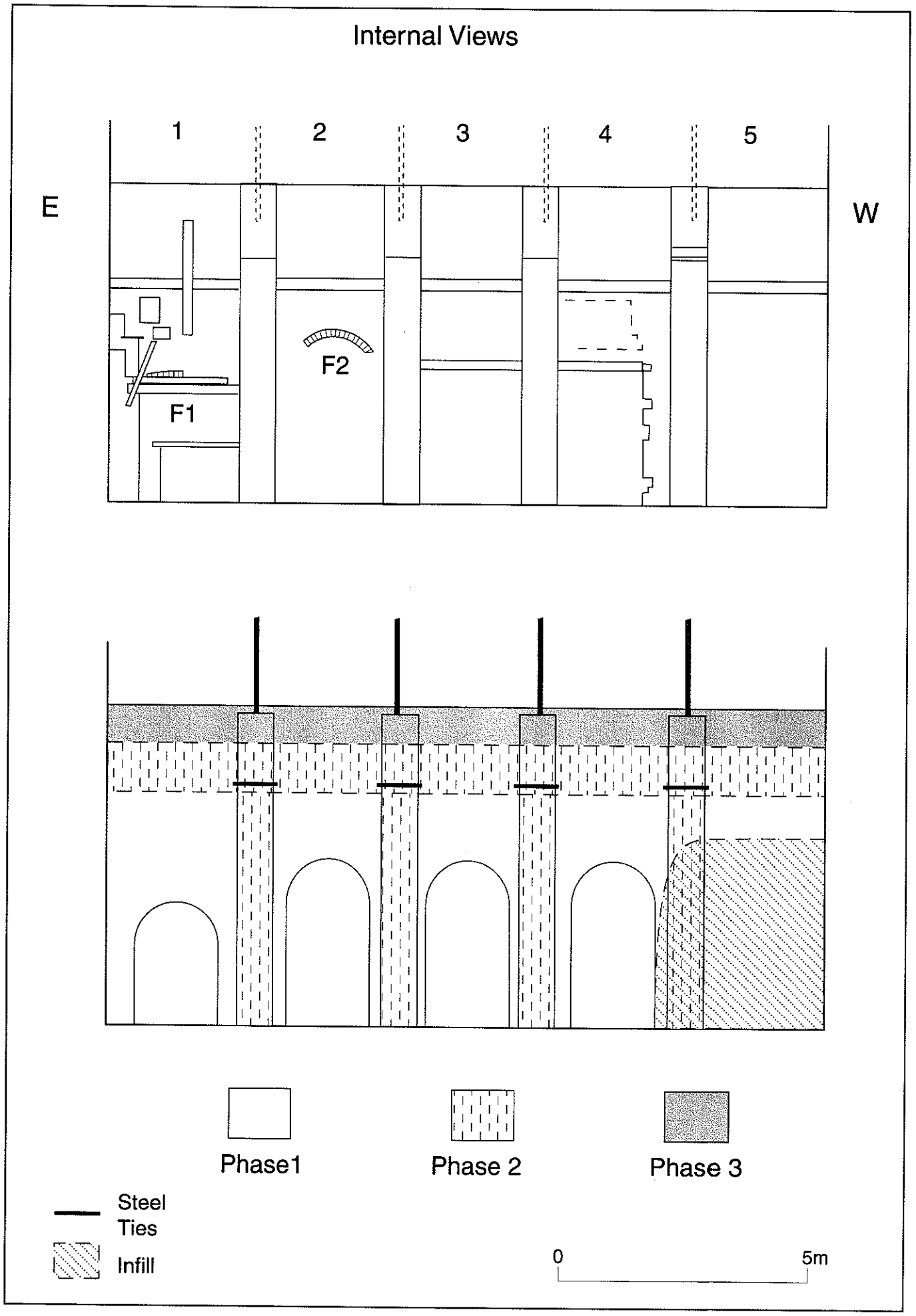

Internal Views
1
2
3
4
5
E
W
F1
F2
Phase1
Phase 2
Phase 3
Steel Ties
Infill
0
5m

fig.5

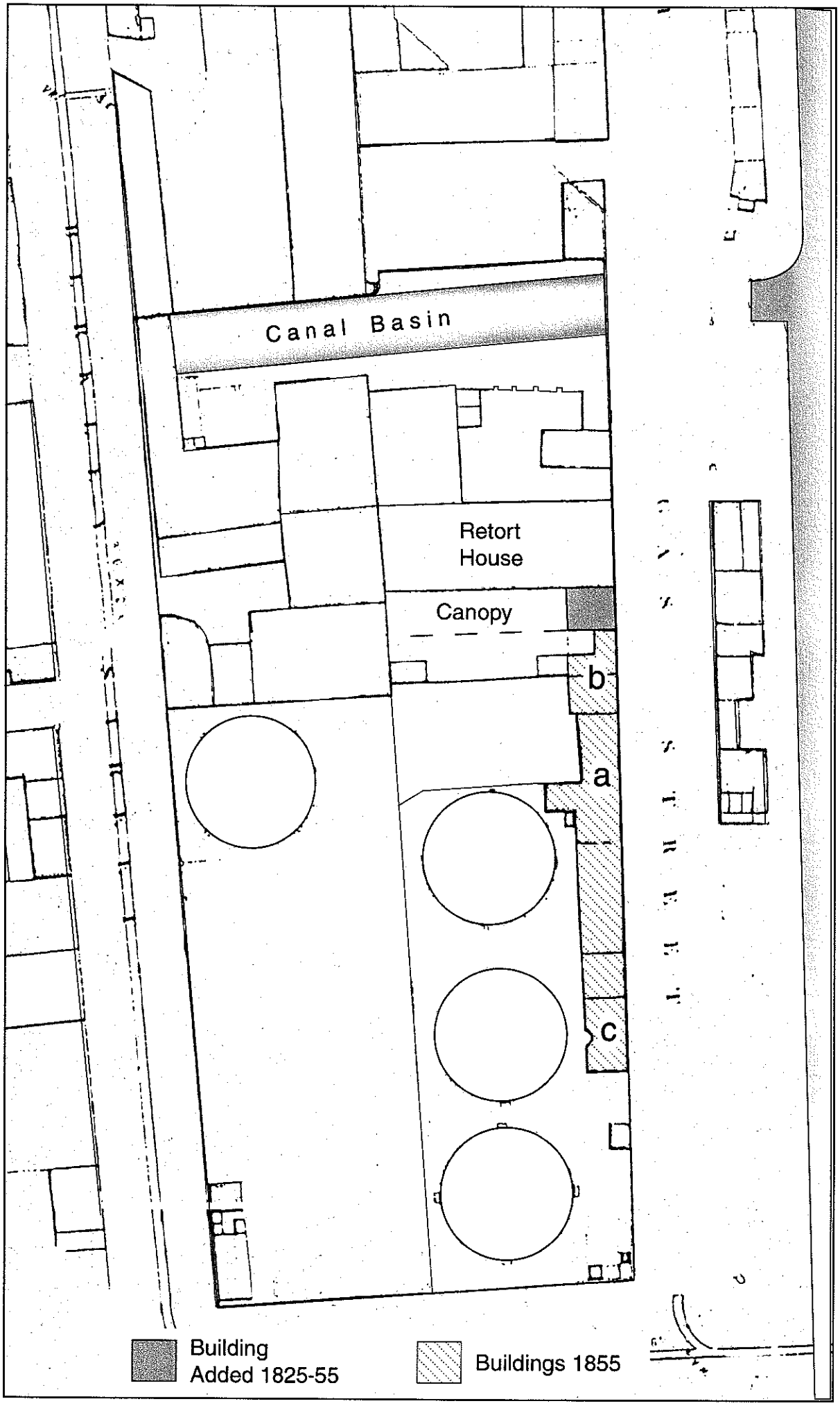

Canal Basin
Retort
House
Canopy
b
a
c
Building
Added 1825-55
Buildings 1855

fig.6

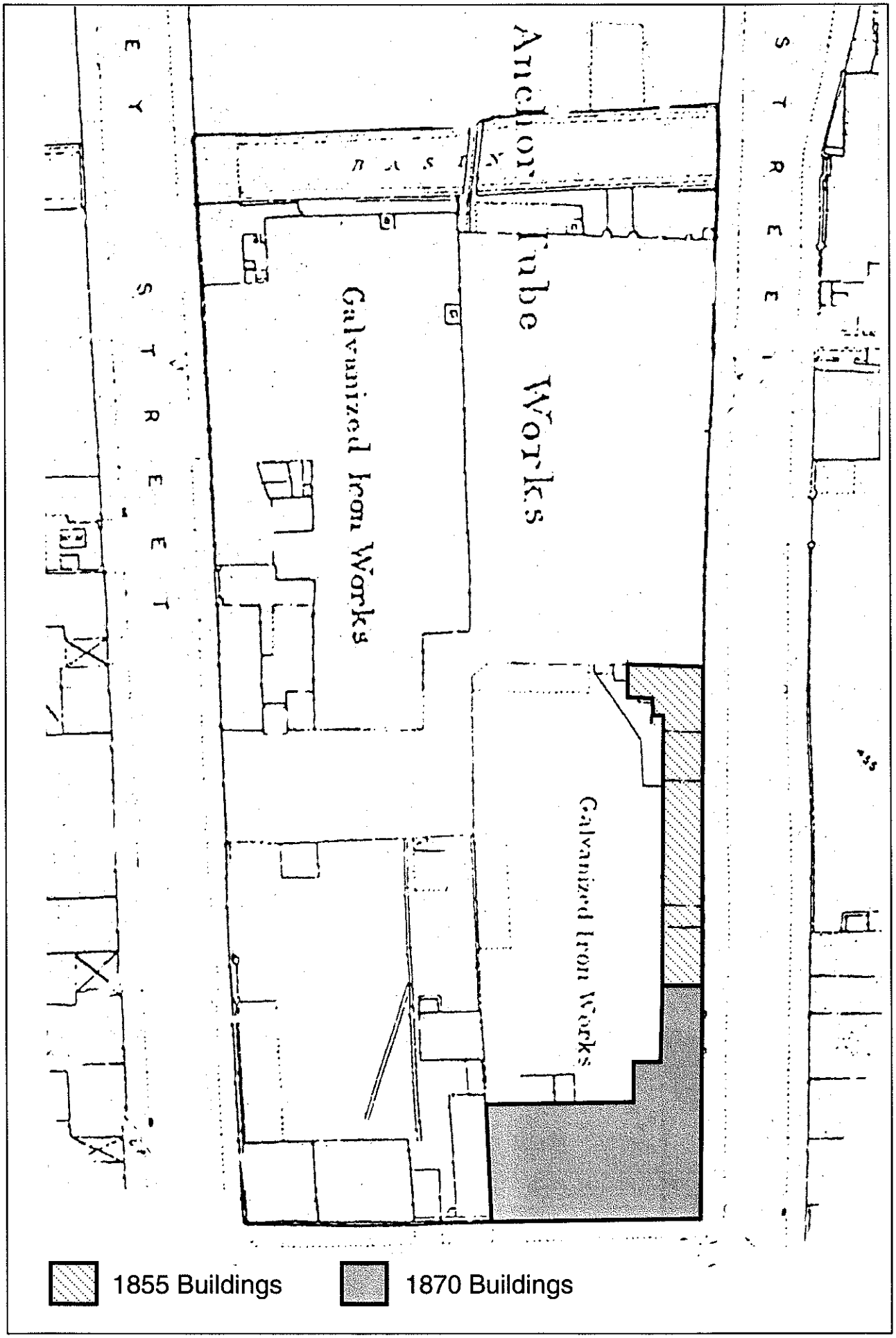
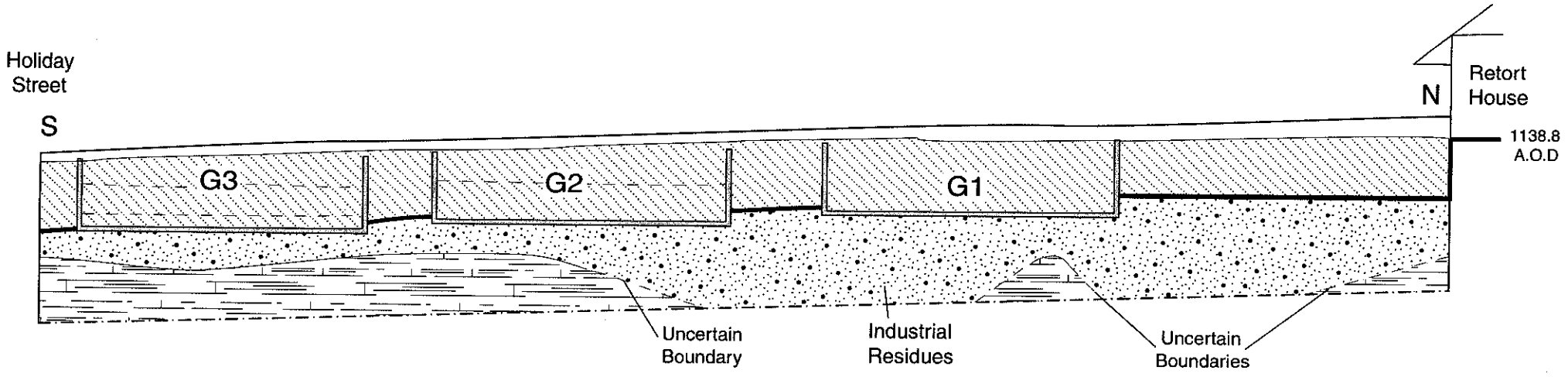

Galvanized Iron Works
Anchor Tube Works
Galvanized Iron Works
1855 Buildings
1870 Buildings

fig.7

Notional Section Through Gasworks Site



Bedrock

Sand & Gravel

Infill Episode c.1870

Buillding Rubble/Debris

Ground Surface 1822 Gasworks

G2 Gas Holders

0 10m

fig.8

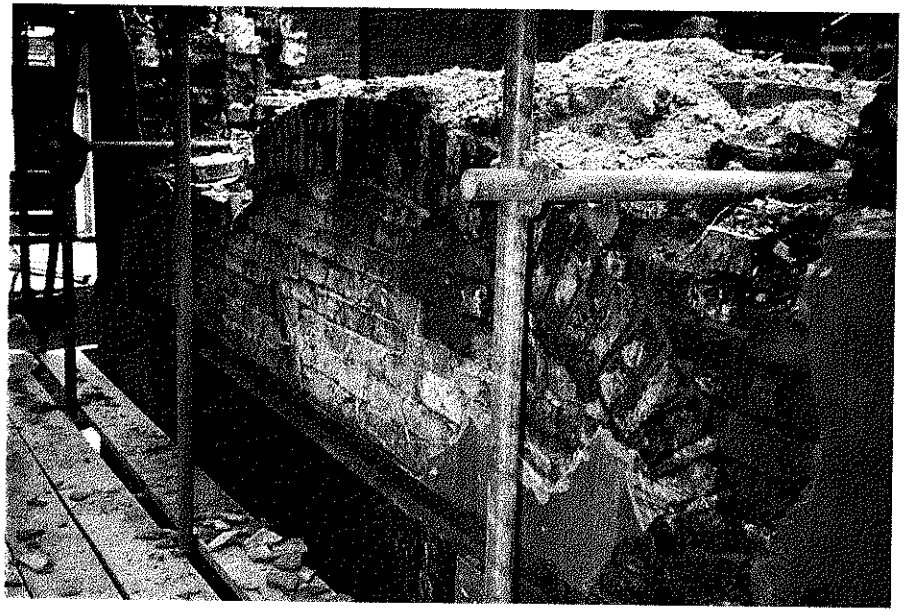


Plate 1

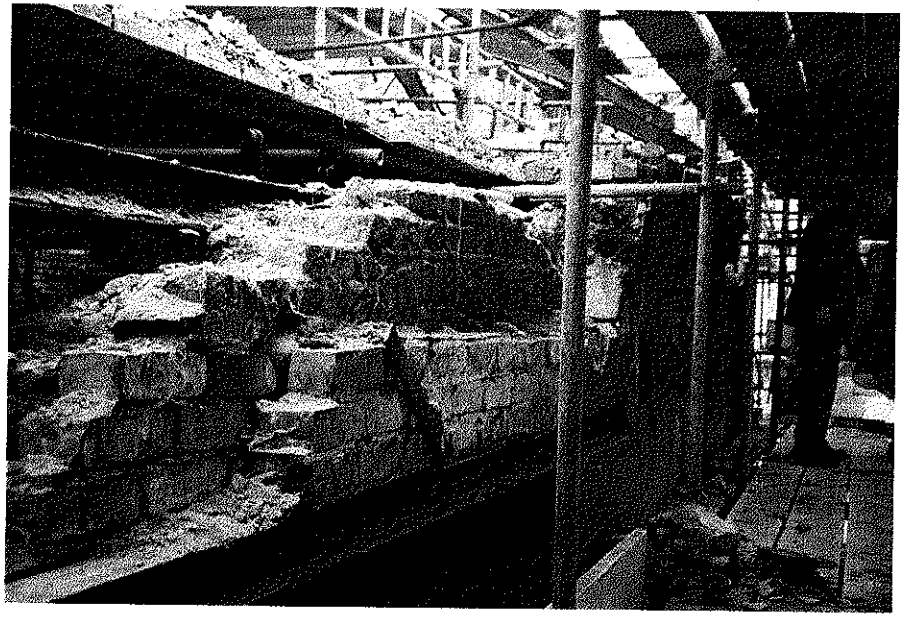


Plate 2

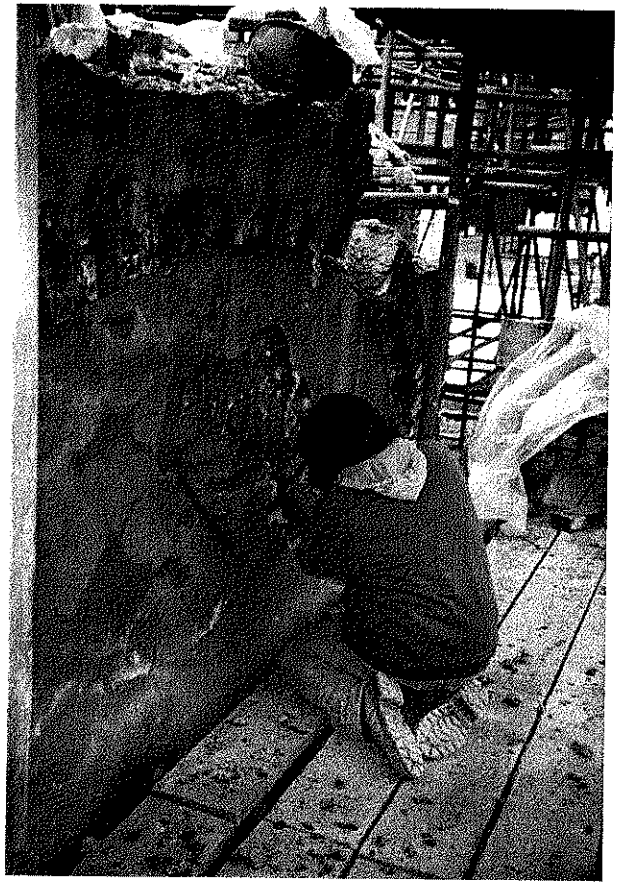


Plate 3

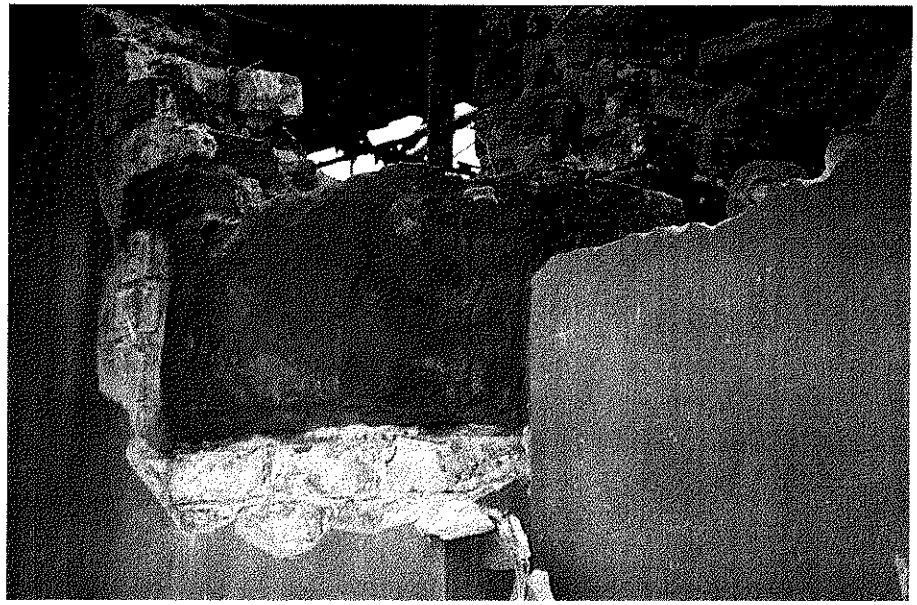


Plate 4

Plate 5

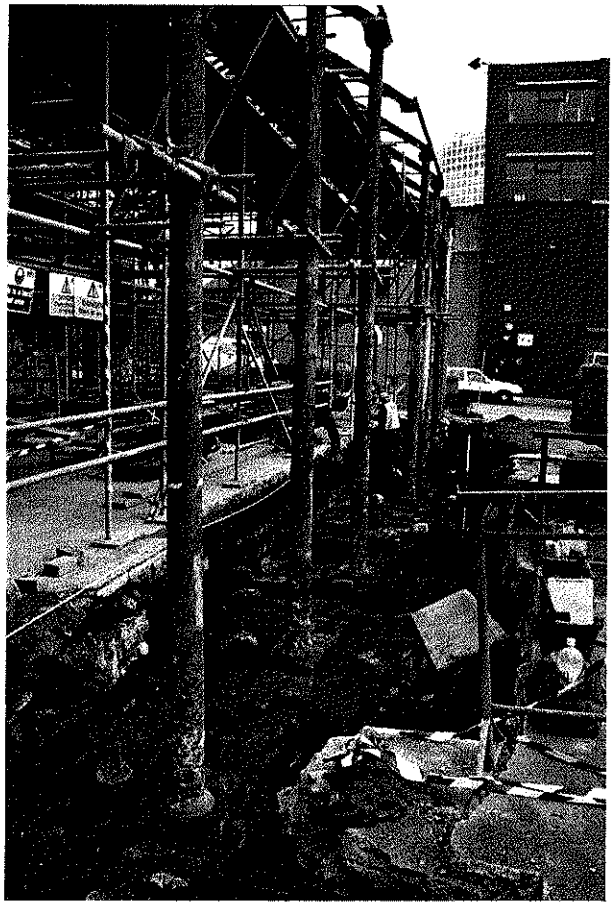


Plate 6

Plate 7

Plate 8

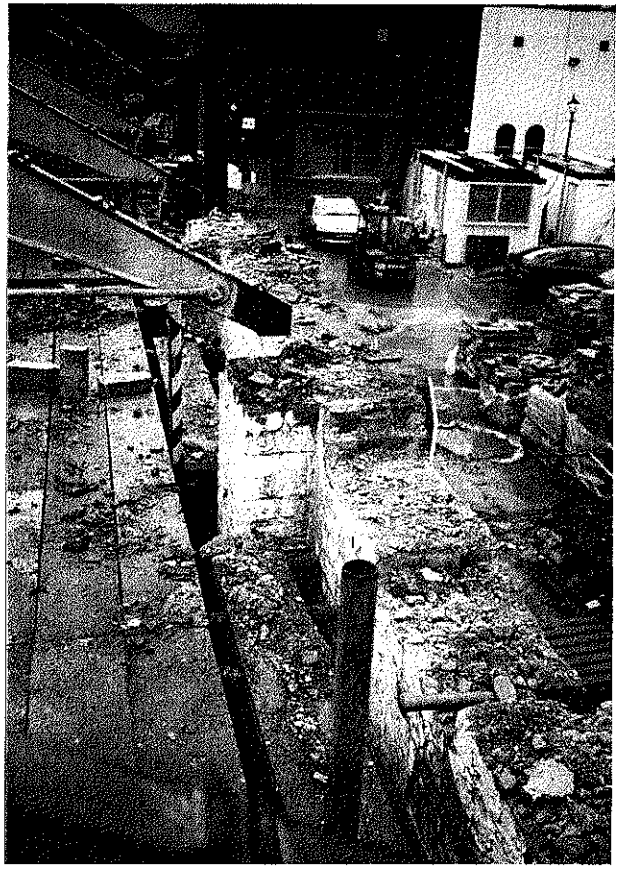


Plate 9

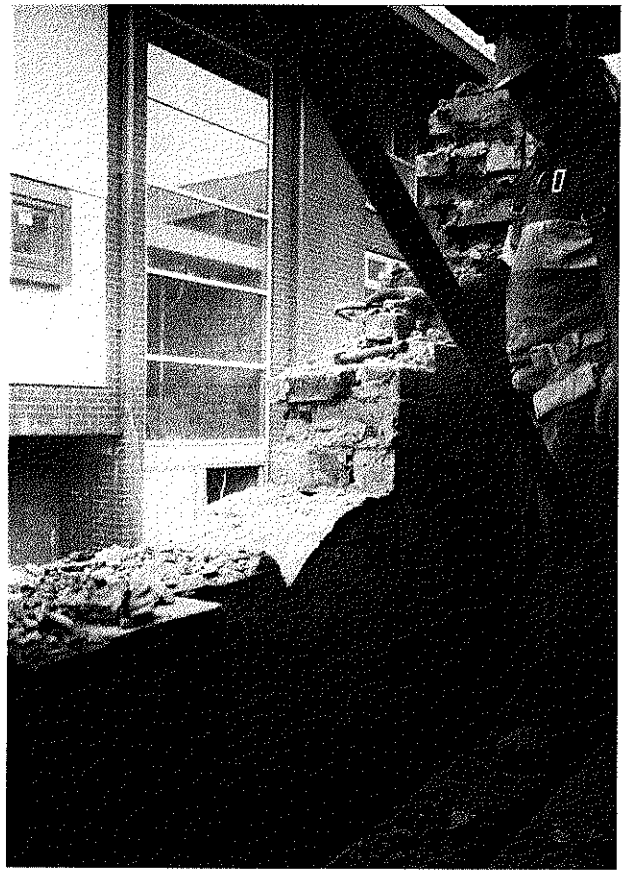


Plate 10

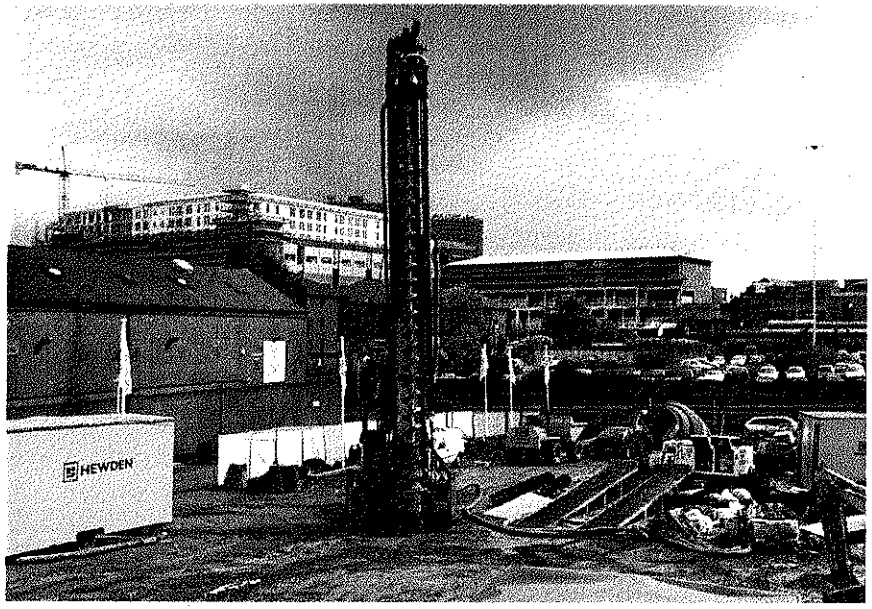


Plate 11

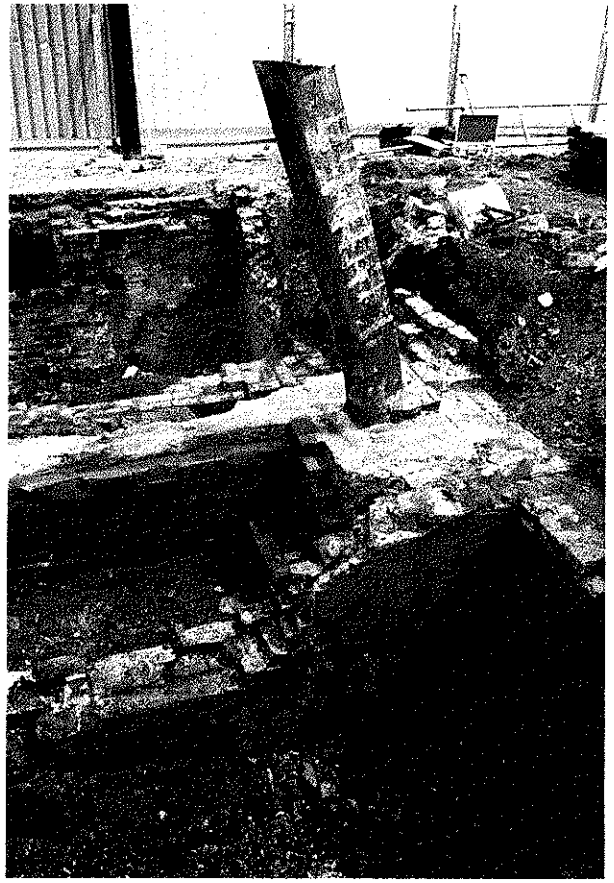


Plate 12

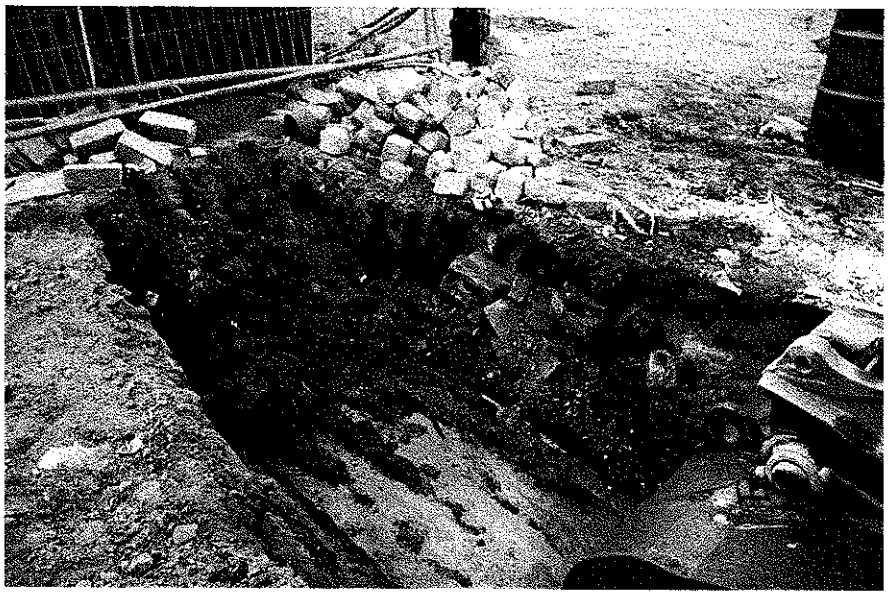


Plate 13

Plate 14

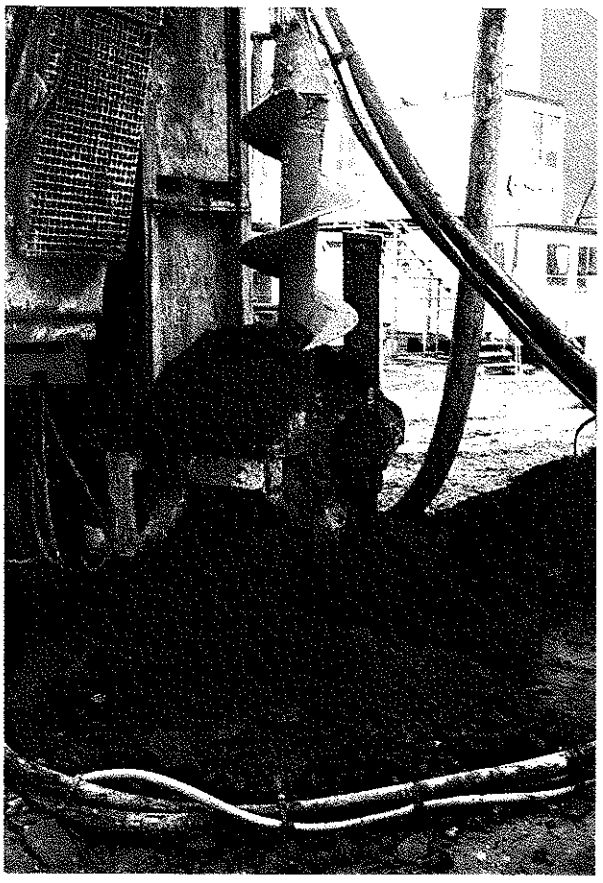


Plate 15