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**Shipton's Wharf, Albion Street,
Wolverhampton:
An Archaeological Building
Record, 2003**



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Shipton's Wharf, Albion Street, Wolverhampton
An Archaeological Building Record, 2003

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For Redrow Homes

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Contents

	Summary	1
1.0	Introduction	1
2.0	Site Location	1
3.0	Objectives	1
4.0	Method	2
5.0	Historical Background	2
6.0	The Building Record	3
7.0	The Evaluation Trenches	8
8.0	Conclusions	9
9.0	Acknowledgements	9
10.0	References	9

Figures

1. Location plan
2. Site plan
3. Buildings E and F in 1833 (Bridgen's Wolverhampton Directory)
4. Building E, ground plan
5. Building E, first floor plan
6. Building E, south facing elevation
7. Building E, north facing elevation
8. Building E, Section A-A
9. Building E, east facing section
10. Building E, Section B-B
11. Building E, Section C-C
12. Building F, ground plan
13. Building F, first floor plan
14. Building F, north facing elevation
15. Building F, south facing elevation
16. Building F, west facing elevation
17. Building F, Section D-D
18. Building F, Section E-E
19. Building G, ground plan
20. Building G, east facing elevation
21. Building J, south facing elevation of roof truss
22. Trench 1, north facing section
23. Trench 2, plan

Plates

1. Building E, impost block, south facing external elevation
2. Building E, impost block, south facing external elevation
3. Building E, canal arch from the east
4. Building E, datestone
5. Building E, roof structure
6. Building F, window, north facing elevation
7. Building F, ground floor from the south
8. Building F, first floor from the south

9. Building G from the northeast

Shipton's Wharf, Albion Street, Wolverhampton, West Midlands: An Archaeological Building Record, 2003

Summary

In February 2003 Birmingham University Field Archaeology Unit (now Birmingham Archaeology) carried out archaeological building recording at Shipton's Wharf, Albion Street, Wolverhampton, West Midlands (NGR SP 9210068675), adjacent to the Grade II Listed Albion Mill on the Birmingham Canal. The work was commissioned by Redrow Homes and was carried out in advance of demolition of the existing complex of factory buildings and redevelopment of the site. Measured and photographic surveys were made of three structures (E, F and G), and a fourth structure (H) was recorded by means of photography and written notes only. In addition, a measured drawing was made of a Belfast roof truss within another building (J). The main interest of the site lay in buildings E and F, which were identified as covered wharves and warehouses built between 1831 and 1835. In August 2003, following demolition of the buildings, a trial trenching exercise recorded two linear canal basins respectively entering two covered wharves, Buildings E and F, from the north. The two canal basins were brick-lined and clay-puddled at the base and dated from the 19th century.

1.0 Introduction

In February 2003 Birmingham University Field Archaeology Unit (now Birmingham Archaeology) carried out the archaeological recording of specified buildings at Shipton's Wharf, Albion Street, Wolverhampton, West Midlands, adjacent to the Grade II Listed Albion Mill on the Birmingham Canal. In addition, two trenches were excavated to locate the canal basins suggested by map evidence to have extended into two covered wharves. The work was commissioned by Redrow Homes and adhered to a written scheme of investigation prepared by BUFAU (BUFAU 2002), which was itself based on a brief provided by Wolverhampton MBC (Shaw 2002).

2.0 Site Location (Figs. 1 and 2)

The development area is close to Wolverhampton City centre and comprises a rectangular block of land about 1ha. in extent lying between the Birmingham Canal (north), Albion Street (south), Corn Hill (west) and Union Mill Street (east) centred on NGR SP 9210068675.

3.0 Objectives

- To obtain archaeological records of specified buildings at varying levels of detail, depending on their historical importance.
- To establish the line of the canal basins within buildings E and F by archaeological trenching.

4.0 Methods

Buildings E, F and G were recorded by measured survey, at scales of 1:20 or 1:50, as appropriate, supplemented by structural analysis, written descriptions and colour and monochrome photography. Buildings E and F, as the historically more significant structures, were recorded in greater detail than Building G. In addition, Building H was recorded mainly by photography and written notes, and a measured drawing was made of one of the Belfast trusses over buildings I and J.

Two trenches were excavated in order to locate the canal basins that formerly extended into buildings E and F. All modern overburden and hardstanding was excavated using a mechanical excavator, fitted with a combination of buckets, under direct archaeological supervision. A detailed written record was maintained using *pro-forma* context and feature record cards. Features and sections were drawn at scales of 1:20 and 1:50. Written records and scale plans were supplemented by monochrome, colour print and colour slide photographs, and digital images. These records comprise the site archive, which is currently stored with Birmingham Archaeology.

5.0 Historical Background

An archaeological assessment of the Albion Mill and its environs undertaken by BUFAU in 2001 included a documentary study of the development area, focusing on the development of the area after the construction of the Birmingham Canal, 1768-72 (Litherland, Morriss and Nichols 2001). Some time between this date and the publication of a map of Wolverhampton in 1836, Shipton's Wharf, later known as Albion Wharf, had come into existence, being constructed around a subsidiary arm of the canal (Litherland, Morriss and Nichol 2001, 4).

The *terminus ante quem* for the construction of buildings E and F, both of which were covered wharves and warehouses, was established as the year 1833, when both structures were depicted in an advertisement (Fig. 3). Building E was raised by Henry Pratt, presumably sometime before December 1831 when the site later known as the Albion Wharf was purchased from him by James Shipton who established a general carrying business there. It was Shipton himself who raised Building F as a grain warehouse. Building G, which was part of the Shipton's Wharf complex lying immediately to the south of Building E, was built between 1871 and 1883 (Litherland Morriss and Nichols 2001, 4).

The other buildings lie to the east of Shipton's Wharf. Building H, which was situated immediately southeast of Building F, may have been one of the buildings shown on the 1852 Board of Health map, but by 1864 it was part of a washer works which was later converted into a saw mill. Buildings I and J were erected during the mid-20th-century. (Litherland Morriss and Nichols 2001, 4).

6.0 The Building Record

6.1 Building E

Exterior

Building E was a two-storey structure with walls of 9" x 4 $\frac{3}{4}$ " x 2 $\frac{1}{2}$ - 3" red bricks laid in a mixture of Flemish bond and English garden wall bond, and a hipped plain tile roof. Aligned east-west, with the principal front towards the Albion Street yard to the south, the building had an irregular trapezoidal plan (Fig. 4 and 5).

South Elevation (Fig. 6)

The south front, which was constructed in Flemish bond, was dominated by two full-height semi-circular arched recesses, both blind at ground level. The right-hand recess contained an inserted first-floor window and the left-hand recess an inserted first-floor doorway. There was also, at the time of the survey, a full-height central recess, containing at ground level a blocked doorway with wooden lintel, and at first floor level a loading hatch with double-leafed door. The recess itself was not an original feature, but is the result of a good deal of alteration. At ground-floor level the jambs of the recess had been rebuilt to make it narrower than at first-floor level.

To the left (west) of the left-hand jamb a sandstone impost survived, its cast face apparently representing the position of the jamb of an original opening (Plate 1). At first floor level sandstone imposts survived on both sides, in each case accompanied by the first few voussoirs of an elliptical arch made of wedge-shaped 14" gauged bricks, grooved to suggest joints. The rest of the arch had been destroyed by the insertion of the loading hatch, but the remnants suggest a low elliptical arch. The structural evidence, then, points to the central recess having evolved from two separate arched openings, one at ground and one at first-floor level. The drawing of 1833 corroborates such an arrangement (Fig.3).

To the left (west) of the central recess, at ground level, was an inserted doorway giving access to the interior. To the left (west) of it was another sandstone impost and a curving break in the brickwork above it suggesting that there was formerly an arch in this position. (Plate 2). It seems probable that the existing doorway replaces an original opening of which this impost is the only surviving trace. To the far left (west) was a Gothic two-centred arch doorway and a window of similar character to the left of it, both openings having been blocked by the refacing of the inner elevation of the south wall. Between the two doorways, at first floor level, was another inserted doorway approached by a flight of wooden steps.

The south elevation continued to the east beyond the end of Building E as far as Building F. This section of the wall between the two buildings was mostly occupied by a large carriage arch, the eastern part of which had been blocked at a later date. It seems to have given access to the side of the canal basin that extended past Building F into Building E. This area may have been a wharf for loading large goods directly from the yard.

North Elevation (Fig. 7)

The north wall of Building E, towards the canal, was built in English garden wall bond (two stretchers to one header) and had a stepped brick eaves band. There were four windows at ground level. The left-hand (east) one, which had a steel lintel, was an insertion, the next to the right (west) retained the basket arch and the upper jambs of an original opening, though the lower jambs had been rebuilt. The other two both had wooden lintels, and although fragments of the original jambs survived, both windows had been substantially enlarged. There were two small first-floor windows with segmental heads. At the right-hand (west) end of the elevation was a straight joint with the adjacent building. At the left-hand (east) end of the elevation was a flight of steps leading to first floor level, though it was not obvious what it communicated with. Only one stone survived from the original parapet coping, which had been rebuilt in brick.

East Elevation (Fig. 8)

At ground level was an opening the full width of the northern bay of the building that formerly contained the canal basin. The wall above the opening, which was supported on an I-beam, was covered with later cladding and could not be recorded in detail, but it is probable that it was originally carried on an arch.

There were three openings into the southern bay. At ground level was a large opening beneath an I-beam, apparently an insertion though perhaps replacing an earlier opening. At first floor level was an inserted doorway to the left (south) giving access to a later bridge between Buildings E and F, and an original opening to the right (north) with two-leaf door.

Interior (Figs 4 and 5)

The greater part of the interior was divided longitudinally by a spine wall into the former canal basin to the north, and the former wharf to the south. The concrete floor of the former wharf was 0.88m below the level of the yard to the south, but judging by the height of the Gothic doorway at the west end of the elevation (2.10m) the yard level had not been built up to any great extent. On the south side of the wharf, immediately behind the central recess of the south elevation, was a projection containing two blocked openings, the blocked doorway visible on the south elevation, and an earlier, wider opening probably connected with the stone impost to the south and part of the original build. The evidence suggests a hatch and platform for the loading and unloading of goods.

The spine wall contained two large loading bays, both with timber sills and lintels, giving access to the canal basin (Fig. 9). The left-hand one was 6.46m wide and partially blocked, in at least three phases. The right-hand one was 6.82m wide and blocked in two phases. In the west wall of the northern room, which formerly contained the canal basin, was the blocked opening with rounded corner and high segmental arch (superseded by an I-beam) that allowed the barges ingress to the next building (Fig.10, Plate 3). It was evident that the canal basin area was originally open to the roof, as the first floor that was in existence at the time of the survey cut across the arch, proving that it was an insertion.

The position of the original access to the first floor of Building E is uncertain owing to the floor having been obscured by later cladding, but it is possible that it had always been from the staircase at the west end of the wharf. Above the wharf was a single room, in the west wall of which was a datestone, partially obscured by a later ceiling support, and inscribed ".....And PRATT/ 1831" (Plate 4). Another spine wall separated this upper room from the canal basin. Vertical breaks in the brickwork suggested that here too there were originally two large open loading bays, 6m (east) and 7.10m (west) with bullnose bricks at the corners.

The roof was supported by a series of queen post trusses with principals extending only as far as the queen posts carrying three pairs of purlins. A collar held between the queen posts supports a plank ridge (Fig. 11). On the north side of the building the tie beams carried a timber plate on top of which paired timbers was raised to create a continuous pattern or serrations of unknown purpose (Plate 5).

6.2 Building F

Exterior

Building F was constructed in 9¾" x 4¼" x 2¼" red brick laid in English bond, and had a hipped plain tile roof. It was a two-storey structure on the east side of the yard, aligned roughly north-south. Although essentially rectangular in plan the north end comprised two faces and was indented at the junction of the two (Figs. 12 and 13).

North Elevation (Fig. 14)

The north elevation, towards the canal, formed the main front of the building. The right hand (west) side of the elevation had a projecting plinth, gradually diminishing in thickness towards the centre of the building where the wall curved back into the entrance to the former canal basin which occupied the entire eastern half of the front at the lower level. There was an I-beam over this opening, though presumably it was originally arched like the opening in Building E.

Building F had three bays of semi-circular arched windows with hood moulds springing from painted stone impost blocks (Plate 6). The first floor left hand window represents a conversion from a larger opening, possibly a doorway. Vertical breaks in the brickwork show that the jambs originally continued downwards. Below the window sill this earlier opening had been infilled with 9¾" x 4¼" x 2¾" bricks. Above the window arch was a segmental arch, latterly a relieving arch but possibly open originally.

South Elevation (Fig. 15)

First floor level was marked by two massive timber beams that extended across the entire width of the elevation. The truncated joints of three former timber supports survived in the soffit, suggesting that the ground storey was originally open. Latterly, probably during the 20th century, it was infilled with 8½" x 4" x 2½" bricks and provided with two doorways and a window. At first floor level were three blocked

semi-circular-arched windows, of similar proportions to those in the north front, and at the left-hand (west) end a large blocked opening, probably a doorway.

West Elevation (Fig. 16)

The west elevation, formerly open to the yard, was divided into two by the continuation of the south wall of Building E. To the left (north) of this wall is a large vehicular opening with I-beam over, evidently inserted or enlarged. To the right of it, and only visible from the interior was a blocked window with timber sill and lintel, partially obscured by the south wall of Building E. At first floor level, above the vehicular entrance, was an opening with double doors, probably a loading hatch, and, to the left of it an inserted doorway contemporary with a timber bridge linking the upper stories of buildings E and F.

The southern section of the elevation had seven bays of unequal sized openings at ground floor level, none original, containing large steel-framed windows of 1930s date. To the left (north) of centre was a wide opening, probably for loading. At first floor level there was only one small blocked window to right (south) of centre.

Interior

Ground Floor (Fig. 12)

The concrete floor of the ground storey was 1.05m below the floor level outside the building to the south and west (Plate 7). There were two large rooms at this level, divided from one another by a spine wall, the loading platform or wharf to the west and the former canal basin to the east. This spine wall contained two large open loading bays approximately 4m wide, and two smaller openings to the left (north) of centre, and at the south end (blocked).

A number of alterations to the original fabric were evident. Firstly, a number of brick piers had been built along the west side of the spine wall, mostly butting against the wall though some had been bonded. In each of these piers was the embedded end of a truncated I-beam. There were corresponding features in the opposite (west) wall, suggesting that they supported an inserted floor (later removed). Approximately 0.2m above the tops of these I-beams was a 'dirt line', perhaps indicating the former floor level, 1.35m above the current one. This theory is supported by the character of the central opening, which had been lined with planks from the level of the 'dirt line' upwards. The brick piers also supported I-beams over each of the two large loading bays, and carried the beams for the upper floor.

A floor had also been inserted in the eastern room. The east side of the spine wall also incorporated the remains of I-beams, and in the opposite (east) wall there were the corresponding remnants of concrete blocks (Fig. 17).

First Floor (Fig. 13, Plate 8)

The first floor cut across the loading doors at the north end of the west elevation, and was only 0.6m below the sills of the north and south windows, both indications that the floor had been raised. The upper storey comprised a single room. In addition to

the openings already mentioned in the north, south and west elevations, the east wall contained a blocked window and doorway, respectively 0.89m and 1.6m from its north end. The window suggests that these openings dated from a time when there was open land to the east side of Building F, and that the doorway was approached by an external flight of steps.

There were three trapdoors in the later floor, two on the west side and one on the east. The eastern trap was situated beneath a platform, raised on the tie beams of two of the roof trusses, containing a second trap over the one in the floor. The roof trusses themselves contained queen struts and, standing on the collars, king-posts that clasped a plank ridge (Fig. 18). The truss was transitional in that some of the members were secured with wooden pegs whilst iron stirrups and straps had also been used. Each roof truss had been strengthened at a later date by an I-beam and by an iron column a row of which extends down the centre of the room, immediately above the ground-floor spine wall.

6.3 Building G (Figs. 19 and 20, Plate 9)

Building G was a late 19th-century brick-built structure with corrugated iron roof. The bricks ranged in colour from red to yellow, and were laid in English garden wall bond. Aligned east-west facing east, the plan was that of an irregular rectangle, the east wall being built at an oblique angle to the side walls. This single-storey structure had a large sliding door to the left (south) beneath a steel girder, probably inserted, though the structural evidence was slight. There were two windows of identical design, one to the right and one in the gable. They had semi-circular heads with small-pane iron frames, and chamfered brick sills. Above the upper window was another small window opening with flat wooden lintel. Inside there were buttresses to each end, and in the centre of the side walls. Two square 20th-century openings had been inserted into the south wall. In the centre, extending from north to south was a single queen-post roof truss. The tie beam supported two longitudinal beams, the southernmost of which had had its western half removed.

6.4 Building H

Building H was a red brick (Flemish stretcher bond) structure with a corrugated asbestos roof, and was probably a garage in its latter stages. The two-storey, three-bay building was aligned east west, and was surrounded by later structures at the time of the survey so that most of its external elevations had been obscured. The east elevation contained two blocked windows and a blocked doorway at ground level and one window at first-floor level, all with segmental heads. On the south side the ground storey had a blocked vehicular entrance to the east with timber lintel, and segmental-headed windows to the centre and west. There were two later blocked windows to the first floor (east) under a single RSJ. To the north, large ground-storey openings beneath steel girders led to the two adjacent buildings. The western opening was divided by a central steel column. Above the eastern opening was a 20th-century window within a segmental-headed frame. On the south side of the west elevation under an RSJ was a large carriage opening. The interior was divided into three bays by internal buttresses. In the southeast corner of the building was a vehicle maintenance pit.

6.5 Building J Roof Truss (Fig. 21)

The roof trusses over Building J were a type of Belfast truss. Constructed of wood, they comprised twelve bays, each containing St Andrew's cross bracing. On the right-hand (east) side, the left-leaning braces crossed over the right-leaning braces. On the left-hand (west) side this pattern was reversed.

7.0 The Evaluation Trenches by Richard Cherrington

Owing to health and safety concerns arising from contamination, and, in the case of Trench 2, to the close proximity of the main Birmingham Canal, complete excavation was not possible in either case.

Trench 1 (Fig. 22)

Trench 1 was 6.5m long by 3m wide and aligned east west across Building F. The modern ground surface level was 145.63m AOD.

The canal basin was approximately 5m wide and ran north-south from the canal frontage into Building F. Its base (1003) comprised clay puddling (Plate 6) and was encountered at a depth of approximately 3.7m below the modern ground surface. The light brown clay of the puddling appeared to have been grogged with gravel and brick inclusions to increase workability. After it had become redundant the canal basin had been backfilled with loose demolition debris and other contaminants (1002). The water level occurred at approximately 1.6m from the modern ground surface. A Ferro-concrete raft with a damp-proof-membrane (1001) 0.15m in depth capped the canal basin, which was enclosed by two 0.7m thick walls (F100 and F101) constructed of hand-made red bricks measuring 9½" x 4½" x 3", laid in English bond and bonded with limed mortar. One of the walls (F100) had been partially whitewashed, this presumably marked the height of the original water-level. Brickwork below the water line had suffered damage from barge traffic (Plate 7). These features were sealed by a layer of modern demolition debris (1000) 0.8m in depth.

Trench 2 (Fig. 23)

Trench 2 was 8.5m long by 2.5m wide and was aligned north-south across Building E. The modern ground surface level was 145.01m AOD.

The canal basin was approximately 7m wide and ran east-west from the main canal frontage leading into Building E, and had been backfilled with loose demolition debris and other contaminants (2001). The canal basin was enclosed by two 0.6m thick walls (F200 and F201) constructed of hand-made red bricks measuring 9½" x 4½" x 3" laid in English bond with limed mortar. The wall on the canal frontage (F201) widened out to 1.8m into a platform for the steps that have been noted in this position (see above) at the point where it met the canal. Elements of the wall that were visible from the canal had been clad in blue-bricks bonded with cemented mortar. The fill of the canal basin could not be excavated due to the risk of contamination to the canal. These features were sealed by a layer of modern demolition debris (2000) 0.5m in depth.

8.0 Conclusions

Buildings E and F were interesting examples of early 19th-century canal architecture, having been purpose-built as covered wharves and warehouses, with loading bays between the warehouse element and the canal. The functioning of both buildings was facilitated by the drop in levels from the courtyard to the wharves. To a man standing on the lower storey of Building E, for example, the courtyard would have been at waist height, the optimal ergonomic position from which to manhandle commodities deposited at the goods hatch. The upper storey also had a loading hatch, situated directly above the lower one, and was also provided with loading bays which would have allowed loading and unloading to have been carried out from separate floors, thereby maximising the opportunity for efficient working practices.

Building F, though similar to Building E at wharf level, had an upper storey, apparently a granary, across the whole building. This floor had been raised but there is no reason to suppose that the original arrangement was substantially different, indeed the original openings at this level suggest that there had always been a floor in this position. The later floor contained a number of trapdoors over both the wharf and the canal, and this might have been true of the original arrangement.

Towards the canal Building E presented a utilitarian aspect, and its public face was towards the yard, where the south elevation facing Albion Street was given a substantial degree of architectural embellishment. The best front of Building F, however was the north elevation, through which the barges would have entered the wharf. Here, the semi-circular arched windows with their decorative hood moulds, provided an element of ornamentation, that might, perhaps have been replicated in the east elevation of Building E.

Finally, the dates of 1831 for Building E and 1831-1833 for Building F have provided useful dating evidence for the architectural detailing. In the case of Building E, this includes the use of bullnose bricks, 14" grooved brick voussoirs and arched recesses, whereas for Building F, the main features are the semi-circular arched windows with their hood moulds and block stops, and the transitional roof truss with its mixture of pegged and bolted joints.

9.0 Acknowledgements

This report was written by Malcolm Hislop and Richard Cherrington, and was edited by Steve Litherland who also managed the project. The building recording was supervised by Malcolm Hislop assisted at different times by Richard Cherrington, John Halsted, Derek Moscrop and Kirsty Nichol. The excavation was supervised by Richard Cherrington, who was assisted by John Halsted and Sally Radford. John Halsted also prepared the illustrations. We are grateful to Scott Wildman of Carillion plc for his assistance with the level survey.

10.0 References

BUFAU 2002. *Archaeological recording of buildings adjacent to Albion Mill, Albion Street, Wolverhampton: Written Scheme of Investigation.*

Litherland, S. Morriss, R. Nichol, K. 2001. *An archaeological assessment of the Albion Mill and environs, Albion Street, Wolverhampton* (BUFAU Report No.817).

Shaw, M. 2002. *Archaeological recording of buildings adjacent to Albion Mill, Albion Street, Wolverhampton*.

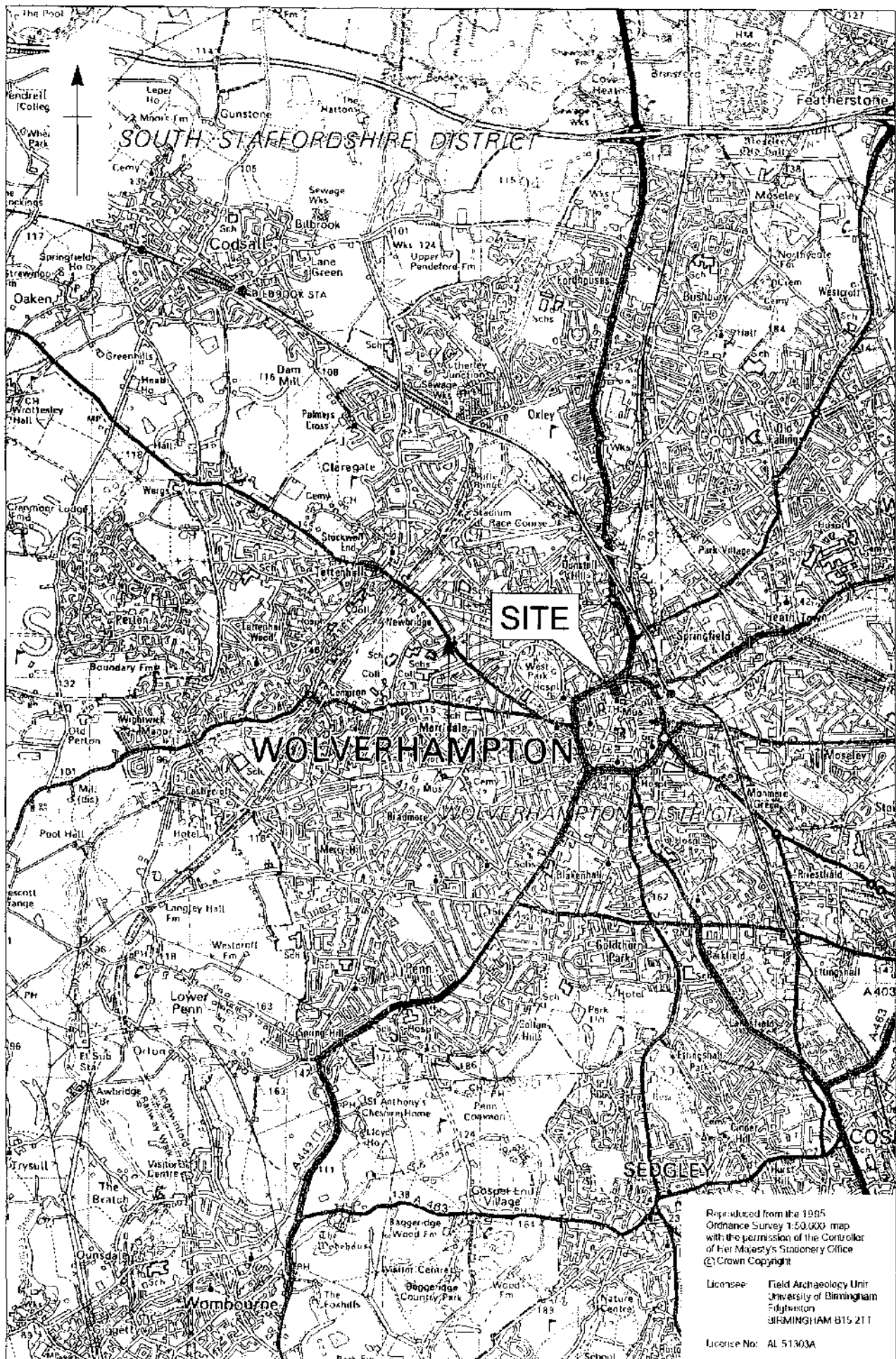


Fig.1

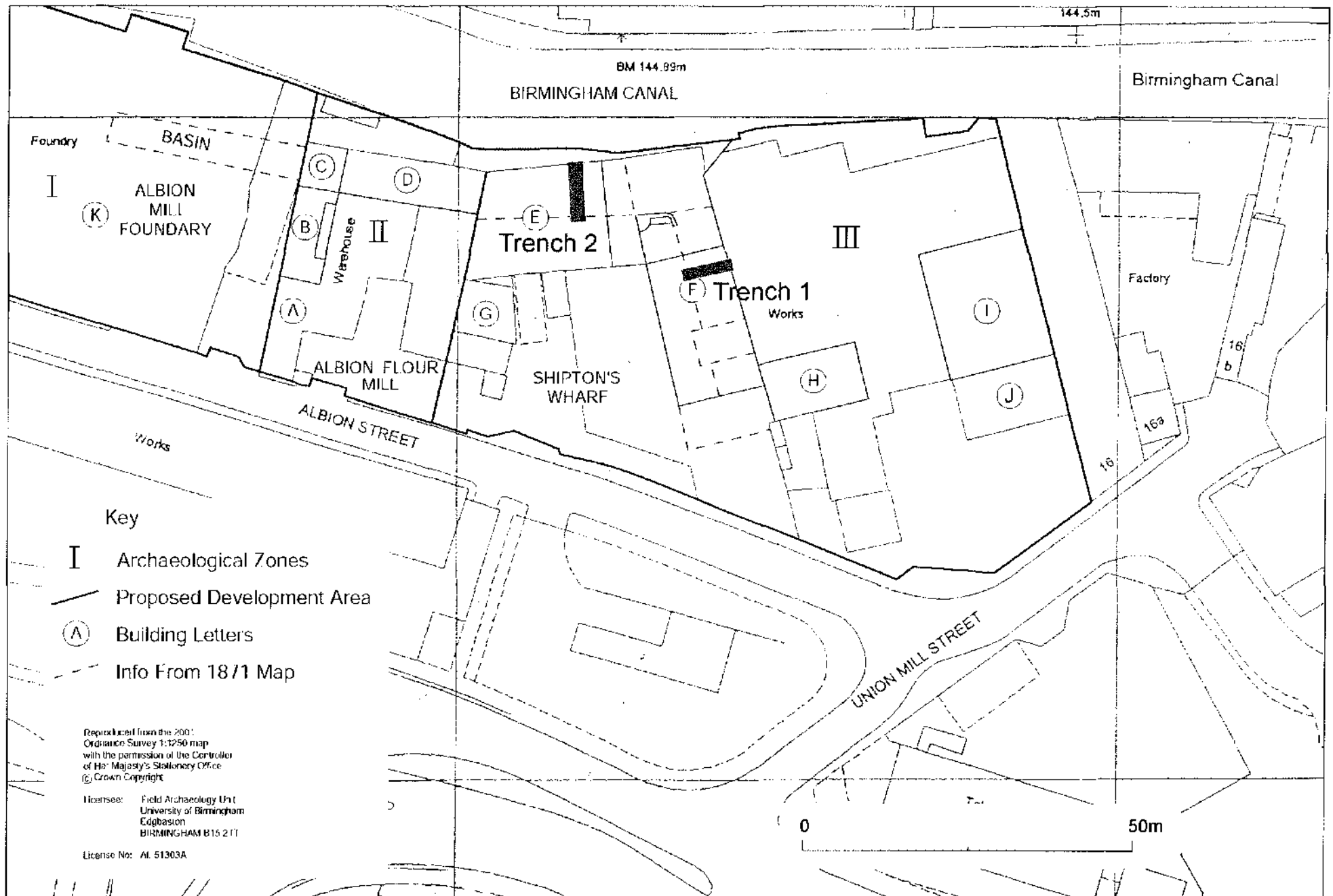


Fig.2

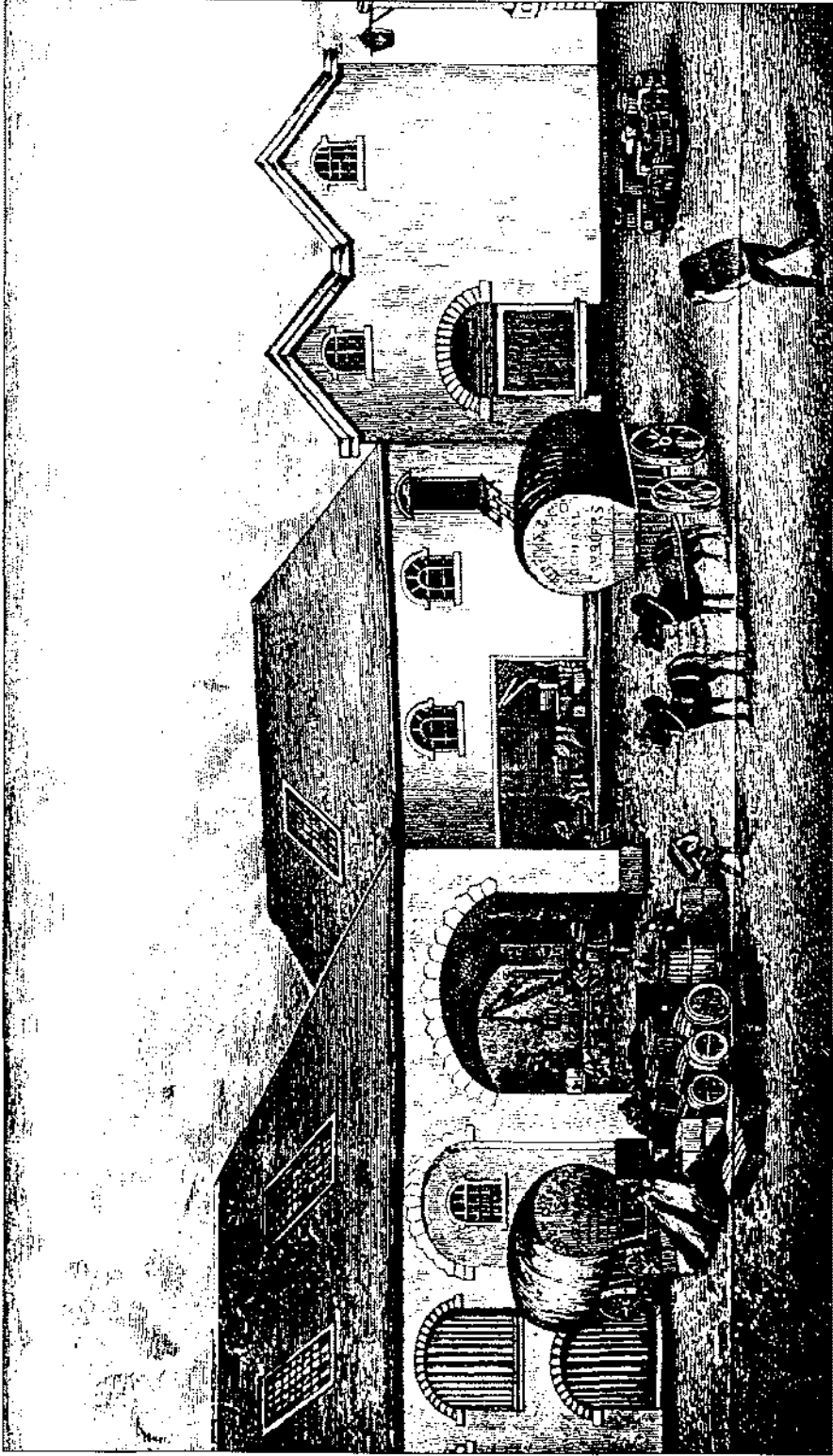


Fig.3

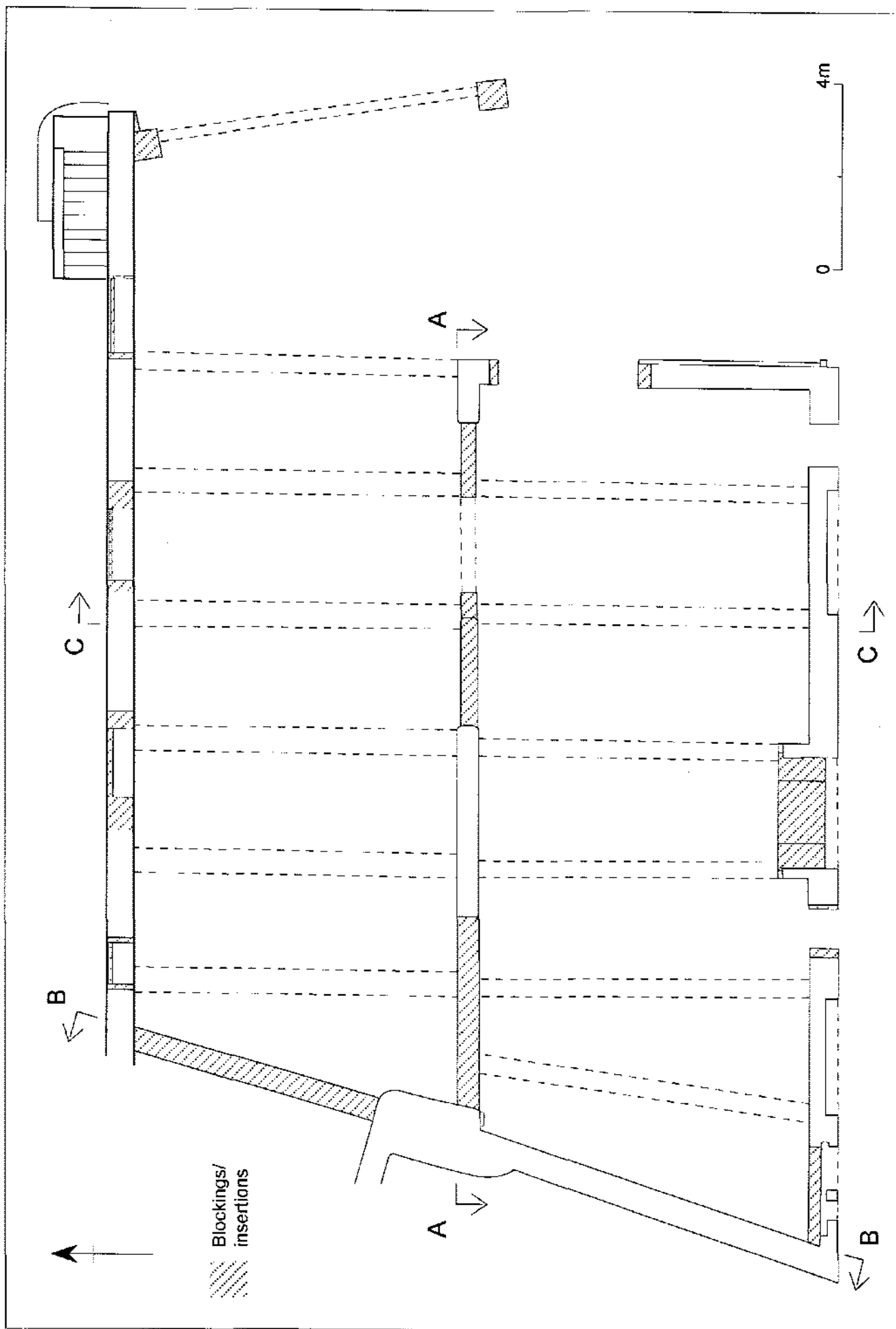


Fig.4 Building E, ground plan

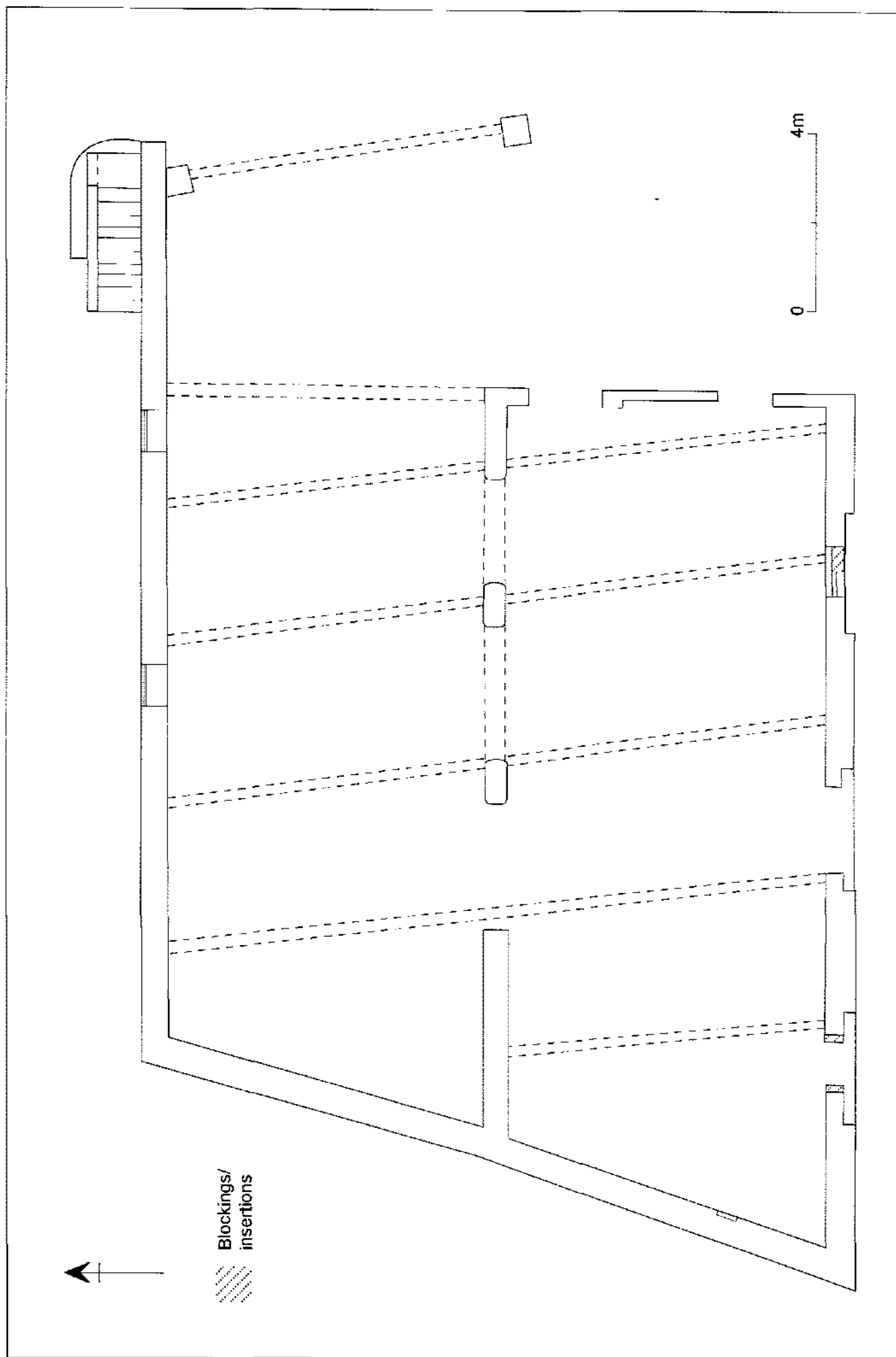


Fig.5 Building E, first floor plan

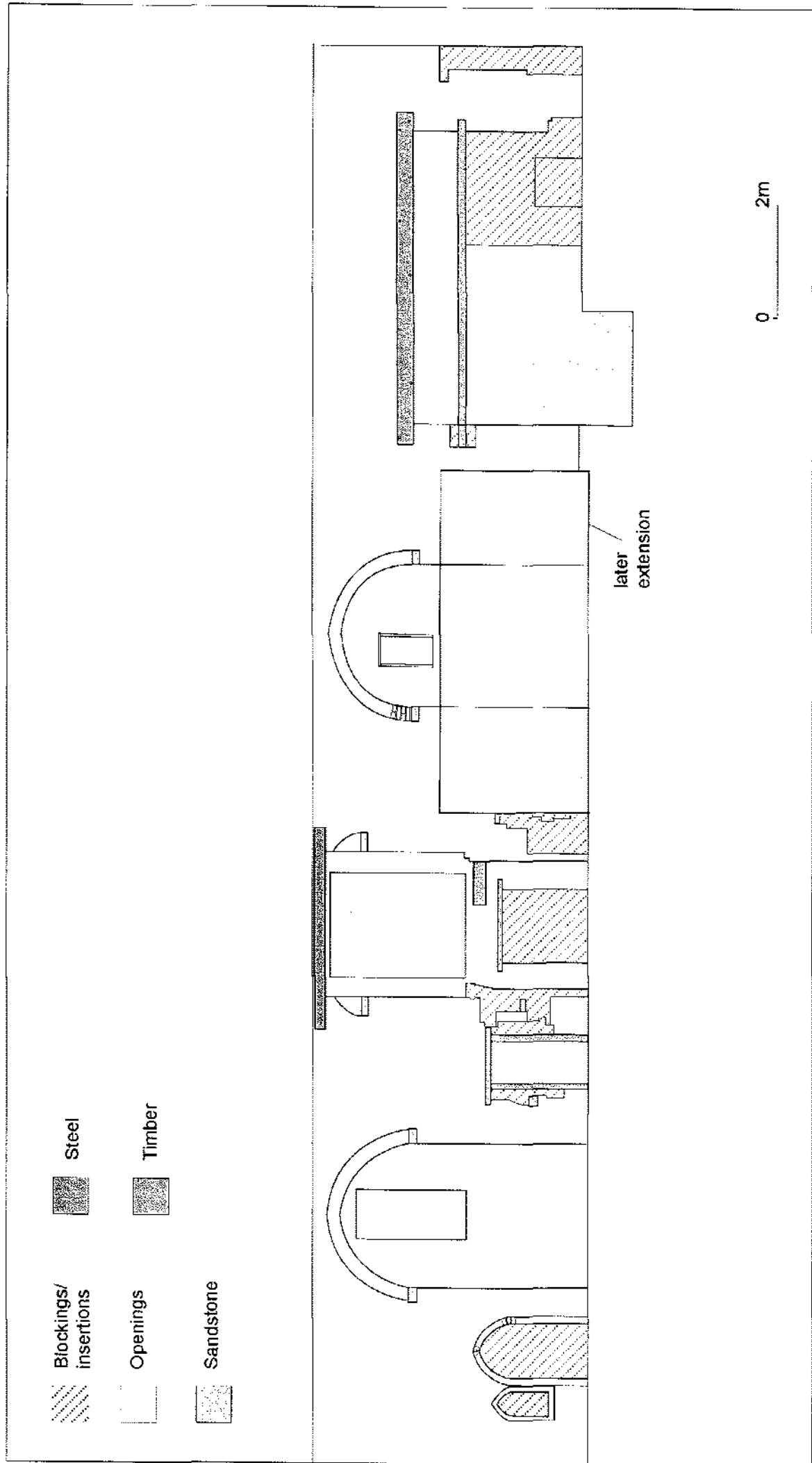


Fig.6 Building E, south facing elevation

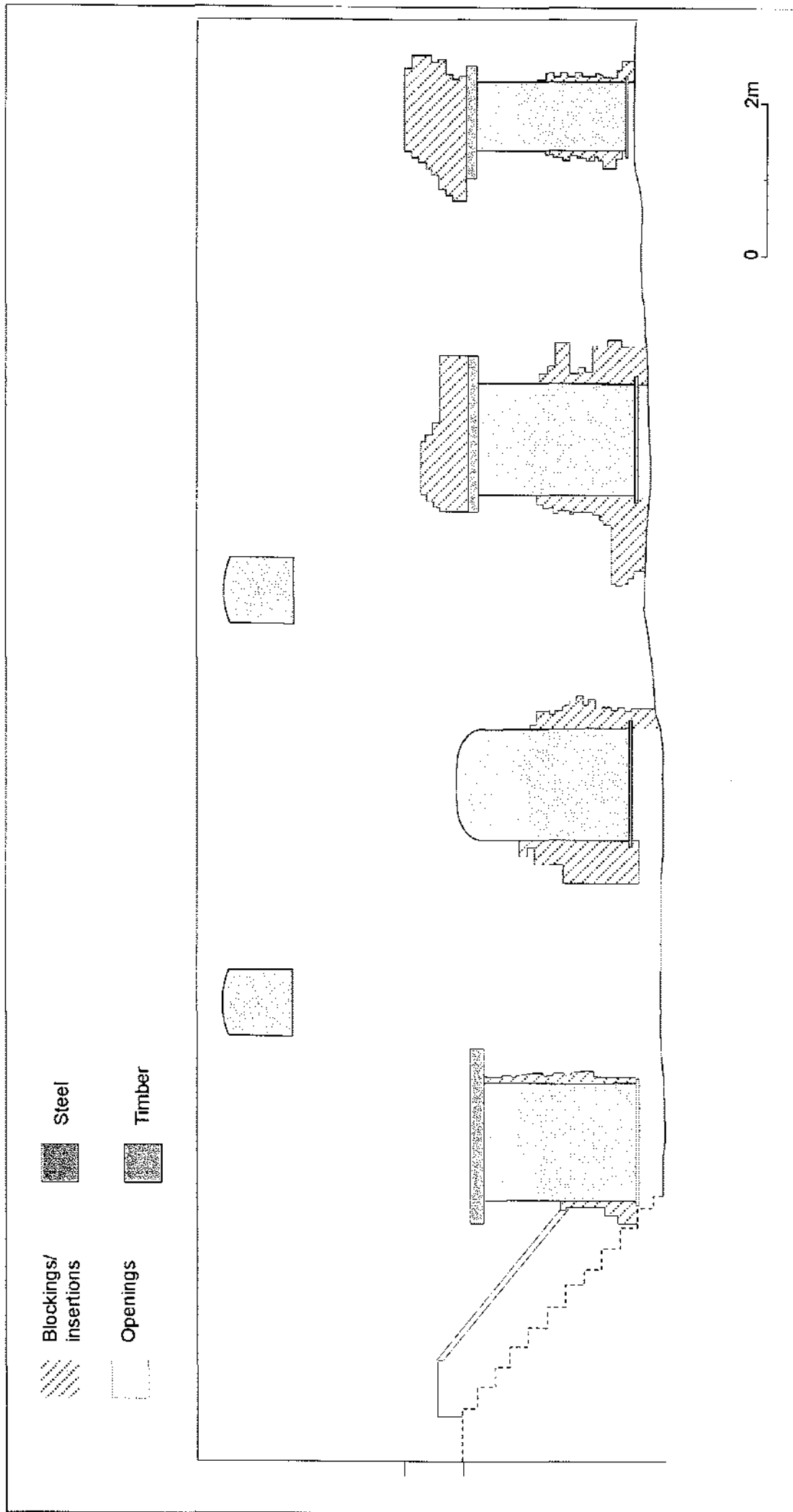


Fig.7 Building E, north facing elevation

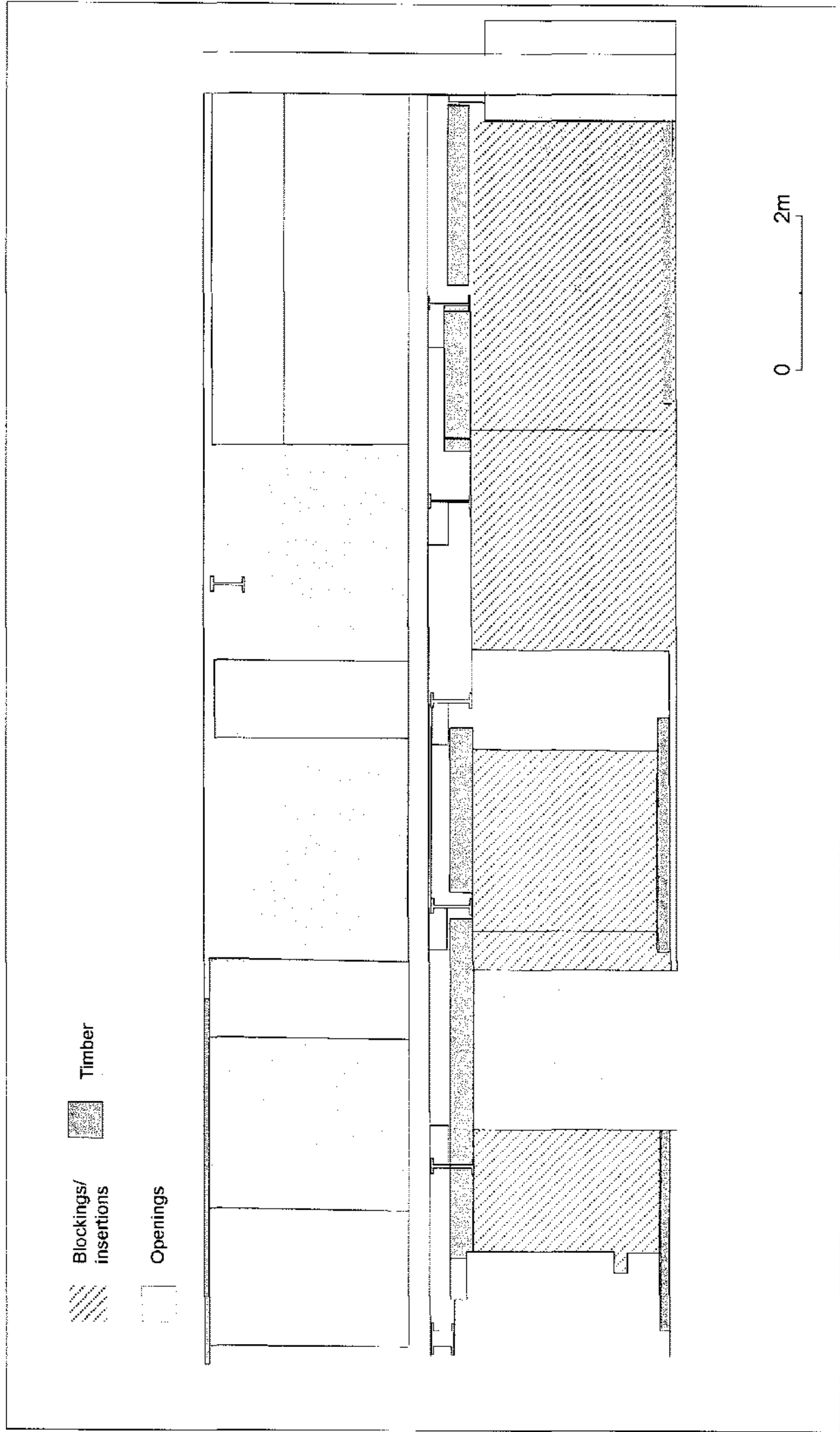


Fig. 8 Building E, section A-A

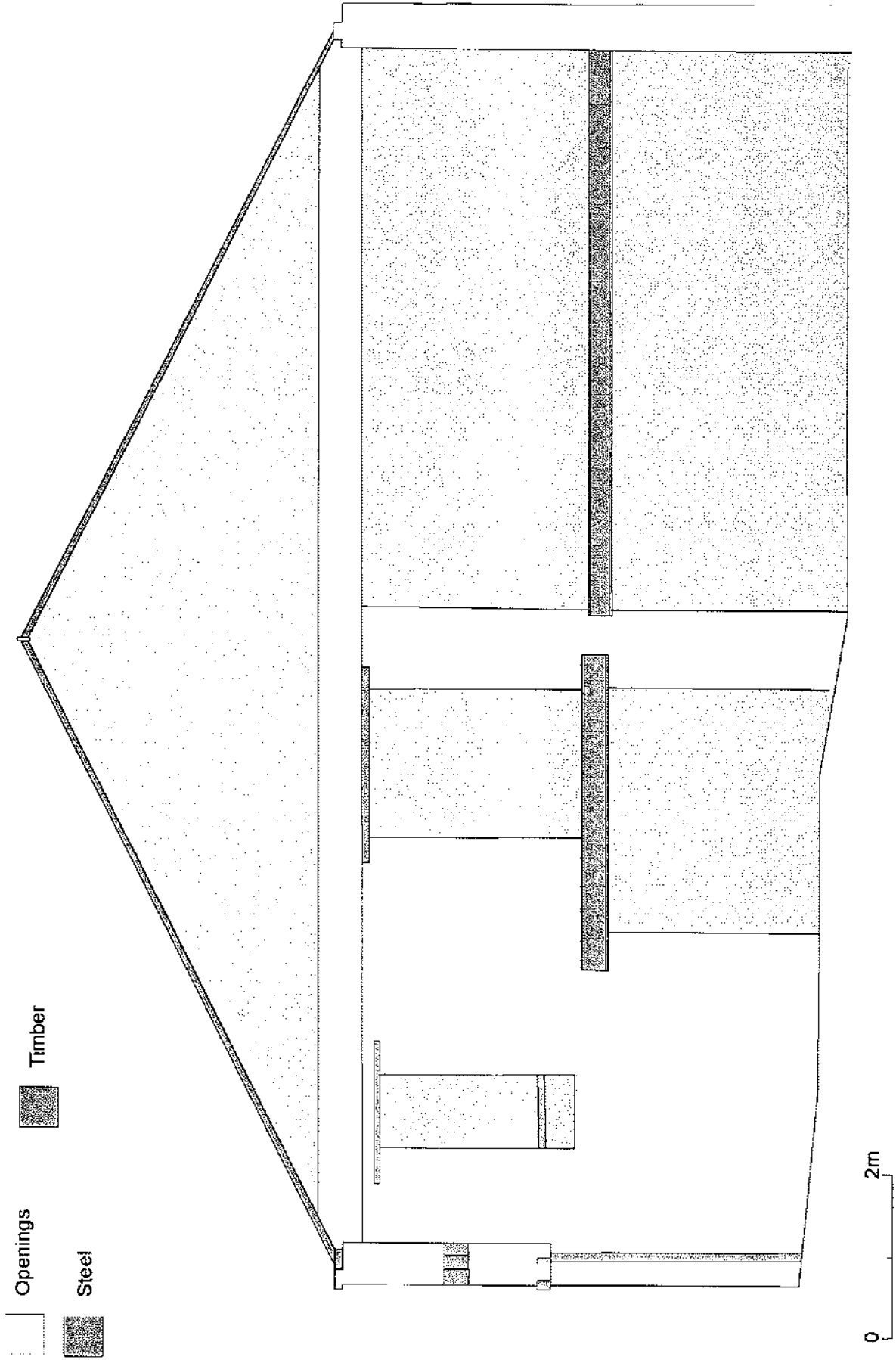


Fig.9 Building E, east facing elevation

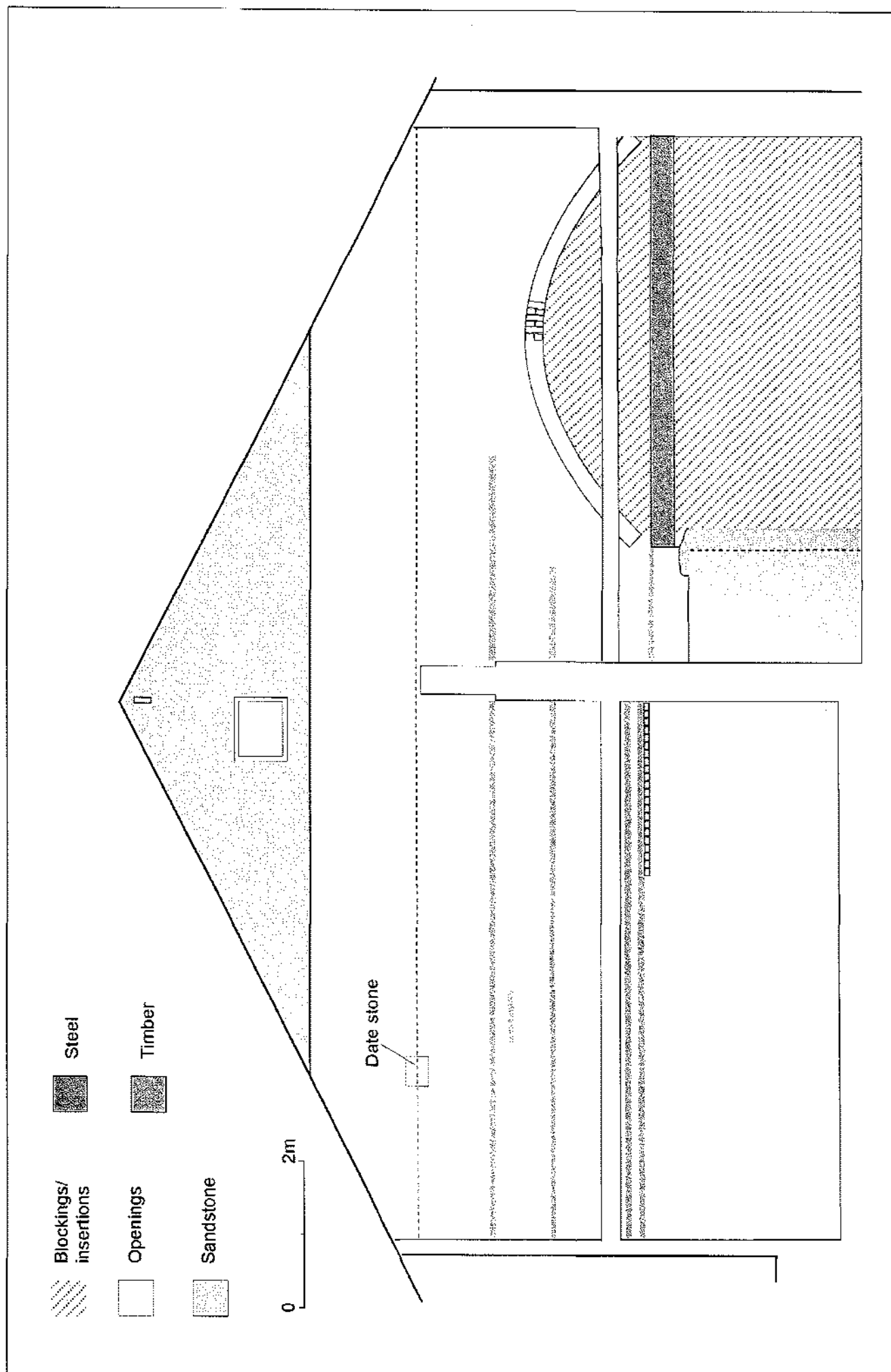


Fig.10 Building E, section B-B

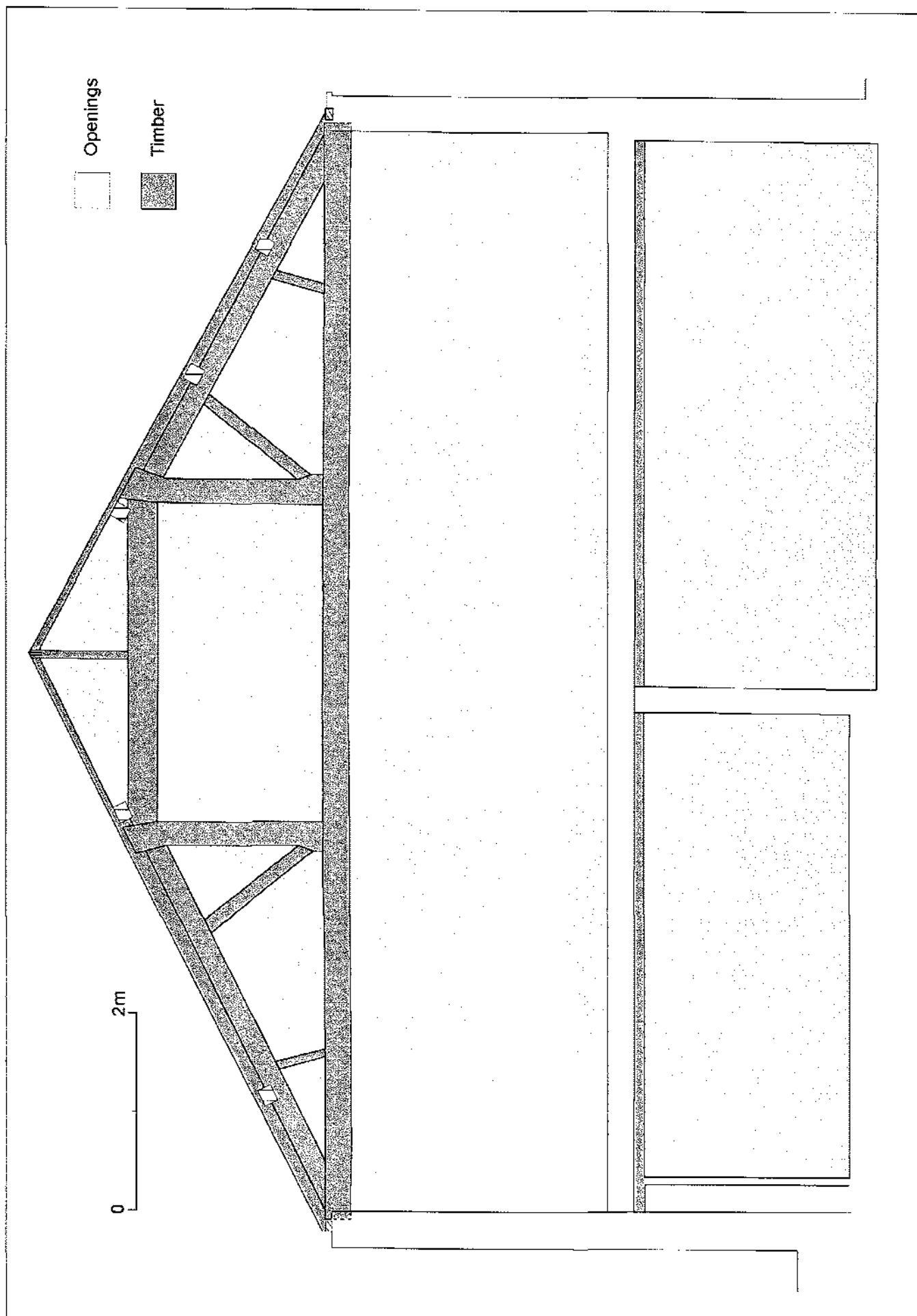


Fig.11 Building E, section C-C

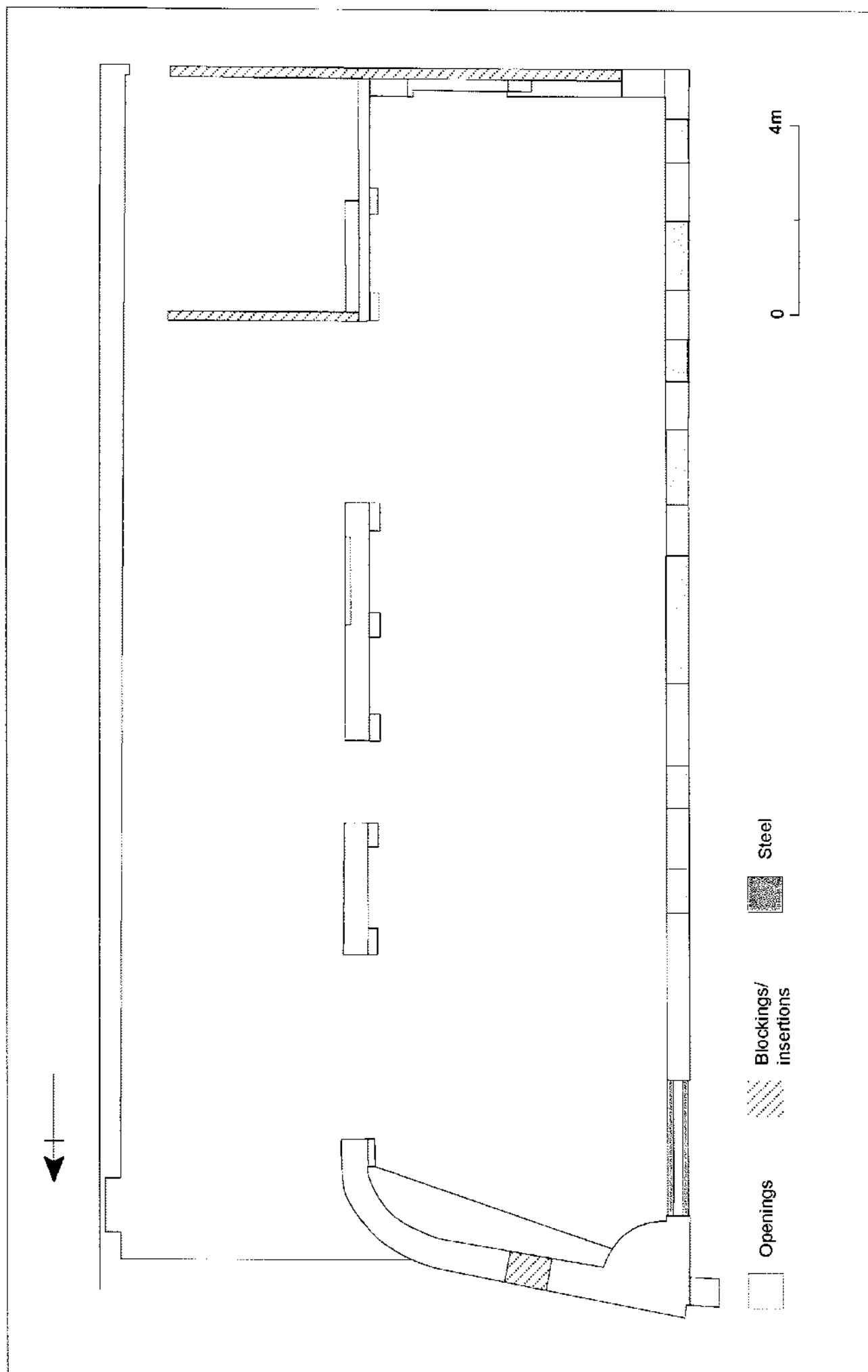


Fig.12 Building F, ground plan

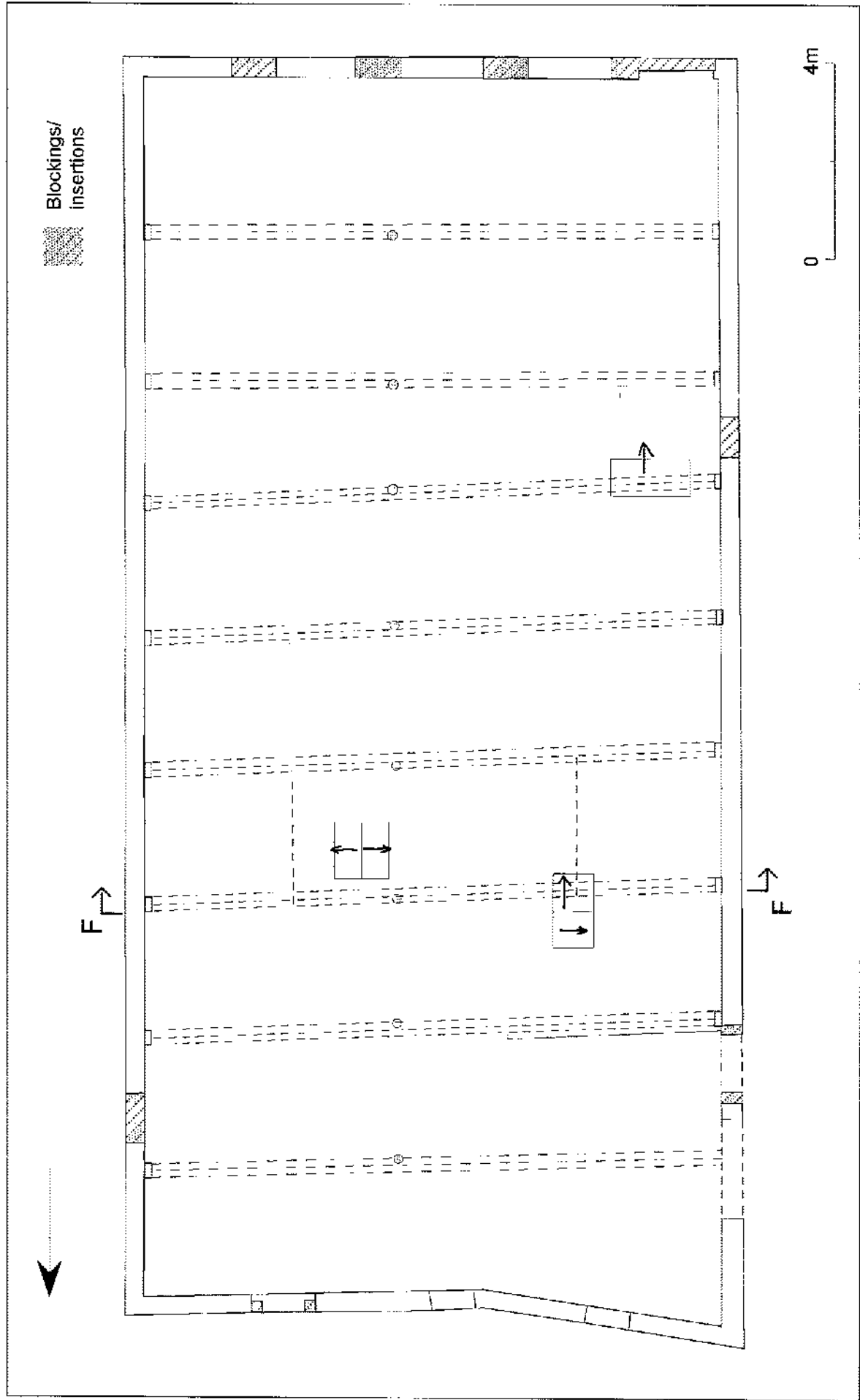


Fig. 13 Building F, first floor plan

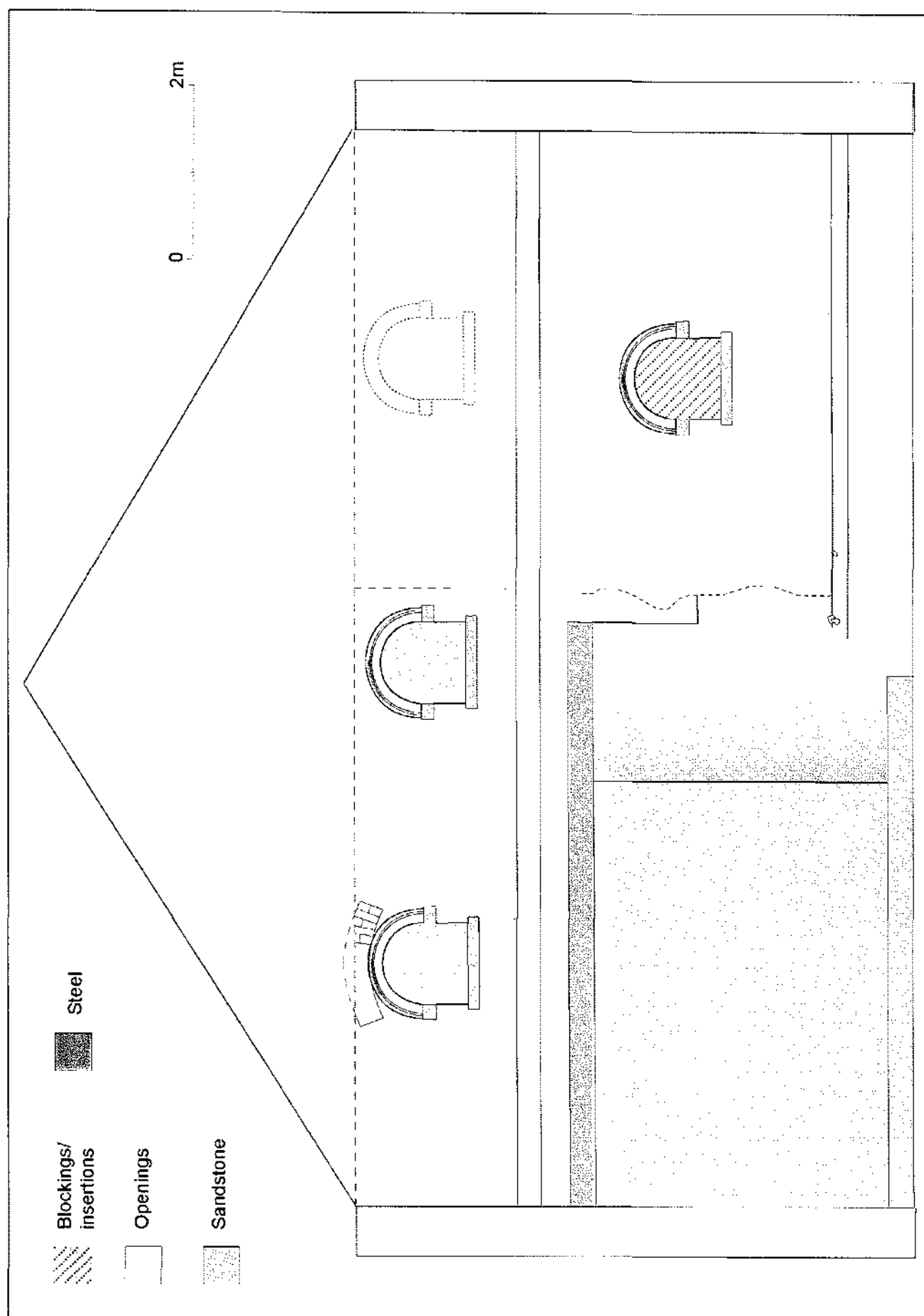


Fig.14 Building F, north facing elevation

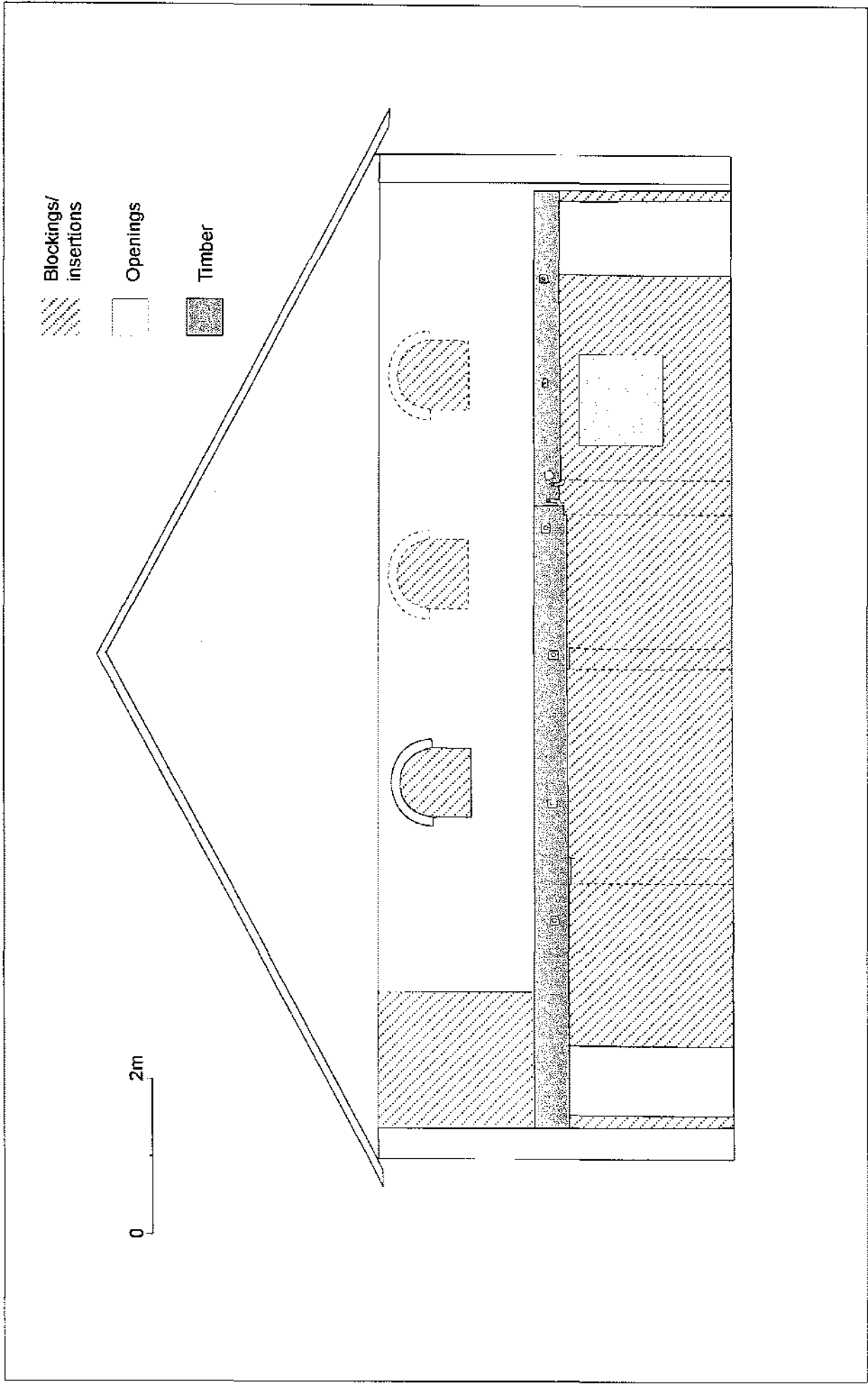


Fig.15 Building F, south facing elevation

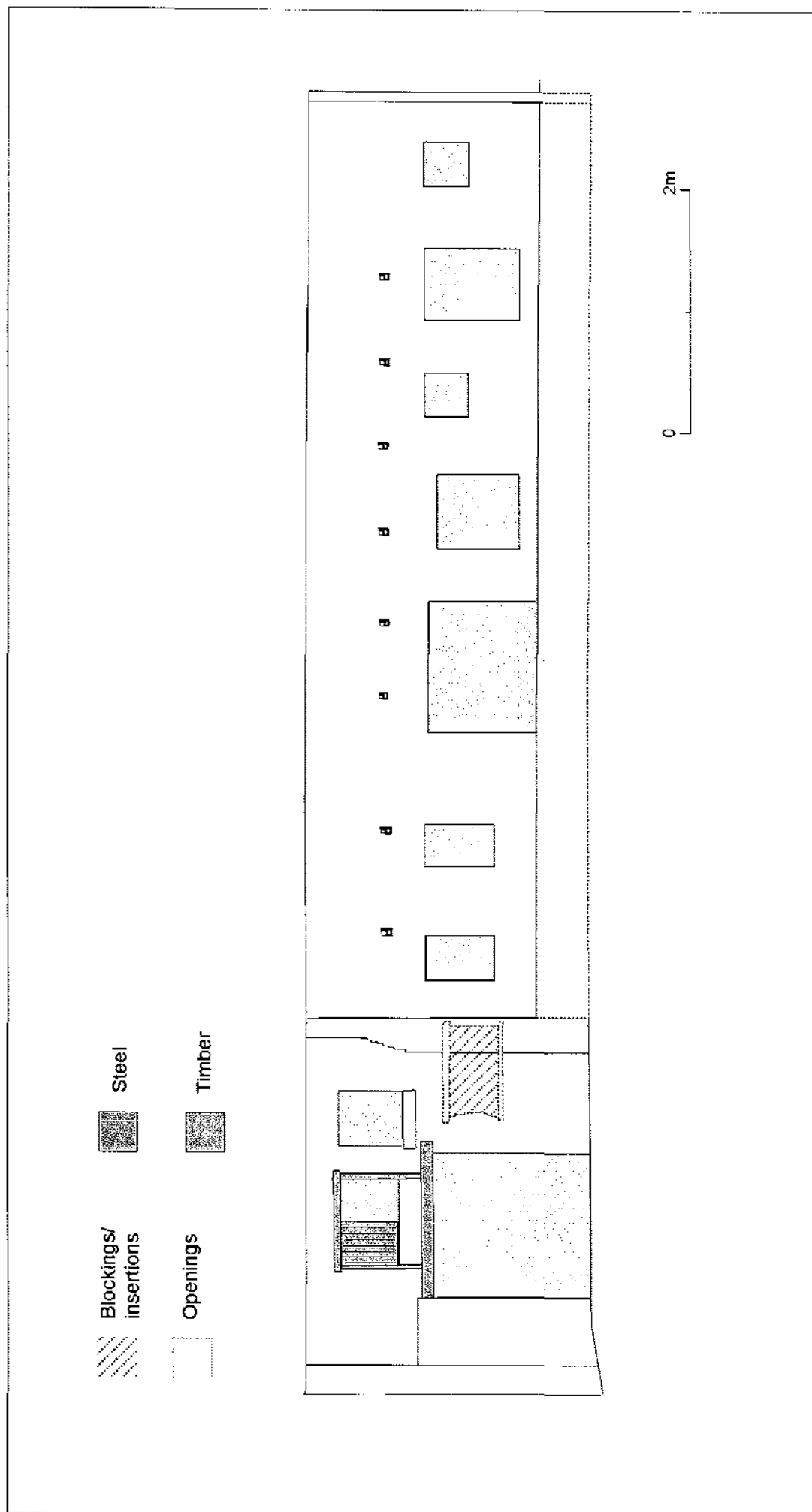


Fig. 16 Building F, west facing elevation

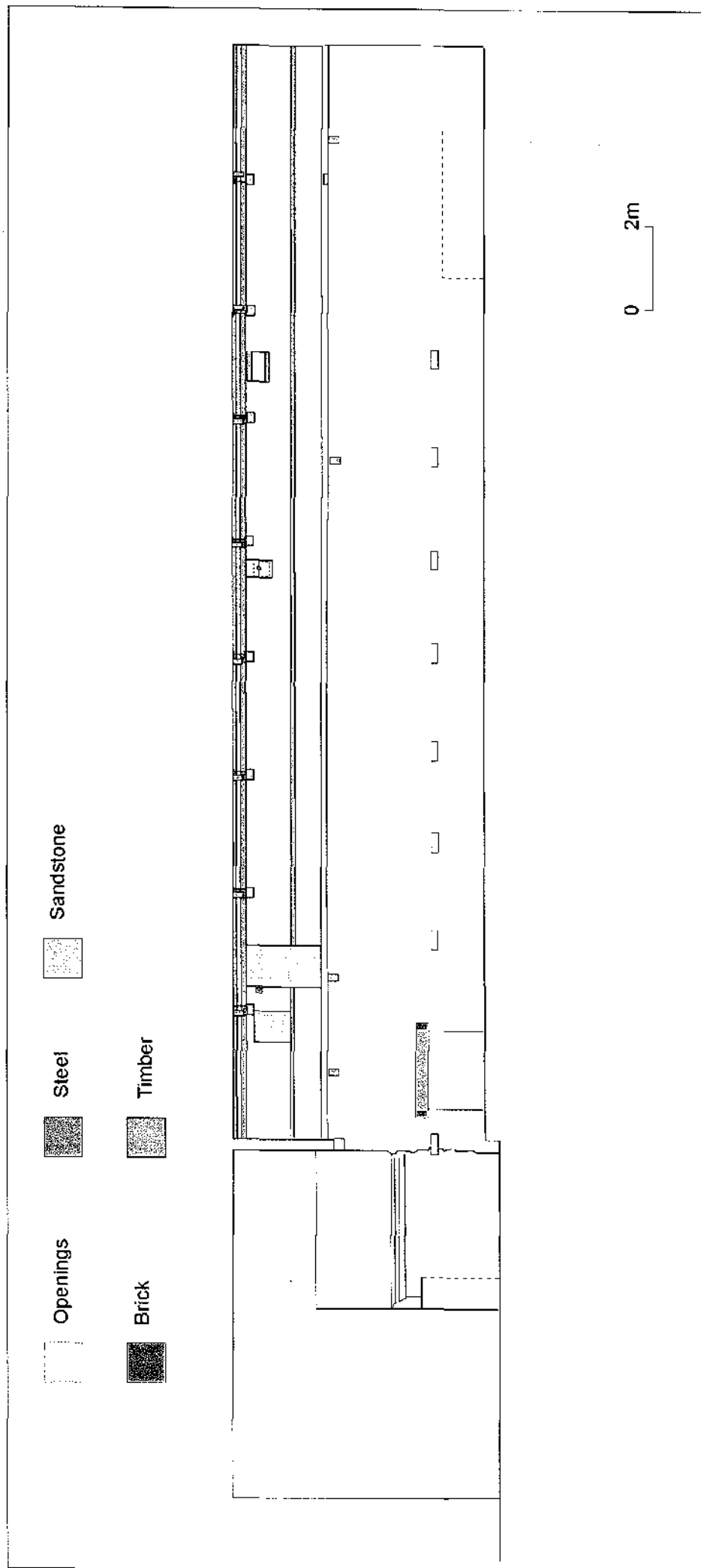


Fig.17 Building F, Section D-D

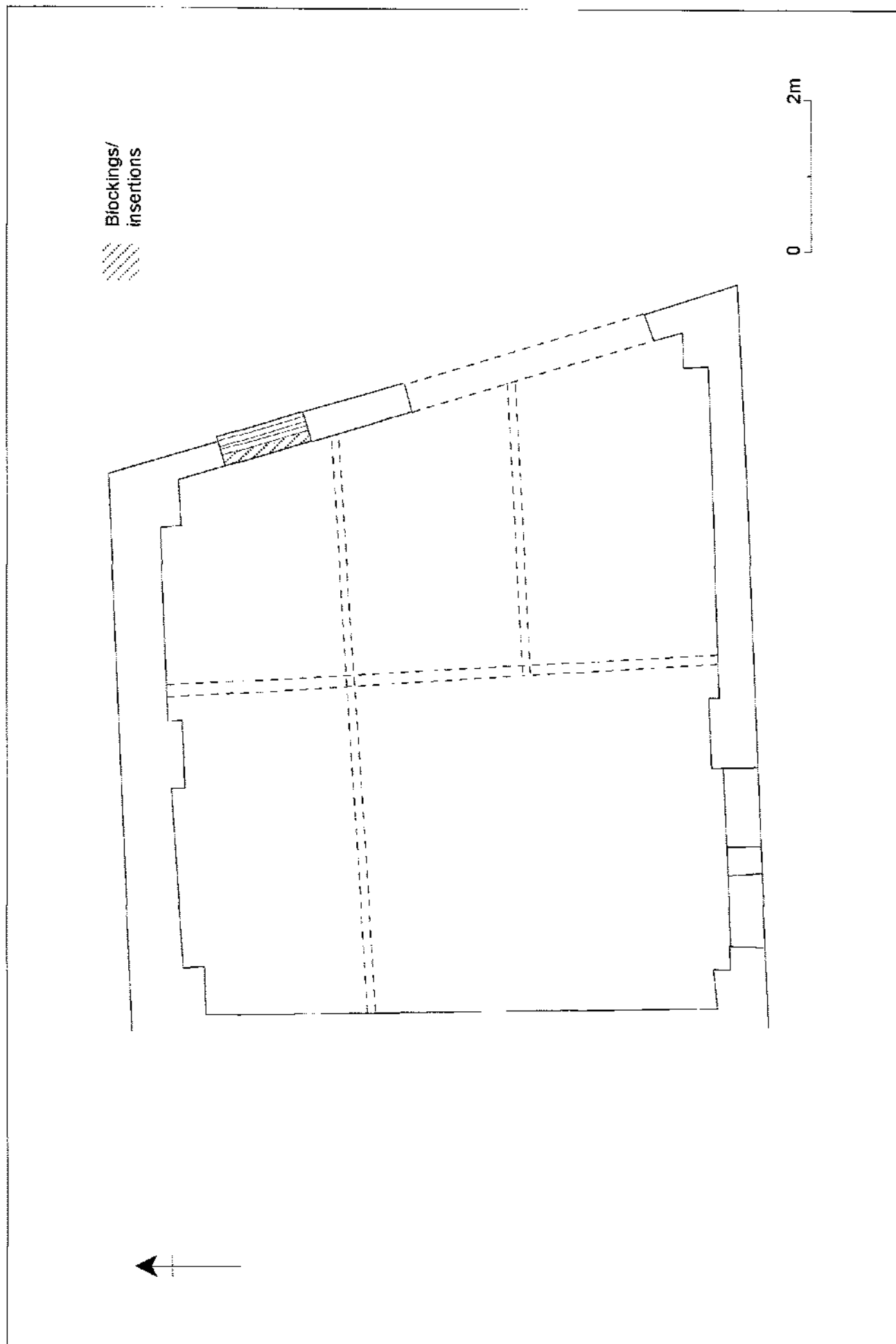


Fig.19 Building G, ground plan

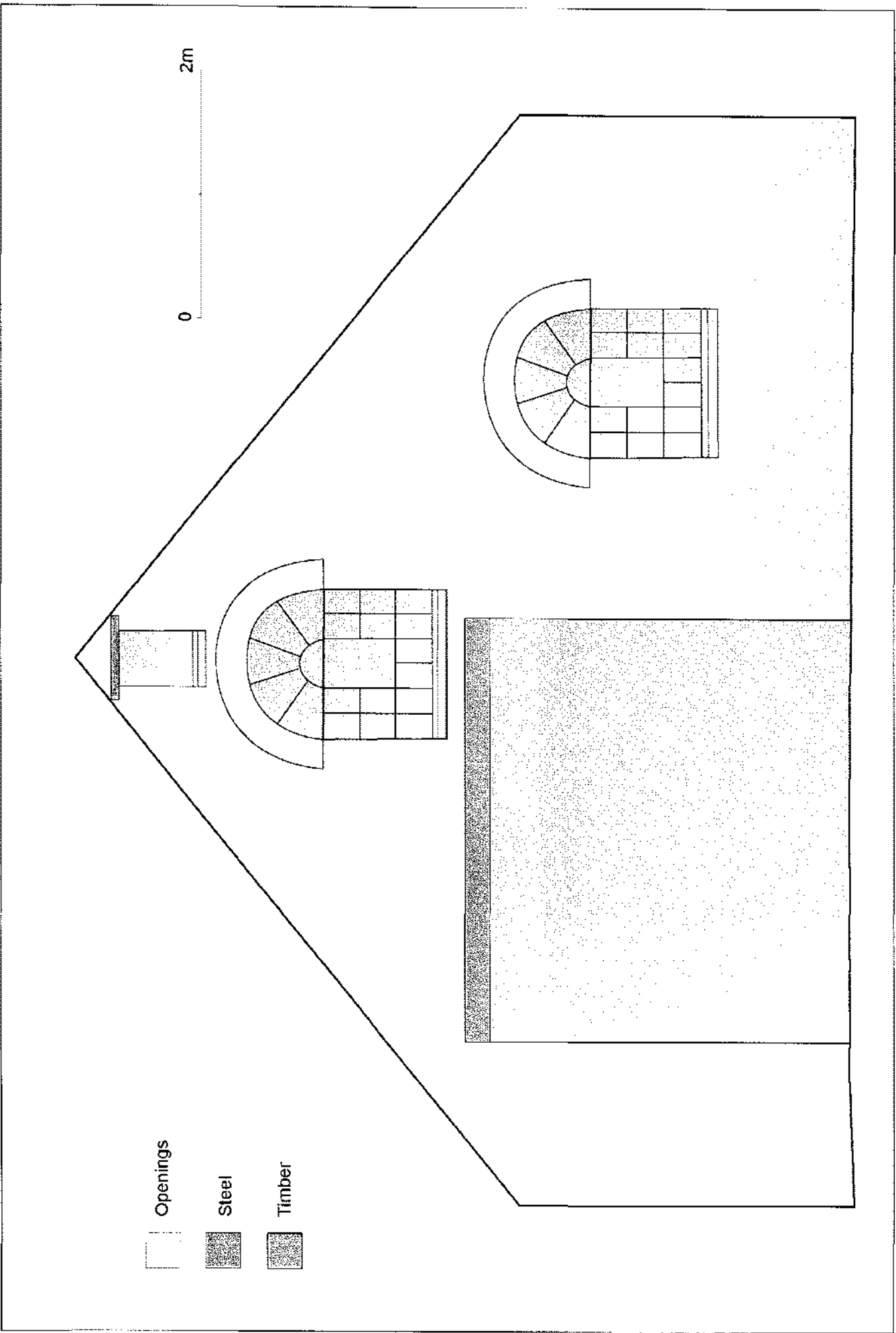


Fig.20 Building G, east facing elevation

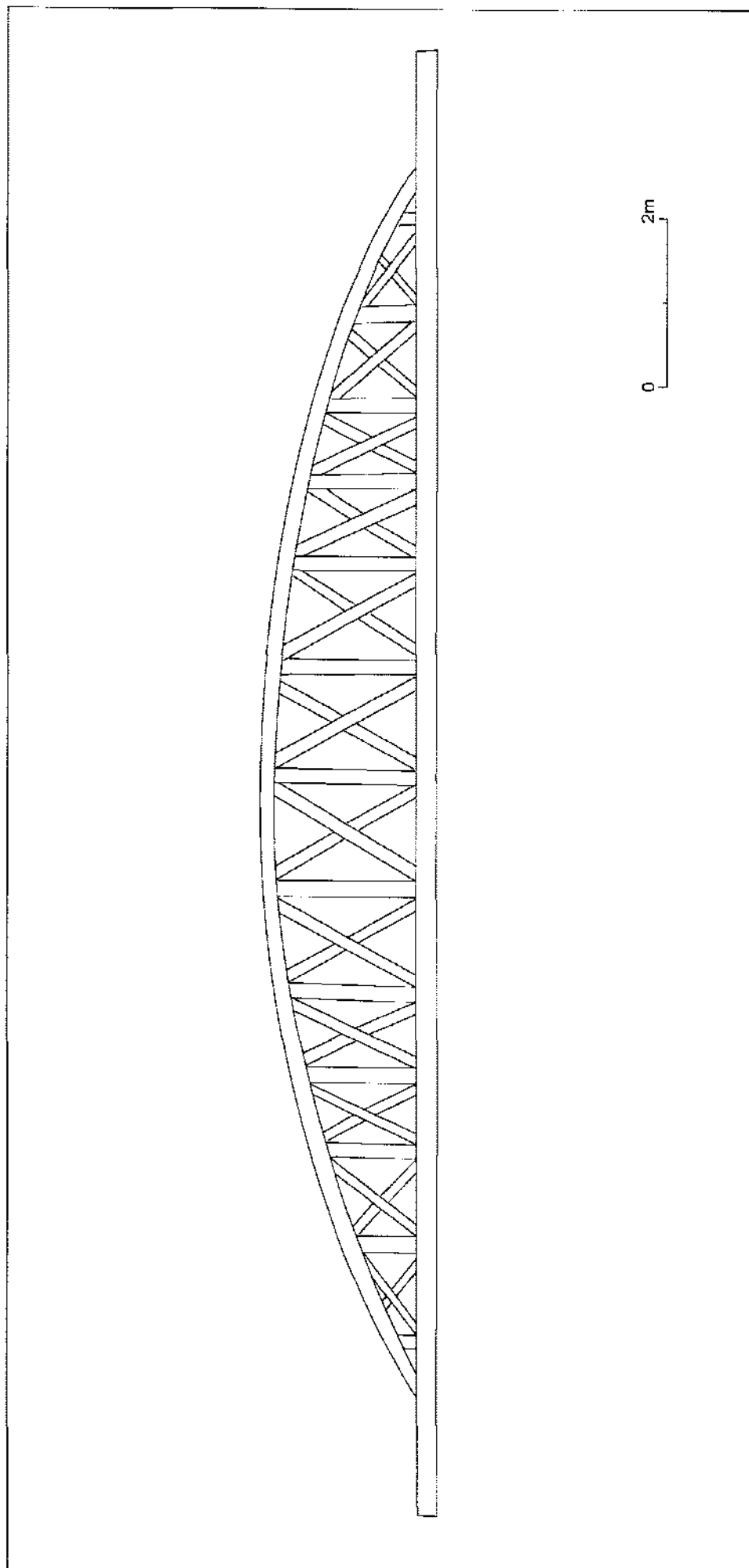


Fig.21 Building J, south facing elevation of roof truss

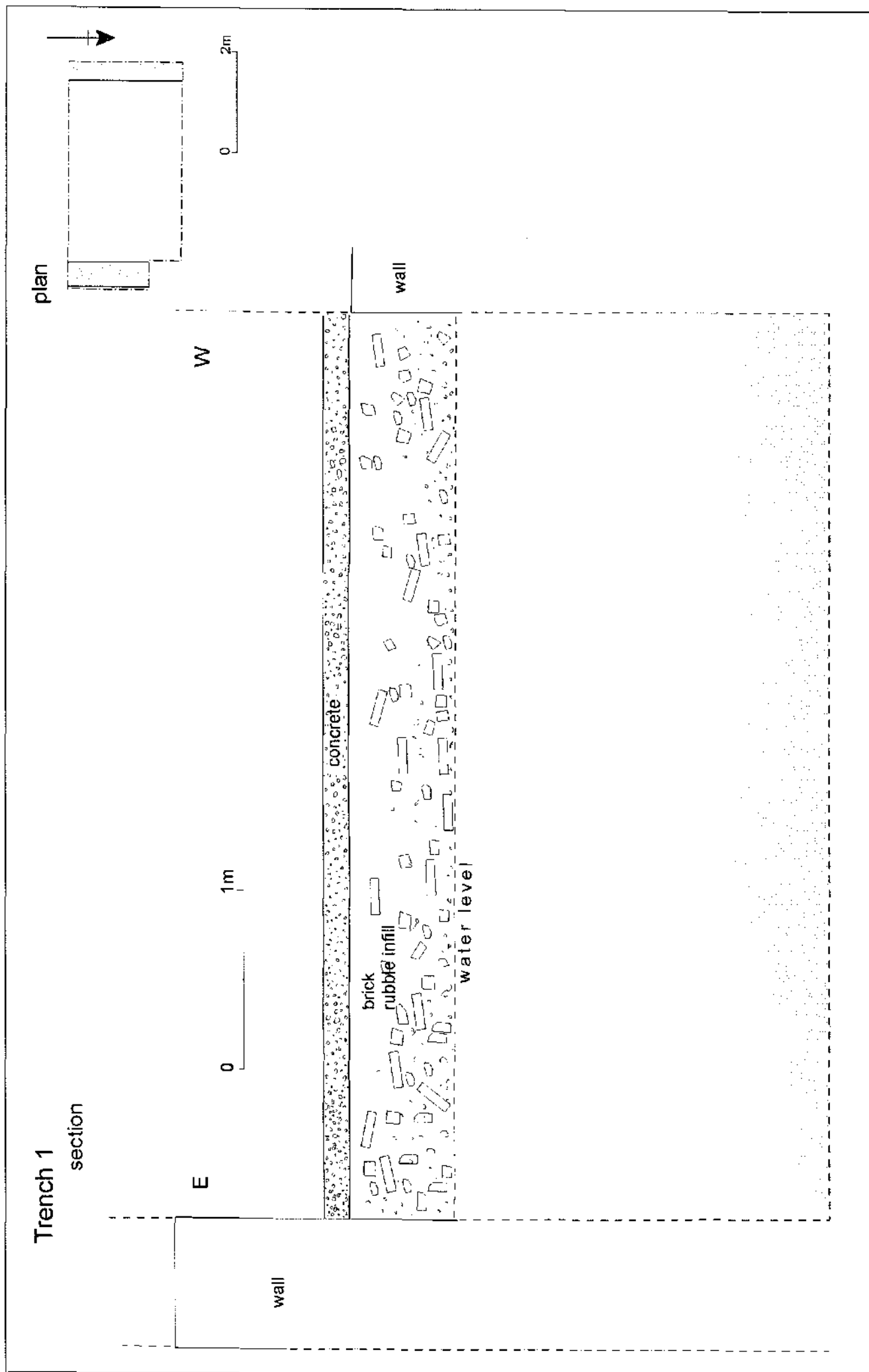


Fig.22 Trench 1, north facing section

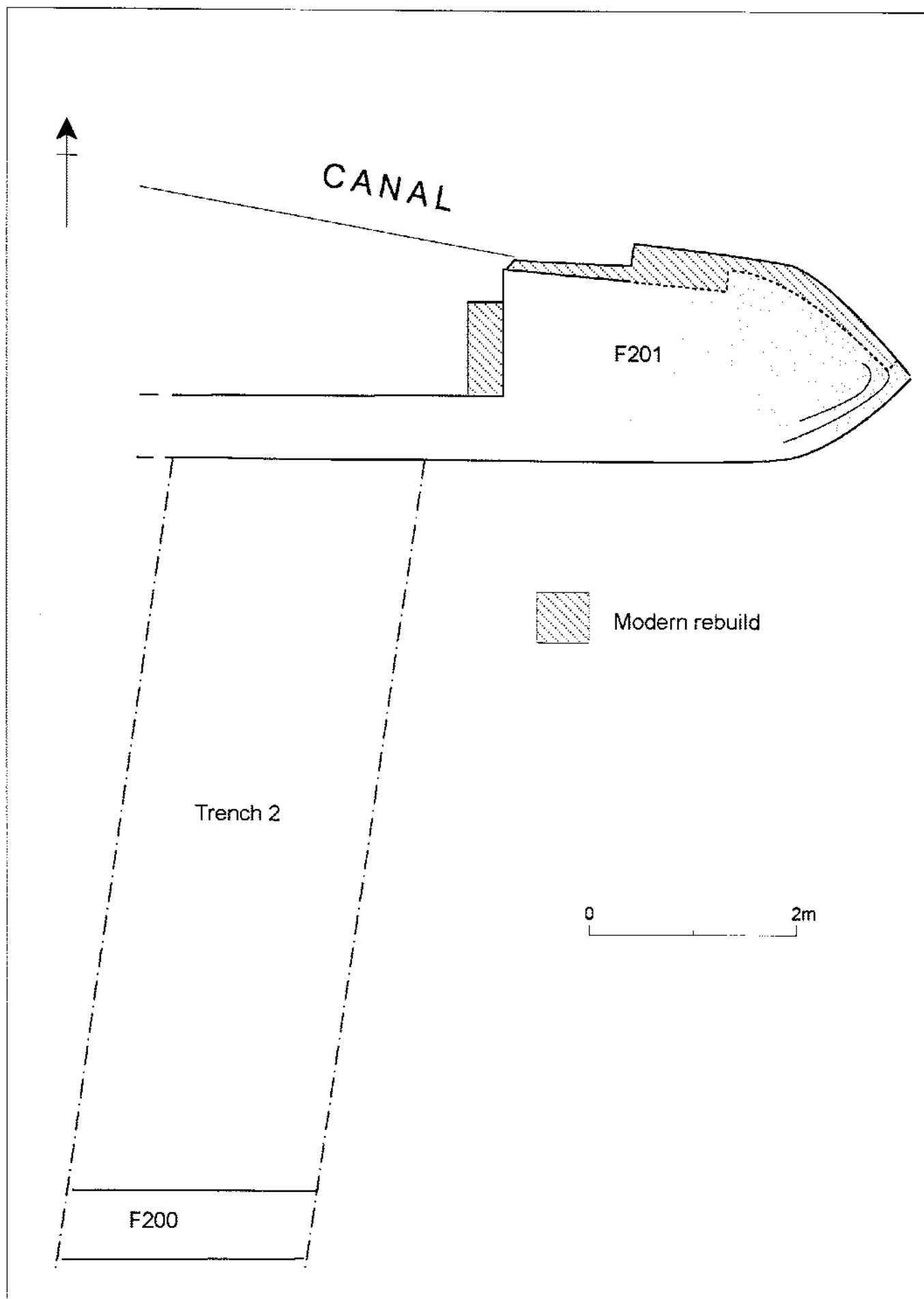


Fig.23 Trench 2, plan



Plate 1

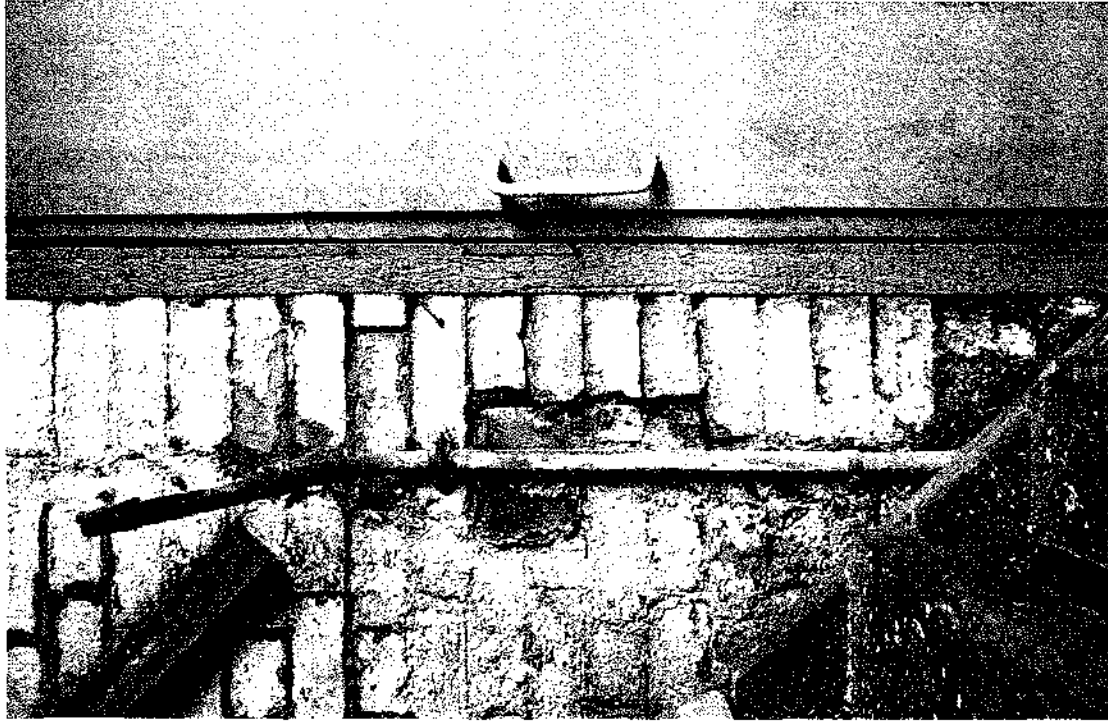


Plate 2

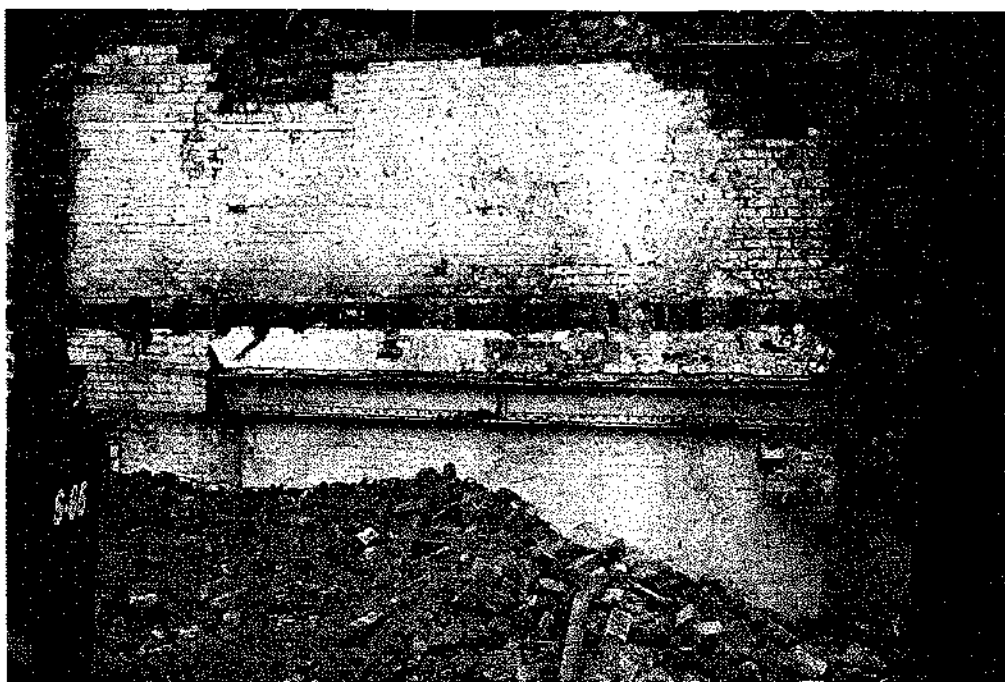


Plate 3

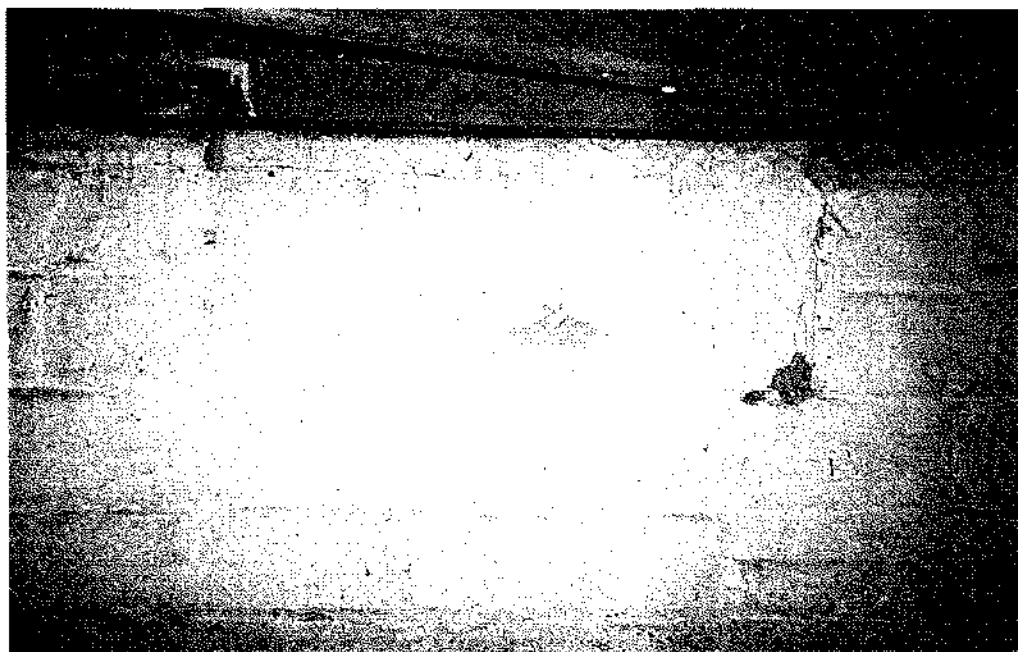


Plate 4

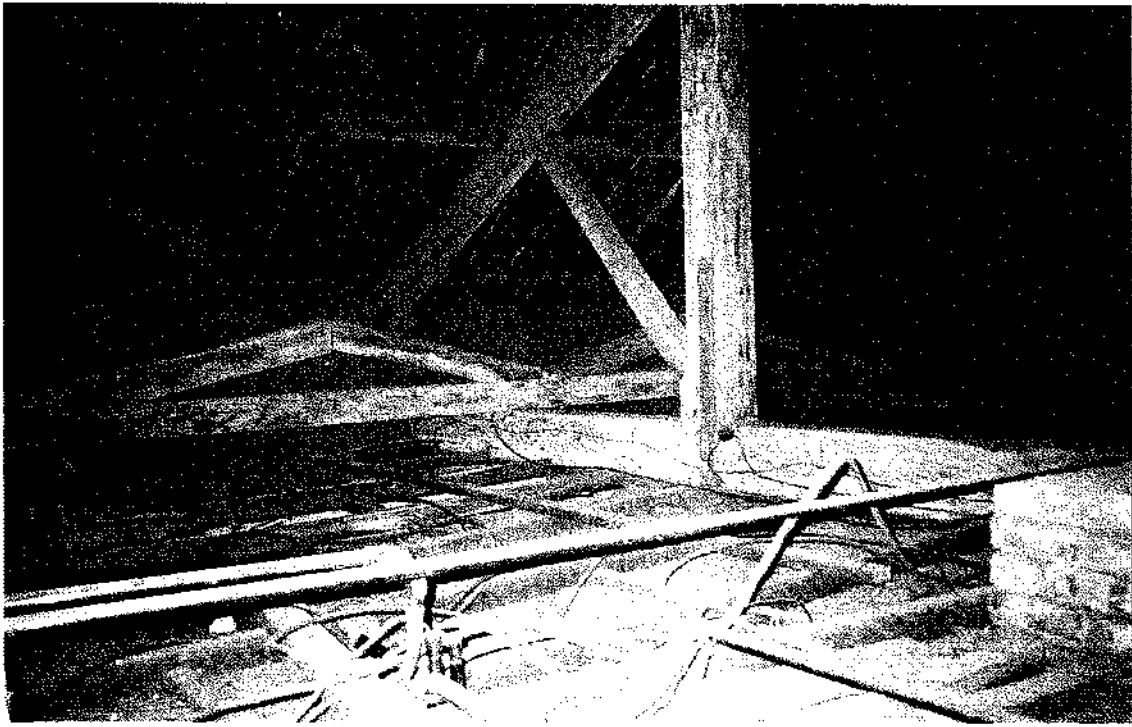


Plate 5

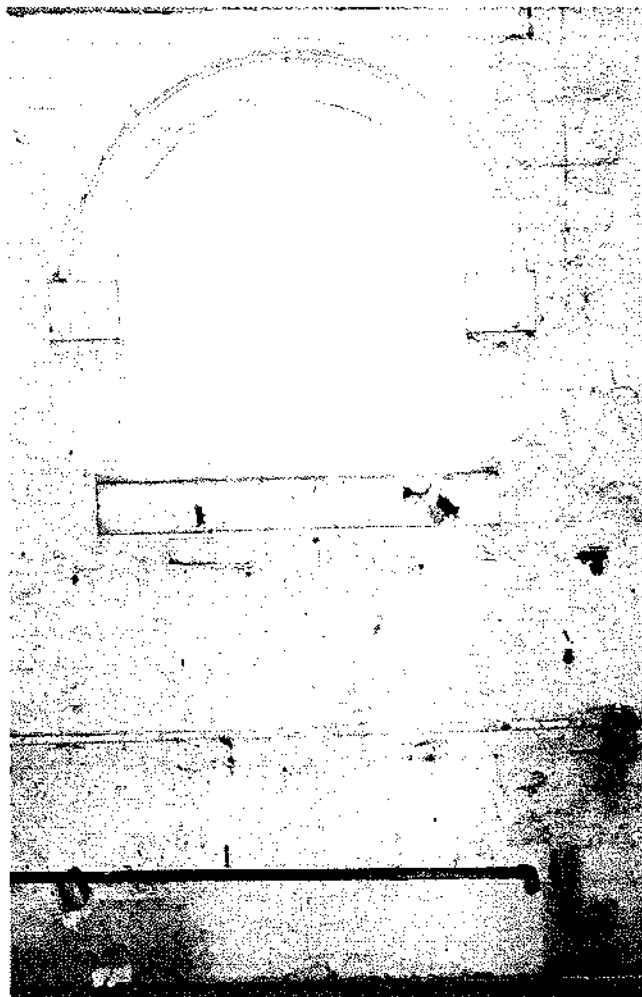


Plate 6



Plate 7



Plate 8