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TY MAWR, PORTHGAIN
SUMMARY REPORT ON EXCAVATIONS. DECEMBER, 1993

Client: Dyfed County Council
Pembrokeshire Coast National Park Department

Report by: Q. Drew BA

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Summary report on the excavation within Ty Mawr, Porthgain undertaken in December 1993.

INTRODUCTION

In May 1992 an archaeological assessment of the Scheduled Ancient Monument, Ty Mawr at Porthgain, a machinery shed for a brickmaking works, was undertaken at the request of the Pembrokeshire Coast National Park. The assessment was carried out by the Dyfed Archaeological Trust in advance of proposals to re-roof and re-floor the structure using an internal steel box frame.

The assessment consisted of limited archaeological excavation and a cursory examination of the published and easily accessible historical sources. The excavation revealed the final floor level of Ty Mawr, with associated features demonstrating the location of a series of machine bases. Further, it was seen that the floor layer sealed a series of earlier sub-floor features and machine pits. Due to the limited extent of the excavation it was not possible at this stage to determine the relationships and chronologies of these features, though it could be seen that the internal layout of the structure underwent several major modifications. The examination of references and sources relating to Ty Mawr likewise provided little insight to the detailed workings of the building. Though the historical research was limited it did provide a basic history of Ty Mawr, and more importantly it identified the location of further documentary sources.

The further excavation at Ty Mawr in December 1993 was a result of the recommendations put forward by the 1992 assessment. The proposed internal development posed a threat to the existing archaeological features. The design of the archaeological excavation was to ascertain the nature of the machine pits, bases and sub-floor layers. Further, it was necessary to sterilise the archaeology for specific areas within the building that would be disturbed by the foundations for the proposed steel box frame.

This report is a summary of the findings from the 1993 excavations, and has been produced ahead of the forthcoming archive report (Level III).

TY MAWR

A major part of the 1993 archaeological examination of Ty Mawr consisted of background research to the building's history. The greater part of this research consisted of a large quantity of contemporary records deposited in the Pembrokeshire Record Office in Haverfordwest. It was with the kind permission of Mrs. T. Salmon, of Sunnybank, Porthgain, that it was possible to view these records.

Though the quantity of material deposited was extensive, there was little relating to Ty Mawr itself. Only two direct references to the building were recovered from this source. The bulk of the deposited records date from 1907 to 1931. As such there is little the documents can tell us about the period between 1878, when brick making commenced at Porthgain and 1907. This is particularly unfortunate as this period should be seen as the productive heyday of Ty Mawr.

Ty Mawr today stands relatively isolated. This is in stark contrast to its position within the quarries, brickworks and the harbour of Porthgain between 1878 and 1931. Ty Mawr, a machinery shed for the brick making works, originally stood amongst a whole range of assorted structures. To the immediate east lay the kilns, characterised by a large chimney. To the south, built against Ty Mawr's southern gable were the long drying sheds, where the bricks would be stacked prior to firing. A lean-to was attached along the full extent of the western exterior, through which ran a small gauge rail track, allowing the direct delivery of the raw material for the brick making process. Against the northern gable, and still standing today, is another lean-to. This ancillary structure at one time would have housed the static steam engine and boilers that powered the machinery within Ty Mawr. This pattern of the engine being housed in an ancillary structure was also seen at the engineering repair shop that stood to the west of Ty Mawr on the other side of the present road. Ty Mawr's engine shed went on to be used for a wide range of tasks. An undated document, DB/7/682 (PRO) shows this structure divided into three sections: a mess room, a store for ship moorings and a timber and cement store. The same document also lists some of the contents of Ty Mawr itself: an air compressor, portable engine and forge. The rear half of the brick drying sheds

are seen as in disuse, with the rest used as a general store place. Though a date for this document is not given, it is possible to place it to the period immediately prior to the 1931 receivership from the machinery described. Evidence for the forge and compressor were identified in the latest phase (see **Phase VI**)

A document dated to 1919 (DB/7/401 PRO) gives a detailed inventory of the equipment and machinery located within Ty Mawr. The machinery listed (see Appendix for the full transcript) gives an impression of the workings in the building. It is possible to determine the stages of brick making being undertaken within the building, from the grinding of the coarse constituents to the pressing of 'fancy' bricks. It is also apparent that machinery servicing the drying sheds was also situated within the structure. What is of particular interest is that each of the items of machinery listed can in some way be accounted for in the archaeological findings. The actual locations for each machine is vague, though for example **Machine Base B** referred to in the text may relate to the cornish boiler, **Machine Base D** with the saw bench, and there is an oral testimony to the location of the wrought iron water tank.

One further document proved to be valuable and has been included (see ***Fig. 9***). DB/7/658 (dated 1910), was an engineering plan for a "toggle lever brick press". It is presumed that this relates to the toggle lever press listed in the above catalogue.

Further research was undertaken at the Royal Commission for Historical Monuments Office in Aberystwyth. It was hoped that comparisons may have been drawn with other similar foundations in Wales. However this line of research failed to bring any specific conclusions.

THE EXCAVATION

The excavations at Ty Mawr in December 1993 concentrated predominantly upon the full length of the western half of the interior (**Trench 1**). It was in this area that the 1992 assessment suggested a series of sunken storage tanks. There were two offshoots to **Trench 1**. The first ran across to the eastern interior wall (**Trench 1a**), allowing an examination of the sub-floor deposits in the south-east quadrant of the interior. The second (**Trench 1b**) extended eastwards less than 3 metres from the main trench. Both offshoots were located so as to follow the lines of existing brick stanchion bases. Two smaller trenches (**Trench 2**

and **Trench** 3) were placed in the north-eastern quadrant to examine in greater detail features that were identified during the assessment excavation. The layout of the trenches is shown in *Fig.* 1.

The excavations, though not covering the full extent of the interior, have provided information from which it is possible to reconstruct to a great extent the processes undertaken in the building. In order to summarise the data, there are 6 basic identifiable phases, up to and including the final workshop floor. I shall discuss each phase individually, starting from the earliest.

Phase I

Phase I represents the intentional levelling of the ground surface upon which Ty Mawr is situated. The material associated with this phase is characteristic of smooth worn pebbles and shale. There was no datable material from this deposit where it was encountered, though it should not necessarily suggest a period of levelling directly preceding the construction of Ty Mawr in the 1870s. Such a process of levelling may have been undertaken for a long period, possibly associated with the consolidation of the harbour.

Phase II (*Fig.* 2)

Phase II represents the construction of the foundations and initial machine pits to Ty Mawr. Roughly dressed and coursed limestone bonded with mortar was used for the primary foundations. The stone foundations were laid to form the basic dimensions of the associated machine and wheel pits. Brickwork was then built up against the stone foundations, for the required structures for the machine pits. That the stone foundations conform to the layout of these first machine and wheel pits demonstrates that these features were part of the initial design for Ty Mawr.

Four wheel pits were identified in this phase (**A**-**D**). Each wheel pit had its own characteristics, though possibly **A** and **B** served the same function. Each pit is described below:

Wheel Pit A:

The pit was brick lined with a concrete floor and 1.50 metres in depth. An opening for an axle appeared on both sides of the pit allowing for a drive wheel no greater than 1.20 metres in

diameter. At the base of the western end of the pit on both sides there was an opening, each receding roughly 0.70 metres. In both openings two iron bars were set back in a vertical position. The bars were held in place by a vertical shaft through the brickwork. Within the recesses each bar had what appeared to be a heavily corroded iron cog at its base. Each bar, (where they protruded from the wheel pit structure), had 0.07 metres of thread at its terminus. Where the bars protruded from the brick work at the surface, they had been hammered to lie flat against the brickwork, presumably during the backfilling of the wheel pit. To the immediate west of the wheel pit, forming its western edge, was a raised brick base. Much of the brickwork to this pit had been heavily damaged during the later process of removing the wheel apparatus.

It would appear that the wheel in this pit was driven by belt or chain from a transmission system supported by beams (see ***Fig.*** 7). The belt / chain would have been attached to the wheel in the same fashion as a bicycle chain (ie: running a smaller wheel fixed to the side of a larger one). The larger wheel would have provided the energy to rotate the horizontal bars discussed (by a system of cogs and axles). The bars in turn would have entered into the base of a mixing tank and held the blades used to agitate the clay. The brick base to the immediate west of the wheel pit presumably supported such a tank.

Wheel Pit B:

This wheel pit was similar to that of **Pit A**, in that it was of the same depth and width. It also revealed a similar working mechanism as discussed for **Pit A**, though only one vertical bar was located . That this pit (as with **Wheel Pit C**) was located on line with one of the large openings in the western wall is of interest (see ***Fig.*** 7). This may suggest that the mixing tank, which was powered by this wheel pit, received a coarser grade of material directly from outside, possibly prepared here for further agitation by **Pit A**.

Wheel Pit C:

As with **Wheel Pit B**, this pit was located on line with one of the large openings in the western wall of Ty Mawr. Due to the limits of the excavation no evidence for an axle shaft or mechanisms was recovered. The sides of the pit were stone faced, though there was two courses of brickwork at the base. The base of the pit was concrete. The function of this feature is not possible to discern. The brick wall that divides this pit with **Wheel Pit D** may have been a later addition, and if this is the case, **Wheel Pit**

C may have been the location for a second wheel running in conjunction with that of **Pit D**.

Wheel Pit D:

The pit to the west and north incorporated the interior wall faces of Ty Mawr. To the South, the side of the pit was brick faced. An opening for an axle shaft appeared on both sides of the pit allowing for a drive wheel no larger than 1.60 meters in diameter. The southern axle recess was formed by two large limestone blocks upon which the brick wall had been constructed. On the northern face of the pit is a bricked in drive shaft leading to the lean-to ancillary structure built against the exterior of Ty Mawr. This drive shaft would originally have driven the main wheel in this pit, which in turn provided the motion to drive the other machines within the building.

The questions that surround the function of **Wheel Pit C**, and the character of the brick wall that separates this pit from **Pit D**, may give rise to the suggestion that initially the main drive engine was to have been located close to this point within Ty Mawr rather than in an ancillary structure.

It is of interest that Mr. I. Griffiths, of Segrwyd Farm, Trevine, recalled in an oral testimony, a "cast iron, 500 gallon water tank" situated some 3 metres above the floor surface against the interior western wall (directly over **Wheel Pits A** and **B**). Though there is no evidence for its position today, Mr. Griffiths remembers it being in place until the early 1950's. The water tank would have been filled either by rain water, or more likely from a pump feeding from one of the several water sources (ie: culvert, water wheel stream etc). The function of the tank would have been to supply water to the clay mixing process undertaken within **Pits A** and **B** (see Appendix).

A stone and brick feature situated in the extreme south-east corner of Ty Mawr was not fully excavated. It did not appear to show any similarities to the wheel pit structures identified along the rest of the western half of the building. The feature, if a pit of some description, would have been located at a peculiar point: directly in front of an entrance. The southern and eastern walls to this feature appear to date to the first phase of construction, though it is possible that the northern wall of mixed brick and stone construction is a later adaptation or consolidation. A plausible suggestion is that this was a raised platform associated with the entrance, perhaps holding the footings to the necessary steps.

Two further features are of note in this phase, these being a brick raft located in **Trenches 1a** and **1b** and a square brick lined pit, over 1.20 metres in depth, seen in **Trenches 1b** and **2**. The purpose of these two features is not clear, though the raft probably surved as a primary machine base, or weight loading area. The location of the raft, in association with the mixing tanks / wheel pits and with regards to the overhead beams for energy transmission, may indicate the position of one of the toggle lever brick presses (see ***Fig.* 9**). With this in mind, the function of the pit is still puzzling, though it may have been associated with storing brick quality clay from the mixing tanks or requirements for the pressing process (ie: water).

PHASE III (*Fig.* 3)

This phase is represented by the slate slab floor that was laid directly over the stone and brick foundations of Phase II. That the slate paving slabs in **Trench 1a** overlie the brick raft discussed in **Phase II** suggests that these are in fact later than the first slate floor covering, though it is conceivable that the brick raft was only partially covered with slate, and therefore possibly contemporary. It is apparent from the breaks in the continuity of the slabs that the slate floor demonstrated in this phase represents a series of re- slate flooring actions.

Phase IV (*Fig.* 4)

This phase represents the disuse of the **Phase II Wheel Pits A** and **B**. The backfilling of the square pit feature encountered in **Trench 1b** has been included in this Phase due to association: the suggestion for this pit was as a storage pit associated with the toggle lever brick press. That the mixing tanks / wheel pits were abandoned suggests a cessation of brick making thereby making the pit redundant. There were similarities in the respective backfill materials that further suggest a contemporary abandonment.

Though **Wheel Pit D** was still functioning during this stage, its neighbour, **Pit C** had been backfilled. However, in contrast to the compact, highly mixed rubble and clay fills of **Wheel Pits A** and **B**, the fill of **Pit C** consisted solely of fine silty pea grit. This deposit lay in a series of irregular bands falling from south to

north. Two vertical timber box shafts with concrete bases and filled with compacted sand were placed at the western end of the wheel pit recess. The function of these two features is not clear; possibly serving as pilings for some form of machinery. The timber box shafts had been placed within the pit after the first infilling of pea grit, with the pea grit backfilling the pit around them. This would suggest that whatever was held in place by these shafts was probably secured in position by other fittings, possibly from an overhead beam.

Phase V (*Fig.* **5**)

This phase represents the further backfilling of the **Phase II Wheel Pits A, B** and **C**, and the establishment of a series of machine bases. Also represented in this phase is the laying of a concrete floor over the majority of the eastern half of the building.

The final backfill of the **Phase II** wheel pits was in turn stratigraphically sealed by a large concrete machine base (**Machine Base A**). This machine base directly overlay an earlier concrete base that had apparently been used as backfill for **Wheel Pit C**. The original location for this base cannot be ascertained, and it should not be assumed to have definitely been from Ty Mawr. That **Machine Base A** conforms to the earlier **Phase II** brick wall that acts as the southern face to **Wheel Pit D**, suggests that the wheel pit was still fully functioning. The two parallel slots, running east - west, on this machine base would have carried timber beams, on which the machine would have been bolted. The bases of these two slots were reinforced with brick. Their close proximity to **Wheel Pit D** which appears to have still been functioning suggests a possible change of power source. Rather than a static steam engine driving the machinery in Ty from the northern ancillary lean-to via a drive shaft into **Wheel Pit D**, it may be that an engine was brought inside to this position. From this location such an engine would have been able to take advantage of the drive wheel arrangement previously employed in the wheel pit. The function of the small rectangular base with two holdfasts, to the south of the slots is unclear, but may be associated with the machine just discussed or of a later phase.

This phase also sees the laying of a concrete floor that covers the majority of the eastern half of the interior. In places the concrete has probably been laid as a replacement to damaged slate slabs. However, the concrete floor that covers the south eastern quadrant appears to have been laid with the specific function of load bearing. It is within this area that three other

machine bases are discernible. **Machine Base B**, close to the southern wall, is rectangular in shape, measuring 1.20 metres by 0.75 metres. The linear off-shoots to this base would appear to be the impressions left by a system of pipes either feeding or relieving the machine. Little can be said of **Machine Base C**, which is represented by two timber sill beam slots, 1.35 metres in length. **Machine Base D** consists of two sets of hold fasts set on a low concrete plinth. Associated with this is a hollow box shape base measuring 2.10 metres by 1.40 metres.

Phase VI (*Fig.* 6)

The final phase discussed here represents the interior of Ty Mawr as at the start of the 1993 excavation. With this phase we see an abandonment and backfilling of **Wheel Pit D** and the replacement of the machine from **Base A**. The change in machinery is demonstrated by the positioning of **Machine Base E** directly over **A**. This new base consists of a shallow stepped concrete and brick plinth with a series of hold fasts. The function of the machine held on this base is given by the oral testimony of Mr I. Griffiths, who recalled a compressor in the same location. The compressor would have powered the surviving machinery within Ty Mawr during its final period of activity, representing a significant change in energy production. The introduction of such a machine would have made obsolete the pre-existing systems of belt / chain transmission.

A further feature within this phase is the deposit of ferrous slag (**F**) situated to the east of **Machine Base E**. The south and west edges of this deposit were fairly straight, forming a right angle where they met. The deposit sloped downwards to the Northeast, where it petered out with a series of splatter marks. The depth of the deposit never exceeded 0.05 metres. The overall appearance suggested the residue from a forge or other high temperature creating machine (ie: boiler), and the lack of any other evidence of burning demonstrates that it was the result of a controlled operation. It may have been associated with the machine from **Base E**, though there is no evidence to link the two. The nature of the deposit probably suggests one of the final activities undertaken within the workshop, though it may likewise have dated to the period when the building was abandoned and the floor layer was still exposed

SUMMARY

In contrast to the findings of the 1992 assessment project, Ty Mawr can be seen to have had two major phases of use. The first phase can be seen as the period of brick making, and the second as the period after the cessation of this industry. From this point Ty Mawr served mainly as a machine shop for the quarries, though it is possible that brick making continued on a limited scale for a short period with the brick clay arriving ready processed.

The 1993 excavations have demonstrated that Ty Mawr was constructed for the specific task of brick making, with the foundations designed around that purpose. With the chance to examine in greater detail the machine bases encountered in the earlier excavation, it is now possible to put forward suggestions for their functions.

During the course of the excavation it was brought to the archaeologists' attention that a local farm still had possession of a quantity of machinery from the Porthgain Quarries and brickworks. On consultation with the owner, Mr. Simmons of Trehowell Farm, Trevine, it became apparent that though the machinery had originated from Porthgain, there was no way of determining if they had been from Ty Mawr. The machinery in question consists of a belt driven precission metal drill (now converted to electricity), two lathe benches (one derelict), an unidentified derelict precission tool, a 6-7 hp steam traction engine "Peggy" (in a derelict state), a stone crusher carriage (derelict) and a restored 12 hp steam traction engine "Ringing Rock". As a point of interest, Richard Morse, the deceased uncle of Mr. Simmons, designed and maintained much of the machinery at Porthgain.

APPENDIX.

Pembrokeshire Record Office, Haverfordwest.
File: D/ADAMS - DB/7/401
Listed below is a detailed extract that relates directly to Ty Mawr

".....situated in brickworks:

1 x Brickmaking machine No. 155 including wire cutting off table.
built by Scholfield, Leeds.
bolted in to concrete floor, purpose: pressing bricks.

1 x Saw bench for circular saw (ex Forest)
belt driven (4ft saw). Bolted in to concrete floor

1 x Belt driven toggle brick press
built by Scholfield, Leeds
bolted in to concrete floor - for making 9" x 3" x 4 1/2" bricks

1 x Grinding pan (Whittaker, Accrington)
bolted into concrete bed

1 x Grinding pan and rollers (Whittaker, Accrington)
rolled into concrete
used for grinding slate debris for brick machine No. 155

1 x Elevator (buckets removed, belting used)
bolted to beams on top and concrete at bottom
for elevating material from grinding pan to mixer

1 x Mixer (Whittaker, Accrington)
bolted to beams overhead - for mixing debris for bricks

1 x Wrought iron tank 1/4" plate (6' x 5' x 3')
fixed up on beams for supplying water to brick mixer

1 x Hand screwing press (Scholfield, Leeds)
not fixed, used for making fancy bricks

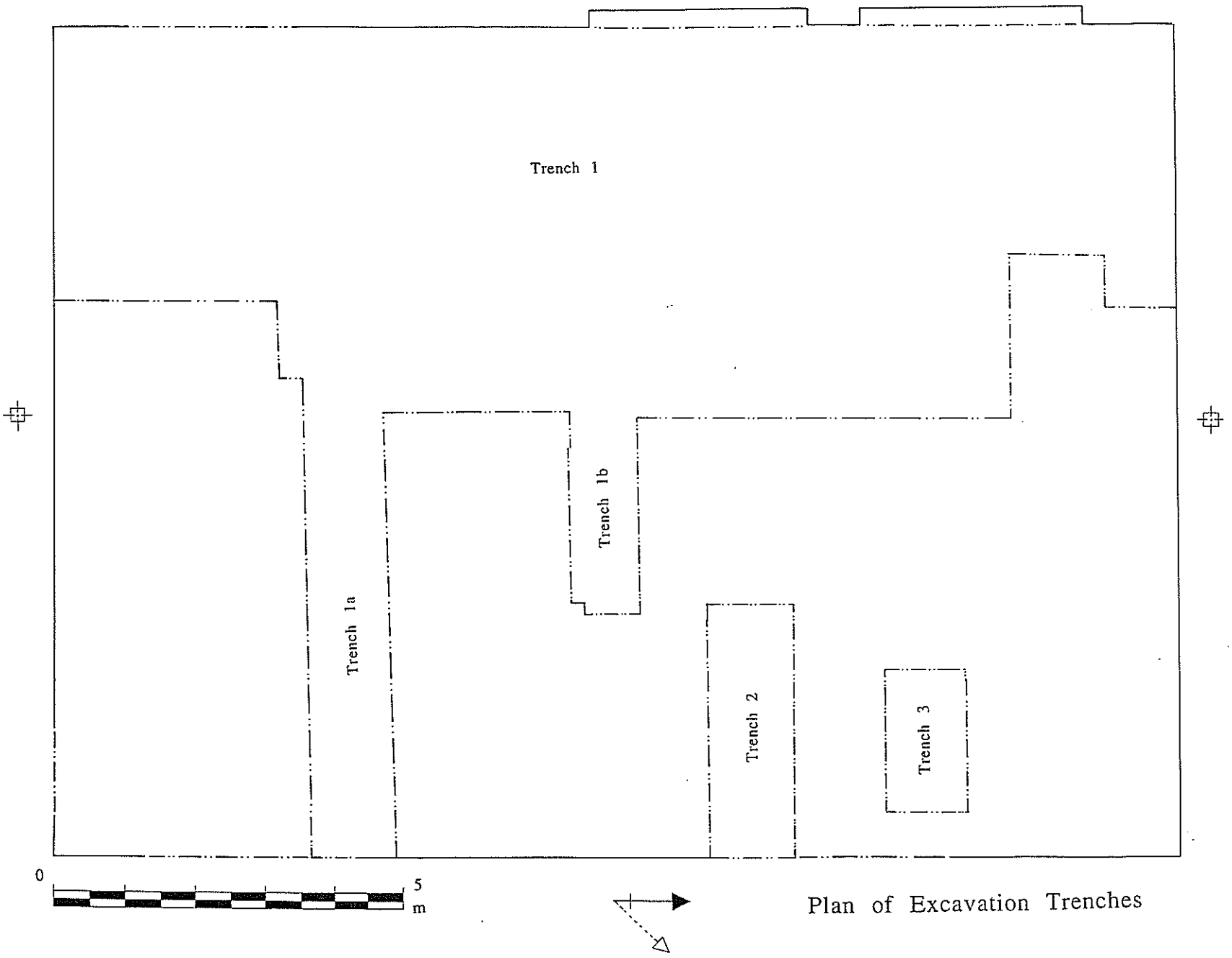
.....situated outside brickworks:

1 x Old vertical boiler, connected by pipes

1 x Horizontal engine with cylinder attachment
for air compressor - bolted with concrete foundation
for driving brick machinery

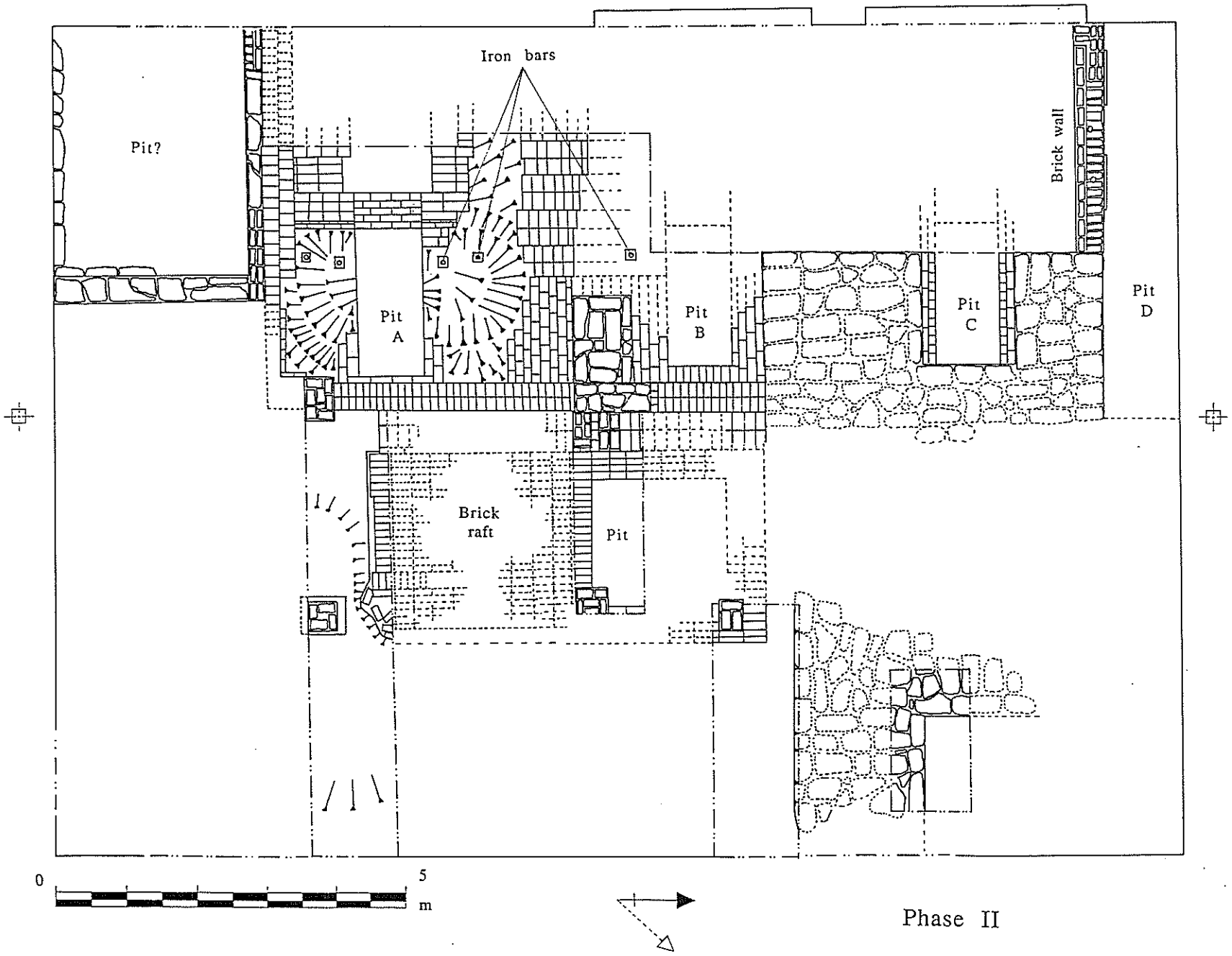
1 x Cornish boiler (Thoshill & son, Heywood)
16' long, 6' diametre, 70lbs pressure
built in brickwork to be reseated before use
for the supplying of steam for brickwork....."

Fig. 1



Plan of Excavation Trenches

Fig. 2



Phase II

Phase III

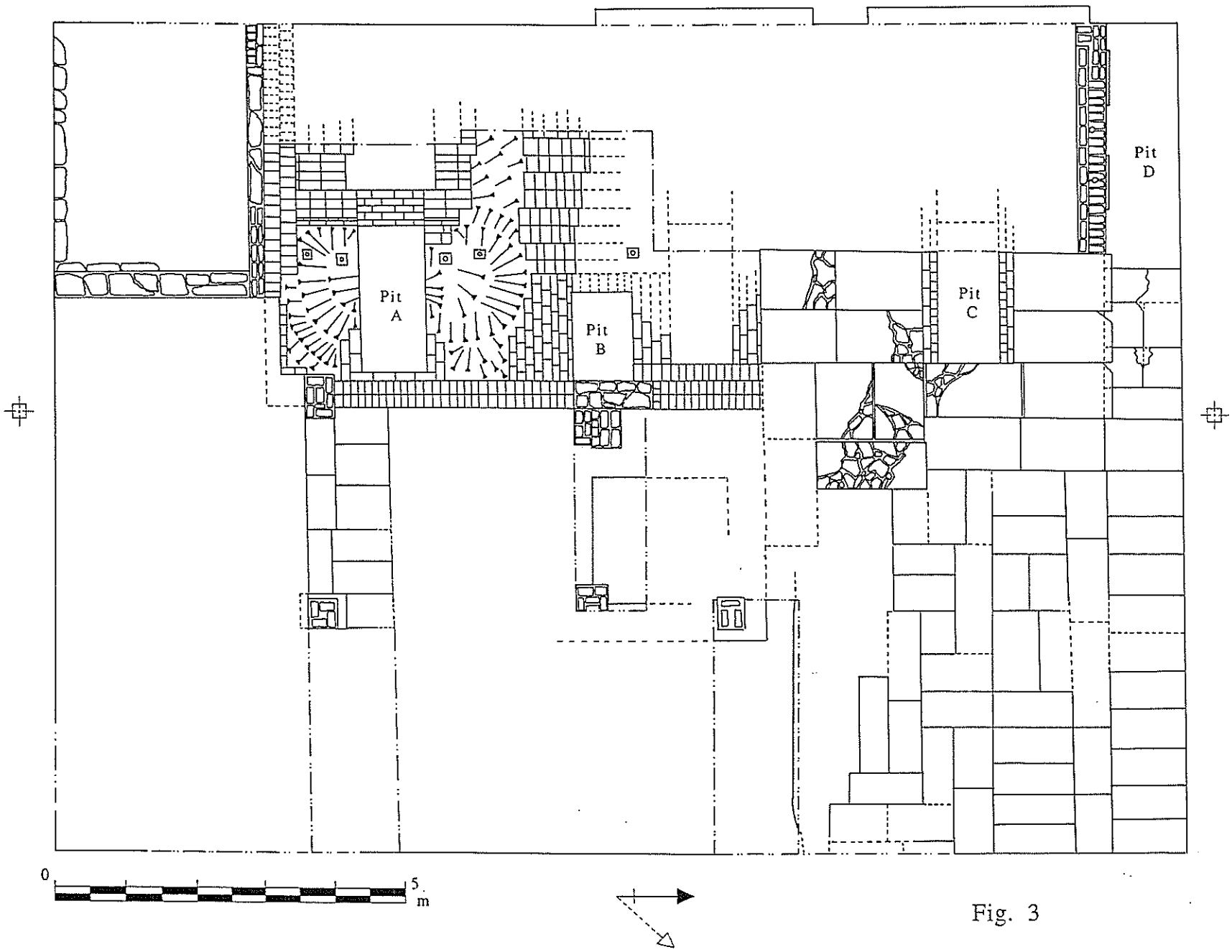
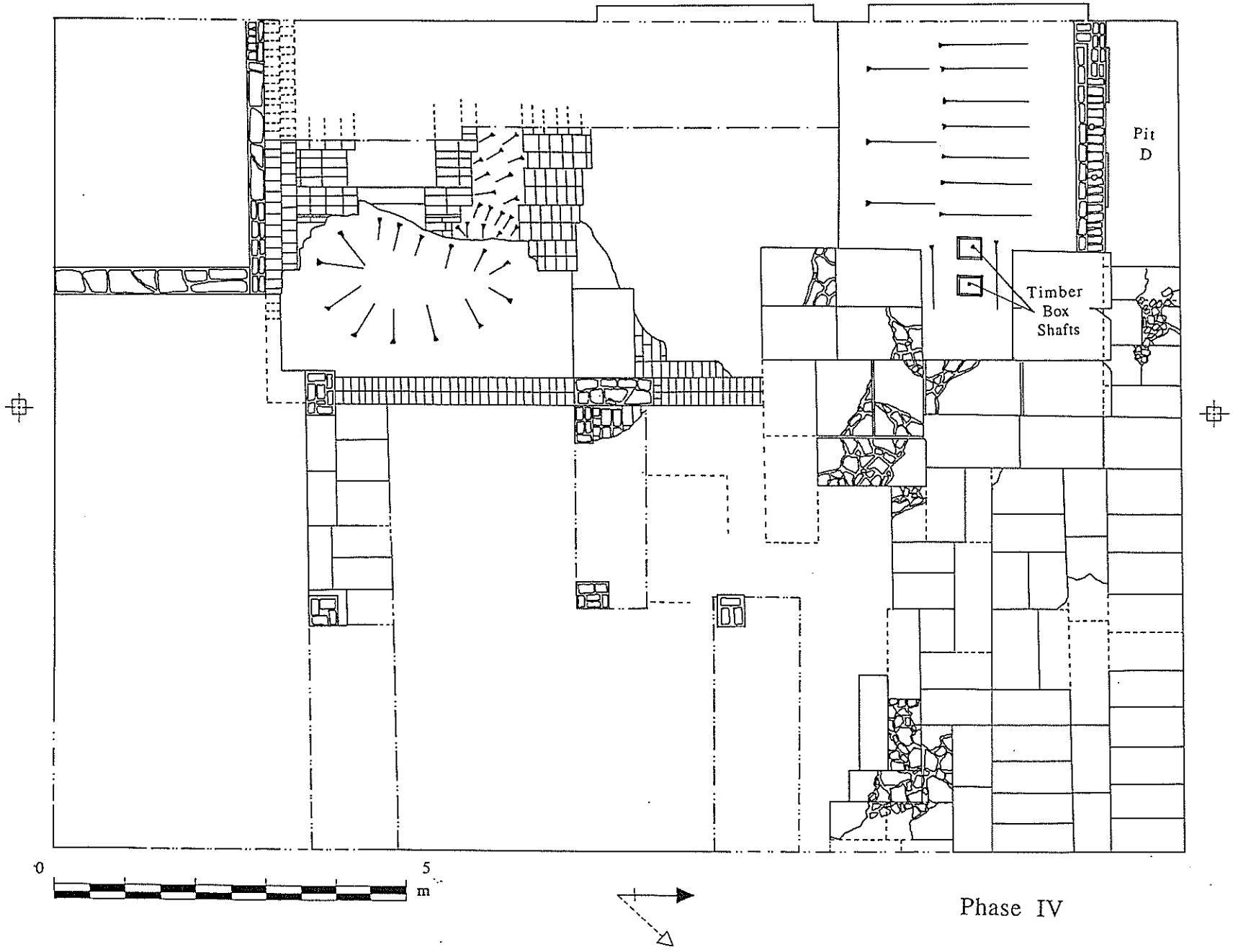


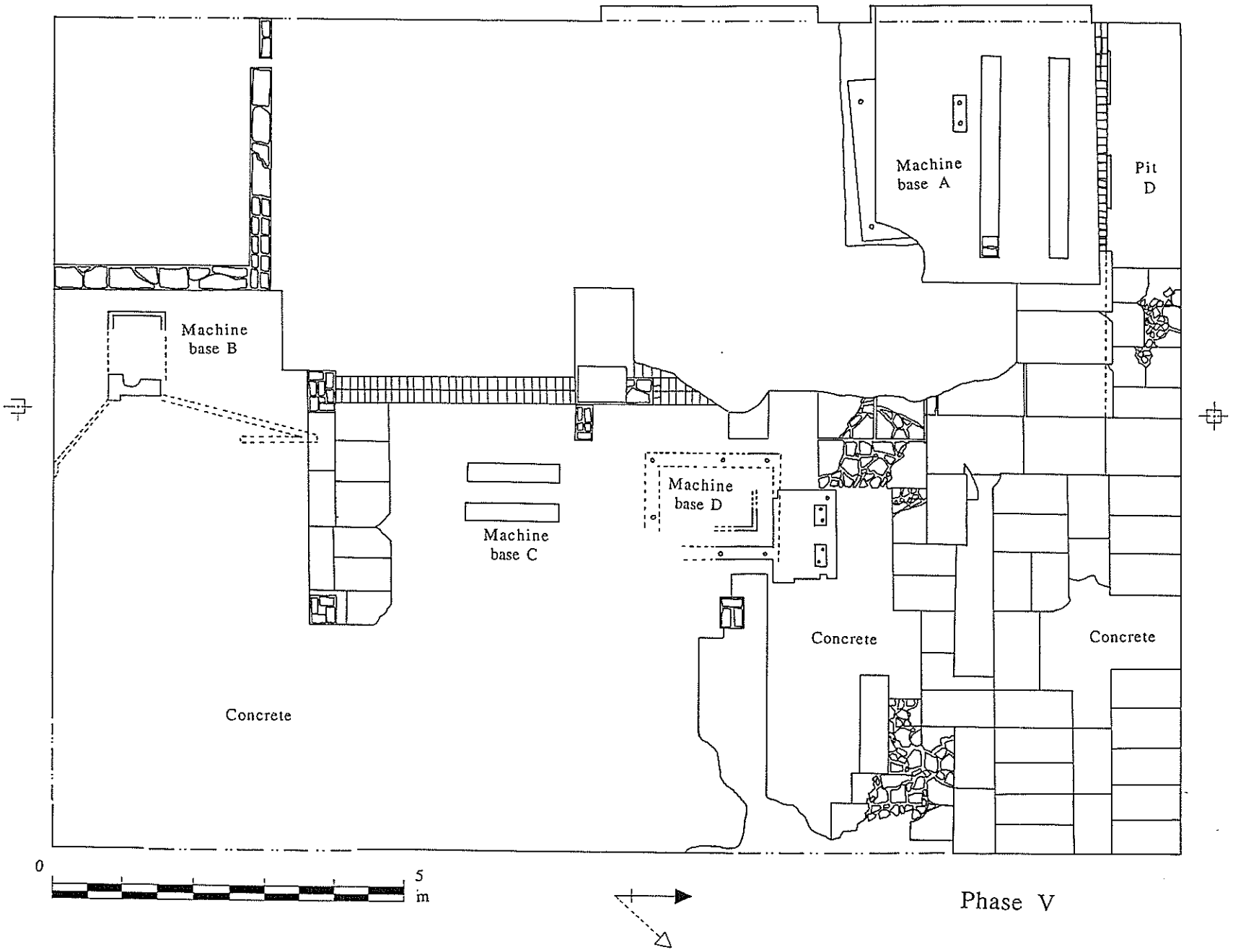
Fig. 3

Fig. 4



Phase IV

Fig. 5


Machine base A
Pit D
Machine base B
Machine base C
Machine base D
Concrete
Concrete
Concrete
0
5
m

Phase V

Fig. 6

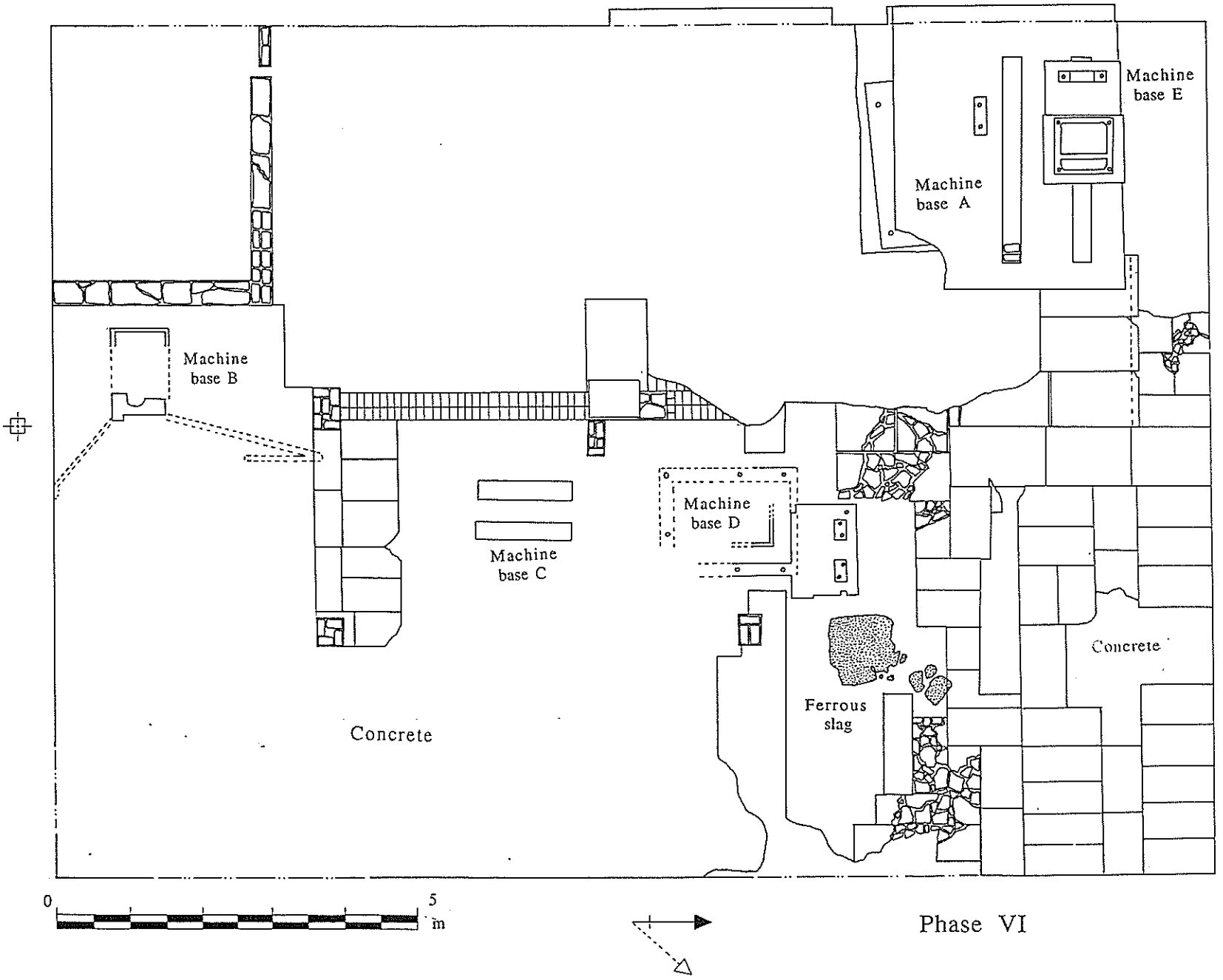
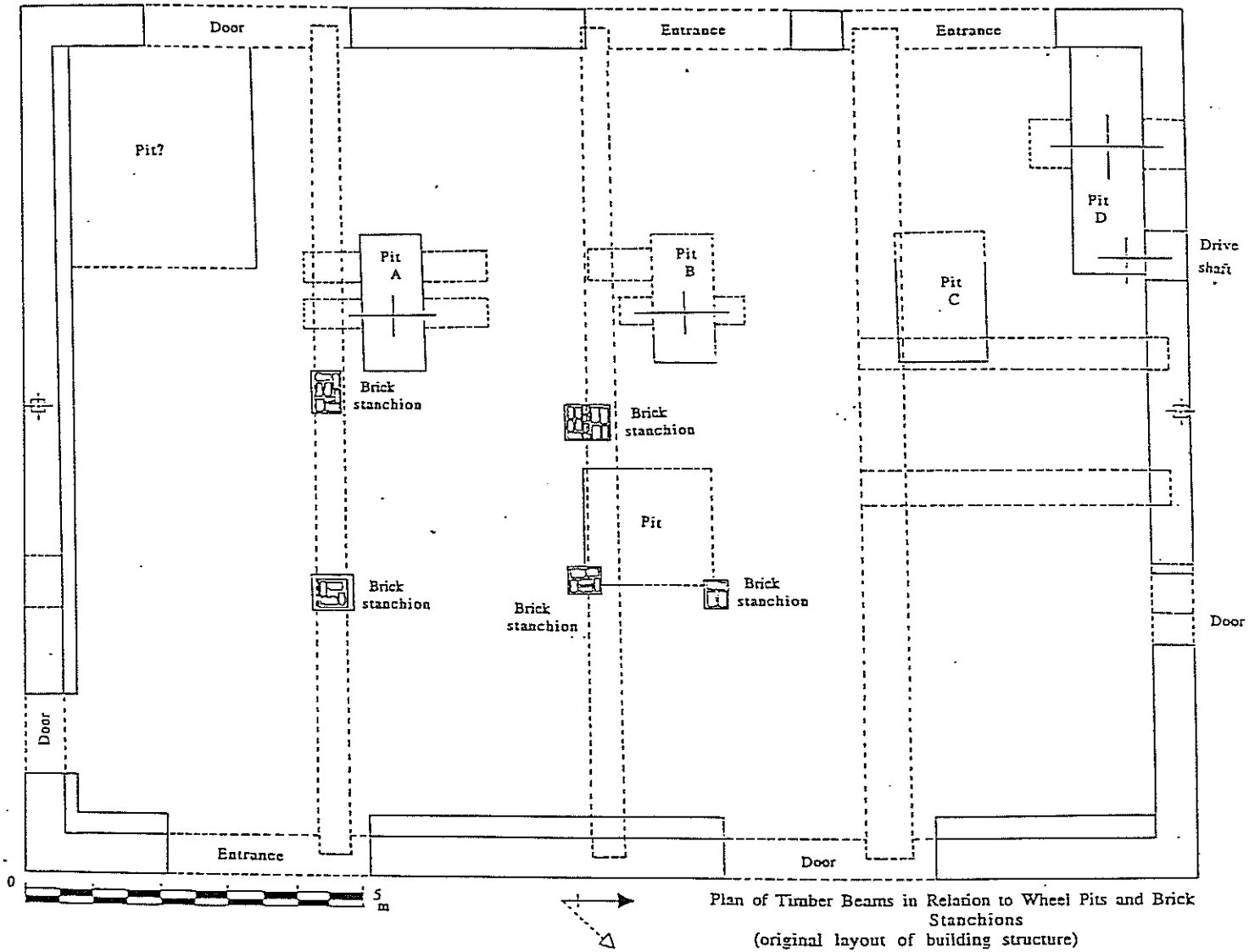
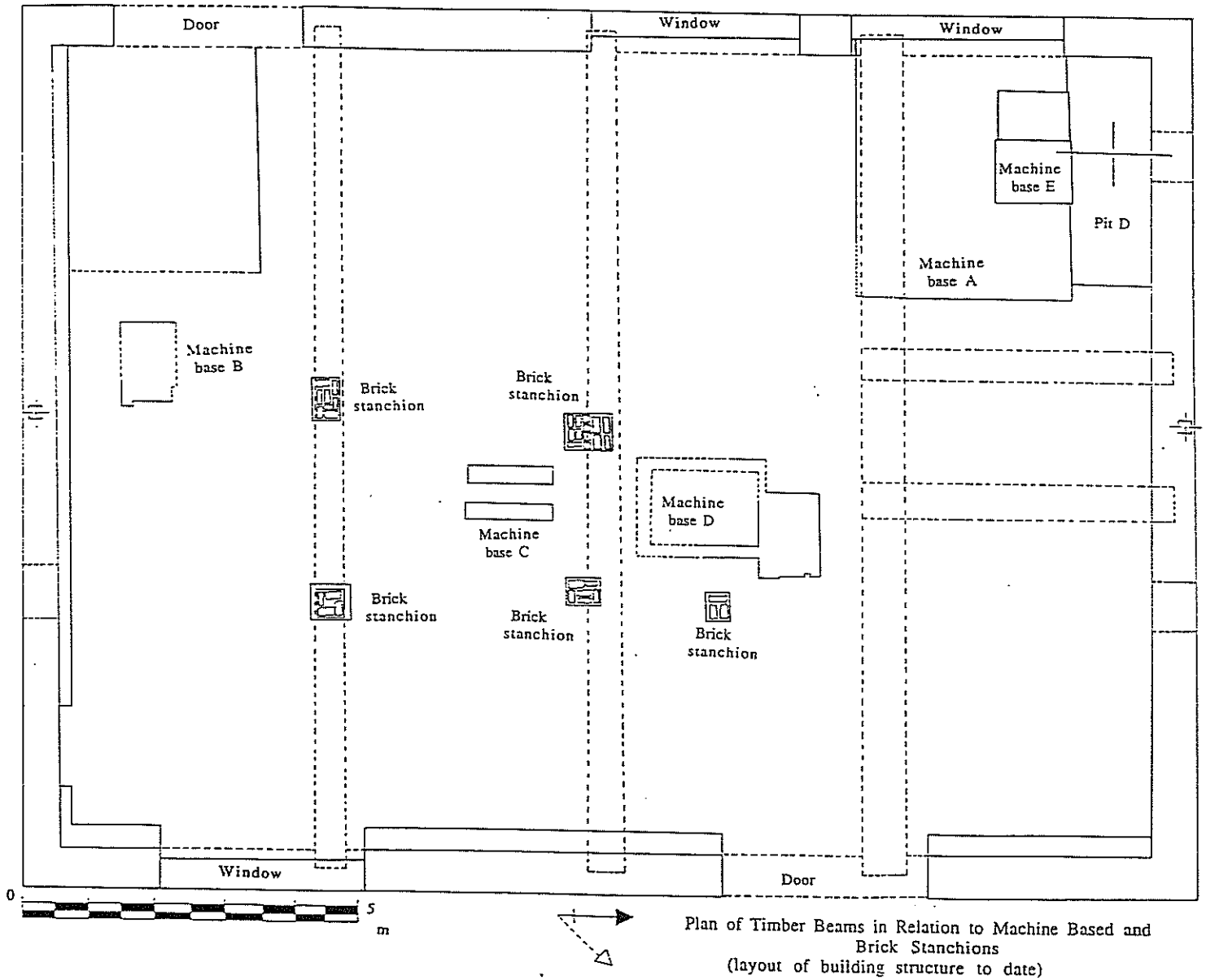

Machine base E
Machine base A
Machine base B
Machine base C
Machine base D
Concrete
Ferrous slag
Concrete
0
5
m
Phase VI

Fig. 7



Plan of Timber Beams in Relation to Wheel Pits and Brick Stanchions
(original layout of building structure)

Fig. 8



Plan of Timber Beams in Relation to Machine Based and Brick Stanchions
(layout of building structure to date)

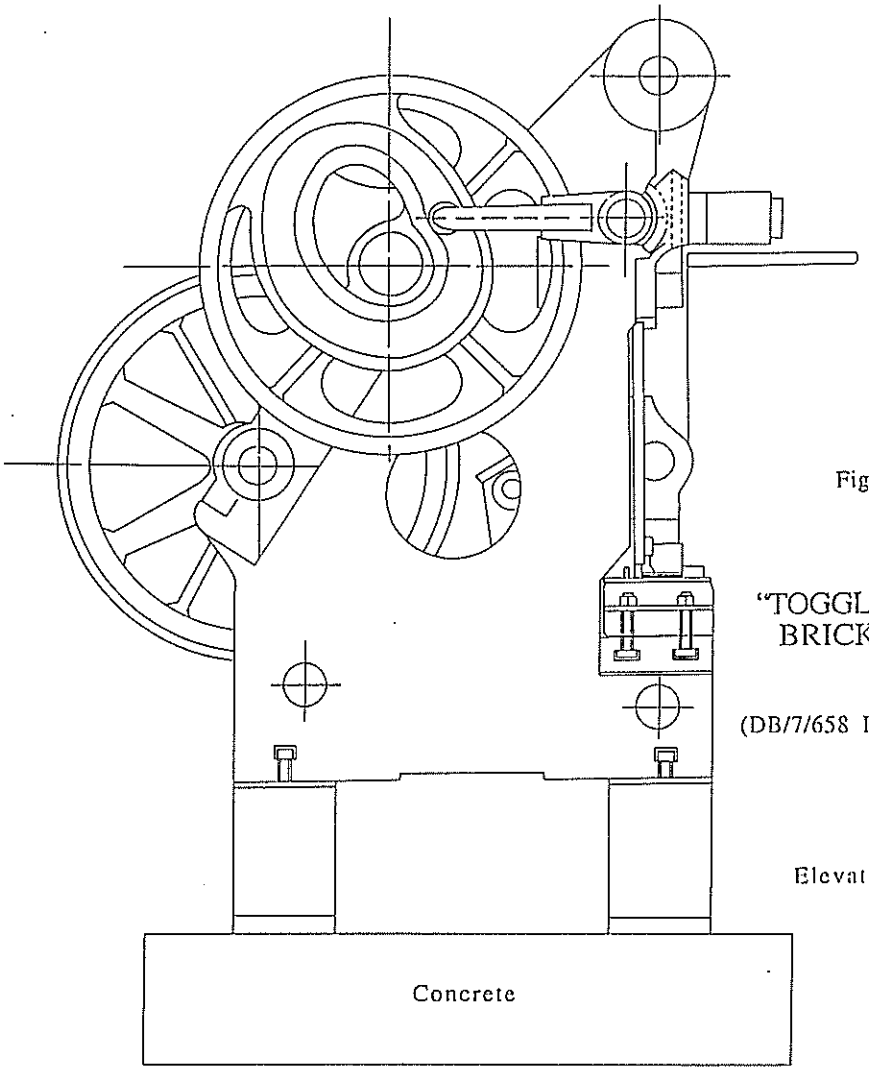
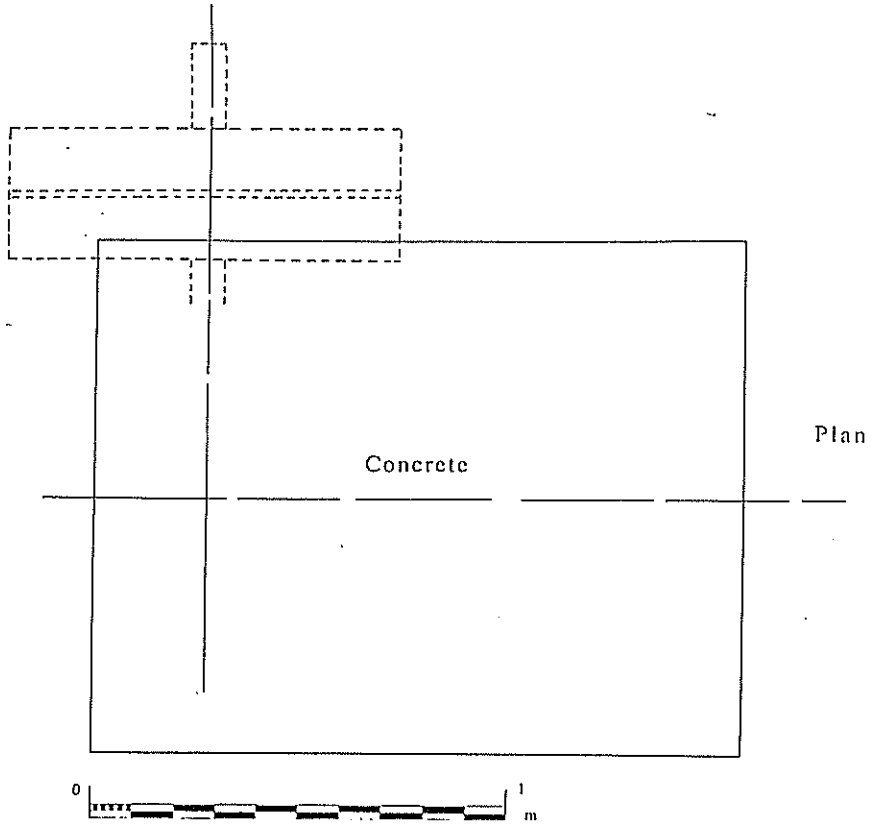


Fig. 9

"TOGGLE LEVER"
BRICK PRESS

(DB/7/658 PRO 1910)

Elevation



Plan