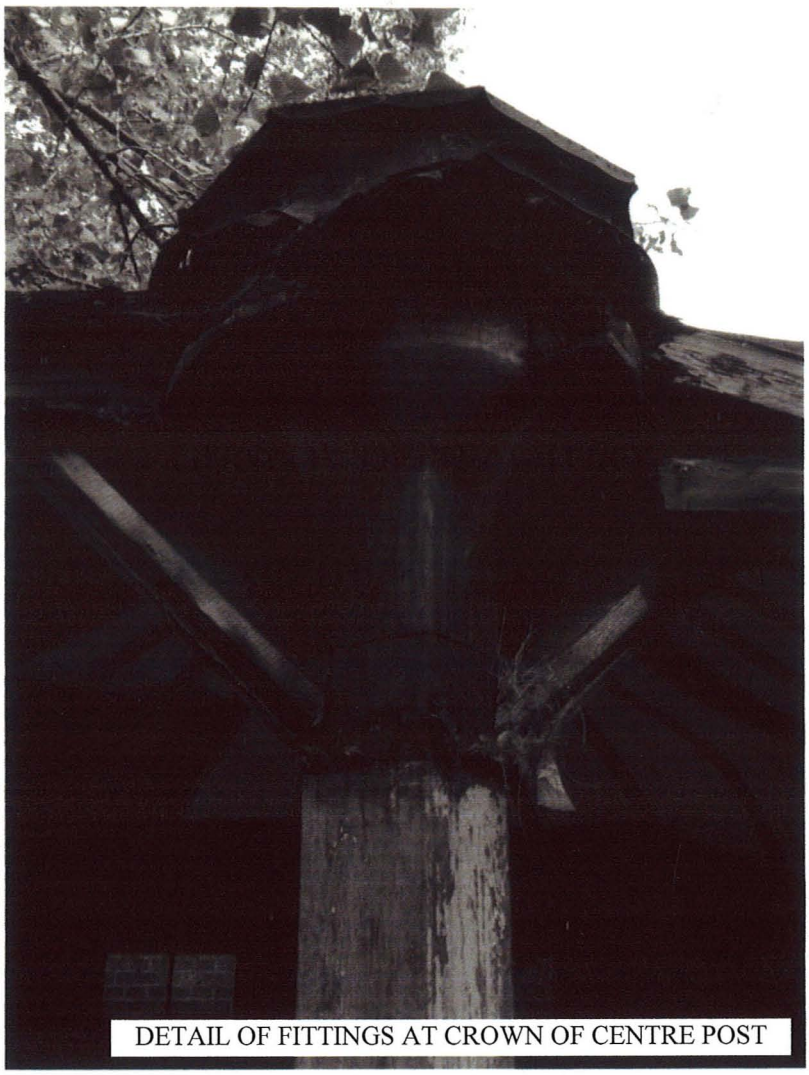

DETAIL OF FITTINGS AT CROWN OF CENTRE POST

WALTHAM ABBEY SOUTH SITE ROYAL GUNPOWDER FACTORY

BUILDING No. M351

REPORT No. ESG 2362/97

BRITISH AEROSPACE
Royal Ordnance

ENVIRONMENTAL SERVICES GROUP
REPORT NO. 2362/97

WALTHAM ABBEY SOUTH SITE
ROYAL GUNPOWDER FACTORY

HISTORICAL SURVEY OF
BUILDING NO. M351

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Date: September 1997
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REPORT NO. ESG 2362/97

Subject: Historical Survey of Building M351 Waltham Abbey South Site

Client: Royal Ordnance Property Services Department

J Chaddock. 8.10.97

ORIGINATOR: ..... **S CHADDOCK** .....**DATE**

8.10.97

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10.12.97

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Guncotton Drying Stove No.2 M351 and Fan House 495, South Site, Waltham Abbey Royal Gunpowder Factory, Essex

Table of Contents

List of Plates

List of Figures

Introduction

Following the recent announcement by the Epping Forest District Council to grant planning permission for a development on the South Site the Essex County Council Planning Department's Archaeological Advisory Group has called for a survey of the Guncotton Drying Stove and its Fan House. The development proposals for the South Site will probably result in the firing and demolition of this building so this report aims to provide an accurate and permanent record of this historically important structure.
The initial survey report of the South Site at Waltham Abbey with component sheets for each building and a computer generated CAD plot has been completed (Chaddock 1996). The report outlines the history of the site, provides a description of each area and outlines appropriate manufacturing techniques to allow fuller comprehension of the archaeological remains. Those buildings of major importance that did not have a 'documentation pack' have been selected for further recording; they include a part of the Guncotton Factory G431, the Boiler House G403, the Box Store M349, the Guncotton Drying Stove M351 with its attendant Fan House 495, the Cordite Mixing House 486 and the gas-proof Air Raid Shelter SS113. This report provides a more detailed record of the building, complementing the initial survey, and placing the structure in its wider context. A copy of this report, the archive comprising plans and photos will be deposited in the Essex Records Office.

Survey Method

Measured surveys of the buildings were carried out using tapes for both vertical and horizontal measurement throughout. In G403 and G431, where health and safety problems were encountered in gaining access to the full interior height of the roofs, reference was made to surviving architects' drawings in the site archive. Copies of these drawings, converted photographically to metric scales, were used as reference for details, and checked for accuracy wherever possible. Original drawings for M349 and M351 were also referred to and checked, but did not form a significant element of the survey of those buildings.

A Kern GK-O level was used to establish floor levels, etc, in the buildings. Reference to Ordnance Survey datum levels was provided by information from plans of the site supplied by Royal Ordnance (RO).

All plans and sections were drawn in pencil on permatrace. Plans and main sections were drawn at scales of 1:50 or 1:100, depending on the size of the building concerned. Detailed sections were drawn at 1:50, and sections through the passageways in 486 and M351 were recorded at 1:10. A total of 17 drawings were produced, all on A1 or A2 sheets. Following approval by RO and Essex County Council Archaeological Advisory Group (AAG) these were digitised (CAD 12), and A3 copies printed for archiving and the final reports.

A detailed written description of each structure was prepared on proformas prepared in conjunction with the AAG, and is presented in this fashion. Reference was made to the measured surveys for major dimensions: more detailed measurements were made as required with a 5-metre steel tape. The fieldwork notes also contain many sketches of various elements of the buildings. The descriptions were subsequently word-processed, and are presented in hard copy and on disk (Word 6).

The photographic survey was carried out using two Pentax ME 35m SLRs, fitted with 28-70mm zoom lenses. The flash photography was carried out with a professional Metz 60 GT-1 flash, though natural light was used wherever possible. 400ASA film (colour slide and B&W) was used throughout. The photographic registers are presented in hard copy and on disk (Word 6).

The video surveys of 486 and M351 were carried out by a professional cameraman under HAT's direction. Given their similarity, both buildings were recorded in a similar sequence, and structural details, etc, were singled out en route for special attention. Both buildings were filmed in natural light, with the exception of the NG delivery tunnel in 486, where a portable floodlight was used.

History of the Site

The Royal Gunpowder Factory at Waltham Abbey was a centre of gunpowder production, and latterly chemical-based explosives manufacture, for more that 300 years. There is documentary evidence that gunpowder was being produced at North Site by mid 1660's. The mills were acquired by the government in 1787, and expanded greatly as a result of the demand for powder generated by the Napoleonic wars. After a period of retrenchment for the 1820's, the RGPF returned to prominence in the second half of the 19th century, playing a leading role in technical innovation, meeting demand for cannon powders for guns of ever increasing size, and manufacturing moulded powders in large quantities (RCHME 1993). From the 1890s into the early twentieth century the site was a leader in the development of manufacturing technologies for the new chemical propellants and explosives that were extensively utilised in the First and Second World Wars.

The Guncotton Drying Stove M351, which was originally constructed in 1892, formed part of the early Guncotton Factory on the South Site. The Stove dried guncotton manufactured on the South Site in preparation for the manufacture of Cordite Mk 1 in a purpose built factory nearby on Quinton Hill.

The history of Chemical Explosives in the late 19th Century.

Guncotton is manufactured by the action of mixed nitric and sulphuric acids on cellulose. The product is a cellulose nitrate but has become known as Nitro Cellulose (NC) . Guncotton is the name given in the armed services to nitrocellulose containing 13% or more of nitrogen. Although Guncotton had been known from 1833, a series of fatal accidents, notably in 1847 at the Faversham Works in Kent where 20 individuals lost their lives, led to reduced interest in the new explosive.

During the mid 19th Century Baron von Lenk continued experiments in Austria (RCHME 1993, p180) and concentrated on the problem of producing a strongly nitrated cotton. His method was to take skeins of cotton and clean them before drying thoroughly. The dried skeins were then immersed in the strongest acids available for forty eight hours before removal into a stream of water, where they remained for several weeks to wash all traces of acids. Finally they were washed in a solution of potash.

Guncotton Manufacture at Waltham Abbey RGPF

Abel continued experiments at Waltham Abbey North Site and in 1864 he patented the pulping and pressing of Guncotton. This improved method used short cotton fibres, for which cotton waste was an ideal raw material. Teasing of cotton waste removed foreign objects and opened up the fibres to allow good penetration by the acids. The pulping after nitration and initial washing resulted in efficient removal of trace acids which had hitherto caused decomposition within the nitrocellulose. The resulting pulp could be moulded with hydraulic presses to form cylinders or discs.

Manufacture of Guncotton as a practical explosive was further helped by the discovery in 1859 that wet Guncotton, a relatively stable and safe substance, could be detonated by a dry Guncotton primer and detonator. In 1873 the boiling of Guncotton after nitration was found to help stabilisation and was widely adopted. Development work continued on the North Site at RGPF where the Highbridge Street Guncotton factory was active.

In 1885 construction started on the Quinton Hill Guncotton Factory. There was plenty of room to stretch the factory out westwards along the south side of Cobbins Brook from the existing farm buildings. The farm and its stables were utilised as stores and offices. In its early days, from 1887 to 1905, the factory was laid out to manufacture Guncotton by Abel's Method. This is clearly laid out in Younghusband's "Description for the Manufacture of Abel's

Pulped and Compressed Guncotton at Waltham Abbey" (1873 referring to the Highbridge Street factory).

Although Abel's method was taken up enthusiastically by many private manufacturers, there was a major development in 1905 when the nitration process was changed to the Thomson and Thomson displacement method from Abel's dipping method (the Thomsons were brought to Waltham Abbey from Ardeer, Scotland on the advice of McRoberts who was the manager at Ardeer). Large earthenware pans containing mixed acids, were filled with the cotton and then weighed down with perforated earthenware plates. Fumes were guided off by means of a fume hood and nitration took about two and a half hours. On completion of nitration, the acids were run off by means of an earthenware cock at the base of the pan and the cotton was washed through with water. From the nitrating pans, the cotton was taken to the boiling vats where trace acids were removed, then to the pulping room where it was pulped in the beaters between rotating knife blades. It was then run over a grit trap and blanket run to remove any foreign matter before being run into the potchers where it received a final wash before being added to the greater mass of pulped nitrocellulose in a tank capable of holding four tons. From this tank the pulp was pumped into hydraulic powered mould presses where it was compressed into cylindrical blocks which could be stored and transported reasonably safely if the water content was kept between 15% and 30%.

Some years later, in 1909, Sir Frederic Nathan delivered a paper "Guncotton and Its Manufacture" (J.Soc.Chem.Ind. No.5, 177-187) to the London Section of the Society of Chemical Industry. The outline of processes then in use at the Royal Gunpowder Factory, Waltham Abbey, which he described allows us to understand the early changes in the layout of the factory.

Considering that the early development of the guncotton manufacturing process was striving towards the production of a high explosive, it must have come as a surprise to many people when Abel and Dewar patented cordite in 1889. This stable, slow burning and smokeless propellant was made primarily from two sensitive high explosives, guncotton and nitroglycerine. Cordite Mk 1 and MD, also known as solvent cordites, did call for dry guncotton in an expanded fibrous form. This meant that the sensitivity of the guncotton was increased, the explosive risk was high and a suitably designed building had to be constructed to carry out the drying process in. In 1892 the **Guncotton Drying Stove** [M351] was constructed along with its **Fan House** [495] to fulfill this requirement for the Mk 1 cordite facility built on Quinton Hill at the same time.

Description of the Guncotton Drying Stove M351

Building no: M351 Guncotton Drying Stove NGR: TQ 3787 9949

1. General

A circular timber inner room (external diameter 9.3m) with a conical roof, constructed within a brick revetment and earth mound. Access via an entrance tunnel to the south. The inner room has a single door, in line with the access tunnel, and 18 2-pane windows, set high in its walls.

Inner Room Walls: Frame consisting of 18 timber uprights 80 x 100mm, at 760mm centres. No sill-beam or intermediate cross-bracing struts visible: uprights are set into gaps in a row of end-set bricks set around the outer edge of the concrete base of the internal floor. Alternate uprights are braced to the traverse wall by 16 horizontal beams 120 x 100mm, set into the traverse wall brickwork *c.*2.8m above outer passage floor and half-jointed to the uprights. Outer cladding of 180mm wide weatherboarding, held with iron nails. The outer cladding of the roofed 'shoe room' area (either side of door to inner room) is horizontal tongue and groove, as for the inner wall. Inner cladding of horizontal tongue and groove planks, 110 x 15mm section, maximum length 6.22m, fastened with iron nails (Plates 5 and 6). 200mm high plain timber skirting above quarter-round moulding, above wood-block floor (Plate 7).

Exterior woodwork is painted grey over a white primer: interior walls and ceiling are painted white.

2. Services

Guttering around roof of inner room. Preformed lengths, 130 x 50mm section, rolled outer edge. Made from galvanised sheet, with cross-bracing rods at 600mm intervals. Mounted on top of horizontal bracing beams. 2 x 75mm diameter downpipes of rolled galvanised sheet leading to inner passage, one 2m from east end of shoe room, the other diametrically opposite.

Drainage: Drains in either step on either side of shoe room carry away runoff from inner room roof through vertical gratings into 100mm diameter earthenware pipes, set in/below the concrete sub-floor (Plate 8). These probably join and exit the structure beneath the access tunnel.

3. Passageways & Traverses

Traverse: 10.9m internal diameter., 4.6m high, 254mm (10") thick blast wall of buff brick, laid in English bond, flush pointed, with capping of edge-set bricks. Wall backed by circular earth mound, 3.8m high and *c.*40m diameter.

Inner Passage: Passage 0.8m wide between inner room and traverse wall (Plate 9). Unroofed, with the exception of *c.*5m length extending either side of the doorway to the inner room, forming 'shoe room'. This is separated from the rest of the passage by doorways to the left and right, each with a 2-pane window 285 x 660mm at the top. The right doorframe appears to have been blocked at some time: the right jamb has been replaced by a plain timber, and a cross-member spans the opening. The inner passage floor is *c.*380mm below that of the access tunnel, shoe room and inner room, and presumably falls towards the drains.

Access Tunnel: Straight tunnel aligned N-S, 8.0m long, 2.0m wide, 2.4m high, with 5m-long wing walls at outer end (Plate 10). Of one build with traverse wall. Side walls 2.0m high, buff brick, English bond, supporting shallow arched roof, buff bricks, stretcher bond. Arch collapsing: propped throughout its length. Outer end of tunnel surmounted by simple brick parapet, capped with edge-set bricks. Wing walls taper downwards and outwards from tunnel entrance. Outside the tunnel door is an area of asphalt, extending beyond the wing walls.

4. Door & Window Details

Passage Door: Double doors, each 1970 x 895mm, four-panelled, outward opening. Set in wood frame, fastened to brickwork at tunnel mouth by iron brackets. Gap between frame and arch closed by timber infill, fastened to brickwork with iron nails. Each door has 3 x 100mm hinges, and 3 single 'coat hooks' screwed to upper member of door, on inner face. The doors were originally fitted with a large mortise lock on the inner face, later replaced by an external iron padlock hasp. The doors and frame sections are currently on the access tunnel floor.

Inner Room Door: Doorway rebated to take inward opening door 1040 x 2100mm. However, the absence both of a door, of hinge or lock rebates or other mounting points for door furniture, suggests that none was fitted. Attached to the outer face of both door jambs at floor level are timber slots, intended to support a toe board, 50 x 225 x 1150mm, across the bottom of the doorway (Plate 11). The toe board, painted red over white, with one rounded edge, was found leaning against the wall next to the door.

Shoe Room Door: Doorways into inner passage from shoe room held outward opening doors 1940 x 640mm, carried on 2 x 75mm hinges, with a single internal bolt. The doors are both missing.

Inner Room Windows: 18 x 2-pane windows, one set in each segment of the wall framing, except for the segment diametrically opposite the door, which has two windows (Plate 12). Each window aperture is 2.6m above the internal floor, and measures 465 x 665mm. Frames are of wood, painted white, and are non-opening. Several of the panes in the windows around the room have been replaced with fine metal mesh (Plate 5). There is no sign of any blackout paint on the glass.

5. Signs & Instruction Boards

On east side of tunnel, 300mm from its north end, is a signboard 530 x 460mm, made of horizontal planks fastened to upright battens at each edge. Painted red, with signwritten lettering, italic serif script. Legend reads:

TNT STORE BLDG 494
LIMIT 15.000 lbs
FOR R.D.X. SECTION

(Plate 13)

Screwed to this board below the legend is a piece of fibreboard 380 x 305mm. The top 50mm of this is painted red, with the stencilled white legend:

ZZ 2.500

The rest of the fibreboard is painted with blackboard paint. There are some chalk marks, none legible.

6. Roof

Inner Room: Conical, 9° pitch, timber-framed. 18 main rafters, 180 x 60 x 4.95m, set at 760mm centres, jointed to the tops of the wall uprights and the bracing beams (Plate 14). 5 roughly concentric rings of internal cross-bracing, consisting of 50 x 50mm section timbers nailed between rafters to prevent twisting.

Roof centre supported by timber post, 170 x 170mm section, set into concrete floor base (Plate 6). Top section of post is cast metal with an integral bracket on each face, supporting a wooden ring *c.*50mm wide, on which the ends of the rafters rest, butting against the central post. The space within the ring is filled with four shaped pieces of wood, presumably fastened to the post. The spaces between the rafters for about 600mm from their inner ends are filled with wedge-shaped pieces of wood. A second ring is fastened to the upper face of the rafters, and above this is a roughly shaped central cap of zinc sheet. Diagonal timbers running from the corners of the post below the cast section to the rafters support fibreboard panelling, now missing, which originally covered the details described above (Plate 15).

The roof exterior is covered with horizontal planking, 170 x 18mm, each piece spanning between two rafters and held by iron nails (Plate 16). This is covered with bitumenised felt segments. Beneath the planking is a layer of zinc sheet segments. The central boss is covered with a circular cap made of zinc sheet.

Roof interior is covered by shaped panels of 15mm fibreboard in 3 concentric rings, each panel spanning 4 rafters (Plate 14). Panels are nailed to rafters with 25mm copper-alloy tacks, and the panel joins and tacks are covered with 50mm wide strips of fabric. The entire ceiling, including the central post, is painted white. The southern half of the ceiling is now collapsed, and the remainder is in a poor condition.

Shoe Room: shallow pitched roof, ridge spanning inner passage. Boarded and felted.

7. Interior Fixtures & Fittings

On the west side of the access tunnel, 1.1m from the north end, is a board 630 x 155 x 35, painted white, with traces of red paint beneath. To this board were originally screwed three iron double coat hooks: 2 are now missing (Plate 17).

8. Lighting

No fittings in access tunnel, inner passage or inner room. Latter lit by natural light through windows, enhanced by white interior.

9. Heating

None noted.

10. Buildings Close by with Obvious Relationship to this Building

None. Closest structure is a concrete plinth (495) carrying a steam-driven fan, 23.75m east of the entrance to the M351 access tunnel.

11. Communications

None.

12. Floor

Access Passage, Inner Room & Shoe Room: continuous level floor of wood blocks, each 295 x 70 x 25mm, laid directly on concrete sub-base. In the access passage, this is edged on both sides with wooden strips.

Inner Passage: concrete, *c.*380mm below the shoe room floor. Presumably slopes upward away from shoe room to assist drainage.

13. Additional Observations

1. In the traverse wall, 2.2m from the west shoe room doorway at a height of 700mm from the inner passage floor, is an area of concrete *c.*500 x 600mm, apparently cast *in situ*. Is this a repair, or a blocked access tunnel?

2. Bolted to the outside face of the traverse wall at mound level, facing SSW, is an iron bracket 150mm square. On the inner face of the wall, the bolts pass through two parallel metal strips running down the wall (Plate 18). A second identical pair of bolts projecting through the strips *c.*520mm lower suggest that a second similar bracket is present below mound level on the outside of the wall. Examination of the visible bracket revealed the remains of a timber post, with 3mm diameter copper wire attached. Could this post have supported a lightning conductor?

3. On the west wing wall of the access tunnel, about 1m above ground level, are bolted 3 shaped pieces of wood, forming a semicircle 510mm diameter. Projecting from its bottom left corner is a batten 50 x 25mm, about 300mm long. Around its curving upper edge are screwed the remains of smaller 25 x 25mm battens also projecting outwards. The most likely reconstruction for this object is a support for a hose reel (Plate 19).

4. The 'bootlocker' reported by the ECC survey as being in the tunnel is now in the inner room (Plate 20). There is also a small stool-like object in the tunnel.

Phasing: As noted elsewhere, the access tunnel and traverse wall were built at the same time, and show no sign of alterations or additions. There are similarly no structural alterations visible in the fabric of the inner room, and no fastenings or fixtures marking the removal or addition of internal fittings.

Description of the Guncotton Stove Fan 495

Building no: 495 Fan House NGR: TQ 3789 9947

1. General

Steam-driven extractor fan on concrete plinth 23.75 m east of entrance to M351.

2. Services

Steam: The supply pipe to the fan motor was not located, so its route could not be traced.

3. Plinth

Concrete base *c.*3.05 x 3.2 m, edged with chamfered blue engineering bricks. Projecting from the west side of this towards the entrance to M351, some 200mm below the plinth, is a rough concrete base 3.4 x 1.15m (Plate 21). No fixings for machinery, etc., were noted on the surface of the latter.

Projecting above the main concrete base is a tapered concrete plinth, ending in two 'steps'. The upper step, 680mm square and 1.02m high, supports the fan motor: the lower step, 430 x 1060mm, supports the fan casing (Plate 22).

4. Motor

A single-cylinder vertical steam engine, manufactured by W H Allen & Co, London. The cast iron crankcase remains bolted to the plinth (Plate 23); the cylinder has been broken off, and lies alongside the base (Plate 24). The crankshaft diameter is 56mm, with a throw of *c.*260mm, and runs in plain phosphor-bronze bearings. There is a drain cock in the base of the crankcase, facing west. Traces of asbestos lagging remain on the cylinder.

5. Fan

A snail-shaped fan casing of iron sheet riveted to a frame made of 25mm angle. Ext. dimensions 255mm wide and 1210mm across. The drive shaft enters from the south through a hole with a rectangular cover-plate. In the side away from the motor (north) is a hole 540mm diameter, with 10 regularly spaced rivet/bolt holes around its reinforced edge. At the base of the fan casing, facing east, is a flanged rectangular inlet hole, 235 x 130mm, and diametrically opposite is another rectangular hole in the casing edge, 200 x 150mm. Unlike the holes previously described, there is no sign of fixings around the edge of the latter. At the top of the casing, a lifting eye is screwed into a reinforcing plate.

The fan consists of a central hub with six curved blade supports (iron rod) projecting from it. No trace of the fan blades remains. Viewed from the north side, opposite the motor, the direction of rotation is clockwise, sucking air in through the hole in the lower part of the casing, and exhausting it through one of the higher apertures (Plate 25).

6. Signs & Nameplates

Engine crankcase has cast legend on east side:

ALLENS PATENT
WH ALLEN & Co
LONDON

(Plate 23)

All the manufacturer's engine plates have been removed or very badly damaged. There is no plate on the fan.

7. Buildings Close by with Obvious Relationship to the Fan

Related spatially to M351, the closest structure, though the existence of a *functional* relationship cannot be proved.

8. Additional Observations

From its construction and orientation this is an extractor fan, drawing gases or fumes in through the hole at its base from a source to the west, and expelling straight into the atmosphere.

Discussion

Guncotton Stove

The system of air drying is still something of a mystery, although the historical photograph[Plate 4] showing the two gauges of pipe arriving at the entrance to a guncotton stove point to a possible route for dry hot air to be introduced and wet air to be extracted. The positioning and route of additional pipework can only be guessed at. If the pipes did once pass along the entrance tunnel and into the timber structure, then there are no signs of support brackets in the tunnel or entrance holes in the timber building, although a later replacement of boards for use as an RDX section store may have removed any surviving evidence.

All evidence of the narrow gauge railway has gone and only Plate 4 and the historical plan shown at Fig 1 provide evidence that it once existed.

The wooden floor in the building is a later addition as the construction drawing shows the non-sparking covering of lead in the stove. This covering would have also been kept clean after each drying by damping down with water and sweeping away any residual guncotton dust.

Fan House

The Plate 1 shows the existence of overhead transmission line insulators, suggesting that the fan house and/or stove were connected to the site telephone system in 1896. Plate 1 also shows the steam supply to the fan house. The method of heat transfer inside the fan house is unclear. The fan house can be seen to be a small weather boarded structure sitting on low brick sill walls. The roof appears to be of felt and there are two windows visible on the north and west sides of the building.

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Appendices

Appendix 1: Photographic Register

Photographic Register

WALTHAM ABBEY RGPF SOUTH SITE	Date: August 1997	Initials: RJZ
Building: M351 Guncotton Stove	Film: 400ASA Colour Slide & Monochrome	

Shot No. B/W+Col	*Description*	*Scale used*	*Neg. No. B/W*
1	General view from south	-	0
2	Entrance to building, from south	2m	1
3	Remains of wooden 'fire hose reel' on west wing wall	500mm	2
4	Iron bracket for ?lightning rod on outer face of traverse wall	500mm	3
5	Roof of inner room, from west	-	4
6	Entrance passage, from south	2m	5
7	Coathook(s) and batten, west wall of passage	500mm	6
8	Coathook(s) and batten, west wall of passage	500mm	7
9	Notice board, east wall of passage	500mm	8
10	Shoe room, west side	-	9
11	Toe board in place at entrance to inner room	500mm	10
12	Shoe room, east side	-	11
13	Drain beneath step from shoe room to outer passage (west side)	500mm	12
14	Concrete patch on traverse wall, and fallen length of gutter	500mm	13
15	Iron plates and fastenings for brackets for ?lightning rod on inner face of traverse wall	-	14
16	Inner room, from south-west	2m	15
17	Inner room, from north-west	2m	16
18	Inner room, from north-east	2m	17
19	Detail of roof structure, north side of inner room	-	18
20	Detail of fittings at crown of centre post	-	19
21	Detail of window, from interior	-	20
22	Shoe locker (no longer in situ)	500mm	21
23	Detail of wood block flooring	500mm	22
24	Detail of wood block flooring	500mm	23

WALTHAM ABBEY RGPF SOUTH SITE	Date: August 1997	Initials: RJZ
Building: 495 Extractor Fan	Film: 400ASA Colour Slide & Monochrome	

Shot No. B/W+Col	*Description*	*Scale used*	*Neg. No. B/W*
NB Black & White negatives on same film as M351 Guncotton Stove			
1	Location of 495, looking east from entrance to M351	-	25
2	Base, plinth and mechanism from west	2m/500mm	26
3	Fan casing and plinth, from north	500mm	27
4	Fan casing, crankcase and plinth, from west	500mm	28
5	Fan casing, crankcase and plinth, from south-east	500mm	29
6	Cylinder (top to left) on ground adjacent to base	500mm	30

Appendix 2: Archive Contents

Archive Contents

Survey plot of the Guncotton Stove and Fan House at 1:100
Surveyed section of the Guncotton Stove and blast mound at 1:100
Surveyed section of the Guncotton Stove at 1:50
Section through the access tunnel at 1:10
Survey data on zipped disc using CAD12
Bound copy of typescript report
One set of monochrome prints from 35mm film
One set of Colour slides (35mm)
3 ½" floppy disc with text and photographic registers
VHS video showing footage of the Guncotton Stove

Appendix 3: Essex Sites and Monuments Record Summary Sheet

Essex Sites and Monuments Record

Summary Sheet

Site name/Address: Guncotton Drying Stove No.2 M351 and Fan House 495, South Site, Waltham Abbey Royal Gunpowder Factory, Essex	
Parish: Waltham Abbey	***District:*** Epping Forest
NGR: TQ 3787 9949	***Site Code:*** WASS 97
Type of Work: Building record/survey	***Site Director/Group:*** Steve Chaddock / Prince Research Consultants
Date of Work: 01.07.97 - 31.08.97	***Size of Area Investigated:*** -
Location of Finds/Curating Museum: Essex Records Office	***Funding Source:*** Environmental Services Group, Royal Ordnance plc
Further Seasons anticipated?: NO, as site is due to be developed and this is last stage of recording.	***Related SMR Nos:*** -
Final Report: -	
Periods Represented: 1892 to ?1950	

SUMMARY OF FIELDWORK RESULTS:

A recording brief, carried out on the Guncotton Drying Stove and Fan House of the South Site Guncotton Factory, included a survey of the building in plan and sections through the foot access tunnel, and photographic and video coverage.

The Guncotton Stove was constructed in 1892 to dry nitrcellulose manufactured at the Guncotton Factory situated along Cobbins Brook to the north. The nitrcellulose had to be dry to be used in the manufacturing of cordite Mk 1, for which a manufacturing facility was situated to the east. The stove was served by a narrow gauge tramway and the fan house drew hot air out through the stove to speed up the drying process. There is no trace of the steam or air pipes, or of the narrow gauge tramway tracks. The stove is an important survival on the historic Waltham Abbey site.

The Stove consists of a free standing, circular, timber building, surrounded by an earthwork traverse, revetted on the inside with a brick wall. The traverse is pierced by a brick-vaulted entrance tunnel.

Previous Summaries/Reports:

1996 ECC FAG Nitroglycerine Washing House Report by Stuart Foreman
1996-7 Archaeological Evaluation of South Site by S. Chaddock including Site Survey in CAD Environment, Component Sheets for all buildings and text report detailing remains and processes carried out on site.

Author of Summary: S. Chaddock	***Date of Summary:*** 04/09/1997

Appendix 4: The Plates

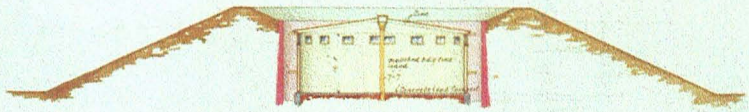
BRITISH AEROSPACE
Royal Ordnance

PLATE 1
REPORT No.
Int 3-97/2362

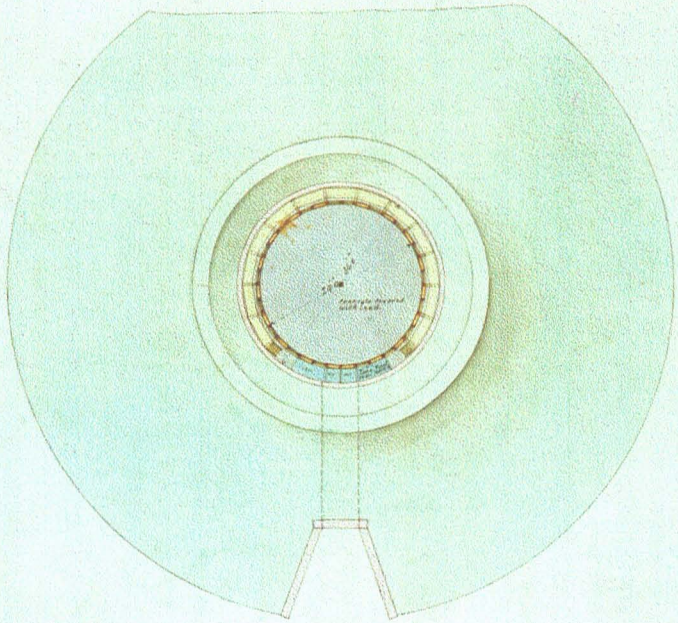
WALTHAM ABBEY

QUINTON HILL

N°2 GUN-COTTON STOVE



Section A B.



Plan

Scale 8 ft to an inch

494

S11H

M.351.B 02

BRITISH AEROSPACE
Royal Ordnance

PLATE 2
REPORT No.
Int 3-97/2362

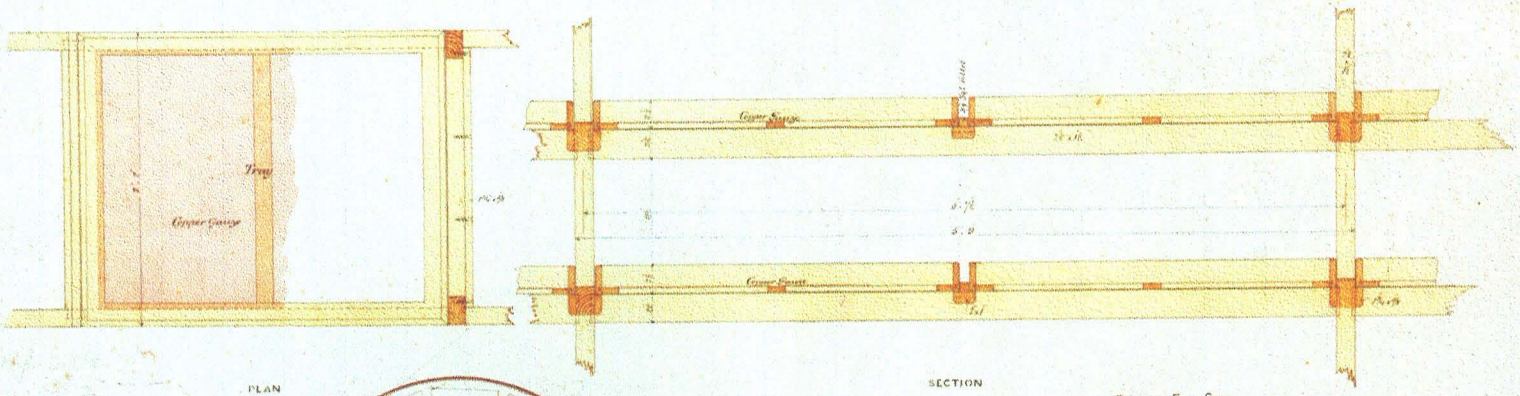
VIIH X448

H 114

494

GUN COTTON DRYING HOUSE

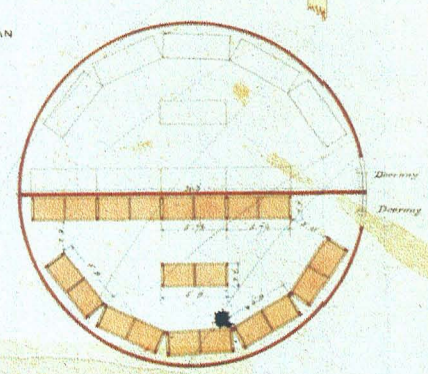
WALTHAM ABBEY

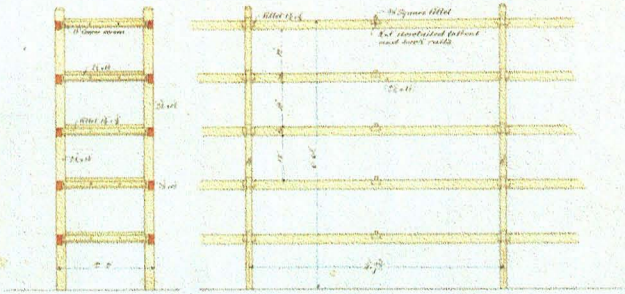


PLAN

SECTION

QUARTER FULL SIZE





PLAN

SECTION

FRONT ELEVATION

INCH SCALE

SCALE 4 FEET TO AN INCH

Wm. T. Dawson
17.9.91

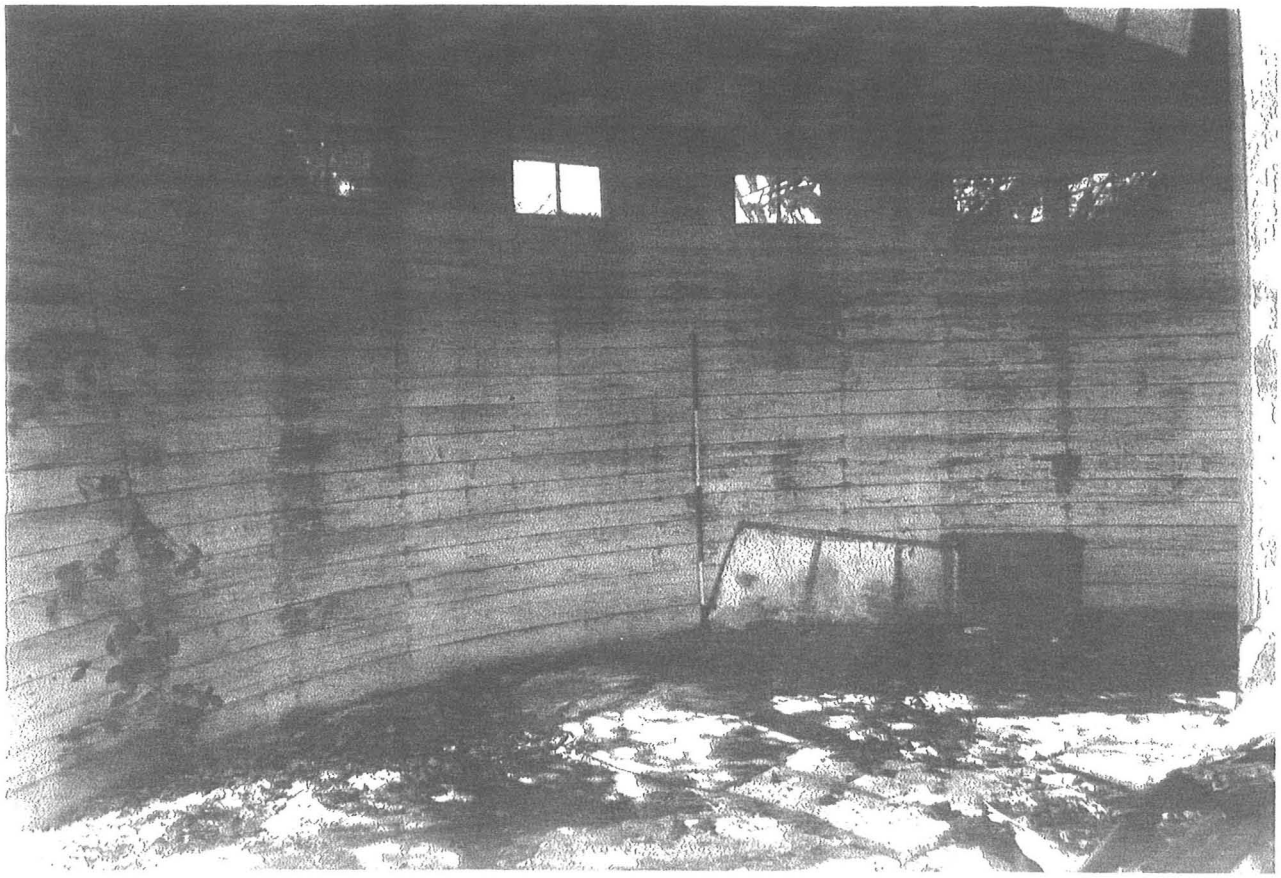
M.351.B.01.

BRITISH AEROSPACE
Royal Ordnance

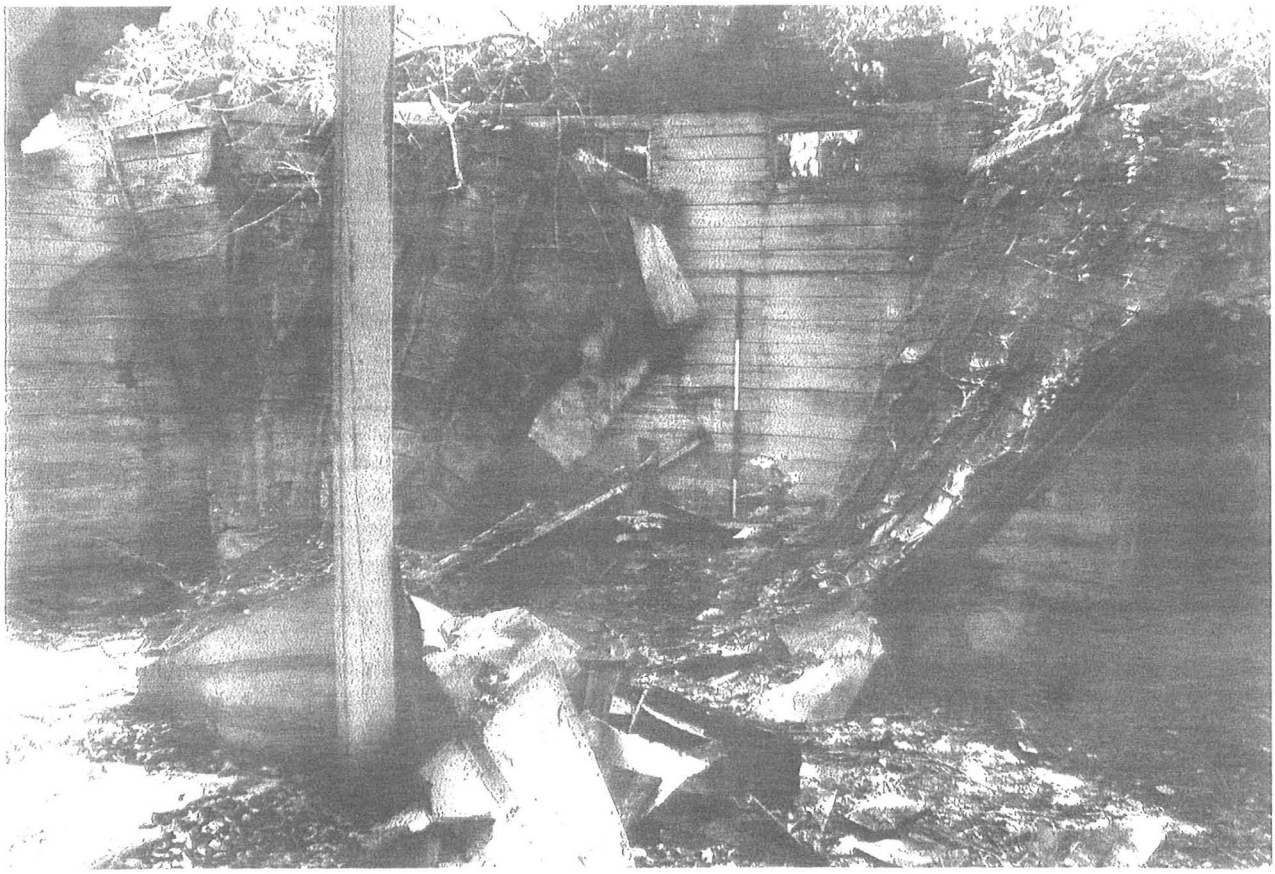
PLATE 3
REPORT No.
Int 3-97/2362

BRITISH AEROSPACE
Royal Ordnance

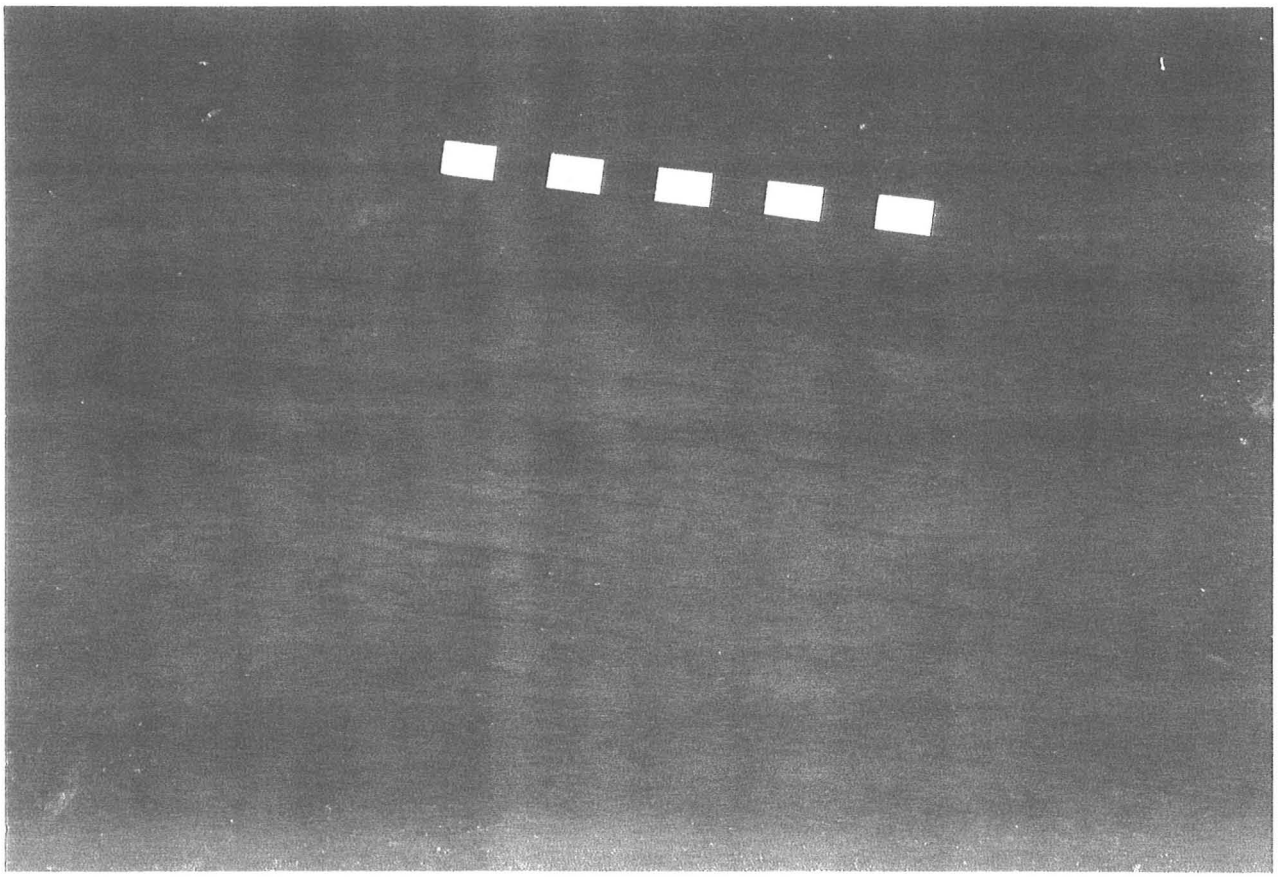
PLATE 4
REPORT No.
Int 3-97/2362



M351 PLATE 5 - INNER ROOM, FROM SOUTH WEST



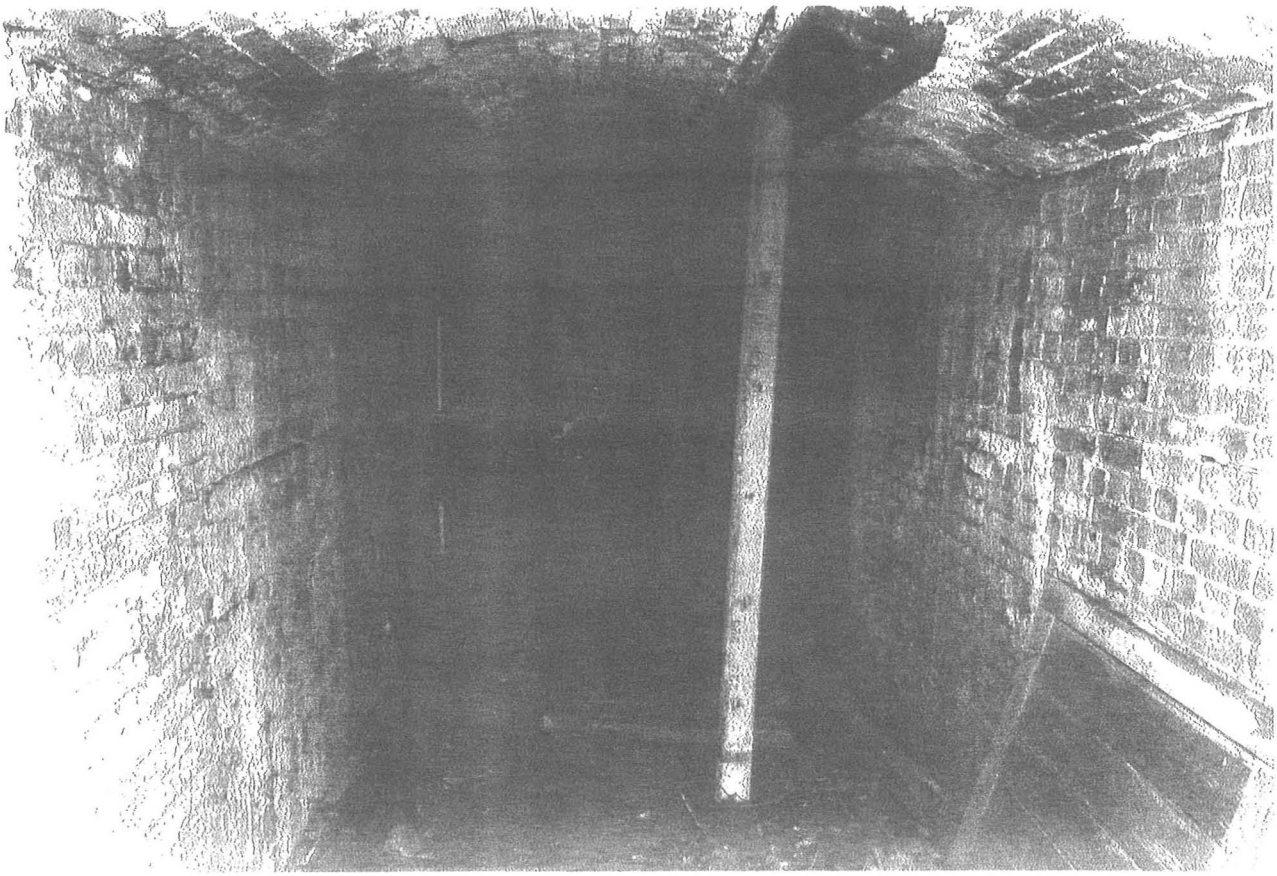
M351 PLATE 6 - INNER ROOM, FROM NORTH WEST



M351 PLATE 7 - DETAIL OF WOOD BLOCK FLOORING

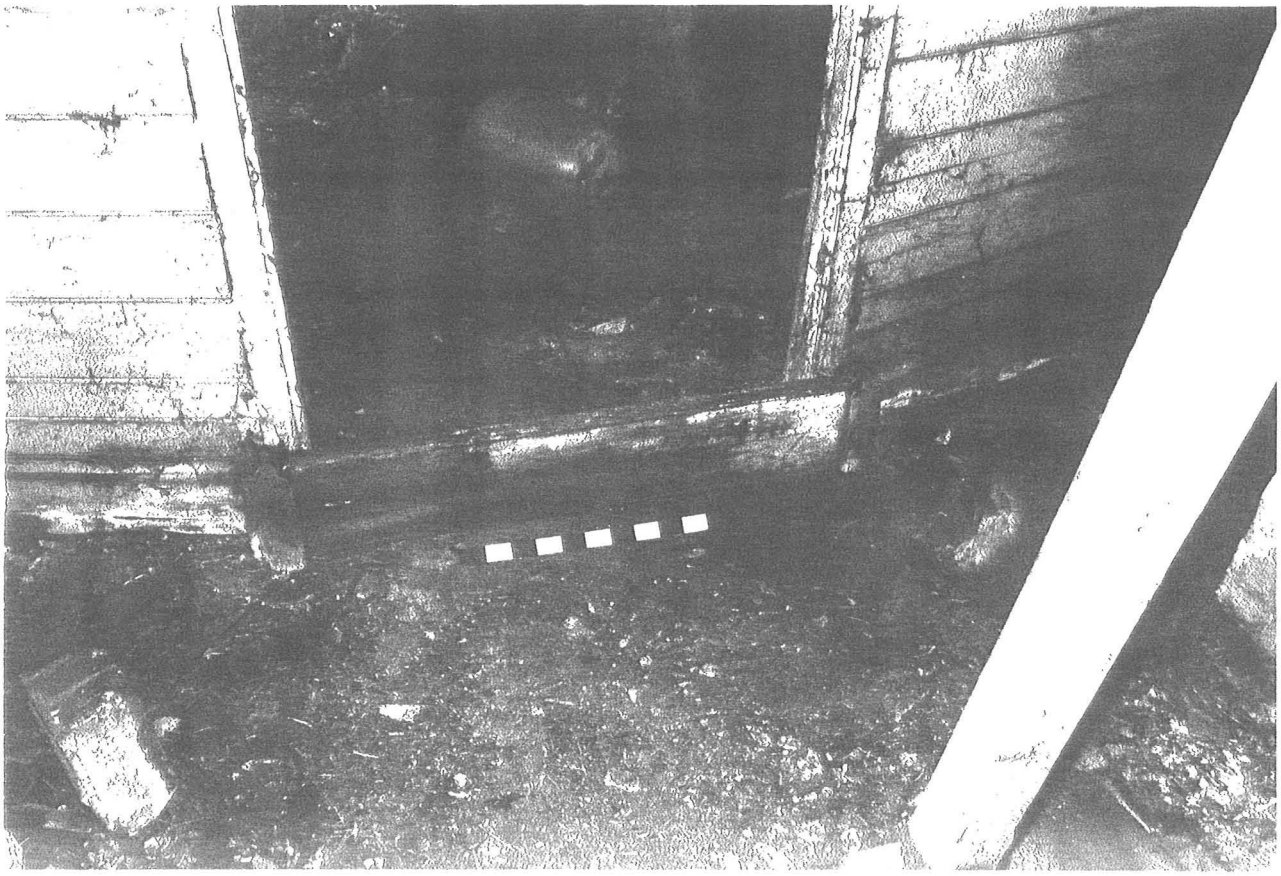
INTENTIONALLY BLANK

M351 PLATE 8 - DRAIN BENEATH STEP FROM SHOE ROOM TO OUTER PASSAGE (WEST SIDE)

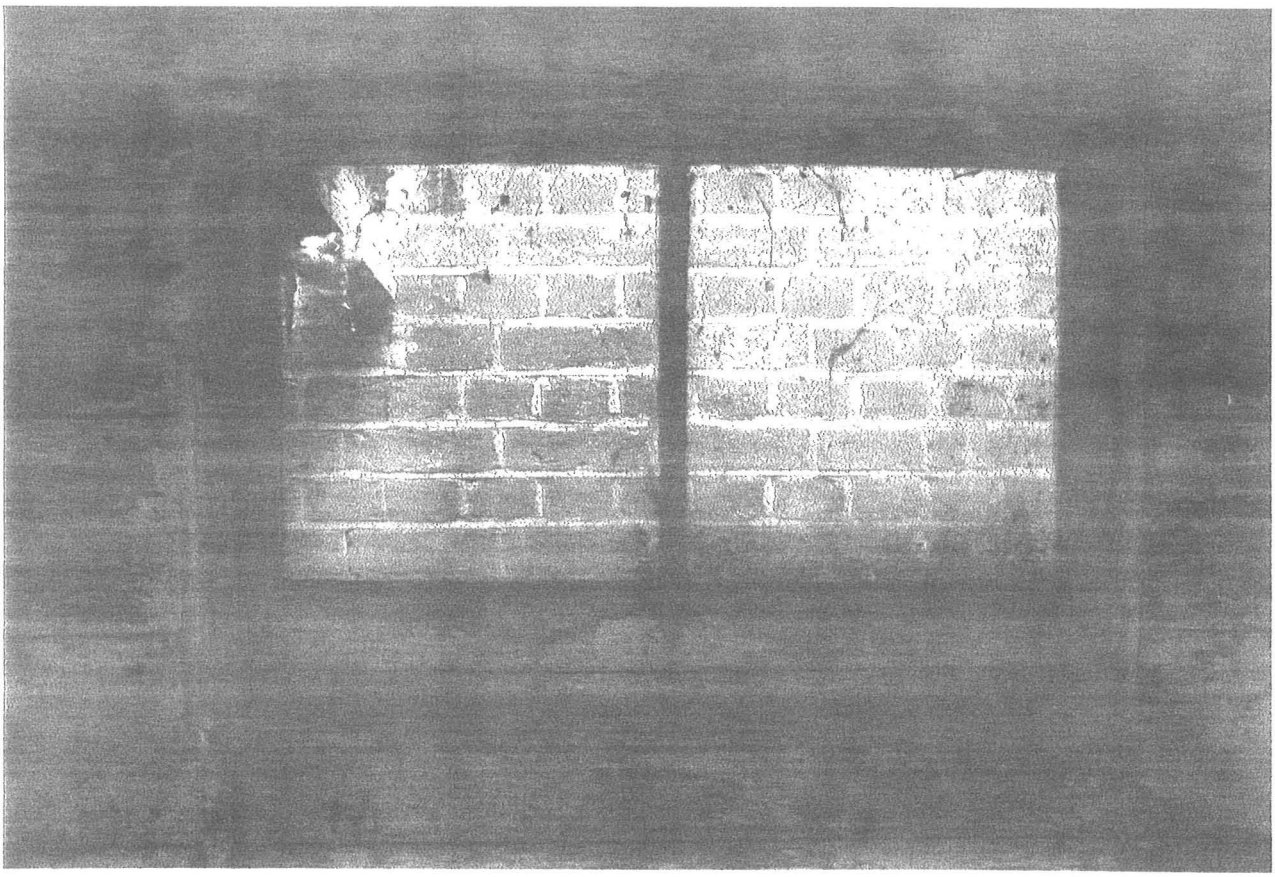


M351 PLATE 9 - ENTRANCE PASSAGE, FROM SOUTH

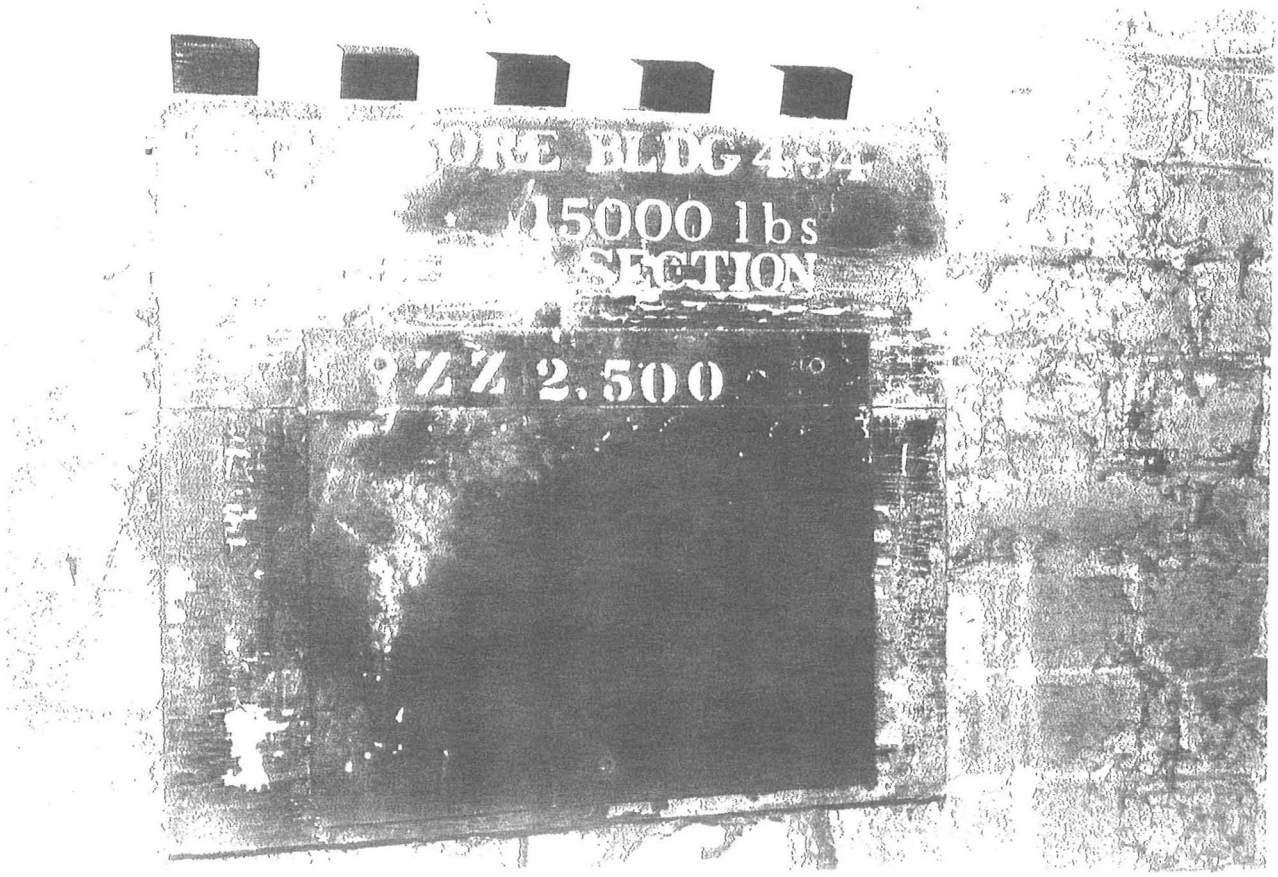
M351 PLATE 10 - ENTRANCE TO BUILDING, FROM SOUTH



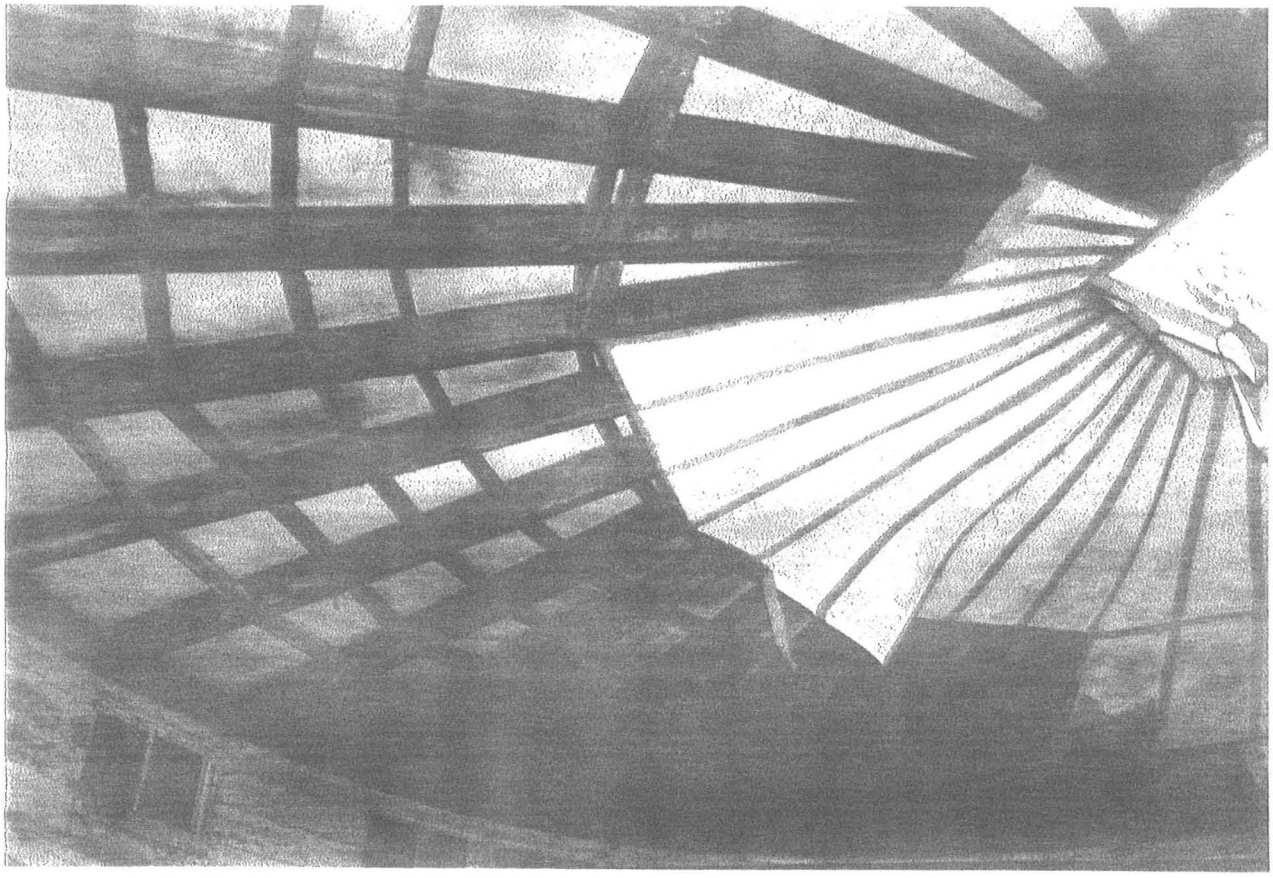
M351 PLATE 11 - TOE BOARD IN PLACE AT ENTRANCE TO INNER ROOM



M351 PLATE 12 - DETAIL OF WINDOW, FROM INTERIOR

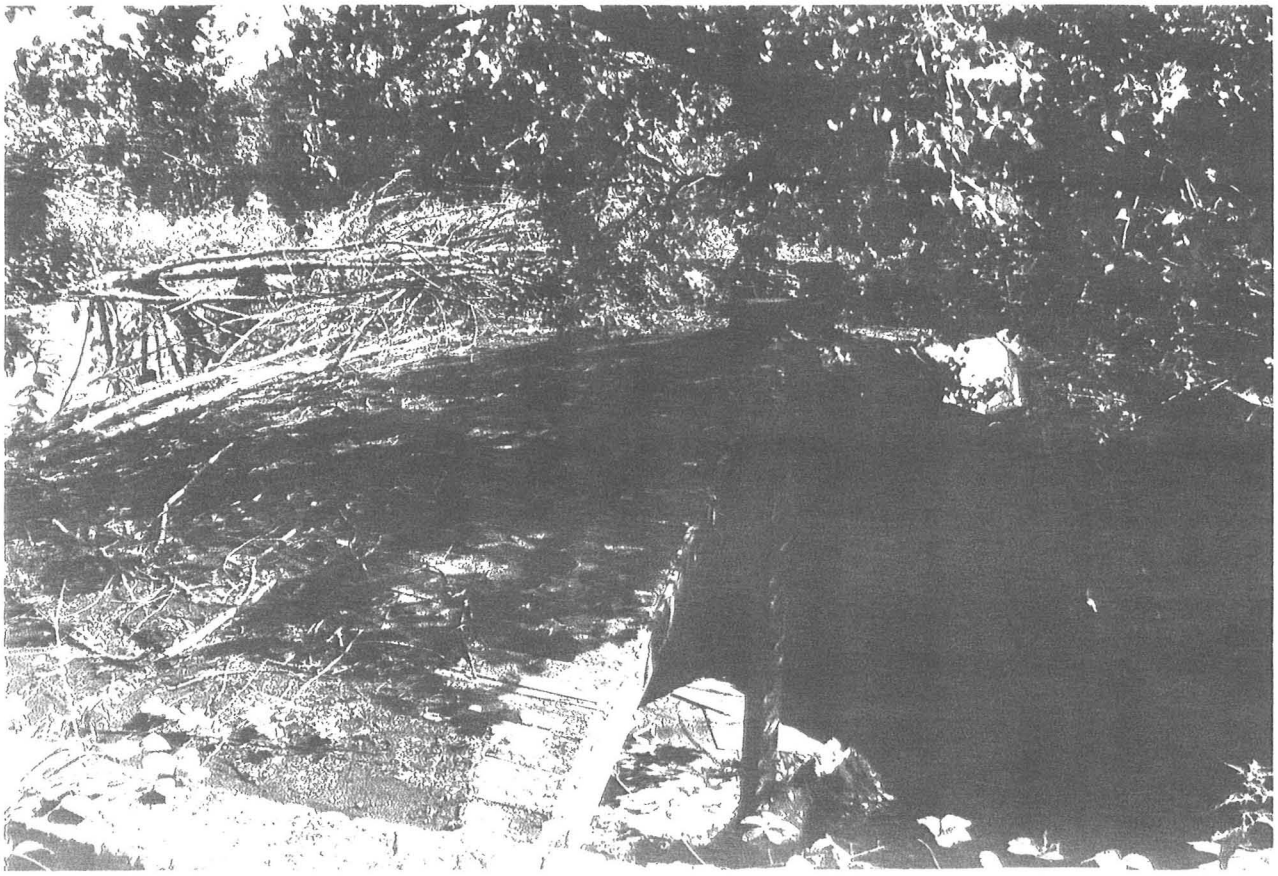


M351 PLATE 13 - NOTICE BOARD, EAST WALL OF PASSAGE

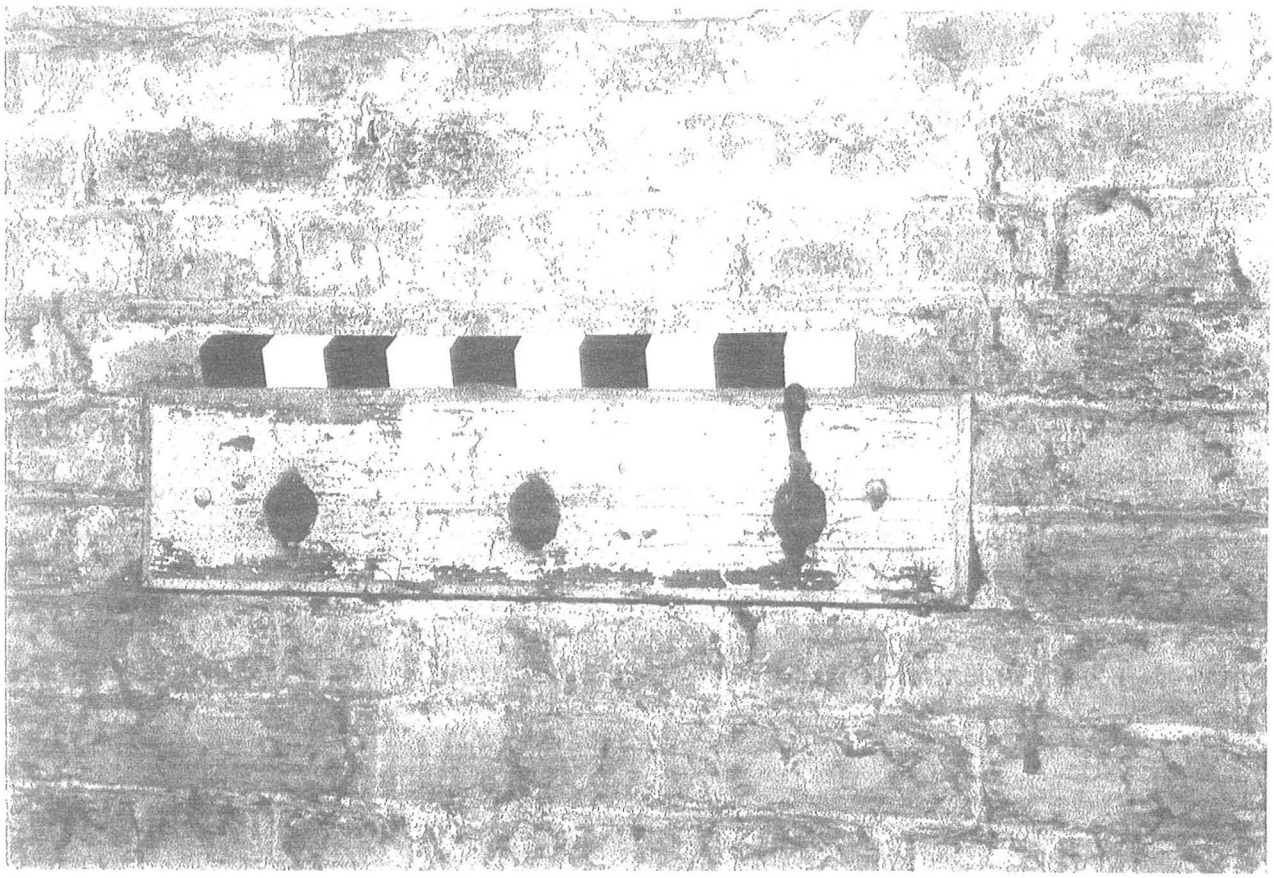


M351 PLATE 14 - DETAIL OF ROOF STRUCTURE, NORTH SIDE OF INNER ROOM

M351 PLATE 15 - DETAIL OF FITTINGS AT CROWN OF CENTRE POST



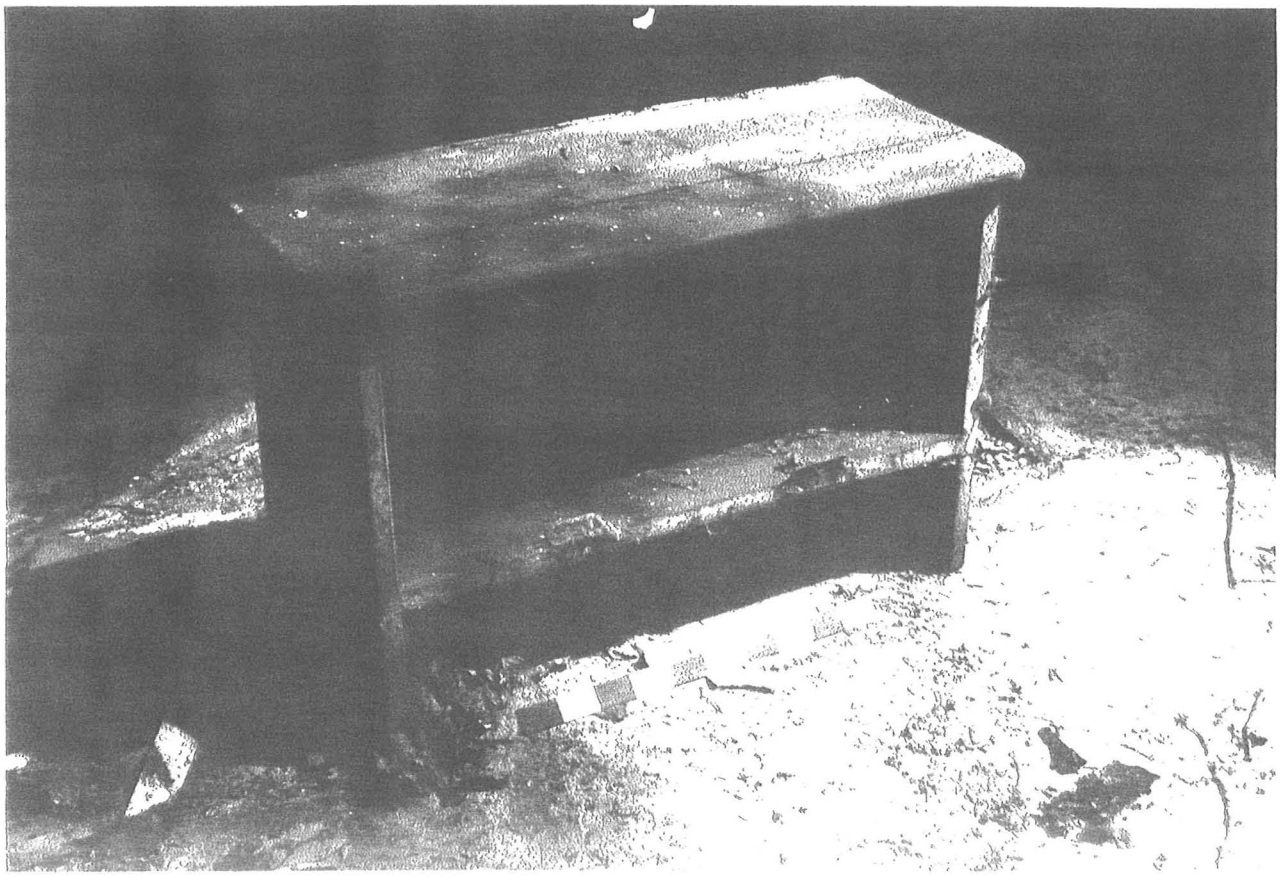
M351 PLATE 16 - ROOF OF INNER ROOM, FROM WEST



M351 PLATE 17 - COATHOOK(S) AND BATTEN, WEST WALL OF PASSAGE

M351 PLATE 18 - IRON PLATES AND FASTENINGS FOR BRACKETS (? LIGHTENING ROD)

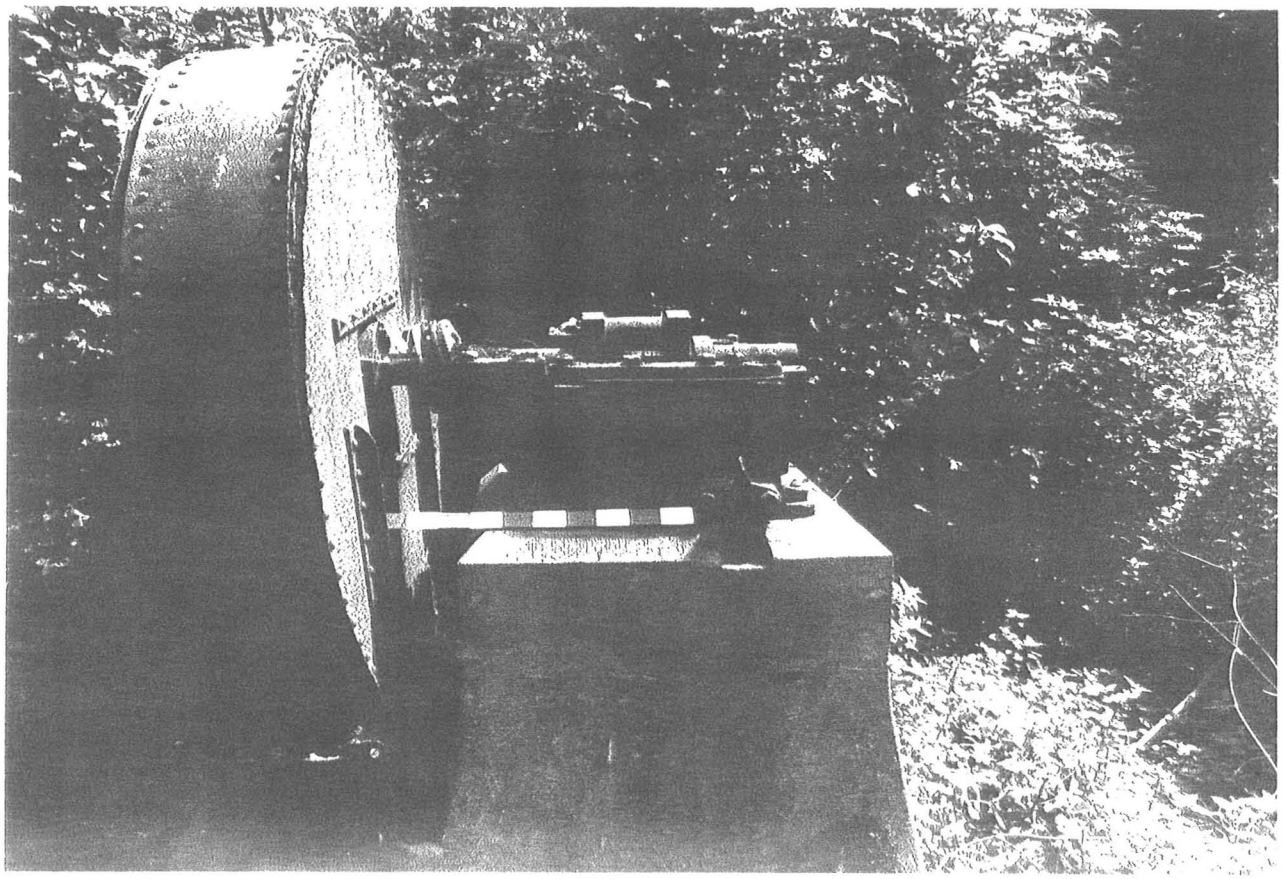
M351 PLATE 19 - REMAINS OF WOODEN 'FIRE HOSE REEL' ON WEST WING WALL



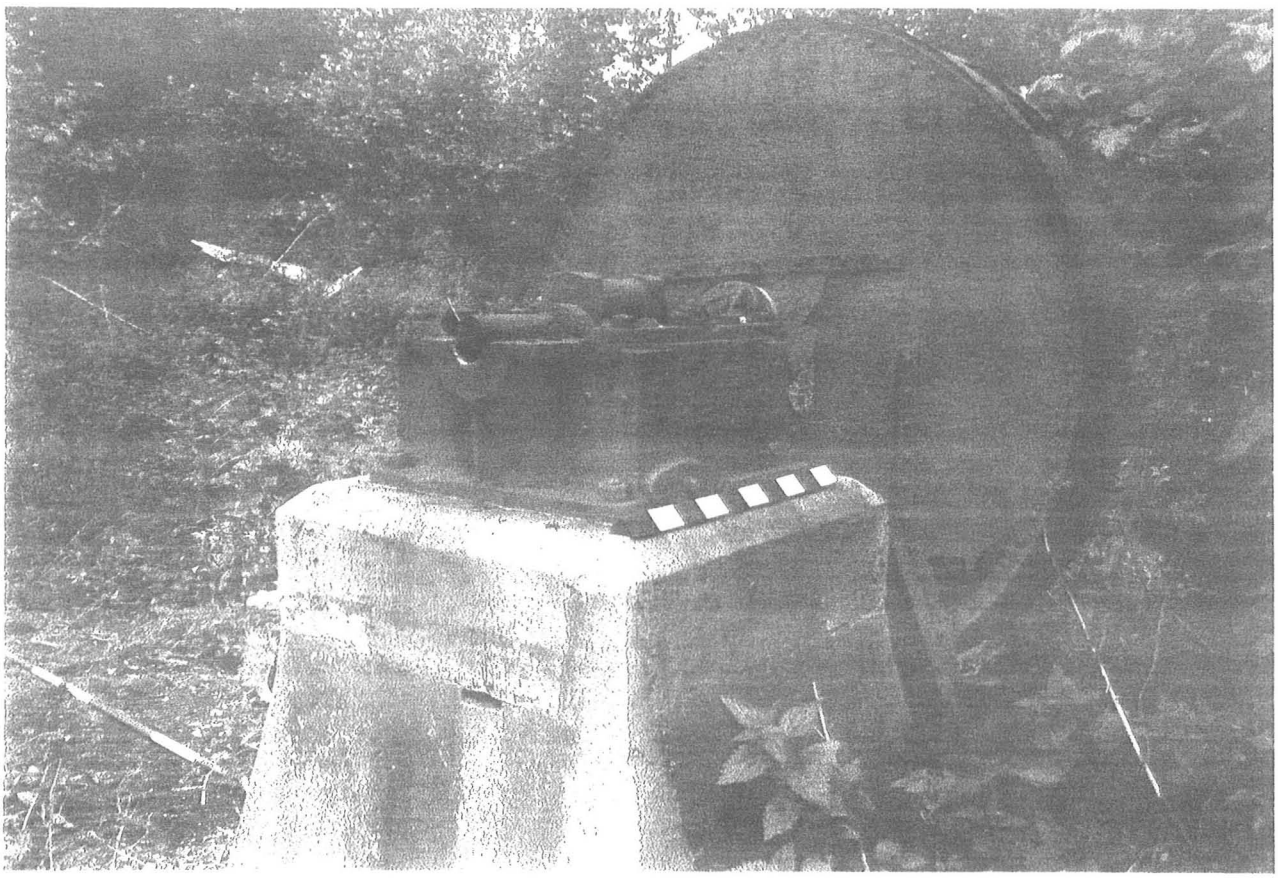
M351 PLATE 20 - SHOE LOCKER (NO LONGER IN-SITU)

INTENTIONALLY BLANK

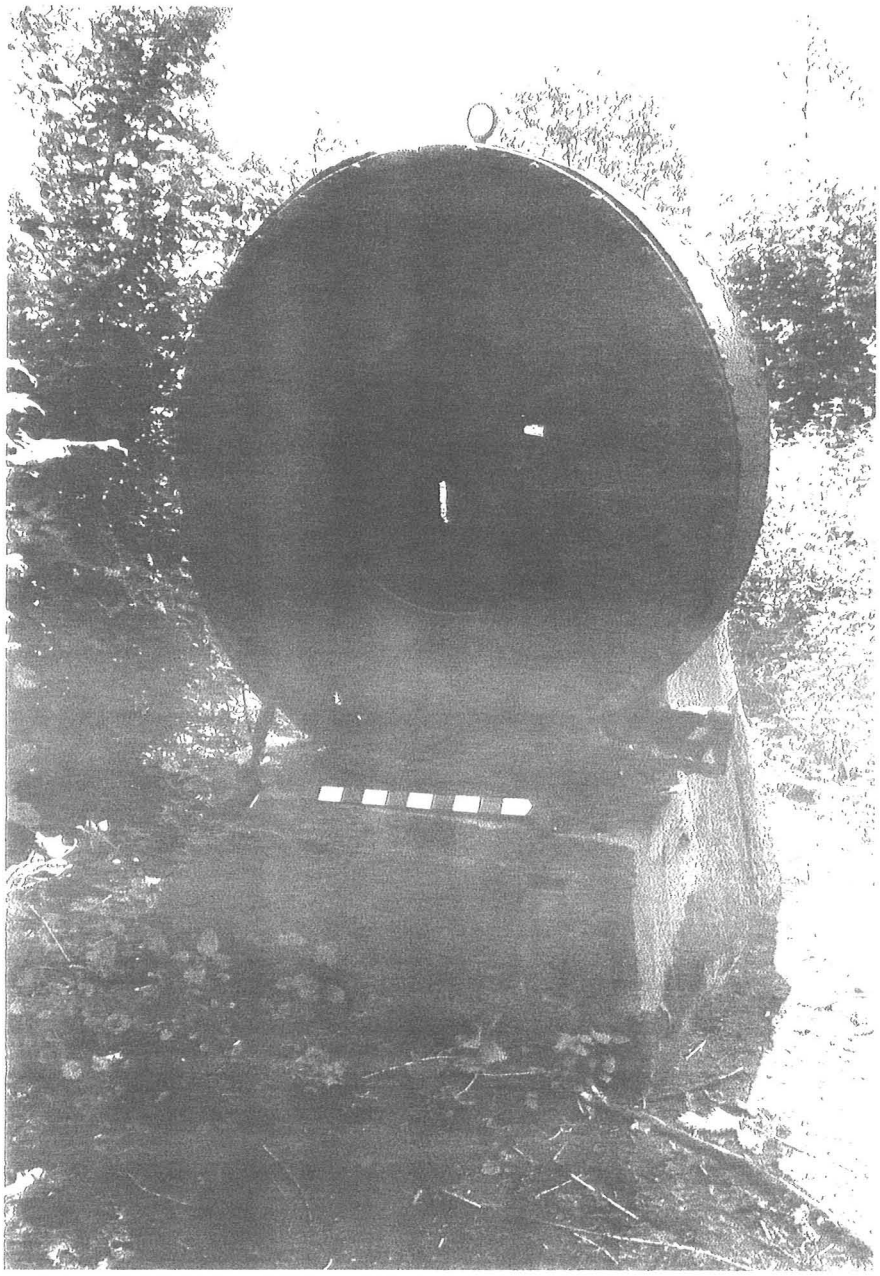
M351 PLATE 21 - FAN CASING; BASE, PLINTH AND MECHANISM FROM WEST



M351 PLATE 22 - FAN CASING, CRANKCASE AND PLINTH, FROM WEST



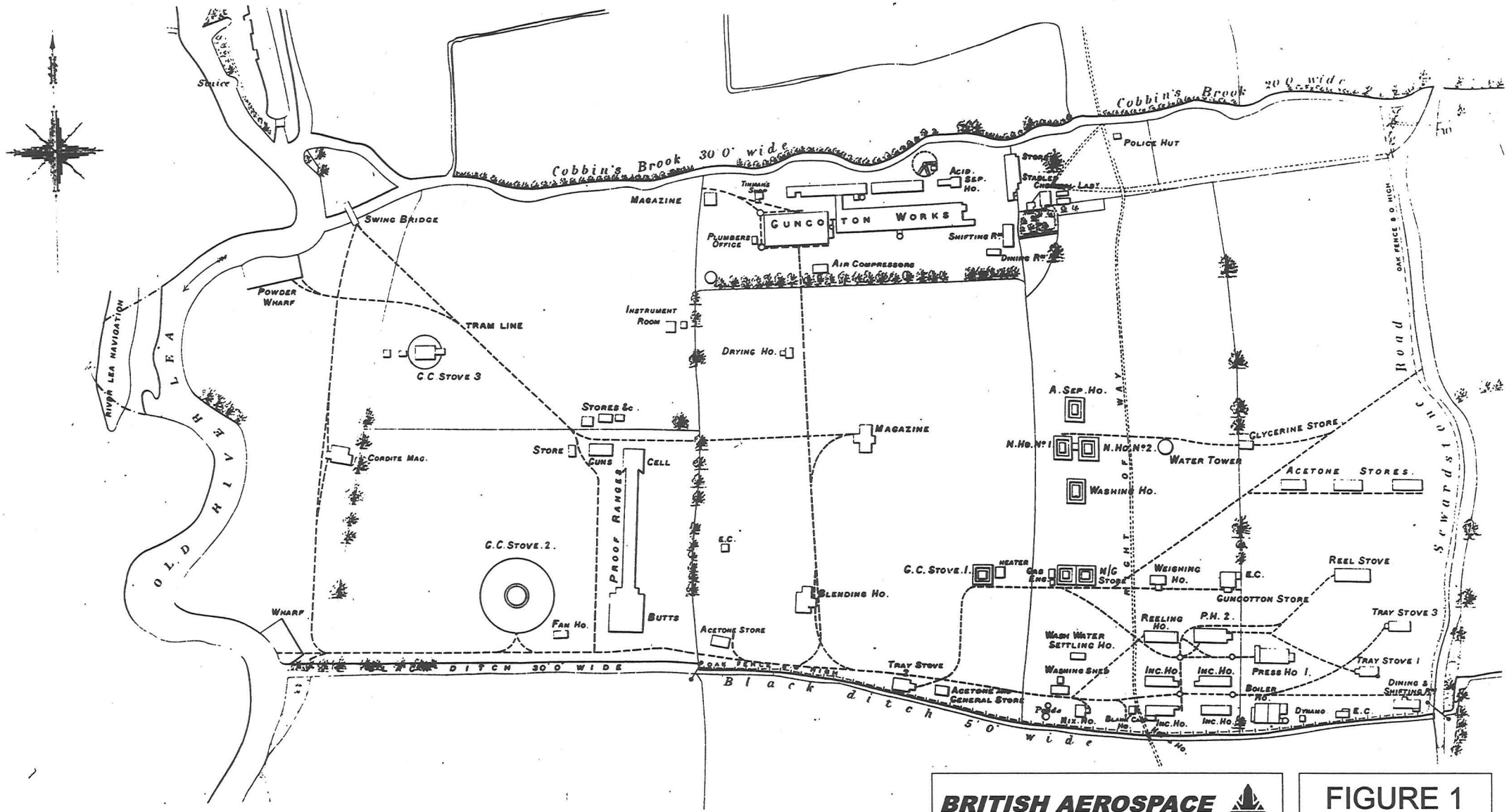
M531 PLATE 23 - FAN CASING, CRANKCASE AND PLINTH, FROM SOUTH EAST



M351 PLATE 25 - FAN CASING; BASE AND PLINTH, FROM NORTH

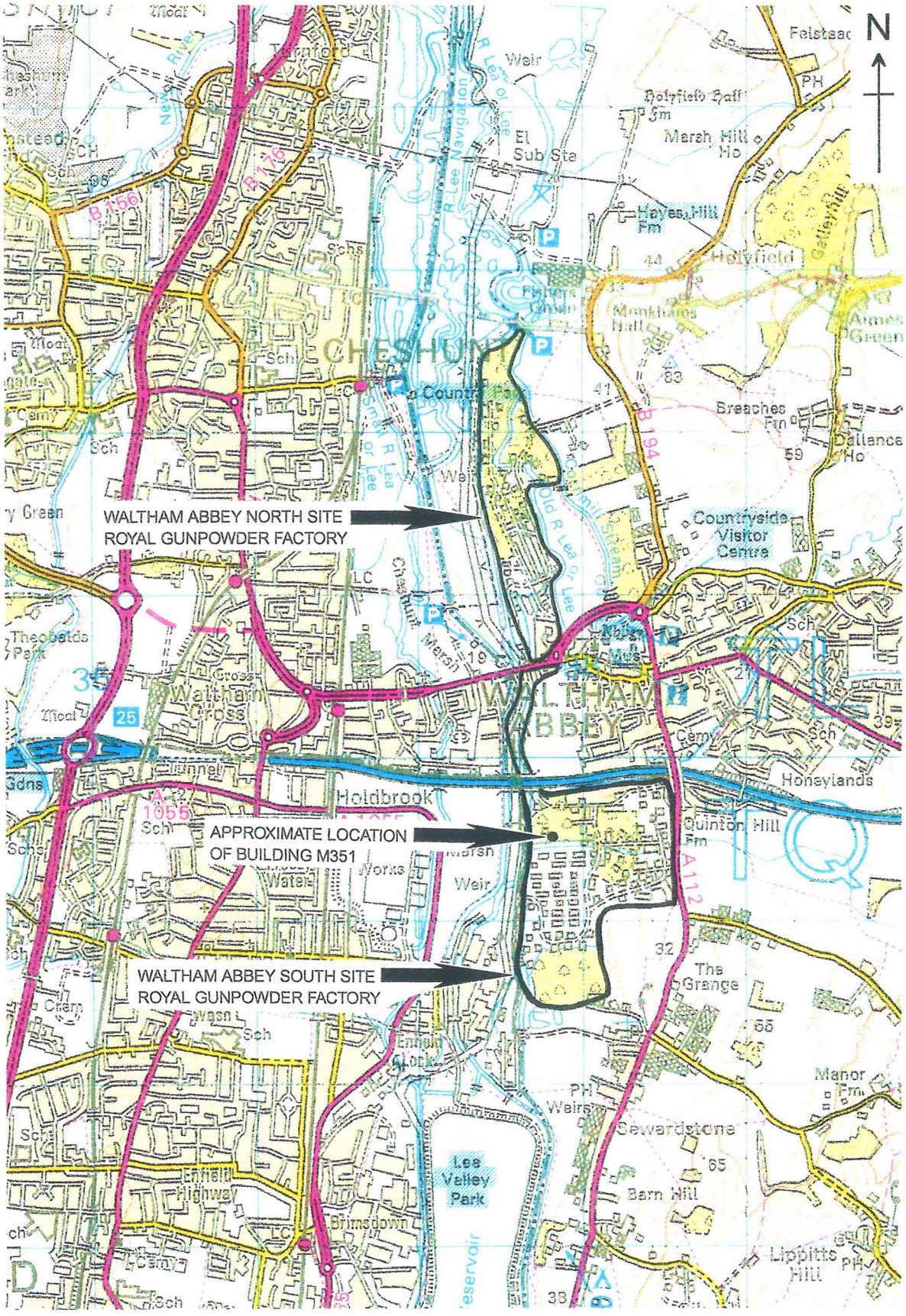
Appendix 5: The Figures

PLAN OF THE CORDITE FACTORY AT WALTHAM ABBEY, COMPRISING THE NITRO-GLYCERINE AND GUN COTTON FACTORIES.



BRITISH AEROSPACE
Royal Ordnance

FIGURE 1
REPORT No.
Int 3-97/2362



BASED UPON THE ORDNANCE SURVEY MAP WITH THE SANCTION OF HM STATIONERY OFFICE. CROWN COPYRIGHT RESERVED.
THIS MAP IS FOR IDENTIFICATION PURPOSES ONLY AND SHOULD NOT BE RELIED UPON FOR ACCURACY.

FIGURE TITLE:

FIGURE 2 - SITE AND BUILDING M351 LOCATION

PROJECT:

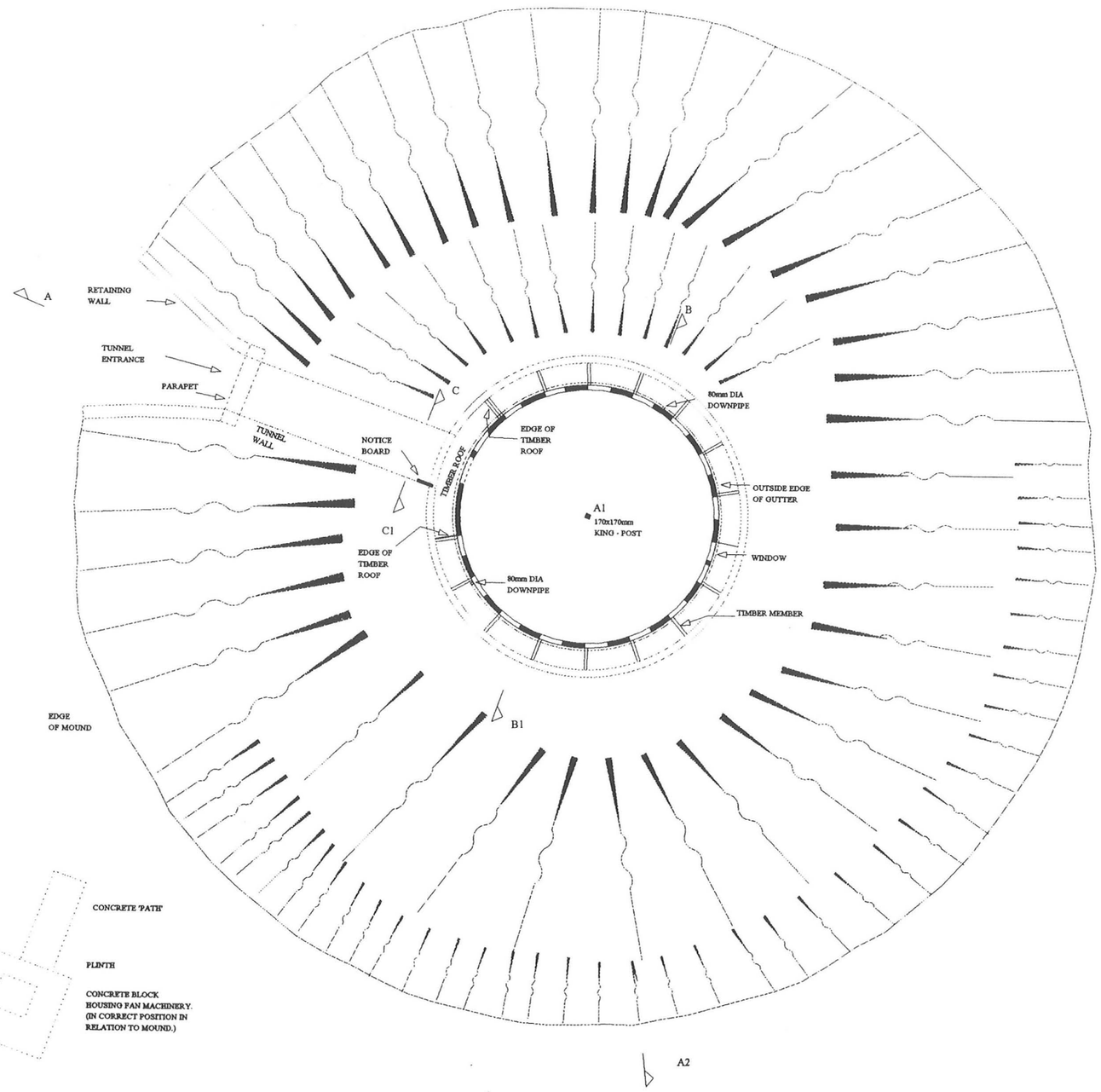
WALTHAM ABBEY SOUTH SITE RGPF

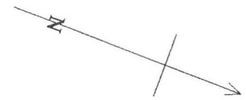
REPORT NUMBER:

ESG 2362/97

BRITISH AEROSPACE
Royal Ordnance

int3/97/figs/2362/map





BRITISH AEROSPACE
Royal Ordnance

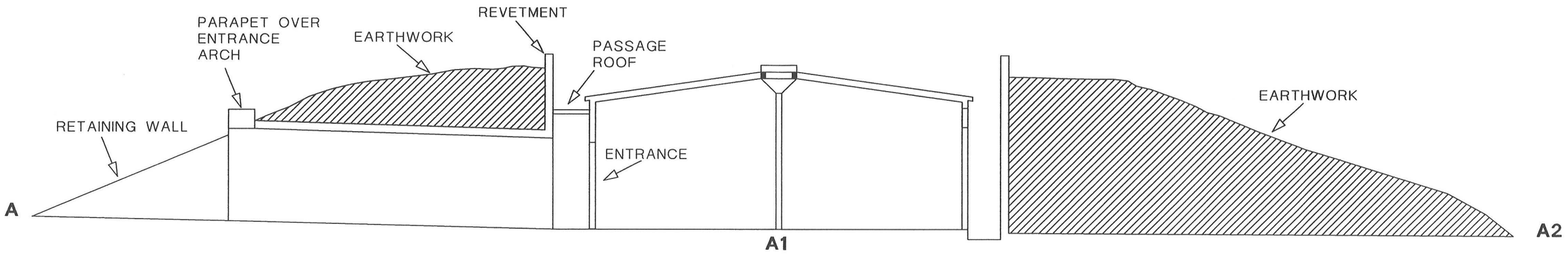
ROYAL GUNPOWDER MILLS
WALTHAM ABBEY
SOUTH SITE

Drawing prepared by:
Hertfordshire Archaeological Trust
The Seed Warehouse, Maidenhead Yard,
The Wash, Hertford. SG14 1PX.

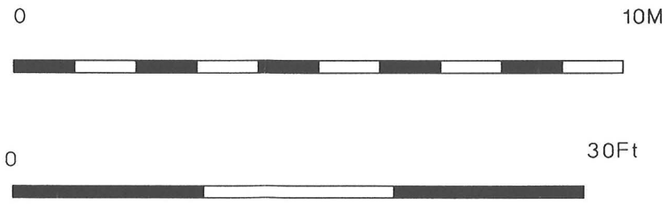
BUILDING No. M351
GUN COTTON STOVE

Overall Plan

ORIGINAL SCALE: 1:100(A2)ORIGINAL	Drawn By:KH,DR
DWG No:M351/1	DATE: 24.07.97



LEVEL ON FLOOR IS 17.615M



BRITISH AEROSPACE
Royal Ordnance

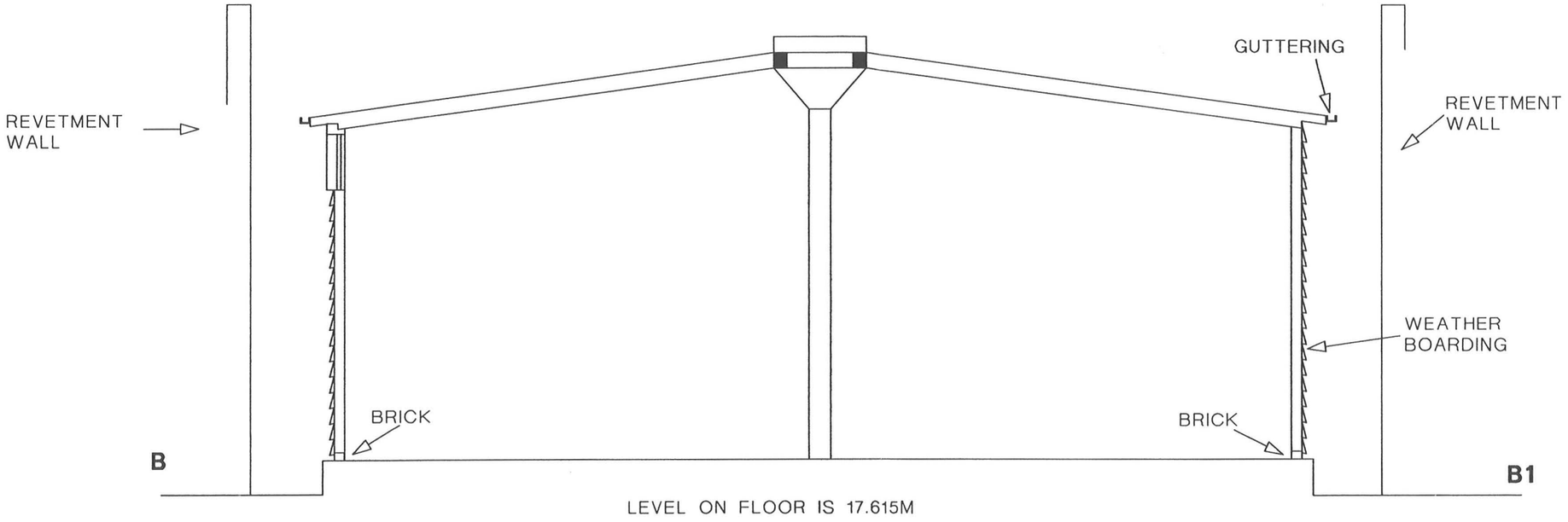
ROYAL GUNPOWDER MILLS
WALTHAM ABBEY
SOUTH SITE

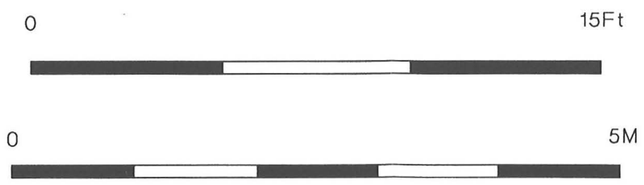
Drawing prepared by:
Hertfordshire Archaeological Trust
The Seed Warehouse, Maidenhead Yard,
The Wash, Hertford. SG14 1PX.

BUILDING No. M351
GUN COTTON STOVE

Overall Section A-A1-A2

SCALE: 1:100	**Drawn By:KH,DR**
DWG No:M351/2	**DATE: 24.07.97**





BRITISH AEROSPACE
Royal Ordnance

ROYAL GUNPOWDER MILLS
WALTHAM ABBEY
SOUTH SITE

Drawing prepared by:
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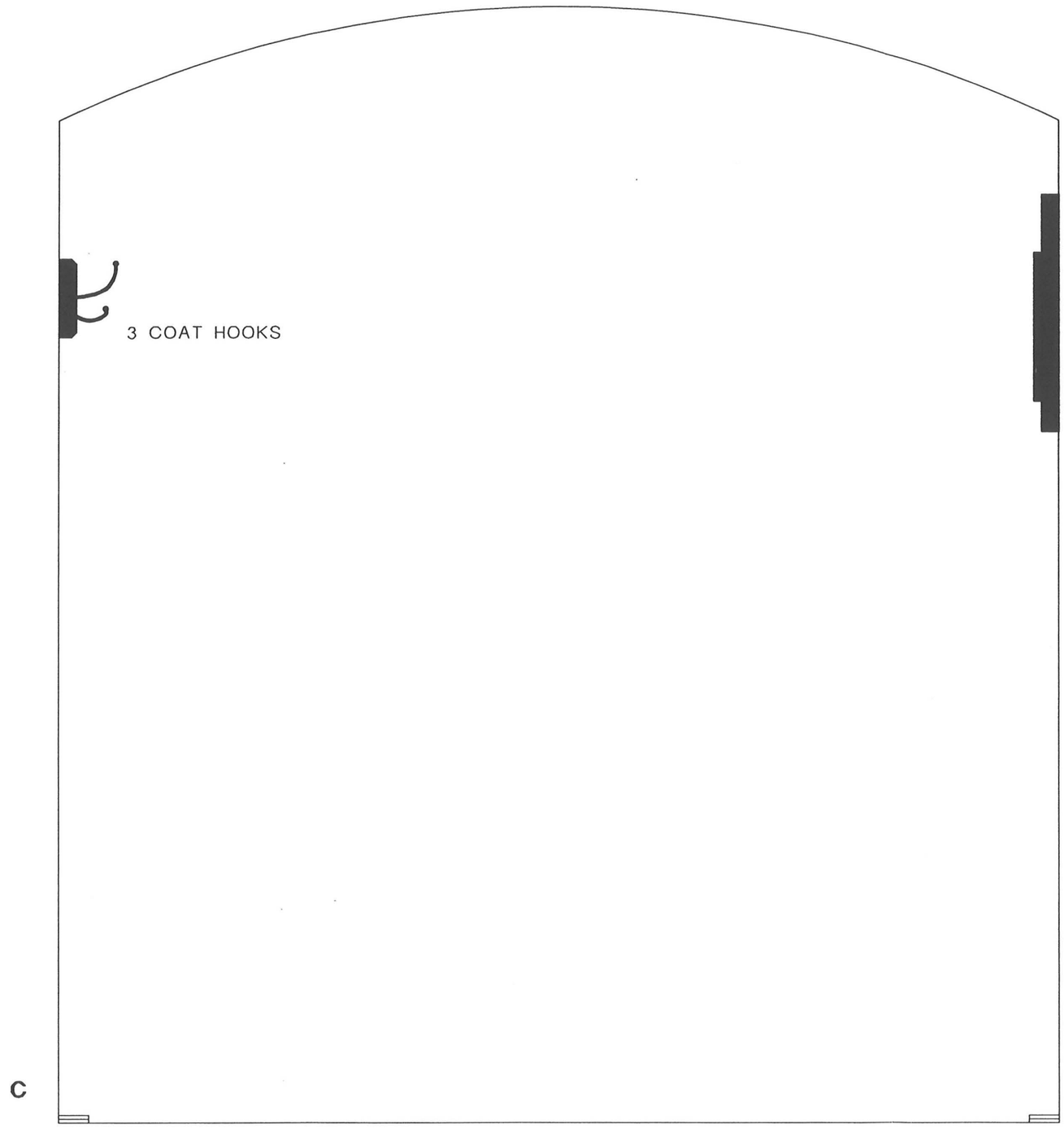
The Seed Warehouse, Maidenhead Yard,
The Wash, Hertford. SG14 1PX.

BUILDING No. M351
GUN COTTON STOVE

Section B-B1

SCALE: 1:50	**Drawn By:KH,DR**
DWG No:M351/3	**DATE: 24.07.97**



BRITISH AEROSPACE
Royal Ordnance

ROYAL GUNPOWDER MILLS
WALTHAM ABBEY
SOUTH SITE

Drawing prepared by:

Hertfordshire Archaeological Trust
The Seed Warehouse, Maidenhead Yard,
The Wash, Hertford. SG14 1PX.

BUILDING No. M351
GUN COTTON STOVE

Access Passage Section C-C1

SCALE: 1:10	**Drawn By:KH,DR**
DWG No:M351/4	**DATE: 24.07.97**