

WALTHAM ABBEY SOUTH SITE ROYAL GUNPOWDER FACTORY

BUILDING No. SS113

REPORT No. ESG 2366/97



ENVIRONMENTAL SERVICES GROUP REPORT NO. 2366/97

WALTHAM ABBEY SOUTH SITE ROYAL GUNPOWDER FACTORY

HISTORICAL SURVEY OF BUILDING NO. SS113

This document is of UK origin and is © Royal Ordnance plc. It contains proprietary information which is disclosed for the purposes of assessment and evaluation only. The contents of this document shall not in whole nor in part: (i) be used for any other purpose, (ii) be disclosed to any member of the recipient's organisation not having a need to know such information nor to any third party individual, organisation or government, (iii) be stored in any retrieval system nor be reproduced or transmitted in any form by photocopying or any optical, electronic, mechanical or other means, without the prior written permission of the Director, P & E S Business Unit, Royal Ordnance plc, Westcott, Aylesbury, United Kingdom.

Environmental Services Group Royal Ordnance Division British Aerospace Defence Limited Westcott Venture Park Westcott Aylesbury Bucks HP18 ONP

Tel: 01296 652123 Fax: 01296 652121 Date: September 1997 Ref: Int 3-97/2366 Issue 2

INT3-97/2366 ISSUE 2

REPORT NO. ESG 2366/97

Subject:

Historical Survey of Building SS113 Waltham Abbey South Site

Client:

Royal Ordnance Property Services Department

Hladbeck

ORIGINATOR: S CHADDOCK

x.u.97DATE

CHECKED BY: G G VINCENT

&. . . . 97 DATE 10,12-97

DR G BULLOCH AUTHORISED BY: .

Air Raid Shelter SS113, South Site, Waltham Abbey Royal Gunpowder Factory, Essex

Table of Contents

LIST OF PLATES2	
LIST OF FIGURES	
INTRODUCTION	
SURVEY METHOD	
HISTORY OF THE SITE	
DESCRIPTION OF AIR RAID SHELTER SS1134	
ACKNOWLEDGMENTS7	
BIBLIOGRAPHY7	

APPENDICES

List of Plates

Plate 1	External view, from south-west
Plate 2	Eastern blast wall, from south-west
Plate 3	Interior of shelter, from east Plate 4
Plate 5	Detail of roof support beams, from north-east
Plate 6	Detail: surviving wiring at entrance to toilet compartment
Plate 7	Internal partiition, south half, from east
Plate 8	Entrance passage between blast wall and end of shelter, from south
Plate 9	Eastern entrance door, from west
Plate 10	Fixtures and fittings: wooden bench, north side
Plate 11	Toilet compartment, from east
Plate 12	Fixtures and fittings: toilet unit
Plate 13	Fixtures and fittings: tramway wheels, axle and bearings

List of Figures

Fig 1	Location Map showing South East England, Waltham Abbey, South
	and North Site and location of SS113 within South Site
Fig2	Plan of Refuge as proposed in report on passive air defence in 1937-8.
	PRO SUPPLY 5/984
Dwg No: SS113/1	Overall plan of SS113
Dwg No: SS113/2	Overall section through SS113

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 Air raid shelter SS113. 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.

With the threat of attack from the air a ministry report into the requirements for passive air defence was completed in 1937 (PRO 984). From this report we find the designs of a range of shelters as well as decontamination centres and laundrys.

Considerable planning had been made for the protection of the explosives workers as it was obviously an important wartime occupation.

Refuges were to be erected for personnel of sufficient capacity to enable "occupants to remain enclosed for 12 hours - no provision will be made to give a supply of purified air, therefore 200 cu. ft. per person to be allowed.

"Construction to be strong enough to withstand light incendiary and gas bombs and high explosives splinters and internal factory explosions. A heavy construction is considered essential owing to the number of persons congregated at one spot. "Erection to be on sites as close as possible to the work-place of the persons allocated to them to allow for very little warning being given.

"Sites also to be chosen so that the minimum possible distance has to be certified as free from gas before evacuation of personnel can be undertaken, i.e. all refuges to be arranged as far as possible on one main path."

Refuges were to be "clean" buildings in which persons wearing Danger Building clothes could congregate and return immediately to work after a raid.

PRO 984

Although similar to the refuge plan shown in Fig 2, the 10 refuges built on South Site are different enough to warrant explanation. In the PRO 984 document the answer is given as follows:

"Due to early removal of RGPF to a new site, it is not proposed that the passive air defence scheme as laid down in Part II be implemented at Waltham Abbey. It is recommended instead that a certain minimum amount of preparation should be made to meet emergencies that may arise before removal is completed. Preparation considered essential includes: darkening (of windows to avoid detection from the air), camouflage (of roofs where possible), avoidance of panic at RGPF in the event of a sudden emergency. A system of trenches as refuges is impracticable, owing to the low-lying level of the terrain, water is struck 1'6" to 2ft. below ground level in most cases."

PRO 984

It is interesting to note that despite the planned 'early removal' of RGPF to a new site, the factory remained open until 1940 with the minimum standard of defence.

Description of Air Raid Shelter SS113

Building no: SS113 Air Raid Shelter NGR: TQ TQ 3807 9918

1. General

Rectangular plan 'Nissen Hut'-type structure sheathed in concrete beneath an earth mound, 11.5×9.8 m overall, aligned east-west (Plate 1). Entrances and revetments of timber at east and west ends, with earth-filled timber blast walls (Plate 2). The shelter interior is one large room, subdivided at its west end into two small compartments, one a two-seater toilet.

Central Structure: Barrel-vaulted, length 8.75m, diameter. 3.65m, constructed of preformed sheets of corrugated iron, backed with bitumenised canvas (Plate 3). This is covered with a layer of ?reinforced concrete, 230mm thick over the top of the structure. Covering this is a layer of earth, on which are growing some substantial trees, giving an indication of the structure's age (Plates 1 and 4). The roof is supported throughout by a 'ridge pole' consisting of two lengths of 'I' beam 120 x 80mm, butt-jointed with bolted plates (Plate 5). This beam is carried on four uprights of 100 x 80mm 'I' beam, held in uprights set in the concrete floor at c.2.5m centres. The ends of the beam are fastened to the end walls with 'L' shaped iron brackets (Plate 6). There are traces of red paint on the beams.

The end walls are of flush vertical 140mm wide planks, painted white, backed with corrugated iron sheeting covered with bitumenised canvas on its outside face. The end walls are fastened to the roof by 45×45 mm angle, preformed to follow the outline of the roof (Plate 7).

Inner Partitions: 1.84m from the west end wall is a north-south partition, constructed of vertical timber planking fastened at its lower edge to a sill beam set into the floor, and at its upper edge to preformed 45 x 45mm angle, identical to the end partitions. The southern part of its west (outer) face is covered with asbestos sheeting, nailed to the woodwork.

Between the west end wall and the partition described above is an east-west partition of similar construction to those already described, running beneath the beam supporting the roof and ending at one of the uprights supporting it.

Timber Revetments: At each end of the structure, *c*.1m out from the end wall, is a revetment constructed with planks 230×50 mm section, nailed and bolted horizontally in a framework of 80×100 mm timbers (Plate 2). The profile of the revetment rises upwards in a triangle ending in a flat top, the whole extending beyond the profile of the mound (this may be due in part to settlement of its earth cover). The space between the revetment and end wall is filled with earth. Access to the interior is gained through each revetment by means of a short corridor or porch, about 800mm wide, lined with vertical boards (Plate 8). The revetment is joined to the blast wall beyond (Section 3) by a series of horizontal timbers at a level above the roof of the porch.

2. Services

Electricity: Fabric-covered cables run along the north side of the roof support beam for about $^{2}/_{3}$ of its length, eastwards from the internal partition. The cables are held in white porcelain clamp-type insulators, bolted to the beam (Plate 6). High up on the wall at the entrance to the toilet compartment is the remains of a switch. Beyond this is the remains of an unshaded light fitting, also fastened to the toilet wall. From this general area a single wire runs in a conduit pipe over the toilet door, and follows the curve of the roof down the toilet wall to end about 400mm above the floor in the north-east corner of the compartment.

Although the cable runs are damaged and most of the fittings are missing, it appears that the elements described above form part of a lighting system consisting of perhaps two lights in the main room of the shelter and one in the toilet compartment, fed by a batteries in the corner of the toilet compartment, using the metal inner shell of the building as an earth return. The structure's function lends some weight to this interpretation.

Apparently unconnected to the system described above, on the wall close to the top of the north side of the doorway through the internal partition, is the remains of a porcelain switched fuse box. The wires leading from it have all been cut short, and cannot be followed. From behind it a heavy gauge single-strand copper wire passes through the partition to earth against the metal roof.

3. Passageways & Traverses

Blast walls: At each end of the building, 1.45m from the timber revetments, are blast walls 4 x 1m and c.1.8m high, constructed with planks 230 x 50mm section, nailed and bolted horizontally in a framework of 80 x 100mm timbers, the interior being filled with earth. The western blast wall has collapsed against the end of the building, and much of the soil fill has leached out of the eastern blast wall. The top of each blast wall is joined by horizontal timbers to the timber revetment (Plate 2).

4. Door & Window Details

There are no windows.

Doors: There are three doors; one at each end, and one in the inner partition, between the inner and outer rooms. The doors are all located off the centre-line of the building: the west door and inner partition door are to the south of the centre line, but the east door is to the north. This may be to reduce the chance of collision by people entering quickly from both ends of the building in an emergency.

All doors are of identical construction. Door frames are made of 75 x 80mm section timber, assembled using dowelled mortise & tenon joints. The outer doorframes are nailed to the end walls. On the left-hand inner face of each door frame are screwed two $400 \times 40 \times 40$ mm battens. Doors are 1760 x 760mm, matchboarded, with a sheet of heavy galvanised metal sheet screwed to the inner face. The doors are hung on galvanised strap hinges 580mm long, screwed to the interior of the door. Locking is provided by two clamp-type lever catches with provision for locking pins, mounted on the battens on the door frame, locating in corresponding handles on the door. These catches are reminiscent of those fitted to the doors of large commercial refrigeration units, are made of a cast white metal, and are

labelled 'THE CASSEY' (Plates 7 and 9). On one doorframe is nailed a fragment of a reinforced rubber 'P'-section seal. This appears to have originally been present on all three doors, forming a continuous seal. In conjunction with the door clamps, this would have made all doors quite airtight.

5. Signs & Instruction Boards

On the south wall of the west entrance porch is a weathered unpainted board 360 x 230mm.

6. Roof

See Section 1.

7. Interior Fixtures & Fittings

Shelf: On the east (inner) side of the inner partition is a wooden shelf. 280 x 460mm, 830mm above the floor. Supported from beneath by two triangular wooden brackets, screwed to the partition (Plate 7).

Benches: Along each side of the inner compartment run wooden benches. Both are freestanding, and of screwed and jointed construction. Each has a seat and single back rail, and could seat about 13 people (allowing 0.5m per person) (Plate 10).

Toilet Compartment: This measures $c.1.84 \times 1.69m$. Access to it is through a doorway 800mm wide in the inner partition, adjacent to the east-west partition, closed off by a curtain hung on an iron rail (Plate 11). Within the compartment are two metal toilet units with wooden seats, bolted to the floor. The toilets are AUSTRAL AUTO-FLUSH CABINETS, made by the AUSTRAL CABINET Co LTD, St JAMES', LONDON. Both have a long operating handle projecting vertically from the rear, and appear to be a version of the 'bucket & chuck it' type of chemical toilet. An arrangement of curtain rails above the two toilets would have permitted a degree of individual privacy for each toilet (plate 12).

8. Lighting

See Section 2.

9. Heating

None.

10. Buildings Close by with Obvious Relationship to this Building

None.

11. Communications

None.

12. Floor

The interior floor is concrete throughout. Because of the build-up of soil leached from the blast walls, floors in the entrance passages and porches could not be ascertained, though in the west porch a layer of sand is present.

13. Additional Observations

Interpretation: A single-phase building. Designed for rapid entry (as one might expect), with subsequent entry and exit controlled by those inside. The small room at the west end could have been used as a crude airlock, but with no means of exchanging the air contained in it, it would not have fully protected those inside from gas or chemical contamination. The lighting system and the toilets suggest that the shelter was intended to be self-sufficient for some length of time (presumably water and some rations were provided). However, the presence of relatively gas-tight doors and no form of controlled ventilation raises the question of how long up to 26 people could survive in that confined space. It is interesting to note that the

shelter's dimensions do not conform exactly to any of the 'standard' shelters listed in the 1937 document located in the PRO. (See History of Site above).

Artefacts: About one-third of the inner chamber is filled with bags of unidentified rubbish. Apart from the toilets, the only artefacts of possible note are two pairs of flanged wheels, complete with axles and mountings for some wooden superstructure (plate 13). It is possible that these wheel-and-axle sets are from vehicles used on the site's internal tramways.

Acknowledgments

I would like to acknowledge the assistance of Royal Ordnance staff G.G.Vincent, Trevor Wilson, Ed Andrews and Lynne Lennard. Wayne Cocroft of the RCHME Keele office. Malcolm McLaren once head of management services RGPF Waltham Abbey. The Hertfordshire Archaeological Trust recording team led by Bob Zeepvat. Amanda Kennedy and Melissa Eyears for research work at the PRO.

Photographs are reproduced here by kind permission of the Waltham Abbey Trust Company Limited whose collection is at present administered by the Epping Forest District Museum in Sun Street, Waltham Abbey.

Bibliography

UNPUBLISHED SOURCES

CRDD 1947 The Chemical Research and Development Department 'Its Programme and Facilities' Internal Report 21 May 1947 Drayson.F. 1830 Treatise (PRO Supply 5/762, Drawings M.P.11.15) Fraser and Chalmers Ltd 1908 The Quinan System of Drying guncotton. Trade pamphlet Lord Sandhurst Committee. Report of the Committee appointed to enquire into the explosion of the 7th May 1894 at the nitro-glycerine Factory, Waltham Abbey. Together with minutes of evidence and appendices. HMSO London. 1894. REP01 EAB/1./2./3 Short report on R.O. Factory, Waltham Abbey. 18.3.86 Supply 5/327 1894-1898 Relating to the Explosions at Waltham Abbey. Supply 5/332 1916-1929 Home Office Reports in connection with the Standing Committee on the Cause of Explosions. Supply 5/466 1891-1895 Guncotton General. Supply 5/491 1892-1902 Nitroglycerine General. Supply 5/710 1902-1907 Quinton Hill NG Factory Annual Reports. Supply 5/760 1861-1904 Photograph Album - RGPF Explosions and Plant Supply 5/861 1903-1938 Photograph Album - RGPF Explosions and Plant Supply 5/862 1903-1930 Photograph Album - RGPF Various Supply 5/863 1940-1941 Photograph Album - Damage by Enemy Action WASC 1508 c.1945 RGPF Buildings Ledger WASC 1680 c.1925 RGPF Buildings Ledger WASC 1764 1908 RGPF Buildings Ledger WASC/1506/1 1972 Explosives Research and Development Establishment List of building numbers and functions Younghusband.C (WASC 20) 1873 'Description of the Manufacture of Abel's Pulped and Compressed Guncotton at Waltham Abbey' Unpublished typescript dated 13.11.1873

PUBLISHED SOURCES

Clarke. B. The Eighteen Inch Gunpowder Factory Railway at Waltham Abbey. Privately published. E.C.C.F.A.G. Nitroglycerine Washing House, South Site, Waltham Abbey Royal Gunpowder Factory, Essex. Survey Report. June 1996.

Encyclopaedia Britannica 1950 Encyclopaedia Britannica Vol.11.

Englebach. F.G 1899 'Her Majesty's Ordnance Factories Waltham Abbey - 11' The Army and Navy Illustrated. 30 Dec 1899.

Fitzgerald. W.G 1895 'How Explosives are Made' The Strand Magazine Vol. IX p307-18.

Gordon. Dr.S 1987 'IMI Summerfield Rocket Motors and Propellants History and Development' in Journal of the British Interplanetary Society. Vol 40 pp311-322. 1987.

Guttman. O. 1895 'The Manufacture of Explosives' London.

Hogg O.F.G. 1963 'The Royal Arsenal.' Vol. II London

Jenkin C.F 1891 'The Electric Lighting of Danger Buildings' Proc. of the Institution of Civil Engineers. 110. 367-79.

Jenkins. J.M 1989 'The Railways of the Royal Gunpowder Factory, Waltham Abbey' Industrial Railway Record 117. 385-415.

Johnson. C.H 1965 'The Explosives Research and Development Establishment, Waltham Abbey' Chemistry and Industry. 20 Feb 320-27.

McLaren. M 1975 'The Explosives Research and Development Establishment, Its Historical Background' Journal of Naval Science Vol. 1 No.2 April 176-83.

Nathan. F.L 1909 'Guncotton and Its Manufacture' Journal of the Society of Chemical Industries 28. 177-187.

Nathan. F.L and Rintoul. W 1908 'Nitroglycerine and Its Manufacture' Journal of the Society of Chemical Industries Vol. XXVIII No.5 193-205.

RCHME 1993 Survey of the Royal Gunpowder Factory, Waltham Abbey, Essex. Cocroft report, A4 report and A3 book of maps. RCHME Publications, London.

Simmons. W.H 1963 'A Short History of the Royal Gunpowder Factory at Waltham Abbey' Privately published Controllerate of Royal Ordnance Factories.

Sobrero. Prof. A 1847 Concerning some new explosive compounds obtained by means of the action of nitric acid on organic substances. Memoirs of the Royal Academy of Science of Turin. Feb 21 1847.

Walton. J 1977 'ERDE Waltham Abbey Monks Mills and Missiles' The Soldier 26. 8 Feb. War Office 1895 Treatise on Service Explosives. HMSO London.

Appendices

Appendix 1: Photographic Register

WALTHAM ABBEY RGPF SOUTH SITE	Date: August 1997	Initials: RJZ
uilding: SS113 Air Raid Shelter Film: 400ASA Colour Slide &		Slide &
	Monochrome	

Shot No. B/W+Col	Description	Scale used	Neg. No. B/W
1	External view, from north-west	2m	00
2	External view, from south-west	-	0
3	Eastern blast wall, from south-west	1m	1
4	Entrance passage between blast wall and end of shelter, from south	1m	2
5	Eastern entrance porch, from east	500mm	3
6	Interior of shelter, from east	1m	4
7	Eastern entrance door, from west	-	5
8	Detail of roof support beams, from north-east	-	6
9	Internal partition, south half, from east	-	7
10	Toilet compartment, from east	-	8
11	Detail: surviving wiring at entrance to toilet compartment	-	9
12	Fixtures and fittings: wooden bench, north side	1m	10
13	3 Internal partition and doorway, from west - 11		11
14	Interior of shelter, from west - 12		12
15	Fixtures and fittings: toilet unit	500mm	13
16	Fixtures and fittings: tramway wheels, axle and bearings	500mm	14

.

Appendix 2: Archive Contents

Archive Contents

Survey plot of the Air Raid Shelter at 1:50 Surveyed section of the Air Raid Shelter at 1:50 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 1/2" floppy disc with text and photographic registers

Appendix 3: Essex Sites and Monuments Record Summary Sheet

Essex Sites and Monuments Record

Summary Sheet

Site name/Address: Air Raid Shelter SS113, South Site, Waltham Abbey Royal Gunpowder Factory, Essex		
Parish:	District:	
Waltham Abbey	Epping Forest	
NGR:	Site Code:	
TQ 3807 9918	WASS 97	
Type of Work:	Site Director/Group:	
Building record/survey	Steve Chaddock / Prince Research	
	Consultants	
Date of Work: Size of Area Investigated:		
01.07.97 - 31.08.97	-	
Location of Finds/Curating Museum: Funding Source:		
Essex Records Office	Environmental Services Group, Boyal Ordnanco pla	
Royal Ordnance pic		
Furiner seasons anticipatea:: Related SMR Nos:		
recording		
Final Report:		
-		
Periods Represented:		
1938 to 1945		
SUMMARY OF FIELDWORK RESULTS:		
A recording brief, carried out on the Air Raid Shelter of the South	Site, included a survey of the	
building in plan and sections through the building, and photograph	nic coverage.	
The shalter was constructed just before the start of MAA/2 as a se	a proof refuge for the evaluation	
The shelter was constructed just before the start of WW2 as a gas proof refuge for the explosives		
workers. The structure contains a bench and two tollets.		
Rectangular plan 'Nissen Hut'-type structure sheathed in concr	ete beneath an earth mound 11.5 x	
9.8m overall, aligned east-west (Plate 1). Entrances and revetment	ents of timber at east and west ends.	
with earth-filled timber blast walls (Plate 2). The shelter interior is one large room, subdivided at-its		
west end into two small compartments, one a two-seater toilet.		
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		
Author of Summary	Data of Summary	
Author of Summury:	Date of Summary: 04/09/1997	
o. onuudook	0.0001001	

Appendix 4: The Plates



SS113 PLATE 1 - EXTERNAL VIEW, FROM SOUTH WEST



SS113 PLATE 2 - EASTERN BLAST WALL, FROM SOUTH-WEST



SS113 PLATE 3 - INTERIOR OF SHELTER, FROM EAST



SS113 PLATE 4 - EXTERNAL VIEW, FROM NORTH WEST



SS113 PLATE 5 - DETAIL OF ROOF SUPPORT BEAMS, FROM NORTH EAST



SS113 PLATE 6 - DETAIL: SURVIVING WIRING AT ENTRANCE TO TOILET COMPARTMENT



SS113 PLATE 7 - INTERNAL PARTITION, SOUTH HALF, FROM EAST



SS113 PLATE 8 - ENTRANCE PASSAGE BETWEEN BLAST WALL AND END OF SHELTER, FROM SOUTH



SS113 PLATE 9 - EASTERN ENTRANCE DOOR, FROM WEST



SS113 PLATE 10 - FIXTURES AND FITTINGS: WOODEN BENCH, NORTH SIDE

INTENTIONALLY BLANK



SS113 PLATE 11 - TOILET COMPARTMENT, FROM EAST



SS113 PLATE 12 - FIXTURES AND FITTINGS: TOILET UNIT



SS113 PLATE 13 - FIXTURES AND FITTINGS: TRAMWAY WHEELS, AXLE & BEARINGS

INTENTIONALLY BLANK

Appendix 5: The Figures



2'EARTH R.S.J. ROOF BEAM WITH STANS FOR 7"CONCRETE SUPPORT WHERE NECCESSARY 6 G ROOF SHEETS TEERIBS 7'10" RADAN 5" CORRUGATIONS STEEL ANGLE PURLINS 4"CONCRETE BASE CL. & HO BOLT 16'S" INSIDE SNEETS MEN'S LAUTY 625 STORES 5×5 REFUGE Malo JALLOCK 3 XS 16'x46' WOMEN'S LANTY 5×8 56'0"

PLAN 50 PERSONS









BRITISH AEROSPACE		
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. SS113 AIR RAID SHELTER		
Overall Section A-A1		
SCALE: 1:50	Drawn By:KH,DR	
DWG No:SS113/2	DATE: 24.07.97	