

Gas Works

'Gas Works' on maps of the site seem to describe the group of buildings immediately to the east of L159 and L160 in a meander of the Old River Lea.

Initially this area produced the high grade charcoal for gunpowder. Before the cordite structures, the area to the south of L149 was the timber stacking yard where the wood was left to dry naturally often for up to 10 years. 171 represents the charcoal cylinder house which was built in 1830 and was of a revolutionary design. The wood was hand packed into cylindrical drums and the latter was then run into furnaces. The furnaces were fuelled by the gasses which escaped from the wood as it was burned. 174 and 174a built around the same time were connected to the repairing of the boats. In 175 the charcoal was examined to ensure that objects such as nails were removed before the charcoal was mixed with saltpetre and sulphur.

168, 169 and 170 appear to be the only structures within the group that have anything to do with Gas. These holders were built between 1917 and 1923. It is unknown whether they stored town gas piped in from the nearby town or stored some of the gas produced by the charcoal process. The latter seems unlikely as at this time production of gunpowder was reducing as cordite became the main explosive, so less charcoal would have been produced.

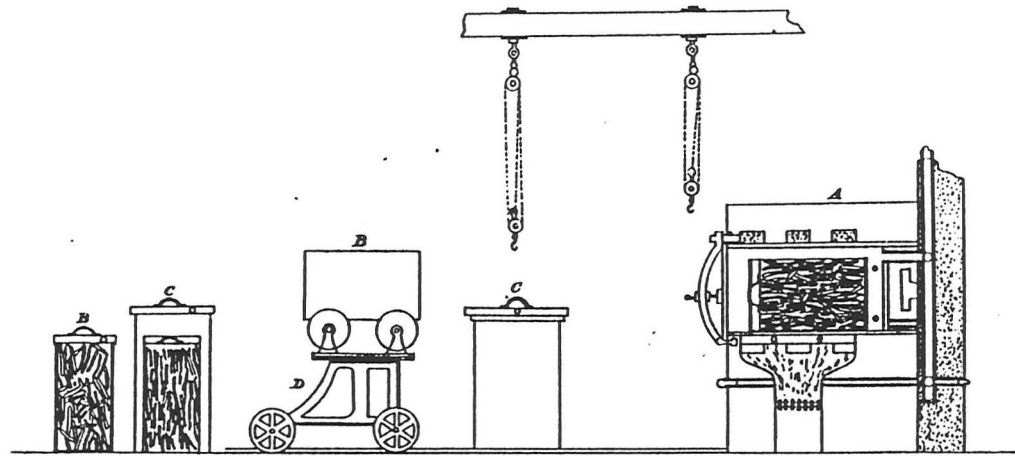
Conclusion

The three gasometers were probably holders for imported town gas and were constructed between 1917 and 1923.

Function of 'CMJ House' unknown.

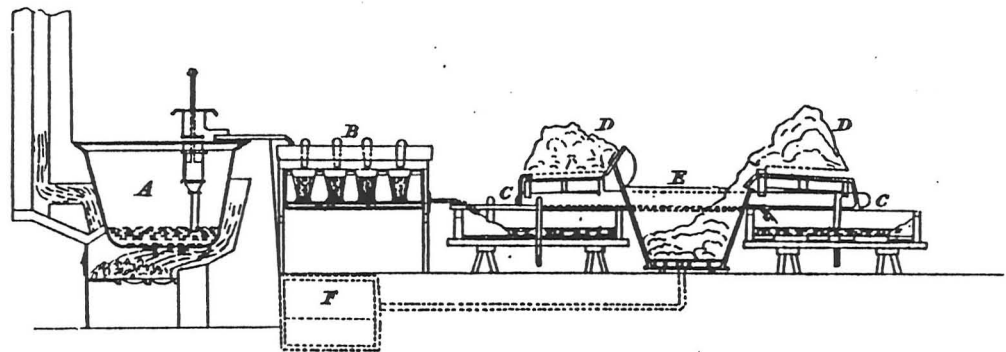
October 1993
Adam Ford

APPARATUS FOR BURNING CHARCOAL.



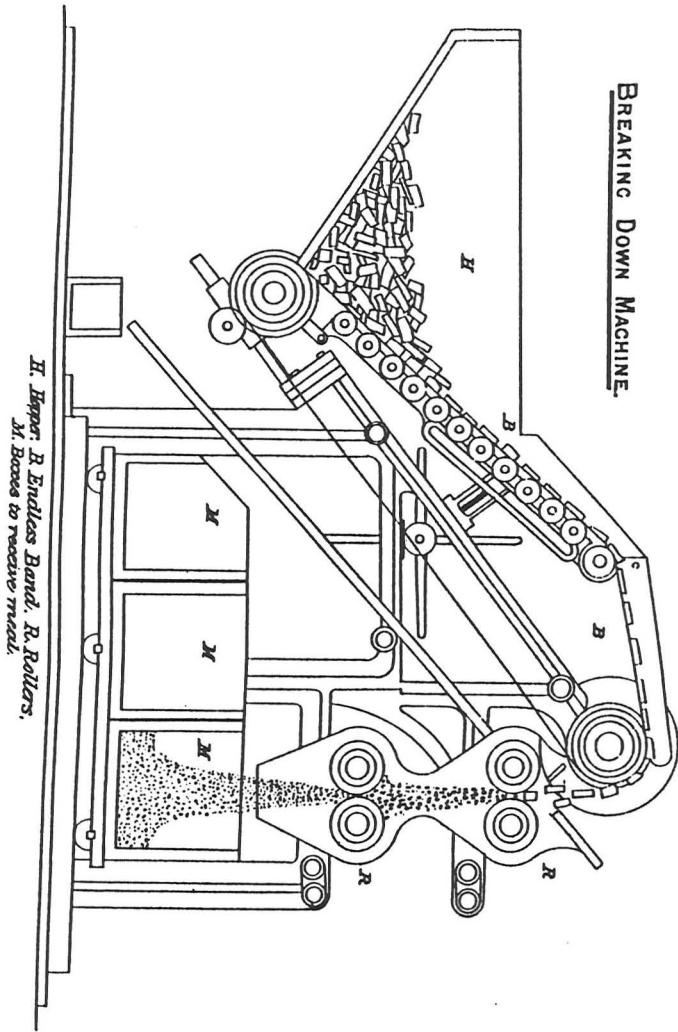
*A. Retort, showing pipes for conducting gases to the furnace.
B. Slip, for holding wood. C. Cooler. D. Carriage for Slip.*

APPARATUS FOR REFINING SALTPETRE.



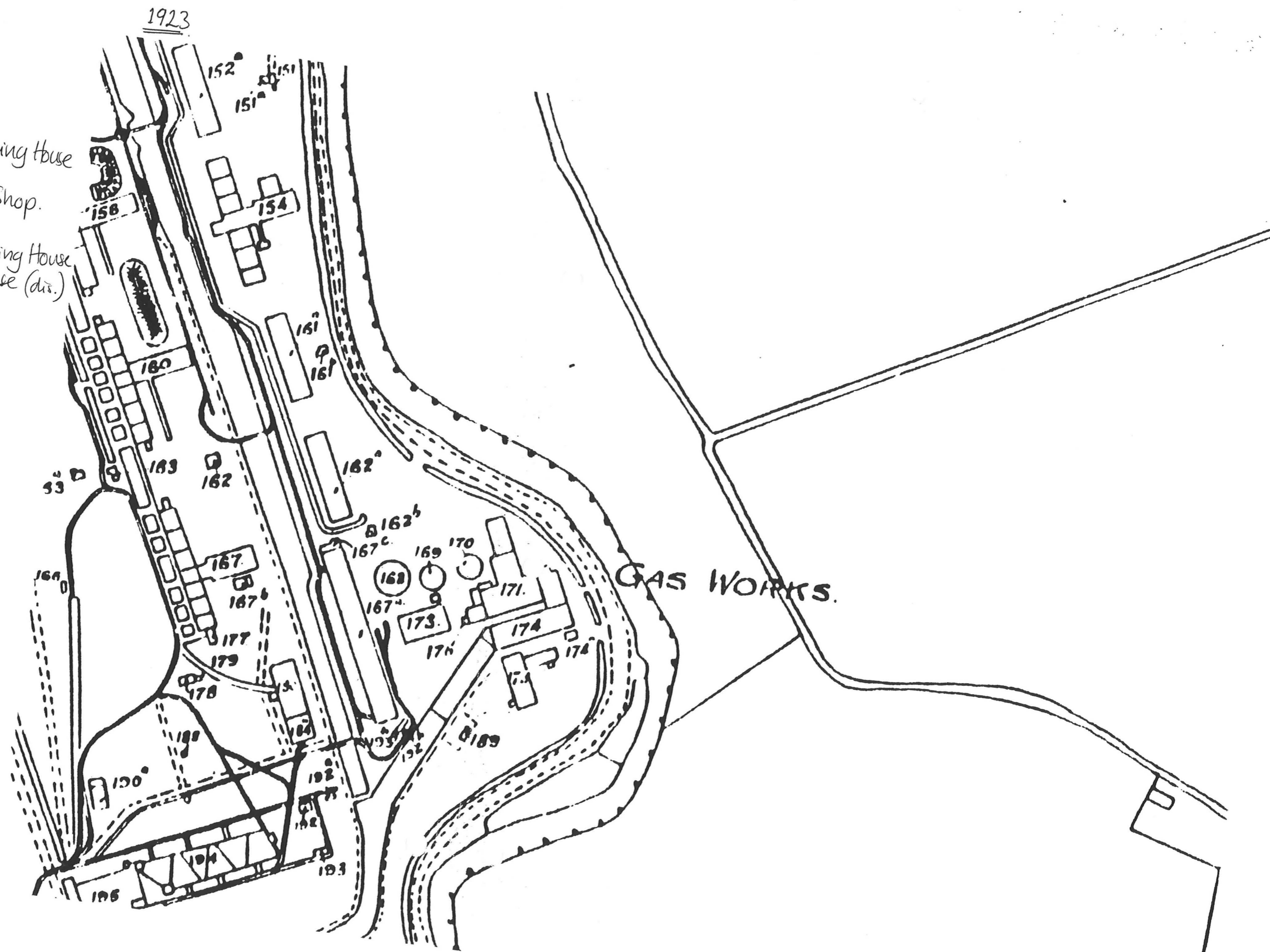
*A. Refining Copper
B. Filtering Stand
C. Coolers or Crystallizing Pans
D. Drainers.
E. Washing Vat.
F. Liquour Tank.*

BREAKING DOWN MACHINE.



*H. Hopper. R. Endless Band. R. Rollers.
M. Boxes to receive wood.*

- 168 = Gasometer
- 169 = Gasometer
- 170 = Gasometer
- 171 = Charcoal Burning House
- 173 = C.M.J. House
- 174 = Boat Repair Shop.
- 174a = Tar Boilers
- 175 = Charcoal Picking House
- 176 = Fire Engine House (dis.)



ROYAL ORDNANCE PLC
ENVIRONMENTAL SERVICES GROUP
FORMER RARDE WA (NS)
WALTHAM ABBEY
ESSEX



PLEASE RETURN
TO BOB WATTS
BRITISH AEROSPACE
DEFENCE
ROYAL ORDNANCE

British Aerospace Defence Limited
Royal Ordnance Division
Environmental Services Group
Westcott, Aylesbury
Buckinghamshire
HP18 0NZ, England
Telephone (0296) 651111
Ext.
Fax (0296) 658778

MEMORANDUM

TO : BOB WATTS
FROM : GRAHAM VINCENT
DATE : 3RD SEPTEMBER 1993
SUBJECT : BARREL GRAVEYARD

Attached are details of Barrel Graveyard trial hole and site grid, please advise ^{positions} partitions of trial pits/sampling required.

Regards

Graham Vincent

CC: P. Mayell

A British Aerospace Company

Registered in England & Wales N° 2653637
Registered Office: Lancaster House, PO Box 87, Farnborough Aerospace Centre
Farnborough, Hampshire. GU14 6YU



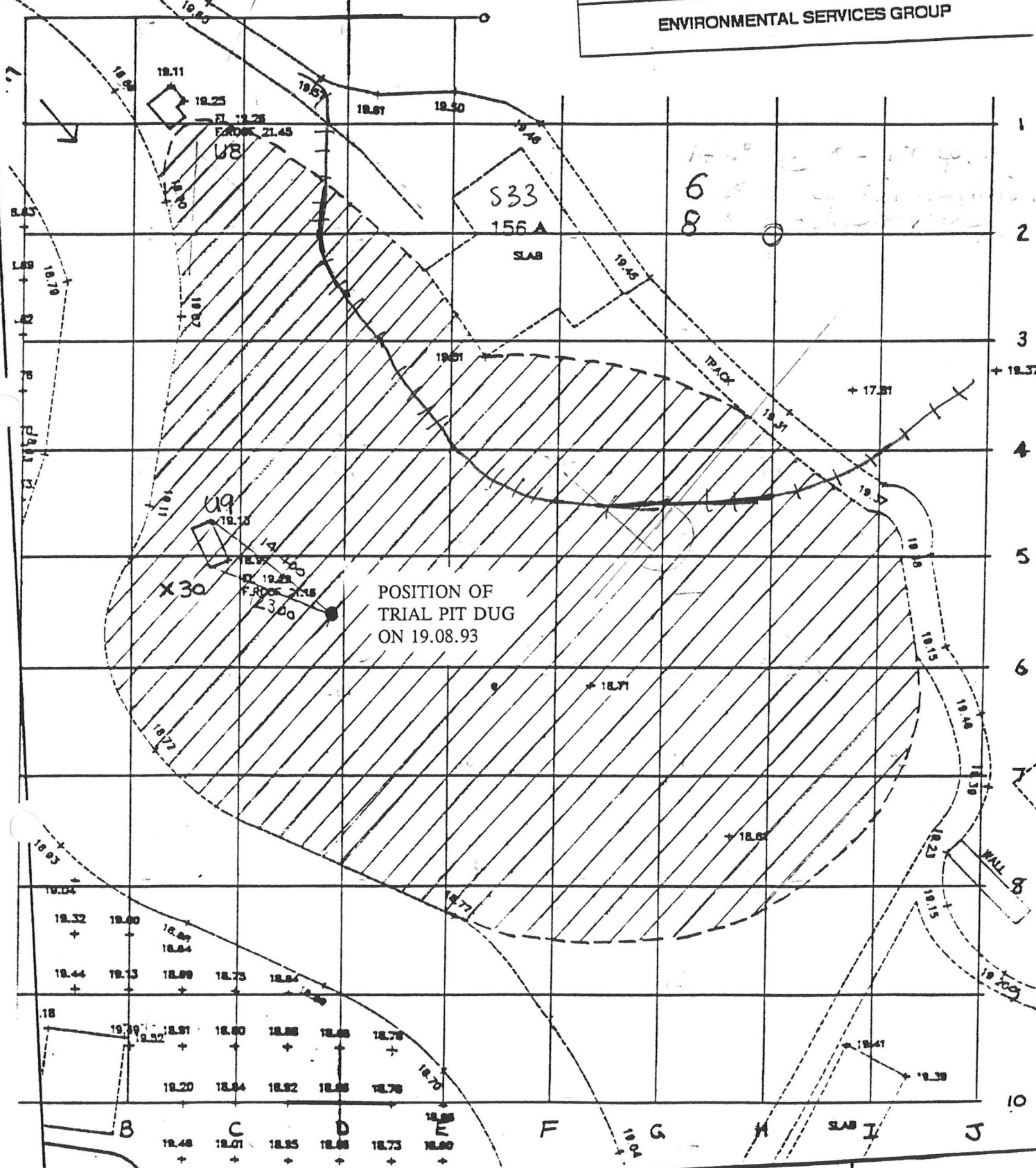
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APPROX. BARREL GRAVEYARD

155



POSITION OF TRIAL PIT DUG ON 19.08.93

FORMER PARADE WALTHAM ABBEY
 NORTH SITE

BARREL GRAVEYARD SURVEY GRID

RECORD DRAWING

DATE:
 AUGUST 1993

DRAWN BY: R.A.D
 SCALE: 1:500

DRG No: BG / WAN / SK54

SITE : FORMER HARDE WALTHAM ABBEY (NORTH SITE)

REF : BG 001

Equipment and Methode : BACKHOE EXCAVATOR

Drawn by : R.A.D


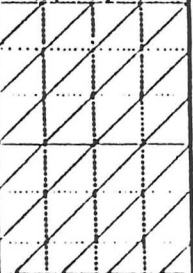
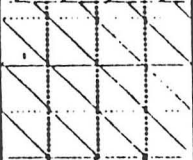
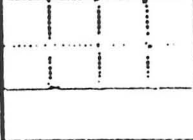
Checked by :

Date of Sampling : 19.08.93

Ground Level : N/A

Plan Reference : BARREL GRAVEYARD

Type : TRIAL HOLE

Description	Samples	Depth	Face	
VEGETABLE SOIL		0.00m		
DARK BROWN STIFF CLAY		0.60 m		
SANDY GRAVEL		1.20 m		
		1.80 m		← WATER (1.5 m BELOW GROUND LEVEL)

Details :

DEPTH OF TRIAL HOLE 1.50 m

ENVIRONMENTAL SERVICES GROUP

Westcott, Aylesbury, Buckinghamshire HP18 0NZ

ROYAL ORDNANCE Pic

Telephone : 0296 651111

Facsimile : 0296 648778

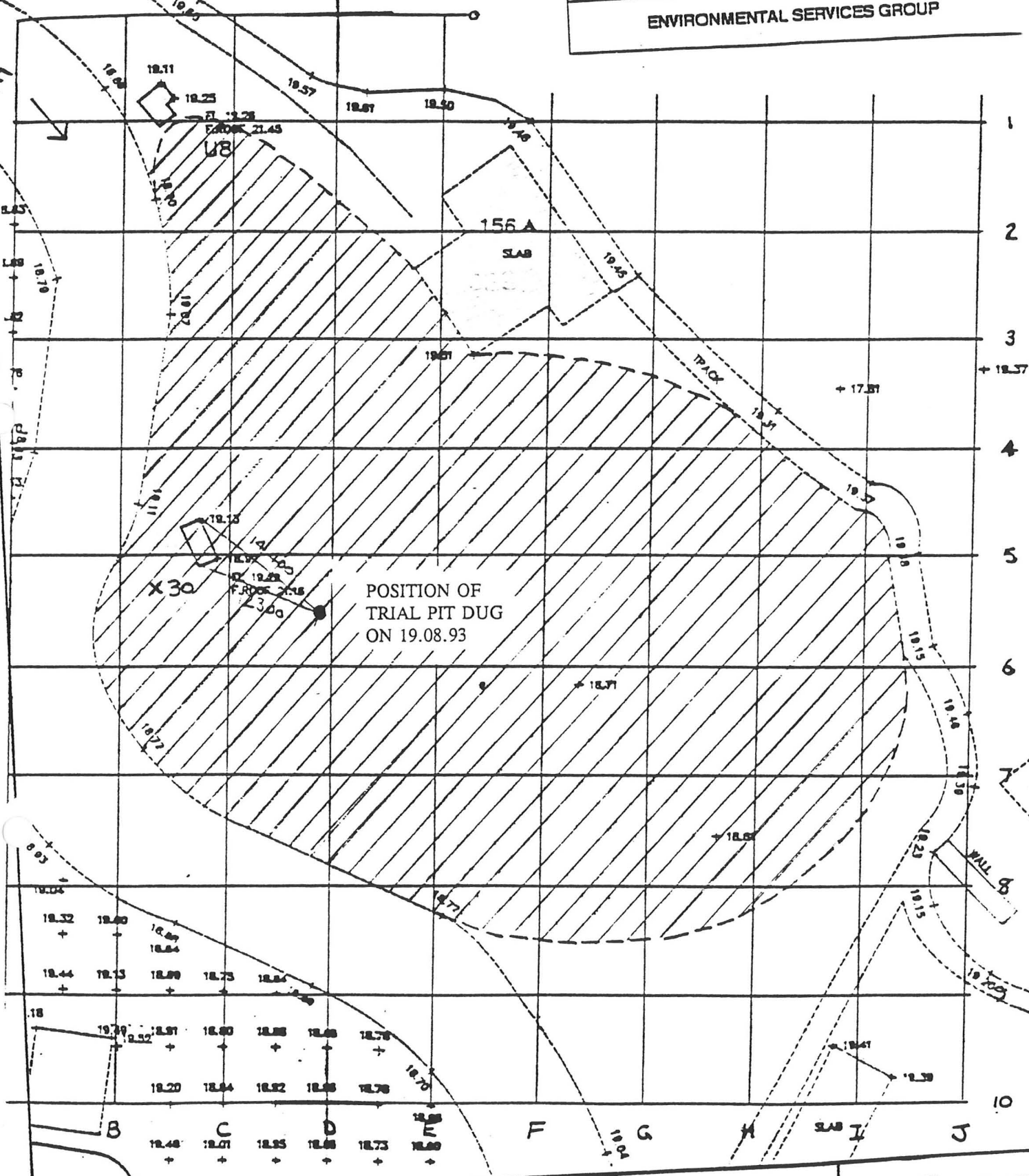
 : APPROX. BARREL GRAVEYARD

*PLEASE
RETURN
TO BOB WATTS*



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FORMER PARDE WALTHAM ABBEY
NORTH SITE

BARREL GRAVEYARD SURVEY GRID

RECORD DRAWING

DATE:

AUGUST 1993

DRAWN BY: R.A.D

SCALE: 1:500

DRG No:


BG / WAN / SK54

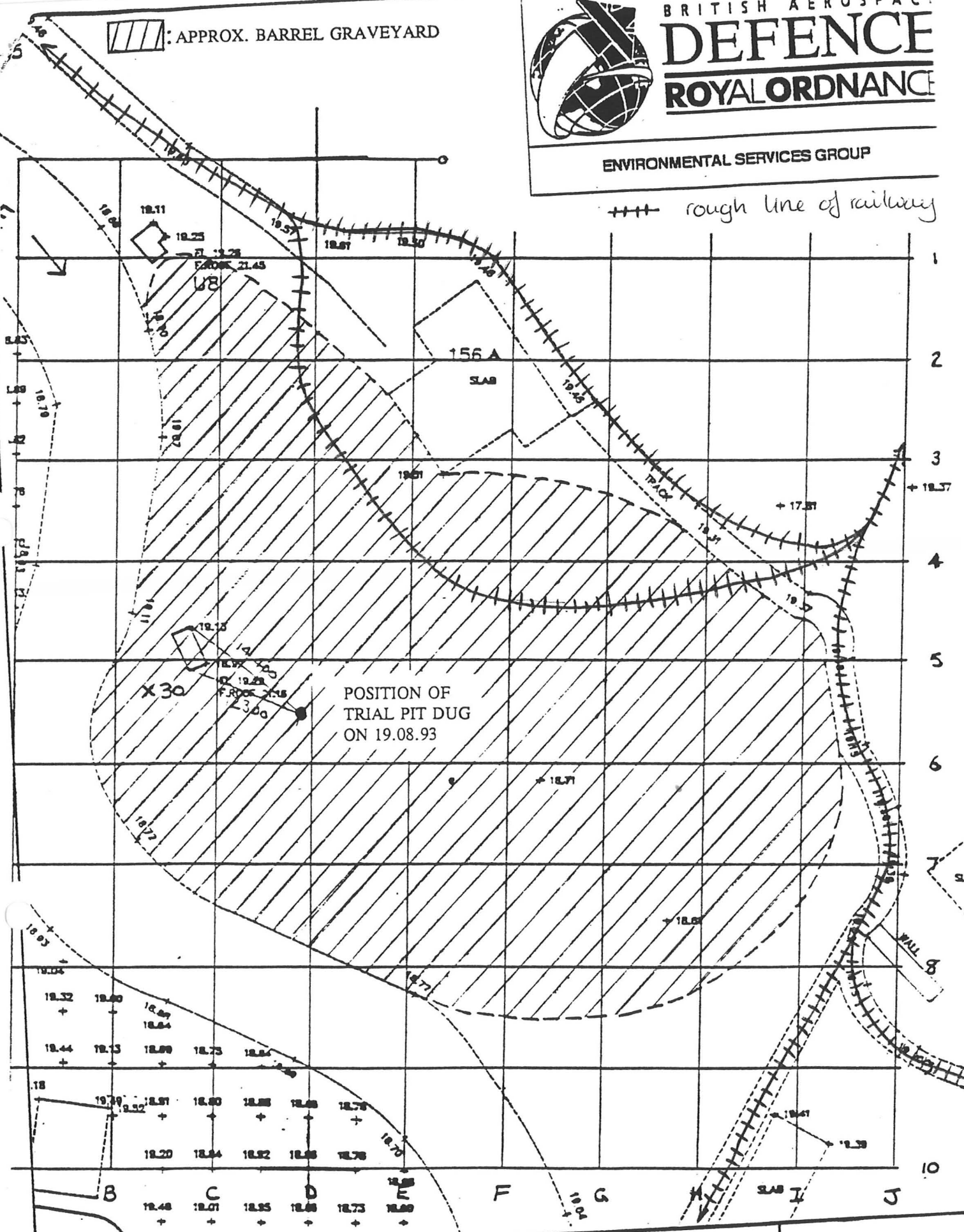
 APPROX. BARREL GRAVEYARD



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 rough line of railway



FORMER PARDE WALTHAM ABBEY
NORTH SITE

BARREL GRAVEYARD SURVEY GRID

RECORD DRAWING

DATE:
AUGUST 1993

DRAWN BY: R.A.D.
SCALE: 1:500

DRG No: BG / WAN / SK54

THE ROYAL GUNPOWDER FACTORY - WALTHAM ABBEY

NUMBER S33	OLD SERIES 93c	RCHME NUMBER	N.G.R. TL 37718 01778
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NAME/FUNCTION Tetryl Stove No.21	START DATE 1916	END DATE 1945?
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NO PHOTOGRAPHY
AVAILABLE

<p>CARTOGRAPHIC DEPICTION</p> <p>1917 WASC 900/70 1917 WASC 900/72 1919 WASC 900/74 c1920 WASC 900/80 1923 WASC 900/84 ; 93a CE Stove No.1 > 1940 WASC 900/91A 1954 A - B.34 ; S33 c1960 WASC 900/94 ; S33 c1963 WASC 900/97 ; S33 1972 WASC 900/102 ; S33 1972 WASC 900/104 ; S33 1976 WASC 900/113 ; S33</p>	<p>DOCUMENTARY REFERENCES</p> <p>1972 ERDE List ; Curing Oven and Magazine 1991 Mott McDonald survey 1992 RARDE List ; Tetryl Stove No.21/Base only</p>
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<p>PHOTOGRAPHY HISTORIC</p>	<p>PHOTOGRAPHY RCHME</p>
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RELATIONSHIPS WITH OTHER MONUMENTS

ASSOCIATED WITH: S32?

CONDITION Demolished

DESCRIPTION

- 1) CONSTRUCTIONAL MATERIAL
Brick walls
- 3) POWER SOURCE
Electricity
- 4) DIMENSIONS i) L 13.6m ii) W 16.6m
- 5) The building has been demolished a concrete floor slab remains.

THE ROYAL GUNPOWDER FACTORY - WALTHAM ABBEY

NUMBER U8	OLD SERIES	RCHME NUMBER	N.G.R. TL 37682 01791
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NAME/FUNCTION Bunker	START DATE 195?	END DATE
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NO PHOTOGRAPHY
AVAILABLE

<p>CARTOGRAPHIC DEPICTION</p> <p>c1960 WASC 900/94 ; U8 c1963 WASC 900/97 1972 WASC 900/102 1972 WASC 900/104 1976 WASC 900/113</p>	<p>DOCUMENTARY REFERENCES</p> <p>1991 Mott McDonald survey 1992 RARDE List ; Small Brick Shelter</p>
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<p>PHOTOGRAPHY HISTORIC</p>	<p>PHOTOGRAPHY RCHME 1)206/L/34 From East</p>
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RELATIONSHIPS WITH OTHER MONUMENTS

ASSOCIATED WITH:

CONDITION Fair

DESCRIPTION

- 1) CONSTRUCTIONAL MATERIAL
Breese block
- 2) ROOF MATERIALS AND STRUCTURE
Flat concrete slab
- 3) POWER SOURCE
None
- 4) DIMENSIONS i) L ii) W iii) HT
- 5)

Charcoal Burning at Waltham Abbey Royal Gunpowder Mills

Introduction

This research was born out of an informal discussion, on 9 June 1998 between Andy Coombes, Steven Chaddock and Andrew Passmore, on the growing of alder at the Waltham Abbey Royal Gunpowder Mills site and its use for the production of charcoal. It was suggested that research be carried out into the production of charcoal for use in gunpowder. The aim of the research was to find out about the production methods involved, and particularly the use of retorts to convert the alder into charcoal. This is with the intention of providing further information in order that a specification could be put forward for a retort, which could be loaded and fired (using coppiced alder from Waltham Abbey) once the site is open to the public.

Production of Charcoal at Waltham Abbey Royal Gunpowder Mills

Charcoal is one of the three ingredients used in the production of gunpowder; the others being saltpetre and sulphur. The exact quantities of charcoal used varied over time, although by the eighteenth century it had become standardised at 15 parts of the total ingredients. Black dogwood, alder and willow were the preferred woods for producing charcoal; some of each was grown on site although most was brought into the site from Sussex or imported from Belgium or Holland (RCMHE 1993, 169).

Some research into the silvicultural history of the site has been carried out by Andy Coombes as part of his Woodland Management Plan (Coombes 1998). He found, by using the maps in the Waltham Abbey archive, that two plantations of willow and alder were planted between 1783 and 1827. A second phase of planting of willow, probably in the 1850s or early 1860s, took place on the area of Great and Little Hoppit. A plantation, and probably also of the same date, of dogwood (? alder buckthorn) was also marked on maps in the area of the later Guncotton Drying Stoves.

The earliest production of charcoal involved burning wood in pits but from the 1790s retort-burnt charcoal was preferred. The use of iron retorts was developed by Bishop Watson in the 1780s who was able to prove that charcoal produced in this way improved the performance of gunpowder. Retort-burnt charcoal was introduced into Waltham Abbey in 1794 although this was imported from Fisher Street and Fernhurst in Sussex (RCHME 1993, 113-114).

In 1830, a Charcoal Cylinder House was installed at Waltham Abbey, although it is not clear whether the retorts were transferred from the Royal Gunpowder Factory at Faversham or whether only the staff to operate the equipment had been transferred (RCHME 1993, 116). This is confirmed by the cartographic evidence, where on an 1827 map (Waltham Abbey Royal Gunpowder mills archive) no buildings on the Gas Works site are shown, but on a later map (WASC 900/5, c1830) a building is marked on the Gas Works site as 'New Cylinder House'.

Once the charcoal had been produced, it was milled in one of three buildings, A225-7, now under the office block (RCHME 1993, 169-170). These were in existence by 1783 when they were illustrated on plan of the site. One of these mills (A226) had been converted into a charcoal store by 1865. A new canal [RCHME Number 278] was probably dug in 1830, and it is likely that it was used to transport the charcoal from the new Charcoal Cylinder House to the existing mills.

By 1888, and possibly by 1865, these mills had been converted into stores (some for charcoal), and new mills were set up on Millhead Stream, where building L197/198 has been identified as a charcoal mill (RCHME 1993, 118). These new mills (including L197/8) may have been built in 1856 when the Group A incorporating mills were constructed. L197/8 was linked to the Group A mills by the tramway laid down in 1856, which had later branches to the other newly-built incorporating mills (Jenkins 1989, 386-387). Building [RCHME Number202] was a charcoal mixing house.

The charcoal was then visually inspected and picked through in order to remove any foreign objects, which if left in the charcoal could cause an explosion when incorporated. This took place in Charcoal Picking Houses, of which L162Way is known to have been converted to such a building in 1887.

As well as the charcoal stores on the island, another store was in building L167, built in 1888/9 and converted to other uses in 1898. In 1887 a coal store (L160) (? A charcoal store) was constructed next to the Charcoal Cylinder House; this was later converted (? 1900) into a Charcoal Picking House (RCHME 1993, 122). By 1865 building [RCHME Number 211], on the western bank on Millhead Stream immediately north of Great Hoppit Pool, had been converted into a charcoal store. This was later linked to the railway system (RCHME 1993, 62), and was extant until 1957.

In the first half of the 1880s, development in the production of gunpowder included some wood charcoal being replaced by carbonised straw. It is not clear whether the carbonising of straw took place at the same location as the production of wood charcoal, although there are two reasons why this seems unlikely. Firstly, the mid-late 1880s saw the expansion of the charcoal production complex, which included in 1888/9 the erection of the gas works. Secondly, the use of carbonised straw was developed for use in large-bore guns. It is likely that the production of wood charcoal would have continued for use in small arms.

Gas Works Site

The Gas Works site consisted of three buildings associated with the production of charcoal, L160, L161, and L162.

L160 was constructed as a coal store in 1887, and was later (? 1900) turned into an additional Charcoal Picking House. After the demise in the production of charcoal this building was for a number of purposes, and is still extant today.

Building L162 would originally appear to have housed a small engine, or it is marked as 'old engine shed' on the plans for a new engine shed, the latter of which was erected in 1880 (plan L162.B.02). In 1886, there were plans for a new dogwood shed to be erected (plan L162.B.01) on the site of the old engine shed. The plan is annotated with the comment an 'old wooden shed', i.e. the old engine shed, needs to be pulled down. This building was later converted into a Charcoal Picking House. The foundations of both the 1880 and 1886 structures are visible today.

Building L161 housed the cylinder Charcoal House, The following is based on the architects plans for the buildings, all of which came to fruition. The original 1830 building consisted of a rectangular structure (? a wood store), measuring 50' x 30', with the cylinder house, measuring 23' x 16', attached to the northern side. According to an undated plan when it was proposed to change the position of the doors and windows, this room contained a bed of retorts. In 1895, an article appeared in the strand magazine (Fitzgerald 1895) which included a photograph (number 5) of a charcoal retort. Unfortunately the article does not say where the photograph was taken. If the proposed changes in the undated plan occurred, the layout of the room matches that of the plan, and it is then possible that the

photograph in the Strand Magazine may be of the original charcoal retorts at Waltham Abbey Royal Gunpowder Mills.

In 1877, a new Cylinder house, measuring 35' x 25', was constructed onto the east of the existing building. The plan is extremely informative and shows there were three brick retorts, a furnace with ash pit, a sand pit behind the furnace, rails to convey the removable cast iron cylinders, and overhead pulley attachments to move the cylinders.

In 1885, a new woodshed, measuring 94' 5" x 39' 9", was added onto the south side of the existing buildings.

After charcoal went out of production, the buildings reverted to other uses (? sometime during the first decade of the twentieth century) including a boat repair shop, a motor transport workshop, and latterly following demolition as a car park. The fragmentary foundations of the buildings are still visible today.

Summary

The production of charcoal was, due to its use in gunpowder, an important part of the workings of the Waltham Abbey Royal Gunpowder Mills. This can be seen by the canal and railway links between the different processes involved in its production. A basic history of its production has been put forward, although more research is needed, particularly on (a) the pre-retort charcoal burning, and (b) on the carbonising of straw, and (c) the production of gunpowder during the twentieth century. The following references in the Waltham Abbey Special Collection may be of some use to overall research.

<i>number</i>	<i>location</i>	<i>type of document</i>
WASC1262	Loughton	plan
WASC 900/04 + MPH 271	Loughton	map
WASC 900/38	Loughton	map
WASC 900/58 + MR 580	Loughton	map
WASC 900/53c	Loughton	map
WASC 1509	Loughton	ledger refers to L160 & L162 & L167 & 226
WASC 1764/5	Loughton	ledger refers to L160 & L162 & L167 & 226
WASC 1680	Loughton	ledger refers to L160 & L167
WASC 1508	Loughton	ledger refers to L160 & L162 & 1167
WASC 901/109	PRO	map
WASC 901/113	PRO	map
SUPP5/975	PRO	map of 1865, corrected 1886

One of the aims of the research was to seek out information on the use of retorts. One plan, L161.B.03, shows a specification for a set of three charcoal retorts for the Waltham Abbey Royal Gunpowder Mills. Unlike modern horizontal retorts that are made of metal, the specification for the Waltham Abbey Royal Gunpowder Mills retort, shows it to be of firebrick and firetiles construction, and built as an integral part of the Cylinder House. If the photograph in the Strand Magazine shows the original 1830s retorts at Waltham Abbey Royal Gunpowder Mills than these are also constructed of brick.

Bibliography

Unpublished Sources (Waltham Abbey Archive)

Arch/G1/1 Gas Works (Archaeology file)

RCHME Component Sheets

A225

A226

211

198/197

L160

L161

L162

L167

WASC 900/5 (map)

Waltham Abbey Archive Plans

L162.B.01

L162.B.02

L161.B.03

L161.B.04

L161.B.06

Coombes, A T, 1998 *Woodland Management Plan Waltham Abbey Royal Gunpowder Mills*
(unpublished report for TTPM)

Published Sources

Fitzgerald, W G, 1895, How Explosives are Made *The Strand Magazine* IX 307-318

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

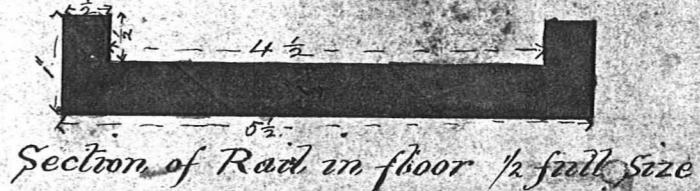
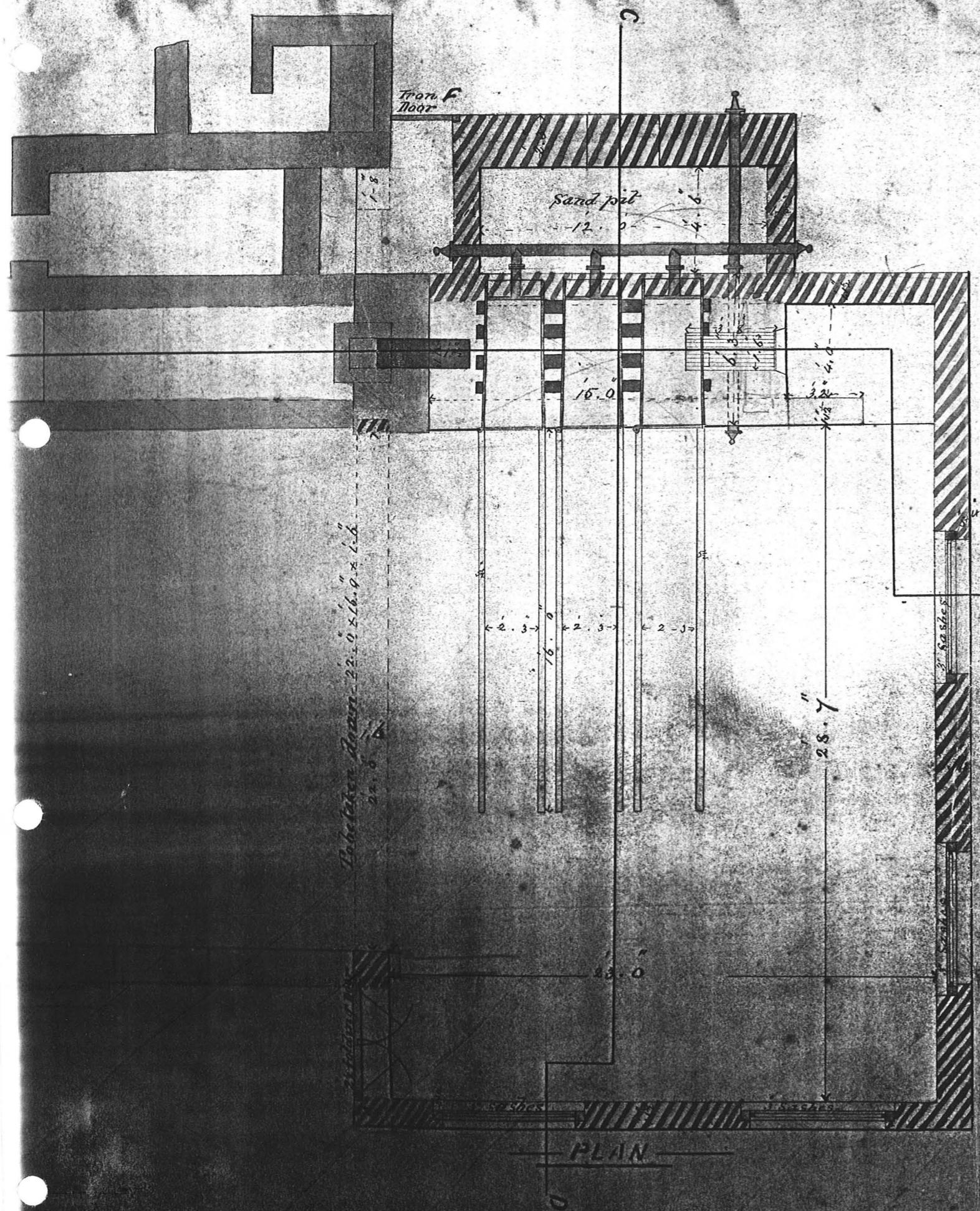
RCHME, 1993, *The Royal Gunpowder Factory, Waltham Abbey, Essex: An RCHME Survey*
(RCHME: Swindon)

Check Winder 1887 - ? were they getting charcoal from Faversham
- Bishop suggested idea to Congiere, who then improved the performance of gunpowder.

Andrew Passmore
23 July 1998

Check Dawson 1829

Check Service textbooks - Baddely 1857?
- 1885
- 1888,



Note a.a. b.b.b are Fire Bricks moulded to shape

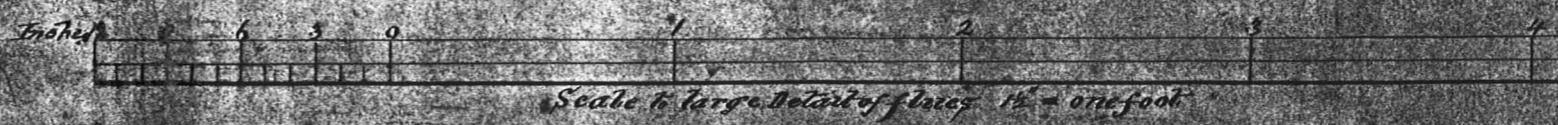
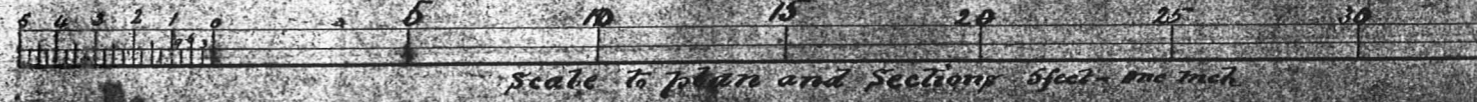
" c.c.c.c. " circular Fire tiles d"

" d.d.d " Firebrick Paving d"

" e.e. " Spaces left under Cylinder for cleaning out fires and built up in front with iron work

" Retorts, Pipes, Furnace front, bars, Door & Shovelbacks will be supplied from Store

" The hatched brickwork only is included in the quantity the other portions viz the Retorts & will be executed



H. I. May
 Cash. P.S.
 14.77

Col. Supl. H.
 13.4

W. H. ...

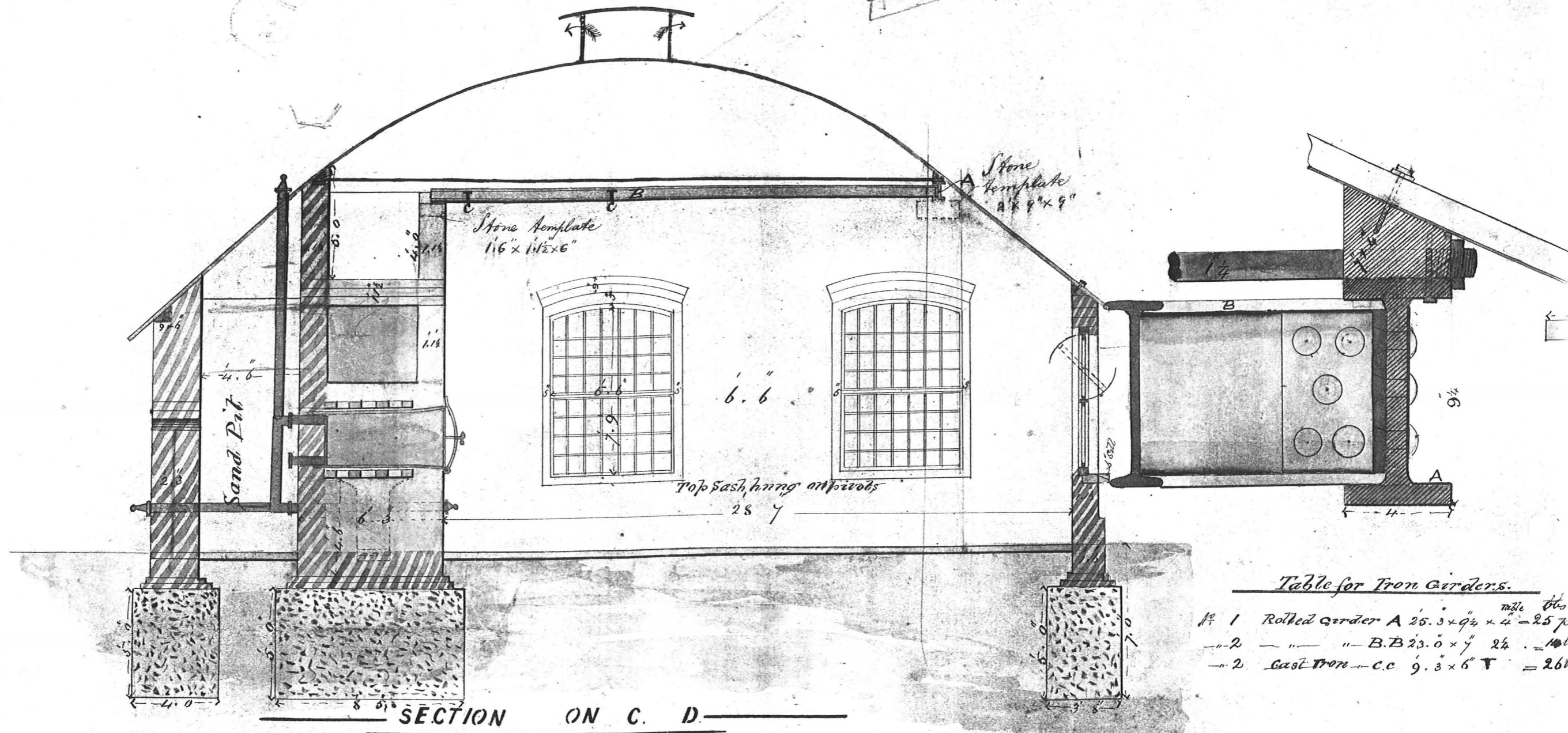
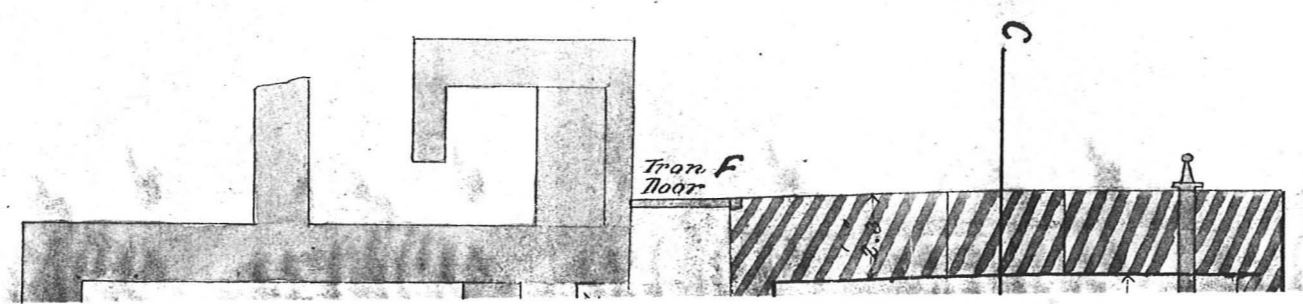
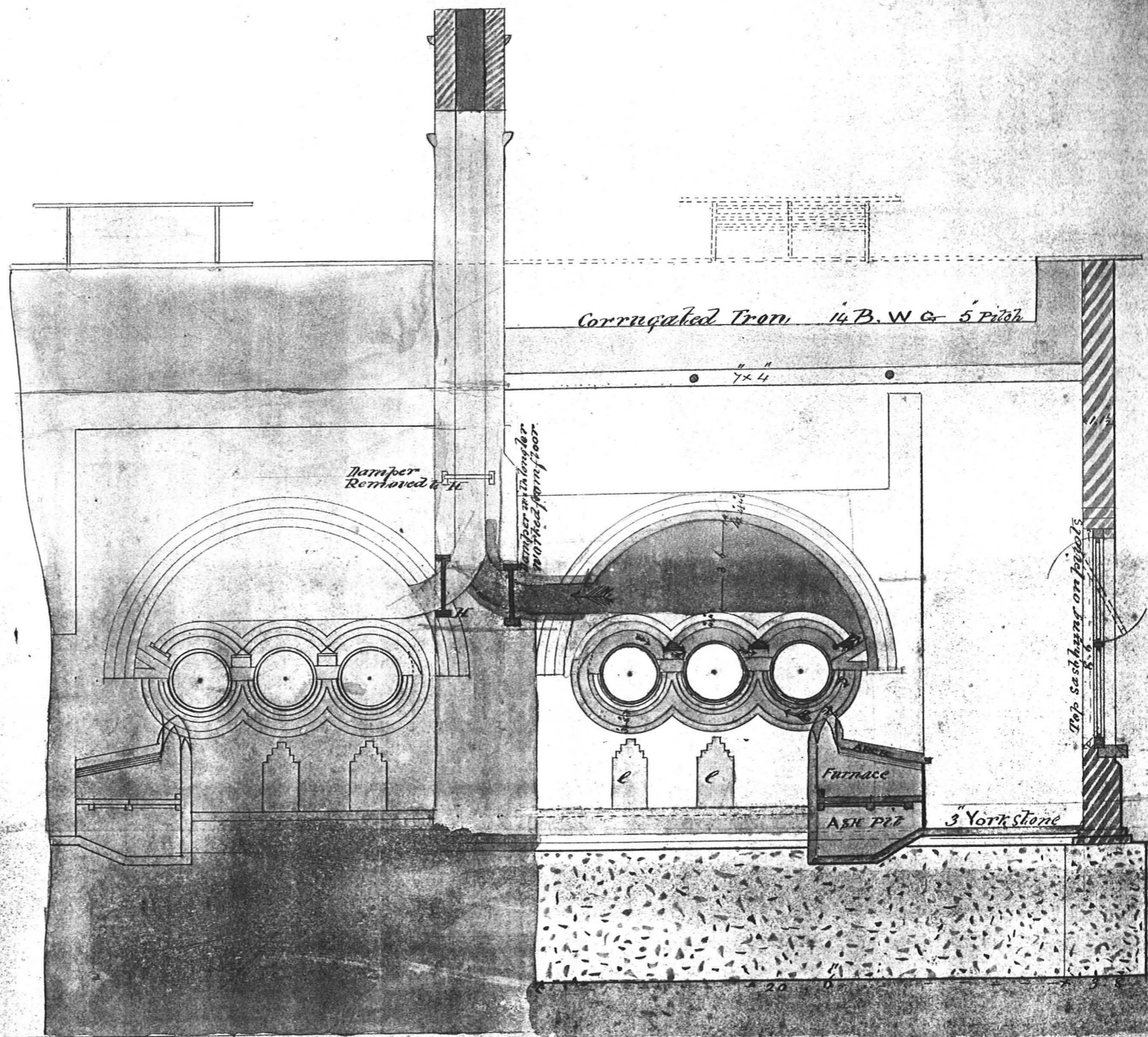
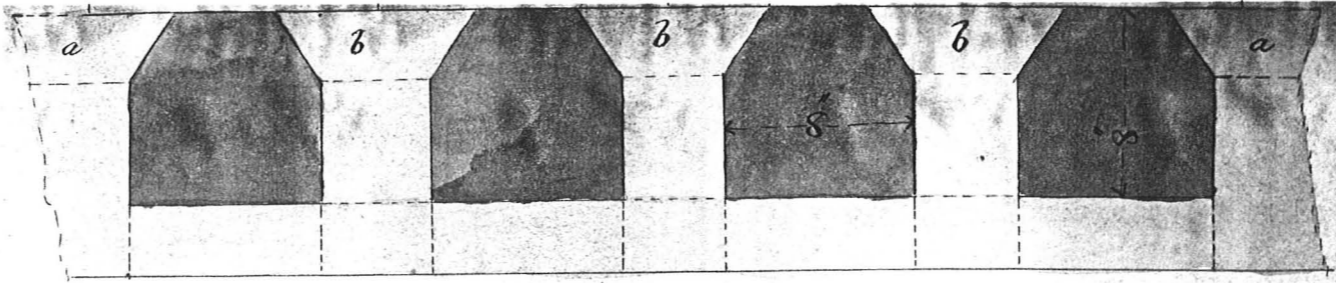


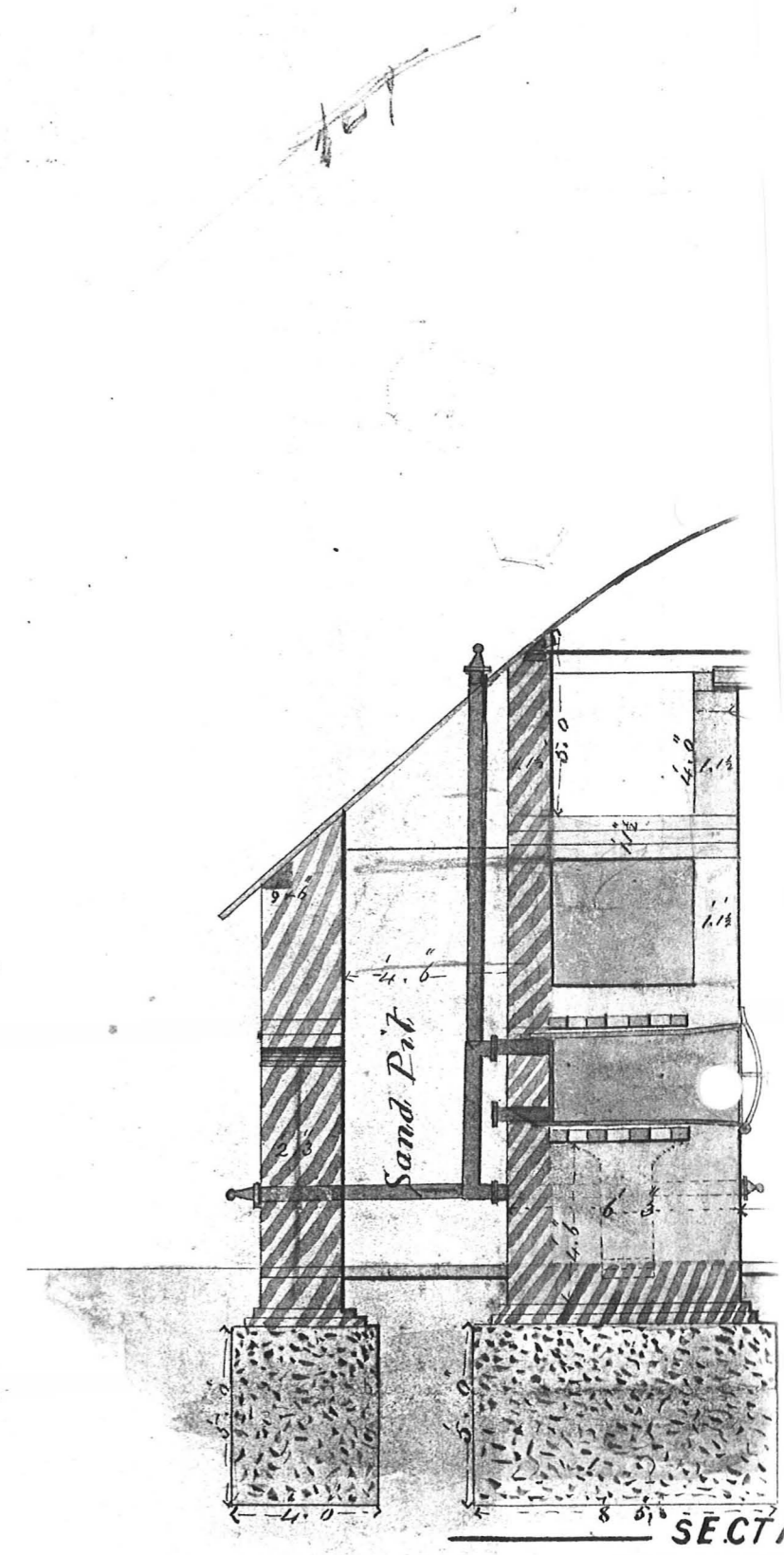
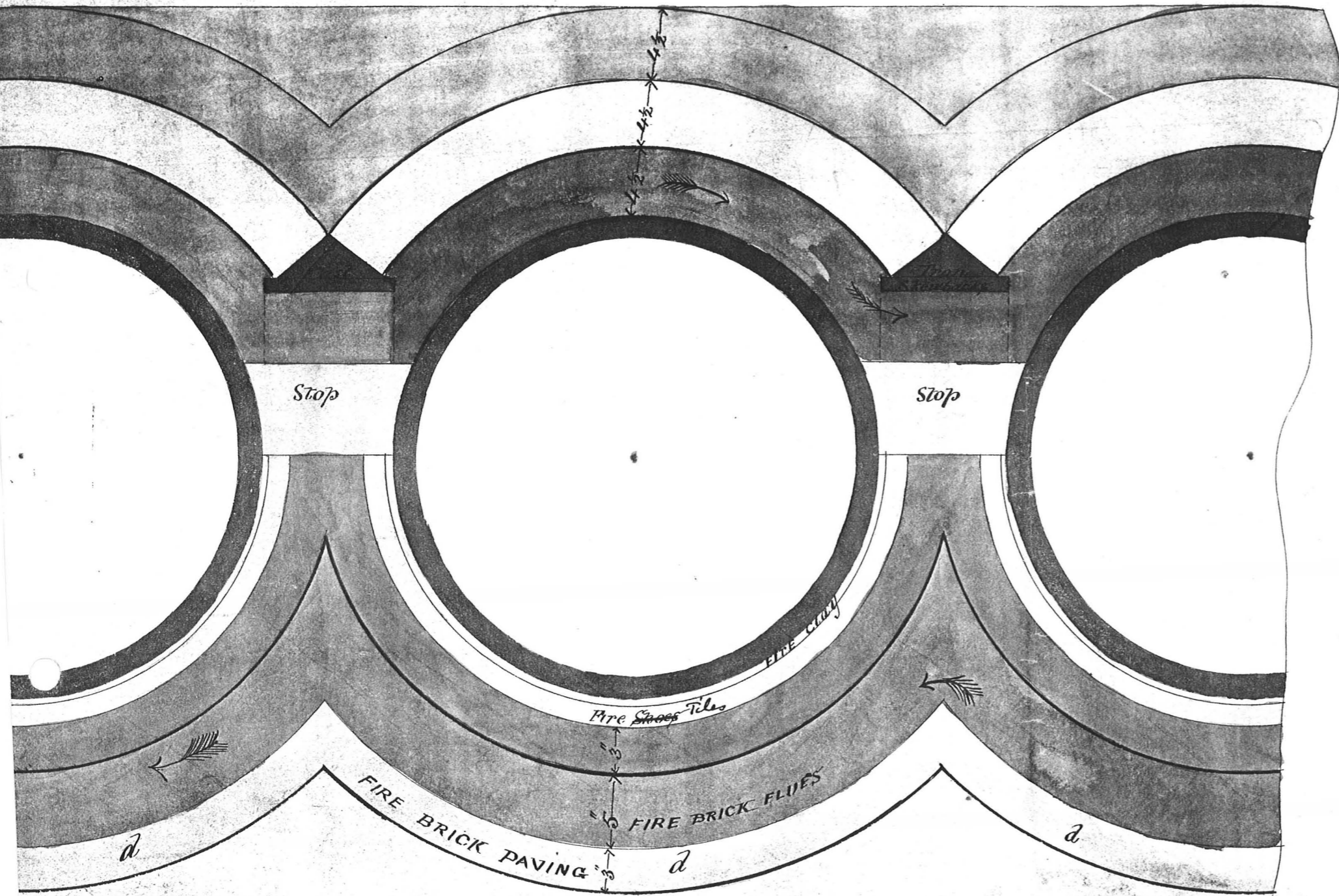
Table for Iron Girders.

No.	Description	Quantity	Weight (lbs)
1	Roller Girder A $25.3 \times 9 \frac{1}{2} \times 4$	2	$25 \times 2 = 50$
2	" " B $23.0 \times 7 \frac{1}{2}$	2	$23 \times 2 = 46$
2	Cast Iron C.C. 9.3×6 T	2	$26 \times 2 = 52$

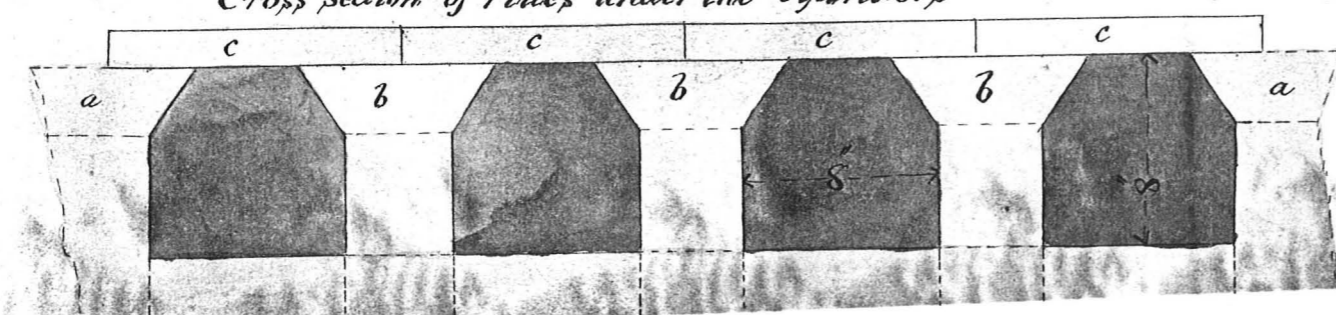




SECTION ON A. B.

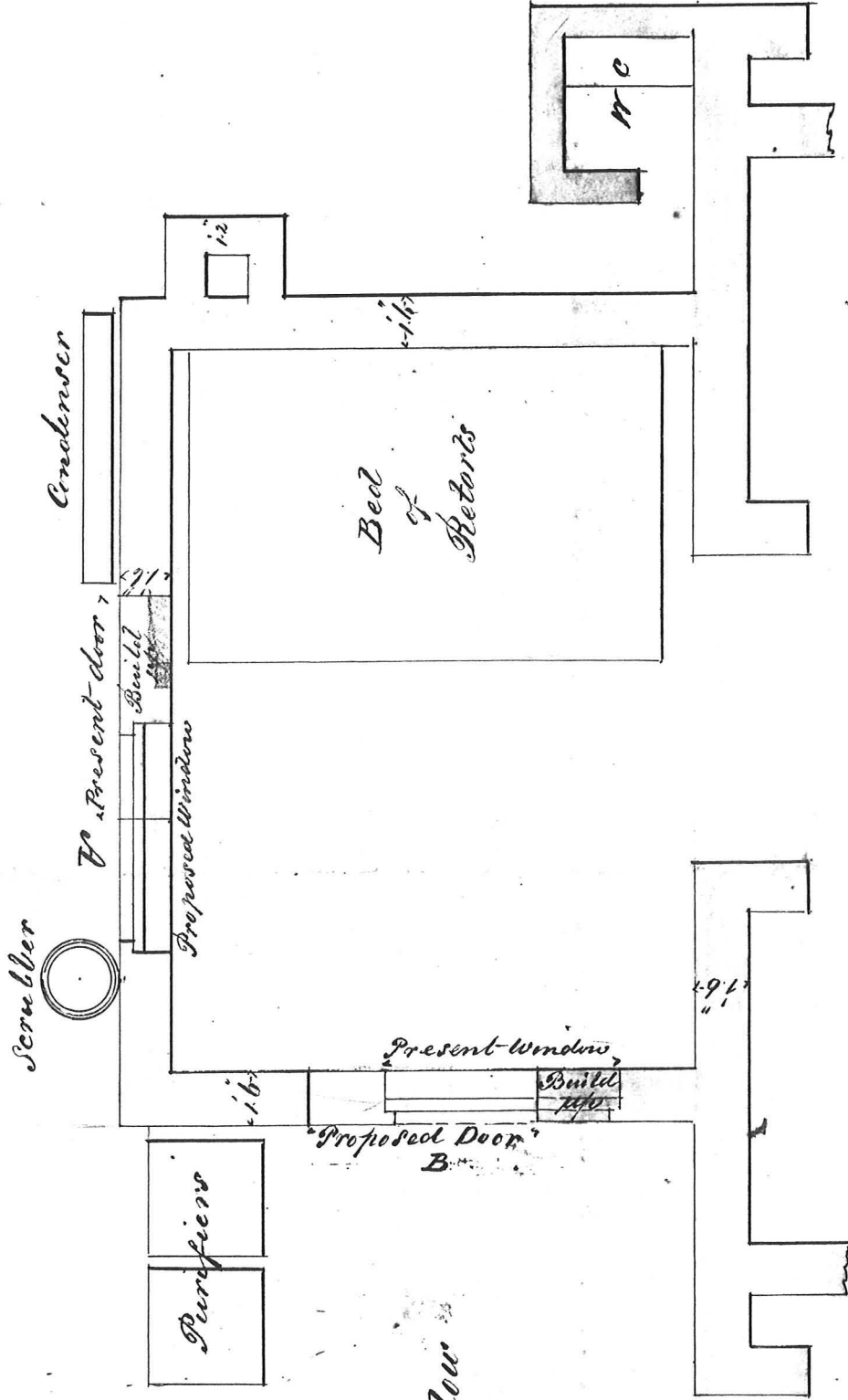


Cross Section of Flues under the Cylinders



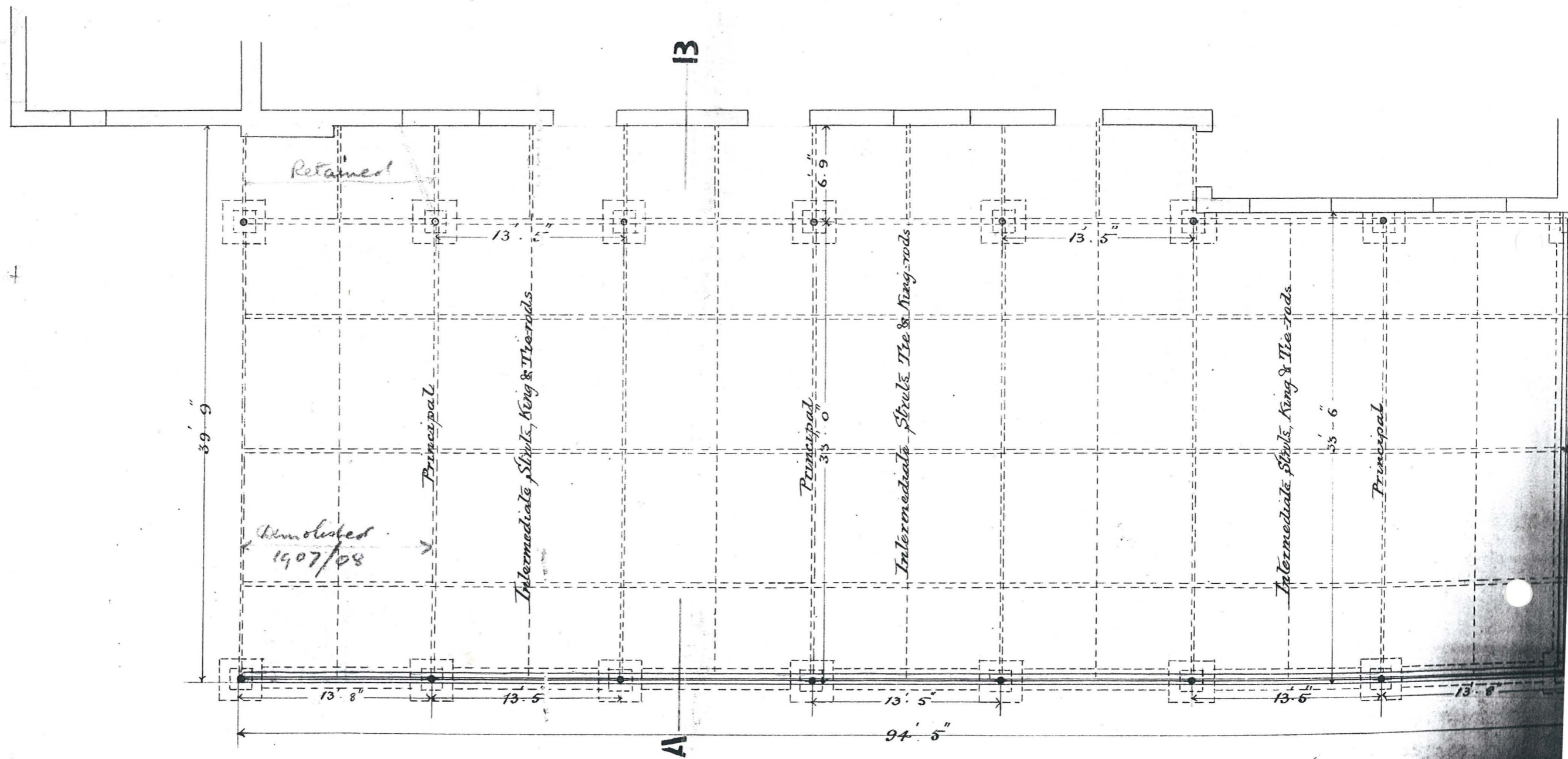
L 161 B.06

1" = 5'



SBEY —
Proposed
and Window
Touse.

Cylinder House



PLAN

Edwin Wright
23. 6. 85.

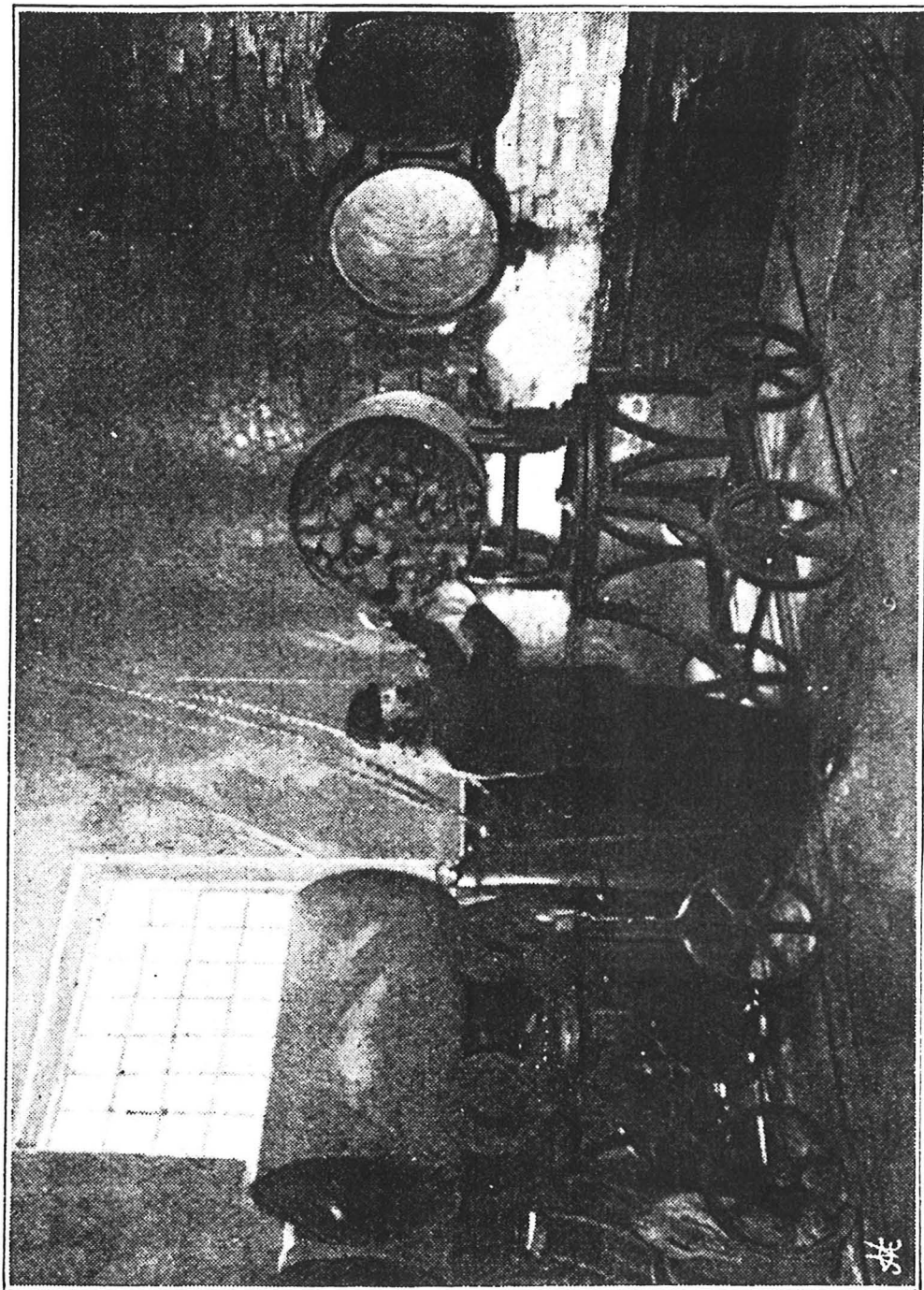
ren words hed.

2" = 8ft.

L14 B04

24 / 6 / 1885
25





NO. 5.—MAKING CHARCOAL.

HE