

The Royal Gunpowder Factory
Waltham Abbey
Essex

Archaeological Report Summary
October 1995

by Steve Chaddock MA AMA
Consultant to the Ministry of Defence

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Archaeological Report Summary

The position of resident archaeological consultant was maintained after the departure of A.D. Ford in January 1995. Essentially the duties of full time archaeological advisor, working to keep the decontamination programme on track while ensuring the appropriate protection to the scheduled areas and listed buildings, continued up to the point that groundwork ceased on site (27 September 1995).

I intend to follow the layout of A.D. Ford's 'Archaeological Report Summary' (1995) and add to it where necessary.

Scheduled Ancient Monument (SAM)

Advice continued to be sought by the decontamination contractor on the likelihood of successful applications for scheduled monument consent. Close liaison with English Heritage (HBMC) continued. Please refer to additional report on SAM for details of work carried out between January 1995 and September 1995.

Listed Buildings

English Heritage were informed of all alterations and damage to listed buildings on site.

To date, only the Grade 1 listed building, L157, has been issued with a certificate guaranteeing safety from explosives. L157 requires its roof timbers to be sprayed with a fire retarding paint.

A201/A202 continued to be occupied as Royal Ordnance's site offices and the mess room. A200, Walton's House, was subject to an outbreak of dry rot which was addressed. Treatment is detailed on the site files and correspondence.

L176 continues to be occupied by Bray Construction Plant, who also have use of the slab of L169 for heavy plant storage.

Areas Outside SAM

Areas outside the SAM were dealt with as described in Ford (1993).

Powdermill Lane Housing Development Site

Wimpey Homes purchased Powdermill Lane Housing Site and it was agreed that the resident archaeologist would provide watching brief cover, in line with Essex County Council guidelines. Further excavation below Flagstaff Road is planned during November and December 1995.

Acid Factory

The Acid Factory, in the area known historically as Edmonsy Mead, was carefully excavated to expose a complex series of concrete and brick foundations. These have been photographically recorded and located within the MKS site survey on CAD. Further archaeological recording was not possible within the time frame available.

Non Listed Buildings

These buildings continued to be treated as described in Ford (1993). Royal Ordnance have compiled an accurate architectural record of all these buildings which can be found in the site archive.

Projects

Where remains were uncovered as a result of the decontamination process, an assessment was made of their significance in close liaison with English Heritage. Consideration was also given to the need for external assistance in order to compile an adequate record.

Three archaeological projects have been carried out on site by external bodies during the decontamination process. All these have been funded by Defence Lands Service(Cambridge) through the decontamination budget.

Powdermill Lane Housing Development Site

Field Evaluation by Essex County Council Field Unit. Detailed in PLHDS Archaeological Report (Ford.1994)

Four Barges

Recording project focusing on four waterlogged barges that lay in the path of the decontamination project. Report forthcoming with figures.

211a and RCHME135

Recording project concentrating on the remains of a water powered gunpowder incorporating mill (211a) and pre 19th Century sluice remains (RCHME135). Copy on site archive.

Photographic Recording

A similar policy to that outlined in Ford (1995) was adopted.

The photographic archive (archaeology) is now complete and together with the Royal Ordnance collection documenting the decontamination programme represents a formidable photographic account of work on site.

Finds

Portable Finds

Aims to catalogue and store all excavated finds in the secure store in A203 proved to be unmanageable. Time and money necessitated an adjustment in plans.

Cataloguing

All artefacts collected on site have been given a label, or are in a box that is labelled. The information recorded is the date of excavation, method of excavation and the context. This should allow a future owner of the site to complete the full cataloguing of the collections without losing any information.

Storage

Labelled as above, the majority of excavated finds are stored in L168. Finds that have had a catalogue sheet filled out are boxed and stored in the Secure Store (A203).

Large Objects

Barges

In all there are 17 Barges on site at present. The surprising survival of so many barges has led the Nautical Archaeology Society to recommend a separate display area for the inland working craft represented at Waltham Abbey. A summary of barge types and locations is copied here.

Masonry Fragments

During excavation of the waterways on site a large number of limestone edge runner fragments and carved sandstone chimney tops were recovered. These are stored in the vicinity of A200

Drawings

Many of the remains uncovered were recorded on the MKS Site Surveys with additional, smaller scale, details added where necessary. Plans of canals excavated and filled can be found on these plans. In addition to these, a series of line drawings (to scale) and sketches (not to scale) were produced where archaeological detail was missed by MKS. These drawings are part of the site archive and have the prefix [WALD]. An index of the WALD drawings is copied here.

Monitoring

Recording of the temperature and humidity conditions in the Conference Room and in the Secure Store, both in A203, has been carried out since October 1994 using Meaco digital thermohygrometers.

Analysis of the different conditions noted should allow conservators to understand the fluctuations more accurately and make plans accordingly.

Reports

It was decided that additional reports would be completed to compliment the interim reports prepared by A.D. Ford in January 1993.

Conclusions

A pragmatic approach to a challenging new kind of site has paid off. Decontamination contractors and heritage bodies are not easy bedfellows, but through discussion and advice, the middle path has been steered.

I would like to thank the following for their help and advice:

Adam Ford

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Stuart Fox

Wendy Webb

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Powdermill Lane Housing Site
and North P Area

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North P Area

During 1995 little excavation was carried out on North P Area, as most of the work had already been completed (see A.D. Ford 1993).

A bank of ground at 45 degrees to the garden wall of 221 was removed over a long period of time and replaced with clear aggregate. No structures were noted during this exercise.

Generally the ground in North P Area has been reduced by over 1 meter. The presence of the Boiler House (A210), led to some contamination from industrial activities. The ground around the Boiler House (A210) has been cleaned up but the ground on which it stands has been sealed in using semi-permeable membrane (Terram) and a capping layer of aggregate. There has been no effort to backfill this area after removal of fills.

Powdermill Lane Housing Development Site

A continuing watching brief on the PMLHDA has noted no unknown features. Two brick vaulted culverts, probably associated with the 19th Century Artificer's Yard, were seen in a trench dug through Powdermill Lane. They were running across the road to the Cornmill Stream on the other side.

Work has yet to be started on insertion of a foul and surface water sewer along Flagstaff Road.

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Area H

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AREA 'H'

Structures left standing on 'H' area are:

H7 - Cordite Reel Drying Stove
- RCHME Sheet
- Threatened Buildings Report attached

H17 - Sewer Pump House
- RCHME Sheet

H26 - Sandhurst Hospital
- RCHME Sheet
- Threatened Buildings Report attached

In the Summer of 1995 work on the Scheduled Ancient Monument at the southern end of 'H' area started. Because of the fragile nature of the remains, a light surface scrape was all that was allowed and the exposed areas were then covered with terram and ballast to seal in any potential contamination. These works were carried out in compliance with Scheduled Monument Consent HSD9/2/3130 pt.23.

Removing vegetation on HBS.SAM did not allow a better understanding of the historic structures in this area as later concrete bases have been laid over their foundations.

S. Chaddock
Consultant Archaeologist
20.09.95

H Area

The majority of work carried out in H Area was completed before 1995 (refer to A.D. Ford 1993).

The whole area, except those parts within the Scheduled Ancient Monument and under standing structures, has been remediated to a reduced level of c. 1 meter. The fence line and land between the fence and the Horsemill Stream has not been looked at.

Proposed housing development on this land may consider access for services via a trench cut through the ancient monument before it was scheduled. It is believed this trench runs in line with the line of the road through Highbridge Street Gates.

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Millhead Stream and The Island Site

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MILLHEAD - REMOVAL OF FILLS

During decontamination work at Waltham Abbey, the fill of all known canals or drainage leats was removed under the guidance of the on site archaeologist who was guided by Scheduled Ancient Monument Consent HSD9/2/3130 pt.2.

In the case of Millhead the fill of the waterways made up a significant proportion of the whole existing landmass. It seems as if fly tipping had been practised, as the hard-core in the canals would have made up more buildings than were known historically.

[RCHME 296] Millhead Stream was fully excavated along almost its full length, the only exception to this being at the northern end, where the old line of the Millhead Stream has been truncated by the flood relief channel, Horsemill Stream. At this northern point, between 155 and Intersection 10, the fill was found to be mostly gravels, presumably deriving from the Horsemill Stream widening in the 1970's, and so a central 'V' only was dug and two supporting banks left up against the canal walls. (Site Photography)

Causeways, with pipes to allow water flow, have been reinstated at the two crossing points. One on the east/west road towards the north of H7, and one from the roundabout east/west to the south of H7.

Previously water powered, the mills along the islands of Millhead Stream also had their wheel shots excavated. These were sandstone curves with some repair patching in evidence.

All steps were taken to restrict excavation on the islands of Millhead Stream and, apart from localised asbestos removal necessary for health and safety reasons, this was achieved.

The southern end of Millhead Stream, the 'Gullies' [RCHME 135], were uncovered during 1995. These interesting water management structures proved to contain phases dating back to the early part of the site's history. Cotswold Archaeological Trust won the contract to record the remains, which included the foundations of 211a, and their report and archive are held on site.

To the east and west of [RCHME 296] Millhead Stream lie the mill races [RCHME 119] and [RCHME 301] respectively. These have both been decontaminated by excavation and are crossed by piped causeways in the same fashion as Millhead Stream (see above).

Also in 1995, Hoppit Pool, which both [RCHME 296] Millhead Stream, and its westerly race [RCHME 301] flow into, was pumped down and the silts excavated. A temporary dam to the immediate south of Bridge 17 kept the water back and it was possible to examine the foundation of the Island Site as well as the 'Gullies' [RCHME 135].

The Island Site is set on a wooden pile foundation, the waterlogged sludge below this receded without water saturation and the chance was taken to insert some concrete support to the foundation. (Site Photog).

[RCHME 135] The 'Gullies' 19th Century brick built walls are founded on wooden piles in an orderly manner, the piles following the walls in the same line as the walls. On the southern edge, the existence of a number of horizontal and vertical timbers was discovered. This construction aligned itself to the east of the centre of the 19th Century sluices. The irregular eastern timbers were packed with some chalk. (See Site Photog). To the west, the island on which 211 sits, the island was founded on more regular upright timbers standing c. 1½ metres from the walls and possibly packed with rubble. It seems reasonable to suggest that this western island is founded on 19th Century style foundations.

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29.08.95

A200 or WALTON'S HOUSE

Malcolm Maclaren pers. comm.

A210 Boiler House provided steam heating for North Site buildings including A200.

M. Maclaren's Museum on site was housed in part of A200, (bay windowed room upstairs and south extension).

When A210 was closed, heating was no longer provided for A200 and this led to a degeneration.

The museum was opened in 1968 and lasted for 12 years up to 1980.

Malcolm remembers checking on the exhibit cases one Friday evening and then returning on the following Monday to find a fine layer of orange spores on every horizontal surface. Dry rot was diagnosed and extensive works were commissioned by Dr Hooper's immediate predecessor, on the understanding that A200 was listed. (It was not at this time.)

Most museum cases were also condemned, believing that the building was listed, the instructions given were to replace all materials with similar materials. This strict "like for like" replacement, although very commendable, led the H & S offices to designate the area 'temporary visitor space' only - presumably based on a fire risk or possibly horse hair in the plaster posed some sort of anthrax risk (B. Watts pers. comm.)

Heating was provided after the work had been completed (at a cost of c. £15,000) in the form of many 4 bar electric oil heaters set on low. This gave the effect of keeping the inside of the walls dry, although the walls suffered on the outside from rain soaking and seepage.

M. Maclaren puts this episode between 1984 and 1986, based on who signed the authorisation form for the work.

Since the site's closure in 1991, having survived 5 years being electrically heated, the unheated building fell prey to the ravages of dry rot once more. Fruiting bodies and spores were discovered in the south extension, west side, and work agreed by S. Fox was carried out in September 1995.

It is unlikely that the building will remain unaffected by dry rot in the future, especially as no heating system is in place at present, and will not be likely for the oncoming Winter as the site is to be closed from 29th September 1995.

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15.09.95

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Queen Meads

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Queen Meads

The RCHME Survey showed few structures existing on this area of land on site.

The removal of fills from canals resulted in the accumulation of large quantities of very wet, sloppy muck. Queen Meads was used to dewater this muck before it could be removed from site.

The action of excavators pulling the muck around and of lorries gaining access to the loading points, has had the effect of stirring the wet muck into the topsoil layer of the Queen Meads. A final scrape of the area therefore resulted in removal of the topsoil from the entire area. This has not been replaced.

Buried Archaeological feature discovered on Queen Meads are limited to the line of concrete and brick foundations which stretch along the western side of the stream powered incorporating buildings.

Canal RCHME 181

Excavation of canal RCHME 181, which runs south from BR8. led to the discovery of two barges and a new area of the site.

This branch was not excavated to its full length and so it is difficult to say if it was a loading cul-de-sac or a through route to the barge workshop and charcoal works in the south. Nevertheless, historical maps show a blastwall along the western bank of RCHME 181 and evidence of one end may be seen as a concrete foundation.

The position of the excavated canal can be seen on (WALD024) and also the position of a footbridge, whose concrete foundations were noted. To the east of the blast mound, in the section of the canal wall, two recessed channels were noted (site photography) (WALD011). No attempt was made to excavate these fully. Presumably excavation would allow exact placement of the conjectured blastwall to be made.

The two barges discovered were backfilled with clay and concrete. RCHME 561 was more interesting as it was a shape not seen at RGPF before (WALD001) RCHME562 is dealt with in the next section.

From these loading jetties, cordite paste would have been taken on narrow gauge trucks around from the east side of the blast wall to L130 and L137 where pressing of the cordite was carried out. No remains of these tracks were found.

RCHME 562

Found to the south of Bridge 8 in Canal RCHME 181, adjacent to the southern of two loading jetties that serviced the Cordite Press Houses L130 and L137.

The fill of RCHME 181 was composed of hard-core and concrete fragments, which, it is possible to assume, came from the demolished blast wall immediately to the west of the canal.

The mass of rubble and concrete had damaged the barge severely at one end but the barge was seen to be sitting on a large bed of cordite - presumably having accumulated from various spills around the loading jetty area. It was necessary to remove this contaminant and this involved moving RCHME 562. A ramp was constructed and the barge removed, during this operation its waterlogged timbers proved incapable of holding together.

On initial inspection of the barge, it appeared to be similar to the other three swim-ended vessels on site. However when boards were removed it became clear that the barge was in fact lined with concrete between the cross timbers below the floor boards and above the hull. This had obviously added to the weight of the vessel and had encouraged separation of the timber planks. It was also clear that the vessel was double diagonal planked on each side and had been bitumen sealed.

The remains were replaced in the canal and backfilled in situ to preserve them in anaerobic waterlogged condition.

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New Hill

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Please refer to the interim archaeological report (January 1995) by A.D. Ford.

During 1995 the area of New Hill Nitro-glycerine factory was examined in more detail. Residual asbestos contamination was found in the structure of many buildings (at the date of the factory's founding, asbestos was used widely in gasketing and generally in explosives buildings).

No buried archaeological features were found on New Hill. Examination of the ditches and ponds to the east of the complex proved fruitless. Some building had been overgrown with thorn scrub.

S16

Clearance of filled pits in S16 revealed the original standing for the NG drowning tank, circular in plan and standing c.20cm proud of the concrete floor. This tank presumably also circular, sat within a square timber revetment pit which was positioned centrally within S16.

During the last few days of work on New Hill, a small amount of reconstituted propellant was found in the area to the north east of S16. This led to removal of some thick scrub but no archaeological features were discovered in this exercise.

S23

Clearance of S23 revealed tank standings and a peripheral walkway which had been covered by slippage of earth on the surrounding mound.

S25

S25 was seen to be suffering from slippage of the earth bank directly to its south east. No action was taken on this.

Steam Pipe routes in the New Hill area have been scrutinised and capped with an aggregate.

Conclusion

Little new has been discovered about New Hill since the RCHME Survey. Clearly some buildings have been revised as part of the proof test experiment on site but others were simply levelled and abandoned to nature.

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Scheduled Ancient Monument Area
(SAM)

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74 and 75

Originally constructed to serve as gunpowder magazines for the Dusting and Glazing Engine (RCHME 275) to the north, the southernmost magazine (75) was later converted to serve as a fan house for S28. Its concrete mounting blocks survive in the interior of the building.

Remains were carefully worked around and photographed. Detailed archaeological line drawings can be found (WALD003 and WALD004).

63

Immediately to the north west of 74, the remains of Mixing House 63 were investigated. Wholesale rearrangement of the structure was expected after reference to the 'Inquiry into the Explosion' in the Waltham Abbey Special Collection.

Some surface asbestos was cleared away but there was a large hole created by the blast and it seems likely that there was some 'clean up' work done after the inquiry. 63 has been capped with hoggin.

RCHME 275

The removal of fills from Canal RCHME 293, which fed the waterwheel of RCHME 275 uncovered a sandstone slab which may mark a previous sluice point.

The concrete slab overlying the wheel pit of was noted as cracked and recorded. No steps were taken to investigate this building further.

E4

This building was cleared of vegetation exposing the footings of the washwater settling tank. An NG gutter fastening strap was found in the building.

Steam Pipe Routes in the area have been scrutinised and capped with hoggin.

E12 North Area

Extensive asbestos contamination discovered in the area immediately surrounding E12 led to the reduction of the ground level by c 0.5 m. most of the fill was made up ground containing rubble, slate and asbestos (fibrous).

This decontamination exercise also brought to light the foundations of five structures previously buried (WALD008).

The group centred around a hexagonal water tower (61). It is supposed that the tower provided a head of water not only for the ablutions in E12 to the south, but also for the Acid Factory to the west and south west.

The tower drew its water by means of a pumping house (60) and this was supplied with water from one of two wells (60A, 61A). 60A was filled by an extended leg from the Waste NG drowning pond to the south of E2. (It seems unlikely that contaminated waters would have pumped up a storage tower.) 61A was fed by way of a pipe, whose easternmost end was fed by the high level canal RCHME 291.

The Dirty Store (54) and its Earth Closet (55) were only exposed and not excavated.

A more detailed drawing of 61 can be found at WALD007, showing pipes and construction details.

Canals in the SAM

The filled canals in the Scheduled Ancient Monument Areas have been systematically excavated using small excavators supervised by the resident archaeologist.

The excavated canals are recorded on Milton Keynes Survey 'Land Survey : Sheets 1 to 8', which is held on site. Photographic recording of the canals being excavated, and after excavation, are accessible through the site photographic index.

Agreed methodology on the excavation of canals was developed through discussion between W.S. Atkins and English Heritage at regular liaison meetings on site and can be summarised by reference to SK10/2A.

Construction

Reference to the RCHME Site Survey reveals that the system of waterways on site developed gradually over a number of years and this patchwork development is also evident in the various construction methods employed. Later repairs are usually carried out in the style of the day, but there are five recognisable styles identified on site.

1. Canal banks at 90° and revetted in brick
2. Canal banks at 90° and revetted in corrugated iron
3. Canal banks at 90° and revetted in upright timbers
4. Canal banks at 90° revetted in reinforced concrete piles
5. Canal banks at 45° clay bank with periodic timbers

Provision of a walkway alongside the canal was important in order to allow the barges to be moved around site. In the case of styles 1-4, a tarmac path often survives alongside one bank. Style 5 had a walkway that is now represented by the periodic timbers. These upright timbers supported a boarded walkway along which persons could walk (WALDO 19B)

Many timber piles (Style 3), have been saved and stored in a watertight lorry body beside W68. These have also been tagged to record their context. The usual profile of the timber

piles is illustrated at WALD19A. Interestingly this design was later copied by the manufactures of the reinforced concrete piles (Style 4).

Lessons

Generally the excavation of canals in the SAM has proved successful with few unwanted results.

It has been found that the reduction of the water level on the site, as a result of the construction of the Horsemill Stream Flood relief channel in the 1970's, has had the effect of reducing the supporting qualities of the ground, notably under canal-side buildings.

Excavation of the filled canals sometimes resulted in slippage, the worst example being L108. Having identified this as a potential problem, action could be taken to support the banks with a 45° bank of clay or granite chips.

In flowing water there has been some revetment collapse in isolated areas. These tend to be located on the bend of a canal and so are attributed to natural erosion effects.

Access Points

Although the methodology followed in the excavation of the canals can be seen to have been successful, it is important to note the careful choice of access points into and out of the canals. Excavators were found to be the least damaging as their tracks spread the load more evenly than tyres and they were under close supervision. Vast quantities of spoil were removed from the canals on site. At a depth of c. 2m, a 100 metre stretch produces about 1120m³ of spoil which represents 510 dumper loads. This is 510 trips laden and 510 trips unladen : so 1020 dumpers going in and out of the access point for every 100 metres excavated.

Conclusion

Information exists that could be added to. Construction of a comprehensive report dealing with the canal system, methods of construction, locks, loading points etc. would be a worthwhile venture in the future.

Building 25, 26, 27

While building 26 is well documented in the RCHME report, its associated drying stoves are less well understood. The two drying rooms are the best preserved on North Site and were buried underneath 50cm - 1m of river worn gravel.

Removal of gravel allowed a series of brick built supports to be revealed. In both of the buildings these brick supports were surviving in the two bays nearest to the stove (26). There was also evidence of ventilation bricks in the upstanding parts of the walls, as well as a possible entrance in the southern side of Building 25. Remains were drawn and photographed and have been left exposed.

It seems reasonable to assume that these buildings were fired before being backfilled with river gravel. A strange tin-like deposit may be seen on the floor of the drying rooms. There was also evidence of slate damp coursing which has been detailed on the drawings (WALD005 and WALD006).

To the north of 25 an earth closet foundations were uncovered. This seems to be in the usual RGPF style. The whole complex was surrounded by a U-shaped canal which passed underneath the present bridge 22, although no evidence for the canal profile was seen during excavation of Canal RCHME 285. As it is expected with drying stove complexes, there were two boathouses, one to service each of the drying rooms. The northern boathouse was identified as a length of wall during a vegetation scrape, no further excavation was carried out. The southern boathouse was discovered by way of excavation from Intersection 27 eastwards. In the process of removing the fill of Intersection 27, two barges were discovered. Both these were large navigation barges which were too heavy and awkward to lift, but were backfilled in situ, remaining under the water level and therefore well preserved. RCHME 560 barge sits inside the southern boathouse.

Quinan Stove (22A) Area

During summer 1995 it was planned to excavate the full extent of Canal RCHME 285, from its junction with Canal RCHME 284 in the south and Guncotton Drying Stove No. 169.

Heat transfer pipes were lying across the canal between 22A/3 and 22A; these were carefully lifted and rested on the bank beside 22A.

On excavating the canal it became clear that there was very little originally deposited silt fill and that the canal was actually buried under 3-4 metres of inert river worn gravel. Apart from a few wooden balls found in soils under BR2, nothing of significance was discovered in the base of the canal. In the light of this discovery, it was thought best to discontinue the removal of the canal fill at the northern end of 22A.

The banks of the canal were seen to have intermittent upright timbers. There was no evidence of a planked walkway, although one would be expected.

Investigation of North and North West of SAM

Due to increasing pressures, an attempt was made to limit the movement of the huge quantities of gravel which, it has been suggested before, derive from the construction of the Horsemill Stream Flood Relief Channel or dredging of the same.

With reference to the RCHME Survey and its recognition of the buried features in this area, and also in reference to the design drawings for the Flood Relief Channel Construction, which are held in the site archive, it was thought most economical to pinpoint potentially hazardous buried remains and excavate these individually. Similarly the Grand Magazine Complex, originally positioned on Payne's (or Paine's) Island and now attached by land to the rest of

North Site, was to be investigated carefully and no attempt was made to remove the fills of the old canal system.

Grand Magazine

A general light scrape around the remains of the two buildings showed Building 1 as having a low wall existing to the north east, forming a small yard in this direction. As little more than vegetation removal was completed, it is difficult to say more about Building 1.

Building 2A, known to be asbestos boarded, proved to be an asphalt floored structure with steps up to it from the western end, also covered in asphalt. To the eastern side, evidence of a narrow gauge railway entering the building from the south was noted.

Foundations for a small hut (3a, 5) were also uncovered but not excavated.

The inlet beside 3a from Cornmill Stream was also investigated as a large amount of concrete hard-core could be seen in the interface. The fill proved to be generally hard-core and, as expected, the remains of a sluice gate and foundation for a footbridge were also found on either side of the intersection. Removal of the intersection ceased after c. 4m when the Hard-core gave way to a more soil and gravel based fill.

The canals surrounding Payne's Island represent a unique archaeological resource that has yet to be tapped and this should be considered when plans are made to develop this area.

Guncotton Drying Stoves [4, 8, 10, 11, 17]

Immediately outside the Grand Magazine compound, the remains of Guncotton Drying Store No.8 were investigated, The general layout of the Guncotton Drying Stores is well understood and the recessed channel running around a concrete pedestal, on which the timber building once stood, proved to be contaminated with asbestos lagging originating from the lagged hot air pipes (site photograph). This slab has been left open.

Similarly the floor slabs of Guncotton Drying Stores Nos. 4, 10, 11 and 17 were also exposed and remediated. In the case of these stoves, the road has been reinstated over their remains but the general outline can be seen.

RCHME 328

Exploratory trenches were dug to find RCHME 328 and, although the building and its concrete revetment walls were discovered, it was decided to backfill the trenches and leave the remains undisturbed as no contamination was found.

OTHER DATA

WALTHAM ABBEY ROYAL GUNPOWDER MILLS

Inland Working Craft Survey at RGPF, WA 1994/5

RCHM N ^o	POSITION	TYPE
101	By Building 76 in RCHM107	Shipshaped
104	By BR26 in RCHM289. Burnt 27.55.95	Shipshaped
121	Moved to A214, South Face.	Swim ended
125	Moved to A214, South Face.	Swim ended
157 158 159 160	In Clean Canal RCHM156. Documented by NAS (12.94). Associated Finds in L168	3 Shipshaped 1 Swim ended
169	To West of Buildings 107/108 in RCHM294	Shipshaped
279	Fort Halstead Reconditioned Barge	Shipshaped
337	Lifted From Millhead Stream and Relocated in Clean Canal RCHM300	Lrg. Navigation
556	Discovered in Canal Interface 21 RCHM288 at TL 37386 01972. Excavated and relocated in RCHM300	Lrg. Navigation
557	Lifted From RCHM179 Behind L136. Relocated in Clean Canal RCHM300. Icebreaker. TL 37644 01437	Small Shipshaped
558	Discovered in Canal Intersection 26. Excavated and relocated in Clean Canal RCHM300. TL 37406 02242	Swimended
559	Discovered in Canal Intersection 27. Excavated and backfilled. End damaged in flood channel excavation.	Lrg. Navigation
560	Discovered in Canal Intersection 27. Backfilled. Located in boathouse south of Building 26. TL 37400 02270	Lrg. Navigation
561	Discovered to the south of RCHME 228 in canal branch RCHME 181. Backfilled in situ. TL 37718 01488	Shipshaped
562	Discovered to the south of RCHME 561. Badly damaged and filled with concrete. TL 37721 01473	Swim ended

This is a summary of the inland working craft found to date on the Royal Gunpowder Factory.

There are 17 boats on the site and 1 at Fort Halstead.

Steve Chaddock. 2 October 1995

SMC LIST RGPF - MONUMENT N° 21567

NUMBER	DESCRIPTION	DATE SENT	DATE ON RET'N SMC
HSD9/2/3130 pt 1	Draining Newtons Pool. Replace culvert and road	13/08/93	06/12/93
HSD9/2/3130 pt 2	Waterways - canals, ponds and hollows. Steam pipe routes	14/10/93	22/12/93
HSD9/2/3130 pt 3	Test pits in mounds on Newtons Pool	07/12/93	20/01/94
HSD9/2/3130 pt 4	Replanting of Long Walk Alders	05/01/94	26/01/94
HSD9/2/3130 pt 5	Strimming, herbicides, hand raking. Clean up of concrete slabs. H37 hole hoggin fill etc	07/02/94	21/02/94
HSD9/2/3130 pt 6	Boot wash by Walton House (A200)	08/02/94	30/03/94
HSD9/2/3130 pt 7	Fence re-erection at Grand Magazine	21/03/94	01/04/94
HSD9/2/3130 pt 8	Chevrons on Bridge 10	17/03/94	12/04/94
HSD9/2/3130 pt 9	North site road system repairs	11/04/94	03/05/94
HSD9/2/3130 pt 10	Semi-permanent barriers and fences - <u>itemised</u>	04/05/94	27/09/94
HSD9/2/3130 pt 11	Brick lined sump 211a. Steam route	13/05/94	21/06/94
HSD9/2/3130 pt 12	Bridge repairs	13/06/94	03/08/94
HSD9/2/3130 pt 13	Removal of timber structure on bank of E2 pond	13/07/94	08/08/94
HSD9/2/3130 pt 14	Realignment of approach to BR10	01/08/94	06/10/94
HSD9/2/3130 pt 16	Removal and treatment to asphalt floors in "danger" buildings	01/11/94	21/11/94
HSD9/2/3130 pt 17	Trial pits in blast mounds	01/11/94	21/11/94
HSD9/2/3130 pt 18	Erection of Tensar windbreak	03/11/94	23/11/94
HSD9/2/3130 pt 19	Localised asbestos in E2 mound	12/12/94	31/01/95
HSD9/2/3130 pt 20	Tree planting and habitat re-creation in SSSI	11/01/95	16/02/95
HSD9/2/3130 pt 21	Safety barriers on mounded buildings	23/01/95	14/03/95
HSD9/2/3130 pt 22	Removal an relocation of TNT channel from E2	10/03/95	26/04/95
HSD9/2/3130 pt 23	Capping of SAM Areas	26/06/95	14/09/95
HSD9/2/3130 pt 24	Tensar Windbreak 250m Acid Fact.	26/07/95	08/09/95

WALTHAM ABBEY RARDE NORTH SITE
ARCHAEOLOGICAL FILE LIST.

ARCH/A1/1	A200 - A250
ARCH/A2/1	A251 - A300
ARCH/A3/1	ACID FACTORY
ARCH/A4/1	ASBESTOS RELATED
ARCH/A5/1	ATKINS/WATTS
ARCH/B1/1	BARGES
ARCH/B2/1	BRIDGE REPORT
ARCH/B2/2	BRIDGE REPORT
ARCH/B2/3	BRIDGES
ARCH/B3/1	BUILDING LISTS, RARDE
ARCH/B4/1	BYWATERS
ARCH/C1/1	CANAL INTERFACE REPORT
ARCH/C2/1	CONSENTS SMC's I
ARCH/C2/1	CONSENTS SMC's II
ARCH/C3/1	CONTAMINATED LAND MEETING MINUTES
ARCH/D1/1	DNH
ARCH/E1/1	AREA E
ARCH/E2/1	ENGLISH NATURE
ARCH/G1/1	GAS WORKS
ARCH/H1/1	AREA H
ARCH/H2/1	HIGHBRIDGE STREET SAM
ARCH/I1/1	IFA
ARCH/I1/2	IFA
ARCH/I2/1	INVOICES (AF)
ARCH/I3/1	INCORPORATING MILLS
ARCH/I4/1	INFRASTRUCTURE
ARCH/I5/1	INSURANCE
ARCH/L1/1	L100 - L125
ARCH/L2/1	L126 - L149
ARCH/L3/1	L150 - L174
ARCH/L4/1	L175 - L199
ARCH/M1/1	MILLHEAD
ARCH/N1/1	NEWTONS POOL
ARCH/N1/2	NEWTONS POOL
ARCH/N2/1	NEW HILL
ARCH/P1/1	AREA P
ARCH/P1/2	AREA P
ARCH/P2/1	PRESS/PUBLICITY
ARCH/P3/1	PHOTOGRAPHY - BW
ARCH/P4/1	PHOTOGRAPHY - CS
ARCH/P5/1	PHOTOGRAPHY - CP
ARCH/P6/1	PERSONAL
ARCH/P7/1	PHOTO NEGATIVES - <i>at Cambridge,</i>

ARCH/P8/1
ARCH/R1/1
ARCH/R2/1
ARCH/S1/1
ARCH/T1/1
ARCH/W1/1
ARCH/W1/2
ARCH/W2/1
ARCH/#1/1
ARCH/#2/1

PHOTO NEGATIVES — *at Cambridge.*
R.O.F's
RCHME COMPONENT SHEETS
S27 - S90
TETRYL FACTORY
WATERWAYS
WATER WAYS
WASC
BUILDING 001 - 040
BUILDING 074 - 098

powdermill lane
housing development
Site

north p area ,

proposed 'western flank'
development area.

Area 'H'

and

highbridge street
scheduled ancient
monument

millhead stream
and
island site

queen meads,
steam incorporating
mills

and

first world war
cordite buildings

queen meads,
steam incorporating
mills

and

first world war
cordite buildings

new hill

Create Headings.

New Hill

Please refer to the interim archaeological report (January 1995) by A.D. Ford.

During 1995 the area of New Hill Nitro-glycerine factory was examined in more detail. Residual asbestos contamination was found in the structure of many buildings (at the date of the factory's founding, asbestos was used widely in gasketing and generally in explosives buildings).

No buried archaeological features were found on New Hill. Examination of the ditches and ponds to the east of the complex proved fruitless. *Some buildings had been overgrown with thorn scrub.*

Clearance of filled pits in S16 revealed the original standing for the NG drowning tank, circular in plan and standing c.20cm proud of the concrete floor. This tank presumably also circular, sat within a square timber revetment pit which was ~~centrally arranged in the interior~~ *positioned within* of S16.

Clearance of S23 revealed tank standings and a peripheral walkway which had been covered by slippage of earth on the surrounding mound.

S25 was seen to be suffering from slippage of the earth bank directly to its south east. No action was taken on this.

Steam Pipe routes in the New Hill area have been scrutinised and capped with an aggregate.

During the last few days of work on New Hill, a small amount of reconstituted propellant was found in the area to the north east of ~~site~~ *S16*. This led to removal of some thick scrub but no archaeological features were discovered in this exercise.

Little new has been discovered about New Hill since the RCHME Survey. Clearly some buildings have been revised as part of the proof test experiment on site but others were simply levelled and abandoned to nature.

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Scheduled ancient monument area.

Titles.

Short intros on the areas
→ copy a standard text.

~~74, 75, 63~~

74+75

Originally constructed to serve as gunpowder magazines for the Dusting and Glazing Engine (RCHME 275) to the north, the southernmost magazine (75) was later converted to serve as a fan house for S28.

Remains were carefully worked around and photographed. Detailed archaeological line drawings can be found (WALD003 and WALD004).

63

Immediately to the north west of 74, the remains of Mixing House 63 were investigated. Wholesale rearrangement of the structure was expected after reading the 'Inquiry into the Explosion' IN THE WALtham Abbey Special Collection. *reference to*

Some surface asbestos was cleared away but there was a large hole created by the blast and it seems likely that there as some 'clean up' work done after the ~~dust had died down~~. 63 has been capped with hoggin. *inquiry.*

RCHME
275

The removal of fills from Canal RCHME 293, which feeds ~~to~~ the water wheel of RCHME 275; uncovered a sandstone slab which may ~~have~~ mark a previous sluice point.

The concrete slab overlying the wheel pit of RCHME 275 was noted as cracked and recorded. No steps were taken to investigate this building further.

E4

This building was cleared of vegetation exposing the ~~base~~ ^{footings} of the wash water settling tank.

An NG gutter strap was found in the building. *routes*

Steam Pipes in this area have been scrutinised and capped with hoggin.

74.75.63.

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E12 North Area

Extensive asbestos contamination discovered in the area immediately surrounding E12 led to the reduction of the ground level by c 0.5m. most of the fill was made up ground containing rubble, slate and asbestos (fibrous).

This decontamination exercise ⁱⁿ also brought to light the foundations of five structures previously ~~unseen~~ ^{buried} (WALD008).

The group ^a entered around a hexagonal water tower (61). It is supposed that the tower provided a head of water not only for the ablutions in E12 to the south, but also for the Acid Factory to the west and south west.

The tower drew its water by means of a pumping house (60) and this ^{was supplied with} ~~got~~ water from one of two wells (60A, 61A). 60A was filled by an extended leg from the Waste NG drowning pond to the south of E2. (It seems unlikely that contaminated waters would have pumped up a tower) 61A was fed by way of a pipe, whose easternmost end was fed by the high level canal RCHME 291.

The Dirty Store (54) and its Earth Closet (55) were only exposed and not excavated.

A more detailed drawing of 61 can be found at WALD007, showing pipes and construction details.

Further research and excavation would help ~~the~~ ^{our} understanding of these structures.

~~WAL~~ E12 North Area.

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60A was filled by an extended leg from the Waste NG drawing pond to the south of E2 - it seems unlikely that contaminated waters would have been pumped up a tower.

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The Dirty Store (54) and its Earth Closet (55) were only exposed and not excavated.

A more detailed drawing of 61 can be found at WALD007, showing pipes and construction details.

Canals in the SAM

The filled canals in the Scheduled Ancient Monument Areas have been systematically excavated using small excavators supervised by the resident archaeologist.

The excavated canals are recorded on Milton Keynes Survey 'Land Survey : Sheets 1 to 8', which is held on site. Photographic recording of the canals being excavated, and after excavation, are accessible through the site photographic index.

Agreed methodology on the excavation of canals was developed through discussion between W.S. Atkins and English Heritage at regular liaison meetings on site and can be summarised by reference to SK10/2A.

Construction

Reference to the RCHME Site Survey reveals that the system of waterways on site developed gradually over a number of years and this patchwork development is also evident in the various construction methods employed. Later repairs are usually carried out in the style of the day, but there are five recognisable styles identified on site.

1. Canal banks at 90 and revetted in brick
2. Canal banks at 90 and revetted in corrugated iron
3. Canal banks at 90 and revetted in upright timbers
4. Canal banks at 90 revetted in reinforced concrete piles
5. Canal banks at 45 clay bank with periodic timbers

Provision of a walkway alongside the canal was important in order to allow the barges to be moved around site. In the case of styles 1-4, a tarmac path often survives alongside one bank. Style 5 had a walkway that is now represented by the periodic timbers. These upright timbers supported a boarded walkway along which persons could walk (WALDO 19B)

Many timber piles (Style 3), have been saved and stored in a watertight lorry body beside W68. These have also been tagged to record their context. The usual profile of the timber piles is illustrated at WALD19A. Interestingly this design was later copied by the manufactures of the reinforced concrete piles (Style 4).

Lessons

Generally the excavation of canals in the SAM has proved successful with few unwanted results.

It has been found that the reduction of the water level on the site, as a result of the construction of the Horsemill Stream Flood relief channel in the 1970's, has had the effect of reducing the supporting qualities of the ground, notably under canalside buildings.

Excavation of the filled canals sometimes resulted in slippage, the worst example being L108. Having identified this as a potential problem, action could be taken to support the banks with a 45 bank of clay or granite chips.

In flowing water there has been some revetment collapse in isolated areas. These tend to be located on the bend of a canal and so are attributed to natural erosion effects. ~~rather than~~

Access Points

Although the methodology followed in the excavation of the canals can be seen to have been successful, it is important to note the careful choice of access points into and out of the canals. Excavators were found to be the least damaging as their tracks spread the load more evenly than tyres and they were under close supervision. Vast quantities of spoil were removed from the canals on site. At a depth of c. 2m, a 100 metre stretch produces about 1120m³ of spoil which represents 510 dumper loads. This is 510 trips laden and 510 trips unladen : so 1020 dumpers going in and out of the access point for every 100 metres excavated.

Information exists that could be added to. With more detailed drawings and the construction of a comprehensive report dealing with the canal system, methods of construction, locks; loading points etc. would be a worthwhile venture in the future.

Conc

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1. Canal banks ^{at 90°} horizontal and revetted in brick.
2. Canal banks at 90° and revetted in corrugated iron.
3. Canal banks at 90° and revetted in upright timbers.
5. Canal banks at 45°. ^{clay} bank with periodic timbers.
4. Canal banks at 90°, revetted in/concrete piles.
reinforced

Provision of a walkway alongside the canal ~~is~~ was important in order to allow the barges to be moved around site. In the case of Styles 1-4, a tarmac path often survives alongside ~~the~~ one bank. Style 5 had a walkway that is now represented by the periodic timbers. These upright timbers supported a boarded walkway along which persons could walk (WALDO 19.B)

(Style 3)

Many timber piles have been saved and stored in a watertight lorry body beside L168. These have also been tagged to record their context. The usual profile of the timber piles is illustrated at WALDO 19.A. Interestingly this design was later copied by the manufacturers of the reinforced concrete piles (Style 4.)

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Excavation of the ~~old~~ ~~ex~~ filled canals sometimes resulted in slippage, the worst example being L108. Having identified this as a potential problem, action could be taken to support the banks ~~with~~ with a 45° bank of clay or granite chips.

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Building 25, 26, 27

While building 26 is well documented in the RCHME report, its associated drying stoves are less well understood. The two drying rooms are the best preserved on North Site and were buried underneath 50cm - 1m of river worn gravels.

Removal of gravels allowed a series of brick built supports to be revealed. In both of the buildings these brick supports were surviving in the two bays nearest to the stove (26). There was also evidence of ventilation bricks in the upstanding parts of the walls, as well as a possible entrance in the southern side of Building 25. Remains were drawn and photographed and have been left exposed.

It seems reasonable to assume that these buildings were fired before being backfilled with river gravels. A strange tin-like deposit may be seen on the floor of the drying rooms. There was also evidence of slate damp coursing which has been detailed on the drawings (WALD005 and WALD006).

To the north of 25 an earth closet foundations were uncovered. This seems to be in the usual RGPF style. The whole complex was surrounded by a U-shaped canal which passed underneath the present bridge 22, although no evidence for the canal profile was seen during excavation of Canal RCHME 285. As it is expected with drying stove complexes, there were two boathouses, one to service each of the drying rooms. The northern boathouse was identified as a length of wall during a vegetation scrape, no further excavation was carried out. The southern boathouse was discovered by way of excavation from Intersection 27 eastwards. In the process of removing the fill of Intersection 27, two barges were discovered. Both these were large navigation barges which were too heavy and awkward to lift, but were backfilled in situ, remaining under the water level and therefore well preserved. RCHME 560 barge sits inside the southern boathouse.

Building 25, 26, 27.

While Building 26 is well documented in the RCHME report its associated drying stores are less well understood. The two drying rooms are the best preserved on North Site and were buried underneath 50cm - 1m of river worn gravels.

Removal of gravels allowed a series of brick built supports to be revealed. ^{In} ~~the~~ both of the buildings these brick supports were surviving in the two bays nearest to the store (26). There was also evidence of ventilation bricks in the upstanding parts of the walls, as well as a possible entrance in the southern side of Building 25. Remains were drawn and photographed and have been left exposed.

It seems reasonable to assume that these buildings were fired before being backfilled with river gravels. A strange tin-like deposit may be seen on the floor of the drying rooms. There was also evidence of slate dampcoursing which has

been detailed on the drawings (WALDOO5 and WALDOO6).

To the ~~south~~ north of 25 an earth closet foundations were uncovered - this seems to be in the usual RGPF style.

The whole complex was surrounded by a U-shaped canal which passed underneath the present bridge 22, although no evidence for the canal profile was seen during excavation of Canal RCHME 285. As is expected with drying stone complexes, there were two boathouses, one to service each of the drying rooms. The northern boathouse was identified as a length of wall during a vegetation scrape, no further excavation was carried out. The southern boathouse was discovered by way of excavation from Intersection 27 eastwards. In the process of removing the fill of Intersection 27 two barges were discovered. Both these were large navigation barges which were too heavy and awkward to lift but were backfilled in situ, remaining under the water level and therefore well preserved. RCHME 560 Barge sits inside the southern boathouse.

Quinan Store (22A) Area

During summer 1995 it was planned to excavate the full extent of Canal RCHME 285, from its junction with Canal RCHME 284 in the south and Guncotton Drying Store No. 169.

Heat transfer pipes were lying across the canal between 22A/3 and 22A; these were carefully lifted and rested on the bank beside 22A.

On excavating the canal it became clear that there was very little originally deposited silty fill and that the canal was actually buried under 3-4 metres of inert river worn gravel. Apart from a few wooden balls found in soils under BR2, nothing of significance was discovered in the base of the canal. In the light of this discovery, it was thought best to discontinue the removal of the canal fill at the northern end of 22A.

The banks of the canal were seen to have intermittent upright timbers. There was no evidence of a planked walkway, although ~~this is usual on site.~~ *one would be expected.*

Quinan Store (22a.) Area.

During summer 1995 it was planned to excavate the full extent of Canal RCHME 285, from its junction with Canal RCHME 284 ^{in the} ~~and~~ south and Guncotton Drying Store No. 16A.

Heat transfer pipes were lying across the canal between 22A/3 and 22A.; these were carefully lifted and rested on the bank beside 22A.

On excavating the canal it became clear that there was very little originally deposited silty fill and that the canal was ~~was~~ actually buried under 3-4 metres of inert river worn gravels. Apart from a few wooden balls found in soils under BR22, nothing of significance was discovered in the base of the canal. In the light of this discovery it was thought best to discontinue the removal of the canal fill at the northern end of 22a.

The banks of the canal ~~was~~ were seen to have intermittent

upright timbers. There was no evidence of a planked walkway, although this is usual on site.

Investigation of North and North West of SAM

X Due to increasing financial pressures, an attempt was made to limit the movement of the huge quantities of gravels which, it has been suggested before, drive from the construction of the Horsemill Stream Flood Relief Channel or dredging of the same.

With reference to the RCHME Survey and its recognition of the buried features in this area, and also in reference to the design drawings for the Flood Relief Channel Construction, which are held in the site archive, it was thought most economical to pinpoint potentially hazardous buried remains and excavate these individually. Similarly the Grand Magazine Complex, originally positioned on Payme's (or Paine's) Island and now attached by land to the rest of North Site, was to be investigated carefully and no attempt was made to remove the fills of the old canal system.

Grand Magazine

A general light scrape around the remains of the two buildings showed Building 1 as having a low wall existing to the north east, forming a small yard in this direction. As little more than vegetation removal was completed, it is difficult to say more about Building 1.

Building 2A, known to be asbestos boarded, proved to be an asphalt floored structure with steps up to it from the western end, also covered in asphalt. To the eastern side, evidence of a narrow gauge railway entering the building from the south was noted.

Foundations for a small hut (3a, 5) were also uncovered but not excavated.

The inlet beside 3a from Cornmill Stream was also investigated as a large amount of concrete hard-core could be seen in the interface. The fill proved to be generally hard-core and, as expected, the remains of a sluice gate and foundation for a footbridge were also found on either side of the intersection. Removal of the intersection ceased after c. 4m when the Hard-core gave way to a more soil and gravel based fill.

The canals surrounding Payme's Island represent a unique archaeological resource that has yet to be tapped and this should be considered when plans are made to develop this area.

Wendy
Immediately outside the Grand Magazine compound, the remains of Guncotton Drying Store No.8 were investigated. The general layout of the Guncotton Drying Stores is well understood and the recessed channel running around a concrete pedestal, on which the timber building once stood, proved to be contaminated with asbestos lagging originating from the lagged hot air pipes (site photograph). This slab has been left open.

Similarly the floor slabs of Guncotton Drying Stores Nos. 4, 10, 11 and 17 were also exposed and remedied.

g with last
In the case of these stores, the road has been reinstated over their remains but the general outline can be seen. Exploratory trenches were dug to find RCHME 328 and, although the building and its concrete revetment walls were discovered, it was decided to backfill the trenches and leave the remains undisturbed. *as no contamination was found.*

Handing

Investigation of North and North West of SAM

Due to increasing financial pressures, an attempt was made to limit the movement of the huge quantities of gravels which, it has been suggested before, derive from the construction of the Horseshill Stream Flood Relief Channel or dredging of the same.

With reference to the RCHME Survey and its recognition of the buried features in this area, and also in reference to the design drawings for the Flood Relief Channel construction, which are held in the site archive, it was thought most economical to pinpoint potentially hazardous buried remains and excavate these individually. Similarly the Grand Magazine Complex, originally ~~so~~ positioned on Payne's (or Paine's) Island and now attached by land to the rest of North Site, was to be investigated carefully and no attempt was made to remove the fills of the old canal system.

Grand Magazine.

A general light scrape around the

remains of the two main buildings showed Building 1 as having a low wall existing to the north east, forming a small yard in this direction. As little more than a vegetation removal was completed, it is difficult to say more about Building 1.

Building 2a, known to be asbestos boarded, proved to be an asphalt floored structure with steps up to it from the western end, also covered in asphalt. To the eastern side, evidence of a narrow gauge railway entering the building was noted - ~~presumably dating from a~~ ^{from the south}

Foundations for a small hut (3a, 5) were also uncovered but not excavated.

The inlet beside 3a from Cornmill Stream was also investigated as a large amount of concrete hardcore could be seen in the interface. The fill proved to be generally hardcore and, as expected, the remains of a sluice gate and foundation for a footbridge were also ~~ag~~ found on either side of the intersection. Removal of the intersection ceased after c. 4m

when the hard core gave way to a more soil ~~and~~ and gravel based fill.

The canals surrounding Payne's Island represent a unique archaeological resource that has yet to be tapped. and this should be considered when plans are made to develop this area.

Immediately outside the Grand Magazine compound, the remains of Guncotton drying stove No. 8 were investigated. The general layout of the Guncotton Drying Stoves is well understood and the recessed channel running around a concrete pedestal, on which the timber building once stood, proved to be contaminated with asbestos lagging originating from the lagged hot air pipes. (Site Photog). This slab has been left open.

Similarly the floor slabs of Guncotton Drying Stoves No.s 4, 10, 11 and 17 were also exposed and remediated.

In the case of these stores, the road has been reinstated over their remains but the general outline can be seen.

Exploratory trenches were dug to find ~~the~~ RCHME 328

and, although the building and its concrete revetment walls were discovered, it was decided to backfill the trenches and leave the remains undisturbed.

RCHME 330

GUNPOWDER DRYING STOVE & CANAL

RCHME 558

TL 3742502217

(Please refer to Scheduled Ancient Monument Area
Archaeological Report January 1995 by Adam Ford)

In December 1993 decontamination works exposed the remains of the massive Gunpowder Drying Stove as well as the line of the U-shaped canal which provided access for barges to the two barge houses to the north and south.

Constructed from soft yellow handmade stocks, the remains were likely to suffer from frost damage and so were backfilled with the clean mound material from H8 (demolished) in November 1994 after they were recorded and photographed.

In July / August 1995 the canal and reduced ground level in the area immediately surrounding the remains was also backfilled to a higher level.

Reference to MKS survey updates enables site levels to be determined at any point during excavation or backfilling.

The intersection between the northern branch of the U-shaped canal around RCHME 330, and Horsemill Stream (Intersection 26) was sheet piled and its fill removed in May 1995.

Intermittent timber uprights marked the edge of the canal and a swim-ended barge was discovered in water-logged anaerobic conditions in the mouth of the intersection. It was cleaned and relocated in the Middle Stream [RCHME 300]. Referred to as [RCHME 558], this barge had a tin lining around the walls of the interior section - possibly to protect the sides of the barge from a shovelling action inside. It is possible that the barge was used to clear weed from the canals - or used to transport loose coal to the boiler houses around the site. It appears that the barge was located at this point and deliberately scuppered to act as a barrier, preventing unwanted water traffic from entering the site after the manufacturing activities had ceased.

S. Chaddock
Consultant Archaeologist
20.09.95

L109, L110 TRAVERSE, L111

Lying to the north of the Lock [RCHME 225] this group of three structures sat in-between the two water way levels on site. To the east, Canal [RCHME 156] connected the lower water level system through Middle Stream [RCHME 300] and also further east [RCHME 181] which served the Cordite Press Houses L130 and L137. To the west Canal [RCHME 179] served L133 and L136 in the south, and also ran northwards to L108, L102, L103 and beyond.

During the decontamination of Canal [RCHME 179] it became clear that L109 was not only served by the canal, but there may have been some sort of water usage as a pair of curving walls led underneath the loading platform and terminated in a iron plate, fixed with two ornate rivets.

During December 1994 remediation of Canal [RCHME 156] started and, after careful excavation and recording of four barges that were silted up in the canal, the remainder of the silt and hard-core could be removed.

The fill of [RCHME 156] proved to consist of large lumps of hard-core. These fragments probably originated from L110 Traverse, which also came to light during decontamination works. The massive traverse had a central 'Shoe Room' which had been re-used as an engine room. It had been demolished down to c. 1m high and a concrete proof stand had been built over the western quarter, providing a stop point for the excavation of the interior of the traverse.

On the eastern side of L109, identical curving walls showed an outshot point that corresponded with the inlet to the west (see above). This too had been sealed with an iron plate and ornate rivets.

It seems as if L109 originally started life as a gunpowder process building of some sort, using water power generated by the higher water in Canal [RCHME 179] which spilled out into Canal [RCHME 156]. At this point the Traverse L110 was used as a changing room and presumably watch house. The magazine to the south would have held powder or other raw materials, ready to be processed in L109 or elsewhere.

When cordite became the standard service propellant, L109 and its traverse and magazine were converted to cordite manufacture.

The traverse seems to be reused as an engine room, power being transmitted via belts as in the refits effected on the Incorporating Mills along Middle Stream. A patch of new brickwork high on the southern elevation of L109 points to an access point for the belts.

Later still the traverse was demolished when L109 was used as a proof stand. The concrete stand was constructed over the demolished traverse at this time

S. Chaddock
Consultant Archaeologist
20.09.95

HORSEMILL STREAM / TETRYL FACTORY

Bank Between

On inspection of the reduced levels around the Tetryl Factory it was clear that contaminated fill existed in the bank between the factory and the river.

Removal of the fence and bank to clean levels followed with reinstatement using clay from New Hill during May / June 1995. New fencing has been erected on line with the old fence.

No structures were encountered during the bank removal. The honey pot / crane foundation to the west of the Gunpowder Stove [RCHME 330], which was avoided and backfilled to protect it from the weather, lay to the east of the bank. As did two wells immediately to the south of the honey pot and recorded on a sheet plan on site files.

**S.Chaddock
Consultant Archaeologist
15.9.95**

NEWTON'S POOL

Further work to the Newton's Pool area, since the excavation of the sludge in the pool and the construction of a new weir and concrete culvert, has been restricted to a surface vegetation scrape around the banks of the pool. No new structures were seen.

Under Scheduled Monument Consent HSD9/2/3130 pt.20 the creation of a varied habit in the pool was carried out.

Decontaminated hard-core was introduced to the north east and south west of Newton's Pool so that a shallower habitat was created. Some topsoil was spread over the hard-core to encourage natural flora reproduction. No part of the hard-core or topsoil emerges from the surface of the pool.

A layer of topsoil and aggregate (c. 100mm) has been introduced around the banks to the east and west of the new culvert (BR 12) to provide a medium for flora regeneration.

S. Chaddock
Consultant Archaeologist
13.09.95

additions to the
Archaeological
reports (1995 jan.)

(1995 oct.)

a summary

TH Readings
+ WAL's NOS

Archaeological Report Summary

The position of resident archaeological consultant was maintained after the departure of A.D. Ford in January 1995. Essentially the duties of full time archaeological advisor, working to keep the decontamination programme on track while ensuring the appropriate protection to the scheduled areas and listed buildings, continued up to the point that groundwork ceased on site (27 September 1995).

I intend to follow the layout of A.D. Ford's 'Archaeological Report Summary' (1995) and add to it where necessary.

Scheduled Ancient Monument (SAM)

Advice continued to be sought by the decontamination contractor on the likelihood of successful applications for scheduled monument consent. Close liaison with English Heritage (HBMC) continued. Please refer to additional report on SAM for details of work carried out between January 1995 and September 1995.

Listed Buildings

English Heritage were informed of all alterations and damage to listed buildings on site.

To date, only the Grade 1 listed building, L157, has been issued with a certificate guaranteeing safety from explosives. L157 requires its roof timbers to be sprayed with a fire retarding paint.

A201/A202 continued to be occupied as Royal Ordnance's site offices and the mess room. A200, Walton's House, was subject to an outbreak of dry rot which was addressed. Treatment is detailed on the site files and correspondence.

L176 continues to be occupied by Bray Construction Plant, who also have use of the slab of L169 for heavy plant storage.

Areas Outside SAM

Areas outside the SAM were dealt with as described in Ford (1993).

Powdermill Lane Housing Development Site

Wimpey Homes purchased Powdermill Lane Housing Site and it was agreed that the resident archaeologist would provide watching brief cover, in line with Essex County Council guidelines. Further excavation below Flagstaff Road is planned during November and December 1995.

Acid Factory

The Acid Factory, in the area known historically as Edmonsy Mead, was carefully excavated to expose a complex series of concrete and brick foundations. These have been photographically recorded and located within the MKS site survey on CAD. Further archaeological recording was not possible within the time frame available.

Non Listed Buildings

These buildings continued to be treated as described in Ford (1993). Royal Ordnance have compiled an accurate architectural record of all these buildings which can be found in the site archive.

Projects

Where remains were uncovered as a result of the decontamination process, an assessment was made of their significance in close liaison with English Heritage. Consideration was also given to the need for external assistance in order to compile an adequate record.

Three archaeological projects have been carried out on site by external bodies during the decontamination process. All these have been funded by Defence Lands Service(Cambridge) through the decontamination budget.

Powdermill Lane Housing Development Site

Field Evaluation by Essex County Council Field Unit. Detailed in PLHDS Archaeological Report (Ford.1994)

Four Barges

Recording project focusing on four waterlogged barges that lay in the path of the decontamination project. Report forthcoming with figures.

211a and RCHME135

Recording project concentrating on the remains of a water powered gunpowder incorporating mill (211a) and pre 19th Century sluice remains (RCHME135). Copy on site archive.

Photographic Recording

A similar policy to that outlined in Ford (1995) was adopted.

The photographic archive (archaeology) is now complete and together with the Royal Ordnance collection documenting the decontamination programme represents a formidable photographic account of work on site.

Finds

Portable Finds

Aims to catalogue and store all excavated finds in the secure store in A203 proved to be unmanageable. Time and money necessitated an adjustment in plans.

Cataloguing

All artefacts collected on site have been given a label, or are in a box that is labelled. The information recorded is the date of excavation, method of excavation and the context. This should allow a future owner of the site to complete the full cataloguing of the collections without losing any information.

Storage

Labelled as above, the majority of excavated finds are stored in L168. Finds that have had a catalogue sheet filled out are boxed and stored in the Secure Store (A203).

Large Objects

Barges

In all there are 17 Barges on site at present. The surprising survival of so many barges has led the Nautical Archaeology Society to recommend a separate display area for the inland working craft represented at Waltham Abbey. A summary of barge types and locations is copied here.

Masonry Fragments

During excavation of the waterways on site a large number of limestone edge runner fragments and carved sandstone chimney tops were recovered. These are stored in the vicinity of A200

Drawings

Many of the remains uncovered were recorded on the MKS Site Surveys with additional, smaller scale, details added where necessary. Plans of canals excavated and filled can be found on these plans. In addition to these, a series of line drawings (to scale) and sketches (not to scale) were produced where archaeological detail was missed by MKS. These drawings are part of the site archive and have the prefix [WALD]. An index of the WALD drawings is copied here.

Monitoring

Recording of the temperature and humidity conditions in the Conference Room and in the Secure Store, both in A203, has been carried out since October 1994 using Meaco digital thermohygrometers.

Analysis of the different conditions noted should allow conservators to understand the fluctuations more accurately and make plans accordingly.

Reports

It was decided that additional reports would be completed to compliment the interim reports prepared by A.D. Ford in January 1993.

Conclusions

A pragmatic approach to a challenging new kind of site has paid off. Decontamination contractors and heritage bodies are not easy bedfellows, but through discussion and advice, the middle path has been steered.

I would like to thank the following for their help and advice:

Adam Ford

Anthony Moores

Bob Stebbings

Bob Watts

CIVIX

David Prince et al

David Stanners

Deborah Priddy

Gordon Wyatt

Kate Carver

Melissa Eyears

Royal Ordnance

Stuart Fox

Wendy Webb

Archaeological Report Summary

X The position of resident archaeological consultant was maintained after the departure of A.D. Ford in January 1995. Essentially the duties of full time archaeological advisor, working to keep the decontamination programme on track while ensuring the appropriate protection to the scheduled areas and listed buildings, continued up to the point that groundworks ceased on site (27 September 1995).

I intend to follow the layout of A.D. Ford's 'Archaeological Report Summary' (1995) and add to it where necessary.

X Scheduled Ancient Monument (SAM)

X X Advice continued to be sought on the likelihood of a successful application and close liaison with HMBC continued. Please refer to additional report on SAM for details of work carried out between 1.1995 and 9.1995. *by the decontam. contractor.* ⁵

Listed Buildings

English Heritage were informed of all alterations and damage to listed buildings on site.

X Details concerning the listed buildings are dealt with in the appropriate archaeological addition reports.

X To date, only the Grade 1 listed buildings, L157, has been issued with a certificate guaranteeing safety from explosives. Even L157 has to have the roof timbers sprayed with a fire retardent paint.

A201/A202 continued to be occupied as Royal Ordnance's site offices and the mess room.

X A200, Wlato's House, was subject to an outbreak of dry rot which was dealt with and is detailed on the site files and correspondence. *addressed.*

X BCP maintain occupation of L176 *Treatment*

Areas Outside SAM

Areas outside the SAM were dealt with as described in Ford (1993).

X PMLHS Wimpey Homes purchase Powdermill Lane Housing Site and it was agreed that the resident archaeologist would provide watching brief cover, in line with Essex County Council guidelines. No buildings outside of the SAM were demolished and in general the whole site was dealt with as if it lay in the courtyard of the Scheduled Ancient Monument.

X Acid Factory *located* Notably the Acid Factory, in the area known historically as Edmonsby Mead, was carefully excavated to expose a complex series of concrete and brick foundations. These have been photographically recorded and located generally within the MKS site survey on CAD. Further archaeological recording was not possible within the time frame available.

Non Listed Buildings

X These buildings continued to be treated as described in Ford (1993). Royal Ordnance have compiled an accurate architectural record of all these buildings. *which is held on site.*

Recording

A similar policy to that outlined in Ford (1995) was adopted.

X X The photographic archive (archaeology) is now complete and together with the Royal Ordnance ^{photography} ~~decontamination photography~~, *collection documenting the* represents a formidable account of work on site.

Finds

X Aims to catalogue and store all finds ^{excavated} ~~excavated~~ *on site* in the secure store in A203 proved to be unmanageable. Time and money necessitate an adjustment in plans.

X *Cataloguing* All artefacts collected on site have been given a label ^{or} ~~or~~ are in a box that is labelled. The information recorded is the date of excavation, method of excavation and the context. This should allow a future owner of the site to complete the full cataloguing of the collections without losing any information.

Strongly ~~Strongly~~ *Labelled as above, the majority of excavated finds are stored in L168. Finds that have been catalogued and had a catalogue sheet filled out are boxed and stored in the*
Drawings *Secure store in A203.*

X X Many of the remains uncovered were recorded on the MKS Site Surveys with additional, smaller scale, details added where necessary. Plans of canals excavated and unexcavated can be found on these plans. In addition to these, a series of line drawings (to scale) and sketches (not to scale) were produced where archaeological details ~~was~~ *was* missed by MKS. These ~~the~~ drawings are part of the site archive and have the prefix [WALD]. An index of the WALD drawings is copied here. .

Copy of Waldo.
Drawings List

Reports

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Conclusions

challenging

A pragmatic approach to a ~~new kind of~~ *challenging* site has paid off. Decontamination contractors and heritage bodies are not easy bedfellows, but through discussion and advice, the middle path has been steered.

I would like to thank the following for their help and advice:

David Stanners

Stuart Fox

Deborah Priddy

Bob Watts

Graham Vincent R.O.

~~Peter Mayle~~

Gordon Wyatt

Bob Stebbings

Anthony Moores

David Prince et.al

Adam Ford

~~Trevor Wilson~~

Wendy Webb

~~Denise Hollebrand~~

Melissa Eyars

Civix.

WARGMTSC
(EFDM) Kate Carter

Add to this
large objects
(Barge Sheet)

Temp + Humidity Monitoring.

Projects: N.A.S.
Cotswold Arch. Trust.

Projects

Where remains were uncovered as a result of the decontamination process, it was felt necessary to assess their significance and also to consider whether additional help was ~~needed~~ needed in making an adequate record of the remains.

Three projects were carried out by external bodies during the decontamination projects at Waltham Abbey. All projects were funded by ~~the Ministry~~ Defence Land Service (Cambridge) through the decontamination budget.

PMLHS.

Field Evaluation by Essex County Council Archaeological Unit, funded by ~~the MoD through the decontamination project budget, in a response~~ Detailed in PMLHS Arch. Interim Report (1995) A.D. Ford. which includes specification and report.

N.A.S.

Recording project focussing on four waterlogged barges that lay in the path of the decontamination project. Report forthcoming with ~~drawings~~ figures in site archive.

Cots. Arch. Trust.

Recording project concentrating on the remains of a ^{water powered} gunpowder incorporating mill and ~~pre~~ pre. 13th sluice remains. Site archive.

THT Readings

WALD NOS.

Finds =

Portable.

Large Objects

Barges.

In all there are 17 barges known on site at present. The ~~surprising~~ surprising survival of so many barges has led the Nautical Arch Soc to recommend a separate display area within the planned museum complex. ^{on site}

A summary of the barges is copied here.

Masonry Fragments.

During excavation of the ~~excavations~~ ^{waterways} on site a large number of limestone edgemoors and sandstone chimney tops were uncovered. These have been stored in the vicinity of A200.

Monitoring of the ~~temp~~ temperature and humidity conditions in the Conference Room and Secure Store A203, has been carried out ~~from~~ ^{Digital.} until the close in late September. using Meako ^{Digital.} Thermohygrometers

Analysis of the different conditions noted should allow conservators to understand the conditions more exactly and plan accordingly.

Results are given here.

Conclusion

A pragmatic approach to a new kind of site has paid off. Decontamination contractors and heritage bodies are not easy bedfellows but through discussion and advice the middle path has been steered.

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& Archaeological Report Summary.

The position of resident archaeological consultant was maintained after the departure of A.D. Ford in January 1995. Essentially the duties of full time archaeological advisor, working to keep the decontamination programme on track while ensuring the appropriate protection to the scheduled areas and listed buildings, continued up to the point that groundworks ceased on site. (27 September 1995).

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Advice continued to be sought on the likelihood of a successful application and close liaison with HBMC continued. Please refer to additional report on SAM for details of work carried out between 1.95 and 9.95.

Listed Buildings

English Heritage were informed of all alterations and damage to listed buildings on site, ~~as before~~.

Details concerning the listed buildings are dealt with in the appropriate archaeological addition reports.

To date only the Grade I listed building, L157, has been issued with a certificate guaranteeing safety from explosives.

Even L157 has to have the roof timbers sprayed with a fire retardant paint.

A201/A202 continued to be occupied as Royal Ordnance's site offices and the mess room. A200, Walton's House, was subject to an outbreak of dry rot which was dealt with and is detailed on the site files and correspondence.

Areas Outside SAM

... with ~~as~~ described in Ford (1993),

Areas outside the SAM ^{were} ~~not~~ dealt with...

Wimpey Homes purchased Bowdren Mill Lane Housing Site and it was agreed that the resident archaeologist would provide

watching brief cover, in line with Essex County Council guidelines.

No buildings outside of the SAM were demolished and in general the whole site was dealt with as if it lay in the curtilage of the Scheduled Ancient Monument.

Notably the Acid Factory, ~~in~~ ⁱⁿ the ~~western~~ area known historically as Edmonsby Mead, was carefully excavated to expose a complex series of concrete and brick foundations. These have been photographically recorded and located generally within the MKS site survey on CAD. Further archaeological recording was not possible within the timeframe available. ~~but the remains~~
~~are stable and~~

Non listed Buildings

These buildings continued to be treated as described in Ford (1993). Royal Ordnance have compiled an accurate architectural record of all these buildings.

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Drawings

Many
~~Much~~

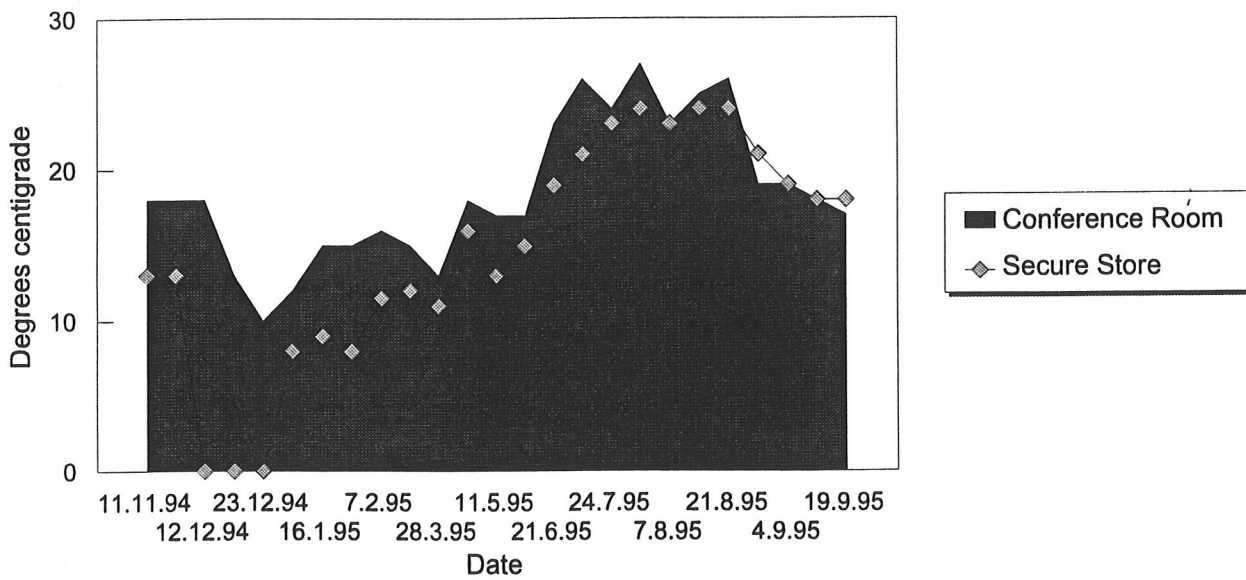
of the remains uncovered were recorded on the MKS Site Surveys with additional, smaller scale, details added where necessary. Plans of canals excavated and unexcavated can be found on these plans. In addition to these a series of line drawings (to scale) and sketches (not to scale) were produced where archaeological detail was missed by MKS. These line drawings are part of the site archive and have the prefix [WALD]. An index of the WALD drawings is copied here.

WALD
INDEX
INSERT

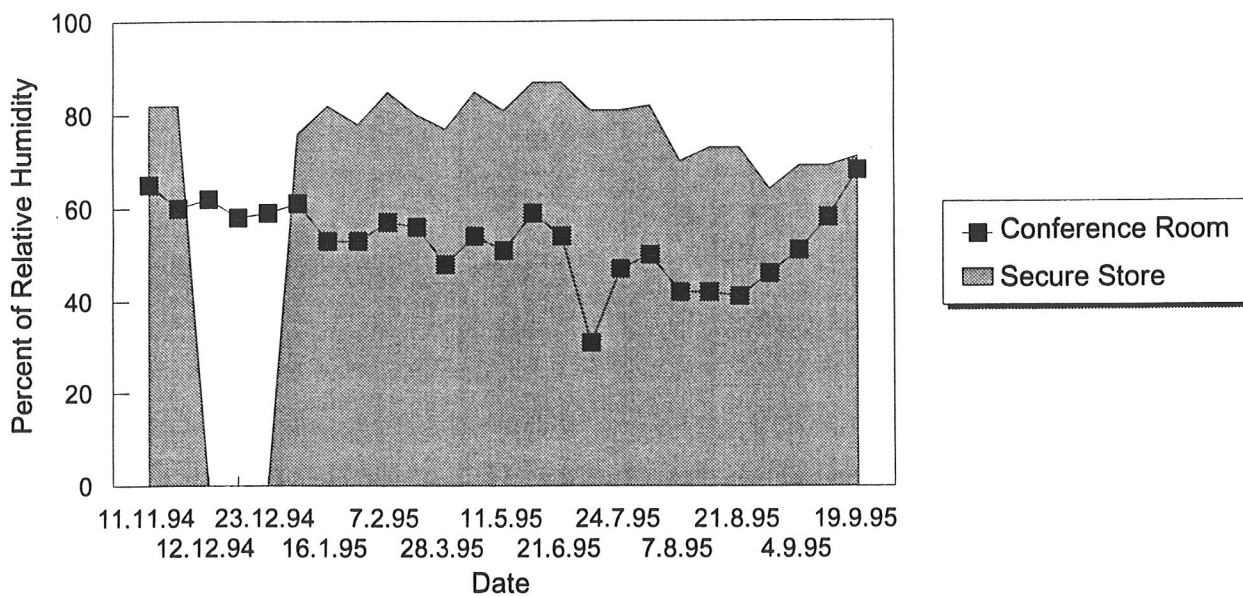
Reports

It was decided that additional reports would be completed to complement the interim reports prepared by ADFord in Jan. 1998.

Temperature Spot Readings, Waltham Abbey

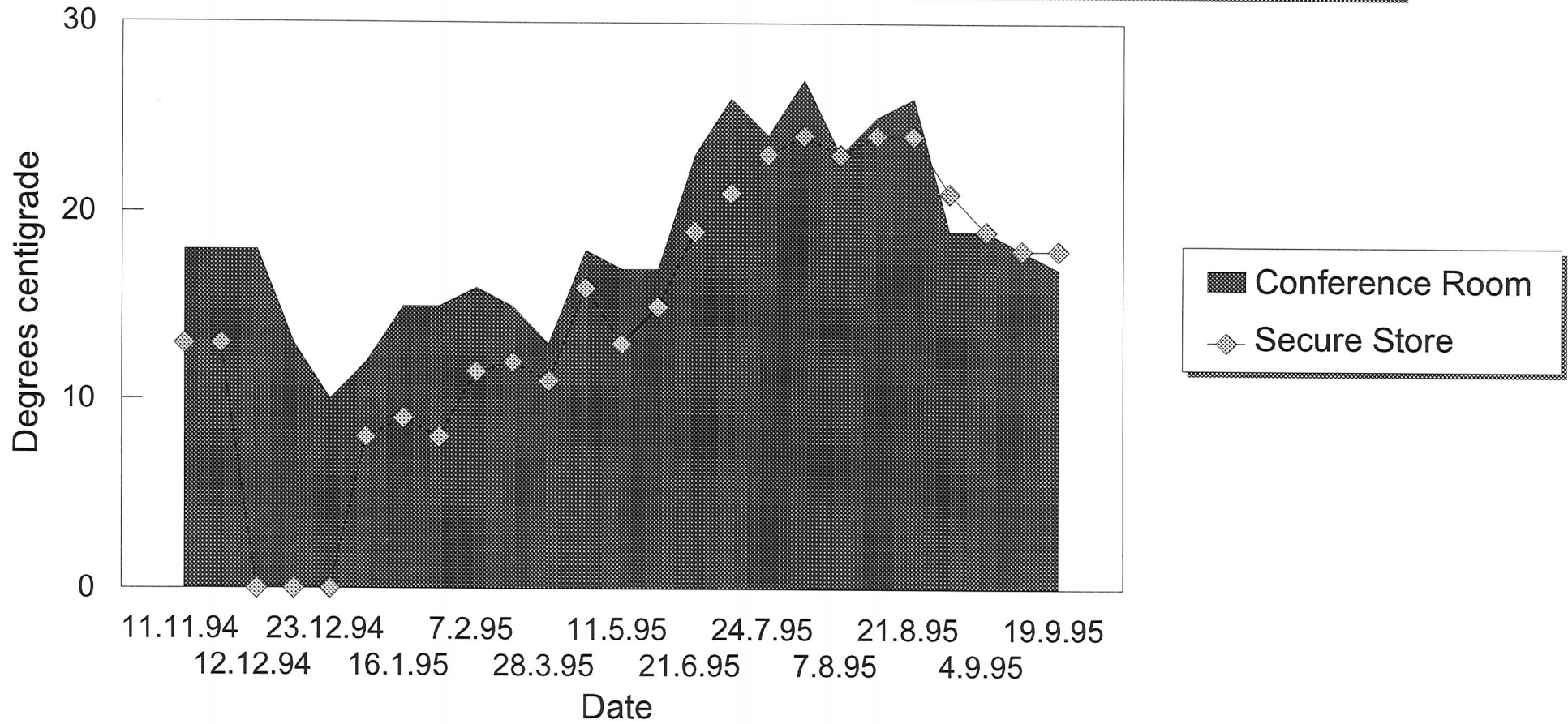


Humidity Spot Readings, Waltham Abbey

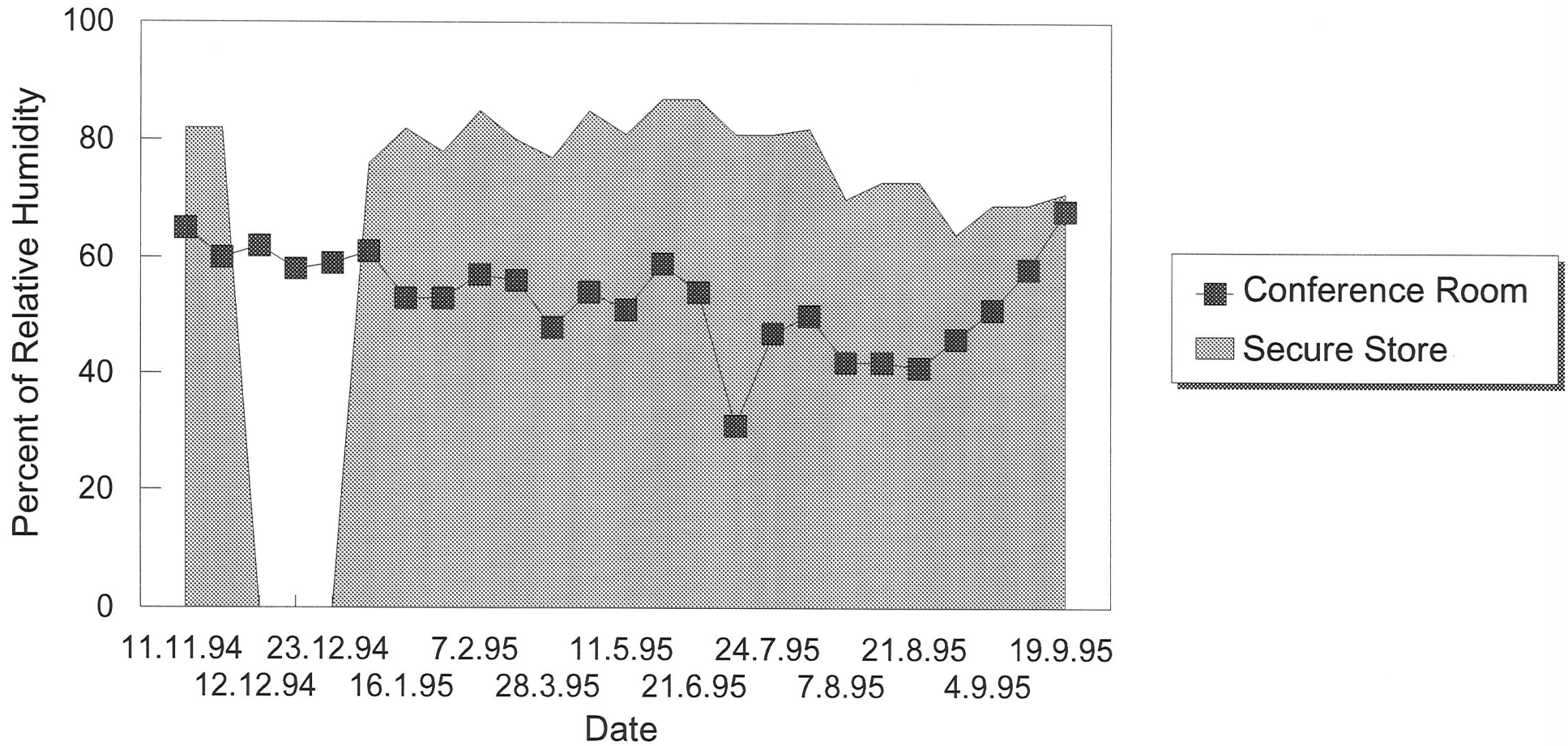


Date	Super Store		Conference Room	
	Deg.Cent	%RH	Deg.Cent	%RH
11.11.94	13	82	18	65
21.11.94	13	82	18	60
12.12.94	0	0	18	62
19.12.94	0	0	13	58
23.12.94	0	0	10	59
9.1.95	8	76	12	61
16.1.95	9	82	15	53
27.1.95	8	78	15	53
7.2.95	11.5	85	16	57
24.2.95	12	80	15	56
28.3.95	11	77	13	48
1.5.95	16	85	18	54
11.5.95	13	81	17	51
14.6.95	15	87	17	59
21.6.95	19	87	23	54
26.6.95	21	81	26	31
24.7.95	23	81	24	47
31.7.95	24	82	27	50
7.8.95	23	70	23	42
14.8.95	24	73	25	42
21.8.95	24	73	26	41
28.8.95	21	64	19	46
4.9.95	19	69	19	51
12.9.95	18	69	18	58
19.9.95	18	71	17	68

Temperature Spot Readings, Waltham Abbey



Humidity Spot Readings, Waltham Abbey



Waltham Abbey Royal Gunpowder Factory

Date	Super Store		Conference Room	
	Deg.Cent	%RH	Deg.Cent	%RH
11.11.94	13	82	18	65
21.11.94	13	82	18	60
12.12.94	Ø	Ø	18	62
19.12.94	Ø	Ø	13	58
23.12.94	Ø	Ø	10	59
9.1.95	8	76	12	61
16.1.95	9	82	15	53
27.1.95	8	78	15	53
7.2.95	11.5	85	16	57
24.2.95	12	80	15	56
28.3.95	11	77	13	48
1.5.95	16	85	18	54
11.5.95	13	81	17	51
14.6.95	15	87	17	59
21.6.95	19	87	23	54
26.6.95	21	81	26	31
24.7.95	23	81	24	47
31.7.95	24	82	27	50
7.8.95	23	70	23	42
14.8.95	24	73	25	42
21.8.95	24	73	26	41
28.8.95	21	64	19	46
4.9.95	19	69	19	51
12.9.95	18	69	18	58
19.9.95	18	71	17	68

WALD000 DRAWINGS NUMBERS

DRAWING N°	NGR	DESCRIPTION AND DETAILS	SCALE	DATE	DRAWN BY
WALD 001	TL 37718 01488	RCHME561 Barge. Plan and side elevations.	1:20	11/08/95	SC
WALD 002	TL 37680 01573	RCHME303 Experimental House. Plan + notes.	1:100	13/09/95	TS
WALD 003	TL 37650 02000	75. Plan.	1:50	13/09/95	TS
WALD 004	TL 37640 02024	74. Plan.	1:50	13/09/95	TS
WALD 005	TL 37414 02308	25. Plan. + notes.	1:50	14/09/95	TS
WALD 006	TL 37415 02291	27. Plan plus 4 x 1:10 side elevation. + notes.	1:50	19/09/95	TS
WALD 007	TL 37480 02080	61. Plan and elevation. + notes.	1:50	19/09/95	TS
WALD 008	---	Area to North of E12:- E12, 47a, 50, 51, 54, 55, 60, 60a, 61, 61a.	NTS	24/05/95	SC
WALD 009	105 - TL 37557 01663 106 - TL 37537 01659	106 and 105 Gunpowder Magazines. Plans. + notes.	1:50	20/09/95	TS
WALD 010	564 - TL 37725 01785 565 - TL 37683 01555	RCHME564 and 565. Timber catchment/ settlement tanks. Plans and elevations.	1:20	29/11/94	SC
WALD 011	---	RCHME181 canal. Sketch of section.	NTS	08/95	SC
WALD 012	TL 37386 01972	RCHME556 Barge. Large navigation type. Plans (x 3) (3 sheets).	1:50	19/05/95	SC
WALD 013	TL 37386 01972	RCHME556 overlay.	1:50	19/05/95	SC
WALD 014	---	South P Area - 40m S of Bridge 1. Plan.	1:100	24/11/93	ADF
WALD 015	---	South P Area - 40m S of A230. Plan.	1:100	24/11/93	ADF

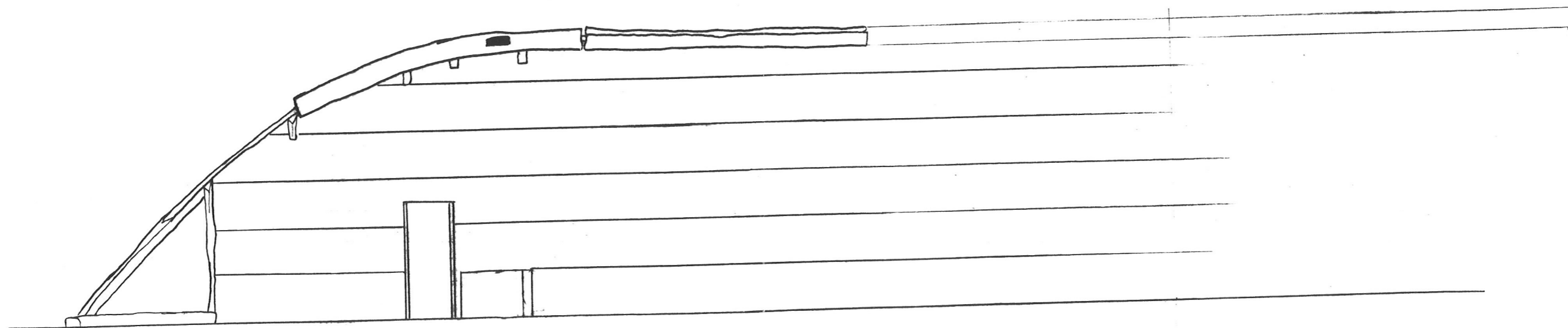
DRAWING N ^o	NGR	DESCRIPTION AND DETAILS	SCALE	DATE	DRAWN BY
WALD 016	---	South P Area. Plan of drainage leats and foundation trenches.	1:500	06/10/93	ADF
WALD 017	---	NW of South P Area. Plan.	1:500	06/10/93	ADF
WALD 018	TL 37667 00995	211a section looking S through E part of remains. (Ref: MKS4/01).	1:10	01/06/94	ADF
WALD 019A		Sketch of wooden piles in SAM.	NTS	03/10/95	SC
WALD 019B		Profile of canal with timber walkway.	NTS	03/10/95	SC
WALD 020	---	Permatrace map showing location of Waltham Abbey in S.E. England and of RGPF North Site in Waltham Abbey.	NTS	---	OS based
WALD 021		South P Area.	1:100	20/11/93	ADF
WALD 022		L153 Incorporating Mill. Detail of floor machine features.	1:100	29/05/94	ADF
WALD 023		Building 1, 2, 2a. Grand Magazine, sketch showing old waterways and new sheet piles.	NTS	27/09/95	SC
WALD 024		Sketch of RCHME181 canal and loading jetties.	NTS	27/09/95	SC
WALD 025	---	Sketch to show method of barge relocation at L109.	NTS	30/94	ADF
WALD 026	---	Burning Ground. Sketch showing expected features before removal of canal RCHME294.	NTS	03/10/95	SC
WALD 027		Sketch recording exact location of barge RCHM558	NTS	04/05/95	SC
WALD 028		Sketch showing relationship between chute for 197/098 and canal Millhead Stream.	NTS	08/09/95	SC
WALD 029		Series of tracings showing history of HBS SAM development	Photo-copies	06/95	SC

RCHME 561

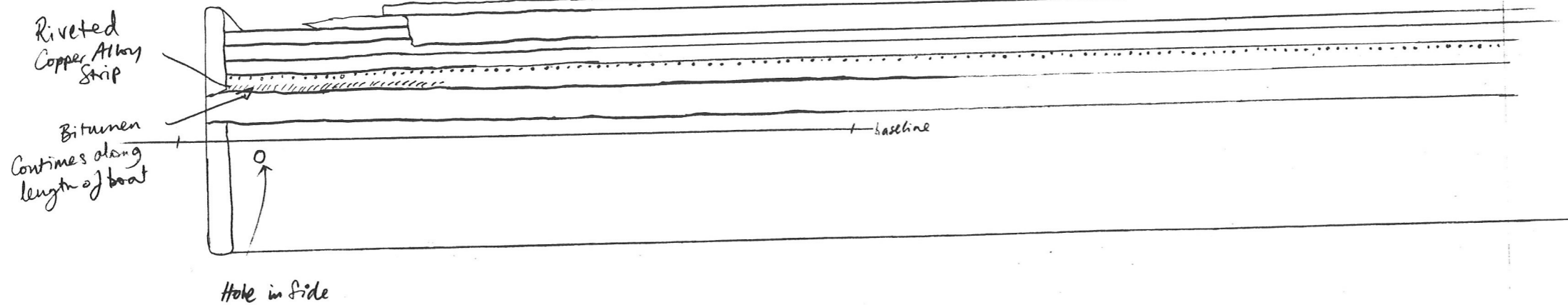
DRAWN BY S. CHADDOCK

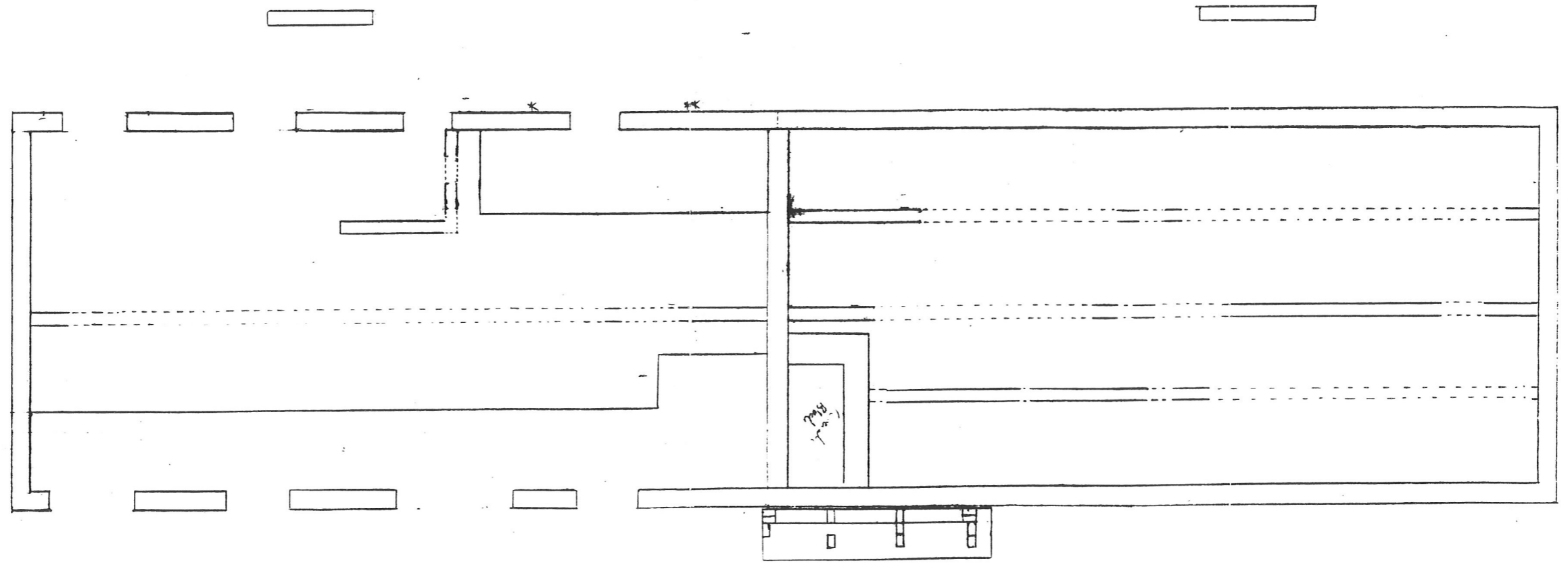
11.08.95

Scale 1:20



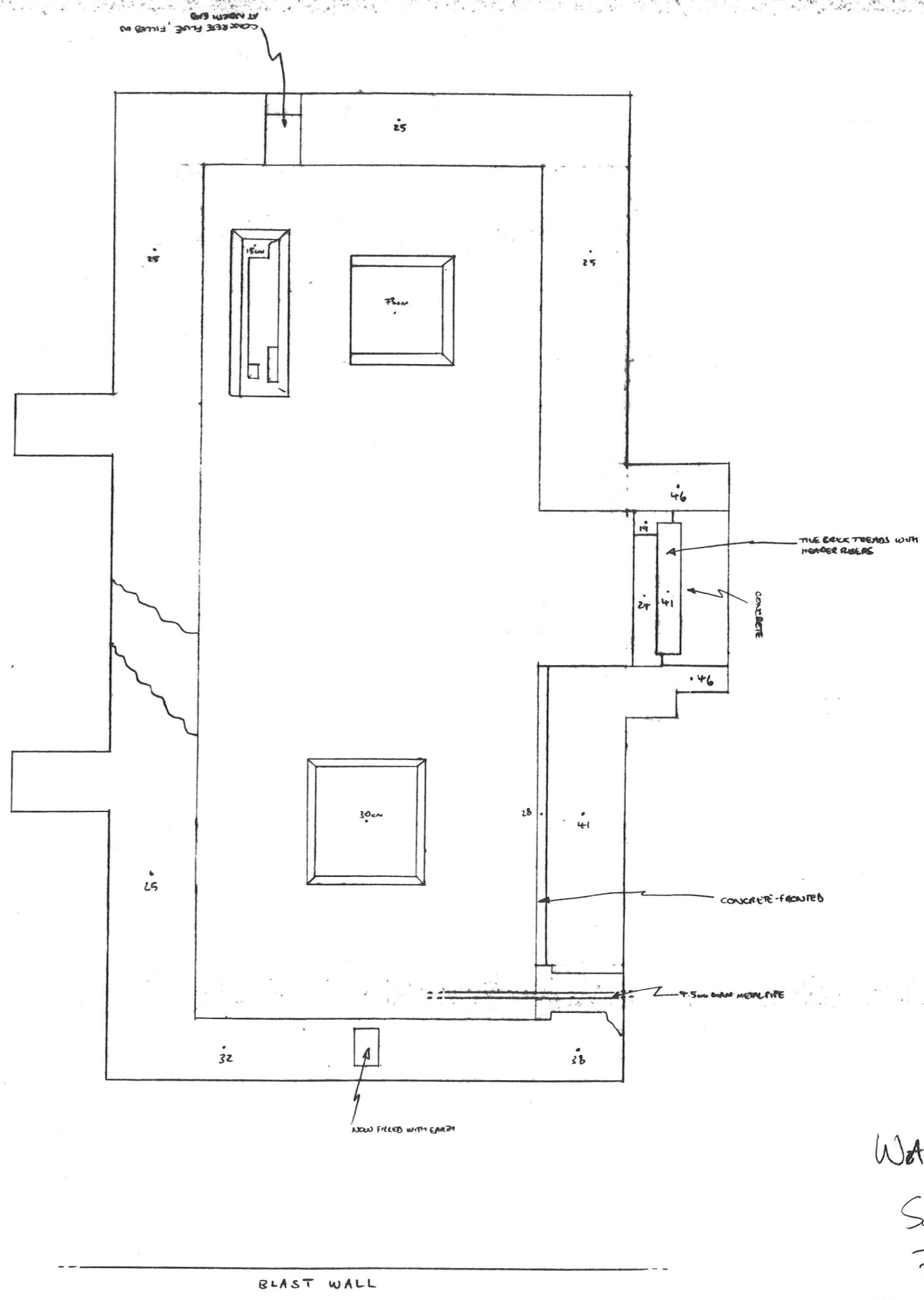
WALD





WACD 002
ACAD 303
Scale: 1:100
Tim Stevens 13/9/95

ALL WALLS YELLOW STEEL ENGLISH BONDED.
 ALL INTERNAL STRUCTURES CONCRETE, AS IS THE
 FLOOR.
 ALL DIMENSIONS REFER TO HEIGHT ABOVE FLOOR IN CM.

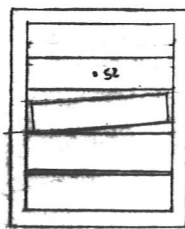


WALD003
 Scale 1:50
 75.
 Tim Stevens
 13.9.95

ALL WALLS ARE SOFT YELLOW STICKS
ENGLISH BOND

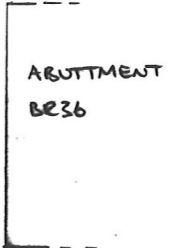
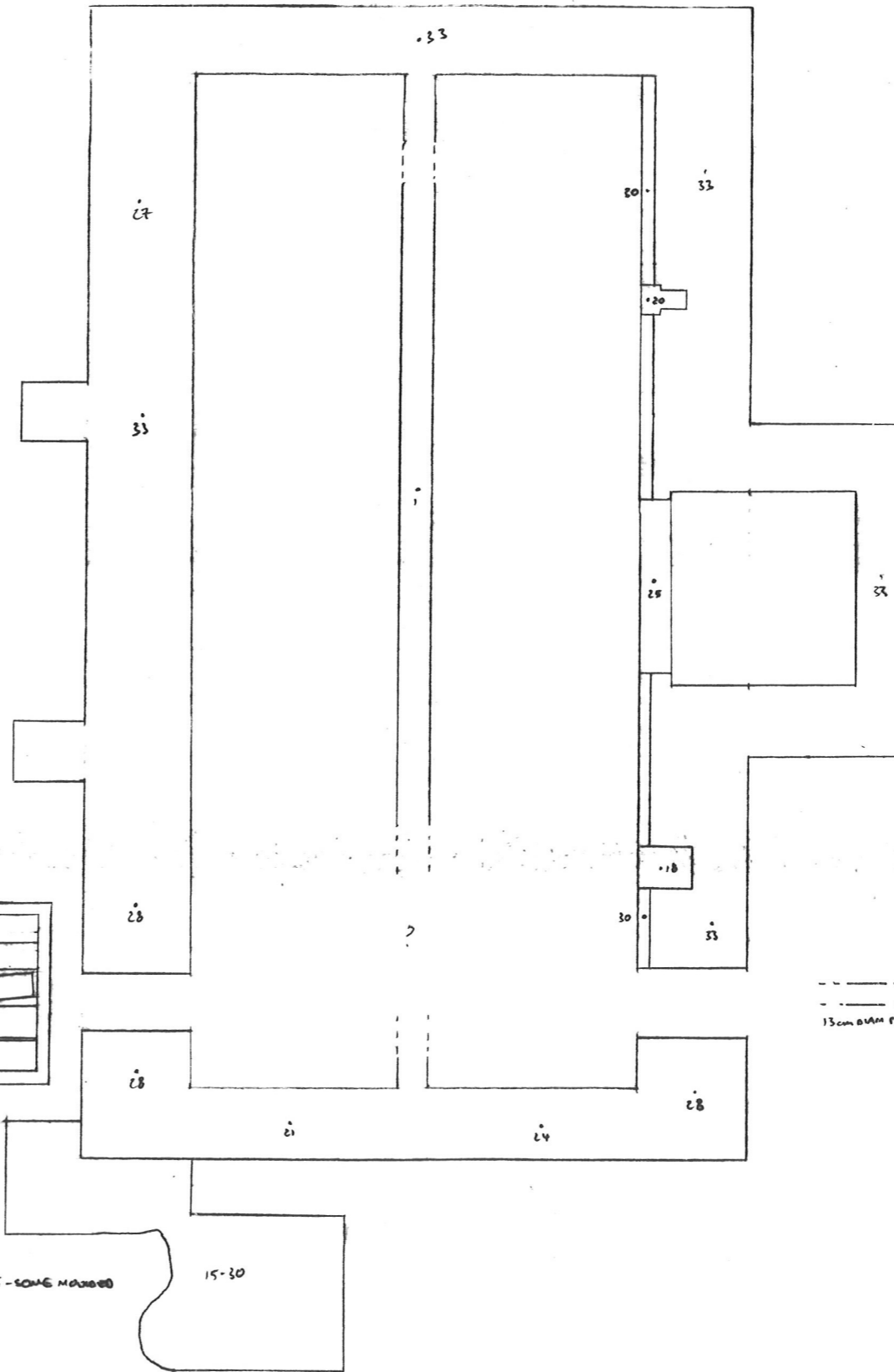
ALL ELEVATIONS IN MATCH ABOVE AVERAGE
GROUND LEVEL IN CENTIMETRES

VALVE HOUSING COVERED WITH
WOODEN PLANKS E.G.



ROCKY CONCRETE - SOME MARBLE

15-20

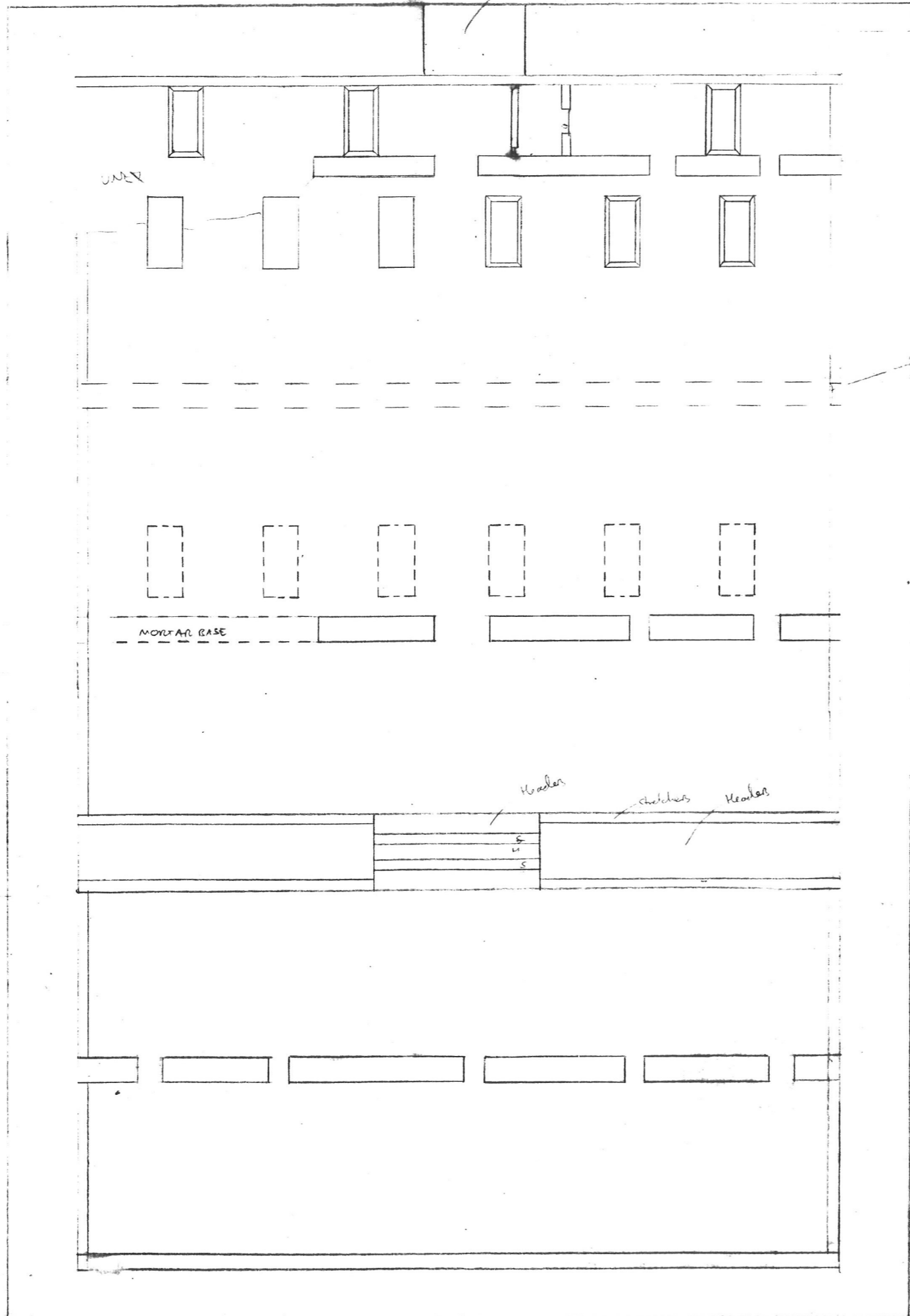


13cm DIAM PIPE → CANAL

WALD 004
74
Tim Stevens
13/9/95
Scale: 1:50



concrete slab



RED TILE SHOWING

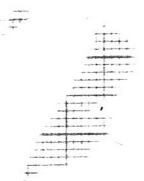
UNEX

MORTAR BASE

Header

chickens

Header



BRICK

BITUMEN

BRICK

OUTSET OF 12 CM

ON THE INSIDE OF OUTER WALLS (WHITE)

1:10

BRICK

BITUMEN

RED TILE

BRICK

RED TILE

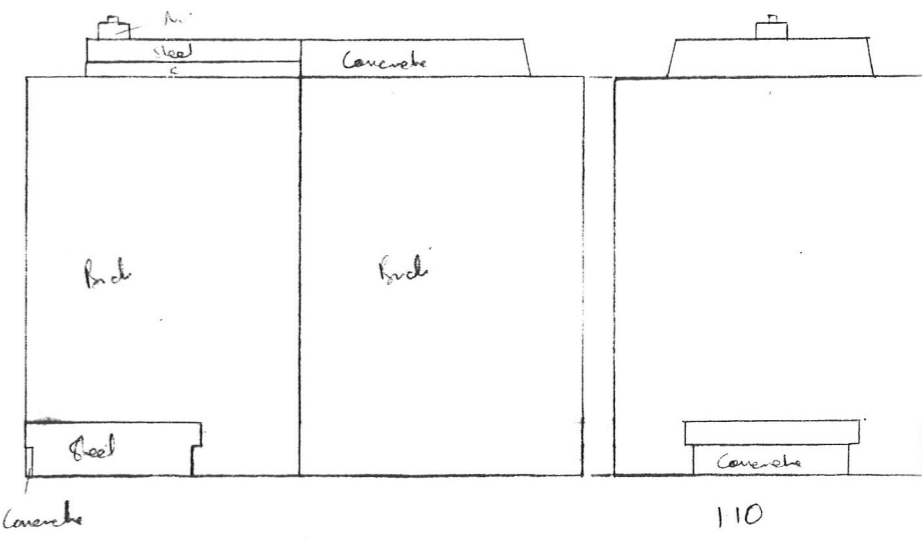
BITUMEN

BRICK

OUTSET OF 12.5 CM

ON THE INSIDE OF OUTER WALLS (N/S)

1:10



APPLIES TO BOTH 25 + 27

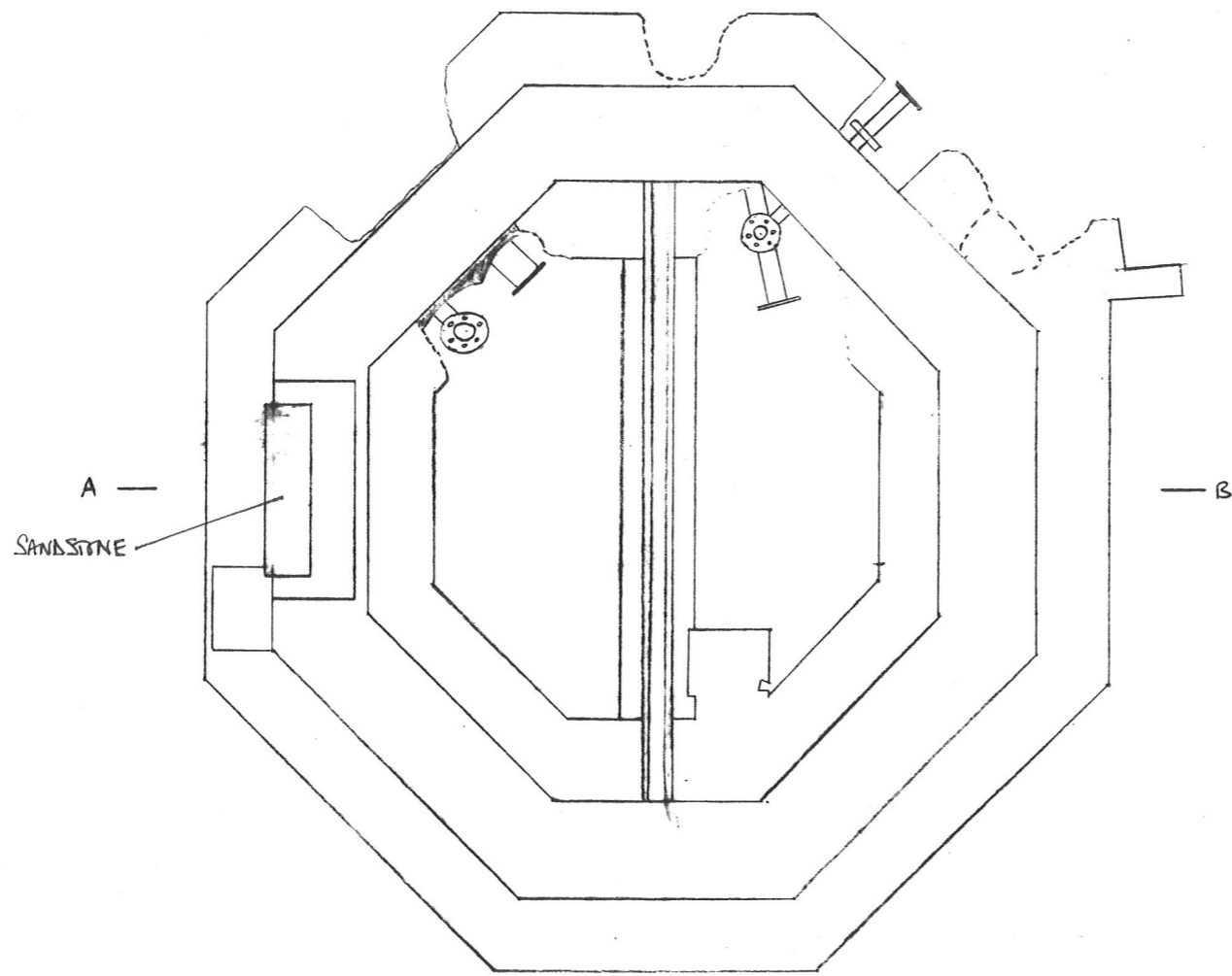
27

WAUS 006

1:50

Tim Steens

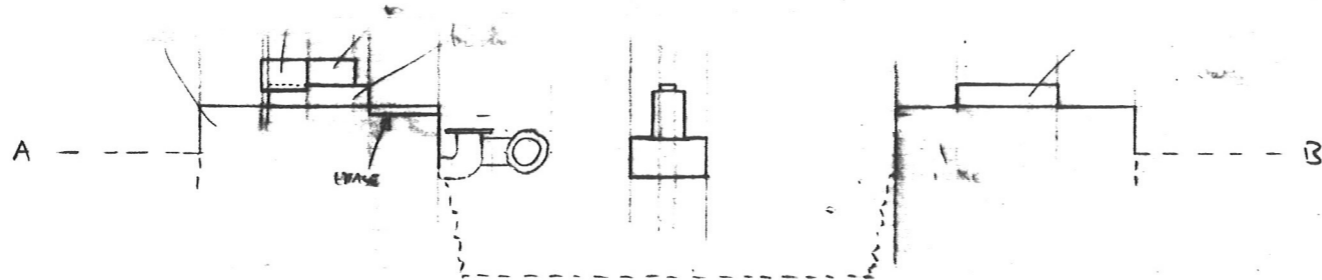
19/9/05



1:50



Top hole from 20cm
 Building blocks - 20.5 x 11 cm
 = 12" x 16"



WALD.007

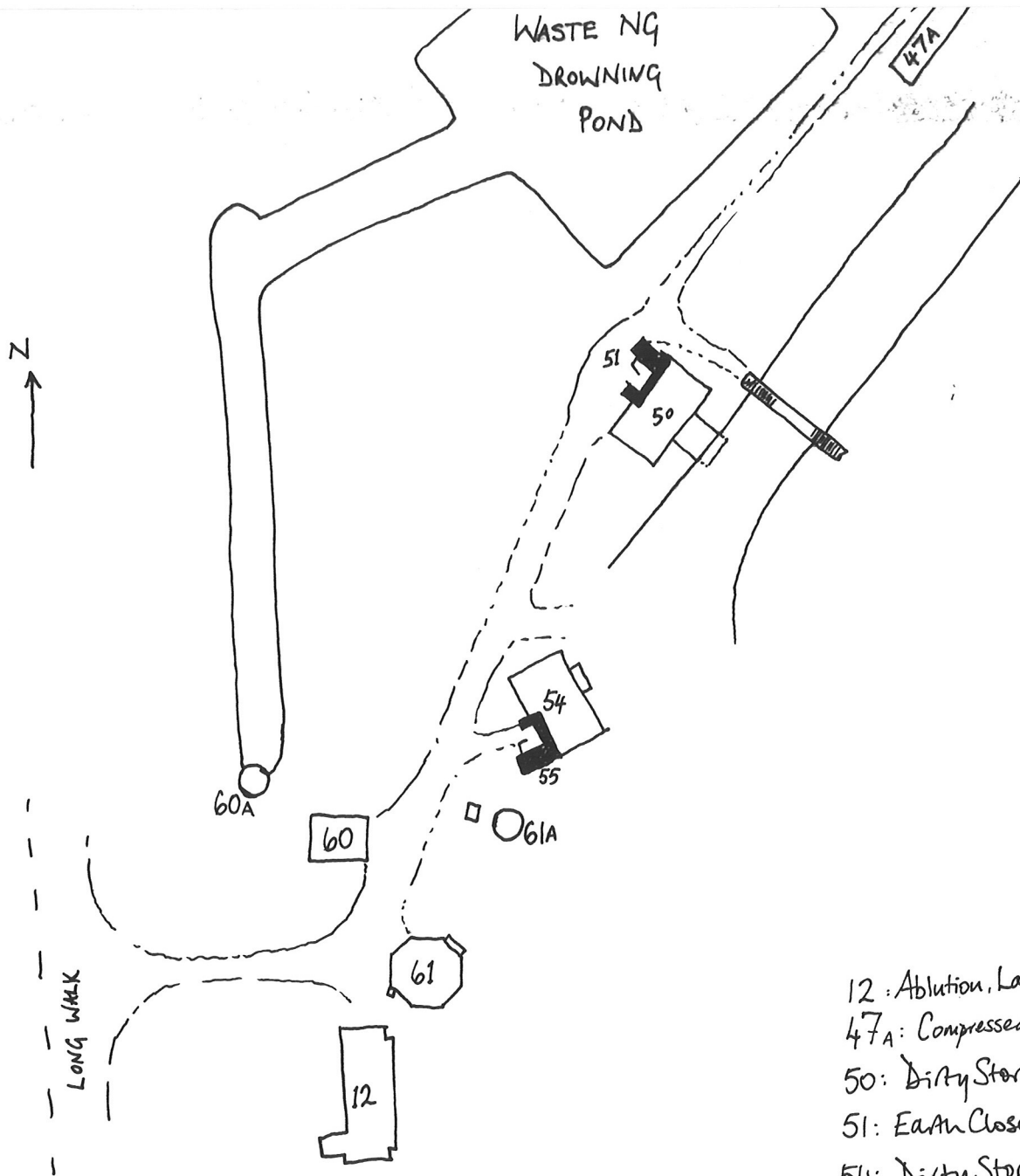
(6)

1:50

19/9/95

Tim Stevens

1:50 SECTION A-B, WITH SOME FEATURES ADDED



- 12: Ablution, Lavatory + Changing
- 47A: Compressed Air Reservoir
- 50: Dirty Store
- 51: Earth Closet
- 54: Dirty Store
- 55: Earth Closet
- 60: Pump House
- 60A: Well
- 61: Water Tower
- 61A: Well

E 12 NORTH AREA

Steve Chaddock 24.5.95

CONTAMINATED FILL REMOVAL (ASBESTOS) RESULTED IN LOCATION OF STRUCTURES ABOVE.

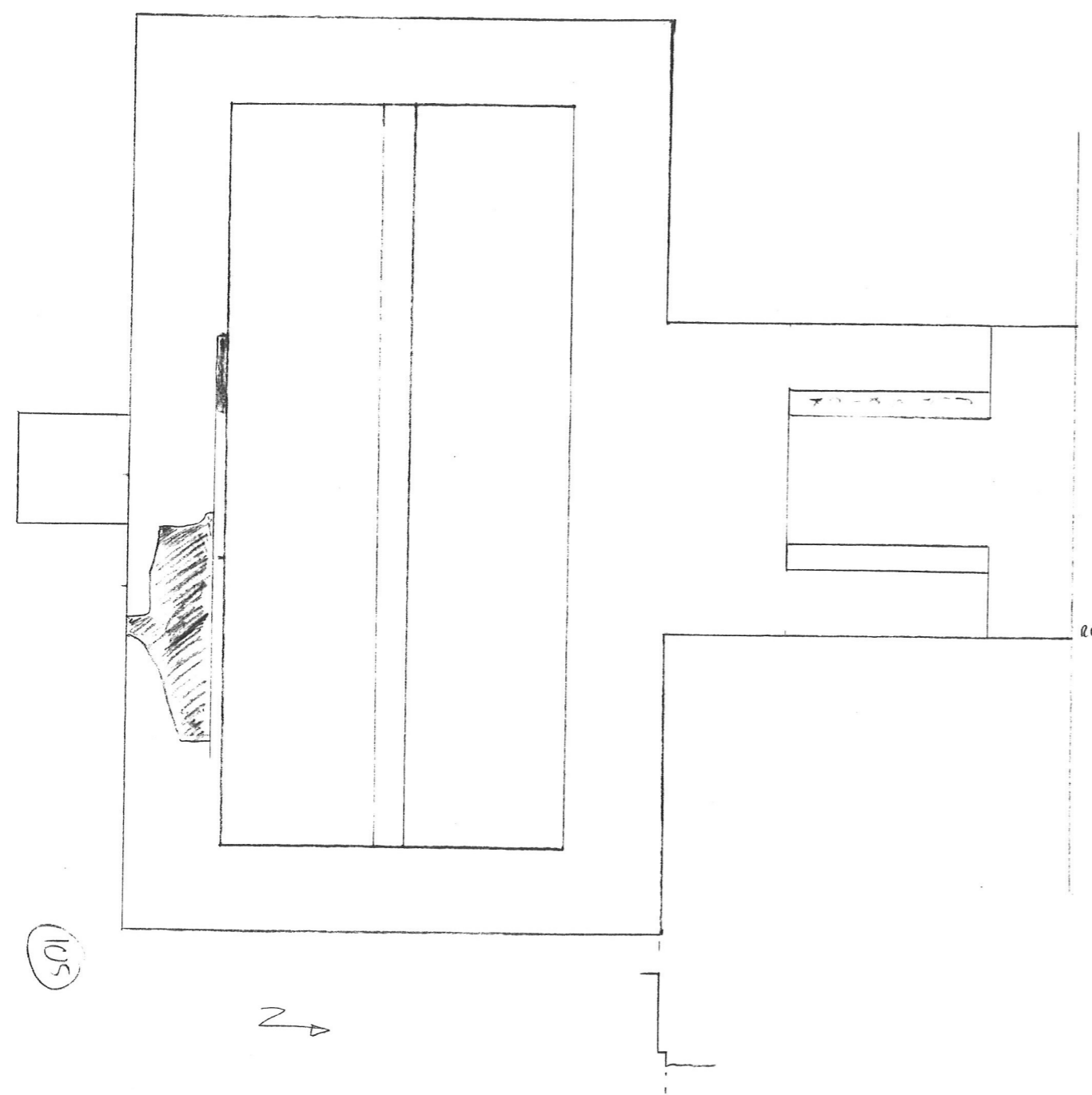
WALD 008

NALD 009

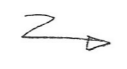
105 + 106

1.50
20/1/15
Tim Skewen

06, 6.7m

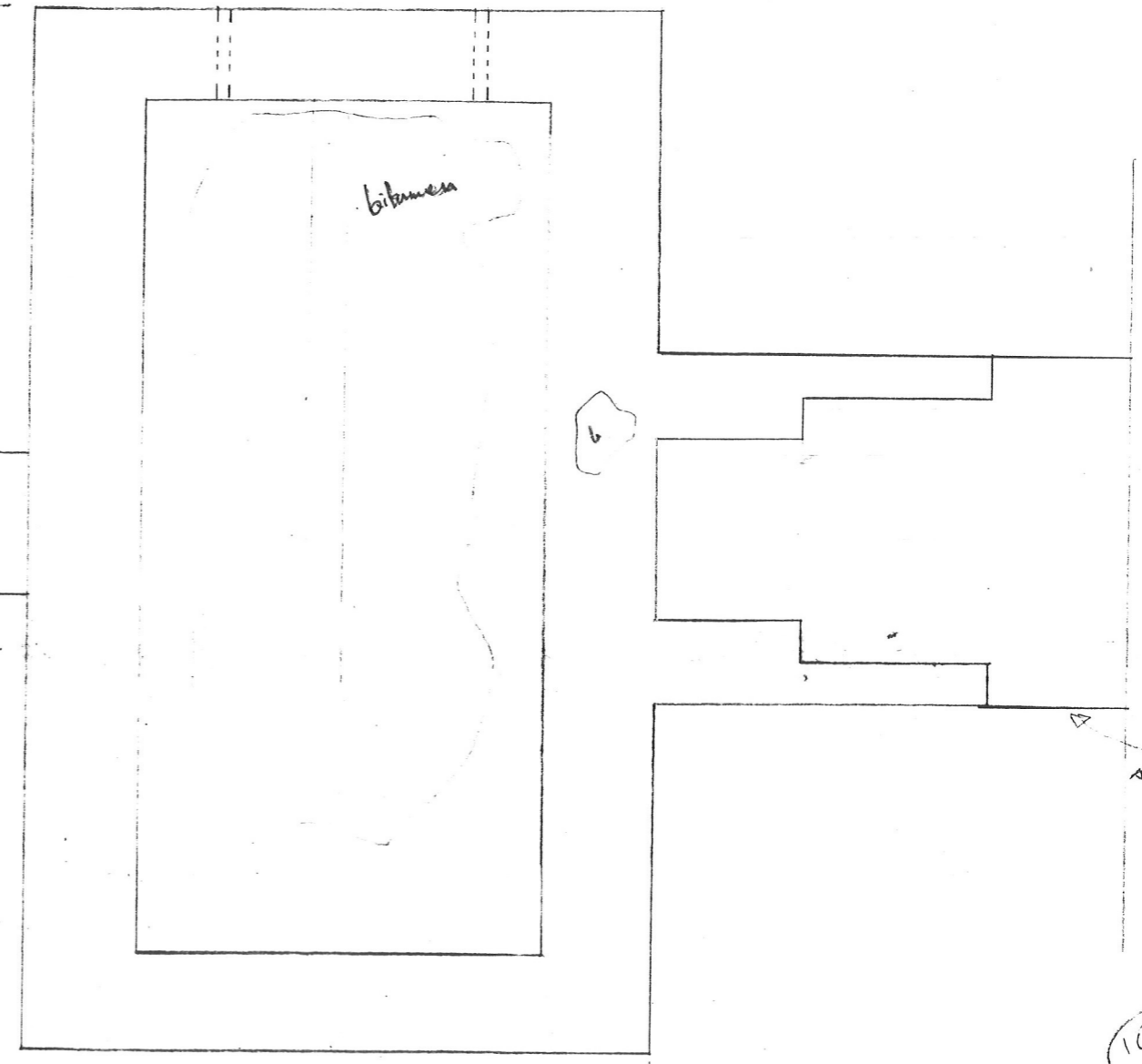
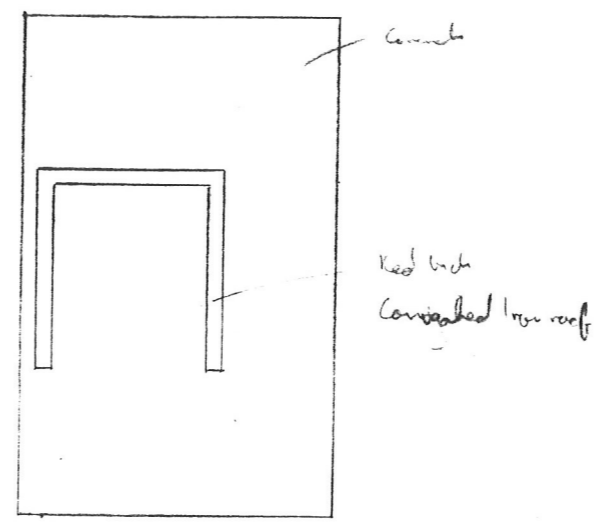


105



CANAL

REINFORCED
204



CANAL
REINFORCED
204

REVISION
IS UPRIGHT
TIMBER PLANKS
12 x 2"

106

107, 6.7m



RCHME 181.

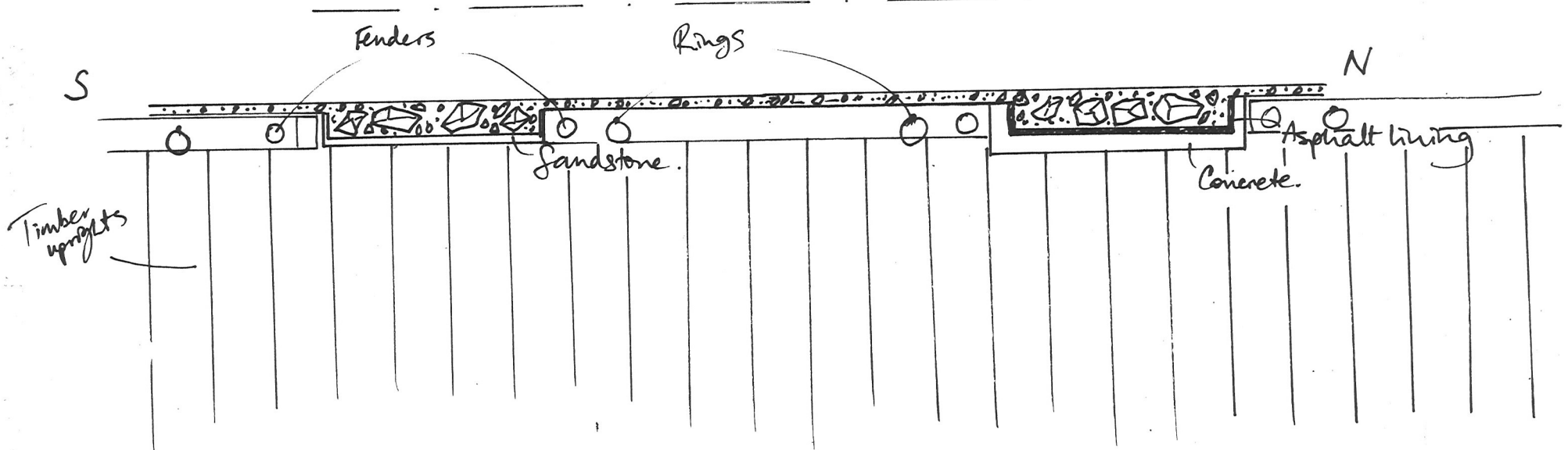
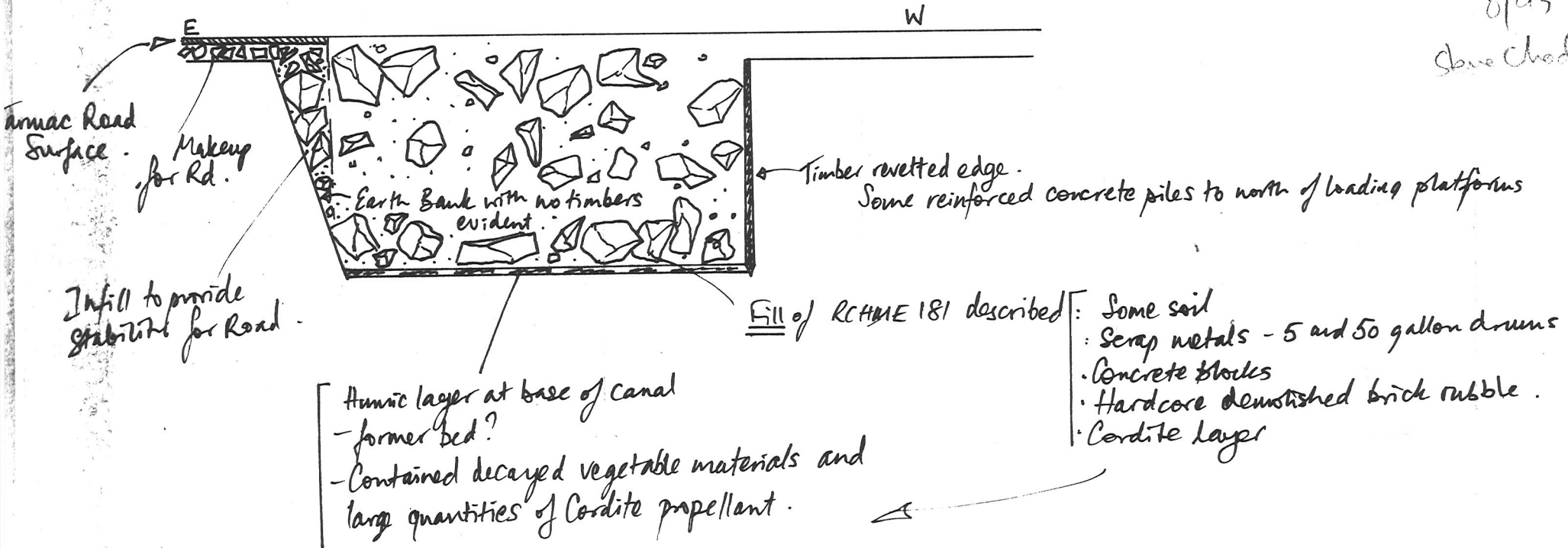
Sketch to show canal fill and general arrangement of loading stages in section.

WALD OII

NTS

8/05

Steve Chaddock



BARGE RCHME 5576

c. 11m x 3m

Recorded by Steve Chaddock on 19th May 95

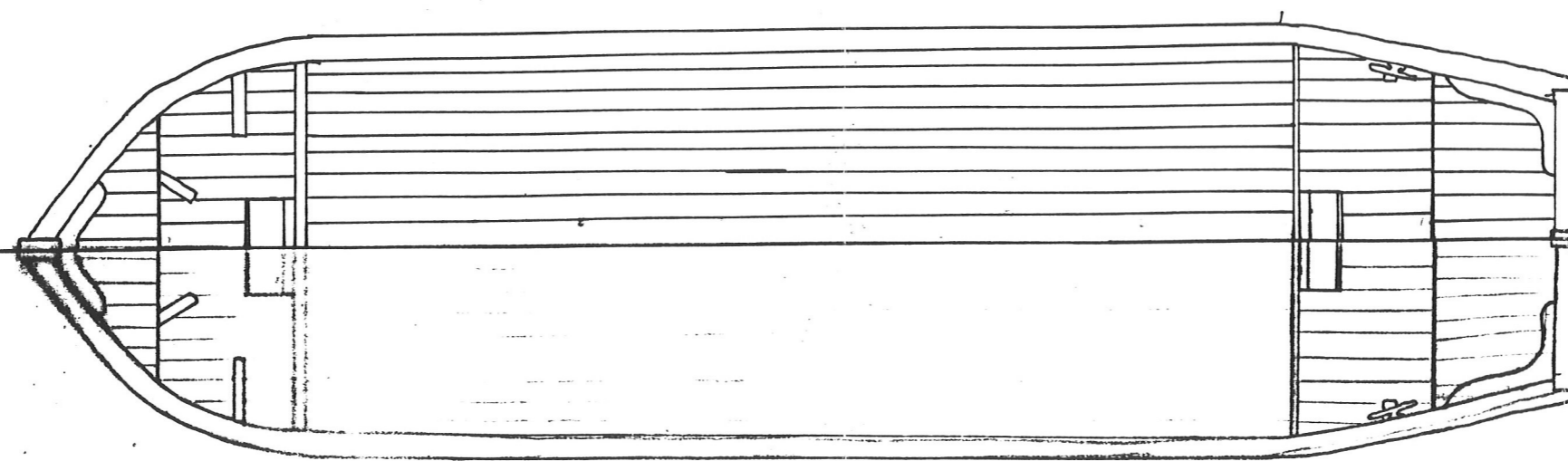
19.5.95
Steve Chaddock

:50
c. 11 x 3 m

11.08m x
3m

55

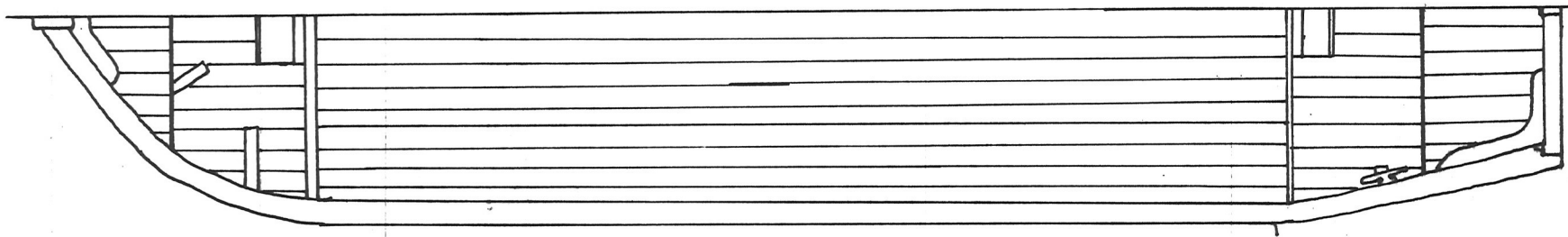
no X on



- wire photo
of RCHME 225
original to remain

WHD.012

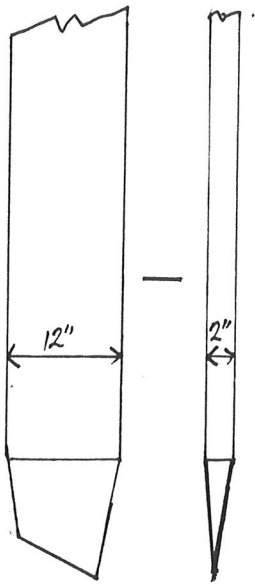
Overlay to Drawing
of RCHME 556
- river barge
WALD013



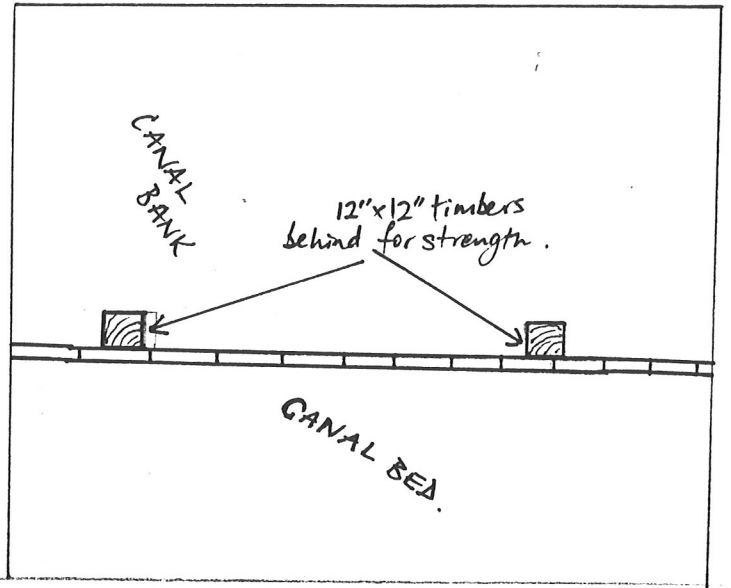
Sketch of Wooden Piles in SAM.

S. Chaddock . 27.9.95 . NTS.

WALDO19.A



Face and Side View of timber Pile design.

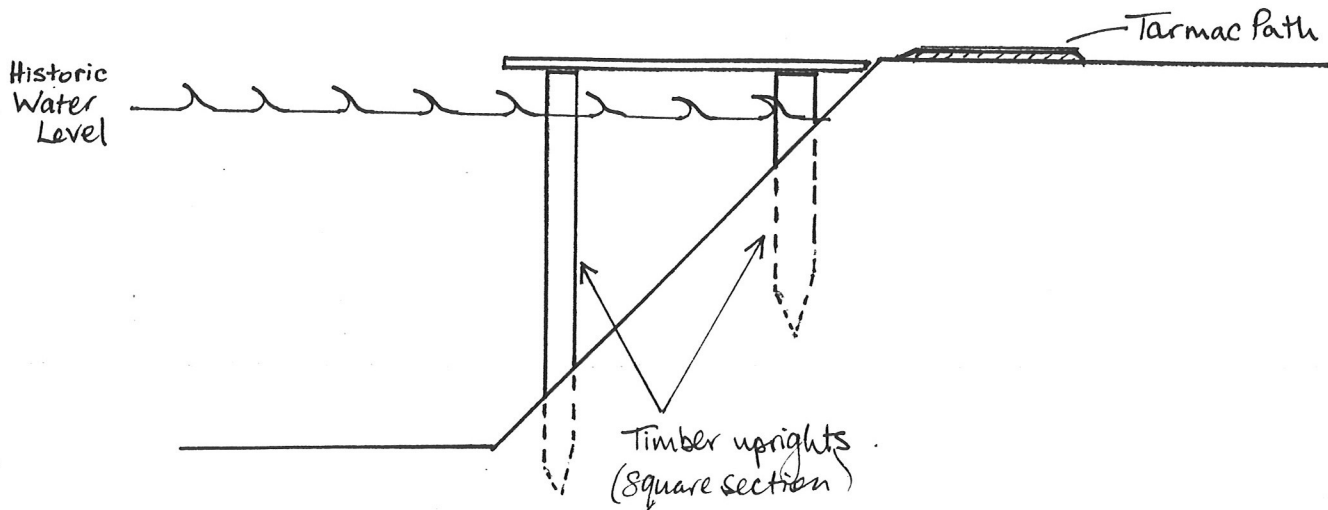


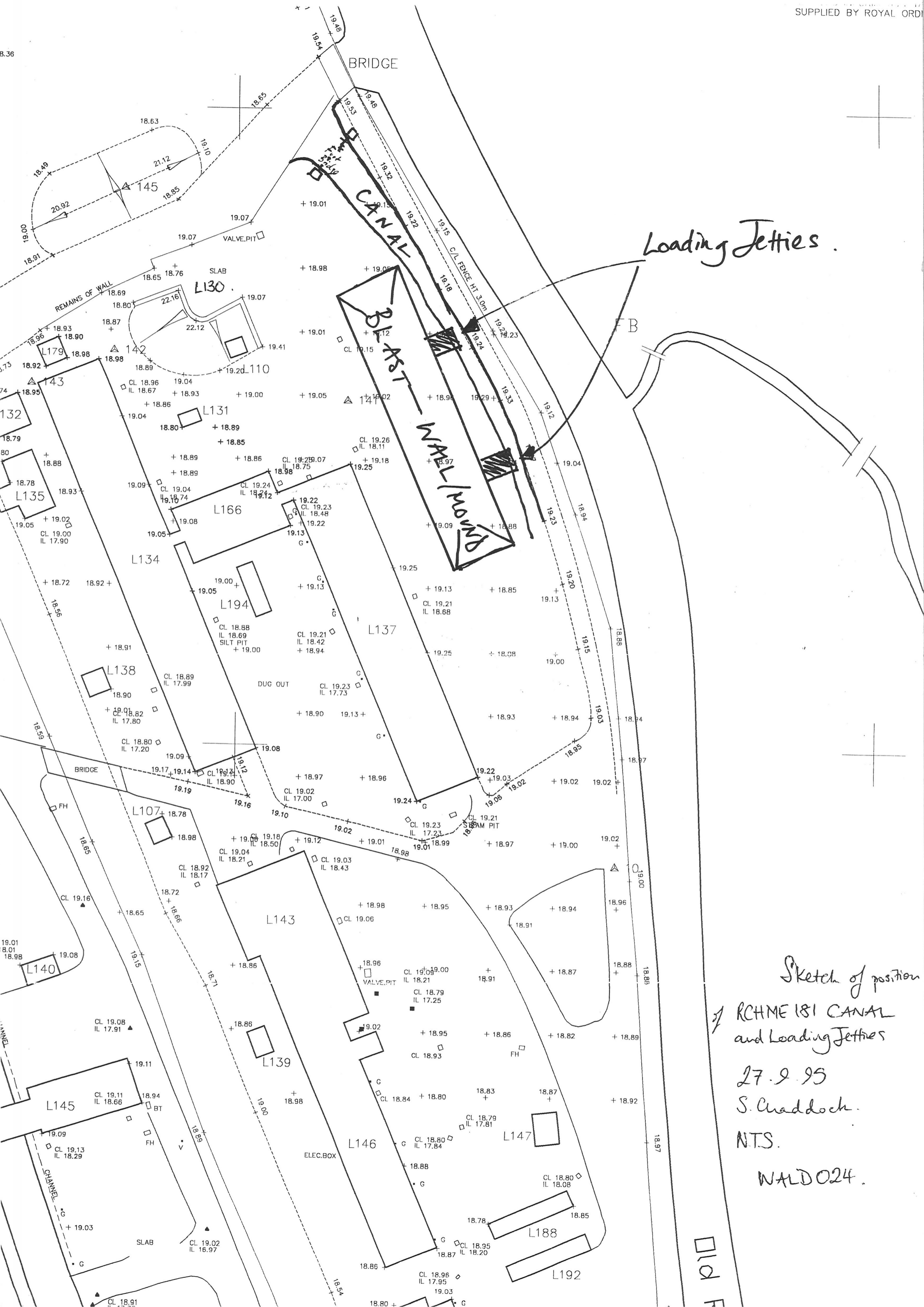
WALDO19.B

NTS.

S. Chaddock 3.10.95

Profile of Canal with Arrangement of Timber piled walkway.





Loading Jetties.

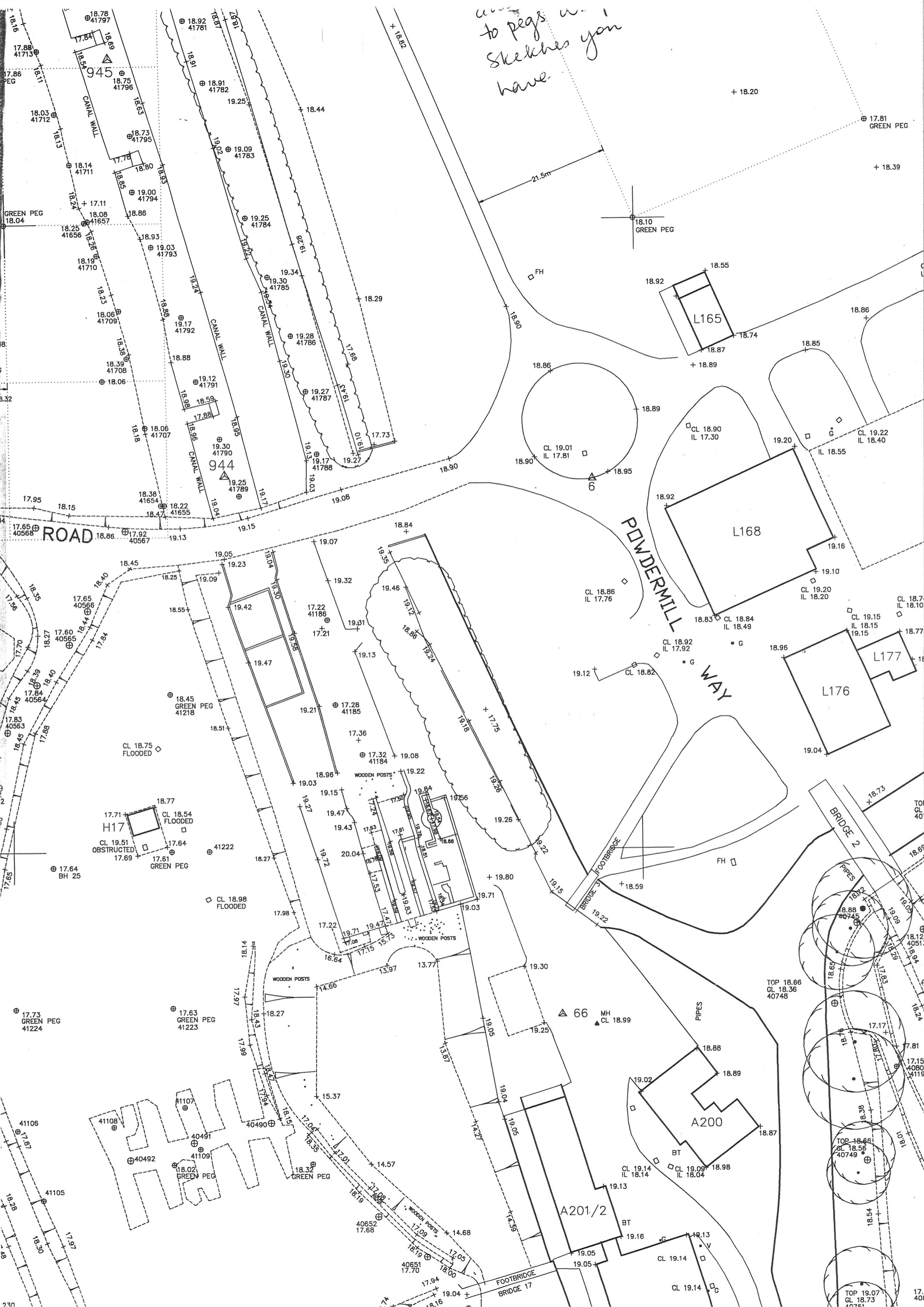
CANAL

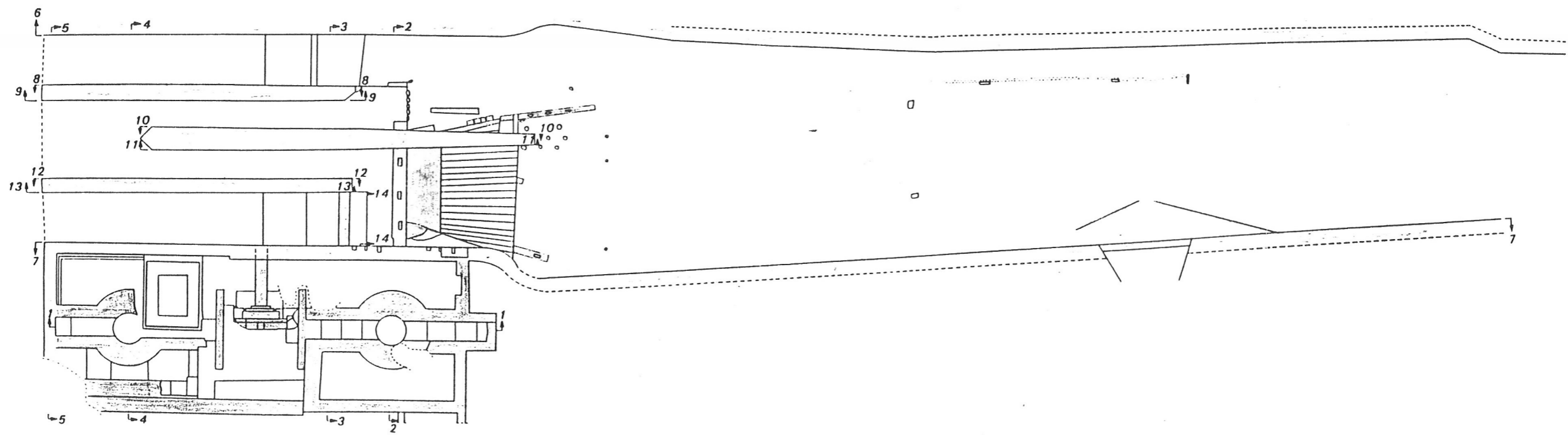
BRASS T WALL / MONING

Sketch of position
 RCHME 181 CANAL
 and Loading Jetties
 27.9.95
 S. Chaddock.
 N.T.S.
 WALDO24.

DIP

to pegs in sketches you have





- | | |
|----------------------------------|----------------------------------|
| <input type="checkbox"/> Phase 1 | <input type="checkbox"/> Phase 4 |
| <input type="checkbox"/> Phase 2 | <input type="checkbox"/> Phase 5 |
| <input type="checkbox"/> Phase 3 | <input type="checkbox"/> Phase 6 |

Figure 3: Phase plan of site