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WET SITE ARCHAEOLOGICAL SALVAGE AT THE
KING'S NAVY YARD, AMHERSTBURG, ONTARIO

by John Dewhirst

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Abstract

This report describes the wet site archaeological salvage excavations conducted at the King's Navy Yard Park, Amherstburg, Ontario, in August and September, 1978. The site was part of the former Navy Yard and Commissariat associated with Fort Malden from 1797 until the mid-19th century. The site attracted attention when offshore dredging in the Detroit River brought up numerous well preserved military artifacts. A cofferdam was erected around the richest area of the site so that it could be drained and excavated. The area excavated is in the approximate location of three successive wharves associated with the pre-War of 1812 King's Navy Yard and the postwar Commissariat. The remains of three incomplete structures were recorded. The largest and most intact is tentatively identified as the pier head of one of the three historic wharves. Excavation contexts are described for artifact analysis.

Acknowledgments

The King's Navy Yard archaeological project was realized only through the support of several organizations and many persons, of whom only the most prominent can be mentioned here.

Mr. Leo Lauzon, project supervisor with Dillon Engineering, recognized the importance of the artifact discovery, and set in motion the lengthy process to salvage it.

Mr. William A. Fox, Regional Archaeologist, Ontario Ministry of Culture and Recreation, facilitated the setting up of the salvage operation and loaned some of his staff to carry it out.

Dillon Engineering and McQueen Marine generously accommodated the unforeseen salvage, and eventually the archaeological excavation, into their construction, and assisted the whole archaeological project in endless ways.

From its inception the Navy Yard project received outstanding support from Mr. Murray Smith, then Mayor of Amherstburg, and from the Amherstburg municipal agencies: the Town Clerk's office, the Public Works Department, the Fire Department, and the Police Department.

The Amherstburg Historic Sites Association enthusiastically backed the salvage and the archaeological excavation. Its members, Mr. Hazen Price and Mr. and Mrs. Harvey Webster, generously gave up their time to support the salvage and other aspects of the project.

The mollusc species from the site were kindly identified by Mrs. M.F.I. Smith, Mollusc Unit, Invertebrate Zoology Division, National Museum of Natural Sciences, Ottawa. Species identifications of the wood samples from the site were done under the direction of Dr. C.T. Keith, Eastern Forest Products Laboratory, Canadian Forestry Services, Ottawa.

The author is especially grateful to several persons for their outstanding support during the excavation. The field operation was realized only through the excellent support of Mr. Harry Bosveld, Superintendent of Fort Malden National Historic Park, and his staff, particularly Mr. Robert Bondy. The extant recording, so essential to the project was done by Earl Dooley, Robie van Rumpt and Max Wong, all of the Engineering and Architecture Division, Parks Canada, Ontario Region. Finally, a special thanks is owed to crew members whose dedication and superior effort brought the project to a successful completion: Martin Brooks, Donald Brown, Joseph Chapman, Jon-Karl Jouppien and Peter Lane.

Introduction

On July 11, 1978, during construction of a steel retaining wall as part of a land reclamation project on the Detroit River at Amherstburg, a dredge brought up remarkably well preserved military artifacts of the early 19th century, hundreds of clay pipe fragments and large oak timbers. As the dredge attempted to proceed further, it encountered even more artifacts. This discovery attracted considerable attention in Amherstburg and the surrounding area. It was realized that a rich archaeological site was likely present offshore, and that steps should be taken to investigate it and salvage what was there. The Municipality of Amherstburg, the Ontario Ministry of Culture and Recreation, and Parks Canada, Ontario Region, were notified of the site. As the site was located underwater in a navigable channel all parties agreed that the site was a federal responsibility, under the Harbours Commission Act.

The site was then further assessed as to its potential. Parks Canada and the Regional Archaeologist of the Ministry of Culture and Recreation set up an operation to salvage artifacts from the dredge piles. Robert Grenier, an underwater archaeologist with the Archaeological Research Division, Parks Canada, Ottawa, conducted an underwater survey of the site. Despite virtually no underwater visibility, he located a large concentration of artifacts and four large beams which indicated the presence of a substantial structure (Fig. 1). These findings suggested the presence of

considerable cultural remains and the need for an archaeological salvage operation. It was decided to use the steel retaining wall as a cofferdam and then pump out the water so that the site could be excavated. On August 24, the site was drained, and the salvage archaeology began. We had approximately four weeks in which to excavate as much of the site area as possible.

Our salvage objectives were: (1) to record all archaeological contexts and structures; (2) maximize artifact recovery for later analysis; and (3) to identify and date the archaeological contexts, if possible. The excavation and dredge pile salvage together recovered more than 32,000 artifacts. They have been washed and labelled and are now ready for analysis. A preliminary analysis of the clay smoking pipe artifacts from this collection has been published by Jon-Karl Jouprien (1979).

Historical Background

The discovery was made about 500 metres south of Fort Malden, offshore from the southern limit of the former Military Reserve. This locality was the site of the King's Navy Yard from 1796 to 1813, when it was burned by retreating British forces. After the War of 1812 the site was rebuilt as a commissariat, which eventually included a storehouse, office, garrison fuel yard and other structures. In the 1850s the military operation was shut down, and over the years the reserve was gradually divided into lots and sold off. In the late 1880s or early 1890s a waterworks and pumping station were built on the northwest corner of the commissariat property. The waterworks was destroyed, probably in the 1920s, and the site remained largely undeveloped until 1978, when it became a park as part of a municipal

riverfront improvement project.

Structural details from archival sources pertaining to the Navy Yard and Commissariat are presented in Dennis Carter-Edwards' report, Fort Malden: A Structural Narrative History 1796-1976 (1980). As the structural remains exposed by the archaeology were under water, historical data on known underwater structures at the site—the Navy Yard and Commissariat wharves—have been summarized from that report for historical perspective and possible identification of the archaeological structures.

Construction of the King's Navy Yard wharf began in 1797. A list of materials for the wharf included quantities, parts and dimensions (Carter-Edwards 1980: Appendix R); the list is reproduced below, with quantities omitted and metric conversions added for comparative purposes:

cills or posts of oak timber 14 inches to 16 inches square
[35.6 cm² to 40.6 cm²]

sleepers or floor boards of cedar oak or hemlock, 8 inches to 10 inches [25.4 cm - 30.5 cm] in diameter

land ties: cedar oak or hemlock 8 inches to 10 inches in diameter

sides and front work: pine squared on three sides, 10 inches to 12 inches [25.4 cm - 30.5 cm] thick

oak planking, 3 inches [7.6 cm] thick

bar iron, one inch square [2.5 cm²], for bolts, rings, etc.

spikes: 9-inch [22.9 cm] and 7-inch [17.8 cm]

nails

The wharf was completed in the spring of 1798.

Only general information is available on the design and construction of the wharf. It is known to have consisted of at least two major sections: a sunken part (presumably piles supported by cribwork) with a superstructure connected by a "bridge" to the land. A plan of the military post dated 1799

(Carter-Edwards 1980: Fig. 7) shows the wharf planked and L-shaped with the extension pointing downstream. Although the scale of this plan is very small, it does suggest the following very approximate dimensions of the wharf: 20 yds [18.3 m] long by 10 yds [9.1 m] wide, with the extension 10 yds long by 7.5 yds [6.9 m] wide. In 1803 funds were budgeted for building a timber wall to prevent the sand and mud from filling up the dock. This construction may have involved other work as well, because a plan of the military post dated 1804 (Carter-Edwards 1980: Fig. 15) shows a T-shaped wharf with extensions running north-south. In 1813 the Navy Yard was burned; presumably the wharf was destroyed along with it.

The postwar commissariat wharf was built on either the same location or near the old one. A plan of 1830 (Carter-Edwards 1980: Fig. 28) shows the wharf L-shaped, like its predecessor. The scale of this map is very small, but does suggest approximate dimensions for the wharf: 100 ft. [30.5 m] long, with a 20 ft. [6 m] extension. Other plans for the years 1830, 1835, 1838, 1840 show an L-shaped wharf in the same location (Carter-Edwards 1980: Figs. 29, 32, 47, 65).

In 1843 the commissariat wharf was rebuilt. Its description in 1844, quoted by Carter-Edwards (1980: 220), is revealing (metrics are added for comparisons):

Length 75 feet [22.9 m] Width 27 feet [8.2 m] This wharf was rebuilt in the year 1843. The pier head is a crib 50 feet long [15.2 m] 27 feet wide, formed of Oak timber and loaded with Stone, the remaining 20 feet [6 m] part of the pier is supported by piles and beams 12 inches square [30.5 cm²]. The Gangway is 100 feet long [30.5 m] 15 feet wide [4.6 m] and supported by 2 Cribs 15 by 10 feet [4.6 m by 3 m], loaded with Stone - the whole covered with 3 inch [7.6 cm] oak plank.

A series of plans from 1844 intermittently through to 1863 (Carter-Edwards 1980: Figs. 66, 70, 92, 94-96, 101-104) show the L-shaped wharf in the same

position. It is slightly north and directly west of the property line running east-west just north of the commissariat office which survives today as a private residence. It is not known when the wharf fell into disrepair or was dismantled, but this likely occurred before 1900.

The Site

The King's Navy Yard site is in Amherstburg, along the river front of a large lot on Dalhousie Street at Rankin Avenue. Close to the street is the Park House Museum. Behind the museum and toward the river is a grassy field with some large trees. At the time of excavation this property was being developed as a river front land reclamation project and municipal park. A concrete pad, park benches, and monument with historic plaques had been constructed in the middle of the property (Fig. 2). In the south adjoining lot, separated by a fence, stands the original commissariat office, now a private residence. The area west of the commissariat property and west of the concrete pad was a construction site. A large concrete storm sewer conduit constructed in recent years jutted into the river. Some 15 metres offshore a dredge was excavating a trench for a line of steel pilings. These were to form a retaining wall, behind which tons of landfill would be deposited. Construction of the retaining wall had been going as expected until the dredge hit large oak timbers (Fig. 3) which prevented effective sinking of the pilings. Removal of the timbers robbed unanticipated time and slowed down the construction project.

Since the discovery of the artifacts near the oak timbers, dredge loads containing artifacts were brought on land for archaeological salvage. A backhoe and pressure hoses were used to cut and spread the enormous piles so that crews could search for artifacts (Fig. 4). This salvage had been

going on for a few weeks until construction of the steel retaining wall had reach a point far enough south on the river so that the gap between the wall and the land could be filled in, forming a partial cofferdam around the area of timbers and historic artifacts. Thus, the storm sewer conduit formed the north side of the cofferdam; the steel pilings, the west side; landfill, the south; and the river bank, the east side (Fig. 2). The area so enclosed measured approximately 22 m by 10 m.

After the water was pumped out, the immediate site area was found to consist of a gently sloping bank that plunged sharply where the dredge had dug out the cofferdam trench (Fig. 5). A timber supporting several pointed logs and an edge of a packing crate lid could be seen near the cofferdam trench (Figs. 6-8). These features compare well with the structures recorded by Robert Grenier; however, the southernmost beam and pile of bricks (Fig. 1) do not fall within the confines of the cofferdam. Stratification was found to be present, but not all strata could be clearly differentiated at this stage. It was apparent, however, that the site was buried under a thick sterile white sand fill. This was largely removed by power shovel (Fig. 9), and shoveled away manually from hard to reach areas. The site was then ready for controlled excavation (Figs. 10-11).

The Excavation

The salvage objectives—to recover as many artifacts as possible and to record all contexts and structural remains for analysis—necessitated a comprehensive excavation of the site. It was divided into excavation units congruent with apparent structural and non-structural contexts. These areas were then excavated, whenever possible, in units corresponding to the natural stratification. To maximize artifact recovery all excavated lots were screened against $\frac{1}{4}$ -inch hardware cloth under high pressure hoses (Fig. 12). All artifacts, suspected artifacts, and materials used culturally, such as coal, were bagged according to excavation lot and stored for cleaning and labelling after the excavation. Perishable finds of wood, leather, tin and other materials were initially treated on site by the conservator and stored in tubs of water and fungicide. Following the excavation, they were taken to the Conservation Division, Parks Canada, Ottawa, for treatment. The maximized artifact recovery not only obtained the highest yield, but also precluded untrained crew members from making an artifact selection in the field, and did away with problems of finding artifacts in the dense clay.

The location of the site below ground water level and behind a cofferdam produced excavation constraints not found on land-based sites. The water table was higher than most areas of the site, and ground water continually flowed into the excavation. The ground water weakened control

walls, causing them to slump. Sometimes it bathed exposed features in a film of clay and water, making it impossible to maintain clean features for photography and extant recording. The other constraint was excavation depth. For safety reasons we were forbidden by the construction engineer to excavate no deeper than the lowest point of the site after it had been pumped out. When we reached that level we found digging extremely difficult in any case because the ground water could not flow away to the pumps. It combined with the clay to form an incredible morass of heavy clinging tofu-like material that could barely be shoveled.

Stratification

Stratification at the King's Navy Yard presents an unusual situation with far-reaching implications for the archaeological analysis. Artifact analysis relies largely on some consistent contextual relationship being maintained on the site through time. Such relationships depend on the principle of superposition and/or horizontal distributions of cultural remains as a reflection of human activities. In land sites deposition layers containing artifacts are usually formed mainly through cultural activities, and the archaeological pattern, once formed, usually persists, unless there is pervasive disturbance. Even underwater sites, often subjected to strong environmental forces, maintain some cultural context through endurance of a structure such as a shipwreck.

The King's Navy Yard site, however, is a portion of a river bed into which artifacts have been deposited rather haphazardly since 1797. Whatever horizontal and vertical depositional pattern that might have formed has likely been modified by the complex and powerful dynamics of the Detroit River. (See, for example, Cooke and Doornkamp 1974: 74-95; Small 1978: 33-62). Such natural processes are further complicated by human activities. The Detroit River is one of the most intensely used waterways in North America; the portion of river on which the site is located has been used as a navigable channel for the past 200 years. Underwater archaeologists have found that river traffic considerably

disturbs the shoreline and stream bed (R. Grenier, personal communication). The effects of river traffic are even further complicated by construction along the shoreline.

To what extent such environmental factors have played a role at the site is not known, but may be suggested by analysis of the artifacts correlated with particular strata. There is a recognizable stratification at the site which suggests that some kind of artifact superposition is present, which in turn may assist in dating the strata. It was observed in the field that most strata seemed to contain artifacts representing a wide time range. This was difficult to define on site because the great quantities of material recovered necessitated bagging and packing it soon after recovery, thereby preventing study of all artifacts from a given stratum. Three strata have been roughly dated on the basis of certain artifacts observed in the field. These rough date ranges should be regarded as tentative pending analysis of all the artifacts from intact deposits. The artifact analysis correlated with the stratification should also indicate whether or not the river environment has shifted artifacts around largely within a stratum, or moved artifacts from one stratum into another.

Four superimposed strata were found to occur throughout the excavation (Figs. 13-18). The uppermost stratum was sterile landfill, whereas the lower strata are naturally formed river deposits. The strata are described below, from lowest and earliest to highest and most recent.

Stratum 1: Fine Grey Silty Clay

This stratum appeared completely homogeneous throughout; no substrata or minor anomalies could be differentiated. The clay was remarkable for its

adhesive properties. Even after the clay had dried out on our boots and shovels, brushes or scrapers were needed to remove all of it. This adhesive quality sealed artifact surfaces from contact with oxygen, thereby contributing to the excellent preservation of metal and leather artifacts in this stratum. The clay stratum continued beyond the maximum depth of excavation, presumably for some distance. The surface of the stratum is the base of the ground water table. Water continuously followed on the impermeable clay surface into the excavation. The fine sediments and absence of coarse sand suggests that a relatively fast moving current was present during the formation of the stratum.

The clay deposits exposed by the excavation have formed around and in between the dock cribbing since its construction (Figs. 16-18). The clay stratum is noteworthy for its clay pipes (Jouppien 1979) and well preserved military artifacts. The artifacts appear to span most of the 19th century.

Stratum 2: Coarse Brown Sand

The base of this stratum through which the ground water table flows is a layer 2 cm to 8 cm thick of decaying twigs, bark, leaves, conifer needles, and thousands of tiny molluscs—mostly gastropods (snails). The gastropods were feeding on organic matter among this debris when they were killed by some kind of oil pollution. It stained many parts of the brown sand black and concentrated along the base of the stratum. Possibly the ground water table assisted the spread of this pollution on site, or perhaps even carried it from a nearby higher land-based location to the site. When first exposed to the air the molluscs gave off a stench, which suggests that the decay

process was arrested shortly after their deaths by deposition of coarse brown sand on the site. The upper portion of the stratum tended to contain occasional small lenses of pebbles and small flattish rocks. Significant artifacts found in Stratum 2 included a Canadian 1896 one-cent piece, various Victorian and Edwardian ceramics, and recent artifacts such as beverage bottles.

Mollusc species are often useful indicators of microenvironments, therefore a sample of 40 specimens, including all the apparently different species present, was collected for identification. Thirty were recognized as the gastropod Goniobasis livescens (Menke), clearly the most abundant species present throughout the base of the coarse brown sand. Other species present, but in very small numbers, were three gastropods, Physa gyrina Say, Stagnicola elodes Say, and Helisoma pilsbryi infracarinatum Baker; and two bivalves, Elliptio delatata (Raf.) and Sphaeriid sp.

Ecological studies of G. livescens in Lake Erie (Krecker 1924; Shelford and Boesel 1942; Wiebe 1926) found this snail to be associated with specific microenvironments. It is most abundant in the early stages of succession to land, particularly in protected places swept clear by currents produced by oscillations in lake level. In these conditions G. livescens prefers shallow water, occurring in greatest numbers in depths ranging from about 8 cm to 45 cm. The factor regulating depth is not force of current, but rather exposure to wave action. The snail cannot withstand waves, but it does inhabit places with strong currents when there is a firm substratum such as boulders or dock pilings present. The snails studied in the above cited sources were invariably found on stones, rocks, boulders and dock pilings when the preferred water conditions prevailed.

There is no mention of sand as a substratum. Given the sensitivity of the snail to wave action and its selection of firmer substrata as current force increases, it would appear that Goniobasis livescens in large numbers inhabits only the most protected and stable inshore conditions.

The environmental preference of G. livescens indicates that early in the formation of Stratum 2 (and perhaps for the duration of its deposition) the site was likely a very protected, shallow still water area. This is also suggested by the depositional materials. The considerable organic debris would not have accumulated under strong currents and wave action. Coarse sand encountering weak currents drops out of suspension and settles. The change to still water at the site may be related to extensive construction on the riverfront in the late 19th and early 20th centuries. A sizeable wharf and/or nearby waterworks upstream may have produced the protected conditions necessary for G. livescens and formation of the sand. The oil pollution in Stratum 2 also appears linked to the very late 19th and early 20th century when watercraft became powered by gasoline and diesel engines. As noted earlier, the ceramics from Stratum 2 include late Victorian and Edwardian ceramics, as well as recent beverage bottles.

Stratum 3: Fine Dark Grey Sand Marbled with Clay

The lower half of this stratum contained considerable quantities of clay mixed with the sand. The clay decreased toward the top of the stratum so that the upper half became predominantly fine sand marbled with silty clay. Initially the difference between the lower and upper levels of the stratum was distinguished, and the upper and lower halves were recorded as separate units. Familiarity with this stratum, however, proved that a natural

division was frequently not readily apparent, and attempts to define one would only result in an arbitrary, questionable division. It was therefore apparent that the difference in the stratum had formed largely through one process, and consequently the stratum was recorded as a single unit. The stratum appears to have formed entirely during the 20th century, as it contained many recent artifacts, particularly beverage bottles. The upper surface of the stratum was the interface with the river until 1977, when it was buried under a thick layer of white sand landfill.

Stratum 4: White Sand Landfill

This white sand was river dredgings, reportedly from the lower end of Bois Blanc Island. They were deposited as landfill on the site in the summer of 1977, and formed an essentially sterile layer about 50 cm thick. This layer was removed by power shovel prior to excavation, and consequently does not appear on the excavation sections.

Excavation Units

Whenever possible, excavation units were based on natural stratification. However, disturbance of certain site areas from dredging and ground water flow necessitated some arbitrary excavation units so that mixed deposits could be removed. All excavation units were designated according to the Parks Canada recording system (Swannack 1973).

The underwater reconnaissance by Robert Grenier (1978) employed four units: 32H1A, 32H1B, 32H1C and 32H1D (Fig. 1). These involved minor collections of artifacts from the cofferdam trench.

The salvage excavation was divided into two large units: 32H2A, the area north of the structure; and 32H2B, essentially the area of the structure (Fig. 19). The depths of these units are defined in the excavation sections (Figs. 13-18). All strata within these two excavation units were excavated in a series of lots. Because of soil colour changes from pollution and variation in stratigraphic contents noted earlier, description in the field of excavation lots varied somewhat. All field descriptions have been checked and standardized in the following lot definitions for each large excavation area or suboperation:

32H2A Intact Deposits

32H2A1: Stratum 4. Lot includes base of white sand landfill and the interface of Stratum 3 with river.

- 32H2A3: Stratum 1. Lot contains a cluster of clay pipes found in apparently intact deposits below rubble in the cofferdam trench.
- 32H2A4: Stratum 3. Lot restricted to upper half of stratum, fine dark grey sand marbled with clay.
- 32H2A5: Stratum 3. Lot restricted to lower half of stratum, fine dark grey sand marbled with considerable quantities of clay.
- 32H2A6: Stratum 2. All deposits.
- 32H2A7: Stratum 1. All deposits.

32H2A Disturbed Deposits

- 32H2A2: Mixed deposits in cofferdam trench, of dredged rubble and downwash from sloping river bank; largely associated with Feature No. 2.

32H2B Intact Deposits Covering Structure

- 32H2B3: Confined horizontally to small area above south end of structure (Fig. 19). Includes Stratum 1 among rocks and log platforms of cribbing.
- 32H2B4: Stratum 3. Lot restricted to upper half of stratum, fine dark grey sand marbled with clay.
- 32H2B5: Stratum 3. Lot restricted to lower half of stratum, fine dark grey sand marbled with considerable quantities of clay; includes interface between Strata 2 and 3.
- 32H2B6: Stratum 2. Lot includes all of stratum.
- 32H2B7: Stratum 1. Deposits among large rocks and log platform of cribbing.

32H2B Disturbed Deposits

- 32H2B1: Disturbed material in cofferdam trench along large horizontal oak timber forming west side of structure (Figs. 6-8). Material from slumping bank, dredging, and downwash along full length of beam was removed in this lot.

- 32H2B2: Confined horizontally to south end of excavation above structure (Figs. 19, 20). Contains material from deposits disturbed by power shovel and from deposits eroded down the slope to east of excavation. Lot also includes Strata 2 and 3.
- 32H2B8: Cluster of clay pipes found directly underneath the northwest corner of the structure: below the north end of the oak beam forming the west side of the structure and the wrenched broken beam running east-west (Fig. 19). The mixed soil deposit about these pipes indicates that they washed out of the bank above them to the east.

Artifacts without excavation provenience, particularly those recovered from dredge piles, were labelled 32H1X1. Surface artifacts without provenience were labelled 32H1X2.

Features

The excavation exposed only four features. Three are structural. The fourth was the concentration of pipe artifacts around the remains of two boxes.

Feature No. 1: Crib Structure of Wharf Head

A large portion of what is possibly the damaged crib of a wharf or dock head was uncovered and recorded (Figs. 21-32). The structure consists basically of a large joined timber outer frame held together with internal cross-bracing and rock fill. Both the outer frame and cross-bracing together support two log platforms loaded with rocks. The structure was built on Stratum 1 along the sloping river bank, and correspondingly slopes from east to west at an angle of approximately 13 degrees. At the time of excavation the highest exposed part of the structure was 1.53 m below river level. Only a portion of the structure could be exposed owing to several constraints: massive overburden on the east and south sides, safety limit of depth of excavation, time, and the relatively small area of the cofferdam. Nonetheless, it is apparent from what was exposed that the structure continues eastward under the overburden and southward beyond the confines of the cofferdam. If the southernmost wooden beam recorded by Grenier (Fig. 1) is part of this structure, then it would continue southward for at least a further 4 m. The structure also originally extended

westward into the river, but this portion was removed or destroyed by the dredge. The structure is relatively complex, and therefore would probably be best described in terms of its construction, starting with the outer frame, then the cross-bracing and log platforms, and finally, the rock fill.

Outer Frame

The outer frame of the crib structure is basically a rectangle of squared timbers. Three sides of the frame partly exposed in the excavation have a maximum outside width of 4.6 m and a length of more than 6.97 m (Figs. 21, 22). The height of each side varies according to its construction.

The west side of the frame is based on at least two abutting horizontal timbers whose base elevation of 172.544 m was 2.5 m below the river level at the time of excavation. Only the north end of the southern abutting timber could be exposed, as this timber extends southward beyond the excavation limits and the cofferdam. Although this timber forms, with its abutting norther neighbour, a combined dado joint, there were no apparent means, such as a header joint or spikes, of securing the timbers together. The combined dado joint was overlooked in the extant recording of the west elevation (Fig. 22), because at the time of recording a deep pool of mud had formed in the area and buried the joint.

The completely exposed northern timber (Figs. 21, 22) measured 6.72 m long, 26 cm wide and 30 cm thick. Tool marks repeated on the surfaces of the timber show that it had been squared by hand. A series of transverse saw cuts was made to a consistent shallow depth at regular intervals along the timber, and the excess wood between the cuts was then axed or wedged off, leaving the surfaces more or less flat and squared. This squaring

technique was found to have been used on all the timbers of the structure, as well as on those brought up by the dredge during excavation of the trench for the steel pilings (Fig. 4).

The complete timber bears two dado joints on its top surface and three on the bottom surface (Figs. 21-23). All joints articulated at right angles with missing structural members. All enclosed joints seem to have been sufficient to hold the articulating timbers without additional means. The only open-sided joint, on the bottom surface of the north end (example 3 below), employed a large iron spike to hold its timber. The open side of this joint no doubt made the spike necessary.

Dimensions of the joints indicate the approximate dimensions of the missing members:

| <u>Joint Location</u> | <u>Width (cm)</u> | <u>Depth (cm)</u> |
|--|-------------------|-------------------|
| 1. south end, bottom surface; combined joint formed with abutting south timber | 40 | 14 |
| 2. middle, bottom surface | 32 | 14 |
| 3. north end, bottom surface | 38 | 14 |
| 4. north end, top surface | 38 | 5 |
| 5. near south end, top surface | 45 | 5 |

The above joint dimensions suggest that the extension to the west contained at least two types of beams in its construction: sturdy timbers, perhaps sleepers articulating with the underside of the crib structure as in examples 1 to 3 above; and broad planks running off the top of the crib structure, as in examples 4 and 5 above. The planking in the extension appears to have involved some diagonal construction as well, as suggested by an angled joint on the broken and twisted timber still held in joint

no. 3 by the spike (Figs. 21, 22). The upper surface of this timber bears the remains of one side of a 4 cm deep dado joint angled at 45 degrees. Its articulating plank would have projected to the southwest.

The north side of the frame is a wall, nearly 90 cm high, of three superimposed white oak timbers sloping from east to west (Figs. 21, 22, 24). The east end of the wall continues beyond excavation limits. The west ends of the timbers descend beyond the safety limit of maximum excavation depth, and therefore could not be exposed. A broken portion with an angled dado joint of the uppermost timber, however, was pushed upwards by the dredge. This hint at the buried construction is described above in the discussion of the west side of the frame. Despite the limits of excavation, some 4.5 metres of the north side of the frame were exposed, revealing its construction and relationship to the internal cross-bracing of the frame.

The three timbers, trapezoidal in cross-section, were superimposed with the widest on the bottom to the narrowest on top (Fig. 22). Their dimensions are as follows:

| <u>Timber</u> | <u>Top Width</u> (cm) | <u>Bottom Width</u> (cm) | <u>Thickness</u> (cm) |
|---------------|-----------------------|--------------------------|-----------------------|
| top | 27 | 32 | 27 |
| middle | 32 | 37 | 28 |
| bottom | 38 | 42 | 25 |

A varying space attaining several centimetres is present between the timbers. It is due to irregularities in the hand-hewn surfaces.

Near the west end of the exposed timber wall is a vertical line of three angled dovetail-dado joints which hold four cross-braces. The lowest was below the safe level of excavation and could not be properly

exposed; presumably it joins the east side of the frame as the cross-braces above do. The second cross-brace supports the end of a sleeper running east-west along the interior face of the north timber wall; the western end of this sleeper is wedged between the second and third cross-braces (Figs. 25, 26). The sleeper supports one side of the lower log platform. The third and top joint holds two cross-braces which support one side of the upper log platform (Figs. 21, 25, 28, 29).

The east side of the frame consists of at least four superimposed large squared white oak timbers in the southeast corner of the excavation (Figs. 18, 21). All extend southward beyond the excavation limits. Although the lowest timber could not be completely exposed, it is likely the bottom member of a timber wall similar to that just described for the north side of the frame. The sizes of the east timbers generally compare favourably with those of the north side. Dimensions of the east side timbers are as follows:

| <u>Timber</u> | <u>Width</u> (cm) | <u>Thickness</u> (cm) |
|---------------|-------------------|-----------------------|
| top | 36 | 18 |
| second | 36 | 29 |
| third | not excavated | 15 |
| fourth | " " | — |

The timbers are also sloped from side to side, at a slight angle similar to the slope of the north face. All four timbers are superimposed without any jointing or other apparent means of securing them.

It is also curious that the timbers, separated from the north side by a distance of 3.2 m, do not abutt or join the timbers of the north side, and thereby close the crib. Perhaps the cross-bracing between the east and

north sides provides sufficient support. The second timber of the east side bears a distinctive dovetail-dado joint (Figs. 25-27) which houses the southeastern end of the cross-brace whose northwestern end is fixed in the highest dovetail-dado joint in the north side of the frame. Further support, through indirect abutment, may come from a log with a squared end that abutts the ends of east side timbers nos. 3 and 4. Only part of this log shows in the drawing of the east face of the excavation (Fig. 18), but the log was later found to run northward and abutt with the interior face of the north timber wall. This log rests on the sleeper running along the interior face of the north timber wall, and is simply part of the lower platform.

Cross-bracing and Log Platforms

A column of four horizontal cross-braces runs diagonally across the structure from the northwest corner to near the middle of the east side of the frame. The three upper cross-braces are also sleepers for a lower and an upper log platform, which together covered the surface of the structure. The platforms were then buried under tons of rock and rubble fill. This fill, in addition to forming a solid platform for the structure, no doubt, by its enormous weight, kept the whole structure in place against the forces of the river.

The northeast area of the structure contains the lower log platform (Figs. 25, 26) which extends eastward beyond excavation limits. An oak timber sleeper running along the inner face of the north timber wall supports the north ends of more than 15 logs of the lower platform. The sleeper, 17 cm wide by 22 cm thick and more than 3 m long, rests on the

second cross-brace and tucks under the third cross-brace, which is set into the top dovetail-dado joint of the north timber wall (Fig. 25). The south ends of the logs also rest on the second cross-brace, and are kept in place by the overlying third cross-brace. Like all the timbers of the structure, the logs are mostly commercial white oak (Quercus sp., Leucobalanus group); however, four logs were eastern red cedar (Juniperus virginiana L.). All are in the round with the bark still attached; ends are unfinished, displaying axe marks. Diameters range from 12 to 22 cm, averaging 15.6 cm (n = 15). Lengths vary according to the distance of the second cross-brace from the inside face of the north timber wall.

The northwest and south areas of the structure are covered by the upper log platform (Figs. 21, 24, 28-32). It is supported on the northeast by cross-bracing, on the east by a sleeper, and on the west by the large oak timber forming the west side of the structure. The upper log platform continues southward beyond the excavation limits.

The third diagonal cross-brace, secured to both the north and east sides of the frame by dovetail-dado joints, supports the end of a small squared sleeper near the east end of the frame (Figs. 21, 25, 27). This sleeper runs more or less south beyond the excavation limits, and supports the east ends of the southern nine logs of the exposed upper platform. The above mentioned end of this sleeper which rests on the third cross-brace was in turn covered by the top or fourth diagonal cross-brace and thus secured (Fig. 21). The top cross-brace, 21 cm wide by 15 cm thick and 5.42 m long, was broken in the middle through strain when the dredge removed the timbers attached to the west side of the structure. The northwest end of the cross-brace is secured to the north timber wall by

a dovetail-dado joint and an iron spike. The southeast end, cut at a 45 degree angle, abutts the second oak timber of the east wall of the frame (Fig. 21). This top cross-brace, moreso a plank, also overlaps the edge of the lower, third cross-brace, and supports the ends of 12 logs of the upper platform.

The exposed upper log platform (Figs. 21, 28-31) consists of 21 logs of various shapes and sizes. The seven short logs at the north end of the platform have been split in half lengthwise and display axe marks at both ends (Figs. 29-30). The next seven logs to the south are in the round, pointed at one end, and flattened at the other; four of them have a well-made notch near the pointed end (Figs. 21, 28, 31). These pointed logs average 16.4 cm in butt diameter (range 14-18 cm), and 362 cm in length (range 333-370). The notches are 12 cm to 13 cm wide. The pointed ends and notching have nothing to do with the construction of the platform. These features and the uniformity of dimensions suggests that the logs were salvaged from some other structure, possibly a picketing of some kind. Apparently there was a high fence nearby at the south boundary of the Military Reserve; perhaps the logs came from there. The next seven logs are split lengthwise; three are placed with their flat sides upwards. All seven have roughly chopped ends. These logs average 349 cm in length (range 376-424 cm), 21 cm in width (range 19-23 cm) and 11 cm in thickness (range 11-13 cm). The log platform continues southward beyond the excavation limits.

Finally the log platforms were loaded with rock fill to produce a more or less level surface (Figs. 16-18, 28-29, 32). The thickness of fill varied from about 20 cm to 45 cm, according to the irregularities and slope

of the underlying platforms. At the western edge of the structure the fill and log platform formed a layer nearly 50 cm thick above the top of the squared timber. The fill consists primarily of large stones (Figs. 28, 32). Measurements were taken of 13 of them to give an idea of their size: average length, 20.3 cm (range 14-28 cm), average width, 14.2 cm (range 8-20 cm), and average thickness, 11.9 cm (range, 6-18 cm). Fragments of brick were found among the stones, but only very occasionally. Some lumps of mortar were also found, thus suggesting that some of the stones had been mortared together, but the quantities of mortar were so small that it could not be considered a significant factor in the fill.

After completion of the structure, river sediments buried it. Stratum 1 formed around it and filled all the spaces between the rock fill. Strata 2, 3 and 4 successively buried the structure.

Identification

The above described structure may be part of a wharf head or pier head of one of the three military wharves known to have been constructed at the site from 1797 to 1843. The structure, judging by its position in relation to the surviving commissariat office (Fig. 2), is in the approximate location of a military wharf depicted in post War of 1812 plans, as outlined in the section on historical background. This location also appears to approximate that of the pre-war wharf. The above described materials and their dimensions compare well with those listed for the 1797 wharf and for the commissariat wharf rebuilt in 1843. While the historical lists give fairly specific dimensions, one must expect a wide range of variation in dimensions of hand-hewn materials used in a rough structure such as a dock,

where consistency of dimensions is not as critical as, for example, in a house. The only description of a pier head is for the commissariat wharf rebuilt in 1843. The pier head, 50 ft. [15.2 m] long and 27 ft. [8.2 m] wide, was built of oak timbers and loaded with stone. The materials correspond to those of our structure, but the dimensions and width-length orientation are problematic. Assuming (1) that the length extended into the river, and (2) that the river bank was at or near the remains of the concrete retaining wall uncovered to the east of the excavation (Fig. 2), and (3) that the structure somehow continues eastward that far, then there is good correspondence for the length dimension. However, so many tenuous assumptions make such an inference extremely weak. Furthermore, we do not know how far southward the structure extended. The southernmost beam noted by Grenier (Fig. 1) is a further 4 metres beyond what we recorded, and there may be more of the structure beyond that.

In addition to the problem of dimensions there are two structural qualities which seem peculiar to a pier head. The structure is, in effect, a large sloping platform that was always underwater. It is curious that no evidence was present for broken or removed upright members. Even though pier heads may be largely underwater, they are not built as sloping platforms, and they do support a considerable superstructure. In view of all these considerations, one should regard the identification of the structure as a wharf head or pier head as very tentative.

Feature No. 2

Feature No. 2, in the northwest corner of the excavation (Fig. 19), is incomplete, and was likely partly removed and disarticulated by the dredge

and/or previous construction in the area. The feature consists of an angled white oak timber and the broken stubs of a group of three angled white oak planks anchored under rocks (Figs. 23, 25, 33).

The timber projects from the river bed at an angle of approximately 20 degrees. Like the timbers in the crib structure, this one was also hand-hewn, which made it difficult to determine whether the raised end was left unfinished or had been broken previously and then smoothed by erosion. The timber, 29 cm wide by 23 cm thick and more than 2.67 m long, continues for an unknown depth into the river bed. The timber is oriented north-south and parallel to the river bank.

The group of three plank stubs are set side by side, sloping to the northwest, but lengthwise they project at a slight angle upwards to the southeast. The ends of all three have been clearly broken off. All three are 8 cm thick; two are 29 cm wide, while the third is about 45 cm wide. The other ends of the planks are weighted under boulders and other large rocks.

About 50 cm east of the planks is an isolated section of white oak plank with sawed ends. It measures 110 cm long by 26.5 cm wide by 7.5 cm thick. Near its south end is a drilled hole 4 cm in diameter filled with a peg of commercial red oak (Quercus sp., Erythrobalanus group). It is not clear if this plank was originally associated with the stubs, or if it came from some unrelated structure.

Feature No. 2 is related in some way to Feature No. 1. Both are built on Stratum 1. The planks and timber of Feature No. 2 are hand-hewn and have dimensions similar to those in the larger structure. The timber of Feature No. 2 is oriented north-south, similar to the large timber

forming the west side of the crib structure. Just how the two features were related, however, is not apparent. Possibly the dredge removed other interconnecting members.

Feature No. 3

This feature in the northeast corner of the excavation (Fig. 13) appears to be an incomplete portion of a much larger structure of which no other trace is present.

The feature is two parallel white oak planks sloped toward the river at approximately 25 degrees (Figs. 25, 34, 35). The upper ends of the planks have been broken off, while the lower ends are sawed square. The north plank measures 200 cm long by 47 cm wide by 7.5 cm thick. The south plank is 125 cm long by 39.5 cm wide by 6 cm thick. Both planks are fixed 28.5 cm apart to an incomplete sleeper 10 cm wide by 10 cm thick. The south plank is secured by four spikes. How the north plank is fastened is not apparent. The north plank also has under it the remains of two small scraps of wood which are not fixed to it, but may have served as some kind of support. East of the planks and virtually under them is a small pit filled with sawdust. A partly buried board lies directly above the sawdust. The board may have once been part of the plank structure, but this cannot be determined.

The feature is difficult to identify because so little of it remains. If more planks and sleepers were present, it would be reminiscent of a ramp for loading cargo into boats. The planks and sleeper rest on Stratum 2, which indicates that they were assembled later than the crib structure and Feature No. 2, possibly at the turn of the century or in the early decades of the 20th century.

Feature No. 4: Crate Lid and Fragmentary Box

A wooden packing crate lid and an associated fragmentary wooden box, together with numerous fragments of unsmoked clay pipes were found near the northwest corner of the crib structure (Fig. 25). The edge of the crate was also observed prior to excavation (Fig. 6). The position of this feature corresponds to the location of the artifact concentration recorded by Grenier (Fig. 1).

The packing crate lid, 115 cm by 115 cm, was exposed near the top of Stratum 1 (Figs. 36-38). Abutting the southeast corner of the lid is a fragmentary wooden box consisting of a bottom board and adjoining side board, as well as a few scraps of wood. The remains of this long box rest in Stratum 1, but were buried by Stratum 2 (Fig. 16). Numerous fragments of unsmoked clay pipes were found associated with the box and lid. They appear to have washed out from the area of the box and deposited on and around the lid. Some were washed out to the cofferdam trench. At the interface of Strata 1 and 2, 1.3 m directly east of the fragmentary box, was a large quantity of perfectly preserved straw packing material with many fragments of clay smoking pipes found throughout the straw and clay. The crate lid and a large sample of the straw were saved.

Concluding Remarks

This paper has described the excavation contexts and structures exposed at the King's Navy Yard site. In doing so, it has also raised some questions that could not be answered at this stage of research.

The very rough dating of strata based on certain artifacts observed in the field needs to be checked and refined through analysis of artifacts in the undisturbed excavation lots. This analysis should also help to answer another pertinent question: to what extent is superposition of artifacts through time present between strata in spite of what appears to be a relatively unstable river environment.

Finally, the identification and dating of what has been called the crib structure, remains inconclusive. The structure, though to be a wharf or pier head, is certainly in the approximate location of three military wharves known historically from 1797 to 1843. The crib structure appears to have been built of similar or the same materials as the historically recorded wharves. However, it is reasonable to assume that most waterfront facilities of a period would be built of the same or similar materials. The construction of a crib, loading with rocks, and articulating structures extending into the river all suggest the "pier head" described in 1844. However, it is curious that the structure was entirely underwater, and that it had no apparent upright structural members. In effect, it appears to have been a large sloping platform extending underwater into river. This

would suggest the possibility of a ship's way or dry dock. The conundrum may be solved through further research into military dockyard installations and comparative structures.

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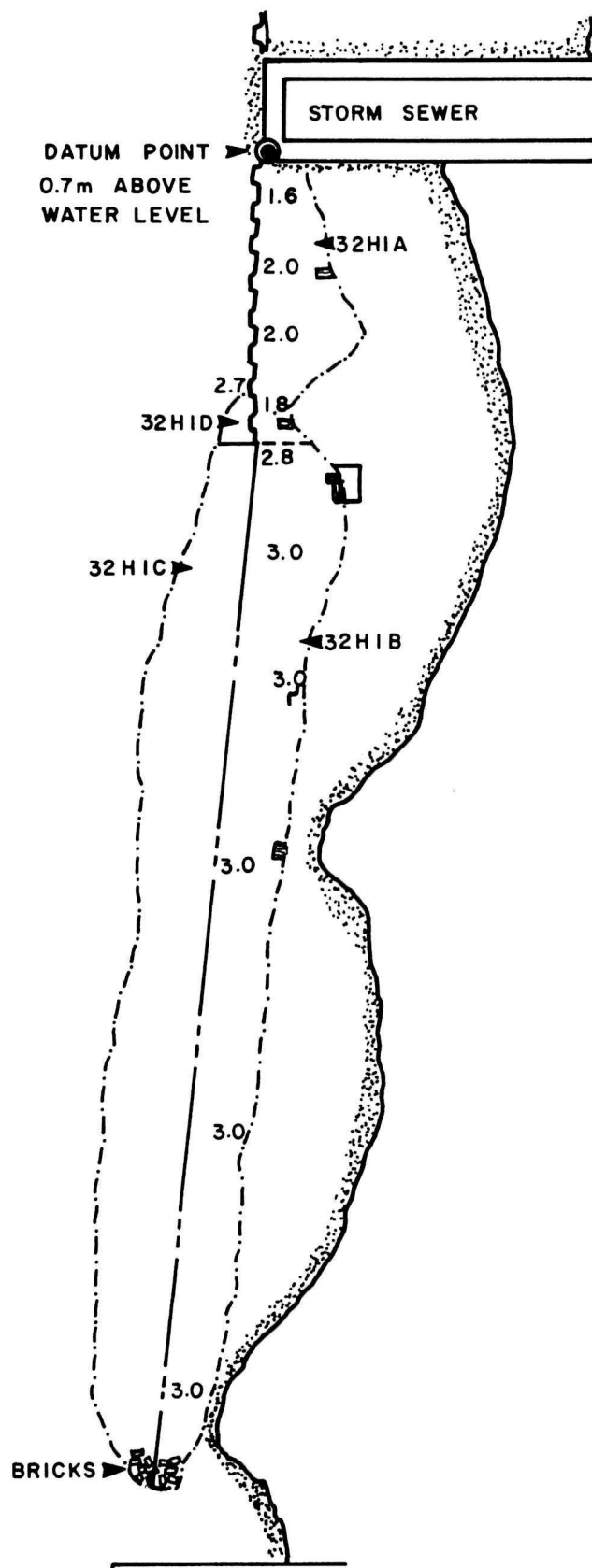
1926

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Illustrations

- 1 Underwater archaeological survey of King's Navy Yard site by Robert Grenier prior to salvage excavation. (Drawing by S. Epps.)

**SITE 32H
KING'S NAVY DOCK YARD
AMHERSTBURG
UNDERWATER SURVEY**

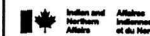
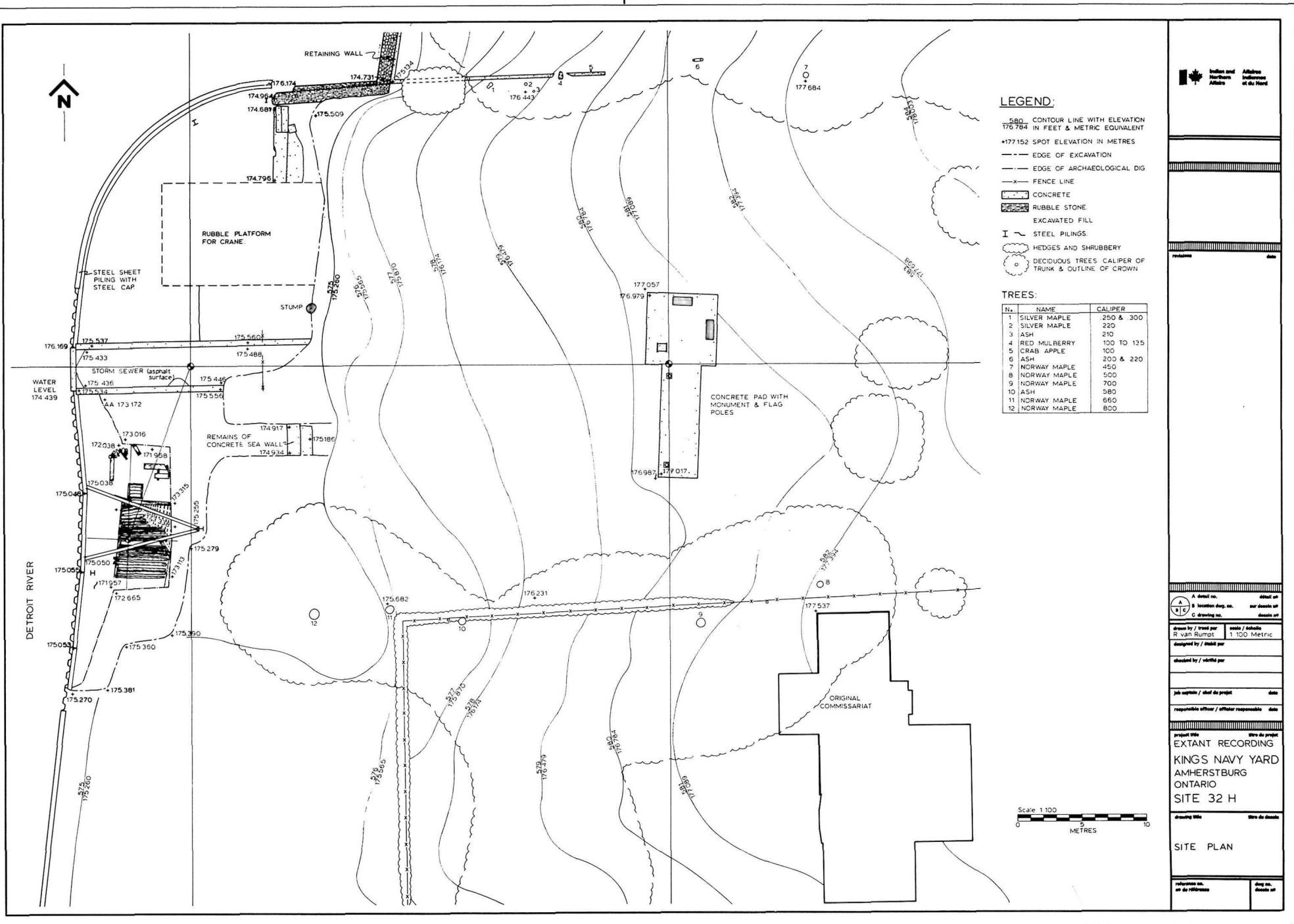


LEGEND

- TRENCH LIMIT
- SUB-OPERATION
- WOOD BEAMS
- ARTIFACT CONCENTRATION
- COFFER DAM
- 1.6 to 3.0 WATER DEPTH (m)



- 2 Plan of King's Navy Yard site and environs. The lot east of the excavation is the King's Navy Yard Park. The lot to the south of the park contains the original commissariat office of the former military reserve. The area between the steel piling retaining wall and the shallowly buried concrete retaining wall about 15 m east has since been reclaimed, and is now part of the waterfront park at Amherstburg. (Drawing by R. van Rumpt.)



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responsible officer / officier responsable date

project title titre du projet

EXTANT RECORDING
KINGS NAVY YARD
AMHERSTBURG
ONTARIO
SITE 32 H

drawing title titre du dessin

SITE PLAN

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- 3 Oak timbers removed by the dredge during excavation of the trench for the steel pilings of retaining wall. Scale: 50 cm.



- 4 One of several large piles of river deposits dredged from the cofferdam trench and moved to higher ground for artifact salvage. Crew members searching for artifacts excavate the pile with a high-pressure hose. In the foreground is rubble from an excavated and removed pile.



- 5 The King's Navy Yard site shortly after removal of water and before excavation, looking south from storm sewer conduit. The cofferdam is to the right and pumps in the upper right. The crane is moving into position a horizontal I-beam to brace the cofferdam. The water filled depression and sloping bank are part of the cofferdam trench, dredged to install the wall of steel pilings. Part of a buried structure protrudes from the bank in the centre right of photo. The layer of white sand landfill, Stratum 4, covers most of the relatively level area of the site. In the background is the construction site and mounds of white sand landfill.



- 6 West side of crib structure before excavation, looking southeast from base of cofferdam. The north end of the large horizontal oak timber that forms the west side of the crib is behind the stadia rod. Ends of logs resting on the timber project from the mud. The timber and corner of the crib were dislodged when the dredge removed attached horizontal timbers projecting at right angles into the river. To the extreme left is the edge of a packing crate lid with which numerous clay pipes were associated. In the foreground is the cofferdam trench. Slumped deposits along the base of the timber in the trench were removed as excavation lot 32H2B1. Scale: 50 cm.

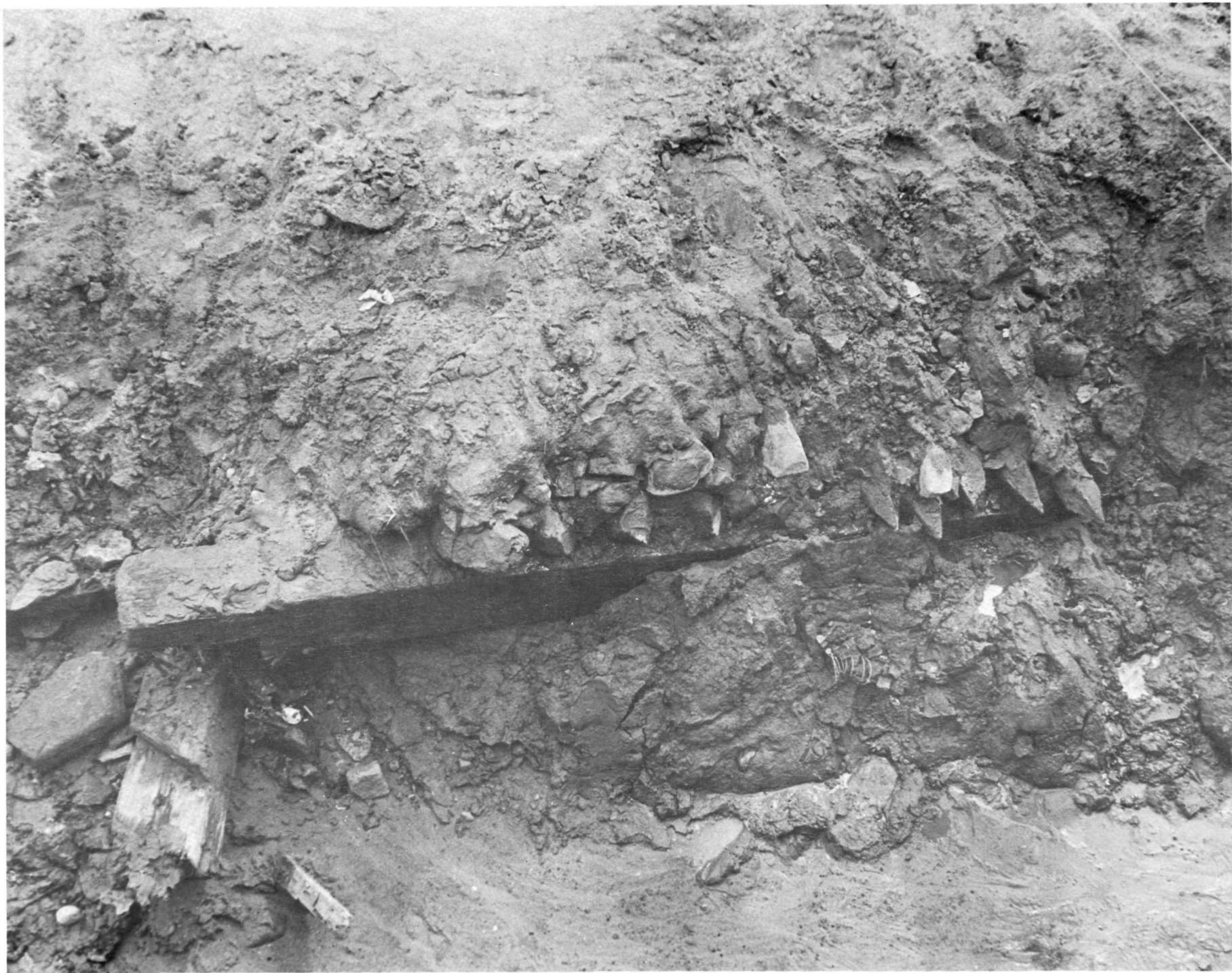


- 7 West side of crib structure before excavation, looking northeast from base of cofferdam. The north end of the large horizontal oak timber that forms the west side of the crib frame is behind the stadia rod. In the foreground is the cofferdam trench. Slumped material along the base of the timber in the cofferdam trench was removed as lot 32H2B1. Scale: 50 cm.



8 Detail of northwest corner of crib structure before excavation.

To the left are dislodged timbers which originally joined. Ends of logs forming a platform within the structure project from the mud. Looking east from top of cofferdam.



- 9 Removal by power shovel of white sand landfill overburden, Stratum 4, from north half of site. On the far left is the cofferdam trench. Protruding portions of the buried structure can be seen below the horizontal I-beam support. In the background is the concrete and steel storm sewer conduit at the north end of the site.



- 10 The north half of the site after removal by power shovel of the sterile white sand overburden, Stratum 4. A thin layer of this stratum remains to be removed manually. The dark patches are the underlying Stratum 3 exposed by the power shovel. Scale: 50 cm. Looking southeast from the storm sewer conduit.

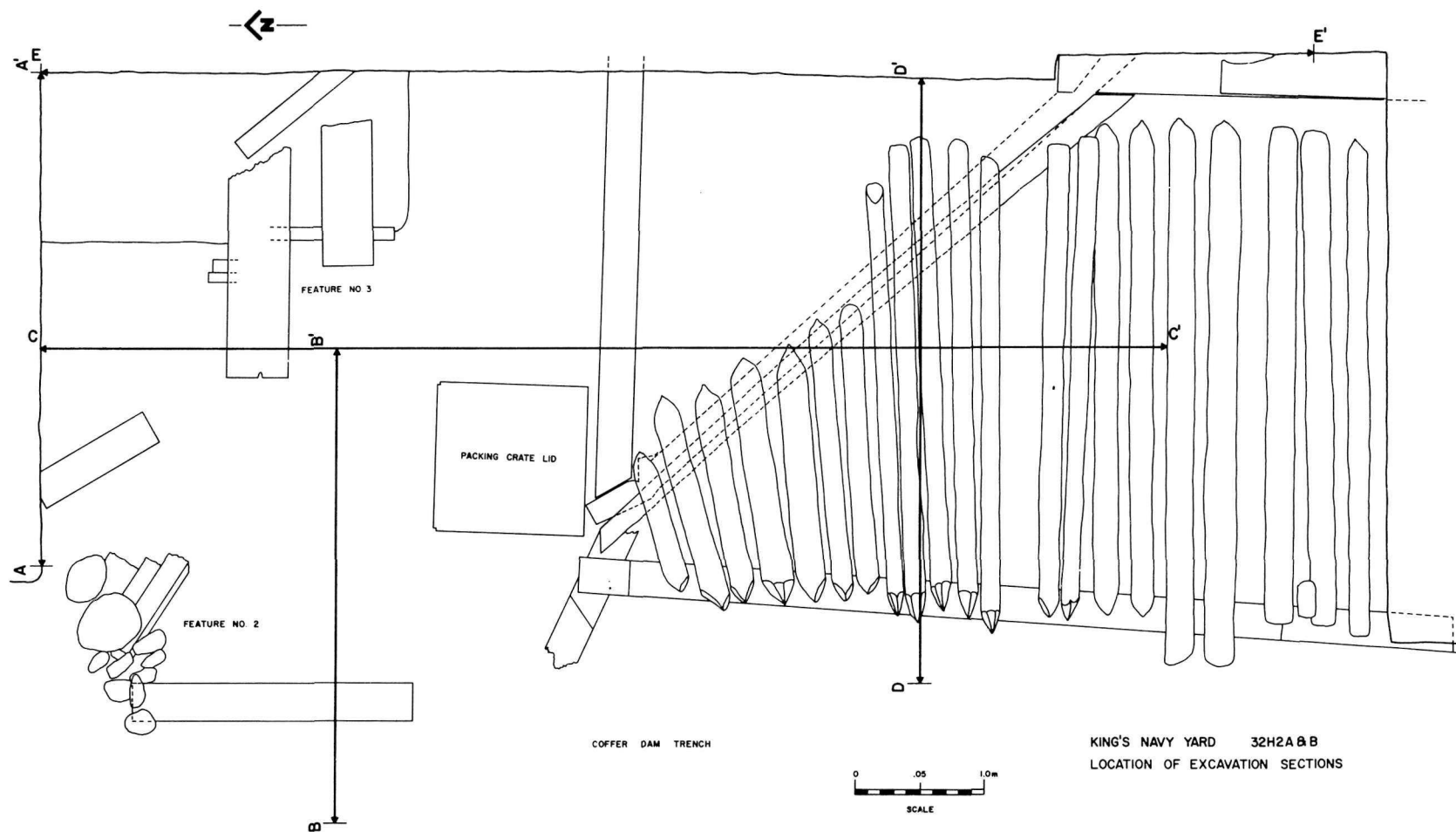


- 11 The south half of the site after removal by power shovel of the white sand fill overburden, Stratum 4. The original 50 cm thickness of Stratum 4 remains under the I-beam supports to be removed manually. The dark soil in centre of photo is underlying Stratum 3 and rubble that tumbled in from the sloping banks. A pool of ground water seepage has formed. Scale: 50 cm. Looking northeast from cofferdam at southwest corner of excavation.



- 12 Screening excavation lots from the archaeological excavation.
Material from only one excavation lot was shoveled onto a screen of $\frac{1}{4}$ -inch hardware cloth and hosed with water pumped from the nearby river. The plastic garbage cans in the foreground contain a mixture of water and fungicide for storage of perishable artifacts.

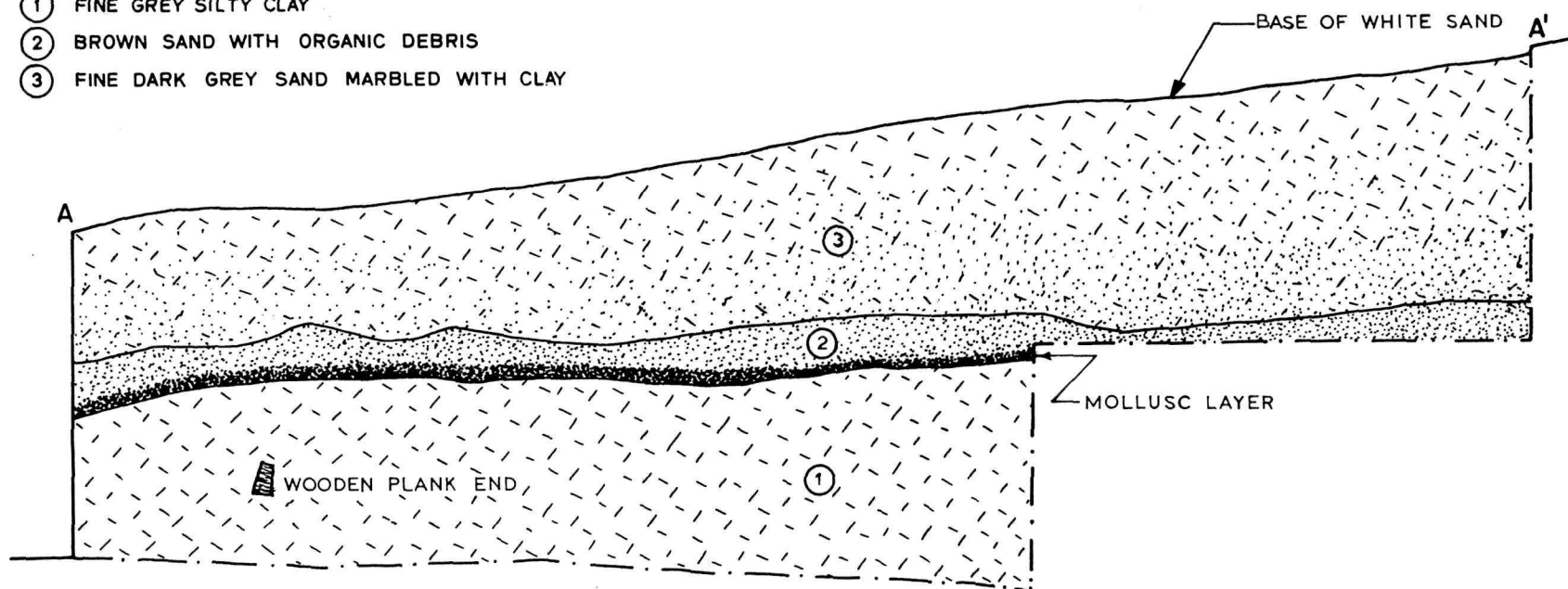




13 Plan showing location of excavation sections and features. (Drawing by Louise Davies.)

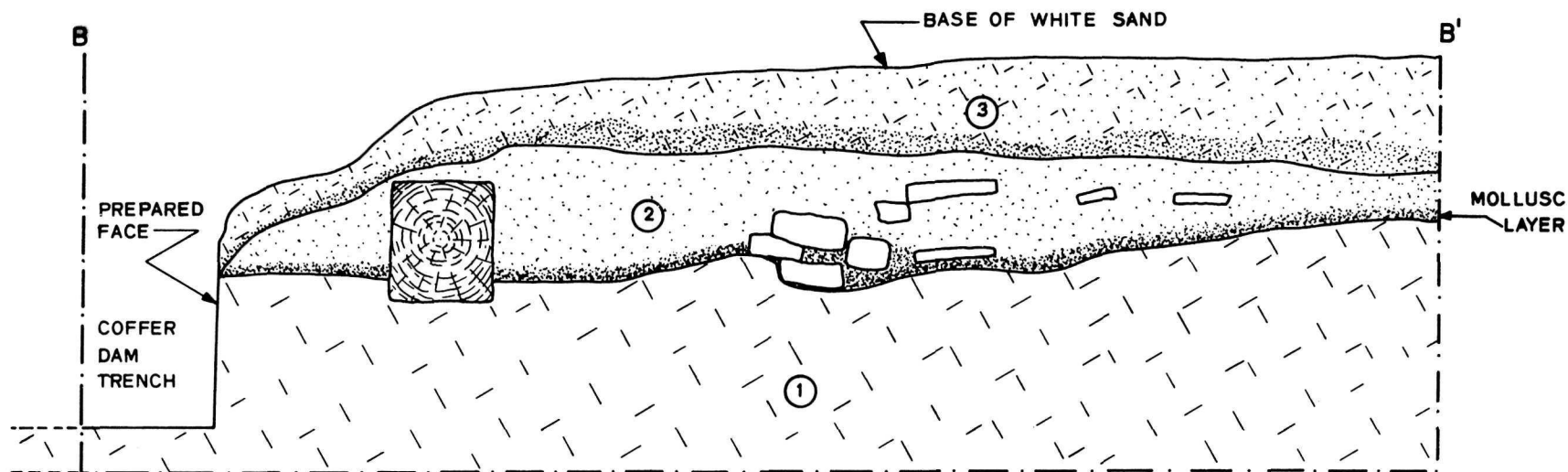
STRATIFICATION

- ① FINE GREY SILTY CLAY
- ② BROWN SAND WITH ORGANIC DEBRIS
- ③ FINE DARK GREY SAND MARBLED WITH CLAY



KING'S NAVY YARD 32H2A
PROFILE 'A' NORTH FACE

14 Section A-A¹, the north face of archaeological excavation unit 32H2A. (Drawing by P. Gerrard.)



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LEGEND

ROCK

LOG



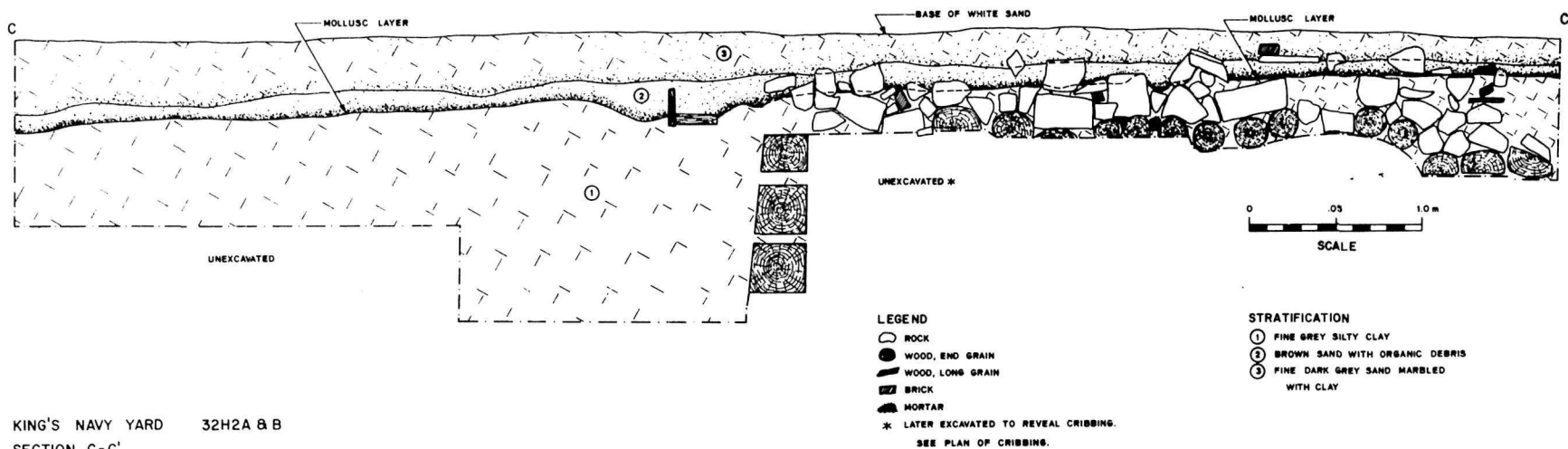
SCALE

STRATIFICATION

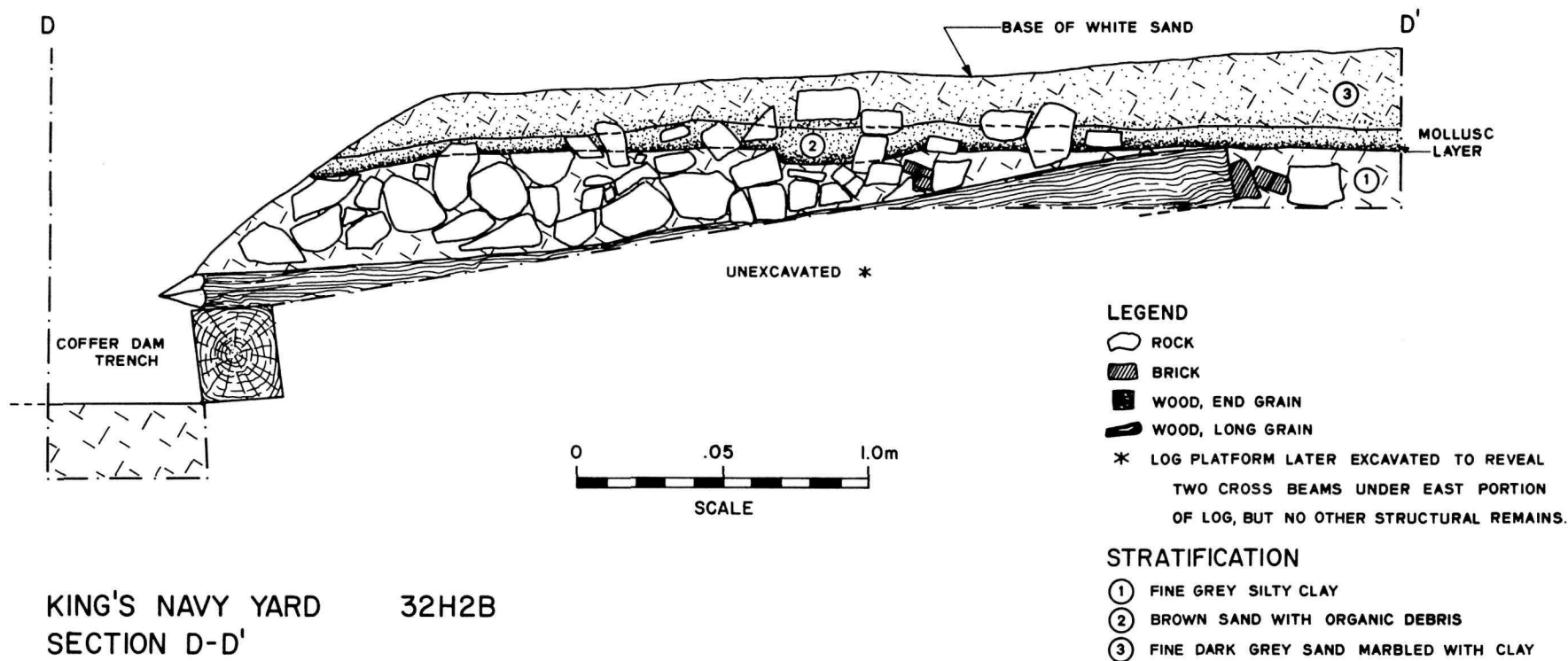
- ① FINE GREY SILTY CLAY
- ② BROWN SAND WITH ORGANIC DEBRIS
- ③ FINE DARK GREY SAND MARBLED WITH CLAY

KING'S NAVY YARD 32H2A
SECTION B-B'

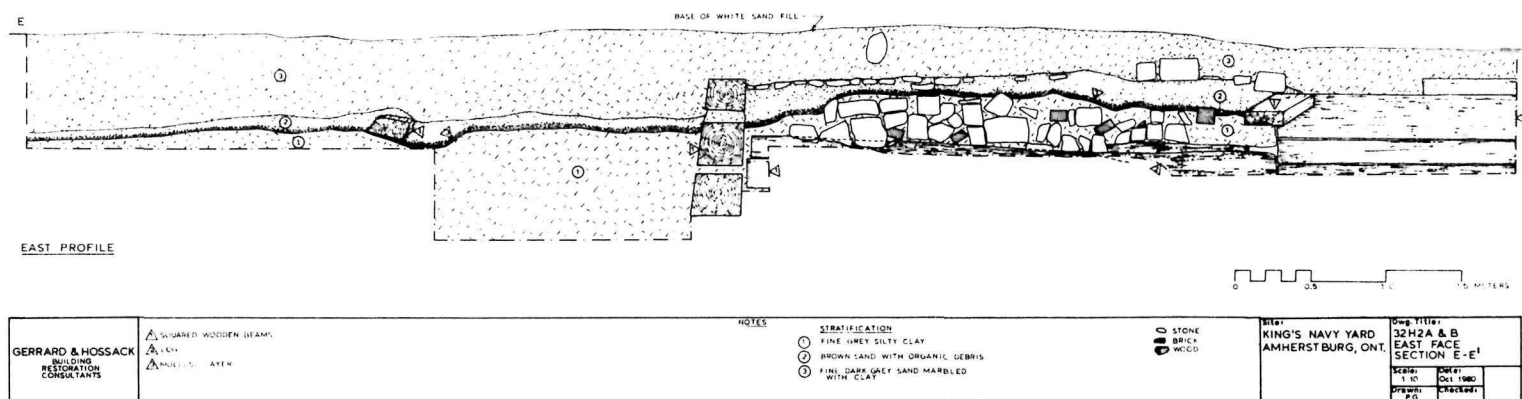
15 Section B-B¹ in excavation unit 32H2A. (Drawing by Louise Davies.)



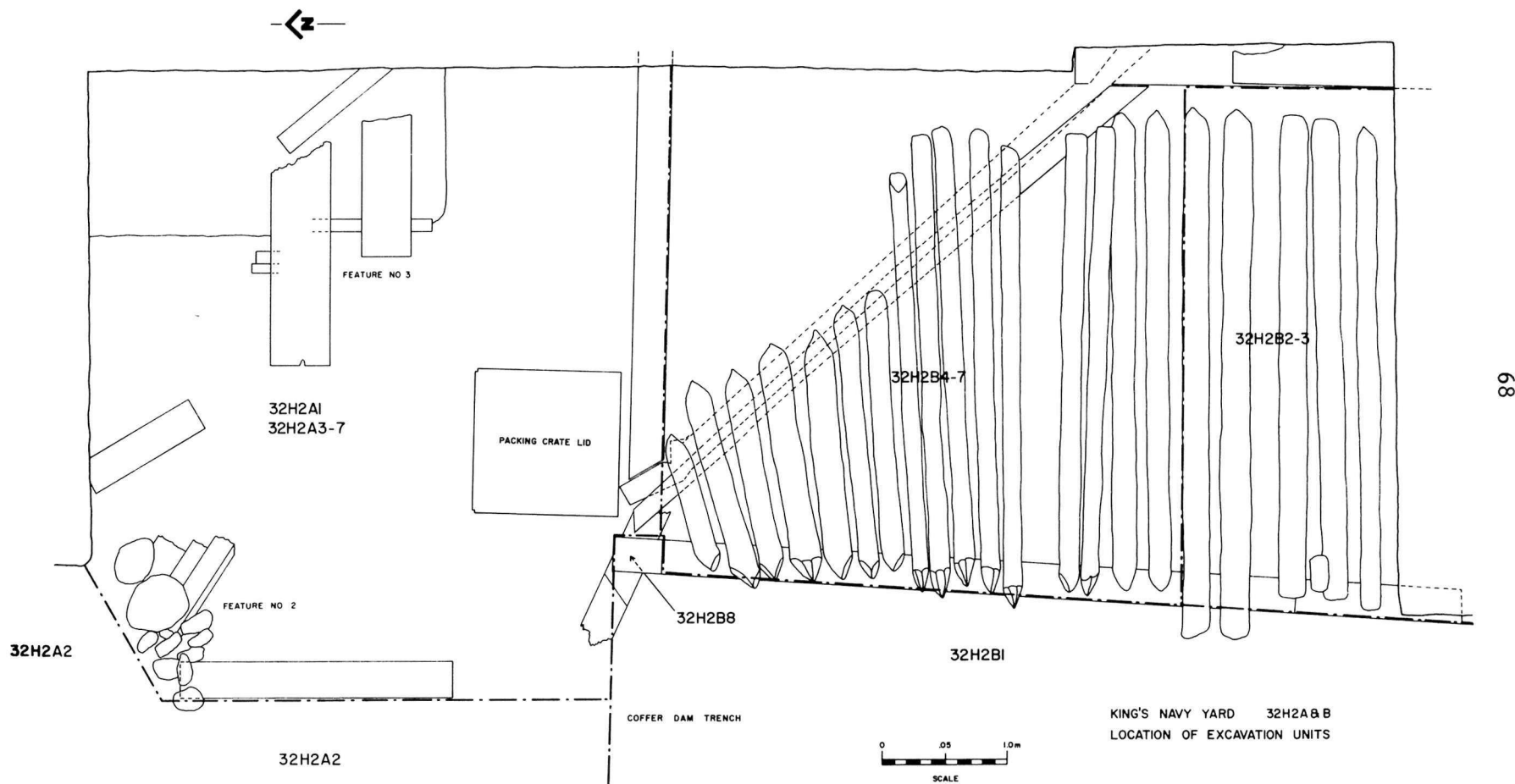
16 Section C-C¹, through excavation units 32H2A&B. The section shows the upper log platform and overlying rock fill of the crib structure in excavation unit 32H2B. (Drawing by Louise Davies.)



17 Section D-D¹, through excavation unit 32H2B. The upper log platform and overlying rock fill of the crib structure are shown. (Drawing by Louise Davies.)



18 Section E-E¹, the east face of archaeological excavation units 32H2A&B. (Drawing by P. Gerrard.)

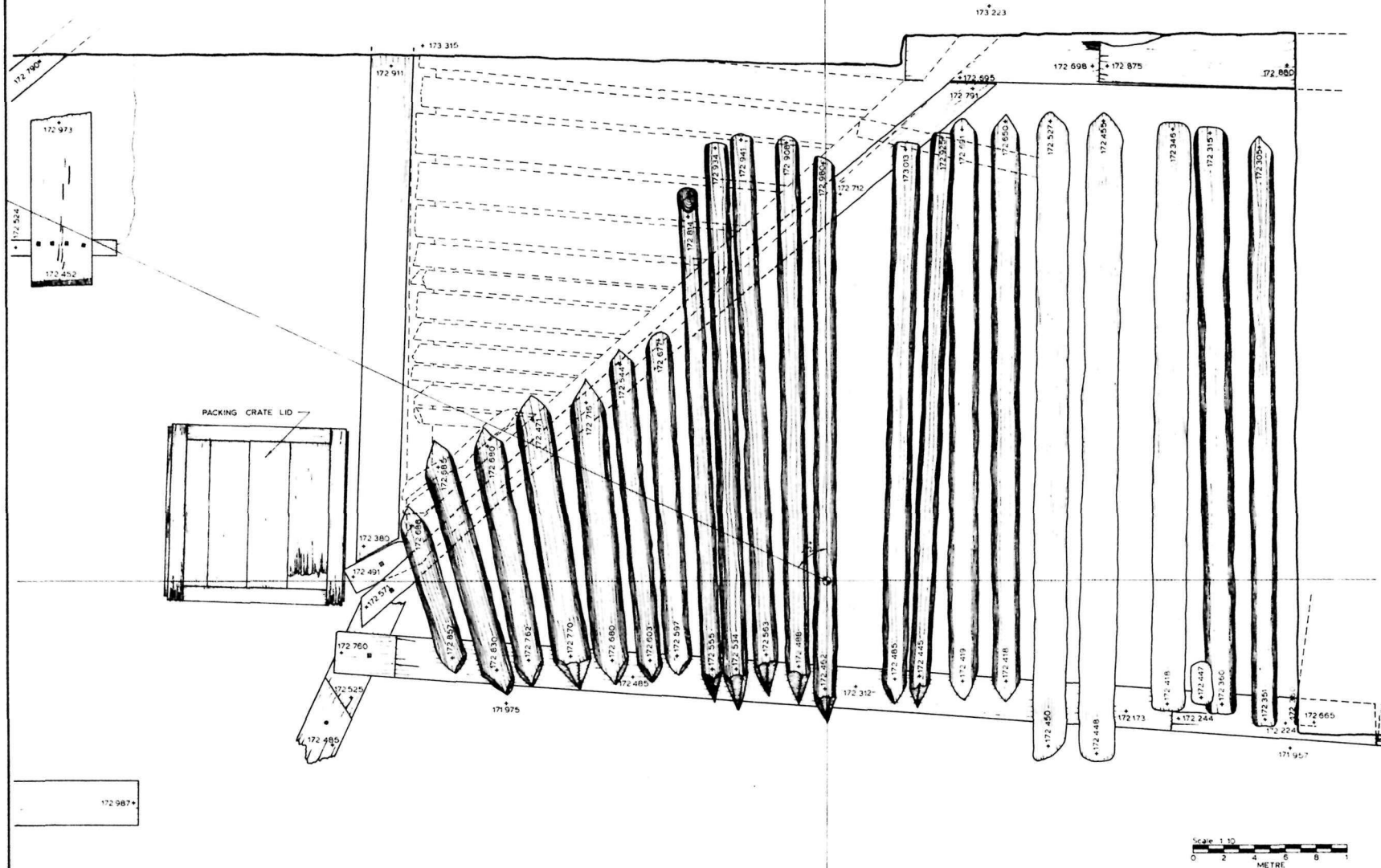
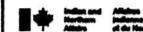


19 Plan showing locations of excavation units. (Drawing by Louise Davies.)

- 20 Excavation of unit 32H2B2, delineated by lines on ground. Slumped and disturbed material has been largely removed, and the workers are excavating Strata 2 and 3. Ground water continues to flow into the site on the water table, Stratum 1, forming a pool. Looking southeast from top of the cofferdam.



- 21 Plan of crib structure after removal of rock fill and Stratum 1. The broken lines indicate beams underneath or lower than the upper log platform shown here. (Also see Figure 25.) The structure extends beyond the excavation limits on the northeast, southeast and southwest corners. The northwest corner of the structure was broken and disarticulated by dredging of the cofferdam trench. The dredging also removed horizontal timbers which projected from the west side of the structure into the river. (Drawing by R. van Rumpt.)



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responsable office / officier responsable

project title titre du projet

EXTANT RECORDING

KING'S NAVY YARD

AMHERSTBURG

ONTARIO

SITE 32 H

drawing title titre du dessin

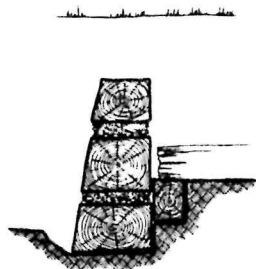
DOCK HEAD PLAN

reference no. ref. no.

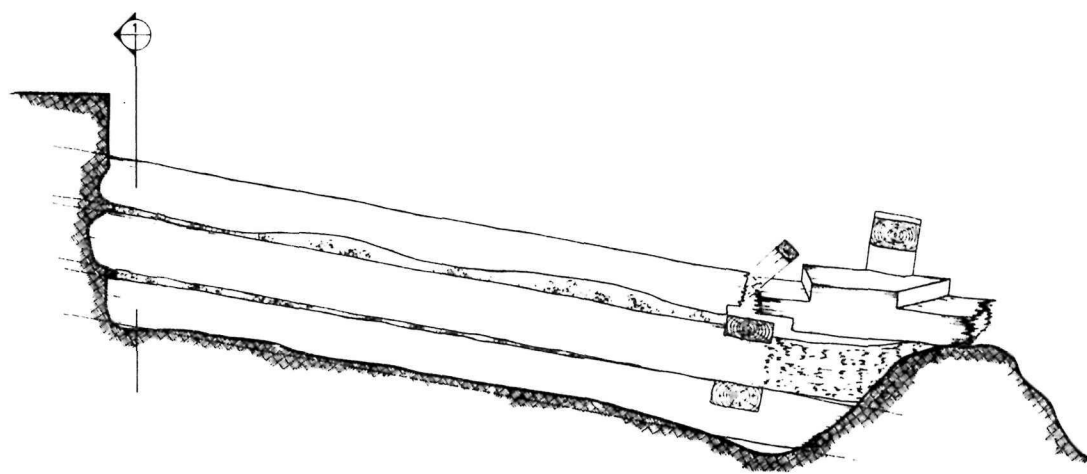
date de révision

22 West and north elevations of crib structure and section of north elevation, all with rock fill removed. The north elevation does not show the top cross-brace illustrated in Figure 21, as the elevation recordings were made after removal of the brace.

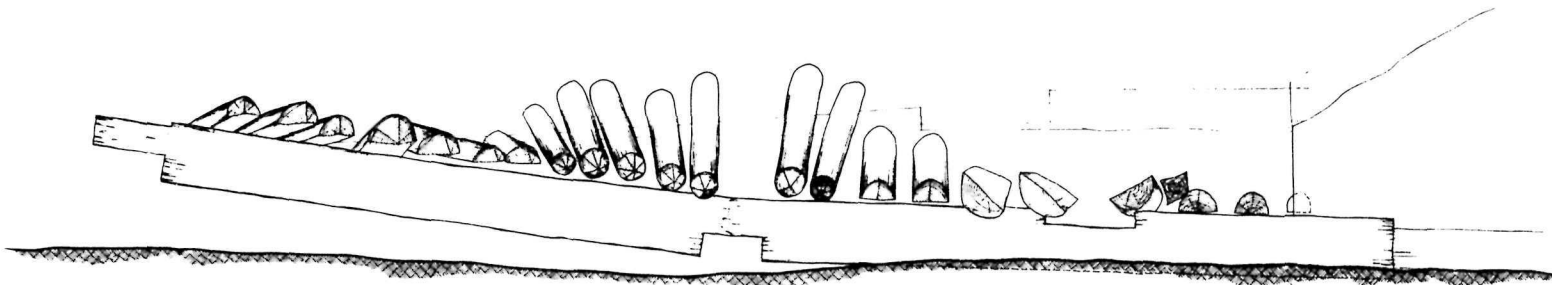
(Drawing by B. Prins.)



SECTION 



NORTH ELEVATION

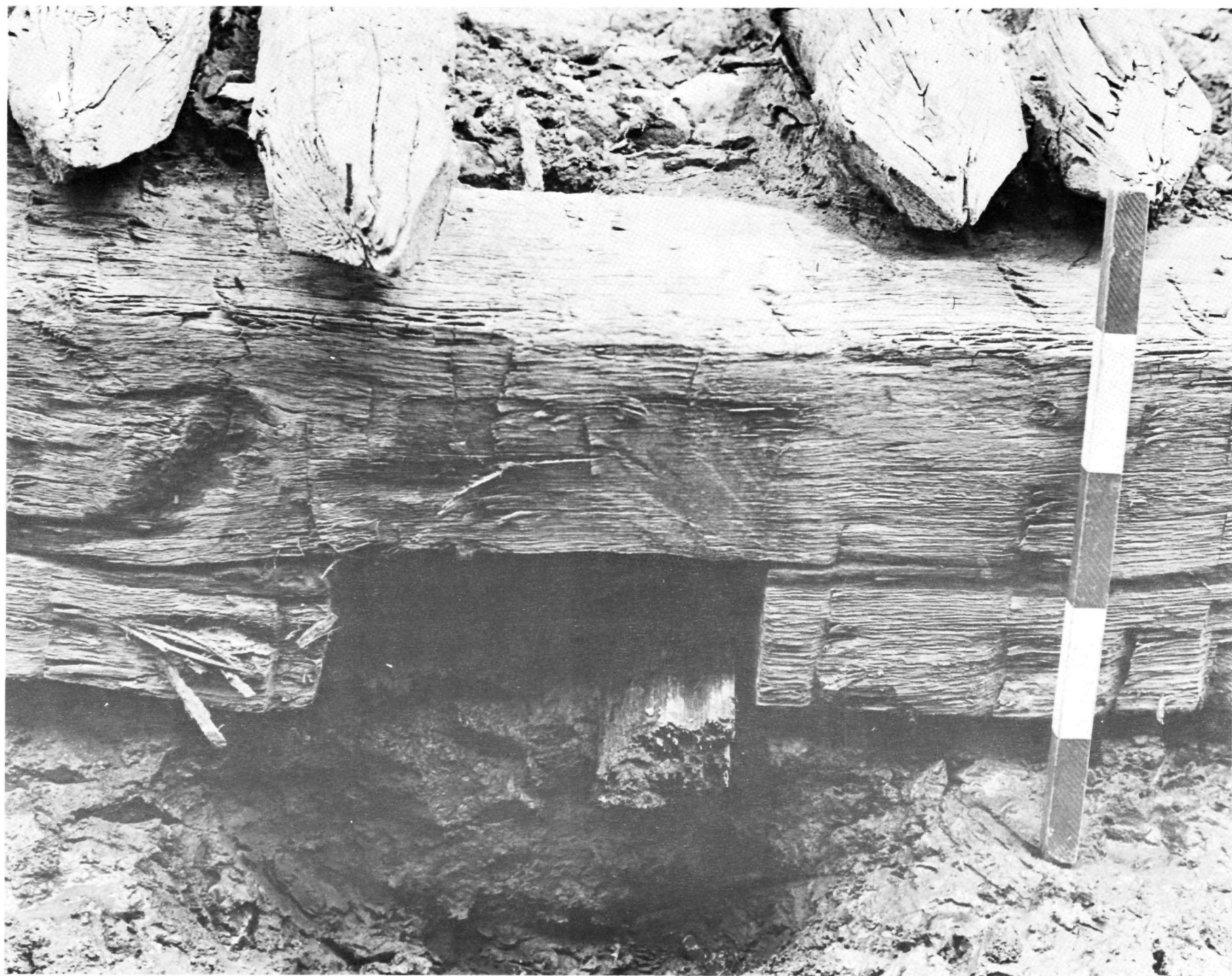


WEST ELEVATION



| | |
|--|--------------------------------|
| A. detail no. detail ref. B. location map, no. sur carte de ref. C. drawing no. dessin ref. | |
| drawn by / dessiné par B. P. P. P. | scale / échelle 1:10 Metric |
| designed by / conçu par checked by / vérifié par | |
| job number / numéro du projet responsible officer / officier responsable date | |
| project title titre du projet EXTANT RECORDING KING'S NAVY YARD AMHERSTBURG ONTARIO SITE 32 H | |
| drawing title titre du dessin DOCK HEAD NORTH AND WEST ELEVATIONS | |
| information on ref. de référence | drawing no. dessin ref. |

- 23 A dado joint in the middle of the oak timber on the west elevation of the crib structure. The joint measures 32 cm wide by 14 cm thick by 26 cm deep. It accommodated a squared beam that projected at a right angle into the river. The beam was ripped out by the dredge. A fragment of the beam can still be seen in place. Scale: 10 cm.



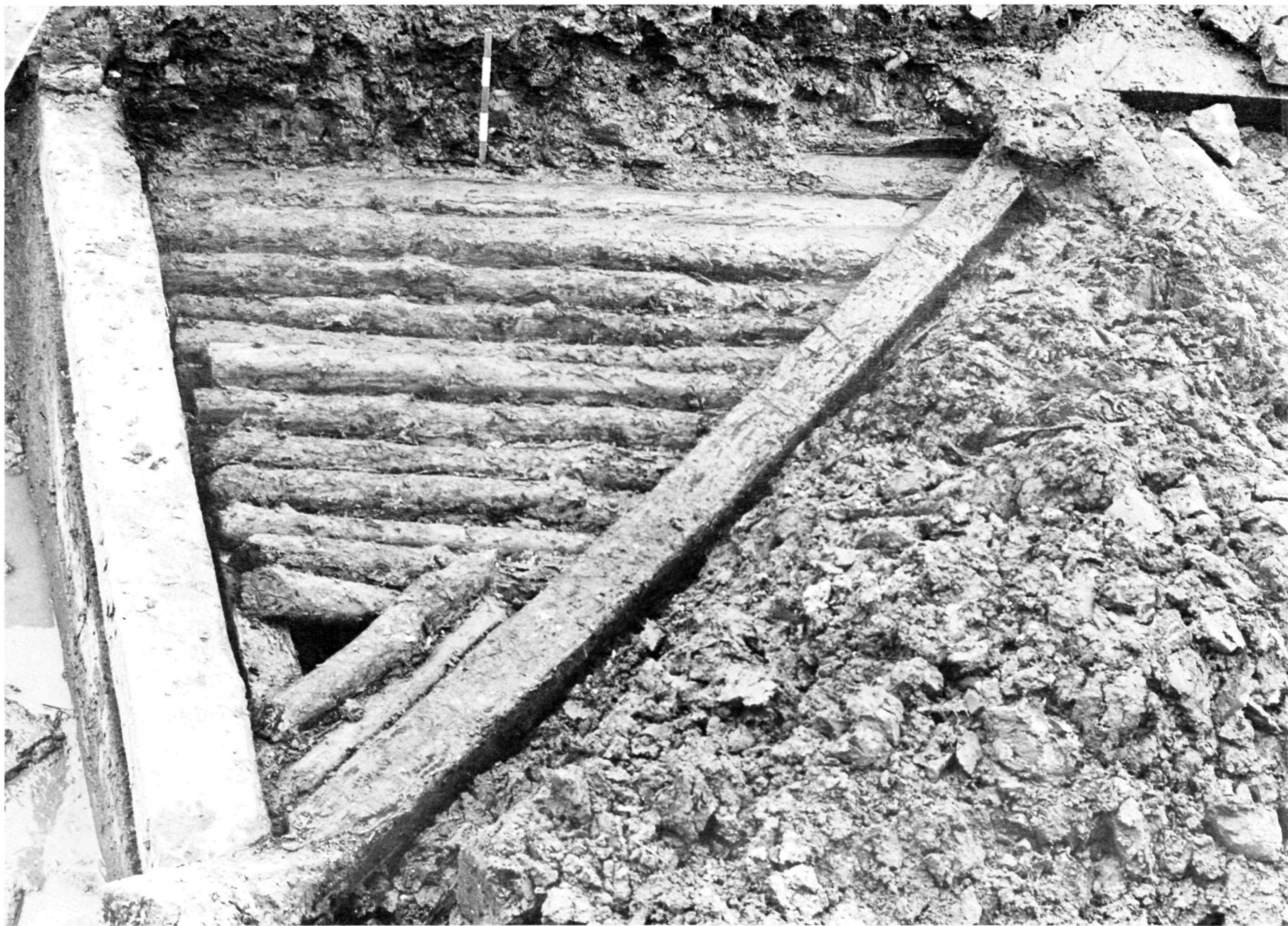
- 24 North elevation of crib structure, looking southeast. The largely exposed sloping north wall of three superimposed white oak timbers is in the centre of the photo. The lower log platform remains buried under the stone fill and Stratum 1 behind the timber wall. The upper log platform has been completely exposed. The slight "undulation" of the platform is due to dislocation by the dredge. Beyond the log platform is the rock fill and clay deposits that covered the platform. In the foreground is Feature No. 2.



- 25 Plan of crib structure showing lower log platform and timbers, indicated by broken lines in Figure 21. In the northwest corner of the plan is the broken Feature No. 2, probably associated in some way with the crib structure. In the northeast corner of the plan is Feature No. 3, a broken structure of sloping oak planks probably not associated with the crib. (Drawing by R. van Rumpt.)



- 26 Lower log platform of crib structure, looking east, after removal of rock fill shown in Figures 24 and 29. The north ends of the logs rest on a small squared beam, part of which can be seen in the lower left of photo. The south ends of the logs are fixed between the diagonal cross-brace visible in the photo and another cross-brance beneath it. The ends of the diagonal cross-braces are set in joints in the massive timbers of the north and east sides of the crib frame. Owing to the continually inflowing muddy ground water and receptacle-like nature of the structure the logs could not be washed for photography, as there was no way of readily draining the water from this part of the structure. Scale: 20 cm



- 27 Detail of dovetail-dado joint which secures the third diagonal cross-brace to east wall of crib. The cross-brace holds down the south ends of the lower log platform. Resting on the cross-brace is a small squared beam which supports the east ends of the southern nine exposed logs of the upper platform. A cross-brace overlapping the one shown here, and covering the small squared beam has been removed. The continuing inflow of ground water over this feature made proper cleaning for photography impossible.
- Scale: 10 cm.



- 28 Looking northward at exposed upper log platform of crib structure after excavation of rock fill and overlying Strata 1 to 4. The platform is supported on the left or west side by the large north-south oriented oak timber. The east ends of the logs rest on a smaller diagonal beam running from the northwest corner of the structure to just south of the middle of the east side. The southeast end of this diagonal beam projects from under the logs at the extreme right. It overlies a much smaller beam, not visible, that supports the east ends of platform logs to the south. To the east and right of the short platform logs in the background is the surface of the stone fill mixed with Stratum 1, burying a lower log platform. In the foreground is stone fill and Stratum 1 removed from the exposed log platform. Scale: 20 cm.



- 29 Detail of northwest quadrant of crib structure showing exposed upper log platform after removal of rock fill and Strata 1 to 4. In the foreground is the surface of stone fill and Stratum 1 covering the lower log platform. Projecting at the far right from under the exposed log platform are the ends of two overlapping cross-braces which serve as sleepers for the platform. They run diagonally from the northwest corner of the crib to the middle of the east side of the excavation. Scale: 20 cm.



30 Short split logs from upper platform salvaged and stored at Fort
Malden National Historic Park. Scale: 20 cm. Dimensions (in cm)
of logs from top of photo to bottom:

| <u>Length</u> | <u>Width</u> | <u>Thickness</u> |
|---------------|--------------|------------------|
| 110 | 19 | 13 |
| 173 | 23 | 11 |
| 172 | 24 | 10 |
| 195 | 26 | 17 |
| 198 | 26 | 12 |
| 220 | 22 | 15 |
| 220 | 20 | 8 |

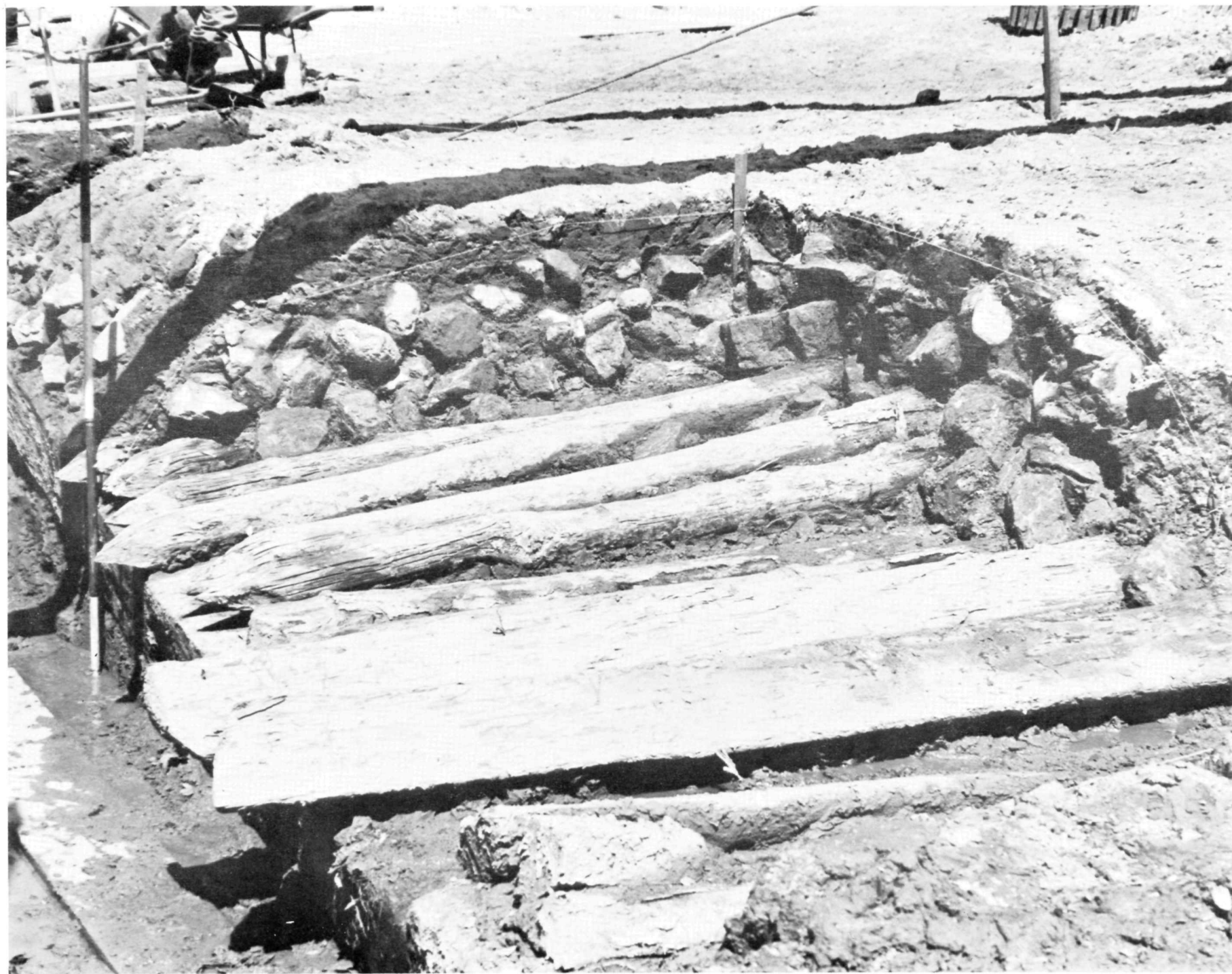


31 Pointed logs from upper platform salvaged and stored at Fort Malden National Historic Park. Scale: 20 cm. Dimensions (in cm) of logs from top of photograph to bottom:

| <u>Length</u> | <u>Butt Diameter</u> | <u>Butt to Notch</u> | <u>Notch Length</u> | <u>Notch Width</u> | <u>Notch Depth</u> |
|---------------|----------------------|----------------------|---------------------|--------------------|--------------------|
| 364 | 16 | 263 | 14 | 13 | 4 |
| 369 | 14 | 267 | 15 | 13 | 4 |
| 367 | 16 | 265 | 16 | 13 | 5 |
| 370 | 15 | 266 | 16.5 | 12 | 1 |
| 366 | 18 | | | | |
| 364 | 18 | | | | |
| 333 | 18 | | | | |



- 32 Southwest quadrant of crib structure excavated to show part of its construction. The log platform rests on the horizontal timber to the right and is loaded with large angular rocks. After construction Stratum 1 deposited among the rocks and covered the structure. Deposition was followed successively by Strata 2, 3, and 4. Scale 50 cm. Looking north.

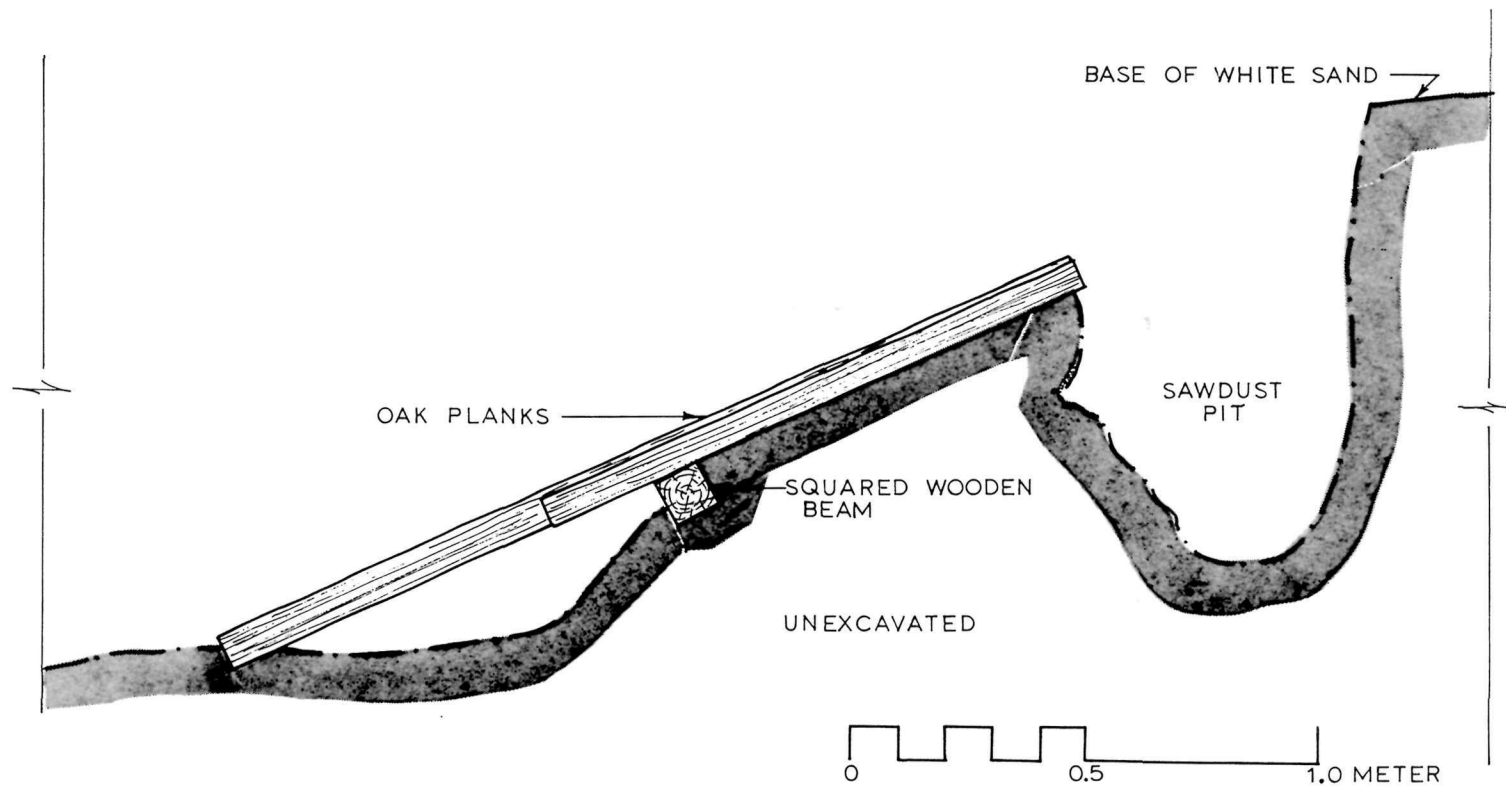


- 33 Feature No. 2, looking west. The feature consists of the large angled white oak timber projecting from the river bed, and, near the base, three angled plank stubs weighted with rocks. Pedestaled in the right foreground is an isolated section of plank that may have been related to this damaged feature. Scale: 20 cm.



- 34 Feature No. 3, looking east. Two parallel white oak planks are fixed to a sleeper and sloped toward the river. Directly behind them is an unattached board that may once have been part of this feature. The feature rests on Stratum 2, which is being washed away at its base by inflowing ground water. The small white flecks to the left of the left plank are some gastropods that have washed out of Stratum 2. Scale: 20 cm.





KING'S NAVY YARD 32H2A
FEATURE No.3 SOUTH ELEVATION

35 South elevation of Feature No. 3. (Drawing by P. Gerrard.)

36 Feature No. 4: packing crate lid, and behind it, box fragments and pieces of clay smoking pipes. Looking east. Scale: 50 cm.



37 Feature No. 4: packing crate lid and fragmentary box (on left) with associated clay pipe fragments. Looking south.



38 Feature No. 4: packing crate lid, fragmentary box and associated clay pipe fragments seen from above.



