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CENTER FOR MARITIME STUDIES AT THE UNIVERSITY OF HAIFA

Caesarea Maritima 1983–1984

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The CAHEP's 1983–1984 seasons (see Raban, 1981; 1983) took place between 15 May–1 July 1983 and 20 May–30 June 1984. As in previous seasons the project was headed by Avner Raban of the Center for Maritime Studies in the University of Haifa, in collaboration with Prof. R. L. Hohlfelder, Department of History, University of Colorado at Boulder (co-director); Prof. J. P. Oleson, Department of Classics, Victoria University, British Columbia (co-director), Prof. R. L. Vann, School of Architecture and the Center for Mediterranean Archaeology, University of Maryland at College Park; Dr S. Sidebotham of the Department of History, University of Delaware (Field Director at area I); A. Sherwood, Department of Classics Princeton University (UW survey); Y. Tur Kaspa, CMS, Haifa University (Field director at area Y and marine geomorphological survey); S. Breitstein, CMS (marine technology and chief diver). Other staff members were: Dr T. Hilliard, Macquaree University, NSW, Australia; Dr T. Griffith, Department of Physical Education, University of Maryland; S. Talaat and S. A. Giannetti of the School of Architecture, University of Maryland (Ass. Architects), H. Wadsworth and M. Little (photographers) and Eng. D. Friedman CMS, marine technician.

The seasons were sponsored by the four participating institutions and the Baron Rothschild's Caesarea Foundation, Mr Morris Hatter (London), the Social Science and Humanities Research Council of Canada, the National Endowment for the Humanities USA and the National Geographic Foundation.

The staff of 15 archaeologists, architects and technicians was assisted by over 200 diving volunteers from Israel, Canada, the USA, England, Australia, Italy, Peru and Japan. The main working areas for 1983–1984 seasons are shown in Fig. 1.

D2 (1984)
A continuation of 1982 section through the debris at the west side of the sunken entrance to the great harbour. The trench was widened, deepened and lengthened in order to try and find the original west side of the entrance and to determine its width. At the end of this season we are quite convinced that the width was 30–35 m, much like the width of the entrance to the Claudian harbour at Ostia. Such a width would increase the rate of siltage by incoming sand and would necessitate a considerable number of washing channels across the southern breakwater.

D3 (1984)
Some 30 m west of D2, on top of the debris layer of the NW breakwater, a trench was opened in order to try and discover what lay underneath. A 10 × 10 m trench was cut through the debris, next to a big conglomerated block. Under a layer of rubble that was laid as a cushion for the conglomerated blocks there were successive layers of sand and shingles, some 3 to 4 m thick. At the bottom of this accretion, at a depth of over 8 m below MSL some sherds of Late Hellenistic date were recovered. There is no doubt that the sandy layers were naturally deposited within 2–3 years, filling a

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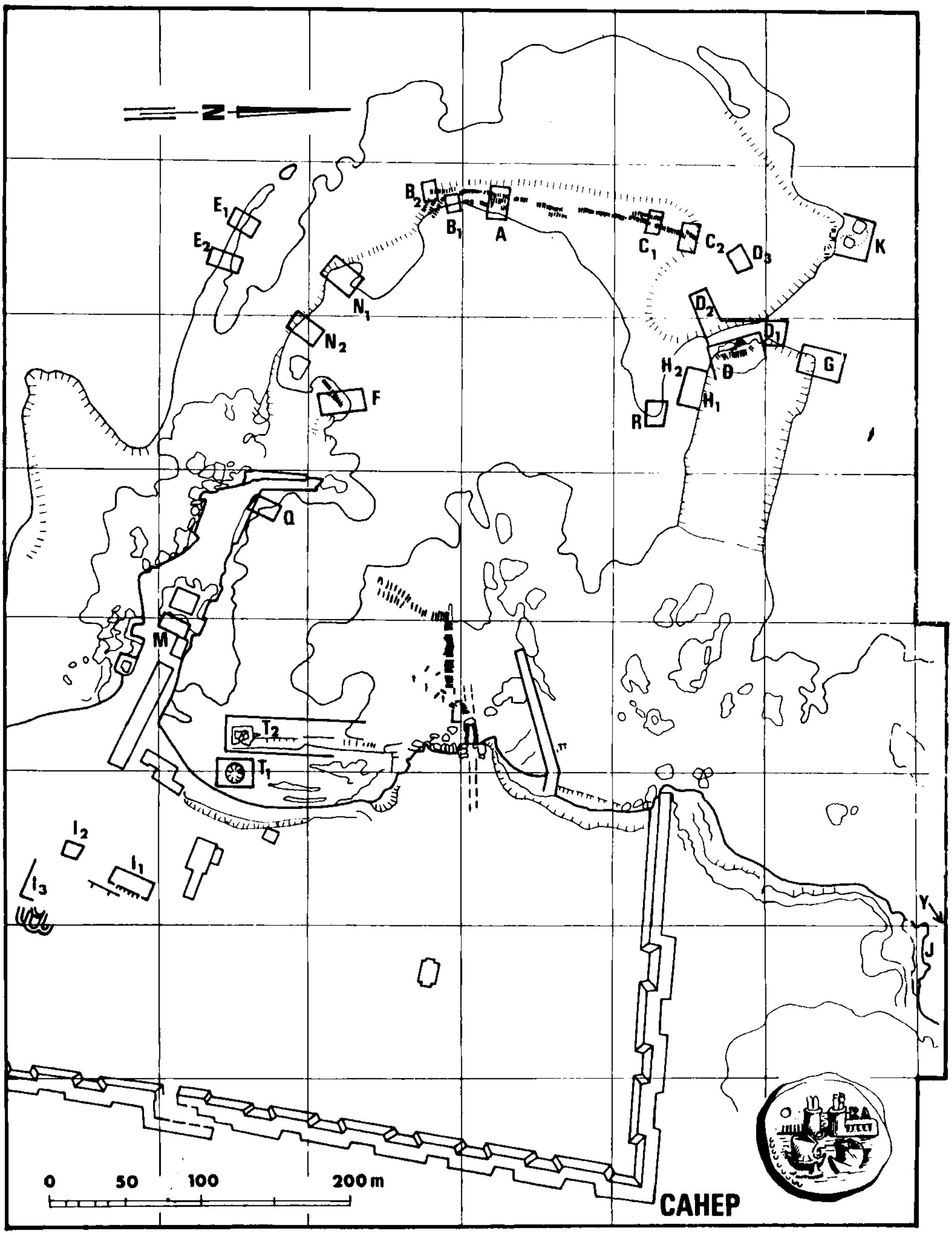


CAHEP 79 - A, F, T_1, T_2, Y.

CAHEP 80 - A, B_1, B_2, C_1, C_2, D, E_1.

CAHEP 81 - D, D_1, K, J.

CAHEP 82 - D_1, D_2, G, J.

CAHEP 83 - E_1, F, N_1, N_2, Q, I, Y, M.

CAHEP 84 - D_2, D_3, H_1, H_2, G, I_1, I_2, I_3, J, R, T_1.

Figure 1. General plan of CAHEP working areas.

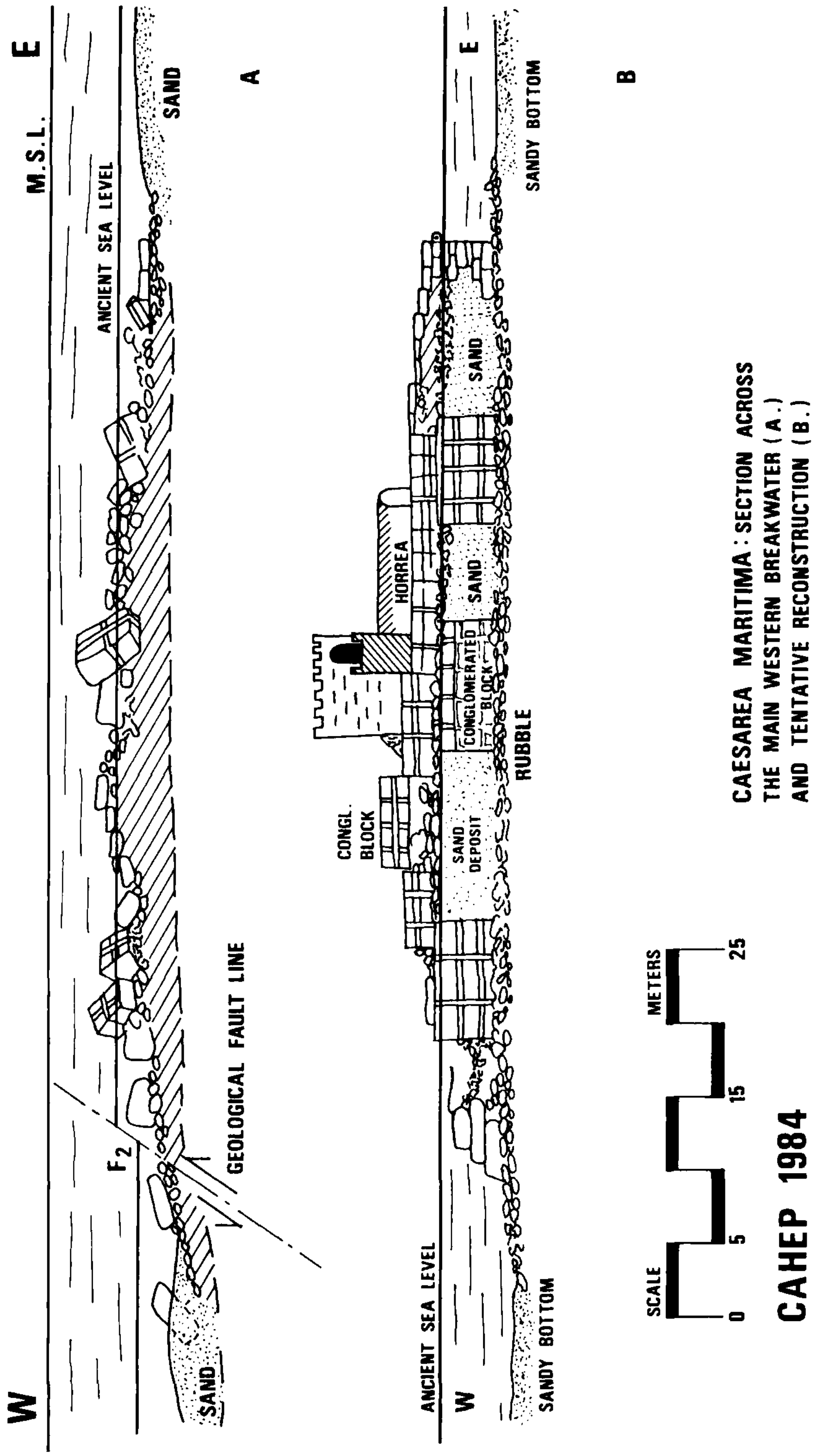


Figure 2. Typical E–W section across the western part of the main breakwater, at present (A) and tentative reconstruction (B).

hollow within side walls which reach just below the ancient sea level. Several thin interbedded layers of shingle and coarser sand would represent stormy seas with a higher wave energy. It is apparent that the hollow was artificially created by man-made side walls and it seems as if there are indications that, by using such a method of construction, Herod's harbour engineers utilized local natural processes for saving over half of the needed volume of building materials in establishing the submerged part of the main breakwater. Such an assumption might be the explanation of the existing topographic hollows along the western and southwest external sides of the main breakwater and the lack of building material debris in the gap between the foundation ashlar courses of the quay at the inner face of the great breakwater and its main core (Fig. 2).

A breakwater of a total width of 200 ft (60 m) may have been constructed by an arrangement of inner, outer and middle walls, established on a gravel paving with a series of connecting cross walls, which would create a set of hollows, some 50 x 100 ft (15 x 30 m) each. Within a few years those hollows would be silted up by wave carried sand, providing that the partition walls were built at a height of just below the water level. The silted cells would then be covered and sealed by a platform, artificially laid with rubble, that could be used as a base for the upper structures of the breakwater, such as the quay, the promenade, the storage magazines, the towers and the sea wall. It seems as if the tectonic fracture, that caused the submergence of the harbour, enabled the waves' suction effect to empty those cells and to establish the present layout of the remains of the breakwater (and see Neev *et al.*, 1978: 60f).

Area H (1984)

Two 6 in airlifts were operated along the south (inner) face of the north breakwater in order to try and find out whether there was an ashlar mooring quay along this side, as is the case along the main breakwater. It seems as if the inner half of the north breakwater had been covered by an additional rampart made of rubble. The excavations revealed that this addition was laid a long time after the original constructions were in ruins. Broken pottery vessels, well eroded by the waves and dated to the Roman and early Byzantine periods, were found embedded on top of the buried structure of the original breakwater and below the rampart. A large quantity of clay vessels was exposed along the foot of the breakwater, creating a thick layer above the ancient sea bottom. The repertory of pottery represents a large variety of provenance and illustrates the scale of sea-borne trade that went through the harbour of Caesarea during the earlier Roman era. This repertory differs from contemporary ones from other Levantine sites by originating mainly in the Mid and Western Mediterranean. Household vessels, fine ware and commercial amphoras have their best parallels in archaeological sites in Italy, South France and even Spain. In sorting out this repertory, one gets the impression that there are almost no types that should be dated to the 4th–5th centuries AD. It is therefore quite likely that the harbour ceased functioning before the beginning of the Byzantine period. The rampart made of rubble, on top of the breakwater, blocks most of the original harbour's entrance and it is to be found along the north part of the main breakwater, west of the entrance. Being post 5th century AD the rampart might well be part of the Byzantine Caesar Anastasius's effort to repair the Sebastos already in ruins (Migne, P. G., 87, 3: 2817; see also Fig. 3).

A special survey was carried out along the upper sections of the submerged breakwaters, while looking for relics of wrecked cargos. The idea is that being wrecked on top of a breakwater would indicate a stage when the main features of the harbour were already submerged below the waves. As many as 17 such wreckage sites were located, most of them on top of the south western segment of the main breakwater. All these wreckage sites contain a heap of ballast stones, mostly of basalt rock, and sherds of amphoras which are encrusted in the debris (Fig. 4). Several types could be dated to the 4th century AD and others to the 5th. It is therefore clear that around 300 AD the Herodian harbour was already destroyed and had subsided to such an extent that most of its main breakwater could not be seen above the surface of the water.

During the 1983–1984 seasons, a section survey was completed. Over 20 cross-sections of the entire length and width of both breakwaters

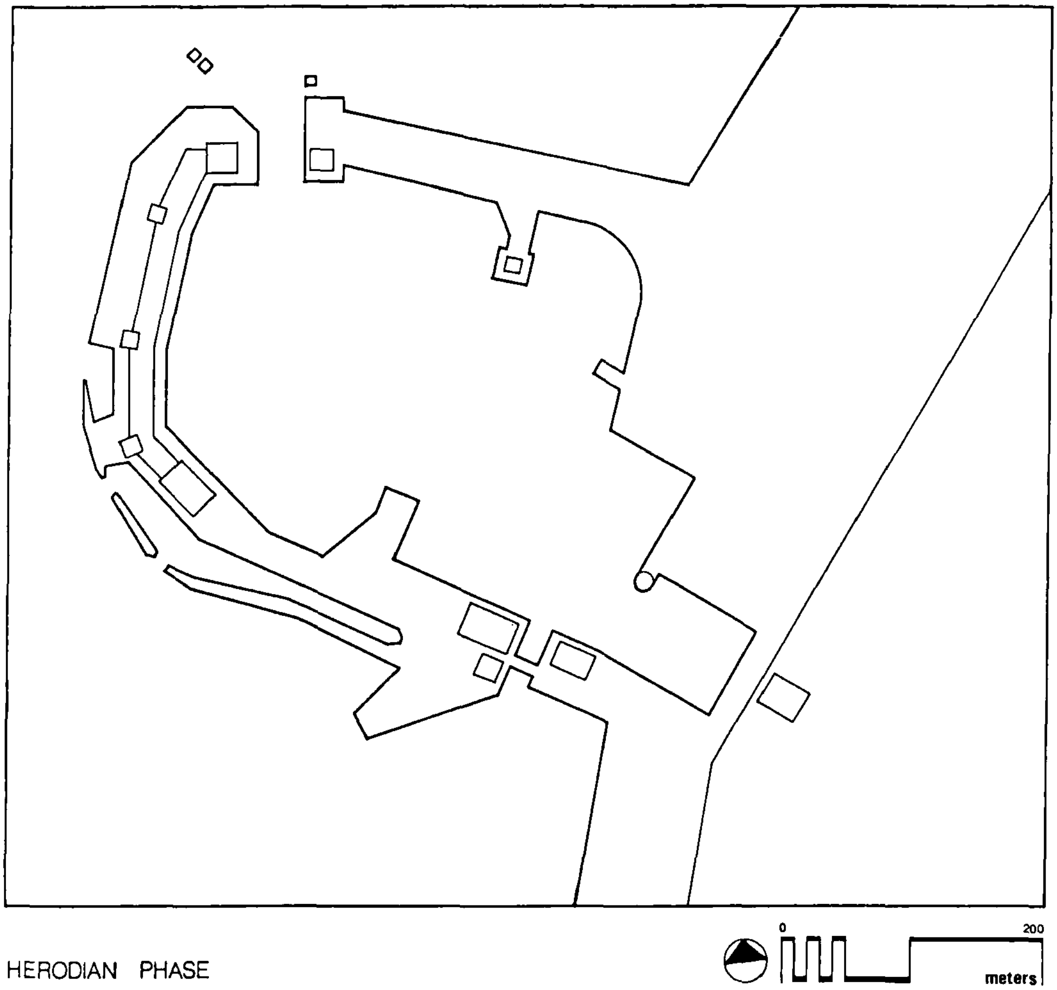
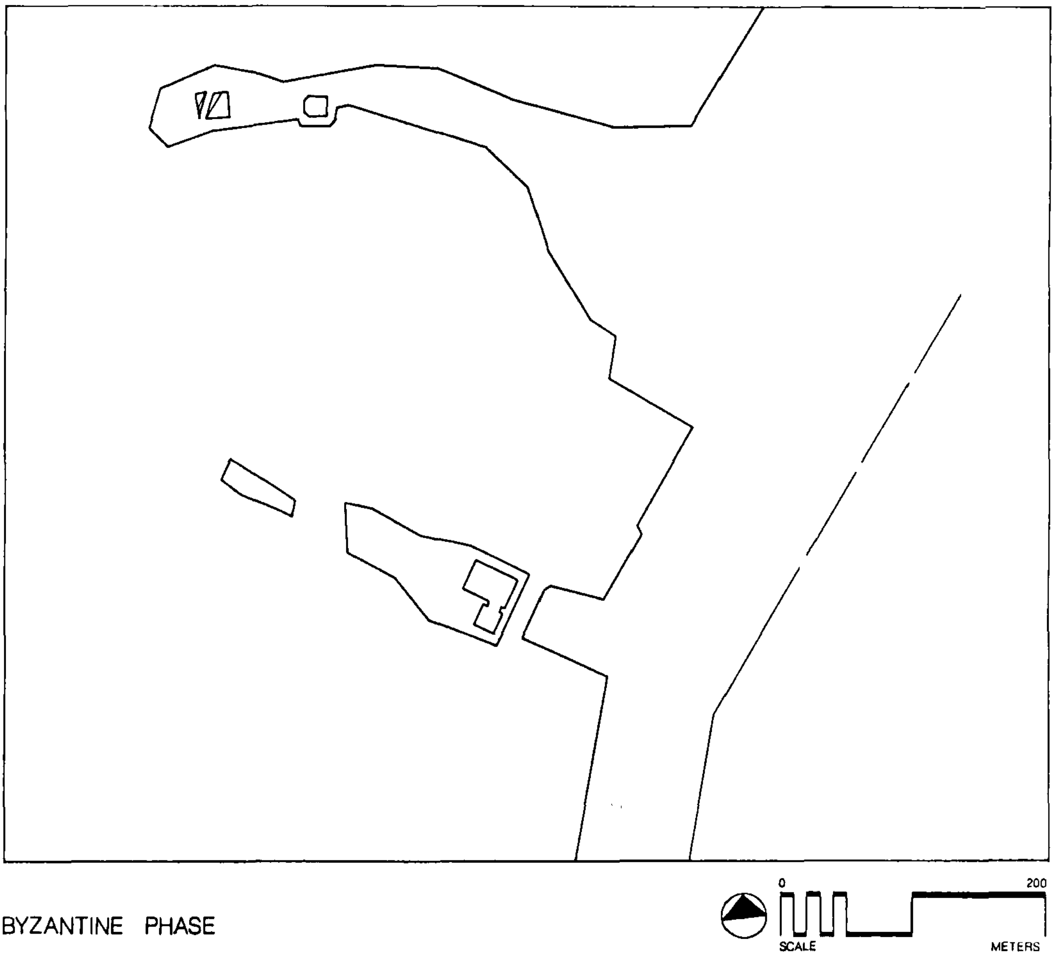


Figure 3. Tentative schematic plans of the Herodian and Byzantine harbours (S. Giannetti).

were carried out by diving surveyors aided by marked survey lines, levels and compasses. The data gathered by these sections enables the construction of a detailed topographic plan of the ruined and submerged architectural features and the extent of the use of various types of building techniques and materials. Completion of this intricate plan would verify the existence of structural hollows along both sides of the main breakwater (see above, area D3) and the extent of the Byzantine additional rampart.

Area E2 (1983)

This area is located some 40–50 m east of E1 (which was excavated in 1980 (Raban, 1981: 292f.; fig. 17) on both sides of the subsidiary breakwater which is parallel to the main one along its external side on the south and south-west portion. In both places (inner and outer faces of the seawall) the trenches went down below the foundation base of the structure. It was originally laid on a pillow of small rubble and rounded pebbles, some 12–15 m wide. The sea floor below it is −8·10 m below MSL. A sub-layer of finer particles, crushed sandstone and coarse sand indicates a natural process of well sorted accretion, which could take place below the protecting pillow. Several pottery sherds dated to 2nd century BC, mixed with a few of the Herodian period, might pre-date the



BYZANTINE PHASE

structure, yet could have penetrated later between the rubble. The sea wall was built on that pillow base in a rather odd manner of mixed techniques: cemented blocks of artificial conglomerate were placed well apart and in between them were large rubble blocks in roughly laid courses. It seems quite clear that the wall was built in one single stage, very probably at the same time as the main breakwater and without any structural connection between the two. This subsidiary breakwater was much narrower and rather lower than the main one, probably not higher than the original surface of the sea. It can be traced today along the southern line of the main breakwater, some 30 m away from its external limits, to some 170 m towards the point where the main breakwater curves to the north. Further north-west it seems to continue as an interrupted and segmented line, maybe to enable an easy outflow of extra water which would collect due to incoming stormy waves but this line cannot be traced further than about half way along the main breakwater and it was either originally absent at the west side or is now completely covered under the sandy bottom. This phenomenon could be due to the additional subsidence of the sea floor west of the second fault line (see eg. D. Neev *et al.* 1978: 60, fig. 9a). Some probings are to be done with a water jet and

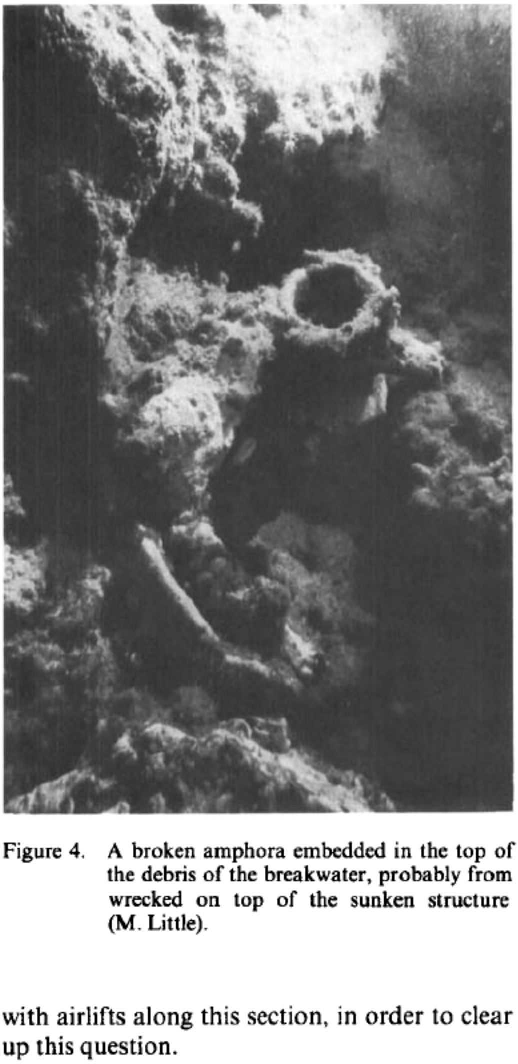


Figure 4. A broken amphora embedded in the top of the debris of the breakwater, probably from wrecked on top of the sunken structure (M. Little).

with airlifts along this section, in order to clear up this question.

Area N1 (1983)

A trench was dug along the south-eastern edge of a large rectangular rampart of debris covering some 30 × 50 m just inside the main southern breakwater. The trench was 3–4 m wide and over 10 m long, and was carried towards the contour line of the inner face of the main breakwater. It seems as if the rampart has two different parts, the higher is 2–3 m above the sea bottom and only 1–2 m lower than the uppermost remnants of the main breakwater. It consists of offset ashlar blocks probably from the paving of the main quay and maybe of some additional massive collapsed structure. There is an additional sandy layer of about a metre between the original sea bottom of the Herodian period and the base of this rampart, and so one would consider it to be the creation of a somewhat later period. Either it was man-made *in situ*, or just accumulating debris of the destroyed breakwater and its superstructures, which seems to be the case. The lower part, further away into the harbour basin is 1·5 m lower than the other and consists mainly of small ashlar and rubble stones. On top of it there are at least five heaps of ballast stones, most of which are of basalt. In these contexts, there are many sherds of broken amphoras dated to late Roman and early Byzantine periods (3rd–5th century AD). These are probably from ships which have been wrecked on top of the already subsided breakwater a few dozen yards south-west of this deposit (see Fig. 4).

The trench went down below the inner face of the main breakwater which missed the ashlar courses, to be found at the western section, between areas A–C. Some of the original ashlar blocks of the foundation course of the Herodian inner quay were exposed, but they are not in their original place., They are some 3 × 1 × 1 m in size and all of them were tilted some 30°–40° anti-clockwise.

Area N2 (1983)

This area is also a trench dug toward the inner face of the main southern breakwater, some 60 m east of N1. Here, the foundation block and in fact the entire inner facing of the quay is missing altogether. The trench was widened then and deepened to below the sea bottom of the Herodian period. As in other excavated areas in this part of the harbour this level is just below 8 m of water and comprised a compact layer of fine silt, probably deposited when the basin was well protected and the wave energy was minimal, with some late 1st century BC/early 1st century AD pottery sherds on it (Fig. 5). At this stage, the dig revealed the sand filled hollow where the inner face and its foundation course were supposed to be located. The complete absence of tilted ashlar blocks at this part of the breakwater suggested that, at this closer-to-shore part of the Herodian harbour, better building material was salvaged from the sea bottom at a later period, to be

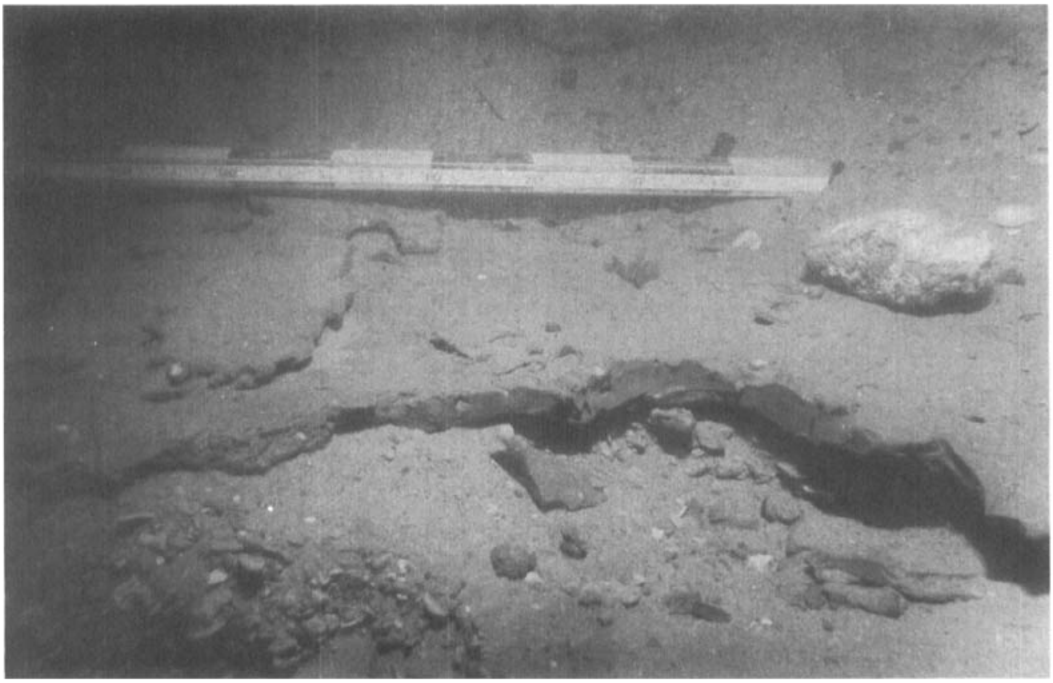


Figure 5. The compact layer of mud in area N2, representing the bottom of the Herodian harbour (M. Little).

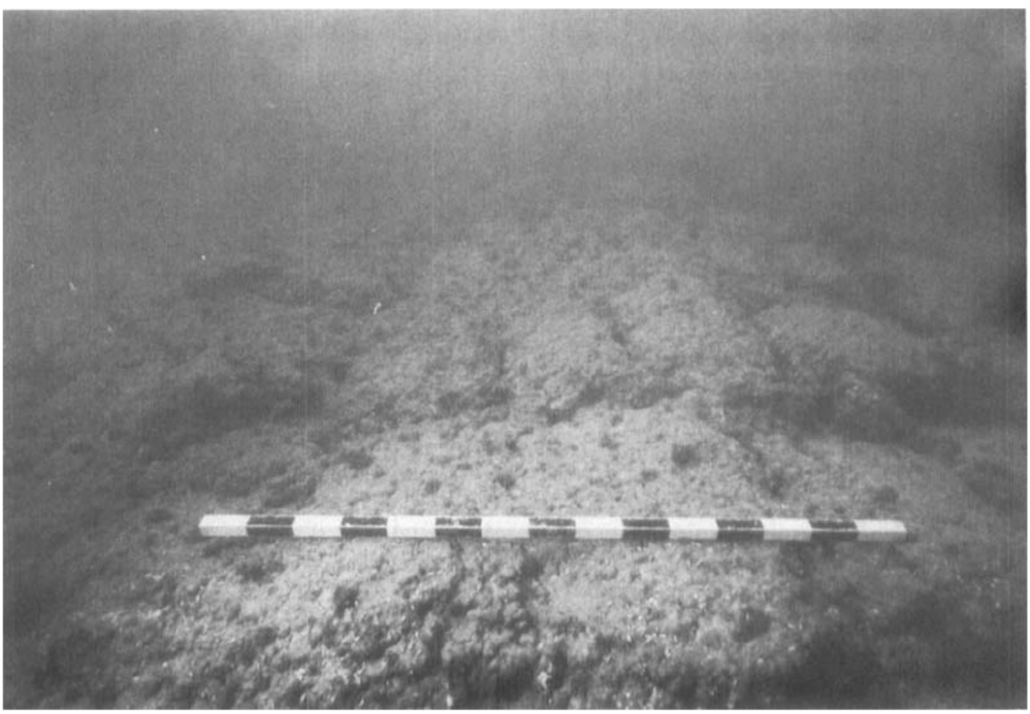


Figure 6. The sunken floor F, looking west.

reused on land, very probably by the Crusaders, for their harbour's Citadel.

Area F (1983)
This area is the so called 'Sunken Floor'. It is a pavement or a platform built of ashlar blocks 1·10 × 0·55–0·40 × 0·40 m and is located some 60 m west of the tip of the modern pier and about 40 m north of the inner face of the southern Herodian breakwater. Its surface is nearly horizontal, at a depth of about 5 m of water (Fig. 6). The rectangular structure is preserved to maximum length along its original northern face, which is built of headers only for 17 m. The maximum preserved width is just over 4 m, but it seems as if there is more of it to the south, partially uprooted and partially covered by fallen stone blocks. To the east of this floor there is a course of large headers, running south, at a lower level. The blocks here are larger and resemble the size and shape of the blocks of the foundation course of the face of the quay on the inner side of the western main Herodian breakwater (2·0 × 0·6 × 0·5 m). Two trenches were dug along the sides of this sunken floor, at the west part of the northern face and at the middle part of the southern side. In both places the floor appeared to be made of only one ashlar layer which was laid on a fill layer, some 0·3 × 0·5 m thick, made of large pebbles and small rubble stones. In and under this fill there were quantities of well eroded pottery sherds of various dates up to modern times. Most of the sherds were covered by limish residues of marine fauna and seemed to have travelled on the sea floor for some distance. It is quite probable that currents dragged the sherds underneath the floor.

At the dig on the south side, it seems as if some of the original paving blocks are missing. Some of the blocks had been displaced by the waves and were floated away by us in order to clear the trench. Underneath, there was a layer of rubble well cemented by natural marine encrustation; below it a hollow was exposed. This hollow was filled with a large quantity of broken pottery vessels, most of which evidently rolled in to it by waves and water currents. All the pottery is to be dated between early 1st century AD to the end of the Byzantine period (early 7th century AD). This pottery fill went to a depth of 7·3 m, below, there was pure, fine sand. At a depth of 7·8 m the dig reached the clay layer, which represents the Herodian sea bottom and is evidently far below the foundation level of the floor. The hollow must have occurred after the completion of the floor and maybe was created during a severe earthquake, or due to the very close proximity to the active fault line. If this was the case, the accumulation of the pottery in the hollow represents a post-destruction date and gives it a rather early date (2nd–3rd century AD). As for the function of the 'floor', not much can be said for sure, the state of preservation of the overall complex, of which this floor might have been a part, is too sketchy. Yet, the fragmental courses of larger ashlars on the east and some offset blocks of the same type on the west might point to existence of a mole, some 20–25 m wide and 40–45 m long that was positioned on the inner side of the southern breakwater to the north. This mole might have served as a partition between the outer and the intermediate basins of the great Herodian harbour. It also might have been built of two main walls of large headers, one on the east and one on the west; the sand below the pavement is probably intentional fill between those walls (Fig. 7). In any case, the floor makes no sense at its present elevation and it had to be at least a foot or two above the sea level when functioning. In that case, the floor is clear-cut evidence for a rate of vertical subsidence of the sea bottom since the Roman period of over 5 m.

Area T
This area is located in the present bay, some 30 m off the sandy beach, in shallow waters. In 1977 a round tower was found there, submerged just below sea level (Raban & Linder, 1978; 243, fig. 5). It is a 13 m diam ashlar structure closely resembling the twin tower the Italian expedition excavated near the shore on the north side of the site. A 2nd century BC cooking pot was found crushed against the side of this submerged tower and would date it to pre-Herodian times. This season, its south face (Fig. 8) was cleared all the way down to the bedrock on which it was directly based. The depth of the sandstone rocky bottom is 2·7 m and this seems to be the depth of it all the way across from the tower to the rocky promontory at the south of the bay. On top of the bedrock there is a layer of fine mud mixed with pottery sherds. It looks as

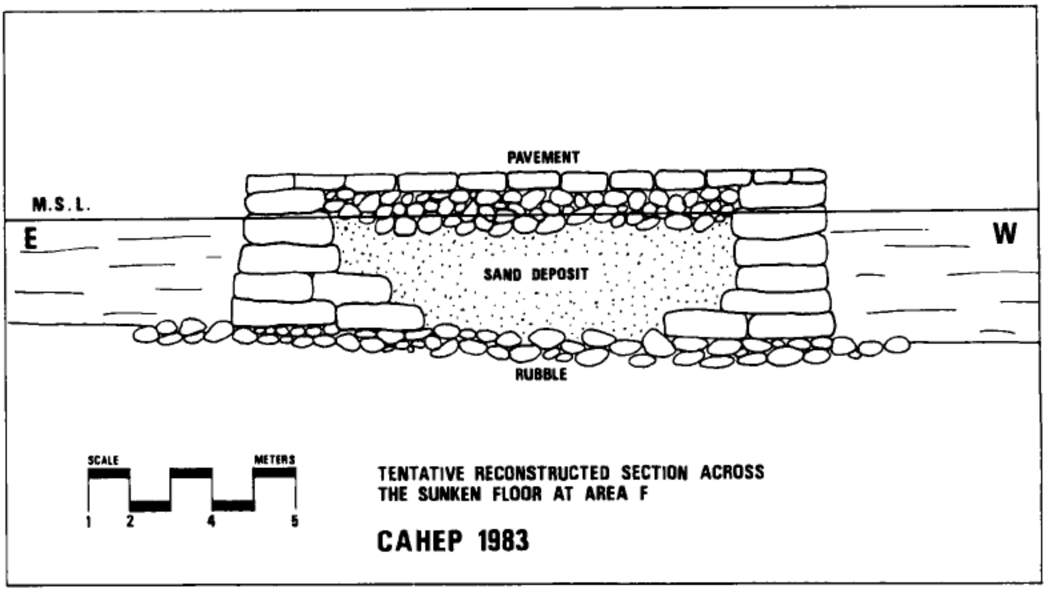


Figure 7. Tentative reconstructed E–W section of the sunken floor.

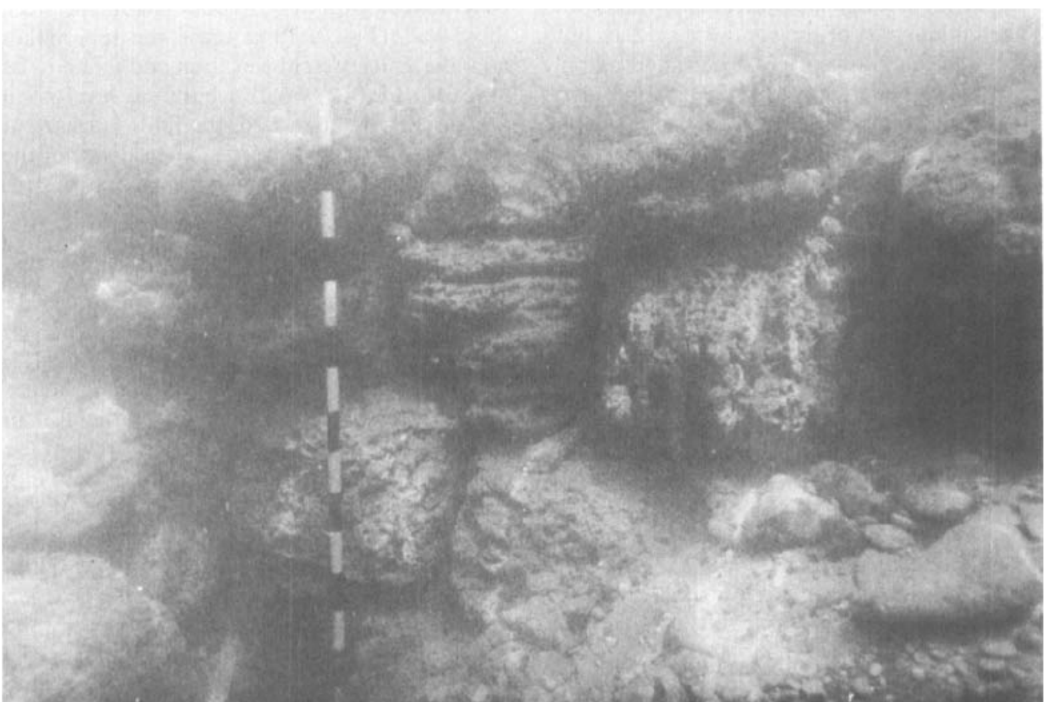


Figure 8. The headers at the side of the round tower in area T, looking north (M. Little).

Figure 9. The top of the Herodian (?) inner quay at area Q and the Crusader and modern structures on it.

if during most of the Roman era this area was under a closed body of water, not affected by wave energy. Considering the gap between the tower and the promontory as an entrance to the innermost basin of the Herodian harbour and most likely to be first established not later than the 2nd century BC, one would wish to estimate MSL for that time much the same as the present.

Area Q (1983)

This area is within the modern mole, just east of the point where it leaves the line of the ancient one and turns north in a sharp angle, at the cement-filled hull of a sunken vessel. Along the inner face (the northern) of this mole, below the modern cement pavement, one can easily distinguish an earlier medieval structure that was built on top of earlier ashlar pavement, which is now just above the sea level (Fig. 9). A trench was opened in the sea floor, at the base of this pavement in order to expose and learn its character. The dig was carried out with a dredger, using the water pump we brought for excavating the Roman wreck, during periods when the sea conditions made it impossible to work there. The excavators had to go through a layer of almost 2 m of gravel that was dumped there when the modern mole was built. Below it the fill is of mixed fine clay and dark gray sand, typical of bottoms of undredged harbour basins. The trench did not reach the original level of the Herodian sea bottom and it is to be continued in the future. So far, a course of large headers was traced to just below the pavement. This course was laid on top of an artificially made conglomerate block comprised of crushed limish gravel, small rubble stones, clay and volcanic ash and tuffa. The face of the block is well eroded and contains a series of now sunken worn cavities. At a depth of 3·2 m below MSL, the face of the block recesses sharply and although it is definitely not the base, it seems as if the base is not much further down, judging from the conglomerates of the same composition that were exposed in 1982 in area G and turned out to be of a maximum original height of 3·5 m (Raban, 1983; 245, fig. 19). This similarity and the fact that the blocks in area G were dated by C^{14} (their wooden caissons) to about 2000 years before present times suggest that the conglomerate in area Q is to be considered also as part of the original Herodian harbour.

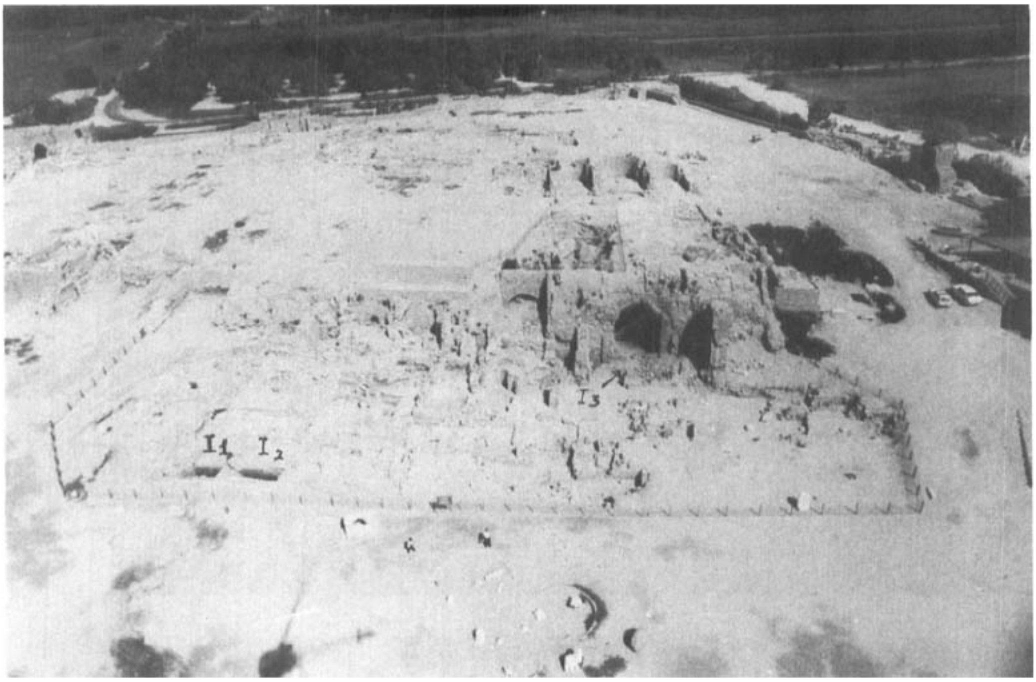


Figure 10. Aerial view of the podium area and Field I during 1984 season, looking east (R. L. Hohlfelder).

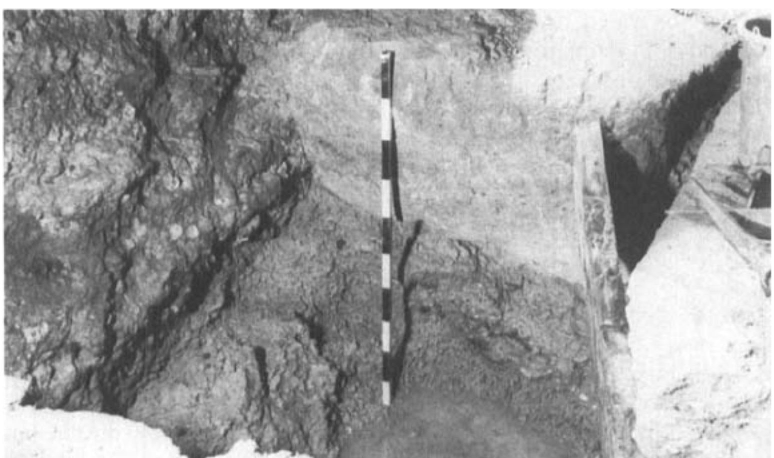


Figure 11. The base of the quay in area I-1; notice the ostrea shells on the wall and the quarried bedrock underneath (M. Little).

Area I (1983–1984)
Area I is on land some 100 m southeast of the beach in the intermediate basin (Fig. 10). It is just west of the complex of walls which was excavated by Prof. A. Negev during the late 1950s. Negev called this complex which is just south of the Temple's podium, a Roman pier (Negev, 1975; 274). In 1976, we opened a square

Figure 12. The mooring stone on the inner quay, in area I-2 (M. Little).

pit next to the lowest and westernmost course of white ashlar paving slabs. The pit enabled us to expose a face of a wall which was buried under this paving course and almost lined up with it. The top of this wall is 1·4 m above MSL (the paving course is 1·6 m above MSL) and its face (facing west) was found well agglomerated with the fill of gravel, sand, silt, occasional building stones and pottery sherds. Underneath, at about the present sea level and well submerged in ground water, a worn cavity was detected, with marine ostrea still attached to the wall below it (Fig. 11). At the time, we referred to it as an indication of the wall being the eastern side of the innermost basin of the Herodian harbour. This pit was made at the south end of the paving course (Raban *et al.*, 1976; 36–8). During the 1983 season we used some of the spare time in stormy days to start a new ditch along the northern part of the same course. The stratigraphic picture in this area resembles that of 1976.

Under the paving slabs there is an ashlar wall, built of alternating headers and stretchers. Each course is 0·40 m high and the top of the wall is 1·40 m above MSL. Its orientation is about 5° offset clockwise from the pavement on top. At a level between 1·2–0·6 above MSL there is a beachrock-like conglomerate of debris. The agglomeration is due to the seasonal surface of ground water in this area. Below this agglomerated fill there is one comprised of water carried material. At a level of 0·2–0·3 m above MSL the worn cavity was detected. This is a clear indication of a rather long presence of a body of calm water. Just above it a mooring stone was exposed, protruding from the face of the wall and incorporated into its second course from the top. The stone is horizontally pierced (the diameter of the hole is just over 0·2 m), it is protruding 0·6 m off the face of the wall and the centre of the hole is about 0·5 m above the worn cavity. Such a height of mooring stone is appropriate for mooring lighters and small boats, rather than sea-going vessels (Fig. 12).

Area I 1,2

During the 1984 season, a large scale land excavation was carried out in this area which had been divided into trenches along the west side of the Roman quay, first identified in 1976. Some 20 m of this quay were exposed this year, all the way down to its base; and the trench was widened to a maximum of 6 m to the west. The vertical face of the quay is still encrusted with a thick layer of marine shells. Some vermatides are the most characteristic at the elevation of 0·40–0·10 m above MSL. Below it the various ostrea would dominate the composition of the marine coating. The base of the quay was laid directly on the bedrock at 0·90–1·20 m below the present MSL. This sandstone bedrock slopes sharply towards the west and at a distance of some 3 m west of the quay its depth is over 2 m below MSL. It is quite likely that the builders of this inner harbour actually quarried the bedrock in order to have a deeper anchorage (see Fig. 11). The sloping rocky bottom is covered by a few inches of fine mud with some sherds of pottery from the early Roman period. Two coins were found in this layer; they were both locally minted during the last regnal year of Nero (68 AD). The mud is covered also with

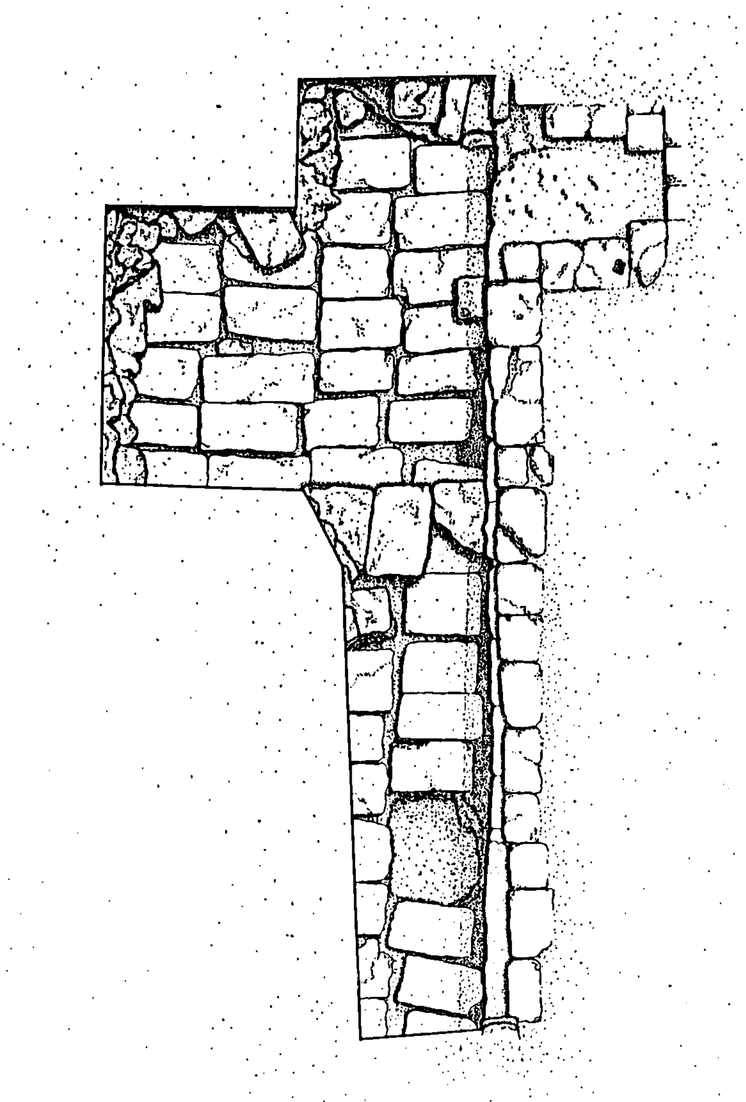


Figure 13. Plan of area I-1,2.

a typical marine encrusted layer of ostrea. On top of that crust there is a filling of broken sandstone, levelled out to prepare for a pavement made of rectangular flagstones of considerable size. The face of this pavement is 0·20–0·05 m above MSL and it gained its more or less horizontal surface by additional lower courses of ashlars on the westward down sloping base (Fig. 13). This ashlar paving is loosely laid and carries no traces of marine encrustation on it. It was divided by a partition of ashlar walls and plastered side walls of rubble and cement (Fig. 14). There is no doubt that at the time it was constructed its site was already blocked off from the sea. However, bearing in mind that at the present sea level, the flagstone paving is under more than 0·5 m of fresh ground water all year round, it could not have been dry unless the MSL was at least some 0·70–0·80 m lower than today. Such a low sea level during the later Roman or during the Byzantine period would contradict the data collected elsewhere in

Figure 14. The flagstones pavement and the partition wall at area I-1, looking south (M. Little).

Caesarea and other nearby coastal sites, which indicate higher sea level than the current MSL and constantly rising during these periods. It is therefore more likely that the function of the paving was to meet the rising sea level (and with it the interface between the sea water and the lighter fresh ground water) by serving as a permeable base for a fresh water tank. On top of that paving there was a 0·20–0·50 m layer of wave deposited sand, shells and rounded pottery sherds, the latest of which are to be dated to the end of the Byzantine or early Arab periods (7th–8th century AD). It seems that at this stage the site was open again to the rising sea. Above that layer there were deposits of wind blown sand up to 1·4 m above MSL. The sand served as a base for a cement floor and stone walls for residential buildings (Fig. 15). In one place, a large number of complete pottery vessels were found on the floor, to be dated to the 13th–14th century AD (Mamluke Period).

Area I, 3

This is the area of two trial trenches inside the great vault at the south side of the podium (see Fig. 10). This vault was cleared by A. Negev in the early 1960s and identified by him as an Herodian *horrea* (harbour magazine) (Negev, 1975: 273). We have noticed that the face of the south and back (east) walls are built of dressed ashlar blocks laid in the typical order of alternating headers and stretchers. This order, the size of the blocks and their dressed faces resemble the character of the inner face (southern) of the city wall in the north part of Caesarea, which runs east from the twin round towers, cleared by the Italian expedition and dated by the excavators to the Herodian period. The face of the north wall of the vaulted hall and the vault itself are of a different type of stone, smaller and undressed (Fig. 16). From architectural and structural observations, it is quite clear that the east and south walls pre-date the other wall and the vault. Their dressed faces and the resemblance to the city wall on the north side of the site would suggest that they were originally the southeast corner of the fortification.

The first trial trench was dug along the south wall of the vault, down to and below the

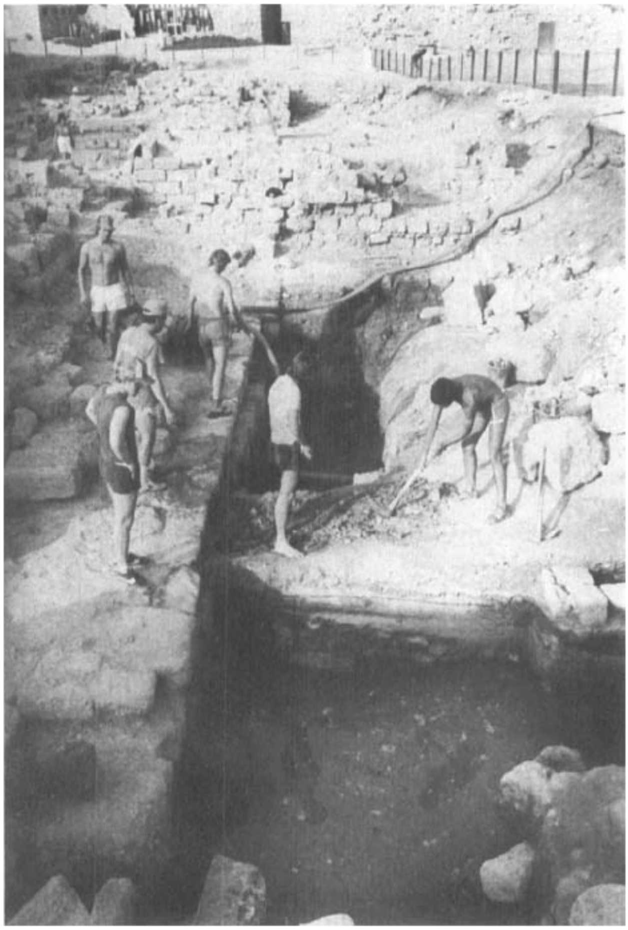


Figure 15. The quay in area I-1 looking south, notice the elevation of the ground water and the wedge-like intrusion of coastal sand at the baulk (M. Little).

foundation course. The original foundation trench was cut down to the level of the ground water in the sandstone bedrock (Fig. 17) and on top of it some late Hellenistic pottery sherds were found, among them two Rhodian amphoras' handles.

The other trench was dug along the side of the north wall. The base of this wall is at a height of almost a metre above the south wall; the surface just above its foundation trench is covered by a thin layer of grey ash (Fig. 18). On the floor some crushed cooking pots and sherds of early types of Eastern Sigillata ware were found. These pottery types are characteristic of the time of Herod. The stratigraphic and archaeological data from the trenches prove that the date of the walls are Herodian and pre-Herodian, the southern one being the earlier.

This conclusion matched Negev's dating of the vault and would suggest a 2nd century BC date for the walls of the fortification system, but see another opinion about the date of the north wall (Blakely, 1984; Roller, 1983).

Assuming that the dressed ashlar structure in the vault and near the north shore are of the same city wall and of pre-Herodian date, one can try and reconstruct the delineation of the walls of the Hellenistic town that pre-dated Caesarea: Straton's Tower. These walls are well attested in the Jewish religious tradition as one

Figure 16. The great vault at the south-west side of the Herodian podium, looking east; notice the different type of structure of its side walls (M. Little).

Figure 17. The trench along the south wall in the great vault, looking east. The white line at the baulk indicates the original foundation trench. The metre rod is on the floor's ledge (M. Little).

Figure 18. The trench along the north wall of the great vault. The right-hand metre rod is on the original floor level (M. Little).

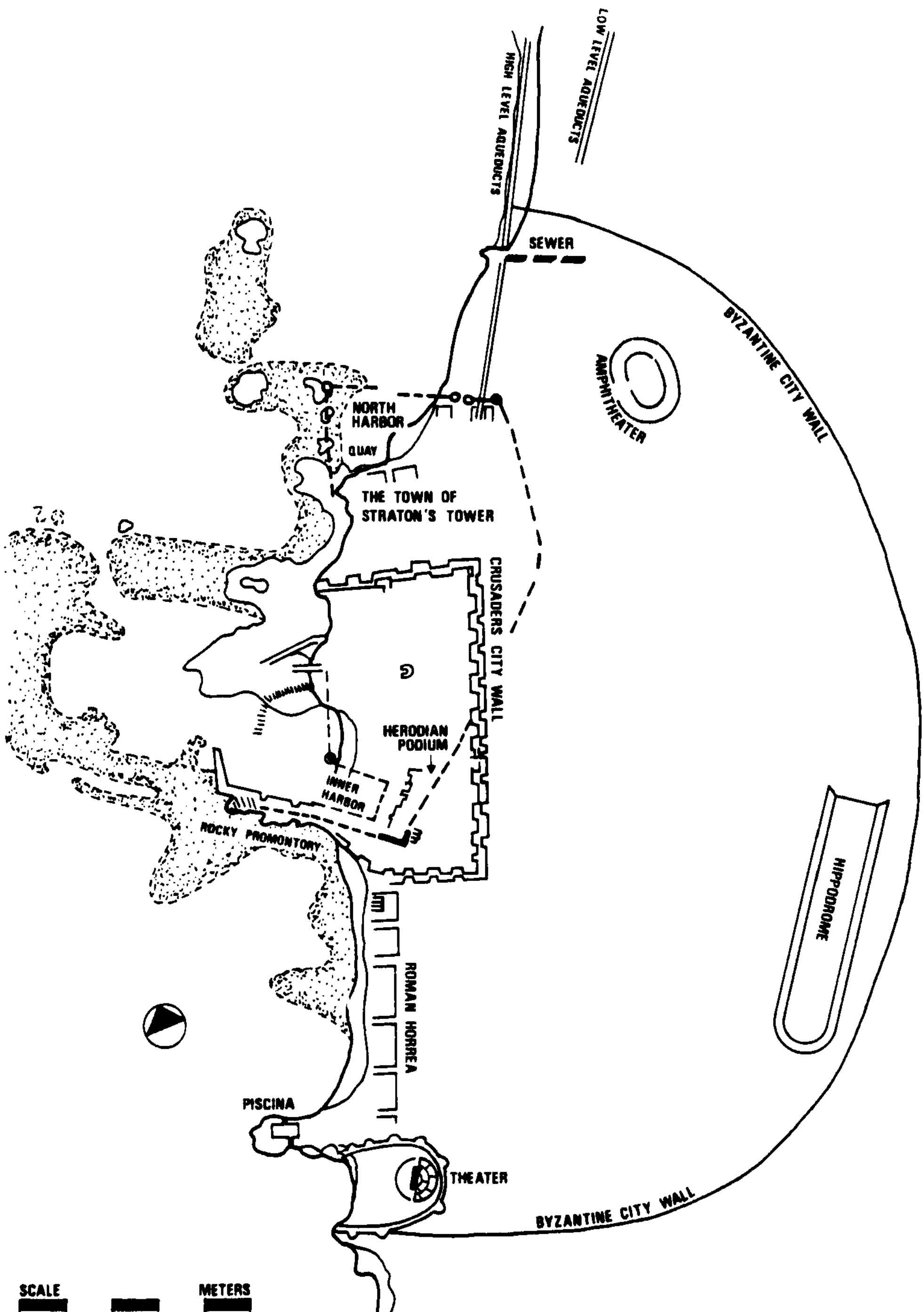


Figure 19. Proposed outlines of 2nd century BC Phoenician town of Straton's Tower and its two protected harbours.

of the 'benchmarks' for defining the boundaries of the 'Holy Land' (Tosefta Shevi'it, IV, 11).

The topographical setting of this line of fortification is logical and would incorporate both anchorages: the one in area J and the inner one (area I) within the city walls, in a regular *limen kleistos* manner, which was so characteristic in the Hellenistic era (Fig. 19).

The accumulated data gathered during the seasons of CAHEP in areas I, J and T enable us to suggest that the fortifications of Straton's Tower are to be attributed to Zoilus, the tyrant of Dor and Straton's Tower is the last third of the 2nd century BC.

Area Y (1983)

This is the area of shallow water partially protected by rocky reefs to the west and southwest, about 150 m north of the Hellenistic quay of Straton's Tower, Area J (Fig. 20). In this area we traced in 1976 a series of wooden ship frames sticking out of the sandy bottom. In 1980 a few wooden planks were exposed by the natural currents and it was the first time that we could determine the wreck to be of the Roman era, based on the style of shell-first building technique and the type of mortises and tenons, which were used for fastening the planks to each other. In early April 1983, some 13 × 4 m of the southern part of the preserved hull were exposed again by the currents (Fig. 21). At this time our survey yielded two bronze balance scales (another two were salvaged there in 1980, by S. Wachsmann) from near the wreck.

The site of the wreck is about 60 m offshore at the edge of an area of the sea bottom, littered with building stones, ashlar blocks and pottery sherds which had been dragged from the nearby coastline by stormy waves. The depth of the sea floor below the wreck's hull is only about 2·5 m and usually there is an additional layer of over 1 m of sand. This sand bar is quite constant due to the line of the breakers. Excavation in such a locality can be done only when the sea is extremely calm, which is not usually the case for late May or June, and cannot be done with airlifts, but rather by using a water dredger.

Figure 20. Aerial view of the north bay of Caesarea and the location of area J (The Hellenistic quay) and the Roman wreck (Y).

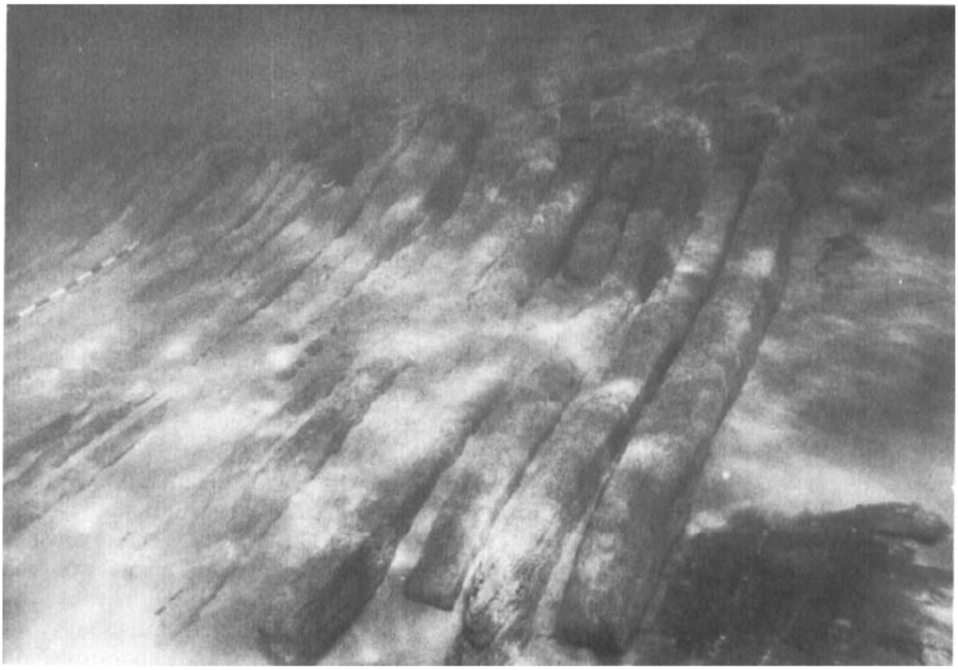


Figure 21. Part of the hull of the wreck in area Y.

To utilize our working season we tried every possible day to carry out a dig there although doing it in a Sisyphean manner. Even so, some 14 × 5 m, about 0·33 of the total area of the preserved part of the wooden hull, has been exposed and systematically surveyed, measured and drawn (Fig. 22). It seems as if only about one-third of the original breadth of the hull is preserved from next to midship to above the bilge (Fig. 23). Judging from the dimensions of the preserved part our best estimate for the moment is that she was about 40 m long and 12 m wide. The surviving part of the hull does not contain the ceiling, the keelson, or any beams, just the planking and the entire frame system (Fig. 24). The planking boards are over 0·08 m thick and the mortises arranged in alternating order. It was lead sheeted below the waterline and parts of this sheeting are still in place, much of it was torn off by the waves' current and can be traced below the sand all over the site. The frames are made of rather heavy beams each one some 0·16 m thick and 0·25–0·28 m high. They were laid close by, only 0·09 m apart in a typical heavy construction fashion. The best parallel to this hull is a Republican merchantman dated to early 1st century BC, that was scientifically excavated by the CNRS scholars at Madrague de Giens just off the SW tip of the peninsula of Hiers, southern France (Tchernia *et al.* 1978). The size of the frames at the French wreck are somewhat slenderer than those of the wreck in area Y and it seems that she was somewhat smaller, yet with a calculated carrying capacity of about 250 tons (see ibid.: 101–7).

A survey of the sea bottom by divers assisted by metal detectors revealed additional lead fragments and abundant pottery sherds. Although most of the sherds might have been dragged from the nearby land site, there is a relatively large quantity of broken *dolia*—an alien type of clay vessel in the Orient and so far rarely found in the excavations on land. On the other hand, *dolia* were standard containers for bulk cargo in the Republican and later Roman seaborne trade (see e.g. Pallarés, 1983; 92–7). The combination of heavily constructed merchantman, broken *dolia* and balance scales

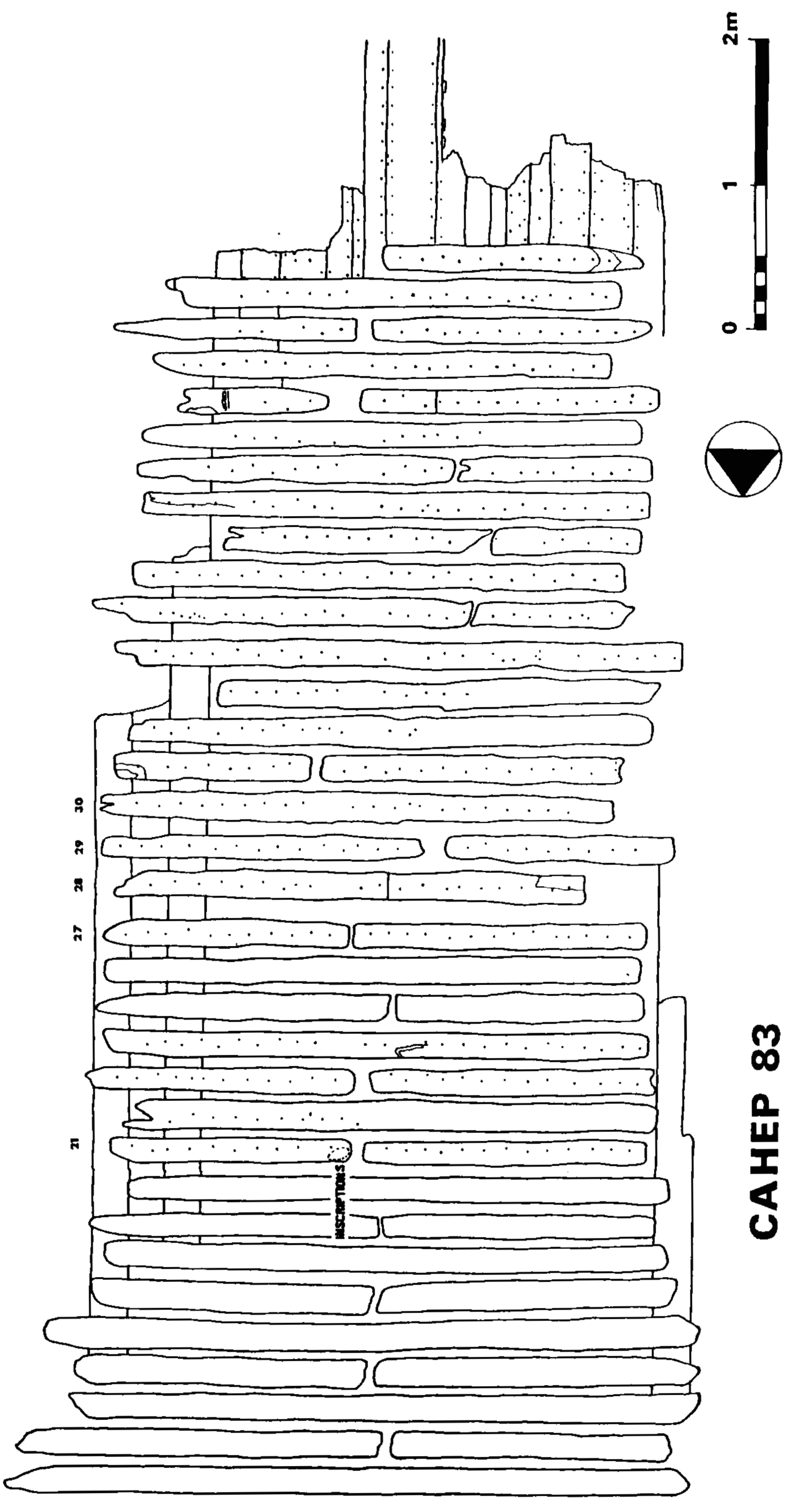


Figure 22. Drawing of the part of the hull excavated during 1983.

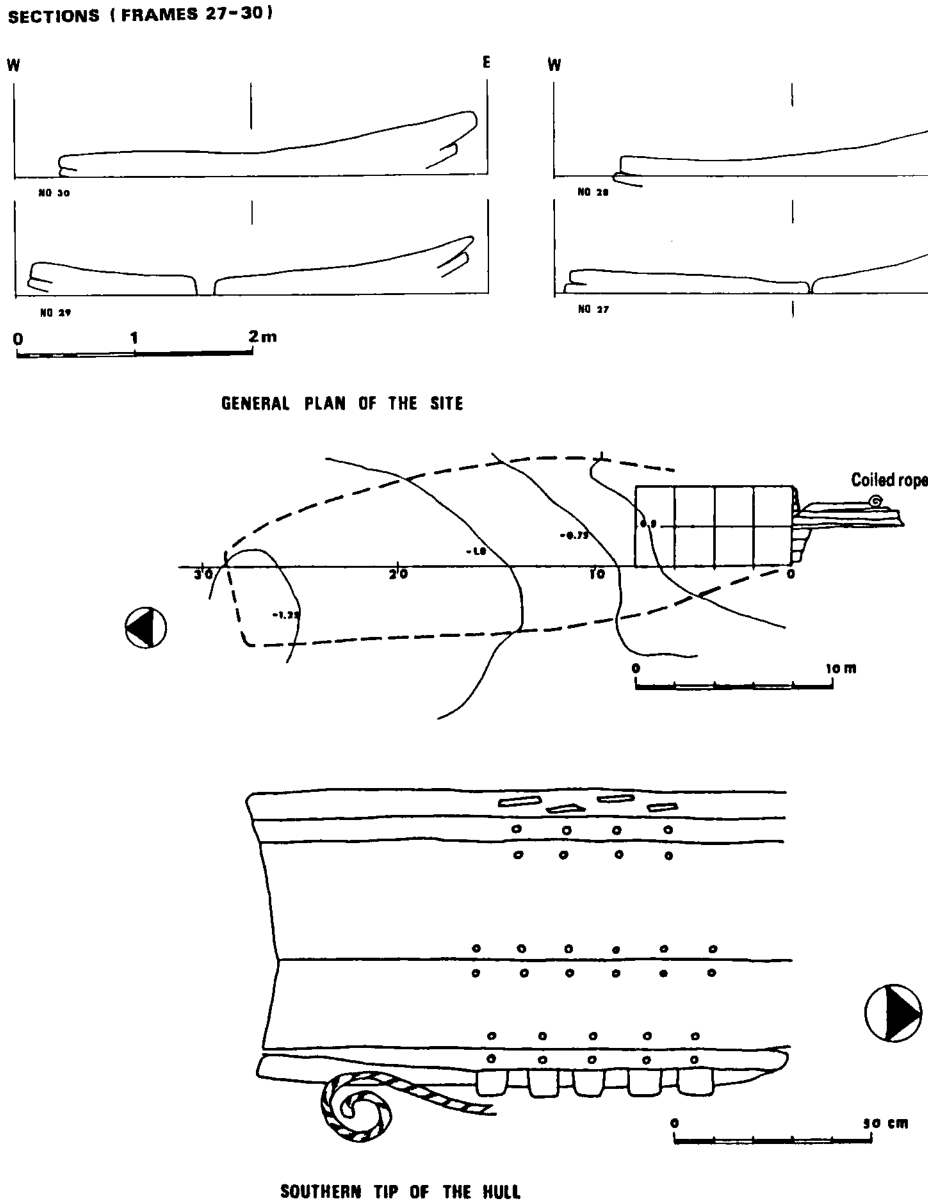


Figure 23. Section of typical frames.

suggests that the wrecked vessel was furnished for carrying a bulk cargo expensive enough to be weighed when loaded or unloaded. The cargo could have been salt from the Dead Sea or spices, such as myrrh or black pepper. Pieces of mud compacted dunnage that were found between the frames might be remnants of the stabilizing fill between the *dolia* in the hold of the vessel. Some well preserved pieces of rather heavy ropes were found on the wreck and were sent, together with selected wooden parts of the planking, frames, tenons and trenails to be checked in the dendro-archaeological laboratory of Tel Aviv University. Other samples of mortar, cement, conglomerated materials and building stones were taken to the petrological Laboratories at Victoria University.

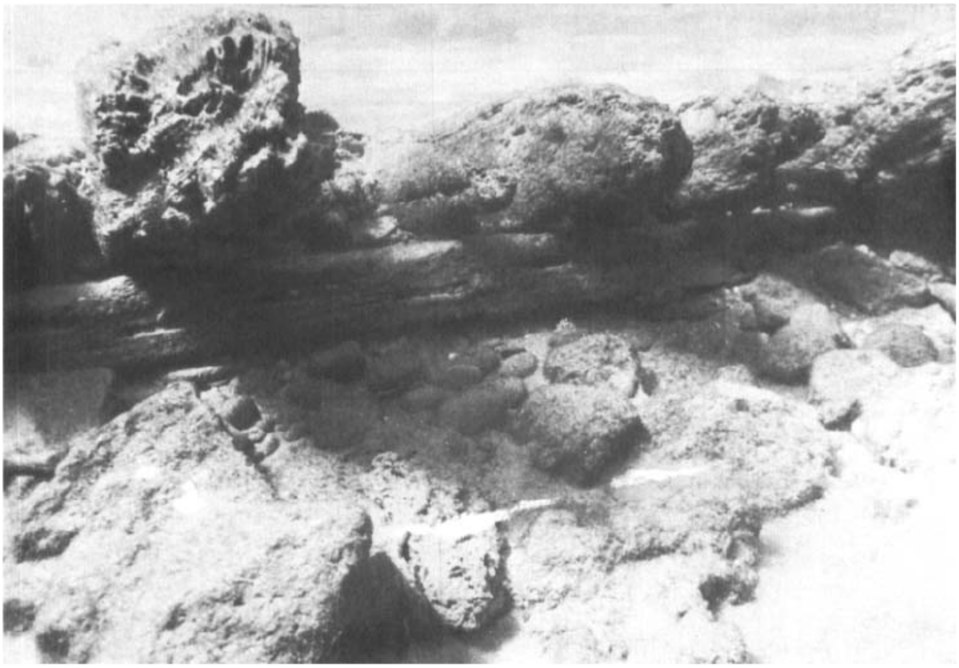


Figure 24. The planking and the frames of the wreck in area Y.

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