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The Inner Harbor Basin of Caesarea: Archaeological Evidence for Its Gradual Demise

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The very existence of an inner basin within the harbor complex of Sebastos might be historically surmised only from indirect passages in Josephus, referring to "subsidiary anchorages within it [Sebastos]": ἔν τε τοῖς μυχοῖς αὐτοῦ βαθεῖς ὅρμους ἑτέρους (*BJ* 1.410); δευτέρους ὑφόρμους (*AJ* 15.331). Our excavations revealed the archaeological evidence for that basin already in 1976,[1] when we followed the earlier data of A. Negev's excavations of 1960.[2] Later studies enabled us to conclude that this basin had already been built during the Hellenistic period, though its conjectural size and shape were wrong.[3] During the present phase of our research we have managed to expose the original size and circumference of that basin, which was found to be three times larger than formerly suggested.[4] During the last three years much additional archaeological and sedimentological data have been collected and processed, which enable us to reconstruct in a rather detailed manner the history of that basin from its initial phase to the time it finally went out of use, becoming a terrestrial part of the built-up urban unit. Yet the implications of our reconstruction are heavily contested by our colleagues, who would question our suggested original time of construction[5] and the various phases of its demise.[6] Because they are still under study, with excavations continuing and data being processed, these issues will not be argued below. The following will therefore be merely a summary of data gathered by us up to the end of 1994.

The Original Topography

We are still shy of knowing exactly when the coastal low ridge of kurkar, eolinite sandstone, had been occupied for the first time by human settlers. A few Iron Age sherds

[1] A. Raban et al., *Marine Archaeological Research in Caesarea* (University of Haifa, CMS report 2/76, submitted to the Israel Electric Co., 1976); Raban, *Site*, 80–81.

[2] A. Negev, *Caesarea* (Tel Aviv, 1967), 27–30.

[3] Cf. Raban, *Site*, 131–38, 271–75; idem, "Καισάρεια ἡ πρὸς Σεβαστῷ λιμένι: Two Harbours for Two Entities?" in *Caesarea Papers*, 68–74, figs. 2–3; *Herod's Dream*, figs. 11, 24, 50, 86, 89.

[4] Raban et al., *Field Report* (1992), 11–14, fig. 13.

[5] See, e.g., D. W. Roller, "Straton's Tower: Some Additional Thoughts," in *Caesarea Papers*, 23–25; Oleson et al., *Finds*, 158; and the chapters by Yosef Porath and Robert R. Stieglitz in this volume.

[6] See, e.g., Y. Porath, in *Hadashoth arkheologioth* 105 (forthcoming); and *Twentieth Archaeological Conference in Israel, Abstracts* (1993), 22 [both in Hebrew].

and more of the Persian period (fifth–fourth century B.C.E.) were found in the vicinity and within the Herodian fills next to the area of the inner basin. Yet no significant architectural features that might be attested to these early phases have been traced so far. Much the same is also true for the following, Hellenistic period, though much more pottery of that time has been found, both within the inner basin and at the top of the rocky outcrops east of it, at the alleged site of the later Herodian Temple of Roma and Augustus.[7] In any case, it seems that before human intervention the topography of that site was characterized by a low, heavily eroded shoreline ridge of kurkar, with its western, seaward side segmented and partly inundated by the sea. Of that part some residual inshore reefs and rocky islets remained well above the waves. The most prominent of these was the one presently under the so-called Harbor Citadel Restaurant (fig. 1). Underwater survey of the seafloor just south of that outcrop proved that at some time in the past there was a very extensive abrasion shelf adjacent to it, at a time when the relative sea level was about 2.4 m. lower than the present one. Yet recent drilling and probes at its lee have traced the topography of the bedrock to be at a depth of as much as 6 m. below the present mean sea level (M.S.L.), indicating that the south bay was originally connected to the area of the inner basin. No sand depositions have been traced at these probes to suggest that there was a stable, perennial tombolo there to bridge the gap.[8]

The First Inner Basin

The exact time when the water passage, between the rocky islet of the Harbor Citadel and the shore to the east, had been closed and bridged over by a manmade seawall is still the subject of debate. So far no direct archaeological and architectural data have been found for that alleged structure. Yet many scholars would suggest that the Harbor Citadel was the original site of the settlement later known as Straton's Tower.[9] The most intriguing architectural feature in that context is the Round Tower, which was discovered in 1978 and has been studied ever since (fig. 3).[10] The ashlar header components of its structure and the close resemblance of its shape and size to the twin towers at the Early North Wall are in complete disaccord with the formed mixture of rubble and pozzolana that characterizes the quay of the inner basin; and yet it corre-

[7] Cf. A. M. Berlin, "Hellenistic and Roman Pottery, Preliminary Report, 1990," in *Caesarea Papers*, 112–24.

[8] The probes were made in April 1994 by a professional team with commercial equipment standard for a building substantiating survey. Their logs and cores were made available to us by the Caesarea Tourist Site Project, and the data were processed by Ron Toueg as part of his M.A. thesis research.

[9] Cf. V. Guérin, *Description géographique, historique et archéologique de la Palestine, 2ème partie – Samarie*, vol. 2, chap. 64 (Paris, 1875), 225; G. Schumacher, in *Palestine Exploration Fund Quarterly Statement* 20 (1888), 134–41, fig. 1; L. I. Levine, "À propos de la fondation de la Tour de Straton," *RBibl* 80 (1973), 75–88; D. W. Roller, "The Problem of the Location of Straton's Tower," *BASOR* 252 (1983), 61–66.

[10] Cf. Raban, *Site*, 177–81; Holum et al., "Preliminary Report," 79–83; A. Raban, "The City Walls of Straton's Tower: Some New Archaeological Data," *BASOR* 268 (1987), 71–88.

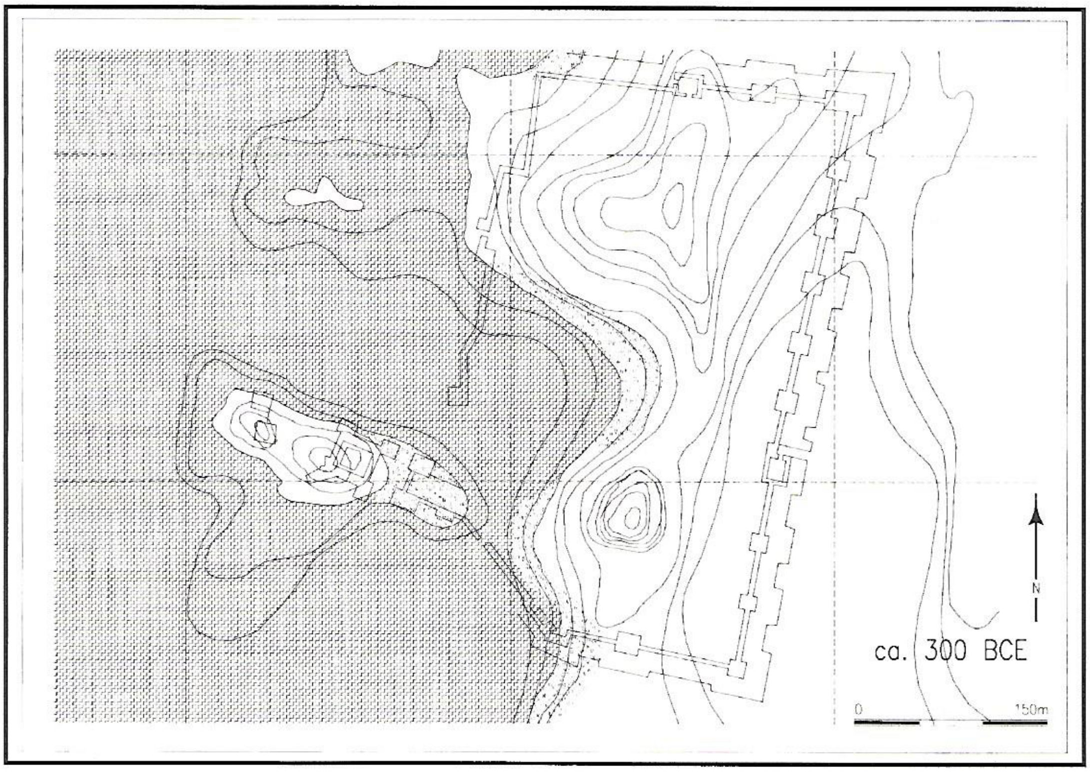

Figure 1. Sketch plan of the central area of Caesarea before Straton's Tower had been established. Drawing by the author with Anna Iamim. Except as noted, all illustrations are by the author.

sponds quite nicely with the style of the pre-Herodian quay at the north bay and other Phoenician harborworks at ʿAtlit and Akko.[11]

The proposed date for that tower, the other two at the North Wall, and the basic issue of the whereabouts of Straton's Tower have been discussed by us and by others elsewhere,[12] but it is important to consider Josephus' entries referring to that pre-Herodian town, from which one must deduce that it was fortified during the time of the tyrant Zoilos and had a harbor (very probably closed within the confinement of the city walls in the best Hellenistic tradition of the *limen kleistos*), the size of which was

[11] Raban, "City Walls," and idem, "The Ancient Harbours of Israel in Biblical Times," in A. Raban, ed., *Harbour Archaeology*, BAR Int. Ser. 257 (Oxford, 1985), 30–44.

[12] Raban, "City Walls"; A. Raban, "In Search of Straton's Tower," in *Caesarea Papers*, 7–22; J. A. Blakely, "Stratigraphy and the North Fortification Wall of Herod's Caesarea," ibid., 26–41; T. W. Hillard, "A Mid-1st Century B.C. Date for the Walls of Straton's Tower?" ibid., 42–48; see also the chapter by Robert R. Stieglitz in this volume.

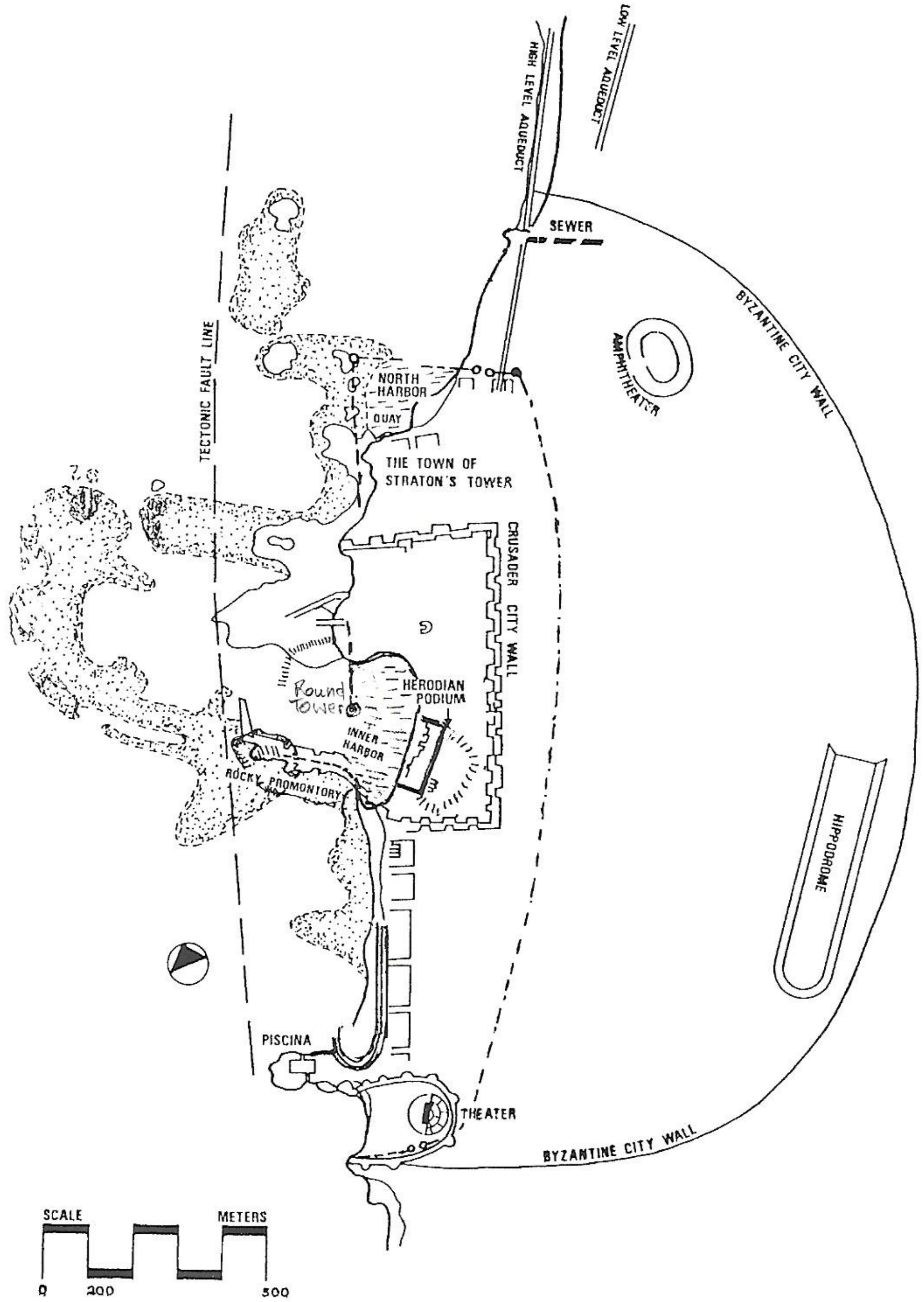

Figure 2. Sketch of tentative plan of Straton's Tower in Zoilus' era

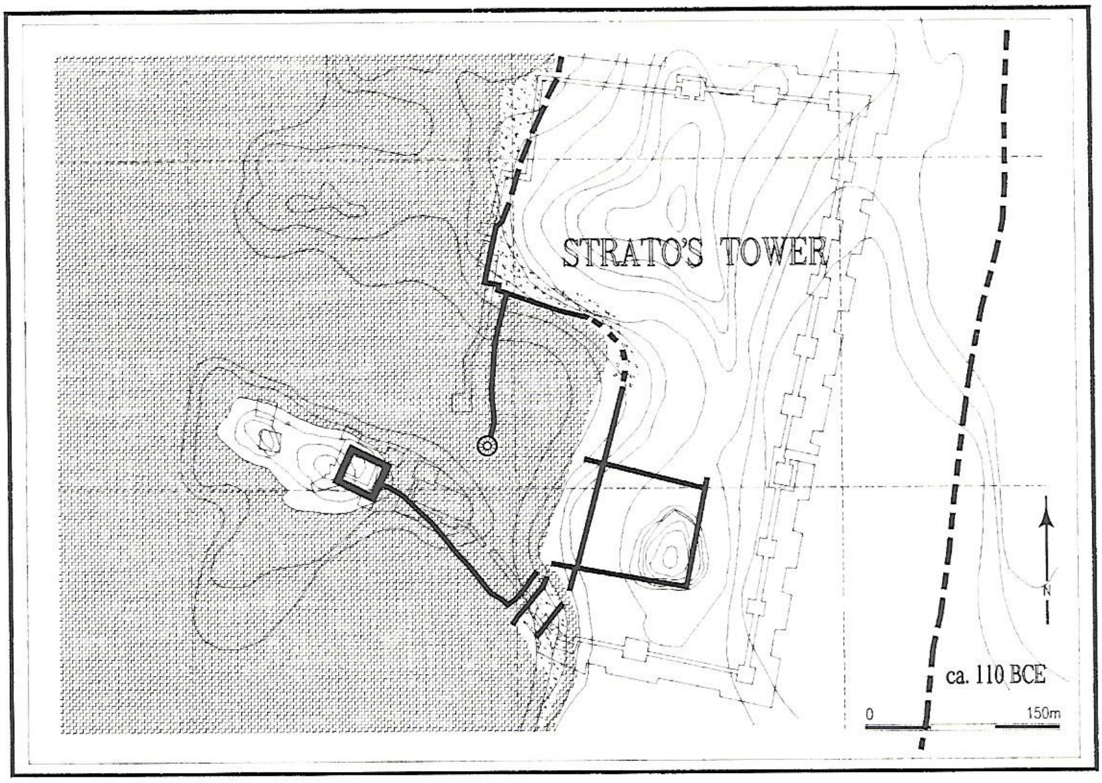

Figure 3. Sketch plan of the inner basin ca. 110 B.C.E. Drawing by the author with Anna Iamim

larger than contemporary Dor (80 acres).[13] With all these circumstantial data in mind one would consider the round tower and some fragmentary pre-Herodian ashlar structures parallel to the eastern quay of the inner basin, on its lee,[14] as components of what might be considered as the *hormos* (anchorage) of Zoilos' Straton's Tower (figs. 2–4). The very location of the round tower does not fit any reasonable layout other than that of a protecting feature at the entrance to a closed basin (*limen kleistos*). As such it would not fit the overall layout of Sebastos, as it was described by Josephus, or any later harbor (see below). An intriguing issue is the absence of any significant remains of a seawall which should have connected this tower to the north shore, encompassing the town of Straton's Tower along its western side.

The relatively large quantities of third to second century B.C.E. sherds within the thin layer of fine mud that covers the rocky floor in the inner basin next to its east-

[13] See Raban, "In Search of Straton's Tower," 21–22.
[14] Cf. Raban et al., *Field Report* (1992), 37–41, figs. 77 (W078), 78, 81, 82, 83, 88.

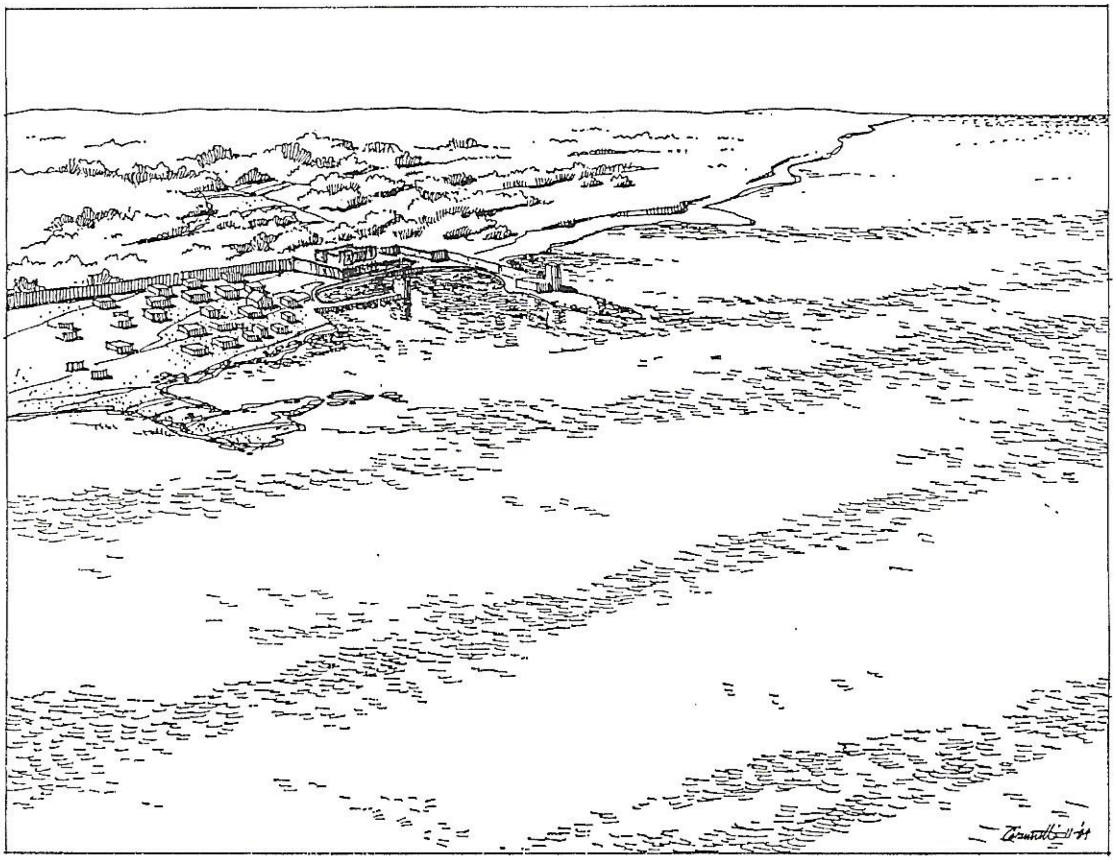

Figure 4. Artist's rendering of the southern half of Straton's Tower. Drawing by S. Giannetti

ern quay, at area I1 of the Caesarea Ancient Harbour Excavation Project (CAHEP), illustrates a situation when there was a still body of seawater (attested by the multitude of *ostreae* shells) in that period.[15] The conjectural conclusion must therefore be that the area of the inner basin was devoid of any wave energy, with no supply of sand and eroded sherds prior to Herod's time. Yet the earliest quays around that basin studied so far are all of the molded mixture of rubble and pozzolana, a building compound not known to the Hellenistic Levant before the last century B.C.E. (see also below).

There is, though, one exception, at the very northwest end of that basin, at CAHEP's area S2 (fig. 5). The quay there (W1) was exposed during the 1986 season in two places, some 10 m. apart. In both places it was found to be built of ashlar blocks with no binding matrix, and in both places *ostreae* were found along the south face to

[15] Cf. Holum et al., "Preliminary Report," 89–93.

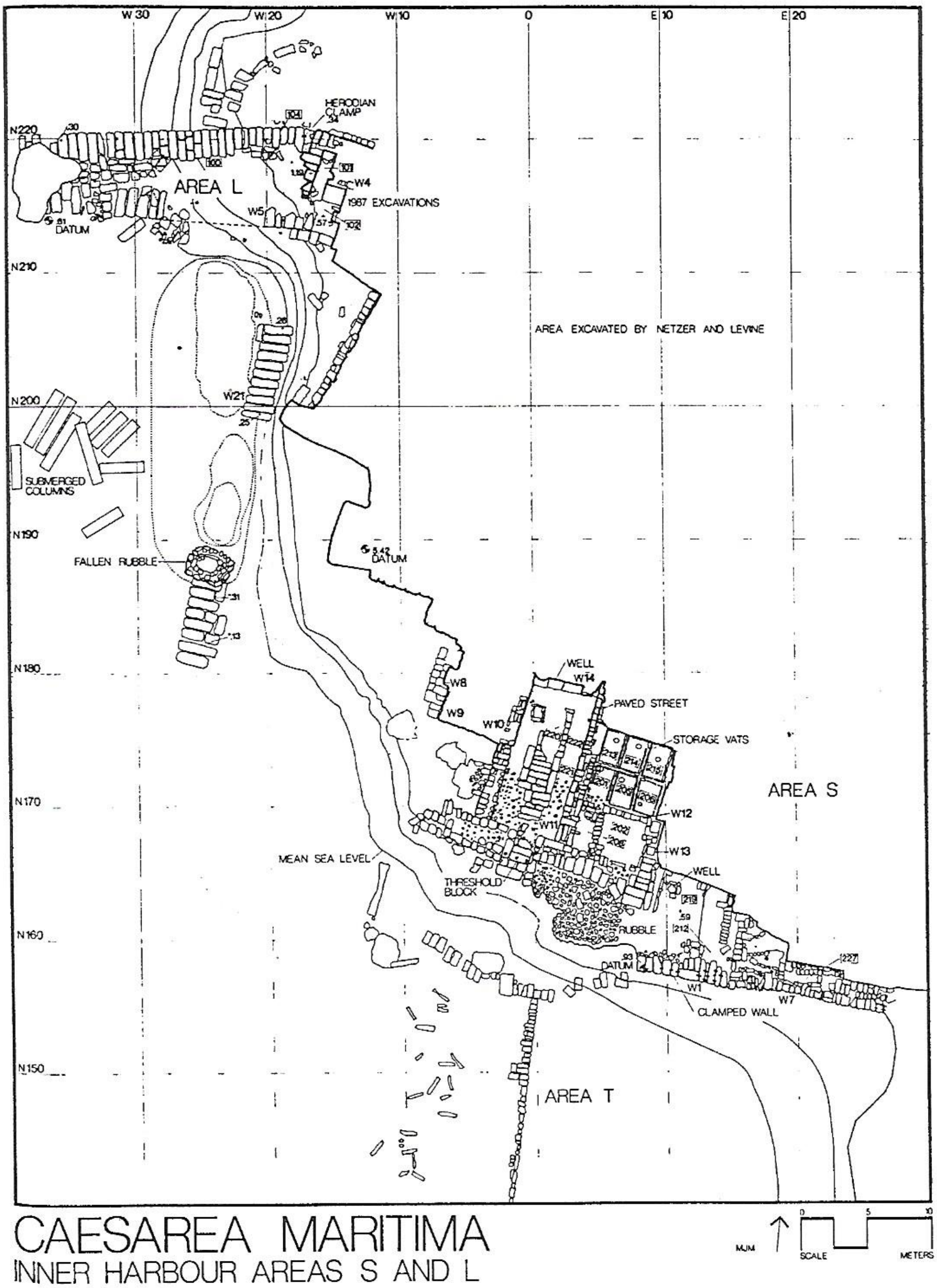

Figure 5. Top plan of CAHEP area L and area S after the 1986 season. Drawing by S. Sachs

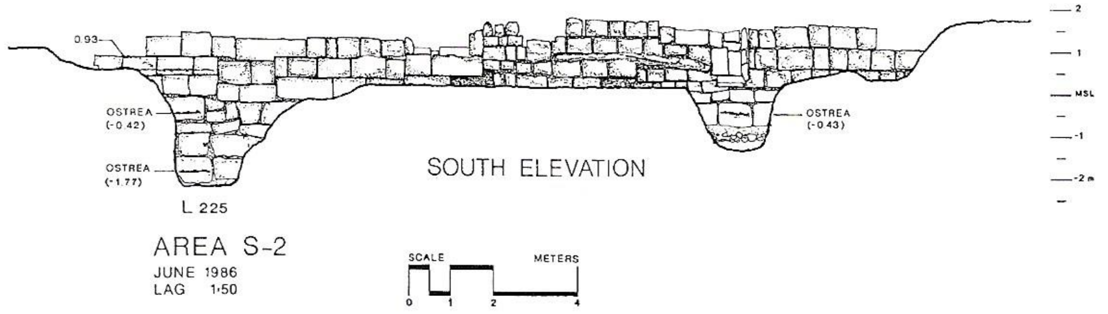

Figure 6. South elevation of W1 at area S after the 1986 season. CAHEP drawing

-0.42 cm. below M.S.L.[16] The western probe went down to almost 2 m. below M.S.L., with bedrock being reached at about -2.7 m., by water jet probe (locus **225**; cf. fig. 6). This quay, and perhaps also the header paved passage northwest of it (fig. 5, **220**), might have been built earlier than Sebastos, for the harbor of Straton's Tower, at a time when the relative sea level was lower by as much as 0.4 m. Such data would fit the Hellenistic era better than the Herodian one.[17] A related issue might be the original date for the Phoenician-style ashlar jetty of headers and its adjacent quay at the nearby area S1 (CAHEP's former area L),[18] but this is not part of the inner basin, and should be discussed elsewhere.

The Inner Basin of Sebastos

The study of the inner basin as the innermost one of Sebastos is based on the assumption that it was during Herod's time that the entire complex of the harbor and its basins was established, formed, and executed as the initial part of the urban master plan described by Josephus (*BJ* 1.408–14; *AJ* 15.331–41). For that reason, any wooden formed, cemented compound of rubble and pozzolana that can be related to the quay and adjacent structures at its lee have been considered Herodian, unless proved otherwise. Two additional dating facts for that original building phase of Sebastos are that the formed cement walls are set directly on the bedrock, and that remains of wooden planks from the forming caissons are dated by calibrated C-14 analysis to over 2000 B.P. With that in mind we can summarize the relevant data exposed during our recent excavations as follows (from north to south; for the location of various probes, see fig. 7).

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[16] Raban, *Site*, 173–77; R. R. Stieglitz, in *IEJ* 37 (1987), 188.

[17] See Raban, *Site*, 293–95.

[18] Ibid., 151–54. Recently we have cleared the fill next to that quay (W021), to the west, and found that it lies on the bedrock at -0.6 m. below M.S.L.

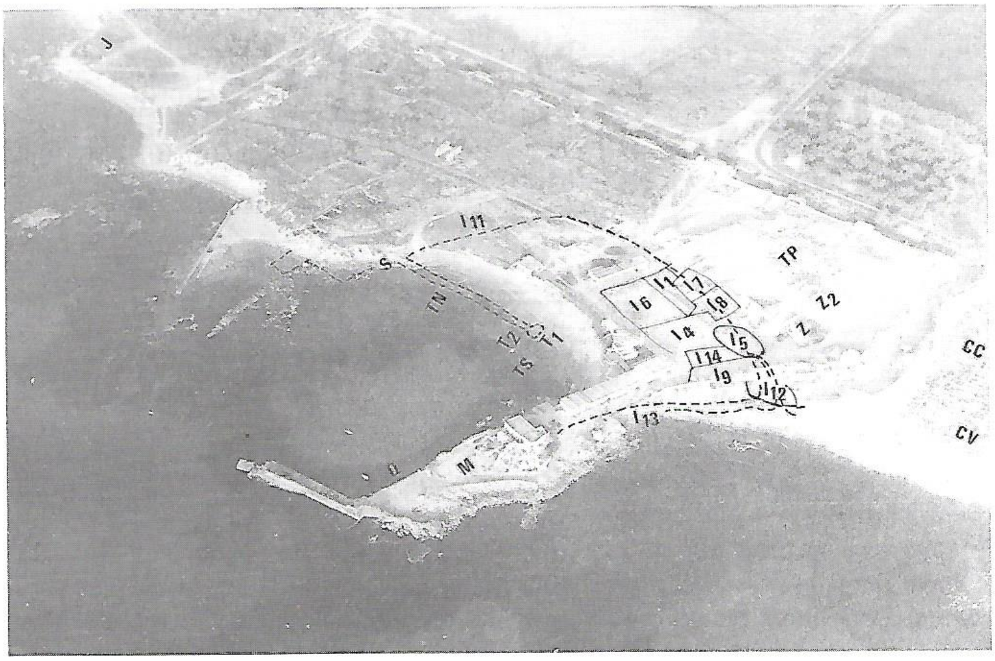


Figure 7. Aerial photograph of the area of the Inner Harbor and its surroundings, with the various probes marked

Figure 8. The cast seawall at I11, from the west

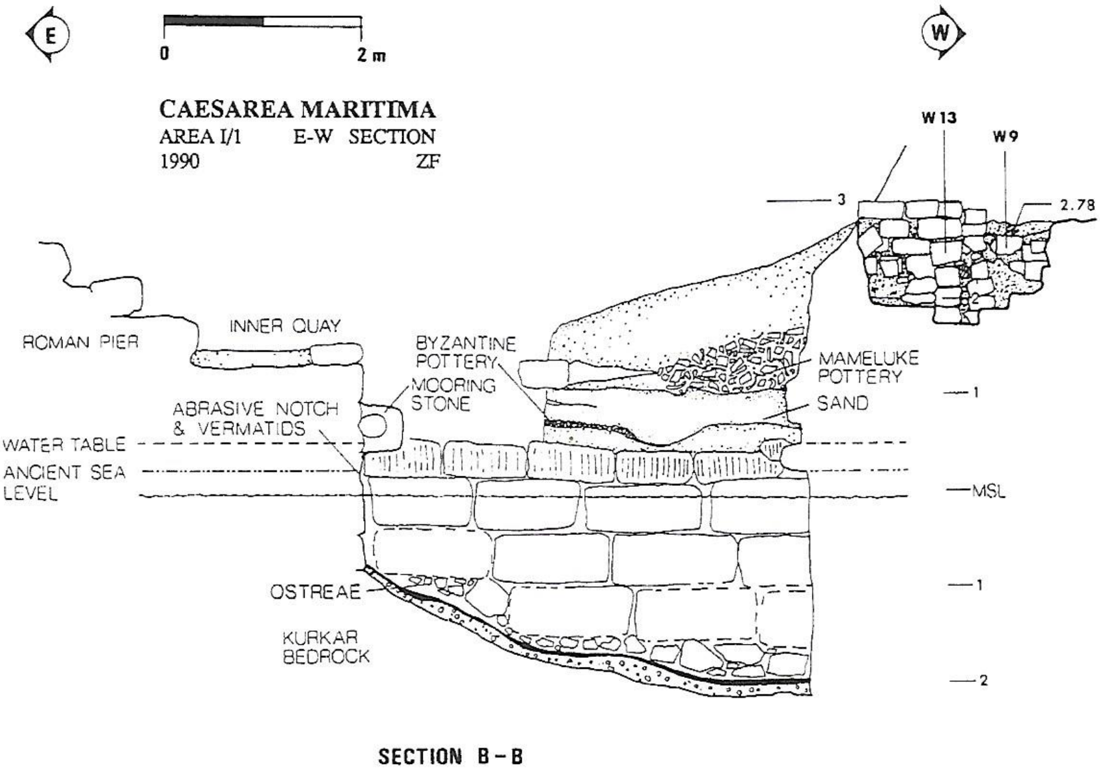


Figure 9. Section at the eastern quay in area I1

(a) *Area I1* is the probe made during the 1992 season at the northeast side of the inner basin.[19] There caisson-formed cement wall W518 has been exposed. It was cast on bedrock sloping gently toward the south-southwest, with its surface at -0.16 m. below M.S.L. The width of that cast wall is 1.85 m. and its height 1.2 m. This wall had been laid along what was at that time the water line of a bay with a thin layer of fine sand covering its rocky beach. At the lee of that wall there is an artificial fill of fine sand mixed with carbonates and dissolved lime. The large quantity of molluscs, typical of brackish water, indicates that this fill was saturated by a mixture of fresh groundwater and seawater, open to the air above, and adjacent to sea level at least 0.2 m. higher than the present M.S.L. Some time later, but still before the mid-first century C.E., both the fill on its lee and the top of the cement wall were covered by a concrete floor (F511) about 0.2 m. thick and very coherent. On top of that floor there were sherds of the Herodian era (fig. 8).

[19] R. Toueg, in Raban et al., *Field Report* (1992), 44–46, figs. 13, 21 (top plan), 94–97.

Figure 10. The flushing channel at the lee of the eastern quay in area I4, looking south

(b) *Area I1*, at the midsection of the eastern quay, west of the northwest corner of the Temple Platform (fig. 7), is the one that has been under study since 1976.[20] The more it is studied, the more complicated the data become. Yet its original phase, though covered in many places by later renovations and additional structures, is of a clearly discerned character: a vertical seawall, of which only the western face is exposed, had been installed on a leveled edge of rather crumbling kurkar, at -0.85 m. below M.S.L. Within its upper part a pierced stone slab was incorporated, with the center of its horizontal hole for mooring at 0.7 m. above M.S.L. (about 0.4 m. above the ancient one). The formed mixture of rubble and hydraulic concrete (pozzolana) was topped by a single course of ashlar headers to a height of 1.65 m. above the pre-

[20] Raban, *Site*, 80–81, 132–37; Raban et al., *Field Report* (1992), 15–22.

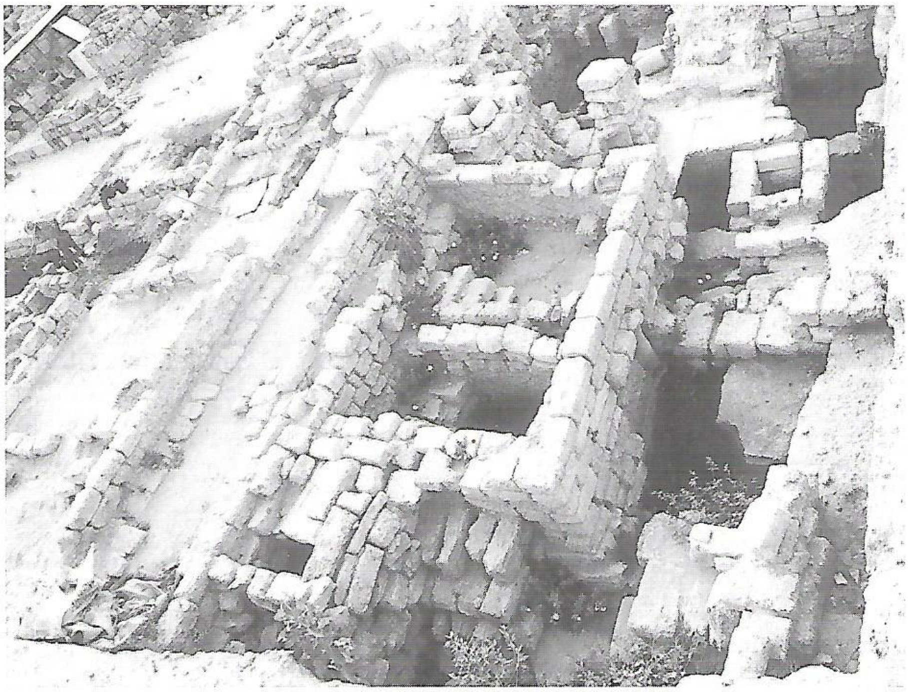


Figure 11. Area I5 from the southwest; well 342 is within channel 360 at the top right-hand side

sent M.S.L. (fig. 9). The highest elevation of *ostreae* shells on the face of this wall indicates that sea level was about 0.3 m. higher than the present M.S.L. when seawater reached that wall, probably in the second or early third century C.E. (see below).

(c) *Area I2*, just south of I1. There the line of the eastern quay has been exposed below the floor of one of the Fatimid bins (1295),[21] at 1.16 m. above M.S.L., built of ashlar slabs. Yet, in another bin of that group, which was later used as a well (loci **1212**, **1255**), the mosaic floor of the bin seems to have been laid over concrete that extends west of the line of the eastern quay.[22] The same type of concrete was exposed at 1.17 m. above M.S.L., even farther to the west, during the 1993 season, at locus **951**, under an eighth-century C.E. floor. Thus it is probable that there was some kind of projecting cast jetty at that area, which is still hidden under later structures.

(d) *Areas I4, 5,* two adjacent probes along the eastern quay. In both, the original structure was partly dismantled and rebuilt with topping courses of very large ashlar blocks. I4 is a probe attempted during the 1989 season. The quay there was found to be 2.6 m. wide and laid on leveled bedrock at 0.3 m. above M.S..L on its lee and -1.05 m. below M.S.L. on its western side.[23] Farther north along the eastern quay

[21] Raban et al., *Field Report* (1992), figs. 27, 48.
[22] Ibid., 22–24, fig. 41.
[23] Holum et al., "Preliminary Report," 89–90, figs. 16–18.

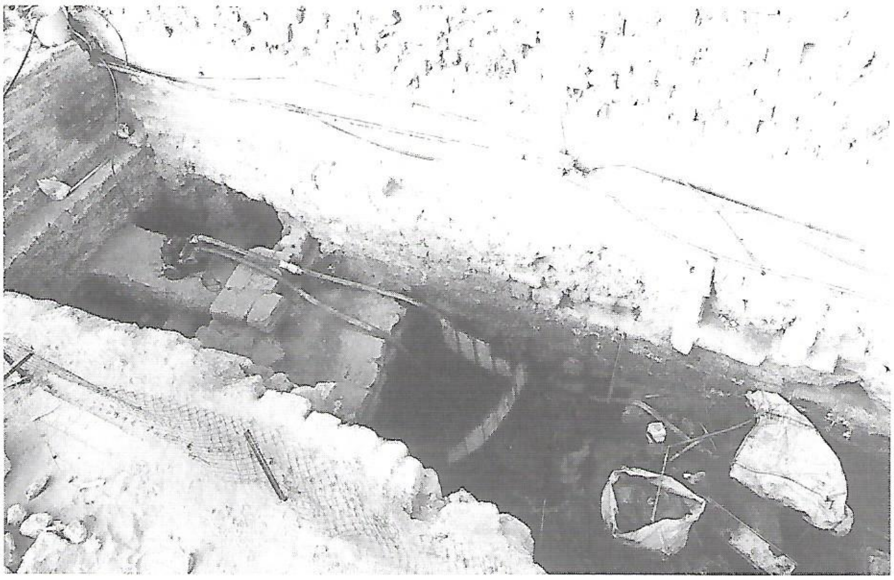


Figure 12. Area I9 looking south. The pump is laid on the Byzantine floor that covers the flushing channel. Photograph by Zaraza Friedman

(locus **1271**), the entire height of the seawall seems to be a later replacement of the original Herodian one, and such is the case for the adjacent area at its lee, which was disturbed and penetrated by various Early Islamic cisterns and wells (fig. 10). There the very northern surviving segment of a flushing channel has been exposed. It is a plastered structure that was molded in hydraulic concrete with its 0.8 m. wide floor at 0.89 m. above M.S.L.[24]

A similar situation has been found at I5, but at this more southern segment of the quay, there were two crushed kurkar floors, of which the lower one (**359**), at 1.21 m. above M.S.L., was based on a fill of crushed kurkar, mixed with some sherds that would date it to the Herodian era.[25] Beyond that floor, some 6 m. at the lee of the quay, there is a Byzantine square wall (**342**) that pierced through another, better preserved segment of the flushing channel (**360**). That channel was found to be deliberately filled with a mixture of fine, dark clay, in which many *ostreae* and sherds are incorporated (fig. 11). Careful reading of every significant sherd and any readable coin enabled us to suggest that this fill had been dredged from the bottom of the inner basin early in the third century C.E. (a coin of the Roman Emperor Septimius Severus, 193–211 C.E., is the latest datable item found in that context so far).

(e) *Area I9* is next to the base of the southern medieval city wall, just east of the gatehouse of the "Jaffa Gate."[26] There the eastern quay was found to be crossing under-

[24] Raban et al., *Field Report* (1992), 27–31, figs. 50–52.
[25] Ibid., figs. 49, 54, 58.
[26] Y. Porath, in *Hadashoth arkheologioth* 105 (forthcoming).

Figure 13. Area I9, locus **906,** from the west: the quay, excavated almost to the bedrock

Figure 14. The quay at area I12, looking from the southwest. Photograph by Zaraza Friedman

Figure 15. The face of the quay at I12, from the west. Photograph by Zaraza Friedman

neath the foundation of the Early Islamic wall, and to be topped by three courses of ashlar slabs that are incorporated with a floor of beaten soil. That floor and the fill that substantiated it cover two channels (fig. 12). The western one resembles, by form, size, and elevation, the flushing channel exposed in I4 and I5, though its floor is somewhat higher (0.95 m. above M.S.L.). The original quay incorporates three courses of cut stones; the upper one is of headers of considerable size with its base well abraded by the sea. The *ostreae* shells were found up to its base (fig. 13) at 0.3 m. above M.S.L. The lower course of cut stones is embedded in the cast mixture of rubble and pozzolana, which had been laid on bedrock at -1.4 m. below M.S.L.

(f) *Area I12* is the southeastern corner of the inner basin. Here the excavations followed the course of the eastern quay toward the south bay and exposed its curved turn toward the west (fig. 14). In that area the original quay has survived to a maximum

Figure 16. The flushing channel at I12, from the south

height of only 0.6 m. above the M.S.L., topped by later added blocks. The only surviving course of heavily eroded headers had been originally incorporated with molded concrete, composed of rubble and pozzolana, much like in I9 (fig. 15). The probe made next to it went through a very disturbed mixture of shells, sherds, and wave-deposited coarse sand. The rate of abrasion on the surface of the quay indicates that it was exposed to extensive water energy for a rather long period. The cast quay was found to be laid directly over a gently sloping surface of beachrock, at -0.9 m. below M.S.L. Below the beachrock there is sand with no sherds or any other manmade artifacts. At the lee of the quay, to the east, a wide and rather shallow flushing channel was found, in continuation of that in I4, 5, and 9. The floor of the channel in I12 is more than 1.4 m. wide and it gets wider, shallower, and lower in elevation toward the south (fig. 16).[27]

[27] Ibid. I am grateful for the oral information given to me by Dr. Porath, who excavated the "Land Site" at I9 and I12.

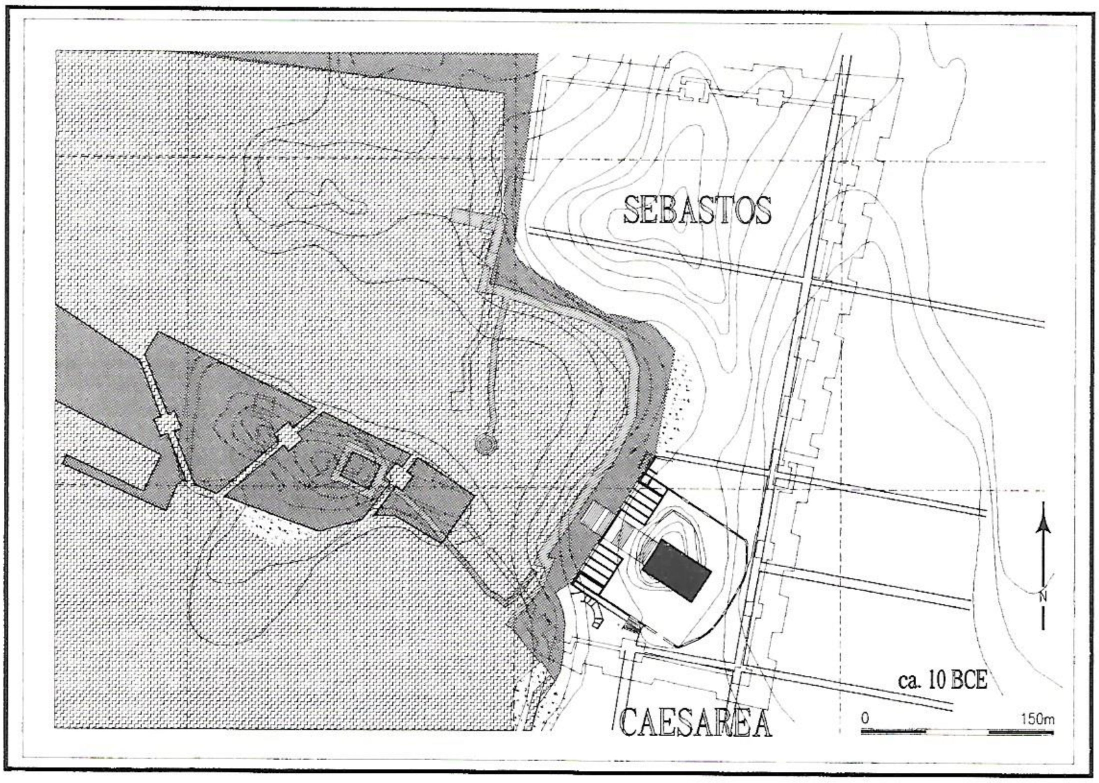


Figure 17. Sketch plan of the inner basin of Sebastos. Drawing by the author with Anna Iamim

It seems as if that flushing channel had been fed from the wash of the waves over the rocky beach of the nearby South Bay (even today there is no deposition of sand at that place). The incoming water would rush into the ascending channel to a point somewhere between I9 and I5, where we assume there was a settling basin, with sluice-gates and threshold at just over 1 m. above M.S.L. From that alleged basin the flushing water would run down through the channel and would flow into the back of the inner basin at area I4. Unfortunately, that part of the quay went through a series of modifications in a later period, so the exact whereabouts of the turn of the course have not survived. Based on the data summarized above, the following drawings represent the reconstruction of the Inner Harbor as it was incorporated by Herod's engineers within the overall complex of Sebastos (figs. 17, 18).

The Inner Harbor During the Later Roman Era

As a topographic "terminal" for sediments, the inner basin's water depth was most sensitive to any deficiency of the flushing system or altered rate of wave energy at its west-

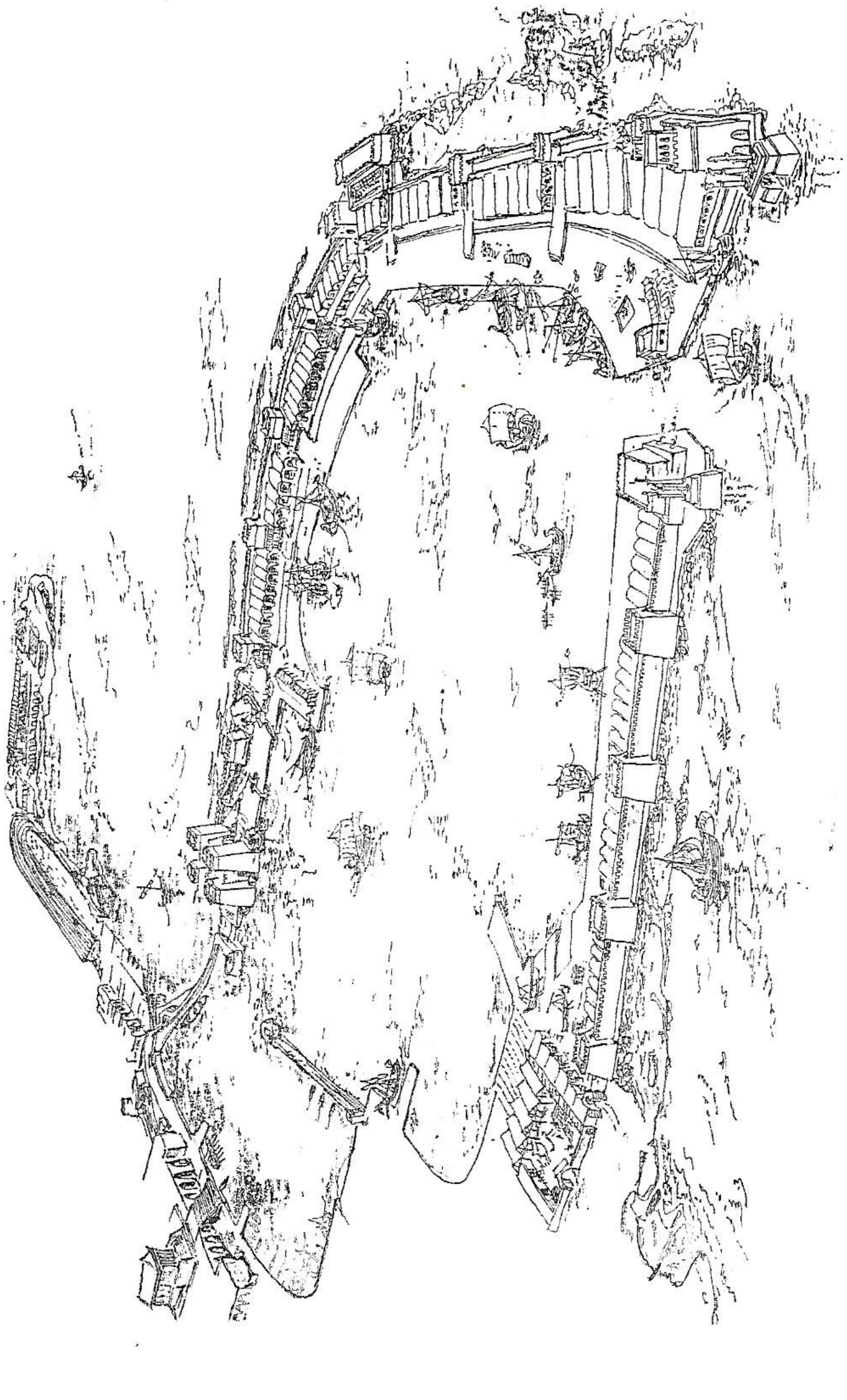


Figure 18. Artist's rendering of Sebastos. Drawing by the author and Christopher Brandon

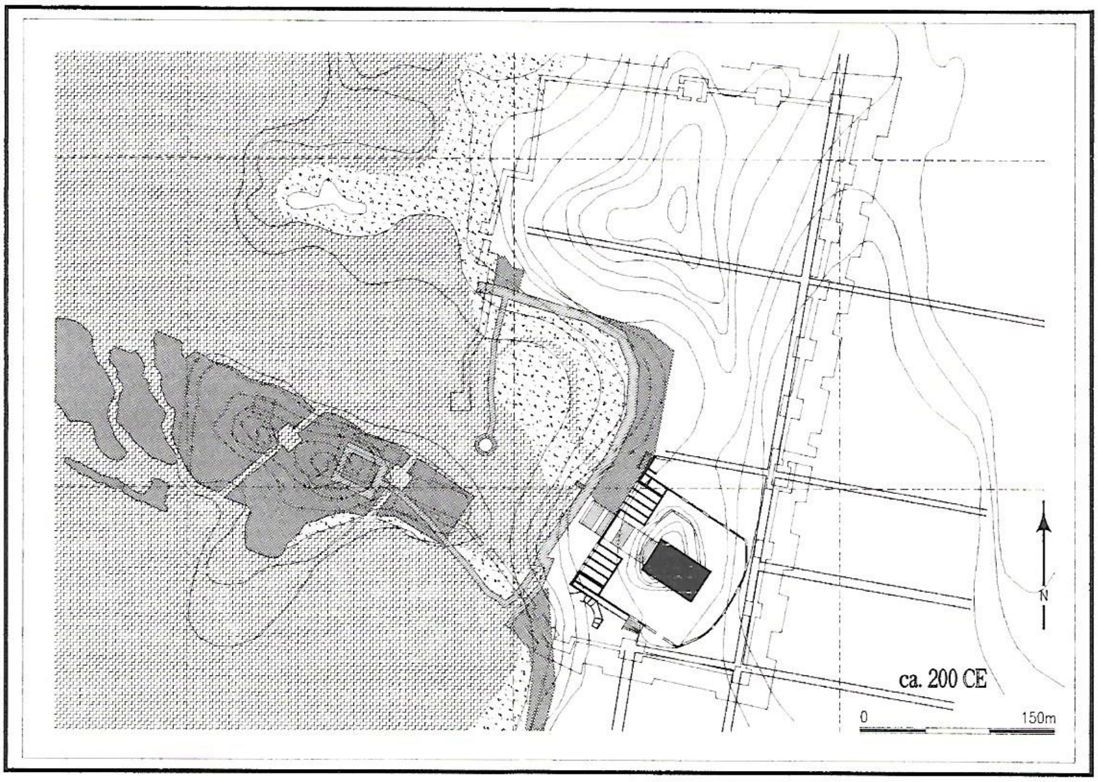


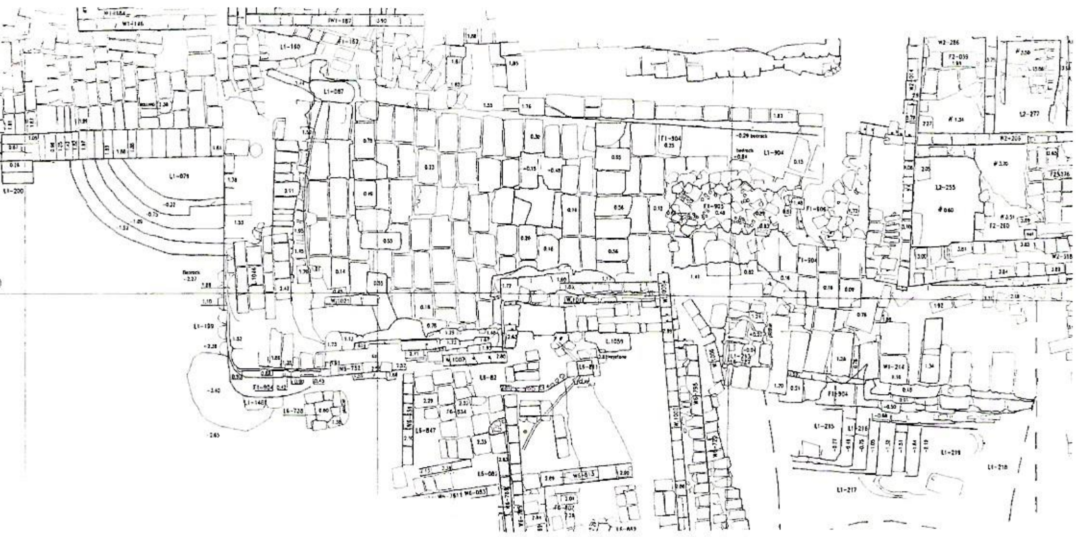
Figure 19. Sketch plan of the inner basin toward the end of the second century C.E. Drawing by the author with Anna Iamim

ern entrance. It seems that the original depth of the inner basin of Sebastos was properly maintained for more than a century, with properly functioning flushing system, relatively narrow entrance channel (between the Round Tower T1 and the "Harbor Citadel"), and probably occasional dredging attempts. The thin layer of fine mud, encrusted by rather extensive colonies of *ostreae*, is good evidence to attest to it.[28]

Yet there is circumstantial evidence to suggest that the main mole of Sebastos had lost integrity already toward the end of the first century C.E., and that the surge overran it, into the harbor's basins, in an ever increasing manner, all though the following two centuries.[29] From the theoretical model for sedimentation and the thus far sketchy

[28] Holum et al., "Preliminary Report," 89–93.

[29] For the wreck site of the late first century C.E. over the northern tip of the main mole, see Christopher Brandon's chapter in this volume; Holum et al., *Caesarea Papers II* (forthcoming): the preliminary report for the CCE 1993–94 seasons; A. Raban, "New Data from the Study of Caesarea and Its Harbors" [Hebrew], in E. Shiler, ed., *Ariel* 102–3 (Jerusalem, 1994), 119–33. For other data see A. Raban, "Sebastos: The Royal Harbour at Caesarea Maritima: A Short-lived Giant," *IJNA* 21 (1992), 111–24; *Caesarea Papers*, 68–74.



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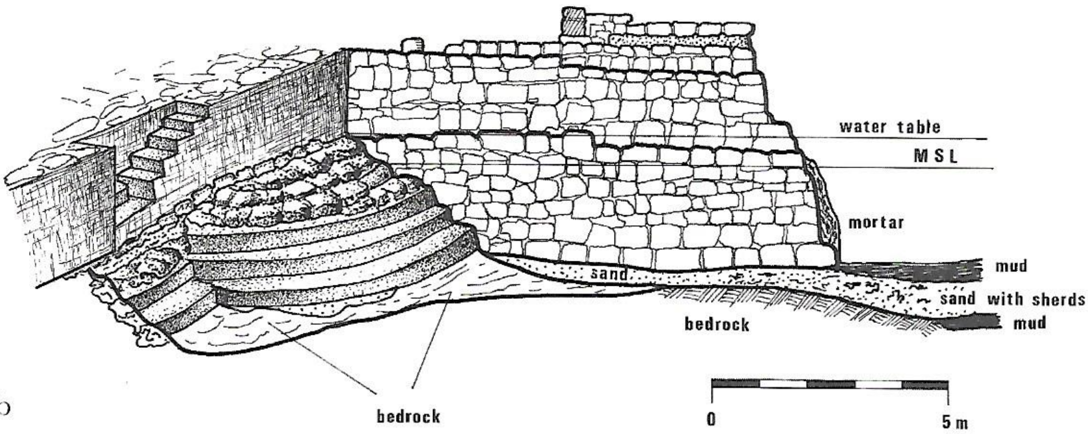

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Figure 20. Plan and northern elevation of the circular staircase at I1

data we have from core drills made within the inner basin, it seems to us that sand started accumulating soon after 70 C.E., mostly at its northern half and next to its southern seawall (fig. 19). The still operating flushing channel at the SE seemed to allow navigation in the area between its outflow and the western entrance. Yet sometime during that period an attempt was made to add a protruding quay to the seaward facade of the eastern quay, at the area facing the entrance and adjacent to the molded Herodian jetty on its northern side (area I1 and I6). This quay was built of loosely fitted large ashlars, laid over a layer of sand, some 0.3–0.6 m. thick, mixed with abraded seashells and Early Roman sherds, which had been silted from the original floor of the Herodian basin. The quay was built up to about 0.4 m. above the present

Figure 21. The staircase in I1, looking from the northwest. Photograph by Zaraza Friedman

Figure 22. The lower north corner of the staircase in I1 at the point where it meets the bedrock. Photograph by Zaraza Friedman

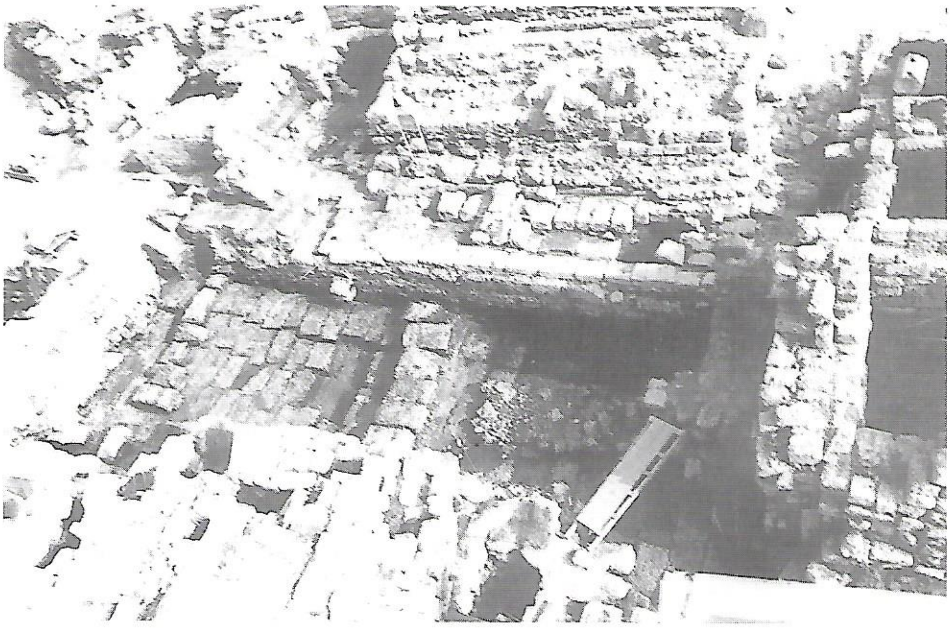

Figure 23. Overview of part of I1 and I6, showing much of the second- to third-century C.E. quay and some of the later structures over it, looking northeast

Figure 24. The staircase in I6, looking east. Photograph by J. Gottlieb

Figure 25. The west face of the "New Quay" at I6 (locus **148**), looking from the west. The meter rod is at the present M.S.L. Photograph by Zaraza Friedman

M.S.L. Next to the NE corner, between that new quay and the Herodian one, a circular staircase was built, leading from the seafloor(!) to the face of the new quay, with its northern extension being cut in the bedrock next to the older one (figs. 20–22).

A second staircase was added next to the SW side of the new quay, along its western face, leading down southward from the water level of the time (0.4 m. above the present one?). This 1.2 m. wide staircase comprises seven steps (like the circular one) and was based on 0.3 m. of sand (over bedrock) at -2.1 m. below M.S.L. (figs. 23, 24). The face of the staircases was covered by gray plaster, rich in volcanic ash and pieces of charcoal. This plaster, which had been applied manually, also covered the face of the bedrock and the retainer of the western face of the quay, found at its NW end (I6,

Figure 26. The lower part of the western face of the new quay at I6 (locus **148**), looking from the west. Note the wooden post at the top of the retaining rubble and the *ostreae* over the plaster.

locus **148**). This retainer was made manually by laying courses of small rubble, mixed with cement, around wooden upright posts (figs. 25, 26).

The cement and the plaster were found to be very soft and noncoherent, after being rinsed for centuries in fresh groundwater. Yet the marine encrustation adds much to solidify their surface, indicating that the composition of both was calculated as a "marine" one rather than "hydraulic." The entire structure is of very intriguing character:

Why were there staircases leading from water level to the seafloor?

Why put a staircase at the mooring face of a quay (hampering boats from mooring next to the quay)?

Why have the top surface of a quay at about sea level?

How were the retainer wall and the plaster applied manually at an elevation down to almost 2.5 m. below sea level?

Even if we consider a situation when this part of the inner basin was already landlocked (as is the case today), it would have still been well below water table (which is about half a meter higher than M.S.L.). Calculating the rate of pumping needed in order to keep a caissoned area of a size demanded to accommodate this structure (which is 18 x 8 m.), in order to facilitate manual construction, one might arrive at a figure close to 5 $m.^3$ per minute to be pumped off day and night for as long as it took to complete the work!

As for the date of that structure, the best we can say at this stage is based on C-14 dating of the wood from one of the posts (ca. 1890 B.P.), and on the earlier non-eroded sherds of amphoras found at the base of the fill that covers its various components, which are of Spanish, Italian, and North African amphora types dated to the second–third century C.E.

Having no additional data from elsewhere in Caesarea, either from along its waterfront or in other parts of Sebastos, to suggest radical changes in land/sea relations during these centuries, the enigmatic features and the logic behind the construction of such a "quay" remain to be solved, hopefully by future research and exposure of additional data.

The later history of that structure seems to have been even more complicated. To judge from the fill next to it, to the north and to the west, there was a body of seawater here that was gradually filled up, mainly during the fifth century C.E., almost to water level with what seems to have been deliberately dumped broken vessels (mainly jars and amphoras), building stones, and decomposed plaster and cement, mixed with fine mud and covered by *ostreae* shells. This marine fauna indicates that seawater was flowing next to that structure at a pace that provided a continuous supply of oxygen but did not erode the sherds and carry in sand.

Some time during the first half of the third century C.E. the southern seawall of the inner basin was breached, either deliberately, by the people of Caesarea, or by the transgressing sea. One might argue for contemporaneous occurrence with other dramatic changes at the waterfront of Caesarea at that time, such as the abandonment of the amphitheater along the coast of the South Bay and its replacement by a new one farther inland;[30] the additional submergence of the western mole;[31] and the renovation of the western facade of the Temple Platform.[32] At that time the flushing channel at the southwest went out of use and was deliberately filled (see above). Instead, an uncontrolled flushing of seawater, carrying quantities of coarse sand, shingles, erod-

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30 Y. Porath, "Herod's Amphitheater at Caesarea: Preliminary Notice" [Hebrew], *'Atiqot* 25 (1994), 15.

31 Raban, "Sebastos," 113–19; R. L. Hohlfelder, "The Changing Fortunes of Caesarea's Harbours in the Roman Period," in *Caesarea Papers*, 75–78.

32 Y. Porath, at the ASOR annual meeting, 1993 (Washington, D.C.).

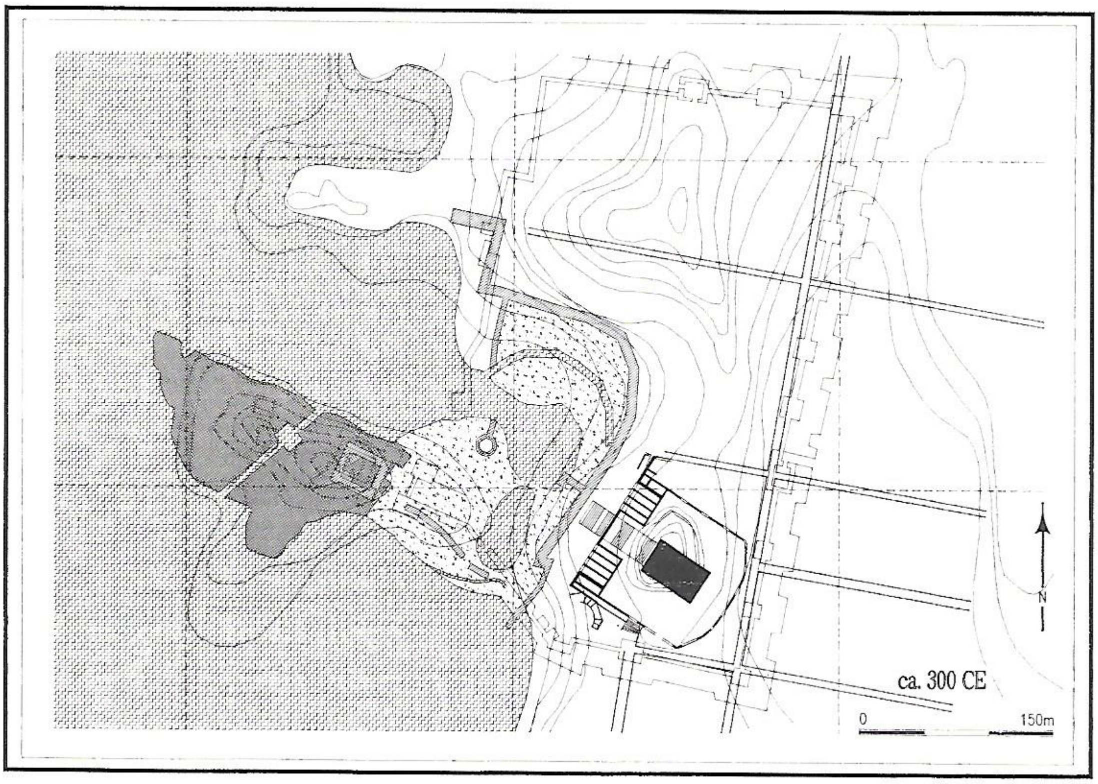


Figure 27. Sketch plan of the inner basin toward the end of the third century C.E. Drawing by the author with Anna Iamim

ed seashells (mainly *Glycimeria*), and sherds flowed in through the southern gap. The solid load was deposited next to the gap, within the SE corner of the inner basin. Additional sediments were brought up by the surge from the west, through the wide seafront that had been created following the dismantling of the western seawall. The double source of sediments created sandbars in the inner basin, with at least one big hollow filled with stagnant water at its southern side (fig. 27). A probe made in area I9, about a dozen meters west of the point where the eastern quay of the inner basin passes under the medieval city wall, has exposed, under the base of the Byzantine seawall (see below), a thick and very compact layer (locus **904**) of almost pure organic materials. The top of that layer is at -0.6 m. below M.S.L., and its base is above bedrock and a thin layer of sand at -2.3 m. below M.S.L. (fig. 28). The organic content of that layer included wooden branches, pieces of rope, mats, and woven baskets, and vast quantities of food remnants: fruit stones, olive and grape pits, fig seeds, cereals, beans, sesame seeds, chicken and cattle bones, and so on, all uncarbonized and nonoxidized and still retaining their original color and texture (fig. 29). The pottery found at that context and C-14 dates for samples of the rich organic repertory enable

Figure 28. The organic layer at I9, locus **904**, looking from the north. Photograph by Zaraza Friedman

Figure 29. Samples of typical food remains from locus **904**. Photograph by Zaraza Friedman

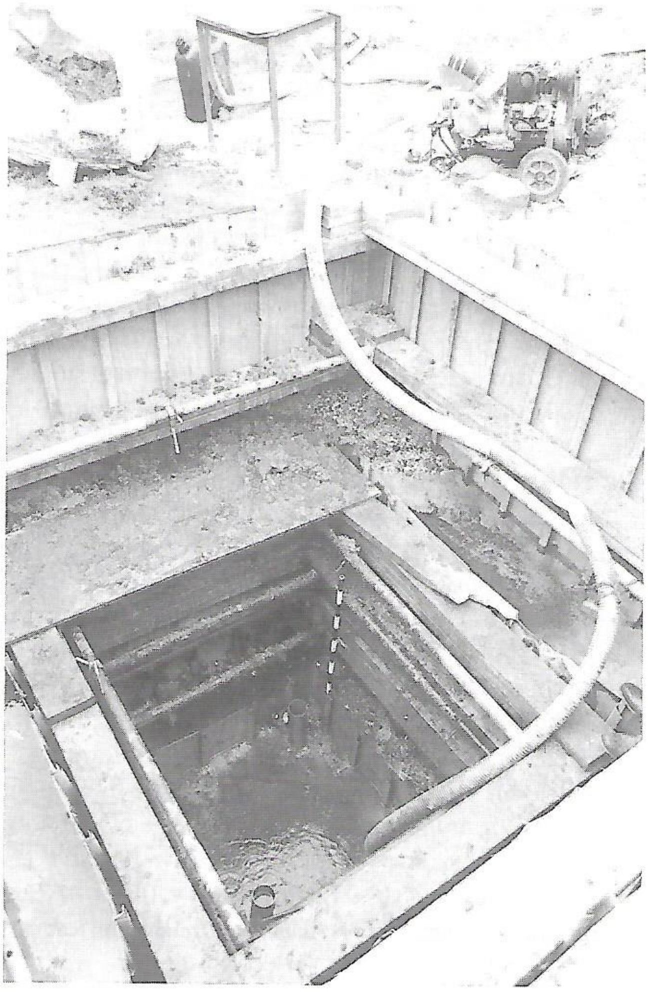
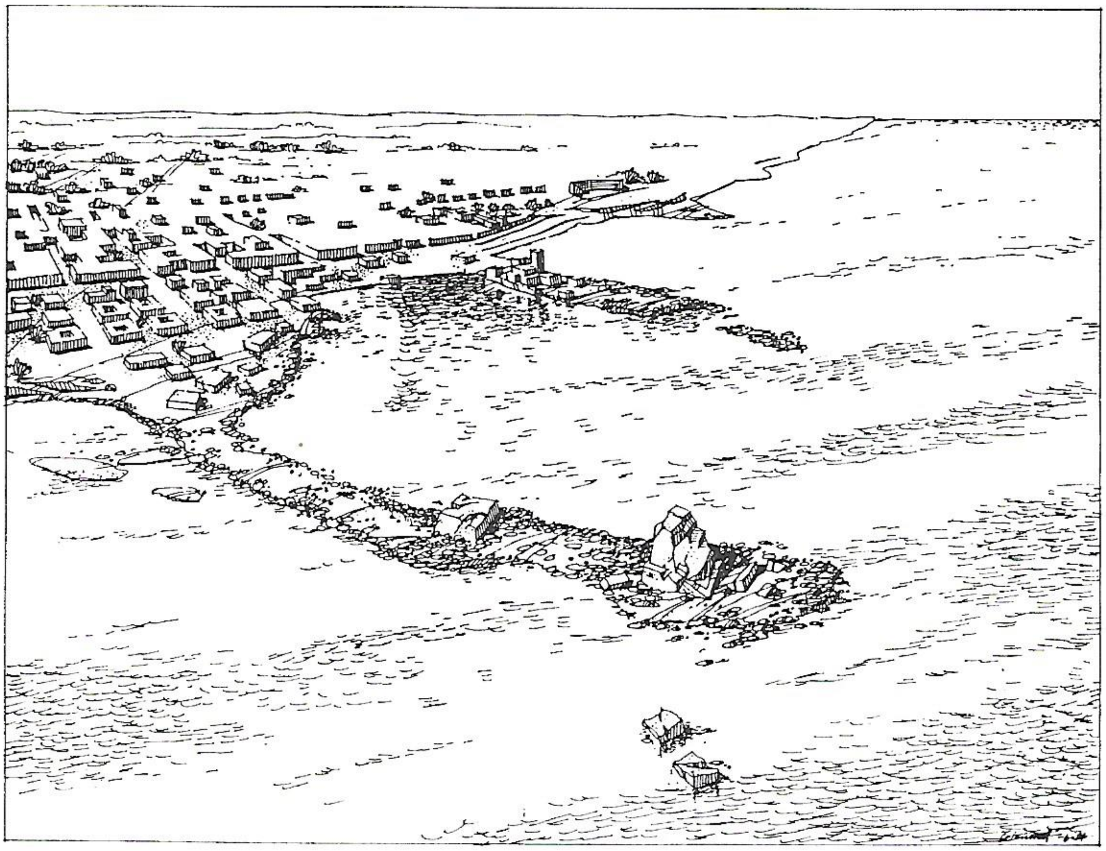


Figure 30. The shored probe (locus **700**) in I14. Photograph by Zaraza Friedman

us to date that dump to the late third to early fifth century C.E.

During the late months of 1993, a team of archaeologists from the Museum of London excavated an area designated as I14 within the southern part of the inner basin. In this project a well-shored probe was excavated in an attempt to study very carefully the alternating layers of sediments (fig. 30). There, too, a layer of compact silt with a high percentage of organic material, of the same type and state as in locus **904** of area I9, was found between -2.5 m. and -0.9 m. below M.S.L.[33]

[33] B. Yule and R. Rowsome, *Caesarea Maritima Interim Report of 1993 Season at Area I14*, Museum of London Archaeological Service, August 1994; V. D. Williamson, "Preliminary Sedimentological Assessment of Samples from the Inner Harbour at Caesarea Maritima," Geoarcheological Service Facility Technical Report, 94/05 (1994), Institute of Archaeology, University College, London. For further updated information see B. Yule, *Caesarea Papers II*.



BYZANTINE PHASE

Figure 31. Artist's rendering of the harbor after Anastasius' renovation ca. 500 C.E. Drawing by S. Giannetti

We can then deduce that, during the Later Roman era and probably as late as the mid-fifth century C.E., the inner basin went through a process of decay that was perpetuated by the continuous addition of deposited, wave-carried sediments and urban dump. Yet there was a rather confined body of flowing seawater along the southern half of the eastern quay, with possible access for small navigating vessels entering it from the west, through a narrow passage next to the round tower.

The Inner Basin during the Byzantine Era, to the Mid-sixth Century C.E.

The next stage in the history of natural processes and human responses is tentatively dated by us to ca. 500 C.E. For that time period we have a rather unique reference to imperial funds made available to the people of Caesarea by Anastasius I (491–518

C.E.) for "amending the ill-fated harbor and for its restoration as a navigable one."[34] So far the only structural remains that have been traced along the external harbor basin which can be connected with that effort are a rather extensive, loosely laid rampart comprised of small rubble. This follows and covers the inner half of the northern main mole and continues beyond it to the west, filling up the original harbor channel, and reaches the northern tip of the western mole (fig. 31).[35] At the present stage of fieldwork we cannot suggest the whereabouts and character of the water line at the lee of Anastasius' mole, yet it is quite clear that it was at least 50–60 m. west of the eastern quay of the inner basin. Some time before Anastasius' building attempt, the area of the inner basin had been covered by depositions of wash-carried beach materials characterized by heavily eroded small sherds, seashells, and coarse sand. That type of deposition has been found everywhere within the inner basin, over those of the previous era, described above.[36]

Everywhere along the eastern and southern edge of the inner basin there are very impressive remains of major architectural features which are tentatively related to that imperial-initiated building project allegedly sponsored by Anastasius. Most probably the renovation of the entire Temple Platform, including the renovation of the pediment vaults, extension of the retaining walls on the north and south sides, the construction of a large staircase that led from the eastern edge of the former inner basin to the Temple Platform and, the building of the octagonal monument (the alleged "Martyrium of St. Procopius") were all parts of that project.[37] During that building phase, temporarily designated by the Combined Caesarea Expeditions (CCE) as stratum XI, a new seawall was established along the south side of the inner basin, within the line of the former, breached one, at a course later to be used as the base for the medieval city wall.[38] That seawall (fig. 32) was exposed during the 1992 season by Y. Porath, for the Israel Antiquities Authority (IAA), and also in our 1993 probes in area I9, extending for more than 40 m. just west of the eastern quay of the inner basin. That wall was based on a foundation comprised of reused column shafts that had been laid within the layer of beach deposits described above in a rather loose manner. Over it, there is a well-constructed ashlar structure of a considerable width (probably 3 m. or more, but its southern face is buried within the later medieval wall), with its surface sloping gently toward the west (being at about 1.6 m. above M.S.L. next to the old quay and only 1.2 m. above M.S.L. 20 m. farther to the west). It is interesting that the easternmost end of that wall is about 3 m. west of the line of the eastern quay. Apparently a passage was left open by the Byzantine builders, enabling excess seawater

[34] Cf. Procopius of Gaza, *Panegyricus in Imperatorem Anastasium*, *PG* 87.3:2817, §19.

[35] Raban, *Site*, 130–31, 290–92; *IEJ* 38 (1988), 273–75.

[36] Raban et al., *Field Report* (1992), 20–22, 26–27.

[37] Cf. Holum et al., "Preliminary Report," 100–107; Raban et al., *Field Report* (1992), 37–42 (areas I7, I8, and the date of the staircase), 50–51 (the southern retaining wall of the Temple Platform in area Z2), 54–55 (the Temple Platform).

[38] Y. Porath et al., *Excavations and Surveys in Israel* 9 (1989–90), 132–34.

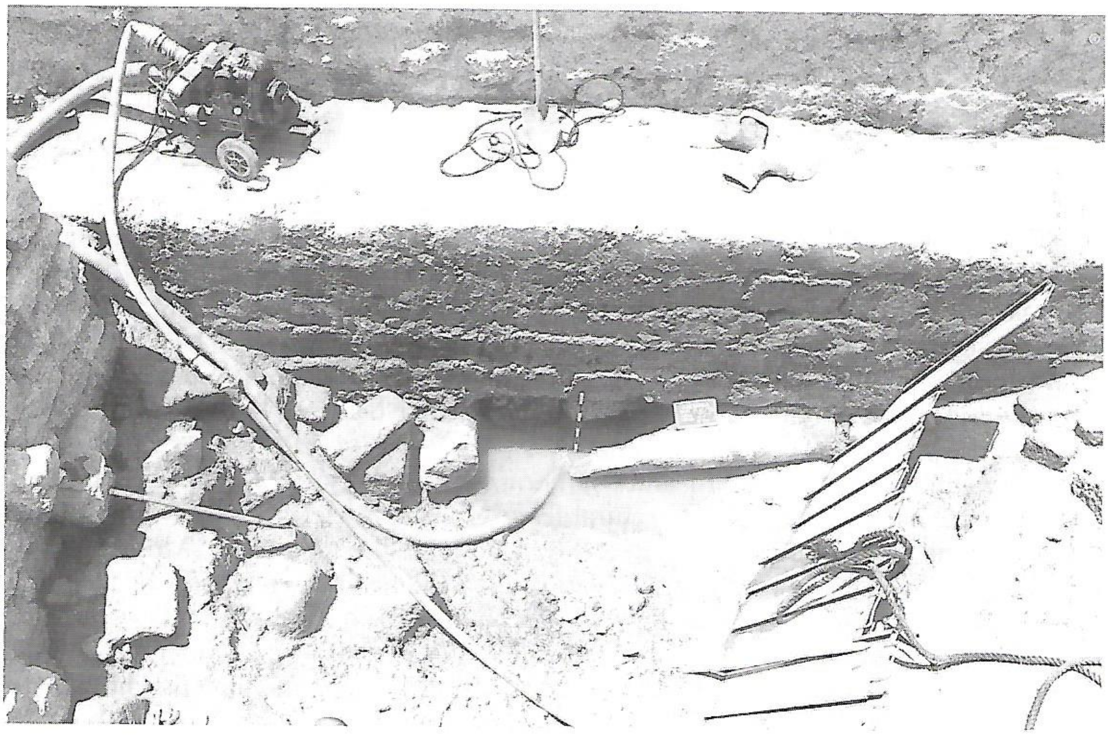


Figure 32. The Byzantine seawall in area I9, looking from the north

from storm breakers in the South Bay to find its way into the area of the former inner basin for some yet unknown reason.

The eastern quay, during this phase, lost its original maritime function but was renovated as a retainer between *terra firma* on its lee and the still inundated landlocked inner basin. The second- to third-century C.E. quay at I1 was altered during this phase by addition of an elevated confining wall along its edges to create what might have been a rectangular "Reflecting Pool" in front of the staircase that led to the Temple Platform (fig. 23). On its northeast side, the northern side wall of that alleged pool was incorporated into a rather wide, ashlar-paved platform that was laid over the original quay, extending a few meters beyond its edge to the west. This extension was based over a beach deposit in what seems to have been a very ill-substantiated manner (figs. 33, 34). From that platform there was a small staircase, leading down to the low ground in the west (see fig. 34), which was probably inundated at the time, at least during the winter and spring seasons, by shallow groundwater. This was suggested by a set of column drums that we found laid in the mud at intervals leading west from the base of the staircase.[39] The elevation of that dry walk facility, 0.9 m. above M.S.L., is almost half a meter too high for the one required at present and might indicate that

[39] Raban et al., *Field Report* (1992), 18–21, figs. 28, 37.

Figure 33. A close-up look at the base of the Byzantine platform in I1, looking from the west

Figure 34. The Byzantine Platform in I1, from NW. Photograph by Zaraza Friedman

Figure 35. View of the southern balk of locus **112** in area I1. Photograph by Zaraza Friedman

the water table of that time was higher by that much (as was probably the eustatically altered sea level). This low area was retained by a wall, later looted, that had been laid parallel to the ashlar platform, 6–7 m. west of it, so that it was confined and protected from being silted in by wave-carried sand. These beach depositions were found up to almost 2 m. above M.S.L., against the "shadow" of the looted wall, while within it there were terrestrial deposits of mud and quantities of Late Byzantine pottery (fig. 35).[40]

Columns that had been inserted vertically in the eastern quay as mooring posts, probably during the Later Roman period, were now cut off, and this might indicate the nonmaritime function of that Byzantine platform (fig. 34). The modified area as it was established around 500 C.E. (fig. 36) seems to have functioned and maintained its integrity for about half a century. During that period several marine transgressions overran the western side wall of the "Reflecting Pool," depositing wave-eroded sherds, seashells, and coarse sand over its ashlar-paved floor. That floor was consequently raised by adding about 0.3 m. of rubble fill, mixed with gray mortar and retained by

[40] Ibid.

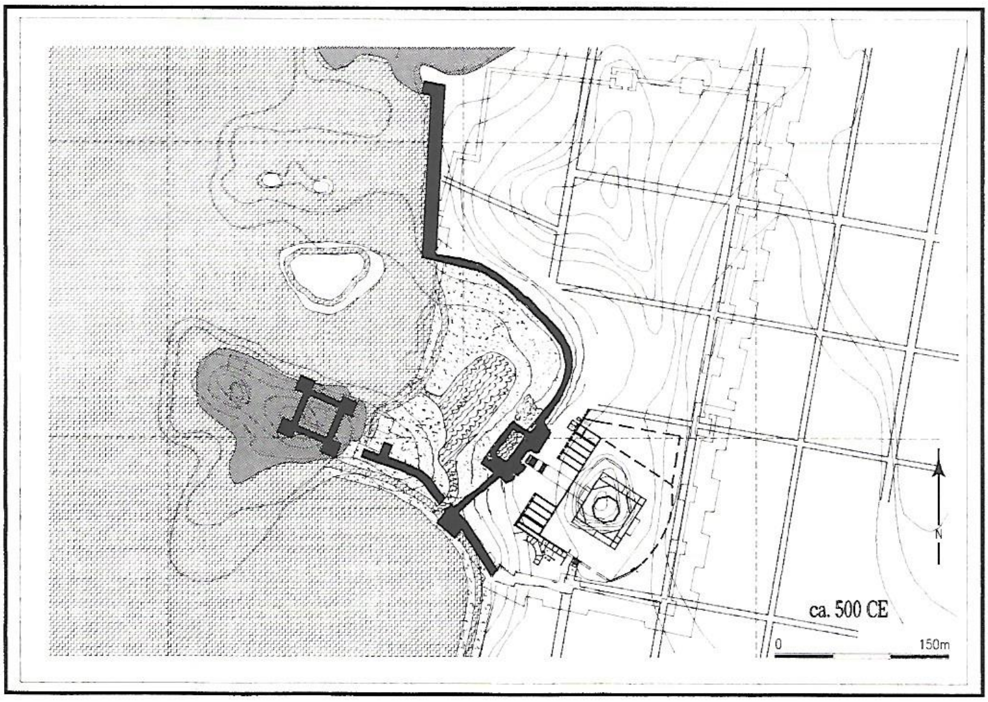


Figure 36. Sketch plan of the inner basin around 500 C.E. Drawing by the author with Anna Iamim

Figure 37. The various floor levels within the "Reflecting Pool" in area I1, looking from the southwest

three parallel ashlar retainer courses. On top of that floor, an additional deposition of beach sediments indicates another transgression by the sea, which necessitated establishing yet another, higher floor, this time about 0.8 m. above M.S.L., some time around the mid-sixth century C.E. That elevated floor and all the surrounding structures were abandoned and silted up, by coarse beach deposits, to about 1.3 m. above M.S.L. (fig. 37). In this rather thick deposition one can clearly define two laminas of even coarser materials that would have been carried there by extremely high energy. A survey of recently published research concerning the so-called "mid-sixth-century tectonic paroxysm" and the updated list of historically recorded tsunamis along the coast of Caesarea indicates that such a phenomenon might have been connected with these laminas and may also be one of the reasons for the radical change and the urban demise of the coastal quarters along the South Bay. This argument refers to the tsunami of 542 C.E. (according to Michael the Syrian) and to that of 9 July, 551 C.E.[41]

The Inner Basin during the Later Byzantine Era

During the last eighty years of the Byzantine era, the area of the inner basin continued to gain in elevation of beach and coastal sediments, with a larger component of eolian sand being incorporated into it. In various decreasing areas within it there were still natural and artificial pools of either fresh or brackish water that were used as dumping sites for urban garbage. In other parts, mainly in the central and northern areas, there were higher sand bars, up to 2.5–3.0 m. above M.S.L. On both this higher and drier ground and in the area extending west from the facade of the Temple Platform and the old quay, some terrestrial buildings were constructed, the nature and extent of which are yet to be studied.[42] These structures represent at least two successive building phases (Levels X and IX in CCE tentative nomenclature); the earlier one might be of the later years of the sixth century C.E., including the building with the mosaic floor with the political inscription that praises the "Orthodox";[43] and the later includes such installations as the drainage channel that runs from area I8 westward through the south side of I1 to I6 (I8 **8012,** I1 **1042,** I6 **712**) and the nearby settling basin **727.** Farther west, in the northwest part of area I6 and the western half of I4, there are some ashlar walls and stone-slab floors at a relatively low elevation (1.2–1.6 m. above M.S.L.) that should be dated to the same, latest Byzantine phase. Everywhere these structures are under at least one layer of shell-rich beach deposits.

Probably the best illustration of that sequence is the southern balk of locus **216,** at

[41] P. A. Pirazzoli, "The Early Byzantine Tectonic Paroxysm," *Zeitschrift für Geomorphologie*, suppl. 62 (1986), 31–49; D.H.K. Amiran, E. Arieh, and T. Turcotte, "Earthquakes in Israel and Adjacent Areas: Macroseismic Observations since 100 B.C.E.," *IEJ* 44 (1994), 260–305, esp. appendix 5 (p. 294).

[42] Cf. Raban et al., *Field Report* (1992), 51–21, 26–37.

[43] Ibid., 15–17, fig. 25.

Figure 38. The southern balk of locus **216** from the northwest. Photograph by Zaraza Friedman

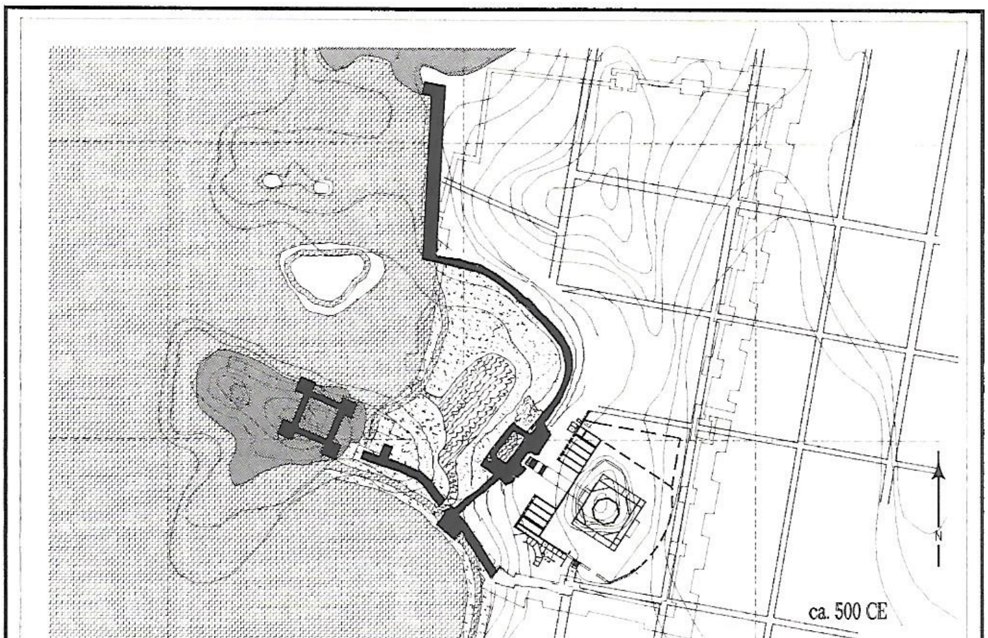


Figure 39. Sketch plan of the inner basin toward the end of the Byzantine era. Drawing by the author with Anna Iamim

the SW corner of I1 (fig. 38). There, next to the external face of the confining wall of the "Reflecting Pool" and its overlaid, later drainage channel (**1042**) and ashlar course (W**1214**), there are three layers of coarse beach deposits, interbedded with fine sand. The lower one, at 1.1 m. above M.S.L.; the second, at 1.35 m. above; and the third, uppermost, at 1.6 m. above, covering an ashlar floor which is the latest Byzantine structural element in the area. That deposition is the last and the uppermost in the stratigraphic sequence of beach or marine sediments. Directly above it there is a fill of terrestrial silt mixed with recirculated Byzantine sherds and some pieces of broken pottery vessels of the Umayyad period. This type of fill, which substantiates the earlier Abbasid buildings everywhere within the silted-up inner basin, might indicate that by the mid-eighth century C.E. this area was properly protected from any potential marine encroachment, probably as part of the large-scale precaution measures taken by the Arab residents of Caesarea following the great earthquake of 749 C.E. (fig. 39).[44]

The Aftermath and Later Maritime Facilities

The long-lasting story of man versus nature in the inner basin seems to have come to an end with the coastal processes taking over and the people of Caesarea giving in. However, seaborne trade was so essential to the economic prosperity of the city that some kind of maritime facilities had to be kept functioning, even if they were of lesser quality.

Probes made at the seafloor near the present-day public beach, around the Round Tower (T1), north and south of it, have exposed the same picture everywhere: beneath the upper wave-disturbed layer there is an extensive fill of rather homogeneous nature – a mixture of building materials and broken pottery vessels, mainly amphoras, of Late Byzantine date (sixth to seventh century C.E.).[45] Only a few sherds of the Herodian and Early Roman periods were found near the base of that fill, within a thin layer of mud that remains at the very surface of the kurkar bedrock, at -2.4–2.7 m. below M.S.L. This phenomenon of a harbor fill consisting of debris of only one period (the latest one) might be explained either by the assumption that this part was constantly dredged, even though the area at its lee was in a process of rapid silting, or by deliberate artificial fill. Considering that almost no sherd from the area T context is wave-eroded, the significant percentage of household pottery, and the typical "terrestrial" oxidation of the coins, one might prefer the second alternative. Perhaps that allegedly deliberate fill is to be attributed to the Arab conquerors of Caesarea, in 640 C.E., who would fill in Byzantine harbors in order to prevent potential seaborne invasions of Christian fleets. Yet this allegedly deliberate fill might be a consequence of a Late

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[44] Amiran et al., "Earthquakes," 266–27.

[45] Cf. Raban, *Site*, 177–81, 275; Holum et al., "Preliminary Report," 79–83; 1993–94 Report, in *Caesarea Papers II*.

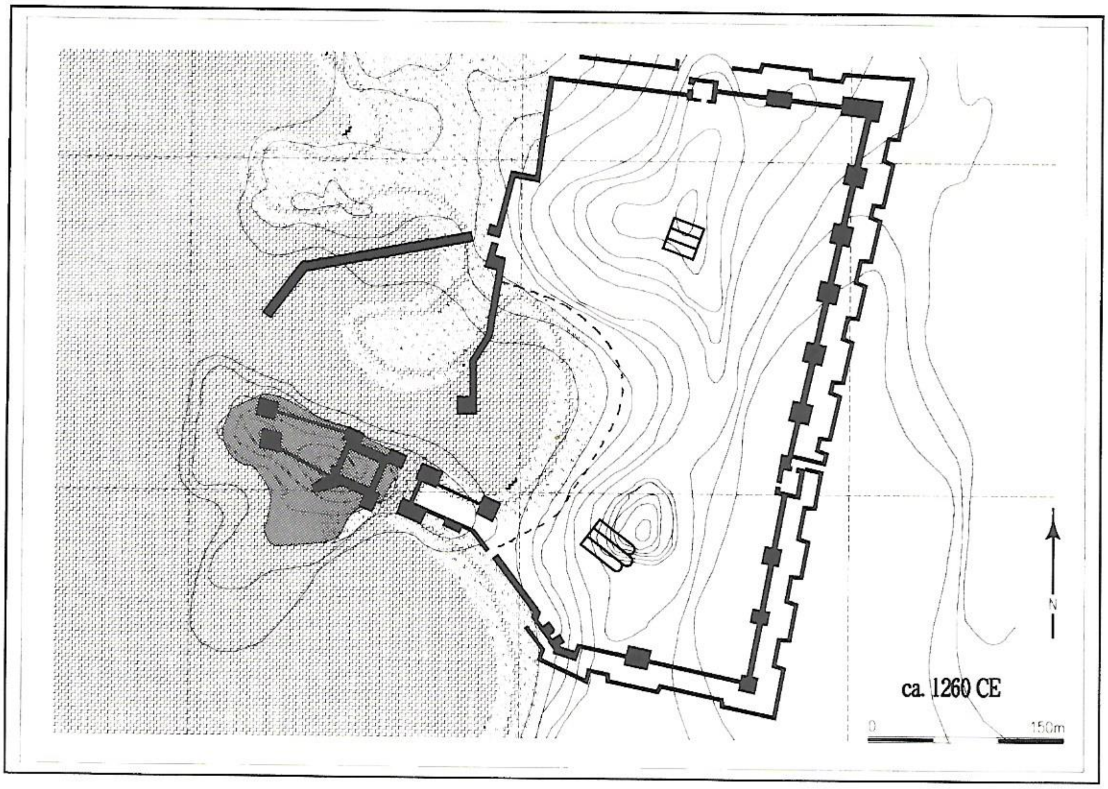

Figure 40. Sketch plan of the inner basin and other maritime facilities in the twelfth century C.E. Drawing by the author with Anna Iamim

Byzantine change in the location of the main municipal anchorage, from that basin to the South Bay.[46] In either case, that deliberate fill was in a marine environment of low wave energy provided with ample oxygen-rich seawater supply long enough to be coated by extensive marine fauna (*vermetids* and *ostreae*). The same repertory of large pottery sherds, coated by the same type of marine fauna, has been found in quantities in the artificial sand dunes that topped areas CC and KK at the lee of the South Bay.[47] Stratigraphically, these artificial mounds are above a natural layer of eolian sand that covers a complex of seventh- or early eighth-century C.E. irrigated gardens with wells and stone-built water conduits. Above them there was a burial ground that was initiated some time around 900 C.E. It is therefore quite safe to suggest that these sand mounds were the spill of dredged sediments from the harbor basin, either next to the South Bay, or at the present-day fisherman's haven, just west of area T, an attempt

[46] See the chapter by Yosef Porath in this volume.

[47] D. Thomas and R. Buyce, "Geoarchaeological Survey," in Raban et al., *Field Report* (1992), 74–75, fig. 144.

carried out by the Abbasid regime (or the following, Tulunid one) in the ninth century C.E.[48]

So far we have no archaeological data from meaningful topographic context that might enable us to suggest the whereabouts and character of the maritime installation that would facilitate seaborne trade during the Early Islamic period (640–1101 C.E.), though one might advocate a location adjacent to the fortified core of the city – more or less at the present fisherman's haven (built in 1951). There are two major structural complexes there which are related to maritime activity: the Harbor Citadel and the column jetty, both tentatively dated to the Crusader era.[49] Yet recent studies, both historical and archaeological, raised the issue of possible earlier, tenth- to eleventh-century C.E. dates for the construction of both.[50] In either case, the Crusaders did use them until their final defeat in 1265 (fig. 40).

[48] For the seaborne trade at Caesarea during that period, cf. Y. Arnon, ASOR annual meetings, 1994 (Washington, D.C.) and 1995 (Philadelphia), and eadem, in *Caesarea Papers II*.

[49] Cf. SWP, II, 17–18; F.-M. Abel, "Le littoral palestinien et ses ports," *RBibl* 11 (1914), 588; Raban, *Site*, 79–80, 154–56, 291–93.

[50] Cf. Porath et al. (above, n. 38); R. Gertwagen, "Crusader Caesarea – From Port to Coastal City," in Y. Mart and B. S. Galil, eds., *Annual Symposium on the Mediterranean Continental Margin of Israel, Abstracts* (Haifa, 1991).