

## Report to the Honor Frost Foundation

### The South Bay of Tel Dor and Maritime Activity: A Study of Submerged Structures and Deposits from the Pottery Neolithic to the Iron Age

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#### **Introduction**

Three underwater excavation seasons in July 2016, February 2017, and July 2018 and surveys in September 2017 and February 2018 were conducted by the present author in the South Bay, as part of the Tel Dor Land and Sea Project, co-directed by Profs. Ayelet Gilboa, Ilan Sharon, Rebecca Martin and Assaf Yasur-Landau. The coastal and underwater excavations were conducted as part of the study excavation of the Department of Maritime Civilizations at the University of Haifa co-directed by Profs. Ruth Shahak-Gross and Assaf Yasur-Landau. In addition, the July 2018 season was conducted as a joint fieldschool with the University of California, San Diego Scripps Center for Marine Archaeology, and co-directed with Prof. Thomas E. Levy. The February 2017, February 2018 and July 2018 activities were supported in part by the Honor Frost Foundation, and included training of graduate students from the university of Haifa, mostly from Israel but also from the US, Spain, Hungary and Italy, joint in July 2018 by 12 graduate students from UC San Diego. The infrastructure and diving instructions and safety was provided by the maritime workshop of the Recanati Institute of Maritime Studies, directed by Mr. Amir Yurman and the diving officer Mr. Moshe Bachar. They were joined in 2018 by Mr. Rich Welsh, Scripps Institute of Oceanography Assistant Safety Diving officer. Archaeological staff of the underwater excavation included Mr. Ehud Arkin Shalev (field director), Mr. Roey Nickelsberg and Ms. Brigid Clark (area supervisors). Architecture was drawn by Dr. Sveta Mitzkevitz. Pottery was drawn by Ms. Sapir Ad. The Habonim diving club was the base of the expedition, providing air and storage facilities for the equipment.

#### **Bronze and Iron Age harbor facilities and previous work at Dor**

While many classical, Roman and Byzantine maritime constructions and harbors have been excavated in the Mediterranean, very few structures are known from the Iron Age and earlier (Frost 1995; Raban 1995a; Marriner et al. 2014). These include the Minoan shipsheds in Kommos, Malia and Poros and a possible artificial Mycenaean harbor by Pylos (Tartaron 2013: 158–161). In Egypt, artificial harbor basins were found at Tell el-Dab‘a (Bietak 2017) and harbor storage facilities and related installations were found in the Red Sea harbors of Wadi Gawassis (Fattovich 2012) and Ayn Sukhna (Tallet 2012). Direct archaeological evidence for built quays and moles in the Iron Age is scarce, with examples at Tabat el-Hammam in Syria and Atlit in Israel (Haggi 2007). The site chosen for this study, Dor, yielded massive coastal structures on the waterline and underwater, to be discussed below in detail, which were previously associated with maritime construction of the Bronze and Iron Ages (Raban 1995b). Furthermore, its rich settlement history as a coastal site make it an ideal case for a diachronic study of a harbor. It was settled in the Middle and Late Bronze Ages, during most of the Iron Age, and from the Persian period to at least the Late Roman period

(Stern 1994; Raban 1995b; Gilboa et al. 2008; Nitschke, Martin and Shalev 2011). Dor is located 21 km south of present-day Haifa and 13 km north of Caesarea. Its setting makes it almost insular: it is located on a *kurkar* ridge, separated from the nearby coast of the Carmel by a narrow alluvial area, giving it only a minimal agricultural hinterland, thus necessitating maritime connectivity. Three bays are located to the west of the site, named the North Bay, the Love Bay and the South Bay, from north to south, respectively. The Tantura Lagoon is located south of the South Bay (Raban 1995b: fig. 9.1) (Fig. 1).



Figure 1: The location of Tel Dor on the coast of the Carmel (left) and the bays of Dor (right).

Excavations on the tell were carried out first by Stern (1994) and since 1999 by Gilboa and Sharon (2003). Initial underwater surveys and coastal excavations were carried out by Raban (1995b) and were followed by surveys by Kingsley and Raveh (1996) and, since 2012, by the present author.

Bronze Age architecture that may be related to maritime activity was found by Raban on the coastline of the Love Bay. It is a massive structure made of large coarsely drafted stones and boulders. As the structure remains seem to have a corner, it may well have been a tower or a part of a sea gate leading to an anchorage in the bay. Pottery associated with it, including imported Middle Cypriot Pottery, is still being studied to determine whether it was constructed in the MB I, as argued by Raban, or later in the Middle Bronze Age (Raban 1995a: 145; 1995b: 301–303; Yasur-Landau et al. 2018). A Cypriot-style three-hole anchor characteristic of LC I–IIIA Cypriot coastal sites was found in the Love Bay in 2016 by the Dor Underwater Survey team, further supporting the use of the bay in the Bronze Age. The renewal of large-scale maritime trade in the 11th century BCE, after the 12th-century crisis years, is especially pronounced at Tel Dor. Land excavations have yielded conspicuous evidence of trade with Egypt in the Iron Age I, including more than 750 Egyptian vessels and sherds, most of which belong to amphorae; this is the largest concentration of such pottery outside Egypt. Numerous bones of Nile Perch were also found at the site, indicating that this fish was also a traded commodity. Contacts with Egypt are also well attested in the misadventures of the Egyptian Wenamun in the harbor of Dor (Gilboa 2015). This strong connectivity brought unprecedented prosperity to Dor. During the Iron Age Ib, an ambitious building program was carried out on the southern edge of Tel Dor, overlooking the South Bay. It included the construction of the “Monumental Building”, made of boulders with

ashlar corners; the rounded “bastion”, built of boulders; and the so-called Sea Wall, which may have been built to retain the massive constructions to its north (Gilboa et al. 2008; Sharon and Gilboa 2013).

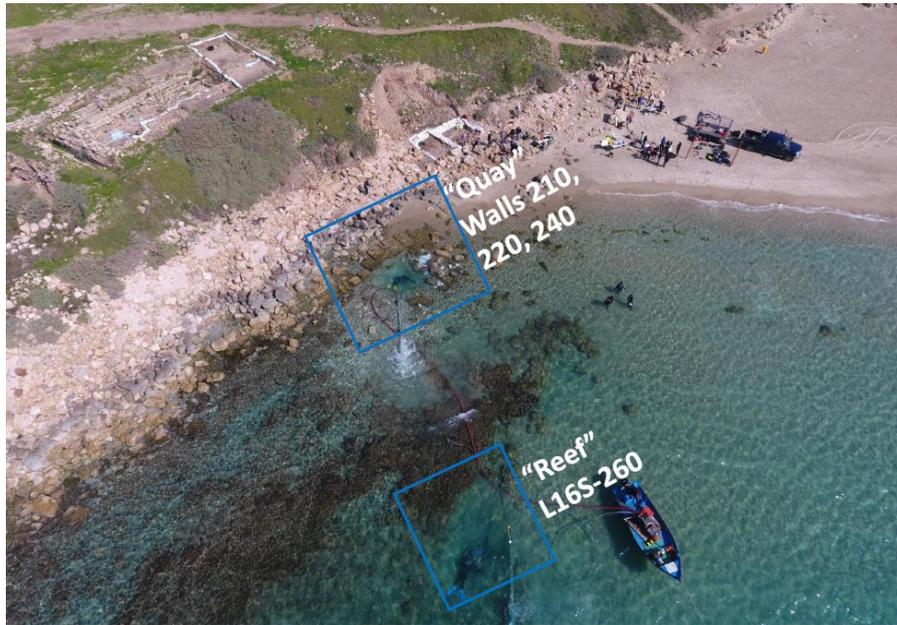


Figure 2: The February 2017 underwater excavation areas (Photo: Arie Pessó).

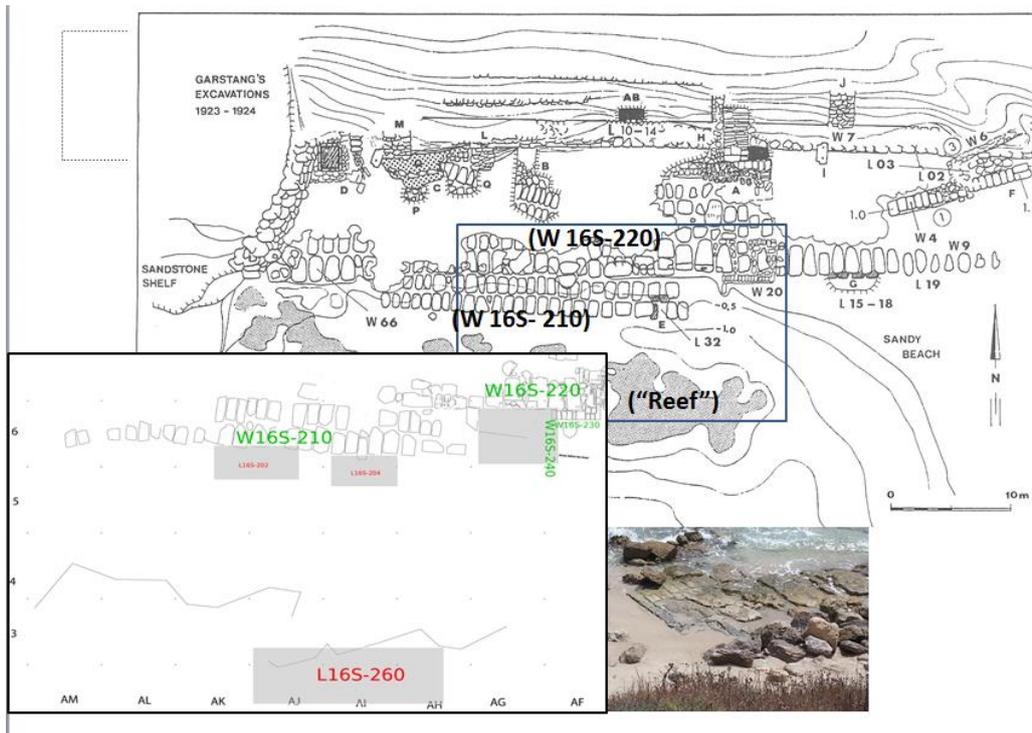


Figure 3: Raban 1995b plan (top); 2016–2017 excavation areas with Dor grid, and the top course of Wall 220 in low tide (bottom)

**Results of the 2016-8 excavations:**

**1. Underwater features in Northern part of the bay**

The results of these excavations, as well as a recent geophysical survey opens the possibility that an ambitious Iron Age building program was executed in the interface between the site and the sea during Iron Ib or the transition to Iron IIa. Two massive parallel ashlar walls, semi-submerged by the waterline of the South Bay, were previously interpreted as quays belonging to the Sea People harbor of Dor (Figs. 2, 3). The northern one, closer to the tell, was initially dated to the Iron Ib, and the southern, to the Late Bronze Age (Raban 1995b: 339–341). The bay was no doubt used for anchoring in the Bronze and Iron Ages, as indicated by underwater surveys that documented numerous anchors and pottery (Kingsley and Raveh 1996: 18; Lazar et al. 2017). However, our underwater excavations have demonstrated that the southern wall (unnamed by Raban; our Wall W16S-210) comprises a single course of rectangular, flat ashlars with a maximum bottom elevation of ca. 0.6 m b.s.l. (Figs. 4, 5). The northern wall (Raban’s Wall 9/Structure G; our Wall W16S-220), made of massive wedge-shaped ashlar blocks that are as long as 2.5 m and laid as headers, has a maximum bottom elevation of ca. 1.1 m, b.s.l. (Figs. 4, 5). It would have been too shallow for any boat to have anchored next to it, especially given that the sea levels were lower during the periods under discussion (Sivan et al. 2001; Benjamin et al. 2017). It is far more likely that these structures were the foundations of a massive coastal fortification and an adjacent ashlar paving. The date of this elaborate feature is provided by ceramic remains found between the stones of the walls and below them, which are not later than Iron Ib or the transition to Iron II, and include fragments of imported Egyptian amphorae.

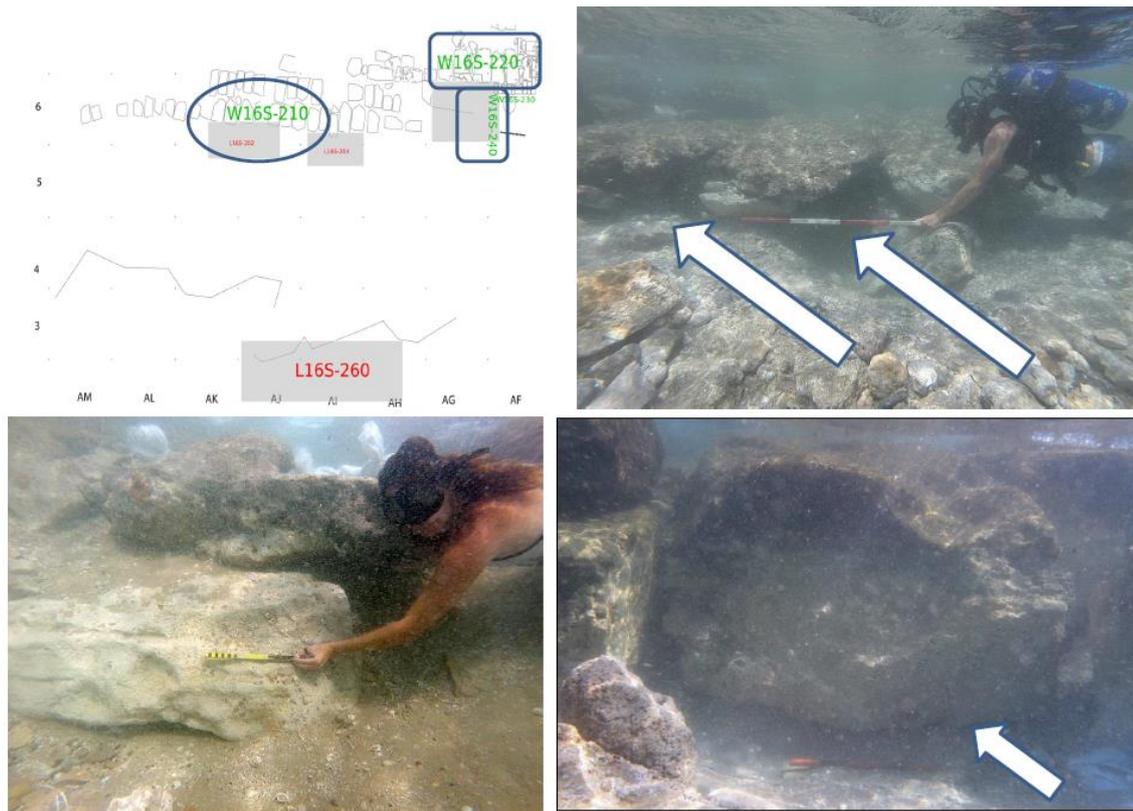


Figure 4: The 2016-7 excavations (lef, top); The foundations of Wall 210 (right, top) and Wall 220 (right, bottom) resting on a layer of small stones and sand; the face of Wall 240 covered with *Vermetidae* (left bottom) (Photos: Ehud Arkin-Shalev).

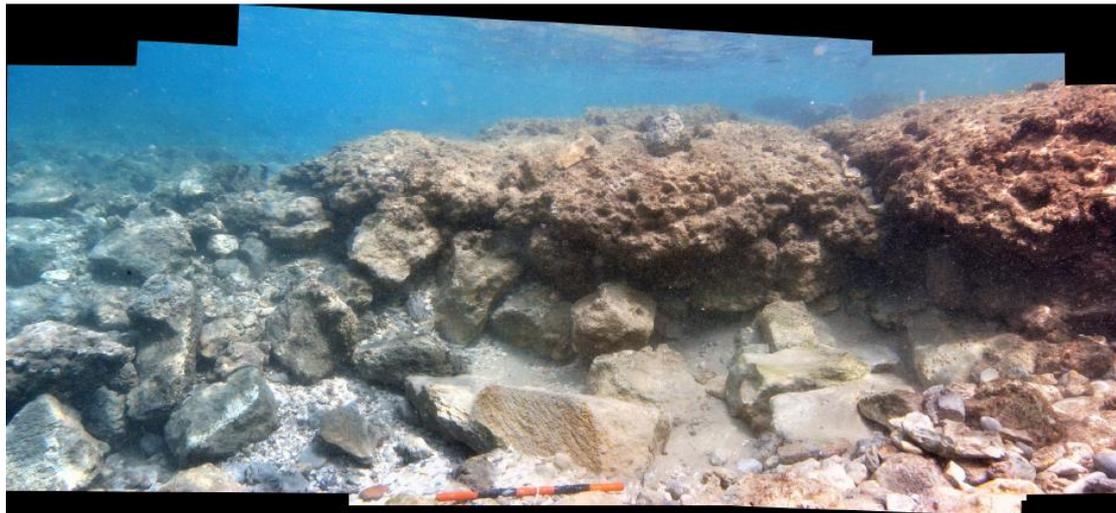


Figure 5: Top: Combined photographs of the “reef” (L16S-260) made of ashlar stones (Photo: Ehud Arkin-Shalev). Bottom: The western edge of the “reef” composed of large ashlar blocks (left) and two of the stone anchors found south of the “reef” (right) (Photos: Ehud Arkin-Shalev and Jonathan Benjamin).

We were surprised to learn, that there is architecture buried in the sediments underwater well below the bottom level of Walls W16S-210 and W16S-220. A test trench by W16S-210 revealed a new north–south wall, W16S-240 (Fig. 3), perpendicular to and stratigraphically earlier than W16S-220. The base of this two-course wall is sunk into light-brown clay. Fragments of Iron I Cypriot and local pithoi were found wedged below its lower course. Its construction is very solid. In the small area excavated, the stones of this wall are 150 cm long and ca. 65 cm high. The western face of the lower course of W16S-240 has remains of *Vermetidae* exoskeletons, indicating that it was exposed to water in the intertidal zone. An east–west submerged reef-looking feature, running parallel to the ashlar walls, was thought previously to be a natural reef, partially blocking approach to the “quays”. In the renewed excavations it was found to be made of biogenic rock that formed on an enormous accumulation of large ashlar—possibly a mole (L16S-260; Figs. 3, 5). The water south of this feature is 2.5–3 m deep, which would have been

sufficient for anchoring boats in antiquity. In underwater surveys in February and September 2016 we discovered stone anchors immediately south of this “reef” and a concentration of large ashlar blocks, possibly laid in courses, creating the western edge of the “reef” and strengthening the hypothesis that this is a maritime construction. Excavation at the base of the “reef” (L16S-260) revealed a dark clay sediment layer, known in the Carmel Coast and usually assumed to date from the Neolithic period and not connected to later deposits. We were, however, surprised to find ceramic remains in this layer that were dated to the Middle Bronze Age. This clay apparently provides beneficial conditions for the preservation of organic material, as evinced by a Middle Bronze Age storage jar base that was found in it when it is still coated with a thick, shiny layer of dark substance, which is possibly resin. Additional structures are likely buried under the sand on the coast and underwater. Our FDEM geophysical survey of the coast of Dor’s South Bay have uncovered additional buried features with a possible relation to maritime activities (Lazar et al. 2017).

## **2. Underwater features in Center and Southern part of the bay**

Underwater surveys in September 2017 and February 2017 has confirmed the existence of an underwater feature wall made of large, 1.5 m long, ashlar blocks located in the southern boundary of the bay, extending some 25 m. to the north of the tombolo. Its building style, with large ashlar headers is similar to that of the Iron Age moles found underwater in Atlit (Haggi 2007). This feature seems to include at least three large walls, two going in a North-South orientation, while one goes in an east west orientation. The top of the stones are in a depth of 1.5m, while the bottom of the feature is covered in sand, yet is may be possible to see a second course of stones emerging below the top course. Documentation included photography, photogrammetry and 3D modelling of the visible parts of the walls (Fig. 6). This may be a quay or a mole located at the side of the bay opposite of the tell. Future excavations, planned for the winter of 2019 will enable to tell more of it function and date.

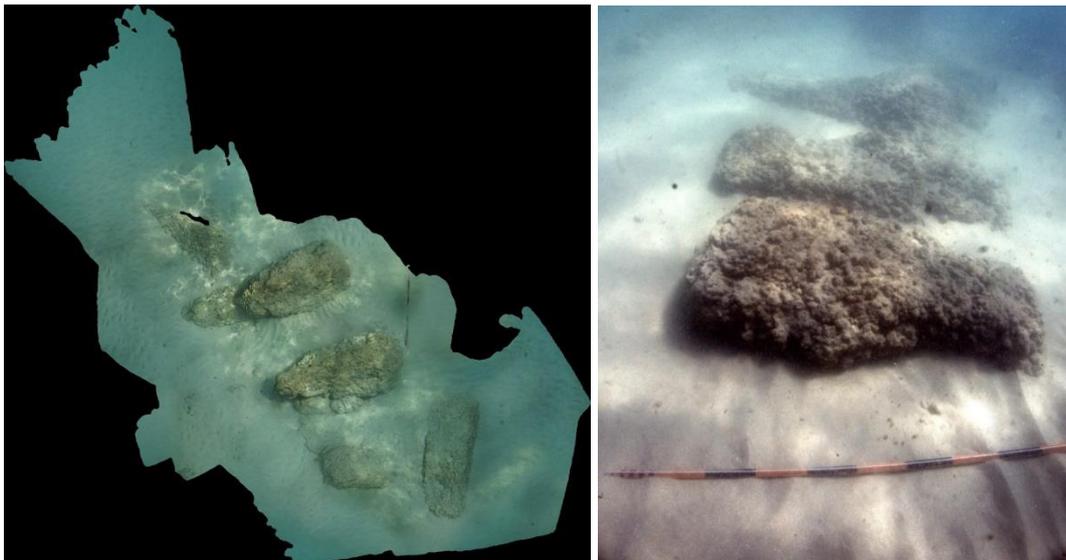


Figure 6: Parts of the ashlar feature at the southern edge of the bay (Photos: Anthony Tamberino and Ehud Arkin Shalev).

A second underwater feature was excavated at the center of the bay in Squares AI/994 and AI/993. The center of the feature is a 2.1 meters long ashlar stone, its top at a depth of 2.43m. It is similar to one found in W16S-220 and is one of the largest ashlars found at Tel Dor, as well as several other, smaller hewn blocks in its vicinity. The stones to the north of the ashlar form two rectangular spaces (Figure 7). Several of the hewn stones had linear grooves cut into them parallel to the stones sides (Figure 8), which may possibly be grooves for mooring ropes. Similar features have been reported from Palmachim in stones belonging to a Roman period mooring facility at the site (pers. comm. Ehud Galili). While Roman pottery was observed during the excavation of this feature, its date is still unclear. It is however located in a prime area for anchoring in the center of the bay.



Figure 7: schematic plan of the mooring (?) feature (right) and photo of the central mooring stone (Photo: Anthony Tamberino. Plan: Ehud Arkin Shalev).



Figure 8. Hewn stone in square AI/994 with highlighted cut grooves (Photo: Ehud Arkin Shalev).

### **Presentation of the results**

The initial results of this were presented in four international venues (table below), receiving much scholarly attention and creating productive discussions with colleagues. The manuscript of an article of the study of the Iron Age remains in an advanced stage of preparation and will be submitted to the peer reviewed journal by November 2018.

Date	Conference	Place	Title and authors
17 May 2017	Stanford University Department of Classics Seminar	Palo Alto	Resilience, Fragility and integrative archaeology of maritime connectivity at Tel Dor and Tel Achziv, Israel (Assaf Yasur-Landau)
19-23 October, 2017	Under the Mediterranean, 100 years on: The Honor Frost Foundation conference of Mediterranean Maritime Archaeology	Nicosia, Cyprus	Underwater Excavations in the South Bay of Dor and the Development of Harbors in the Eastern Mediterranean (Assaf Yasur-Landau, Ehud Arkin Shalev, Ayelet Gilboa, Ruth Shahack-Gross, and Ilan Sharon).
15-18 November 2017	2017 ASOR Annual Meeting	Boston, MA	Iron Age Coastal Structures at Tel Dor: Results of the 2016 and 2017 Underwater Excavation Seasons (Ehud Arkin Shalev, Ayelet Gilboa, Ilan Sharon and Assaf Yasur-Landau)
23 March 2018	Inaugural Scripps Center for Marine Archaeology (SCMA) workshop	La Jolla, CA	Maritime Adaptation in the Levant before and after the Late Bronze Age Collapse (Assaf Yasur-Landau)

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