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Chapter 1
The Small Finds from the Area 1 Slipways and Shipsheds

Mette Schaldemose

1.1. Introduction

The finds presented in this study were excavated during the combined land and underwater excavations at Zea in 2002 and during subsequent underwater excavations carried out in 2003–2004 and 2006.[1]

The land excavation was conducted in the limited area of the basement of Sirangiou 1, which houses the upper ends of Shipsheds 16, 17(η) and parts of 18(χ) and 26(?) (Pls. 1–2, 6), while the underwater excavations were carried out in a larger area comprising the submerged parts of Slipways 1–3, 5–6, Shipsheds 7–15 (Phase 2), 16–24 (Phase 3) and possible Shipshed 26 (Phase 4) (Pls. 1–2, 40). Despite the large difference in total excavated area between land and sea, the amount of ceramic finds from the underwater excavations is less than double (742 fragments) than that of the land excavation (442 fragments). *In toto*, the underwater excavations yielded 1,189 finds (including the ceramic finds), and the land excavation 1,017 (including the ceramic finds).

The disparity between the quantities of finds and the total area of the respective excavations is probably due to the harsh marine environment. The submerged parts of the slipways and shipsheds are located within a modern marina built largely during the 1960s. Building activities around the shore and in shallow water, small boat anchorages and moorings, heavy pollution, and wave action – all of these factors combine to exact a heavy toll on the quantity and preservation of the ancient remains. It is little wonder that the underwater stratigraphy is confused and disturbed with virtually no identifiable contexts (see Appendix 7). Finds from the land excavation, while less worn and eroded, have

1. Several people have kindly helped during different processes of this publication; however, any mistakes are entirely the responsibility of the present author. The present author is very grateful to R.C. Anderson, Dr. D. Davis, Dr. H. Gerding, M. Hahn, A. Hooton, B. Klejn-Christensen, Dr. G. Kallos, Dr. D. Kourkoumelis, K. Lovén, Dr. M. Lawall, Dr. J. Pakkanen, Dr. P. Pedersen, Dr. E. Ralli, Dr. P. Reynolds, Dr. S.I. Rotroff, I. Sapountzis and Dr. L.E. Vaag. The present author also wishes to thank the 26th Ephorate of Prehistoric and Classical Antiquities, the Ephorate of Underwater Antiquities and the Archaeological Museum of the Piraeus and their staff for providing workspace during the many registration periods. All drawings in this chapter were done by A. Hooten ©ZHP 2011. All photographs were taken by K. Lovén ©ZHP 2011.

nevertheless suffered some degree of exposure, some perhaps after the 1885 excavation of I.C. Dragátsis and W. Dörpfeld.

Subsequent years, particularly in the 1950–1960s, have seen constant and heavy building activity in the same area. The re-excavation in 2002 revealed mainly disturbed contexts. The single exception was one man-made rock-cut pit (U:2), which had been overlooked during the 1885 excavation.

1.2. The Pit

During the excavation of Shipshed 17(η), rock-cut pit U:2 was found just north of ramp block S17:R13 in the southern part of the frame-constructed ramp (Pl. 6; Fig. 234).[2] The feature is preserved well below the top surface of the ramp and is not structurally related to any identifiable shipshed remains. Inside the pit were found four large tile fragments (**92–94**) intentionally stacked one atop the other (Figs. 126, 234), along with some smaller tile fragments. In the top fill of the pit lay a rim fragment of a black glazed kantharos (**1**), and at the bottom of the pit lay an undiagnostic black glazed kantharos fragment with incised graffiti (**2**). West of the pit, in the disturbed fill of the north side of the foundation cutting (S17:R6) of ramp block S17:R13, and probably unrelated to the pit itself, was found a base fragment of a black glazed fish-plate (**3**).

1.3. Composition of Finds

Both the terrestrial and marine environments have yielded a wide array of ancient and modern material, with no one specific category of artefacts prevailing over any other in terms of concentration, grouping or distribution (see Pls. 38–39 for distribution maps).

Tiles make up the largest and most homogeneous group among the terracotta finds, and within this group are the majority of the best preserved fragments from the excavation. The tile fragments are presented in Chapter 2, with a study of shape and fabric, followed by hypothetical reconstructions of the Phases 2 and 3 roofs of the shipsheds in Area 1 at Zea. The ceramic material is limited, quite fragmented and nearly deficient in diagnostic sherds. The term ‘diagnostic' encompasses all rims, handles and bases, regardless of the ability to identify their type. In general at ZHP there is just one fragment of each kind, a circumstance that naturally makes it impossible to speculate as to any kind of form development or to attempt clay analyses on the different groups of material, especially the small groups (loom weight, bricks). The present study and the accompanying catalogue is thus a presentation of a representative part of the small finds from underwater and terrestrial excavations of the Area 1 shipsheds at Zea – *in toto* 123 catalogue entries. The worn and eroded ceramic material receives a fully representative treatment to demonstrate the harsh depositional environments, although the reader will notice that it is not always possible to date each artefact, determine original shape or give specific typologies. Indeed, as there are few identifiable ceramic fragments, the present author has chosen not to give an introduction to each type of vessel. This study, excluding the tile chapter, is thus rather an enlarged catalogue with a short introduction to each group. The clay descriptions are based on G. Sanders fabric descriptions,[3] a particle measurement scale from the Geological Survey of Denmark and Greenland (Danish Ministry of Environment) and the Munsell® colour charts.[4] The shapes of rims, handles and bases are, where possible, described according to the typologies presented in the *Athenian Agora*, Vol. XXIX.[5]

Each entry in the catalogue begins with the catalogue number in bold, followed by the registration number in parentheses (all references to the catalogue numbers in the main text are also represented in bold). The second line contains the specific provenance of each artefact (the individual feature codes cross-reference directly to the feature catalogue in Vol. I.2, pp. 73–109; a full list of abbreviations is also found there) and the year it was excavated. The third and subsequent lines of each catalogue entry contain a detailed description of the artefact, when possible a date or date range, and when

2. For feature labelling format and legend, see pp. 73–74.
3. Sanders 1999: 477–478.
4. Munsell 2000. The Munsell is an American version, thus the colour grey is spelt “gray” throughout the present study.
5. Rotroff 1997: figs. 1–3.

possible scholarly works in which parallels for the artefact have been identified. All measurements are in centimetres unless otherwise labelled. The descriptive section uses the following abbreviations:

D	Diameter
H	Height
L	Length
T	Thickness
W	Width

The ancient finds and the modern ceramic finds in the catalogue are illustrated by drawings with additional photos of a few selected finds. The miscellaneous modern finds are illustrated solely by photographs.

The finds are divided into the following groups:

- Ceramics (**1–58**)
  - Classical Period to Late Antiquity (**1–41**)
    - Fine wares (**1–9**)
    - Plain wares (**10–41**)
      - Medium wares (**10–24**)
      - Transport amphora (**25–36**)
      - Cooking wares (**37–38**)
      - Coarse wares (**39–41**)
  - Byzantine (?) (**42–46**)
  - Modern (**47–58**)
- Terracotta (**59–61**)
  - Loom weight (**59**)
  - Bricks (**60–61**)
- Stone (**62–67**)
- Miscellaneous material (**68–91**)
- Tiles (Chapter 2) (**92–123**)
  - Corinthian (**92–120**)
  - Laconian (**121–123**)

As mentioned above, dateable materials are scarce, but are found in the following groups: fine ware, transport amphora, cooking ware, coarse ware, Byzantine (?), modern ceramic, loom weight and tiles. The datable fine ware fragments are by far the most important as a few of them were found in the only closed context (pit U:2; see above). They thus help date the closure of the pit and the tiles within it and accordingly other similar tile fragments on stylistic grounds. As the few other datable fragments are all found in disturbed contexts, their dates are relevant only in relation to the overall picture of the distribution pattern (dates and fabric groups) of the finds.

1.4. Ceramics

1.4.1. Classical Period to Late Antiquity

Fine Wares

Fine ware fragments were found during the land excavations of the upper ends of Shipsheds 16, 17(η) and 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38), and during the underwater excavations of the area covered by Shipsheds 17(η), 18(χ) and 19(ϕ) in 2003 and 2004 (Pl. 39). The most important finds were found in pit U:2 (**1**–**2**), as they represent a *terminus post quem* for the deposit in the pit (Figs. 126, 234).

Together the fine ware amounts to 40 fragments, 30 from land excavations and ten from the sea. All are very fragmentised. Of these, only nine are diagnostic (**1–9**), but even these are not all identifiable or dateable.[6] There are no fragments with figurative decoration, but all of the fragments have a black or brownish glaze[7] in different states of preservation. In addition, those fragments found under water have suffered particularly harshly from the depositional environment.

Shapes

The five identifiable fragments consist of two kantharoi fragments (**1**–**2**), a fragment of a fish-plate (**3**), a possible fragment of an askos (**4**) and a possible fragment of a chous (**5**). Handle fragments **7**–**8** belong to some kind of drinking cup, while **6** and **9** are unidentifiable. The overall picture is of table ware and a perfume container.

Kantharoi with moulded rims were produced from the 4th century BC.[8] The shape continued in the 3rd century BC, though it became rarer as the century wore on. The shape of the rim of **1** should probably be dated to after *ca* 380 BC. It compares with a kantharos of the second quarter of the 4th century BC found

6. Dr. S.I. Rotroff, pers. comm., 2002 and 2006, kindly reviewed all diagnostic material, and helped with shape identification and dating.
7. The term 'glaze' is used, though it is not a proper glaze in the modern meaning of the word. See Hayes 1984: 1 for discussion of the definition of this word.
8. Sparkes & Talcott 1970: 113, 118.

in the Athenian Agora.[9] The shape of the kantharos fragment with incised letters (**2**) is too small to provide any typological date. The shape of the *upsilon* and to a lesser degree the *rho* suggests a date in the 6th century BC.[10] Fragments incised with similar *upsilons* were found in 5th century BC contexts in the Agora.[11] Obviously, dating by epigraphic evidence alone is a very unreliable method. The graffiti are too fragmentary to be interpreted.

Fish-plates were produced from the end of the 5th century BC and the form continued into the Hellenistic period.[12] The underside of **3** is glazed, which puts the plate beyond the earliest examples of the shape. An early 3rd century BC date is suggested by the fact that the resting surface is not grooved, the floor is slightly convex and the groove at the transition to the depression is angular.[13]

Askoi have an east Greek origin and were widely exported.[14] From the 5th century BC onwards the shape is found in three versions: ring-, domed- and duck-shaped. The duck-shaped askos continues into early Hellenistic period.[15] The closest parallel to **4** is a domed-shaped askos found at the Athenian Agora and dated to 490–450 BC.[16]

The black glazed chous, utilised as a pouring vessel, was very common in the 5th and 4th centuries BC and the form continued into the early Hellenistic period.[17] It is a squat jug with a low ring-foot, which was usually unglazed beneath.[18] A possible parallel to **5** is no. 475 from the Athenian Agora.[19]

The handle fragments **7** and **8** belong to a small drinking cup, perhaps a stemless cup, a kylix or a bowl-shaped kantharos – shapes that were manufactured in the 5th and 4th centuries BC.[20] The two fragments are too worn for a more precise identification.

Fabrics

There is some similarity in the clay employed in the nine fragments. They fall within a colour range of yellowish reddish brown shades (see their individual catalogue entries for exact Munsell numbers), they are all soft or medium-hard fired and contain lime and black particles,[21] and their blackish glaze is either lustrous or matt.[22] The colour of the fabric of **1–3** and **5–9** falls within the descriptions given by S.I. Rotroff for Attic clay.[23] Only the colour of **4** is different, which indicates, along with its shape, that it may have been imported.

Chronology

The majority of the dateable fragments belong to the 5th and the 4th centuries BC. An upper limit is represented by **2**, which dates possibly to the 6th–5th centuries BC. The lower limit is represented by **3** from the early 3rd century BC. No. **1**, dated to the second quarter of the 4th century BC, marks the date of the probable closure of the pit.[24]

9. Sparkes & Talcott 1970: pl. 29, no. 705.
10. Jeffery 1998: 67.
11. Sparkes & Talcott 1970: fig. 23, no. 1906.
12. Sparkes & Talcott 1970: 147; Rotroff 1997: 146.
13. Rotroff 1997: 147.
14. Sparkes & Talcott 1970: 210. The shape was copied by Attic potters in 5th and 4th centuries BC.
15. Rotroff 1997: 171. The duck-shaped askos seems to have been the longest lived version. The ring- and the domed-shaped askoi from the Agora are dated to the 5th century BC.
16. Sparkes & Talcott 1970: 358, no. 1727, pl. 80.
17. Rotroff 1997: 125–126.
18. Sparkes & Talcott 1970: 60.
19. Rotroff 1997: fig. 35, no. 475.
20. Sparkes & Talcott 1970: 98, 121.
21. The fabric of **8** does not contain black particles.
22. No. **5** lacks any remains of glaze.
23. Rotroff 1982: 14.
24. For further remarks regarding the importance of **1** and **2** for dating pit U:2, see pp. 71–72, this volume.
25. See n.6.

Catalogue of Fine Wares[25]

1 (L68.01) Fig. 1.1, Fig. 127
Land, U:2 (north of S17:R13), top fill, 2002.

Moulded rim fragment of kantharos. The rim is slightly flaring above the moulding; the profile of the moulding is reflected on the inside.

H.: 3.4 cm, W.: 6.0 cm, T.: 0.3–1.0 cm, D.: *ca* 6.1 cm.
Clay is soft fired, granular and fine levigated, with few medium-sized lime particles and frequent small- to large-sized black particles. The colour is light brown and brown-yellowish brown (7.5YR6/4 and 10YR5/3–5/4). The kantharos bears a thick lustrous black glaze (7.5YR2.5/1) on the internal and external surfaces.
Date: Second quarter of 4th century BC.
Parallels: Sparkes & Talcott 1970: fig. 7, no. 705.

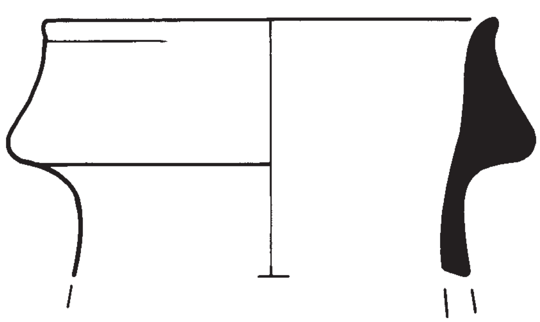

Fig. 1.1, **Cat. 1** (1:1)

2 (L69.01) Fig. 1.2, Fig. 128
Land, U:2 (north of S17:R13), bottom, 2002.

Body fragment of kantharos with incised letters on exterior surface: -?, *upsilon*, *rho*, *tau* and *alpha* or *delta*.

H.: 4.5 cm, W.: 5.9 cm, T.: 0.4–0.6 cm.
Clay is medium-hard, granular and fine levigated, with rare fine lime and black particles. The colour is light brown and reddish yellow (7.5YR6/4 and 6/6). The kantharos has a thick lustrous black glaze (GLEY 1 2.5/N) on the internal and external surfaces.
Date: 6th to 5th century BC?
Parallels: Jeffery 1998: 67; Sparkes & Talcott 1970: fig. 23, no. 1906.

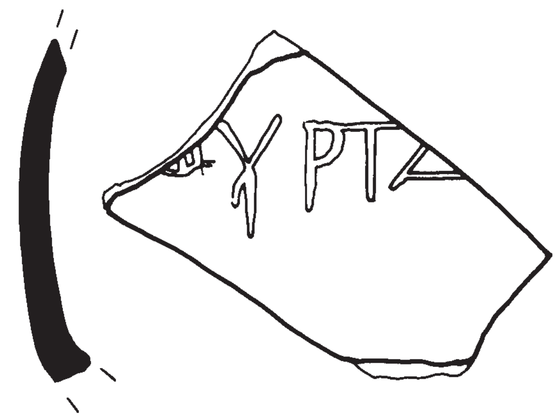

Fig. 1.2, **Cat. 2** (1:1)

3 (L56.01) Fig. 1.3, Fig. 129a-b
Land, S17:R6 (north of S17:R13), disturbed fill, 2002.

Base fragment of a fish-plate. The ring-foot is convex and the resting surface is thick and bevelled. The floor is slightly convex with a shallow unglazed groove before the depression. The edge of the depression is angular.

H.: 2.8 cm, W.: 5.5 cm, T.: 0.6–1.0 cm, D. of foot: *ca* 10.0 cm.
Clay is medium-hard, granular and fine levigated, with frequent fine- to medium-sized lime particles and few small black particles. The colour is yellowish red (5YR5/6). The plate has a thick lustrous bluish black glaze (GLEY 2 2.5/5PB) on the internal and external surfaces. The lowest part of the floor on both sides has a dark reddish brown band (5YR3/2) with a non-glazed band below. There is no glaze on the resting surface.
Date: Early 3rd century BC.
Parallels: Rotroff 1997: fig. 51, no. 716.

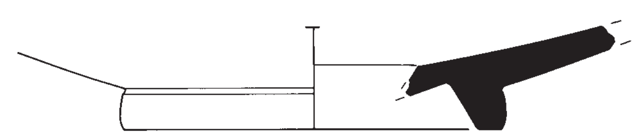

Fig. 1.3, **Cat. 3** (1:2)

4 (L58.01) Fig. 1.4
Land, area north of S17:R12–14, disturbed fill, 2002.

Moulded rim and neck fragment (askos?). The rim is concave/convex.

H.: 3.1 cm, W.: 3.7 cm, T.: 0.4–08, D.: *ca* 6.0 cm.
Clay is medium-hard fired, granular and fine levigated, with rare fine lime particles and common medium to very large black particles. The colour is brown (7.5YR5/4). The rim part is painted a very dark matt grey colour (7.5YR3/1). The colour becomes more brown towards the lower part of the rim (7.5YR4/3).
Date: 490–450 BC.
Parallels: Sparkes & Talcott 1970: 358, no. 1727, pl. 80.

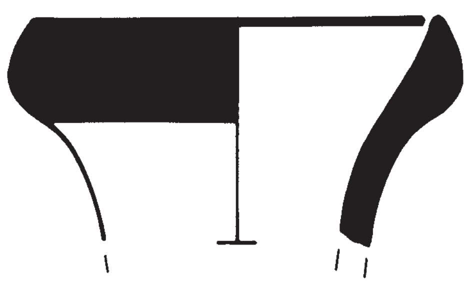

Fig. 1.4, **Cat. 4** (1:1)

5 (S35.03.1) Fig. 1.5
Sea, C7/8:4, disturbed fill, 2003.

Base fragment from an unknown vessel (chous?). The base is a ring-foot with a square resting surface.

H.: 1.1 cm, W.: 2.9 cm, T.: 0.5 cm, D.: *ca* 6.9 cm.
Clay is soft fired, granular and fine levigated, with few small- to medium-sized lime particles and few small black particles. The colour is light reddish brown (5YR6/4). The surface is very worn with no remains of glaze.
Date: 5th to 3rd century BC.
Parallels: Rotroff 1997: fig. 35, no. 475.

Fig. 1.5, **Cat. 5** (1:1)

6 (L32.02) Fig. 1.6
Land, C17/18:8, disturbed fill, 2002.

Base fragment of an unknown open vessel, with a nipple pointing down at the centre of the base.

H: 1.2 cm, L.: 3.7 cm, W.: 5.1 cm, T.: 0.5–0.6 cm.
Clay is soft fired, hackly and medium levigated, with frequent medium-sized lime particles, frequent small- to large-sized black particles and few fine golden mica. The colour is light red to red (2.5YR6/6–5/6). The vessel has a thick matt very dark grey to dark reddish brown glaze (5YR3/1–3/2) on the external and internal surfaces.
Date: Unknown.

Fig. 1.6, **Cat. 6** (1:1)

7 (S35.04) Fig. 1.7
Sea, C7/8:4, disturbed fill, 2003.

Handle fragment from an unknown cup shape. The handle is circular in section.

H.: 2.4 cm, W.: 1.7 cm, T.: 0.4 cm.
Clay is soft fired, granular and fine levigated, with few medium-sized lime particles and few small- to medium-sized black particles. The colour is light reddish brown (5YR6/4). The vessel carries remains of a thick lustrous very dark grey glaze (GLEY1 3/N) on the internal and external surfaces.
Date: 5th to 4th century BC.
Parallels: Dr. S.I. Rotroff, pers. comm., 2006.

Fig. 1.7, **Cat. 7** (1:1)

8 (L33.03) Fig. 1.8
Land, C16/17:1, disturbed fill, 2002.

Handle fragment from an unknown cup shape. The handle is circular in section.
L.: 2.1 cm, W.: 1.4 cm, D.: *ca* 0.8 cm.
Clay is medium-hard fired, granular and fine levigated, with common medium-sized lime particles. The colour is light brown (7.5YR6/4). The handle has a thick, matt black and brown glaze (GLEY1 2.5/N and 7.5YR4/2); the brown colour may be due to misfiring.
Date: 5th to 4th century BC.
Parallels: Dr. S.I. Rotroff, pers. comm., 2006.

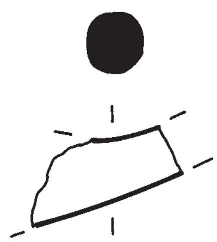

Fig. 1.8, **Cat. 8** (1:1)

9 (L20.01) Fig. 1.9
Land, W16/26:3, disturbed fill, 2002.

Handle fragment. The handle is oval in section.
L.: 3.60 cm, W.: 1.98 cm, T.: 0.65–0.99 cm.
Clay is soft fired, granular and fine levigated, with rare medium-sized lime particles and few medium-sized black particles. The colour is reddish yellow (5YR6/6). The external side of the handle carries a matt black painted band (GLEY1 2.5/N).
Date: Unknown.

Fig. 1.9, **Cat. 9** (1:1)

Plain Wares

Plain ware fragments were found during the land excavation of the upper ends of Shipsheds 16, 17(η) and 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38) and during the underwater excavations of Shipsheds 16–20(π) and 22–24(Ν–Φ) in 2002–2004 and 2006 (Pl. 39). All fragments were found in disturbed contexts. The plain wares constitute 659 fragments, or 55.7% of the total amount of ceramics found at Zea. Of these, 257 fragments were found on land and 402 fragments in the sea.

Within this category of plain wares, the medium and coarse wares represent the largest groups.[26] Medium wares account for 391 of these fragments (152 from land, 239 from the sea). The 22 fragments of transport amphorae are part of the medium ware group (five from land, 17 from the sea), but are discussed as a separate group. The coarse wares constitute 266 fragments (104 from land, 162 from the sea). Finally there are two fragments of cooking ware (one from land, one from the sea).

Of these 659 highly-fragmentary plain wares, 52 are considered diagnostic (see individual catalogue entries for find location): 23 fragments of medium ware (15 in the catalogue), 21 of transport amphorae (12 in the catalogue), two of cooking ware (both in the catalogue), and six of coarse ware (three in the catalogue).

Very few of these fragments are identifiable by any other category (e.g. by shape, function, etc.) than by their medium and coarse ware fabrics. Consequently, the description of the shapes and the fabrics is kept to a minimum. Within each group the fragments are divided and presented in the following order: rims, bases, handles and lids. The majority of the fragments cannot be dated at present, although suggested date ranges are offered for each of the groups.

Medium Wares

The medium ware group consists of six rim fragments (**10**–**15**), five base fragments (**16**–**20**), three handle fragments (**21**–**23**) and one lid (**24**). Only a few of the frag-

26. The difference in the fabric of the medium and coarse wares is due to the level of levigation, i.e., the amount and size of the particles.

ments are identifiable beyond categorisation as some kind of household vessel. The shapes of rim fragments **10**, **13**, **14** are: thickened (**10**), outturned (**13**) and projecting (**14**). There are no apparent parallels to the three rim fragments, but **10** appears to be an open vessel, while **13** is closed and its large diameter suggests a storage vessel of pithos size.[27] Too little is preserved of **14** to determine whether it is part of an open or closed form. The rim of **11** is flat and slightly incurved, with a ribbed pattern below the rim; a similar pattern is present in a Roman jug, an amphora from the Athenian Agora[28] and a Frankish bowl from Corinth.[29] The trefoil rim of **12** identifies it as an oinochoe, but the present author has not been able to find a parallel for its combination of an outturned rim and the triangular shape of the neck. The rim of **15** is plain with a slightly tapering neck; its size and shape suggests that it may be part of a drinking vessel.[30]

Base fragments **16** and probably **20** are flat and plain. The base of **17** is also flat, but has a slightly marked concave/convex profile; flat bases similar to these are seen in such vessels as basins, lekanai and beehives.[31] Base fragment **18** has a flat disk-foot, and the profile is concave/convex; similar bases are seen in jugs.[32] No. **19** has a ring-foot with a concave/convex profile, but too little is preserved for further identification.

The three handle fragments are of different shapes: one circular in section (**21**), one oval (**22**) and one flat and oval (**23**). Such variety in handle shapes is common in household vessels.[33] The lid (**24**) is round and flat with a central depression from the knob.

Fabrics

The fabric of the medium ware group has both similarities and differences. The clay of **13**, **15–16**, **19**, **21–22** is soft fired, that of **10**, **12**, **17–18**, **20**, and **24** is hard fired, while the clay of **11**, **14** and **23** is, respectively, very hard fired, medium-hard fired and very soft fired. The colour of **11**, **13**, **15–17** and **21** is reddish brown to yellowish red, and the colour of **10**, **12**, **18**, **19** and **22**, while similar, is characterised as light brown, reddish yellow to pale brown, brown and light yellowish brown (see individual catalogue entries for Munsell descriptions). Other fragments are red (**14**), dark reddish brown (**20**), light reddish brown (**23**), and gray (**24**) in colour.

The main components of the clay of **10–22** and **24** contain lime and black particles, **23** contains black particles, **10–13** and **15–17** contain pebbles, **19** and **23** contain red particles, **19** and **22** chamotte and **22** light-reflecting particles.

Several fragments have remains of a thin matt slip on the internal and/or external surface in different shades of dark reddish-gray (**10**), pale yellow (**12**), reddish-brown (**16**), light yellowish-brown (**17–18**), brown (**20**) and very pale brown (**22**), while the slip on **24** is thick matt and brown in colour (see individual catalogue entries for Munsell descriptions). No. **11** has thick and lustrous yellowish-brown glaze on the external surface.

Chronology

The state of preservation and lack of parallels make it rather difficult to date the fragments of the medium ware group. However, the fragments that do have at least a *similar* shape parallel are, with one exception, found in Classical and Hellenistic materials; only the glaze decoration of **11** places it in a later period.

27. The rim of the storage bin (Rotroff 2006: fig. 27, no. 166) is similar in shape to **14**, but the diameter is somewhat smaller.
28. Robinson 1959: pl. 18, no. M37, pl. 21, no. M77.
29. Sanders 1987: fig. 7, no. 25. The shape of the rim is different than **12**, which has a glaze that points to a late date.
30. The shape resembles the upper part of kantharoi with a plain rim (Rotroff 1997: fig. 5, no. 24, fig. 7, no. 59), but not in fabric or decoration.
31. Basins: Sparkes & Talcott 1970: fig. 19, nos. 1847 and 1849. Lekanai: Rotroff 2006: fig. 45, no. 262, fig. 47, no. 273. Beehives: Rotroff 2006: fig. 58, nos. 359, 360 and 362.
32. Rotroff 2006: fig. 5, no. 25.
33. For example, storage bins (Sparkes & Talcott 1970: pl. 67, no. 1533), chous (Rotroff 2006: fig. 1, no. 6), chytra (Rotroff 2006: fig. 81, no. 629) and jugs (Rotroff 2006: fig. 6, no. 31 and fig. 12, no. 71).

Catalogue of Medium Wares

Rims

10 (S49.04.1) Fig. 1.10
Sea, U:14A, disturbed fill, 2003.

Rim fragment of an open vessel. The rim is thickened; there is a second bead *ca* 6.7 cm below the rim.

H.: 8.0 cm, W.: 8.2 cm, T.: 1.0–2.0 cm, D.: *ca* 31.9 cm. The clay is hard fired, granular and medium levigated, with few medium-sized lime particles, frequent medium-sized black particles and rare very large pebbles. The colour is brown (7.5YR5/4); at the centre grayish brown (10YR5/2). The vessel carries a thin, matt dark reddish gray slip (5YR4/2) on the internal surface.
Date: Unknown.

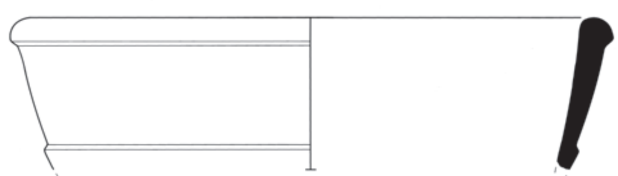

Fig. 1.10, **Cat. 10** (1:4)

11 (S97.02) Fig. 1.11
Sea, surface cleaning in the area of SW5 (S13(?), S22), 2004.

Rim fragment of a thick-walled vessel. The upper profile of the rim is flat and slightly incurved. Ribbed pattern below the rim consisting of four ribs 0.3 cm wide and 0.4 cm apart.

H.: 3.7 cm, W.: 4.6 cm, T.: 0.9–1.2 cm, D.: 16.1 cm. The clay is very hard fired, granular and medium levigated, with frequent medium- to large-sized black particles, few medium-sized lime particles and rare large-sized pebbles. The colour is reddish brown (2.5YR5/4). The vessel carries a thick lustrous yellowish brown glaze (10YR5/6) on the external surface (including the upper part of the rim).
Date: Unknown.
Parallels: Sanders 1987: fig. 17, no. 24 has a comparable rib pattern, but neither the shape nor fabric are similar. Robinson 1959: pl. 21, no. M77 has a similar rib pattern, but the fragment has no glaze.

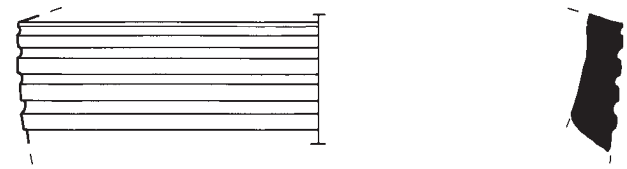

Fig. 1.11, **Cat. 11** (1:2)

12 (L24.01) Fig. 1.12, Fig. 130
Land, W16/26:3, disturbed fill, 2002.

Rim fragment of a jug. The rim is outturned. Its profile is concave/convex. Part of its trefoil mouth is preserved. The neck tapers from the rim toward the shoulder.

H.: 6.0 cm, W.: 9.0 cm, T.: 0.7–1.5 cm, D.: *ca* 10.0 cm. The clay is hard fired, granular and medium levigated, with few medium-sized lime particles, frequent medium- to large-sized black particles and rare very large-sized pebbles. The colour is light yellowish brown (10YR6/4). The jug has remains of a thin matt pale yellow slip (2.5Y8/3) on the internal and external surfaces.
Date: Unknown.
Parallels: The colour of the clay is similar to "water-jug fabric 1" in Rotroff 2006: 29. The shape of the neck is similar to Sparkes & Talcott 1970: pl. 73, no. 1613.

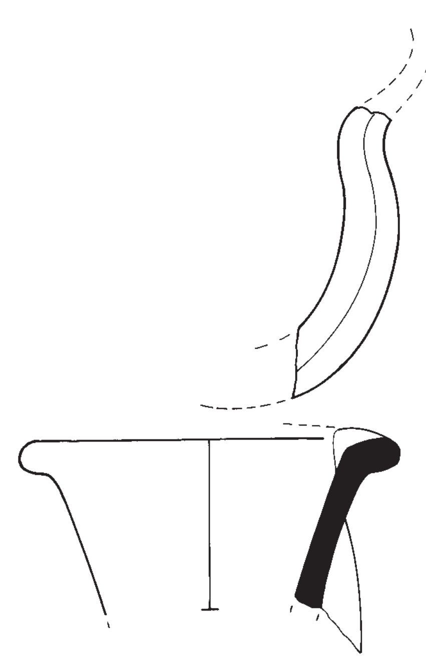

Fig. 1.12, **Cat. 12** (1:2)

13 (L32.05.1) Fig. 1.13
Land, C17/18:8, disturbed fill, 2002.

Rim fragment of a possible closed storage vessel. The rim is outturned with a slight concave/convex profile.
H.: 4.7 cm, W.: 8.2 cm, T.: 1.1–1.7 cm, D. rim: *ca* 47.2 cm.
The clay is soft fired, hackly and medium levigated, with frequent medium- to large-sized lime particles, frequent small- to medium-sized black particles and rare large-sized pebbles. The colour is yellowish red (5YR5/6).
Date: Unknown.
Parallels: The shape is similar to Rotroff 2006: fig. 27, no. 166, but not in size or decoration.

Fig. 1.13, **Cat. 13** (1:4)

14 (S305.03.1) Fig. 1.14
Sea, W16/26:5, disturbed fill (layer 1), 2006.

Rim fragment of a possible open storage vessel. The rim is projecting and its profile is rounded.
H.: 4.3 cm, W.: 15.4 cm, T.: 1.1–2.9 cm, D.: *ca* 47.7 cm.
The clay is medium-hard fired, granular and medium levigated, with frequent small- to medium-sized black particles and frequent medium- to large-sized lime particles. The colour is red (2.5YR5/6).
Date: Unknown.

15 (S305.03.2) Fig. 1.15
Sea, W16/26:5, disturbed fill (layer 1), 2006.

Rim and neck fragment of a possible drinking vessel. The rim is plain, and the neck tapers slightly.
H.: 3.2 cm, W.: 4.0 cm, T.: 0.5–0.6 cm, D.: *ca* 9.6 cm.
The clay is soft fired, granular and medium levigated, with frequent small- to medium-sized black particles, frequent small- to very large-sized lime particles and rare very large-sized pebbles. The colour is yellowish red (5YR4/6).
Date: Unknown.
Parallels: The shape resembles the upper part of kantharoi with a plain rim (Rotroff 1997: fig. 5, no. 24 and fig. 7, no. 59).

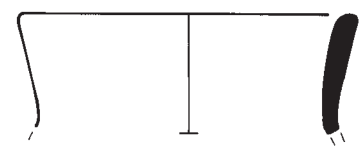

Fig. 1.15, **Cat. 15** (1:2)

Bases

16 (S02.01.1–2, S05.04) Fig. 1.16
Sea, U:14A, disturbed fill, 2002.

Base fragment of a flat-based open vessel.
H.: 7.8 cm, T.: 0.7–1.6 cm, D.: *ca* 22.8 cm.
The clay is soft fired, granular and medium levigated, with frequent small- to medium-sized lime particles, few medium-sized black particles and rare large-sized pebbles. The colour is reddish brown (5YR5/4). The vessel has remains of a thin matt reddish brown slip (5YR4/3) on the external and internal surfaces.
Date: Unknown.
Parallels: The shape and fabric have similarities with Rotroff 2006: fig. 47, nos. 272–273, and the shape has similarities with Rotroff 2006: fig. 58, nos. 359, 362.

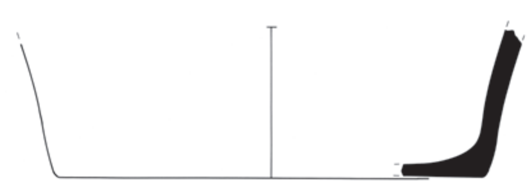

Fig. 1.16, **Cat. 16** (1:4)

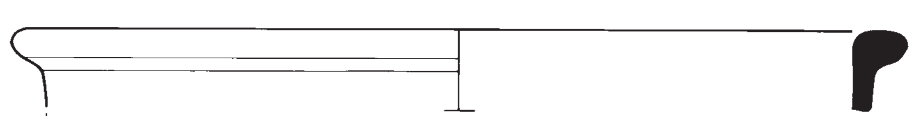

Fig. 1.14, **Cat. 14** (1:4)

17 (S05.03.1) Fig. 1.17
Sea, U:14A, disturbed fill, 2002.

Base fragment of a flat-based possibly open vessel. Its profile is concave/convex.

H.: 3.3 cm, W.: 5.6 cm, T.: 0.6 cm, D.: *ca* 19.2 cm. The clay is hard fired, granular and medium levigated, with few medium-sized lime particles, frequent medium-sized black particles and rare very large-sized pebbles. The colour is yellowish red (5YR5/6). The vessel carries a thin matt light yellowish brown slip (10YR6/4) on the external and internal surfaces.
Date: Unknown.

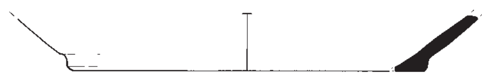

Fig. 1.17, **Cat. 17** (1:4)

18 (S10.01.4) Fig. 1.18
Sea, U:14A, disturbed fill, 2002.

Base fragment from a vessel with a flat disk-foot. Its profile is concave/convex.

H.: 2.8 cm, W.: 6.8 cm, T.: 1.1 cm, D.: *ca* 10.3 cm. The clay is hard fired, hackly and medium levigated, with few large- to very large-sized lime particles and few medium-sized black particles. The colour is light brown (7.5YR6/4). The vessel carries remains of a thin matt light yellowish brown slip (10YR6/4) on the internal surface.
Date: Unknown.
Parallels: The shape is similar to Rotroff 2006: fig. 5, no. 25.

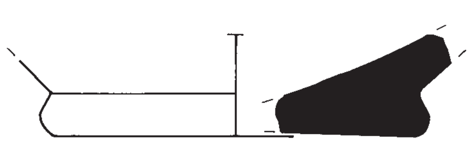

Fig. 1.18, **Cat. 18** (1:2)

19 (L78.02.1) Fig. 1.19
Land, disturbed fill between S17:SSP1 and C17/18:11, 2002.

Base fragment of a vessel with a ring-foot. Its profile is concave/convex.

H.: 2.4 cm, W.: 3.4 cm, T.: 0.5–1.4 cm, D.: *ca* 13.0 cm. The clay is soft fired, hackly and medium levigated, with frequent medium- to large-sized black and red particles, rare medium- to very large-sized lime particles and rare large-sized pieces of chamotte. The colour is reddish yellow (7.5YR6/6) to very pale brown (10YR7/4).
Date: Unknown.

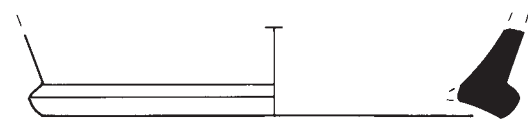

Fig. 1.19, **Cat. 19** (1:2)

20 (S300.01.1) Fig. 1.20
Sea, SW5:R2, disturbed fill (layer 2), 2006.

Base fragment of a flat based vessel.

H.: 3.0 cm, L.: 5.8 cm, T.: 1.0 cm, D.: *ca* 16.6 cm. The clay is hard fired, hackly and medium levigated, with few small- to medium-sized black particles and few medium- to large-sized lime particles. The colour is dark reddish brown (5YR3/3). The vessel carries remains of a thin matt brown slip (7.5YR5/4) on the external surface.
Date: Unknown.

Fig. 1.20, **Cat. 20** (1:3)

Handles

21 (L86.02.1–2) Fig. 1.21
Land, surface cleaning in the area of Shipsheds 16–18, 2002.

Handle fragment, perhaps a lug handle. The handle is circular in section.
L.: 4.2 cm, T.: 1.7 cm.
The clay is soft fired, granular and medium levigated, with frequent medium- to very large-sized lime particles and frequent medium- to large-sized black particles. The colour is yellowish red (5YR5/6). The handle carries traces of secondary firing.
Date: Unknown.
Parallels: The shape and colour are similar to Sparkes & Talcott 1970: 344, no. 1533.

Fig. 1.21, **Cat. 21** (1:2)

22 (S88.02) Fig. 1.22
Sea, surface cleaning in the area of SW5 (S13(?), S22), 2004.

Handle fragment. The handle is oval and very flat in section.
L.: 3.6 cm, W.: 3.2 cm, T.: 0.7–1.0 cm.
The clay is soft fired, granular and medium levigated, with frequent small- to medium-sized lime particles, frequent small- to large-sized black particles, few medium- to large-sized pieces of chamotte and rare fine-sized light-reflecting particles. The colour is pale brown (10YR6/3). The handle carries remains of a thin, matt very pale brown slip (10YR8/2).
Date: Unknown.
Parallels: Rotroff 2006: fig. 81, no. 629.

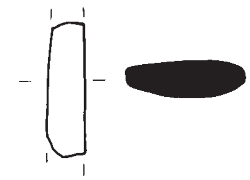

Fig. 1.22, **Cat. 22** (1:2)

23 (L32.04.1) Fig. 1.23
Land, C17/18:8, disturbed fill, 2002.

Handle fragment. The handle is oval in section.
L.: 3.5 cm, W.: 2.4 cm, T.: 1.5 cm.
The clay is very soft fired, granular and medium levigated, with frequent small- to medium-sized black particles and few small red particles. The colour is light reddish brown (2.5YR7/4).
Date: Unknown.

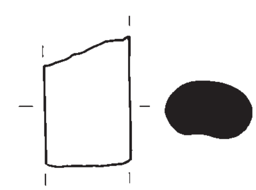

Fig. 1.23, **Cat. 23** (1:2)

Lid

24 (S10.01.6) Fig. 131a-b
Sea, U:14A, disturbed fill, 2002.

Fragment of a flat and round lid. On the upper surface there is a depression from the knob. On the underside there are finger marks.
L.: 9.1 cm, W.: 6.8 cm, T.: 0.8–1.1 cm.
The clay is hard fired, granular and medium levigated, with few medium-sized lime and black particles. The colour is gray (10YR6/1). The lid carries a thick matt brown slip (7.5YR4/4) on its internal and external surfaces.
Date: Unknown.

Transport Amphora

The fragments of transport amphorae consist of one rim and neck fragment (**25**), two toes (**26–27**) and nine handle fragments (**28–36**). The rim fragment has a triangular lip with an offset ridge just below – a shape referred to as a 'mushroom rim'.[34] Similar shapes are known from Samian amphorae, Rhodian amphorae, the so-called Solocha I amphorae and from the Greco-Italic amphora group.[35] M. Lawall, however, assigns **25** to a southeast Aegean production centre.[36] Toe fragment **26** is short and solid with a rounded flat base; similar shapes are known from the region of Thasos.[37]

The base profile of **27** is concave/convex with a depression at the bottom and boasts a high, solid stem, a shape typical of Thasian amphorae.[38] The nine handle fragments **28–36** are all dissimilar, their sections are characterised by different shapes ranging from circular to oval. No. **33** stands out as being very wide and rather crude. P. Reynolds cautiously suggests that it might be a Late Roman Amphora 1 of Cilician/Cypriot origin.[39]

The present author has studied the shape of a number of Late Roman Amphora 1 handles, but they appear generally to be more circular in their sections than **33**, and some have a distinct clay fold on the upper side of the handle. A similar fold is not nearly as visible on **33**, whose upper surface appears simply uneven, an irregularity that may well be caused by wear once deposited in the sea.[40] None of the handles have any stamps, nor are their states of preservation sufficient to identify their place of origin.

Fabric

Although the fabrics of all the amphora material show medium levigation, there are differences that are illustrated in the following three fragments: the clay of **25** is soft fired, has a light brownish-gray colour (2.5Y6/2) very different from the colour of the other amphora fragments and contains lime and black particles; the clay of **26** is medium-hard fired, has a dark grayish-brown colour (10YR4/2) and contains silver flakes and mica alongside lime and black particles; the clay of **27** is hard fired with a red colour (2.5YR5/6) and contains lime, black particles, pebbles and silver mica, all components typical of Thasian clay.[41]

Handle fragments **28** and **31–36** all have a reddish colour (see individual catalogue entries for exact Munsell descriptions and hardness of clay). No. **29** is light brown and **30** is dark bluish gray. Nos. **28** and **30–36** contain lime and black particles and **29** black and brown particles. In addition **29** and **32** contain pebbles, **33** light-reflecting particles and **33–34** chamotte. The colour of **33** (2.5YR5/6) is similar to the fabric description given by J.A. Riley and the fabric photos presented by T. Bezeczky, although the particle descriptions differ somewhat: the amount of lime is abundant in Bezeczky's examples and less so in **33**, but the red inclusions visible at the clay surface are common in both.

D. Williams describes the fabric of Late Roman Amphora 1 from different production places in Cilicia, in Rhodes and in Cyprus. There are local variations of colour and particles. For instance, the fabric from Soles contains mica similar to the light-reflecting particles in **33** and is otherwise similar in colour and particle descriptions.[42]

Several fragments (**25–26**, **28**, **30–32** and **35**) carry a slip on the external surface in yellowish, gray, brown and reddish colours (see individual catalogue entries

34. See Nørskov 2004: 288 for a typology of mushroom rims.
35. Samos: Blondé *et al.* 1991: 229, no. 40. Rhodes: Empereur & Hesnard 1987: 58–59, no. 7. Solocha I: Doulgéri-Intzessiloglou & Garlan 1990: 386, fig. 35a. Nørskov & Lund (Vaag *et al.* 2002: 60–62) give a list of production places for the Solocha I amphorae, among them Rhodes and Samos. Greco-Italic: Will 1982: 341–342, pl. 85b; Empereur & Hesnard 1987: figs. 22–24; Sciallano & Sibella 1994: 30–31; Romano 1994: 86, fig. 13, no. 63 are of questionable Greco-Italic origin, but similar to **25**.
36. Dr. M. Lawall, pers. comm., 2007. Dr. M. Lawall kindly reviewed all the amphora material.
37. Grace 1949: pl. 19, no. 6; 1986: 563, no. 12, fig. 3, no. 12; Kopcke 1992: nos. 248, 245.
38. The closest parallels to **27** are Johnston 1990: 56–57, no. 153 and Blondé *et al.* 1991: fig. 20.
39. Dr. P. Reynolds, pers. comm., 2007. Dr. P. Reynolds kindly reviewed the handle. The question of origin is discussed in Reynolds 2005: 565–567; Williams 2005a: 160.
40. Riley 1979: fig. 91, nos. 337, 338 and 346; Sciallano & Sibella 1994: 33; Peacock & Williams 1986: 185; Bezeczky 2005: pl. 3, no 21–23; Keay 1984: figs. 116–120; Fulford & Peacock 1984: fig. 34, no. 2; Williams 1987: fig. 5.
41. Blondé *et al.* 1991: 216.
42. Clay colour: Riley 1979: 212; Bezeczky 2005: pl. XVI, nos. 21–23. Particle description: Williams 2005a: 163, 166; 2005b: 617–619.

for Munsell descriptions). Nos. **26**–**27** and **30** are the only ones with micaceous surfaces.

Chronology

Only **26** and **27** of the transport amphora category have a positive parallel; **25** and **27** have been dated to the 4th century BC, while the possible identification of **33** places it in the later 5th century AD.[43]

43. Dr. P. Reynolds, pers. comm., 2007; Reynolds, according to the possible identification, dates the handle stylistically to the later 5th century AD.

Catalogue of Transport Amphora

Rim

25 (S25.03) Fig. 1.24
Sea, transition between U:14A and C7/8:4, disturbed fill, 2003.

Rim fragment of a transport amphora. The lip is triangular, with an offset ridge just below. The neck slopes outwards.

H.: 8.6 cm, W.: 9.0 cm, T.: 1.0–2.5 cm, D.: *ca* 14.1 cm. The clay is soft, granular and medium levigated with few medium- to large-sized lime and black particles. The colour is light brownish gray (2.5Y6/2). The amphora has remains of a thin matt pale yellow to light gray slip (2.5Y8/2–7/2) on the external surface.
Date: 4th century BC.
Origin: Southeast Aegean, Dr. M. Lawall, pers. comm., 2007.

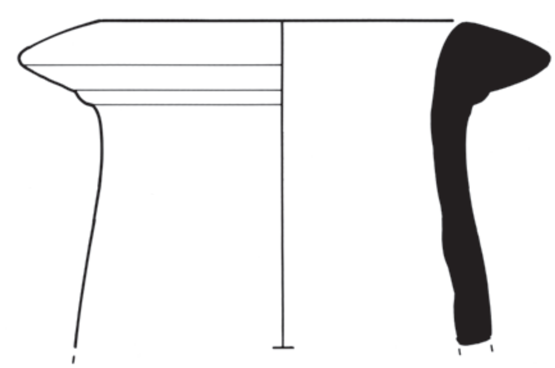

Fig. 1.24, **Cat. 25** (1:2)

Bases

26 (S03.01) Fig. 1.25
Sea, U:14A, disturbed fill, 2002.

Toe fragment of a transport amphora. The toe is short and solid (knob); its diameter increases towards the bottom of the toe.

H.: 9.8 cm, T.: 1.5 cm, D.: 5.2 cm.
The clay is medium-hard fired, conchoidal and medium levigated, with rare medium-sized silver flakes, few

small-sized silver mica, few medium-sized lime particles and frequent medium-sized black particles. The colour is dark grayish brown (10YR4/2). The amphora carries a thick matt pale brown slip (10YR6/3) on the external surface.
Date: Unknown.
Origin: Region of Thasos, Dr. M. Lawall, pers. comm., 2007.
Parallels: Kopcke in McCredie *et al.* 1992: nos. 245, 248.

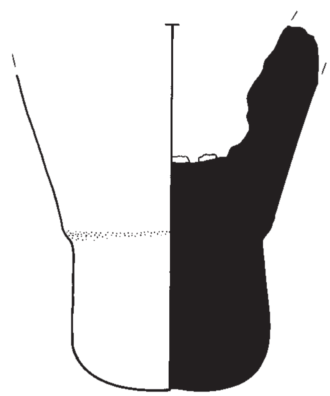

Fig. 1.25, **Cat. 26** (1:2)

27 (L61.01) Fig. 1.26
Land, M:11, disturbed fill, 2002.

Toe fragment of a transport amphora from Thasos. The profile of the base is convex, and the bottom has a depression. There is a groove at the transition between stem and base.
H.: 11.2 cm, D. of base: *ca* 6.3 cm.
The clay is hard fired, hackly and medium levigated, with frequent medium- to large-sized lime and black particles, frequent small- to medium-sized silver mica and frequent large- to very large-sized pebbles. The colour is red (2.5YR5/6).
Date: 4th century BC.
Origin: Thasos
Parallels: Johnston 1990: 56–57, no. 153; Blondé *et al.* 1991: fig. 20.

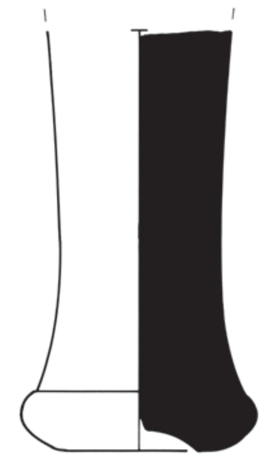

Fig. 1.26, **Cat. 27** (1:2)

Handles

28 (S10.01.1) Fig. 1.27
Sea, U:14A, disturbed fill, 2002.

Handle fragment from a transport amphora. Part of the lower attachment is preserved. The handle is oval in section.
L.: 11.0 cm, T.: 2.1–4.2 cm.
The clay is hard fired, hackly and medium levigated, with common medium- to very large-sized lime particles and frequent medium-sized black particles. The colour is reddish brown (5YR5/4). The amphora bears a thin matt reddish brown slip (5YR4/3).
Date: Unknown.

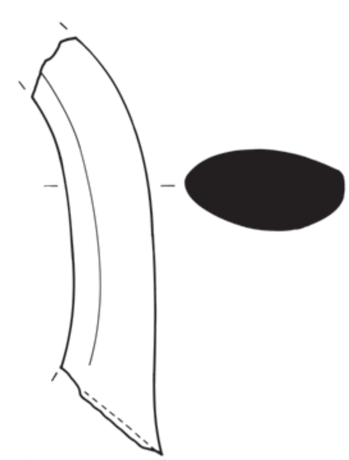

Fig. 1.27, **Cat. 28** (1:2)

29 (S10.01.2) Fig. 1.28
Sea, U:14A, disturbed fill, 2002.

Handle fragment of a transport amphora. The transition between the vertical and the horizontal part of the handle is preserved. The handle is round in section.
L.: 5.8 cm, T.: 2.4–2.7 cm.
The clay is very hard fired, granular and medium levigated, with rare large-sized pebbles, few medium-sized black particles and common medium-sized light brown particles. The colour is light brown (7.5YR6/4).
Date: Unknown.

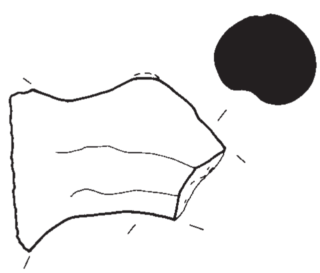

Fig. 1.28, **Cat. 29** (1:2)

30 (S41.03.1) Fig. 1.29
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Handle of a transport amphora. The lower attachment is preserved. The handle is oval in section.
L.: 17.1 cm, W.: 7.0 cm, T.: 2.1–3.6 cm.
The clay is soft fired, granular and medium levigated, with frequent medium- to large-sized lime particles and few medium-sized black particles. The colour is dark bluish gray (GLEY2 4/5B). The amphora has remains of a thick matt very pale brown to pale brown micaceous slip (10YR7/3–6/3) on the external surface.
Date: Unknown.

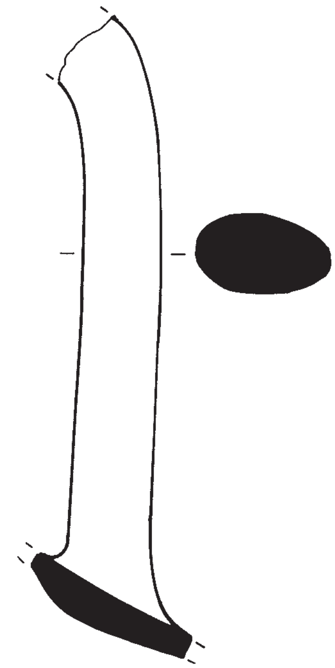

Fig. 1.29, **Cat. 30** (1:2)

31 (S42.02) Fig. 1.30
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Handle fragment of a transport amphora. The handle is round in section.
L.: 11.7 cm, T.: 3.3–4.0 cm.
The clay is hard fired, granular and medium levigated, with frequent medium- to large-sized lime particles and few very large-sized black particles. The colour is reddish yellow (5YR6/6). The amphora has remains of a thin matt dark reddish brown slip (2.5YR4/3) on the external surface.
Date: Unknown.

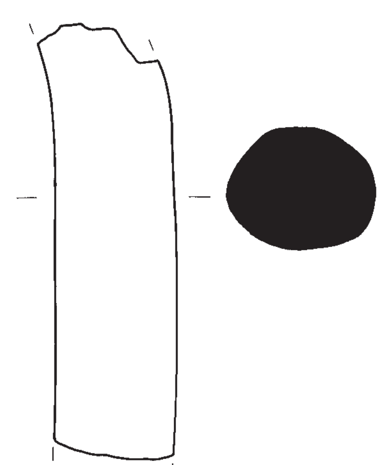

Fig. 1.30, **Cat. 31** (1:2)

32 (S49.03) Fig. 1.31
Sea, U:14A, disturbed fill, 2003.

Handle fragment of a transport amphora. The handle is rounded in section. The surface is very worn.
L.: 10.3 cm, T.: 2.5–3.2 cm.
The clay is soft fired, granular and medium levigated, with few medium- to large-sized lime particles, few small- to medium-sized black particles and single very large-sized pebbles. The colour is reddish brown (5YR5/4). The are remains of a thin matt dark reddish gray slip (5YR5/2) on the external surface.
Date: Unknown.

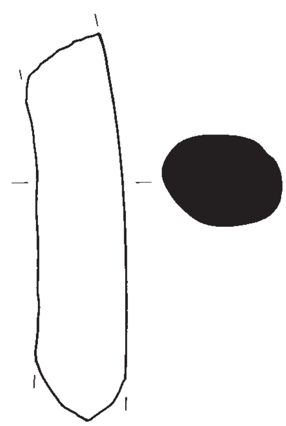

Fig. 1.31, **Cat. 32** (1:2)

33 (S79.02.1) Fig. 1.32
Sea, C14/15:4, disturbed fill, 2004.

Handle fragment of a transport amphora. The handle is an uneven oval in section. The upper side is rough due to wear.
L.: 12.8 cm, T.: 2.8–4.9 cm.
The clay is medium-hard fired, hackly and medium levigated, with few small- and medium-sized black particles, rare small lime particles and rare fine-sized light-reflecting particles. The colour is red (2.5YR5/6). Medium to large-sized pieces of chamotte are visible on the surface of the handle.
Date: Later 5th century AD? Dr. P. Reynolds, pers. comm., 2007.
Origin: Cilician/Cypriot?
Parallels: Possible Late Roman Amphora 1? For fabric: Williams 2005a: 166.

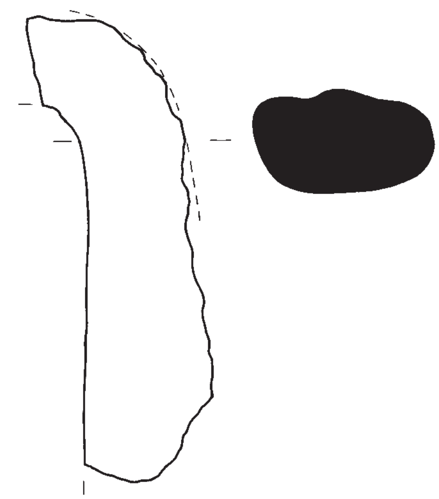

Fig. 1.32, **Cat. 33** (1:2)

34 (S266.03.1) Fig. 1.33
Sea, east part of C14/15 (C23/24), surface cleaning, 2006.

Handle fragment of a transport amphora. The handle is oval in section.
L.: 9.7 cm, T.: 2.5–4.0 cm.
The clay is medium-hard fired, granular and medium levigated, with frequent medium- to large-sized black particles, few small- to large-sized lime particles and common large- to very large-sized pieces of chamotte. The colour is yellowish red (5YR5/6).
Date: Unknown.

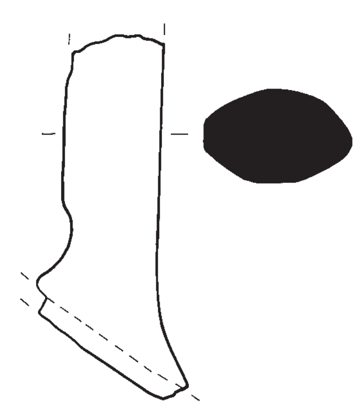

Fig. 1.33, **Cat. 34** (1:2)

35 (S274.03.1) Fig. 1.34
Sea, C14/15:1, disturbed fill (layer 2), 2006.

Handle fragment of a transport amphora. The handle is oval in section.
L.: 8.9 cm, T.: 2.1–3.8 cm.
The clay is soft fired, conchoidal and medium levigated, with few small- to large-sized black particles and rare medium-sized lime particles. The colour is light reddish brown (5YR6/4). The amphora has remains of a thin, matt dark brown slip (10R4/3) on its external surface.
Date: Unknown.

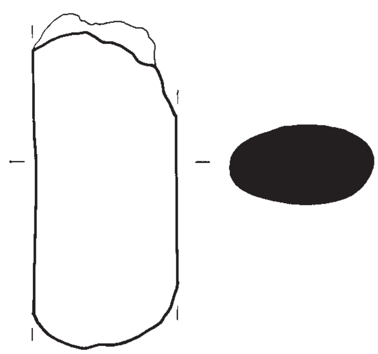

Fig. 1.34, **Cat. 35** (1:2)

36 (S312.02.1) Fig. 1.35
Sea, C8/9:7, disturbed fill (layer 1), 2006.

Handle fragment of a transport amphora. The handle is oval in section.
L.: 3.3 cm, T.: 2.7–3.9 cm.
The clay is soft fired, hackly and medium levigated, with frequent small- to medium-sized black particles and few small-sized lime particles. The colour is red (2.5YR5/6).
Date: Unknown.

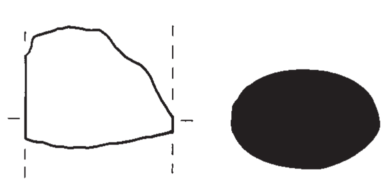

Fig. 1.35, **Cat. 36** (1:2)

Cooking Wares

The cooking wares group consists of two fragments, a rim (**37**) and a handle fragment (**38**). The rim fragment with interior flange is probably from a lopas. Rotroff's Lopas Form 1 appears to be the closest parallel.[44] The handle fragment is in the shape of a lug handle and could be from a lopas or chytra.[45]

Fabrics
The two fragments are made in a reddish brown (**37**) and reddish yellow (**38**) medium levigated clay (2.5–YR5/4 and 7.5YR6/6) containing black and lime particles. No. **38** contains silver mica, which is very characteristic of Attic cooking fabric, while **37** contains light-reflecting particles.[46] No. **38** is soft fired while **37** is hard fired and carries a thick and dull reddish grey slip on the external surface.

Chronology
The Lopas Form 1 was manufactured from the third quarter of the 5th century to *ca* 275 BC, while the classical cooking fabric, to which **38** seems to belong, was probably not employed after the end of the 4th century BC.[47] The two cooking ware fragments from Zea thus may well belong to the 5th and/or 4th centuries BC.

44. Rotroff 2006: 179.
45. Sparkes & Talcott 1970: 374, no. 1970; Rotroff 2006: 307, no. 595. Handle fragment **21** is similar in shape to **38**, but is not made of cooking ware fabric.
46. Sparkes & Talcott 1970: 34–36; Rotroff 2006: 38–43.
47. Rotroff 2006: 38.

Catalogue of Cooking Wares

Rim

37 (S80.03) Fig. 1.36
Sea, C14/15:4a, disturbed fill, 2004.

Rim fragment of a possible lopas. The rim is flaring with an interior flange to support the lid.

H.: 3.1 cm, W.: 6.2 cm, T.: 0.5–1.1 cm, D.: *ca* 21.9 cm. The clay is hard fired, granular and medium levigated, with frequent medium- to very large-sized black particles, frequent medium- to large-sized lime particles and few fine-sized light-reflecting particles. The colour is reddish brown (2.5YR5/4). The vessel carries a thick matt dark reddish grey slip (2.5YR4/1) on its external surface.
Date: Third quarter of the 5th century to *ca* 275 BC.
Parallels: The shape is parallel to Rotroff 2006: 179 (Lopas Form 1) and Sparkes & Talcott 1970: 373, no. 1965, although the fabric seems to be similar only in colour.

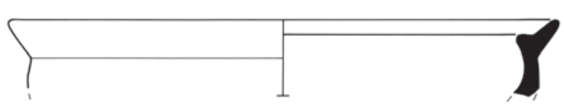

Fig. 1.36, **Cat. 37** (1:3)

Handle

38 (L77.01) Fig. 1.37
Land, disturbed fill between S17:SSP1 and C17/18:11, 2002.

Handle fragment in the shape of a lug handle, perhaps from a lopas or a chytra. The handle is circular in section.

L.: 5.7 cm, T.: 1.4–1.5 cm.
The clay is soft fired, granular and medium levigated, with common medium- to large-sized black particles, rare large-sized lime particles and few small silver mica. The colour is reddish yellow (7.5YR6/6).
Date: 5th to 4th century BC.
Origin: Attica.
Parallels: The shape and the fabric are similar to Sparkes & Talcott 1970: 374, no. 1970; Rotroff 2006: 307, no. 595, made in Classical cooking fabric which was probably not employed after the 4th century BC (see Rotroff 2006: 38 for fabric description).

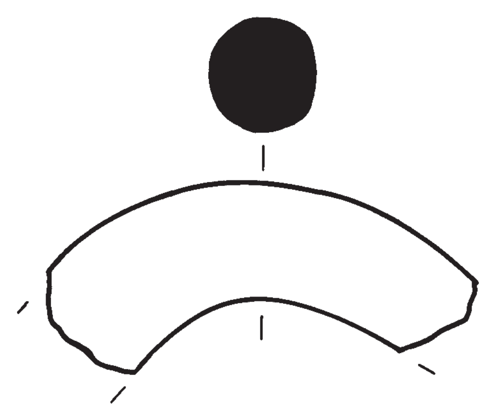

Fig. 1.37, **Cat. 38** (1:1)

Coarse Wares

The three coarse ware fragments from Zea Area 1 consist of one rim (**39**), one base and stem fragment (**40**) and a possible lid fragment (**41**). The rim fragment, part of a perirrhanterion or louterion, is flat and downturned with three horizontal ridges.[48] The closest parallels with regard to shape are a perirrhanterion found on Aigina[49] and one found in the Athenian Agora.[50] The base and stem fragment from Zea has a flat resting surface and a hollow stem. The smooth break of the stem may suggest that the stem itself was made separately from the bowl, plate or small basin it was carrying. No. **41** is a flat fragment of an apparently round object, which may well have served as a stopper or a lid for a pithos or other type of storage container.

Fabrics

The clay colour of **39** and **40** is very similar. Although **41** is pale yellow (2.5Y8/3–7/4) and **40** is pale brown (10YR8/4), they are both soft fired, coarse levigated and contain black particles. No. **41** also contains red particles, while **39** contains chamotte and golden flakes. The fabric of **39** seems very similar to the description of Corinthian coarse ware clay used, for example, in the production of perirrhanteria, where the fabric is described as gritty with a texture of oatmeal porridge.[51] Corinthian perirrhanteria were in high demand in Athens from the final quarter of the 6th century BC, and are the most common shape found in the deposits at the Athenian Agora throughout the 5th and into the 4th centuries BC.[52] The similarity between the fabrics of **39** and **40** may indicate that **41**, too, is of Corinthian origin. The clay of **41** is also soft fired, coarse levigated and contains black and lime particles as well as chamotte. The colour is light gray to very pale brown (10YR7/2–7/3) and has remains of a thin matt reddish-brown slip (5YR5/4). No. **39** has remains of dark reddish gray paint (5YR4/2) in the second groove, similar to the decoration canon for perirrhanteria of the Classical period.[53]

Chronology

Terracotta perirrhanteria were made from the end of the 8th century BC and into the Hellenistic period.[54] The shape and decoration of **39** point to a date in the 5th century BC.

48. Pimpl (1997: 4–5) discusses the names perirrhanterion and louterion in relation to their find context. Iozzo (1987: 355–357) gives a description of the development of the shape from the Archaic to the Hellenistic periods. See also Fullerton 1986: 207–217 and Ginouvés 1962.
49. Kerschner 1996: 67, no. 17.
50. Sparkes & Talcott 1970: 367, no. 1959.
51. Amyx & Lawrence 1975: 94. The oatmeal porridge description fits the fabric of **39**.
52. Sparkes & Talcott 1970: 219–220. Athenian potters produced perirrhanteria as well, sometimes with a light buff slip to disguise them as Corinthian.
53. Kerschner 1996: 63–64.
54. Pimpl (1997: 33–34 and cat. nos. 354, 169, 411, 414) mentions perirrhanteria in Hellenistic and later contexts, though only little material is known. These examples range in date from the 3rd century BC to the Roman period.

Catalogue of Coarse Wares

Rim

39 (L22.01, L22.02) Fig. 1.38, Fig. 132
Land, W16/26:3, disturbed fill, 2002.

Rim fragment of a Corinthian perirrhanterion. Flat down-turned rim, with three horizontal ridges preserved.

H.: 8.3 cm, W.: 25.7 cm, T.: 2.4–3.8 cm, D.: *ca* 79.3 cm.
The clay is soft fired, hackly and coarse levigated, with frequent very large-sized pieces of chamotte, frequent small-sized black particles and rare medium-sized golden flakes. The colour is pale yellow (2.5Y8/3–7/4). In and around the second groove there are remains of dark reddish gray paint (5YR4/2).
Date: First half of 5th century BC.
Origin: Corinth.
Parallels: Kerschner 1996: 67, no. 17; Sparkes & Talcott 1970: 367, no. 1859.

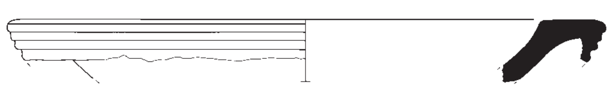

Fig. 1.38, **Cat. 39** (1:10)

Base

40 (L44.01) Fig. 1.39
Land, disturbed fill between S17:SSP1 and C17/18:11, 2002.

Base and stem fragment of a large vessel. The resting surface is flat. The profile is concave/convex and incurved. The stem is hollow.

H.: 4.4 cm, T.: 1.7–1.8 cm, D.: *ca* 10.3 cm.
The clay is soft fired, granular and coarse levigated, with common small- to large-sized black particles and frequent medium-sized red particles. The colour is very pale brown (10YR8/4). The base carries a thin matt pale yellow slip (2.5Y8/3).
Date: Unknown.
Origin: Corinth?

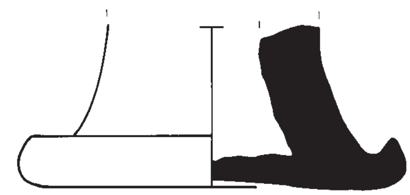

Fig. 1.39, **Cat. 40** (1:2)

Lid or Stopper

41 (S89.01) Fig. 133
Sea, surface cleaning in the area of SW5 (S13(?), S22), 2004.

Round coarse ware object, perhaps a very large stopper or lid for a pithos or other storage container.

L.: 11.2 cm, W.: 12.1 cm, T.: 1.6–1.7 cm, D.: *ca* 28.0 cm.
The clay is soft fired, granular and coarse levigated, with common medium- to large-sized black particles, frequent large- to very large-sized pieces of chamotte and rare medium-sized lime particles. The colour is light gray to very pale brown (10YR7/2–7/3). The object has remains of a thin matt reddish brown slip (5YR5/4).
Date: Unknown.

Conclusion

The plain ware group is large and very mixed even within its various subgroups. What little dateable material there is suggests an upper date from the first half of the 5th century BC (perirrhanterion fragment **39**), and a lower date in the later 5th century AD (the possible handle of a Late Roman transport amphora **33**). In between are the two transport amphora fragments (**25** and **27**) of the 4th century BC and the cooking ware material (**37**–**38**) of the Classical to early Hellenistic periods. Glaringly absent are Roman and later Hellenistic materials of any kind, aside from the possible Late Roman handle (**33**).

In terms of geographic distribution there is little in the way of material from outside the Aegean area: the fabric of the perirrhanterion (**39**) and perhaps the coarse ware base fragment (**40**) is of probable Corinthian origin; the rim fragment of the transport amphorae (**25**) is from the southeast Aegean; toes **26–27** derive from the region of Thasos and Thasos, respectively; the possible Late Roman Amphora 1 handle fragment (**33**) could be of Cilician/Cypriot origin. The cooking ware fabric of **38** is the only ceramic fragment ascribed to an Attic origin, but this may also be the case with several other fragments.

1.4.2. Byzantine (?)

During the land excavation of the upper ends of Shipsheds 16, 17(η) and 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38), a distinct group consisting of 11 fragments were found; similar fragments were not found during the underwater excavations. All fragments were found in disturbed contexts. The group, which is of possible Byzantine date (see below), is discussed as a separate group outside the plain ware category because its uniqueness is attributed to its dating and not its fabric, which would otherwise have placed the 11 fragments within the medium wares group.

Five of the 11 fragments are diagnostic: one bowl (**42**), three rim fragments (**43–45**) and a handle fragment (**46**). The bowl is half preserved. It has a flat base and an outturned rim similar in shape to a bowl from Phokis[55] and another from Khania.[56] The three rim fragments are very similar in shape with slightly incurved rims. Their outer profile tapers inward and their inner profile exhibits a concave/convex profile, although their diameters differ. The shape of **44–45** assigns them as bottles or small jugs based on their similarity to the rim of a jug from Istanbul,[57] while **43** belongs to a small bowl similar in shape to bowls also found in that city,[58] but also others found in Phokis[59] and Sparta.[60] The handle and shoulder fragment **46** is rather robust compared to the relatively thin wall of the vessel and could be part of a jug or an amphora.

Fabrics

The 11 fragments are made in a very distinct fabric: the colour is red (2.5YR4/6 or 5YR4/6), except for **46**, which is red and brown (2.5YR4/6 and 7.5YR4/3). They are hard fired, medium levigated and all contain lime and black particles, some composed of light-reflecting particles, others of silver mica. All but **44** contain pebbles, and **42** alone contains chamotte. Bowl **42** has a thick glaze of metallic pinkish gray, red-

55. Armstrong 1989: 12, no. 67.
56. Hahn 1997: pl. 48, no. 84-P 0215.
57. Hayes 1992: fig. 42, no. 100.
58. Hayes 1992: fig. 91, no. 2.
59. Armstrong 1989: 32, no. 74.
60. Sanders 1993: 262, no. 27.

dish brown and white on the inside and a thick matt glaze of light brownish gray on the external surface (see catalogue entry for Munsell description of glaze). None of the other fragments in the group have any remains of glaze or other decoration.

Despite the obvious characteristics of the fabric the present author has been unable to find perfect fabric parallels. G. Sanders gives a very thorough description of Byzantine red wares from Corinth in his doctoral dissertation. Although his Fabric D and Fabric G seem to be similar in colour, they are not micaceous like the fragments from Zea.[61] J. Hayes gives a description of Mica-dusted Ware from Saraçhane in Istanbul, the fabric of the shape used as parallels for **44** and **45**. This fabric, however, does not seem to be the right colour, and the mica is golden.[62] M. Hahn's Fabric 1 in Khania is red or reddish brown to orange and often contains mica. It may be similar to the Zea material, but she does not specify whether the mica is golden or silver coloured.[63] O. Broneer gives a description of a Byzantine plate from the Acropolis made in brick-red coloured clay,[64] and M. Frantz offers a description of an unglazed amphora made in coarse brick-red coloured clay.[65] J. Vroom describes and shows a photo of Early Plain Glazed ware in a red fabric.[66] These descriptions offer little help, but nevertheless, without a Munsell reference, the present author would describe the colour of the clay as brick-red. Furthermore, the clay visible in Vroom's photo appears similar to the clay of the Zea fragments.

Sanders gives a description of fabrics of medieval pottery from Sparta. His Fabric 7 with its coarse medium-hard fired and red-coloured clay containing lime and silver schist (mica) seems to be the closest parallel to the fabric of the Zea group.[67]

Bowl **42**'s white-gray glaze on a red fabric, apparently without slip, has no parallel. White glaze appears on fine wares such as Zeuxippus ware[68] and different kinds of sgraffito ware,[69] but always on top of a slip, and in a different fabric than the Zea group. C.H. Morgan describes an Imitation Lustre Ware, a red fabric with a white slip and a glaze ranging from a pale cream tint to apple green or yellow colours. This fine ware, however, exhibits more extensive decoration,[70] and thus shares only the combination of red fabric and white glaze with the Zea material. Hahn's White-glazed Ware has the combination of red fabric and white glaze but an underlying slip has been applied.[71]

Frantz and Morgan mention a group of plain glazed ware on a red fabric without the use of slip. This group, however, has mostly a brownish glaze and more extensive decoration.[72] Hayes' Coarse Glazed Wares groups have a reddish or brownish fabric with a dark brownish glaze,[73] and therefore none of the groups described by Hayes, Frantz or Morgan match the Zea material.

Chronology

Without precise parallels for shape or fabric, or both together, dating is naturally rather difficult. Even so, the fabric and shape parallels separately are mainly from the Byzantine period,[74] with a few examples of the later Venetian/Turkish period.[75] Therefore, it is a cautious conjecture that the 11 fragments of this distinct ceramic group from Zea belong to the Byzantine period of the 7th to 15th centuries AD+.[76]

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61. Sanders 1995: 55, 57.
62. Hayes 1968: 212; 1992: 49, 101, no. 100. The similar Mica-dusted Ware is common in the 15th to 16th centuries AD in Istanbul (Hayes 1968: 212, n.29).
63. The present author is indebted to M. Hahn, pers. comm., 2007, for calling attention to her Fabrics 1 and 11 (Hahn 1997: 42–43).
64. Broneer 1938: 259, no. A.P. 938. The plate is glazed and decorated with a medallion.
65. Frantz 1938: 465, D7.
66. Vroom 2005: 65, fig. 18.1.
67. Sanders 1993: 255. It is assumed there is a mistake in his description "red to dark red clay (Munsell 2.YR 4/6 to 3/6)". 2.YR does not exist, as far as the present author is aware. Fabric 23 is also similar in colour and contains quartz and silvery sparkling schist, but the fabric is fine.
68. Megaw 1968: 69–71; Vroom 2005: 109, 111.
69. Rice 1930: 32; Morgan 1942: 117–120; Vroom 2005: 85, 87, 91.
70. Morgan 1942: 86–87, 231–236.
71. Hahn 1997: 184.
72. Frantz 1938: 430; Morgan 1942: 36.
73. Hayes 1992: 41–43.
74. Parallels have been unsuccessfully sought in Late Roman as well as later ceramics of the Venetian/Turkish periods.
75. The shape and fabric parallels of later periods are all from Khania. However, in the chronology given by the authors (Hahn *et al.* 1997: 49) the Early Venetian and the beginning of the Late Venetian are identical to Vroom's Late Byzantine period. Please see note below.
76. Vroom (2005: 16, table 1) gives a chronology for the Byzantine and later periods, which is used in the present study.

Catalogue of Byzantine (?) Ceramics

Rims and Base

42 (L09.01) Fig. 1.40, Fig. 134
Land, W16/26:3, disturbed fill, 2002.

Shallow bowl with a flat base and outturned rim.

H.: 7.7 cm, T.: 0.5–0.7 cm, D.: 20.0 cm.

The clay is medium-hard fired, laminar and medium levigated, with frequent large- to very large-sized lime particles and pebbles, few very large-sized pieces of chamotte, frequent medium- to large-sized black particles and few fine-sized light-reflecting particles. The colour is red (2.5YR4/6). The bowl carries a thick metallic pinkish gray, reddish brown and white glaze (5YR7/2, 5YR5/4 and GLEY1 8/N) on the internal surface and remains of a thick matt light brownish gray glaze (2.5Y6/2) on the external surface. The colour difference of the interal glaze is probably due to a thicker layer of glaze having accumulated at the bottom of the bowl during the glazing process, and the thinner layers being less resistant to wear. There are indications of secondary firing on the external surface.

Date: Byzantine?

Parallels: The colour of the clay seems to be similar to D7 (Frantz 1938: 465) and the clay of A.P.938 (Broneer 1938: 259), both from the 12th century AD. The form is similar to Armstrong 1989: 12, no. 67; Hayes 1992: fig. 89, no. 3; Hahn 1997: pl. 48, no. 84-P 0215.

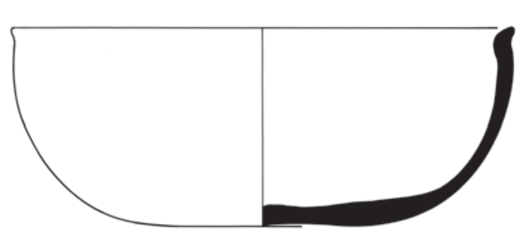

Fig. 1.40, **Cat. 42** (1:3)

43 (L29.01.1–2) Fig. 1.41
Land, C16/17:1, disturbed fill, 2002.

Possible rim fragment of a bowl. The rim is slightly incurved; its outer profile tapers inward and the inner profile is concave/convex.

H.: 3.9 cm, W.: 4.1 cm, T.: 0.5–0.8 cm, D.: *ca* 13.1 cm.

The clay is medium-hard fired, hackly and medium levigated, with frequent medium- to large-sized lime and black particles, few large-sized pebbles and few small silver mica. The fabric colour is red (2.5YR4/6).

Date: Byzantine?

Parallels: The shape is similar to Hayes 1992: fig. 91, no. 2; Armstrong 1989: 32, no. 74, but not in fabric. The shape and colour are also similar to Sanders 1993: 262, no. 27, but the fabric is described as fine (Sanders 1993: 255, Fabric 23).

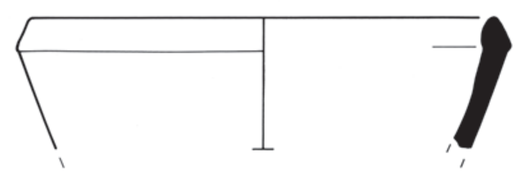

Fig. 1.41, **Cat. 43** (1:2)

44 (L40.03.7) Fig. 1.42
Land, C16/17:1, disturbed fill, 2002.

Rim fragment of a possible flask. The rim is very similar in shape to **43**.

H.: 2.1 cm, W.: 2.3 cm, T.: 0.4–1.0 cm, D.: *ca* 6.0 cm.

The clay is medium-hard fired, hackly and medium levigated, with frequent medium- to large-sized lime and black particles and frequent fine-sized light-reflecting particles. The fabric colour is yellowish red 5YR4/6.

Date: Byzantine?

Parallels: The shape is similar to Hayes 1992: fig. 42, no. 100, but the fabric is not (Hayes 1968: 212).

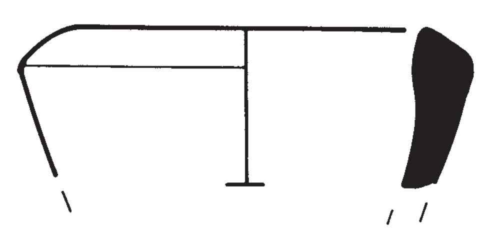

Fig. 1.42, **Cat. 44** (1:1)

45 (L78.03) Fig. 1.43
Land, disturbed fill between S17:SSP:1 and C17/18:11, 2002.

Rim fragment of a possible flask. The rim is very similar in shape to **43**.

H.: 2.5 cm, W.: 3.0 cm, T.: 0.4–0.8 cm, D.: *ca* 4.8 cm. The clay is medium-hard fired, granular and medium levigated, with common small- to large-sized lime and black particles, frequent large- to very large-sized pebbles, common fine-sized light-reflecting particles and frequent small silver mica. The colour is red (2.5YR4/6).
Date: Byzantine?
Parallel: Hayes 1992: fig. 42, no. 100.

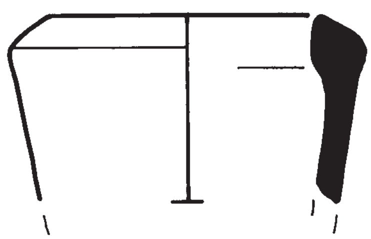

Fig. 1.43, **Cat. 45** (1:1)

Handle

46 (L53.01) Fig. 1.44
Land, disturbed fill of C16/17:3, 2002.

Handle and shoulder fragment of a thin-walled vessel, perhaps a jug or an amphora. The handle is uneven oval and rather flat in section and somewhat robust in comparison with the thinness of the wall.

H.: 5.7 cm, W.: 5.2 cm, T.: 0.4–0.5 cm.
The clay is medium-hard fired, granular and medium levigated, with common small- to large-sized lime and black particles, frequent large- to very large-sized pebbles, common fine-sized light-reflecting particles and also frequent small silver mica. The fabric colour is red and brown (2.5YR4/6 and 7.5YR4/3).
Date: Byzantine?
Parallels: The shape is similar to Hayes 1992: fig. 25, no. 6, fig. 67, no. 18, fig. 84, no. 53.

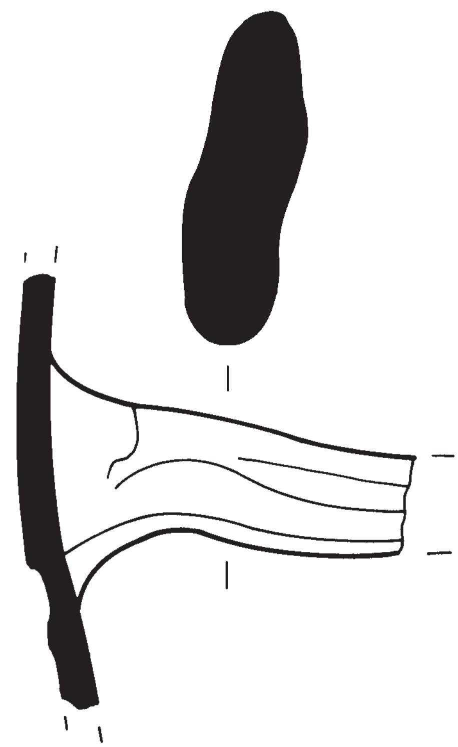

Fig. 1.44, **Cat. 46** (1:1)

1.4.3. Modern

The modern ceramics are discussed as a separate group outside the fine and plain ware categories because the dating of the material (like the Byzantine group (?)), rather than the fabric, defines the group. Modern ceramics were found during the land excavation of the upper ends of Shipsheds 16, 17(η) and 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38) and during the underwater excavations of Shipsheds 16–18(χ) and 22(N)–23(Π) in 2002–2003 and 2006 (Pl. 39). Twelve diagnostic fragments (two from land and ten from the sea) are in included in the catalogue.[77]

The modern material consists of seven rim fragments (**47**–**53**), four base fragments (**55**–**58**) and one rim and base fragment (**54**). Three of the rim fragments (**47**–**48** and **50**) have an outturned rim and the upper part is thickened. They are very similar to modern flower pots. The rim of **51** is outturned with a squared profile; it belongs to a modern yogurt bowl. No. **52** has an outturned rim, while the rim of **49** and **53** are slightly projecting with a flange, perhaps to receive a lid. The shapes of **49**, **52** and **53** have not been identified. Rim and base fragment **54** belongs to a large open bowl with a downturned rim and a flat base, perhaps a kind of household mixing bowl similar in shape to the lekane of the slip-painted ware from Crete and Chalkis or of a Thasian type.[78] Base fragments **55**–**57** have a flat base: **55** is very thick-walled and has some similarity to **54**. The base of **58** has a ring-foot and belongs to a mug.

Fabrics

The clay of **47**–**48** and **50** is hard or very hard fired. It has a reddish colour and contains lime and black particles. Nos. **47** and **50** also contains pebbles. The colour is very similar to a modern flower pot fabric.[79]

The fabric of **51** is similar to that of **47**–**48** and **50** but is soft fired. The fabrics of **49** and **52**–**58** have no apparent similarities: **52** and **56** are soft fired; nos. **53**, **54** and **57** are medium-hard fired; **49**, **55** and **58** are hard fired. All but **49** and **56**[80] contain lime and black particles, **52** and **55** pebbles, **54** chamotte, **49** and **56** silver mica and **53** light-reflecting particles. The colour of the clay is reddish-brown, red, reddish-yellow, yellowish-red and brownish-yellow. Only **56** differs noticeably, being a light yellowish-brown colour (see individual catalogue entries for specific fabric descriptions).

Nos. **49** and **51**–**58** exhibit a thick, lustrous glaze. No. **56** also has remains of stripes, while **58** has a geometric pattern. No. **48** has a thick matt slip. Nos. **47** and **50** are without either slip or glaze.

Chronology

The glaze of **49** and **51**–**58** appears very modern. This, together with the shapes of what may be flower pots (**47**–**48** and **50**), a yogurt bowl (**51**), household mixing bowls (**54** and perhaps **55**) and a drinking cup (**58**), leads to their assignment to a pre-modern or modern context in the 20th century AD.

77. Only 12 diagnostic fragments are included in the catalogue of modern ceramic. The number of undiagnostic modern fragments is accounted for within the number of fragments in the two major groups in the plain ware category: medium and coarse wares.
78. Vroom 2005: 190, no. 5.3.
79. The present author visited and received clay samples from a modern pottery workshop in Maroussi, which manufactures different types of flower pots and vessels intended for the garden.
80. No. **49** contains lime particles, **56** black particles.

Catalogue of Modern Ceramics

Rims

47 (S10.01.5) Fig. 1.45
Sea, U:14A, disturbed fill, 2002.

Rim fragment of an open vessel. The rim is outturned, and the outer profile is flat.

H.: 4.4 cm, W.: 5.0 cm, T.: 1.3 cm, D.: *ca* 22.0 cm.
The clay is very hard fired, granular and medium levigated, with frequent small- to large-sized lime particles, frequent medium black particles and rare very large pebbles. The colour is yellowish red (5YR5/6).
Date: Modern.

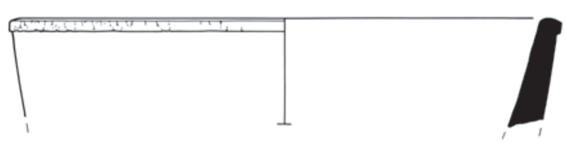

Fig. 1.45, **Cat. 47** (1:3)

48 (S24.05.1–2) Fig. 1.46
Sea, C7/8:3 (C16/17:9), disturbed fill, 2003.

Rim fragment of an open vessel, the rim is slightly outturned, with a groove beneath the upper part of the lip. The upper 4.65 cm is twice the thickness of the remaining wall of the vessel.

H.: 7.7 cm, T.: 0.6–1.4 cm, D.: *ca* 21.1 cm.
The clay is hard fired, granular and medium levigated, with few medium-sized lime particles and rare medium-sized black particles. The colour is reddish brown (2.5YR4/4). The vessel carries a thick matt weak red slip (10R4/4) on the external surface.
Date: Modern.

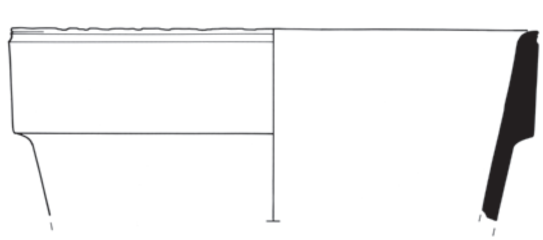

Fig. 1.46, **Cat. 48** (1:3)

49 (L86.03) Fig. 1.47
Land, surface cleaning in the area of S16–18, 2002.

Rim fragment of an open vessel. The rim is projecting with a small external flange.

H.: 6.4 cm, W.: 5.8 cm, T.: 0.6–1.4 cm, D.: *ca* 28.0 cm.
The clay is hard fired, laminar and medium levigated, with frequent medium- to large-sized lime particles and frequent medium-sized silver mica. The colour is yellowish red (5YR5/6–4/6). The vessel carries a thick lustrous red glaze (2.5YR4/8) on the internal surface.
Date: Modern.

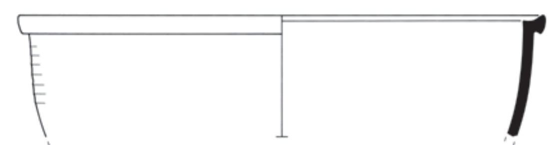

Fig. 1.47, **Cat. 49** (1:4)

50 (S280.02.1) Fig. 1.48
Sea, C14/15:2, disturbed fill (layer 2), 2006.

Rim fragment of an open vessel. The upper 2.8 cm of the rim is twice the thickness of the remaining wall of the vessel.

H.: 8.0 cm, W.: 12.1 cm, T.: 0.7–1.1 cm, D.: *ca* 21.3 cm.
The clay is hard fired, hackly and medium levigated, with frequent small- to large-sized black particles and frequent small- to very large-sized lime particles and few very large-sized pebbles. The colour is red (2.5YR 4/6).
Date: Modern.

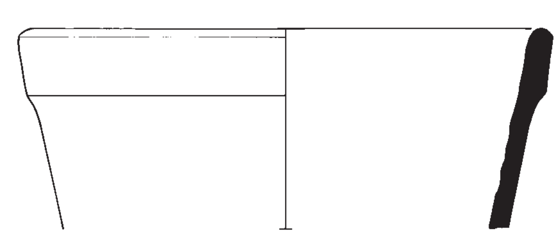

Fig. 1.48, **Cat. 50** (1:3)

51 (S302.02.2 and S308.03.1) Fig. 1.49
Sea, W16/26:8, disturbed fill (layer 1), 2006.

Rim fragment of an open vessel, likely a yogurt bowl. The rim is outturned and its profile is square.
H.: 5.9 cm, W.: 12.0 cm, T.: 0.5–0.9 cm, D.: *ca* 12.0 cm.
The clay is soft fired, granular and medium levigated, with few small-sized black particles and few fine lime particles. The colour is reddish brown (2.5YR4/4). The vessel carries a thick lustrous red glaze (10R4/6) on the external and internal surfaces.
Date: Modern.

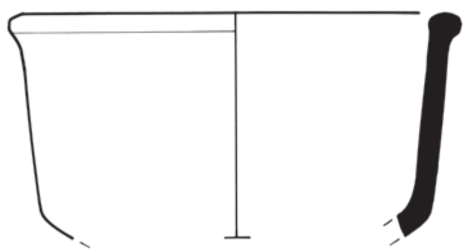

Fig. 1.49, **Cat. 51** (1:2)

52 (S32.01.4) Fig. 1.50
Sea, U:14A, disturbed fill, 2003.

Rim fragment of an open vessel. The rim is outturned and its profile is concave/convex.
H.: 7.5 cm, W.: 6.4 cm, T.: 0.7–1.0 cm, D. rim: *ca* 20.1 cm.
The clay is soft fired, granular and medium levigated, with common medium- to large-sized lime particles, frequent medium-sized black particles and rare very large-sized pebbles. The colour is reddish brown (2.5YR4/4). The vessel bears remains of a thick lustrous very pale brown glaze (10YR8/3).
Date: Modern.

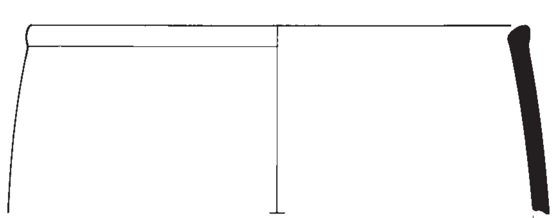

Fig. 1.50, **Cat. 52** (1:3)

53 (S305.03.3) Fig. 1.51
Sea, W16/26:5, disturbed fill, 2006.

Rim fragment of an open vessel. The rim is slightly projecting, with a flange perhaps for a lid.
H.: 6.6 cm, W.: 6.2 cm, T.: 0.5–1.0 cm.
The clay is medium-hard fired, granular and medium levigated, with frequent small- to large-sized lime particles, few small- to medium-sized black particles and rare fine-sized light-reflecting particles. The colour is red to weak red (2.5YR4/6, 2.5YR4/2). The vessel carries a thick lustrous dark reddish-brown glaze on the internal surface.
Date: Modern.

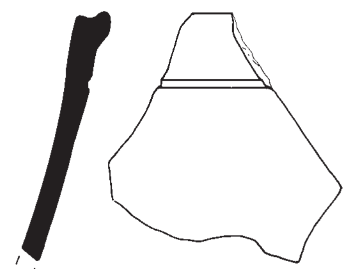

Fig. 1.51, **Cat. 53** (1:2)

54 (S304.01.1–9) Fig. 1.52
Sea, W16/26:5, disturbed fill (layer 1), 2006.

Rim and base fragments of an open vessel. The rim is down turned and the base is flat.
H.: 13.9 cm, W.: 28.8 cm, T.: 1.2–1.7 cm, D. rim: *ca* 45.1 cm, D. of base: *ca* 13.0 cm.
The clay is medium-hard fired, granular and medium levigated, with frequent small- to large-sized black particles, few small- to medium-sized lime particles and few medium-sized pieces of chamotte. The colour is weak red (10R4/4). The vessel has a thick lustrous olive-yellow glaze (2.5Y6/8) on the internal surface.
Parallel: Similar in shape to lekanai of slip-painted ware from Crete and Chalkis or a Thasos type (Vroom 2005: 190, no. 5.3).
Date: Modern.

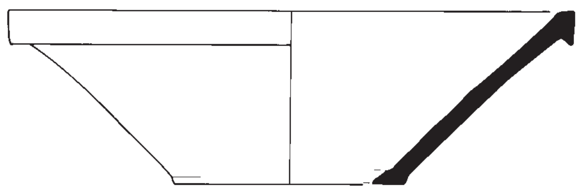

Fig. 1.52, **Cat. 54** (1:6)

Bases

55 (S25.01) Fig. 1.53
Sea, transition between U:14A and C7/8:4, disturbed fill, 2003.

Base fragment of a flat-based open vessel. Its profile is tapered and is concave/convex at the transition to the body.
H.: 8.1 cm, T.: 1.4–2.5 cm, D.: *ca* 17.8 cm.
The clay is hard fired, granular and coarse levigated, with frequent medium- to large-sized black and lime particles and few large-sized pebbles. The colour is reddish yellow (5YR6/6). The vessel carries remains of a thick, lustrous brownish yellow and brown glaze (10YR6/6 and 7.5YR5/4) on the internal surface.
Date: Modern.

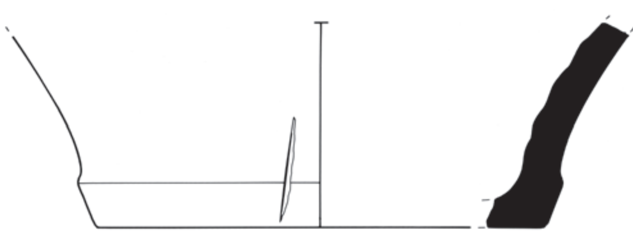

Fig. 1.53, **Cat. 55** (1:3)

56 (L44.03.4–6, L54.03.1) Fig. 1.54
Land, disturbed fill between C17/18:9 and 11, 2002.

Base fragment of an open vessel. The resting surface is flat.
H.: 2.2 cm, T.: 0.3–1.0 cm, D.: *ca* 7.7 cm.
The clay is soft fired, granular and medium levigated, with few small- to medium-sized black particles and few small-sized silver mica. The colour is light yellowish brown (10YR6/4). The vessel carries a thin matt pale yellow slip (approximately 2.5Y8/3) on the external surface and a thick lustrous pink glaze (7.5YR7/4) on the internal surface. The internal surface also bears remains of pale yellow and light reddish-brown stripes (5Y7/3 and 5YR6/4).
Date: Modern.

Fig. 1.54, **Cat. 56** (1:2)

57 (S302.02.1) Fig. 1.55
Sea, W16/26:8 disturbed fill (layer 1), 2006.

Base fragment of a flat-based vessel.
H.: 5.7 cm, W.: 7.6 cm, T.: 0.8–1.0 cm, D.: *ca* 17.9 cm.
The clay is medium-hard fired, granular and medium levigated, with few small-sized black and lime particles. The colour is weak red (10R4/4). The vessel carries a thick, lustrous brown glaze (7.5YR4/4) on the internal side.
Date: Modern.

Fig. 1.55, **Cat. 57** (1:4)

58 (S308.03.2–3) Fig. 1.56
Sea, W16/26:8 disturbed fill (layer 1), 2006.

Two joining base and body fragments of a mug. The base is a ring-foot.
H.: 4.2 cm, W.: 8.0 cm, T.: 0.5–0.9 cm, D.: *ca* 6.3 cm.
The clay is very hard fired, granular and fine levigated, with few small-sized black and lime particles. The colour

is light brown (7.5YR6 /4). The vessel has a thick lustrous brownish yellow (approximately 10YR6/6) glaze on the internal surface and a thick black green white and pink glaze on the external surface.
Date: Modern.

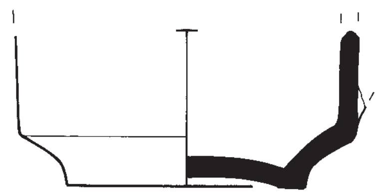

Fig. 1.56, **Cat. 58** (1:2)

1.5. Terracotta

Loom Weight

The fragment of a loom weight (**59**) was found during the land excavations of the upper end of Shipshed 17(η) in the basement of Sirangiou 1 in 2002 (Pl. 38), but no fragments have yet been found during the underwater excavations of Area 1.[81] The weight is probably of pyramidal shape, but only the upper part is preserved. The colour is pale yellow and thus more beige than the common Attic clay.[82] There is no trace of glaze or stamps. Pyramidal loom weights were common in Athens during the 5th and 4th centuries BC, but production of the shape ranges from the 7th century BC (or earlier) to the Hellenistic period.[83]

Catalogue of Loom Weight

59 (L01.02) Fig. 1.57
Land, C17/18:1, disturbed fill, 2002.

Upper part of a loom weight, probably of pyramidal shape. One suspension hole preserved.
H.: 2.4 cm, W.: 3.05 cm, T.: 1.43 cm.
The clay is medium-hard fired, granular and fine levigated, with few small-sized black particles and few fine-sized light-reflecting particles. The colour is pale yellow (2.5Y7/3).
Date: 5th to 4th century BC?
Parallel: Davidson *et al.* 1943: fig. 32, no. 4 (type B ex.).

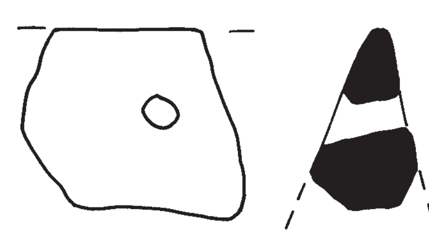

Fig. 1.57, **Cat. 59** (1:1)

81. Another loom weight was found in Area 2 and will be published in *The Ancient Harbours of the Piraeus, Vol. II.*
82. Davidson *et al.* 1943: 74; Rotroff 1982: 14.
83. Davidson *et al.* 1943: 73.

Bricks

Bricks were found during the land excavation of the upper end of Shipsheds 17(η) and 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38) and during the underwater excavations of Shipsheds 7–16 in 2002–2006 (Pl. 39). The bricks constitute 4.4% of the total ceramic material, with 51 fragments found in the sea and only one fragment found on land.

Two types of bricks are apparent in the brick material and one of each type is represented in the catalogue. Both types are modern, although **60** may be earlier than **61**. No. **60** is a solid rectangular brick with a rectangular depression in the top surface; at the bottom of the depression are eight small round depressions in the shape of an A. Its shape is common among the brick material in Zea. No. **61** is a rectangular brick made of two hollow, tube-like sections. The top surface has two parallel depressions over each of the tubes, which are ostensibly the remains of the two additional tubes. The type is commonly found around modern building sites in Greece.

The clay of both fragments is medium levigated and soft fired. No. **60** is a light brownish colour, while **61** is gray. No. **60** contains chamotte, **61** lime particles and pebbles, and both include black particles.

Catalogue of Bricks

60 (S35.01) Fig. 135
Sea, C7/8:4, disturbed fill, 2003.

Fragment of a rectangular brick with one end missing. The brick has a rectangular depression in the top surface (3.8 x 9.6 cm, preserved length), and at the bottom of the depression are eight small round depressions (*ca* 0.5 cm) in the shape of an A. Further there are four holes next to the part that is missing. Almost the entire underside of the brick is covered with mortar.

L.: 12.9 cm, W.: 8.8 cm, T.: 3.7 cm.

The clay is soft fired, granular and medium levigated, with frequent small- to large-sized black particles and frequent medium- to large-sized pieces of chamotte. The colour is very pale brown (10YR8/3).

Date: Modern.

61 (S269.01.2) Fig. 136
Sea, OP/SW6(S):2, disturbed fill (layer 1), 2006.

Fragment of a hollow brick. Parts of two parallel tubes are preserved with remains of two additional tubes above.

L.: 4.9 cm, W.: 6.1 cm, T.: 3.2–4.4 cm.

The clay is soft fired, granular and medium levigated, with few small to large-sized black particles, common small- to medium-sized lime particles and rare very large-sized pebbles. The colour is gray (5YR5/1).

Date: Modern.

1.6. Stones

Seventeen fragments of stones with chisel marks were found in Shipsheds 17(η), 22(Ν) and 23(Π) during the underwater excavations in 2003 and 2006 (Pl. 39). The stones are of the local beige-coloured Akte poros, a type of limestone. Eight fragments (represented by nos. **62–63**) are in all probability from the construction of the ramps, side-passages or colonnades of the shipsheds, which were then deposited in the foundation cutting for one of the column bases.[84] Nos. **62–63** have cut marks on one side. No. **64** exhibits two preserved sides (each with chisel marks) and is probably part of an ashlar block. No. **65** has a chisel mark on one side, but the mark stretches over an area larger than on **62–63**, thus indicating some effort at levelling.

The chisel marks on **62–63** were all made with a tooth chisel, but there are small differences: the marks are best preserved on **63**, which appears to exhibit the full width (*ca* 5.1 cm) of the chisel along with impressions of *ca* 20 teeth; the marks on **62** are similar but without the full width of the chisel preserved. Each tooth is *ca* 0.1–0.2 cm wide and placed at an interval of *ca* 0.1 cm. The chisel used on **65** appears to have been *ca* 3.0 cm wide with *ca* 10–12 teeth. The width of the chisel used on **64** is unknown, but each tooth is *ca* 0.2 cm wide as is the interval between them. The chisel marks on **62–63** are shallower than the marks on **65**; the intervals between the individual teeth on **62–63** are narrow and pointed, while the intervals on **65** are wider and flatter. This difference is likely caused by the wear of the chisel – the chisel used on **62–63** was worn, while the chisel used on **65** was newer.[85] The marks on **64** are more similar to those on **62–63** than the marks on **65**, but share their wavy shape with the marks on **65**.[86]

Normally either a crude pointed chisel or pickaxe was used for cutting away such stones as **62–63**. The tooth chisel, however, appears to have been chosen due to the softness of the stone. The local bedrock is not very hard, and thus the tooth chisel may have been chosen for minor levelling works: pointed tools would only have made a hole. The choice of tooth chisel for the shaping of **64** and the levelling work on **65** is more obvious. No. **65** is the only piece which carries remains of mortar (of unknown date).

In addition to those stones marked with chisels, an additional 35 stones have been found (30 in the sea and five on land). Some exhibit a peculiar shape, others are made from more uncommon materials such as marble or porphyry. Of these, only two pieces have been included in the catalogue. No. **66** is a fragment of an obsidian flake, rectangular in shape and with cut marks. It may have been part of a blade. No. **67** is in all probability a rounded pumice stone with a rugged surface, probably used for grinding.

84. The additional six stones have similar but more poorly preserved chisel marks and are not included in this catalogue.
85. The present author is indebted to Dr. P. Pedersen, pers. comm., 2007, for pointing out this fact to her, and for fruitful discussion and advice on chisel marks.
86. Wavy chisel marks are also known as beach marks. The present author is indebted to S.M. Heath, pers. comm., 2007, for sharing this information with her.

Catalogue of Stones

Stones with Chisel Marks

62 (S41.01.1) Fig. 1.58
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Fragment of limestone with tooth chisel marks. Each tooth of the chisel is *ca* 0.1 cm wide with an interval of *ca* 0.1 cm.

L.: 15.1 cm, W.: 10.3 cm, T.: 3.1–3.7 cm.
Date: Unknown.

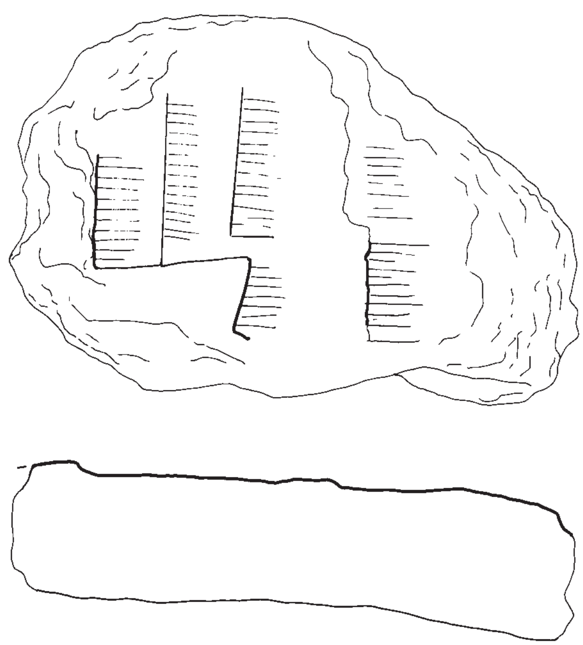

Fig. 1.58, **Cat. 62** (1:2)

63 (S41.01.2) Fig. 1.59
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Fragment of limestone with tooth chisel marks. The stone has two areas of marks next to each other. The marks are made using a *ca* 5.1 cm-wide chisel with *ca* 20 teeth. Each tooth measures *ca* 0.2 cm wide with an interval of 0.1 cm.

L.: 16.6 cm, W.: 13.4 cm, T.: 3.7–5.9 cm.
Date: Unknown.

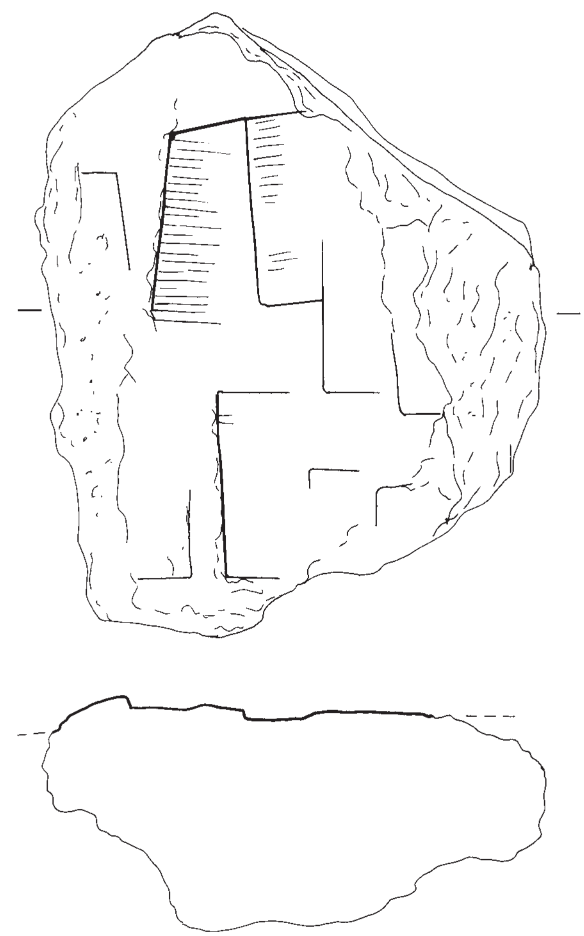

Fig. 1.59, **Cat. 63** (1:2)

64 (S57.01) Fig. 1.60

Sea, disturbed fill between C7/8:4 and C16/17:10, 2003.

Fragment of an ashlar limestone block with tooth chisel marks on two sides. Each tooth is *ca* 0.2 cm wide, with an interval of *ca* 0.2 cm.

L.: 17.9 cm, W.: 12.1 cm, T.: 5.0–8.2 cm.

Date: Unknown.

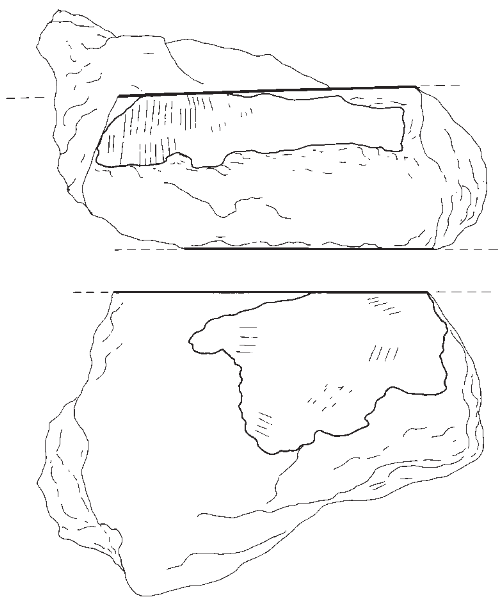

Fig. 1.60, **Cat. 64** (1:3)

65 (S310.01) Fig. 1.61

Sea, C22/23:5, disturbed fill, 2006.

Fragment of limestone with tooth chisel marks. The marks appear to have been made with a *ca* 3.0 cm-wide chisel. Each tooth is *ca* 0.1 cm wide with an interval of *ca* 0.2 cm. The marks are made in wavy lines known as beach marks.

L.: 16.8 cm, W.: 16.4 cm, T.: 4.2–6.6 cm.

Date: Unknown.

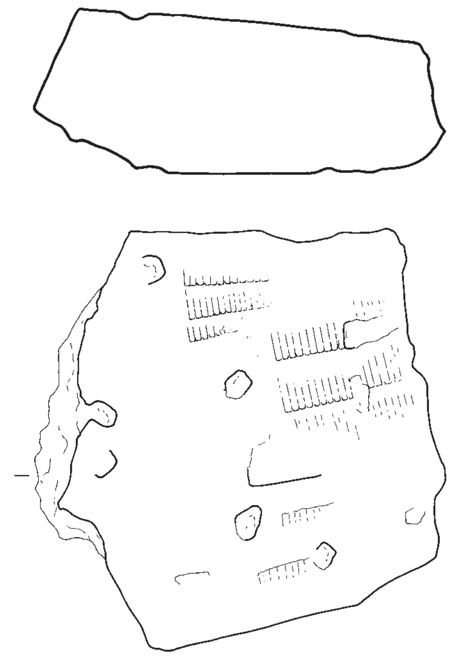

Fig. 1.61, **Cat. 65** (1:3)

Other Stones

66 (L01.01) Fig. 137

Land, C17/18:1, disturbed fill, 2002.

Flake of obsidian with cut marks.

L.: 2.06 cm, W.: 1.32 cm, T.: 0.22–0.33 cm.

Date: Unknown.

67 (S286.01) Fig. 138

Sea, S14:R1, disturbed fill (layer 4), 2006.

Most likely rounded pumice stone, perhaps used for grinding. One side is either broken off or just very worn. The stone is very micaceous with many black spots; the surface is rugged.

L.: 13.9 cm, W.: 11.9 cm.

Date: Unknown.

1.7. Miscellaneous Material

Aside from modern pottery and the brick material discussed above, other material was found in abundance: coins, porcelain, glass, metal, plaster, buttons, glass marbles, jewellery, mobile telephones and bones; all except for an ancient token (**68**) are modern. A small selection of these finds is presented in the catalogue to illustrate the very mixed contexts of the excavations and the different challenges of working in a modern marina. Each subgroup is, as far as possible, a selection of finds from land as well as the sea (Pls. 38–39).

All the coins found in Area 1 are modern. The majority (such as **69–71**) are lepta/drachmas. These are found in large quantities with values ranging from 20 lepta to 50 drachmas; 5, 10 and 20 drachma denominations are the most common. A few foreign coins, such as one Italian 100 lire, have also been found. Several coins are too oxidised and worn for identifications beyond being classified as modern. No. **68** stands out. It is a coin-like lead object with the letters ΑΔ or AM stamped on the obverse; it is too thick to be a normal coin, and is probably a token used as payment for attendance in the Ekklesia, as a ticket for the theatre or to be exchanged for freely-distributed wheat. Lead tokens were produced from the 4th century BC to the 3rd century AD, but are often dateable only from their find contexts; thus, without a close parallel **68** cannot be dated with any certainty to this period.[87]

Porcelain fragments **72–76** are parts of plates, a saucer and a bowl. Rim fragments **73–74** and **76** carry decoration, either painted or in relief. The base (**72**) carries a manufacture stamp (see the catalogue entry) at the bottom, but not a production year.

Glass finds **77–79** consist of a small bottle (**77**), a rim fragment of another bottle in coloured glass (**78**) and the base of a stemmed glass (**79**).

Metal finds **80–83** consist of a blade of a shovel (**80**) found on land. From the sea is a cartridge case (**81**), a key (**82**) and a lead weight (**83**), all of which are common finds.

Two plaster fragments (**84–85**) were both found on land; they have a pinkish surface colour and may be from a modern building.

The remaining six objects are more of a curiosity. Nos. **86–87** are glass marbles with colourful mobiles inside, of the sort used to entertain children. Nos. **88–89** are buttons made of mother-of-pearl and bone, respectively. No. **90** is a wedding ring and represents the surprisingly large amount of jewellery (mainly rings) that has been found in the sea. No. **91** is a mobile telephone from 2003.

The modern material may be divided into three groups: (1) objects broken as a result of falling into the sea or broken objects subsequently thrown into the sea (in this group are the china and glass fragments); (2) objects lost due to accidents (in this group are the key, the mobile telephone, the buttons, probably the glass marbles and perhaps some of the jewellery); and (3) objects that were purposely deposited in the sea (in this group are cartridges, coins of low denomination and possibly rings).

87. Dr. E. Ralli, pers. comm., 2008, of the Numismatic Museum in Athens. Ralli has kindly viewed the token, but because it was found in a mixed context she is unable to date it with any precision within the Classical or Roman periods. See also Lang & Crosby 1964: 76–85.

Catalogue of Miscellaneous Material

Token and Coins

68 (S08.01) Fig. 139
Sea, S20, surface cleaning west of drainage pipe, 2002.

Lead token with the letters ΑΔ or ΑΜ stamped in positive on the obverse. The reverse carries no stamps.
D.: 2.2 cm, T.: 0.3 cm.
Date: 4th century BC to 3rd century AD.
Parallels: Engel 1884: pl. II, no. 42 and pl. III, no. 83, carry the letters ΔΑ and ΑΔΜ, respectively, but both are stamped on the reverse and are smaller than **68**. Lang & Crosby 1964: pl. 19, L11 carries a Δ with a Α or a small Π inside. This token is similar in size to **68**. Svoronos 1900: pl. ΙΖ, nos. 1–15 and 18–21 carry the letters Α and Δ, respectively, but none with a combination of the two. Dr. E. Ralli, pers. comm., 2008.

69 (S50.03.1) Fig. 140
Sea, S17, surface cleaning, 2003.

A 5-drachma coin. On the obverse is stamped 5 ΔΡΑΧΜΑΙ. At the centre of the coin and along the edge is written ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ 1976. On the reverse is a male portrait facing left, and left of the portrait along the edge is written ΑΡΙΣΤΟΤΕΛΗΣ.
D.: 2.2 cm.
Date: 1976.

70 (L86.01) Fig. 141a-b
Land, surface cleaning in the area of S16–18, 2002.

A 50-lepta coin. The obverse carries a portrait of King Paul and the inscription ΠΑΥΛΟΣ ΒΑΣΙΛΕΥΣ ΕΛΛΗΝΩΝ 1959; the reverse carries an escutcheon and the inscription ΒΑΣΙΛΕΙΟΝ ΤΗΣ ΕΛΛΑΔΟΣ – 50 ΛΕΠΤΑ.
D.: 1.8 cm.
Date: 1959.

71 (L86.02) Fig. 142a-b
Land, surface cleaning in the area of S16–18, 2002.

A 20-lepta coin. The obverse carries an Athena head; the reverse 20 ΛΕΠΤΑ and along the edges is written ΕΛΛΗΝΙΚΗ ΔΕΜΟΚΡΑΤΙΑ 1926.
D.: 1.7 cm.
Date: 1926.

Porcelain

72 (S01.06.9–11) Fig. 143
Sea, disturbed fill above U:19B, 2002.

Three joining base fragments of a white porcelain plate with a ring-foot. The plate bears a round stamp with two concentric circles at the bottom. In the inner circle are the letters ΑΚΕΛ. Around it in the second circle is written in smaller letters ΡΑΜΕΥΤΙΚΝ ΕΤΑΙΡΕΙΑ ΛΒΥΡΙΟΥ-ΓΑΘΙ-ΑΝW…..
L.: 9.4 cm, W.: 10.9 cm, T.: 0.5 cm, D.: *ca* 16.0 cm.
Date: Modern.

73 (S89.02) Fig. 144
Sea, surface cleaning in the area of SW5 (S13(?), S22), 2004.

Rim fragment of a white porcelain plate or bowl. The rim carries a 0.9 cm-wide pattern along the top surface. The pattern consists of vertical grooves in intervals of 0.8 cm. A small part of the plate has a bluish colour.
L.: 10.0 cm, W.: 6.1 cm, T.: 0.5–0.7 cm, D.: *ca* 23.0 cm.
Date: Modern.

74 (S274.04) Fig. 145
Sea, C14/15:1, disturbed fill (layer 2), 2006.

Rim fragment of a white porcelain plate with a white and green pattern along the edge. The square pattern is painted in green with two different line widths.
L.: 6.7 cm, W.: 4.4 cm, T.: 3.5–5.4 cm.
Date: Modern.

75 (L06.04.2) Fig. 146
Land, W16/26:3, disturbed fill, 2002.

Rim and base fragment of a white porcelain saucer with a ring-foot.
H.: 2.0 cm, L.: 9.2 cm, W.: 5.4 cm, T.: 0.3–0.5 cm, D.: *ca* 11.5 cm.
Date: Modern.

76 (L10.05.2) Fig. 147
Land, W16/26:3, disturbed fill, 2002.

Rim fragment of a white porcelain bowl bearing a floral pattern.
H.: 4.4 cm, W.: 7.9 cm, T.: 0.3–0.5 cm, D.: *ca* 10.0 cm.
Date: Modern.

Glass

77 (S302.03.1) Fig. 148
Sea, W16/26:8, disturbed fill (layer 1), 2006.

Colourless glass bottle with a semi-rectangular and flat shape. The body of the bottle is ribbed (each rib is 0.7 cm wide and 0.1 cm apart). On one side of the bottle is an area (2.0 x 3.2 cm) without ribbing (label area?). There is a long depression at the bottom of the flask.
H.: 9.0 cm, L.: 4.4 cm, W.: 2.2 cm, D.: *ca* 1.5 cm.
Date: Modern.

78 (L41.02) Fig. 149
Land, C16/17:1, disturbed fill, 2002.

Rim fragment of a small glass bottle. The colour is yellow. The upper part of the rim has a small bead.
H.: 1.6 cm, W.: 1.6 cm, T.: 0.2–0.5 cm, D.: *ca* 2.0 cm.
Date: Modern.

79 (L62.04) Fig. 150
Land, S17:R6, top of disturbed fill, 2002.

Colourless glass base and stem fragment of a stemmed glass. The base is round and flat.
H.: 3.1 cm, T.: 0.3 cm, D.: *ca* 7.4 cm.
Date: Modern.

Metal

80 (L05.01) Fig. 151
Land, W16/26:3, disturbed fill, 2002.

Iron object exhibiting severe loss by corrosion. The object is flat and round at one end and angular at the other. It may be part of a shovel blade.
L.: 16.1 cm, W.: 14.1 cm, T.: 0.3–1.1 cm.
Date: Modern.

81 (S50.05) Fig. 152
Sea, surface cleaning in the area of S17, 2003.

Cartridge case with a circular depression at the bottom and a groove, 0.1 cm wide, 0.1 cm above the base.
L.: 4.7 cm, D.: *ca* 1.1 cm.
Date: Modern.

82 (S50.07) Fig. 153
Sea, surface cleaning in the area of S17, 2003.

The bow of a small key. The lower part of the blade has broken off. There is a half circular hole in the bow.
L.: 3.6 cm, W.: 2.3 cm.
Date: Modern.

83 (S277.02) Fig. 154
Sea, U:22, disturbed fill (layer 1), 2006.

A lead weight with fishing line. The weight is long and slim, with an eye at the top (0.3 cm in diameter).
H.: 11.4 cm, W.: 2.4 cm.
Date: Modern.

Plaster

84 (L06.03) Fig. 155
Land, W16/26:3, disturbed fill, 2002.

Fragment of plaster with pink paint (10R8/4).
L.: 2.0 cm, W.: 2.6 cm, T.: 0.5 cm.
Date: Modern?

85 (L08.05) Fig. 156
Land, W16/26:3, disturbed fill, 2002.

Fragment of plaster with a pale red and a light red colour (10R7/4 and 2.5YR7/6).
L.: 3.0 cm, W.: 3.2 cm, T.: 0.4 cm.
Date: Modern?

Glass Marbles

86 (S295.03) Fig. 157
Sea, U:14A, disturbed fill (layer 1), 2006.

Glass marble half preserved with a blue mobile inside.
D.: *ca* 2.4 cm.
Date: Modern.

87 (L89.10.1) Fig. 158
Land, surface cleaning in the area of S16, 2002.

Glass marble with a white, green and reddish-orange mobile inside.
D.: *ca* 1.5 cm.
Date: Modern.

Buttons

88 (S05.08) Fig. 159
Sea, U:14A, surface cleaning, 2002.

Mother-of-pearl button with an oval hole in the middle. The division between the two circular holes has broken away.
D.: 1.6 cm.
Date: Modern.

89 (L41.01) Fig. 160
Land, C16/17:1, disturbed fill, 2002.

Light brown bone button with five circular holes. Four holes form the corners of a square with the fifth hole in the middle. There is a groove, 0.1 cm. wide, in the middle between the holes and the edge of the bottom.
D.: 1.2 cm.
Date: Modern.

Jewellery

90 (S53.04) Fig. 161a-b
Sea, surface cleaning in the area of S18, 2003.

Golden wedding ring with a pattern on the outside consisting of small flat rhombi arranged into a fish-scale pattern. Inside is inscribed ΔIOTIMA, and stamped: Ω 585 A51.
D.: 2.3 cm.
Date: Modern.

Diverse

91 (S309.01) Fig. 162
Sea, survey in the area of S17, 2006.

Mobile telephone: a blue and white Nokia 3100. Two buttons are partially missing.
L.: 10.2 cm, W.: 3.9 cm, T.: 1.6–2.1 cm.
Date: 2003.

1.8. Discussion and Conclusion

The small finds from Area 1 of Zea Harbour, and those categories of evidence that did not materialise during the excavations, prompt a number of questions: What date range do they signify? Should the dateable ceramics serve as an indicator of the history of the shipsheds and the Piraeus at large? How does the composition of the finds compare with other ceramic assemblages in the harbours of the Piraeus and its environs? How do these small finds compare with those excavated at other known shipshed complexes? And finally, do the production centres of these small finds speak to the position of the Piraeus as a trading centre within the milieu of the eastern Mediterranean?

Despite their meagreness, these finds provide at least some information on activity in the harbour area. The majority of the diagnostic and provisionally dateable material, as well as those objects exhibiting shape parallels (e.g. medium ware), date to the 5th and 4th centuries BC, with some finds from the 3rd century BC. A hiatus in dateable material of some eight centuries follows, interrupted by the appearance of a handle from a 5th-century AD transport amphora and followed by apparent Byzantine material from the 7th through the 15th centuries. A large group of modern material from this and the last centuries completes the finds from Area 1 at Zea.

The date range of the earliest phase is highlighted by kantharoi fragments found in the closed context of pit U:2. The earliest kantharos fragment is tentatively dated to the 6th or 5th centuries BC (pit bottom),[88] and the upper material of the pit closure is assigned to 375–350 BC (*terminus post quem*). The tile fragments found in between range from the 5th to the middle of the 4th centuries BC. Their impact on the dating of the tile material in general, and consequently the building phases of the shipsheds, will be discussed further in Vol. I.2, Chapter 2. The 5th- and 4th-centuries BC material, including the finds from the pit, ties in well with the building activity in the harbour of the 5th and 4th centuries BC (see Vol. I.1, pp. 10–14, 169–173).

The near total lack of dateable material from the later Hellenistic and Roman periods is notable. The Piraeus declined in importance as a trading centre in the eastern Mediterranean under the hegemony of Macedonia, during and after which the population declined.[89] Even so, the fortifications were repaired in the late 4th century BC, and again 229/8 BC,[90] and a shipbuilding industry appears to have thrived throughout the Hellenistic period.[91] The harbours were in a sufficient condition to serve as winter quarters for 30 Roman warships during the Second Macedonian War (200–197 BC).[92] More than a century later, during Mithridates VI's war against Rome, the fortifications and harbours held out for a period of time, when Sulla attacked and later laid siege to the Piraeus (87/6 BC), finally destroying the city, including the Arsenal of Philon and the shipsheds.[93] But these centuries and the later Roman period are not reflected in the identifiable ceramic material from Area 1 at Zea.[94]

With such a limited sample size as presented in Zea's Area 1 it is only speculation whether Kantharos – the largest harbour combining both naval and commercial installations – would have been the most important and heavily utilised of the three harbours during the centuries that are marked by the decline of both Athens and the Piraeus. Zea and Mounichia, which were formerly used exclusively as naval harbours, subsequently would have been in states of decline.[95] Such a scenario, however, must remain hypothetical, as ceramic finds from Kantharos or Mounichia remain unpublished to date. Kantharos has been heavily overbuilt and grossly enlarged in modern times, with destructive consequences for the ancient remains, and the harbour

88. Depending on the life of the kantharos, the *terminus post quem* is of course flexible for a few years after the lower date of the drinking vessel.
89. Garland 2001: 47–54; Ferguson 1911: 278–279.
90. On the repairs and fortifications of 307/6 and 229/8 BC see, respectively, IG *II*^{2} 463 and IG *II*^{2} 786.7, 834.14.
91. On shipbuilding in the Piraeus, see Plutarch, *Demetr.* 43.3.
92. On the Roman fleet in the Piraeus, see Livy 31.26.5, 31.47.1.
93. On the attack, siege and destruction of Piraeus, see Appian *Mith.* 5.30-32, 34, 36-37, 6.40-41 and Plutarch, *Sull.* 14.7
94. According to Livy (45.27.11), Aemilius Paulus visited Piraeus in 168/7 BC; Livy then enumerates the sights of the Piraeus: the harbours, the Long Walls and the shipyards, but it is not clear whether Aemilius Paulus actually saw the sights or if Livy just mentions them. Pausanias (1.29.16) only mentions the still-standing shipsheds, but not their precise location in the Piraeus.
95. The shipshed complexes of Zea and Mounichia are built on an inclination and thus the area would seem impractical for most purpose other than the storage and repair of ships.

of Mounichia awaits further investigation by the Zea Harbour Project.

On the other hand, the numerous private houses excavated in the Piraeus reveal assemblages similar to those of Area 1 of Zea (black glazed ceramics, undecorated household vessels, amphora fragments, etc.) with a comparable chronological spread: that is, from the 5th to the 3rd centuries BC with an addition of some later Hellenistic material, but little or no Roman finds.[96] Thus, the composition of finds from Zea Area 1 may simply reflect the general composition of finds from the greater Piraeus area. Or perhaps we simply have yet to discover those areas inhabited during these apparent chronological gaps in the material record, such as between the early 3rd century BC and the Byzantine period, or between that and the modern era.

How does the find composition from the Zea shipsheds compare with the material from a chosen number of other shipshed excavations? In order to make this comparison it is of course important to include some discussion on the duration of activity and utilisation of the respective harbours.

The chronology of the shipsheds at Oiniadai (see Vol. I.1, p. 120) is a subject of discussion, but the date of their construction appears to be in the 4th century BC. It is unknown when the shipsheds fell out of use, but Kolonas excavated Roman graves in the shipshed complex, with finds above the graves providing a *terminus ante quem* in the 1st century BC.[97] Oiniadai was allied with Athens during the Corinthian War (Xen. *Hell.* 4.6.14), but whether the harbour complex was employed for naval as well as commercial purposes is unknown. The list of finds in the first publication of the excavation of the shipsheds at Oiniadai includes mainly tiles (several with stamps), a lead weight, a jug handle, a bronze coin and a needle-like bronze object. The tiles are interpreted as belonging to the superstructure of the building.[98] From the later excavation, Kolonas mentions black glazed pottery including mouldmade bowls, West Slope Ware, terra sigillata, lamps, loom weights and storage vessels, as well as Laconian and Corinthian tiles. The ceramic material, found in what has been interpreted as a city dump to the east of the shipsheds and a temple deposit to the north of the complex, appears to be mainly of the Hellenistic and Roman periods with some fragments from earlier and later periods.[99]

The chronology of the shipsheds at Sounion is, as at Oiniadai, disputed, but the construction most likely took place in the Hellenistic period and they were probably built for naval purposes. Precisely when the complex went out of use is unknown.[100] The excavations at Sounion revealed many fragments of pottery from the Classical to the Roman periods, but these are considered to be finds from a dump originating from an excavation of houses above the shipsheds; no other small finds are mentioned.[101]

The shipsheds in Mandraki Harbour, which served as the military harbour of Rhodes, exhibits several building phases between the 4th and 2nd centuries BC. During the Roman period the need for a naval base had evaporated and a tetrapylon was constructed atop part of the shipsheds.[102] The ceramics from the shipshed excavations are published by A. Yiannikouri.[103] They consist of black glazed pottery and other fine ware vessels, transport amphorae (some with stamps) and household vessels. These are a mix of local and imported materials mainly from the 4th and 3rd centuries BC, with occasional fragments of the Archaic period and the second half of the 2nd century BC.

The military shipshed complex at Naxos on Sicily was built in the 5th century BC and was in all probability destroyed in 403 BC.[104] Ceramics were found during the excavation of the shipsheds. The publication focuses on the fine wares (mainly black glazed), but mentions a scarcity of cooking ware, some quantity of plain pottery and a modest amount of amphorae. The largest group, not included in the publication, is Late

96. Von Eickstedt 1991: 150–193.
97. Kolonas 1996: 164–165; 1997: 148. The graves are not dated more precisely than to the Roman period.
98. Sears 1904: 235–237.
99. Kolonas 1990: 157; 1996: 164–165; 1997: 148.
100. Kenny 1947: 198; Goette 2000: 48–49; Blackman (1990b: 37) argues that the complex was built at the end of the 5th century BC.
101. Kenny 1947: 196.
102. Blackman, Knoblauch & Yiannikouri 1996: 373, 392–398. The tetrapylon was constructed during what Knoblauch refers to as "the bloom of the Roman imperial era".
103. Blackman, Knoblauch & Yiannikouri 1996: 405–426.
104. Blackman & Lentini 2003: 394, 435.

Roman ceramics from the 4th and 5th centuries AD. In addition, Corinthian pan and cover tiles were found in the shipsheds, as were antefixes – some contemporary with the shipsheds, some from earlier buildings. The main part of the dateable ceramics comes from the 5th century BC. These were flanked by a closed Archaic deposit and the occasional fragment from the 4th century BC.[105]

The harbour at Kition on Cyprus was constructed for military purposes at the end of the 5th century BC. In 312 BC, Kition was captured by Ptolemy I Soter, after which the function of the harbour changed to commerce and fishing.[106] The shipsheds at Kition reveal ceramics from the Mycenaean period (13th century BC) to the Roman era (1st to 3rd centuries AD). Of interest here is the fine ware material from the 5th and 4th centuries BC, some of which included Attic imports. From the Roman period a large amount of transport amphorae was found.[107]

Finally, shipsheds dating to the first half of the 2nd century BC were excavated in the Circular Harbour and on l'Ilot de l'Amirauté of Punic Carthage. The harbour served a naval purpose and was therefore in all probability destroyed along with the city in 146 BC. In the Roman period houses lined the harbour front.[108] The amount of local and imported ceramic material excavated from the shipsheds of the Circular Harbour is minute, with fine wares, coarse wares, amphorae and lamps ranging from the 2nd century BC to the Byzantine period: black glazed pottery was also found, but will be included in the forthcoming publication of the finds from l'Ilot de l'Amirauté.[109] The material at large is mainly residual.

Of these seven harbours, Zea, Carthage and Rhodes were larger naval harbours, Sounion and Oiniadai were smaller naval stations, while the extent of the naval harbour at Sicilian Naxos is at present uncertain,[110] and Kition was probably originally a naval harbour but was later used for commercial and fishing purposes. Unique to each are the date of construction and duration of use, which of course may be reflected in the ceramic finds. The shipsheds in Zea (Phase 2), Kition (Phase I) and Sicilian Naxos (at least two phases)[111] were all constructed in the 5th century BC, Rhodes in the 4th to 2nd centuries BC, Oiniadai probably in the 4th century BC and Sounion at sometime in the Hellenistic period. The youngest shipshed complex is in the Circular Harbour of Carthage from the first half of the 2nd century BC. The shipsheds in Sicilian Naxos and Carthage were completely destroyed in the 5th and 2nd centuries BC, respectively, as probably were those of Phase 2 at Zea in 404/3 BC (at least according to literary evidence, see Vol. I.1, pp. 11–12, 169–171). The shipsheds at Rhodes were overbuilt in the Roman period. Precisely when the shipsheds at Sounion went out of use is unknown, but it was most likely sometime in the Roman period. At the shipsheds at Oiniadai, Roman graves were constructed inside the shipshed complex, with the finds above the graves providing a *terminus ante quem* in the 1st century BC. Because of its change of function the harbour at Kition was used well into the Roman period.

The overall picture from the other six shipshed sites reveals a find composition very like the one from Zea, with fine ware, amphorae, household vessels and tiles. It would thus appear as though this selection of material is to be expected at this type of site regardless of the size of the complexes.[112] The main difference is the state of preservation of the finds, which is much better at the other shipshed sites compared to Zea and thus easier to classify and date. It is notable that the finds from Sounion, Carthage and Oiniadai (except the tiles) are considered to be secondary deposits: by comparison, the small amount of ceramic finds from Zea does not indicate re-deposition. Sounion, Sicilian Naxos and Kition, like Zea, reveal finds from the 5th and 4th centuries BC; Sounion and Kition boast additional Hellenistic and Roman finds. Rhodes has Hellenistic finds, Oiniadai and Carthage Hellenistic and Roman finds, Sicilian Naxos and Carthage Late Roman finds, while Rhodes, Kition and Sicilian Naxos have Archaic finds as well. Only Kition has finds of Mycenaean date.

105. Blackman & Lentini 2003: 412–435.
106. Yon 2000: 111, 113; Blackman 1996b: 39.
107. Yon 2000: 111–114.
108. Hurst 1994: 15.
109. Fulford & Peacock 1994: vii.
110. Blackman & Lentini 2006a: 547.
111. Blackman & Lentini 2006a: 547, 549; 2006b: 193–197.
112. Zea, Carthage and Mandraki are large naval harbours while the others are smaller complexes; see Vol. I.1, pp. 24–30.

Such a range of dates in material is to be expected when compared to the respective dates of use based on historical evidence. But Zea possess a lack of finds from the later Hellenistic and Roman periods, a time when the city was inhabited and its harbours were purportedly in use. Perhaps Zea's Area 1 material record may simply be explained, as mentioned above, by its minor role (at least in these periods) in comparison to the main harbour at Kantharos.

We know from the literary record that the Piraeus was an international hub of commerce in the 5th and 4th centuries BC. However, this is not reflected in the ceramic material in Zea, where we see a relatively limited geographic origin of the finds, confined as they are primarily to Attica, Corinth, Thasos, the southeast Aegean and perhaps Cilicia or Cyprus. Perhaps the answer is to be found in the purposes for which each Piraean harbour was designed and maintained, with Kantharos serving both as a commercial and naval harbour, and Zea and Mounichia serving as strictly naval harbours. Thus the ceramic record would merely reflect the patrol areas and theatres of war in which the navy participated, with a limited amount of ceramics possibly returned to Zea by the crews of the naval ships during the harbour's historically active period.

Chapter 2
The Tile Material and Reconstruction of the Roofs of the Zea Shipsheds

Mette Schaldemose

2.1. Introduction

Roof tile fragments were found during the land excavations of the upper ends of Shipsheds 16, 17(η) and part of 18(χ) in the basement of Sirangiou 1 in 2002 (Pl. 38), and during the underwater excavations of Area 1 in 2002–2004 and 2006 (Pl. 39). The most important finds were discovered in pit U:2 (**92–94**; Figs. 126, 234; Pl. 6), rock-cut feature U:14A (**96**; Fig. 182; Pl. 40), and in the rock-cut Phase 2 column base foundation trench C14/15:2 (**109–111**) (Fig. 207; Pl. 40). A total of 409 tile fragments were found, 269 of which were found in the sea, and 140 on land.

Complete tiles from the combined land and marine excavations at Zea remain as yet undiscovered. A few fragments are large enough to reconstruct the shape of a pan tile, which will be presented in the following section. The present tile catalogue includes 32 fragments; the remaining 377 finds are too fragmentary to provide any information other than their respective details of fabric and colour, and will not be discussed further. Wikander's tile terminology is applied.[1]

2.2. Corinthian Pan Tiles

The majority of the excavated pan tile fragments are of Corinthian type with the Laconian tiles amounting to less than 10% of the complete corpus. Three fragments with two original sides preserved were found (**92**, **96** and **99**), and from them (with the help of other fragments), the first reconstruction of the shape was created (Figs. 163a-b, 164, 235).[2] However, it must be emphasised that their reconstruction is tentative and may have to be reconsidered if or when more material is found. Indeed, the shape of the two preserved sides discussed here may not, in fact, be applicable to all four sides.

No. **92** in the catalogue has a shallow raised border along one side of the top surface. The underside of

1. Wikander 1986: 15–17, fig. 1. That of Winter (1993: ii) is less detailed; see Vol. I.2, p. 2, regarding Munsell charts for fabric colour. All drawings in this chapter were done by A. Hooten ©ZHP 2011. All photographs were taken by K. Lovén ©ZHP 2011.
2. Schaldemose 2007: 91, fig. 33.

the perpendicular side of the tile is divided into three parts: a shallow raised border, a wide cutting and the surface of the tile. Nos. **96** and **99** are corner fragments. Both have a shallow raised border identical to **92**, while the perpendicular border is higher. The shape of the fragments is comparable to the general shape of Corinthian pan tiles found in Attica.[3] We may conclude that **92** is part of the left long side and the lower short side of a tile, **96** is part of the right long side and the upper short side, and **99** is part of the left long side and the upper short side.

Description of the Borders

The raised border of the upper short side is represented in **95–100**, **103** and **104**. The width of the border is between *ca* 2.0 cm (**104**) and *ca* 3.6 cm (**98**) and rises between *ca* 1.2 cm (**99**) and *ca* 3.0 cm (**96**, **97** and **104**) above the surface of the tile. The lower short side is preserved only in **92**, the underside of which is divided into three parts: a raised border along the lower short side, a transverse cutting, and the surface of the tile. The border is 2.7 cm wide and curves with two radii towards the 5.1 cm-wide cutting. The long sides are partially preserved in **92–94**, **96**, **99**, **101** and **105**, all of which have a shallow raised border. The width of the border differs from *ca* 1.9 cm (**105**) to 3.0 cm (**93**), and their height varies from 0.1 cm (**99** and **101**) to 0.3–0.4 cm (**93**). The width and height of the border of **102** is *ca* 3.6 cm and *ca* 1.0 cm, and thus it is lower than the majority of the upper short side borders,[4] but higher than the average height of the long side borders.[5] Nonetheless, it seems more likely to be a low upper short side than a high long side. Disregarding **102**, the differences in width and thickness of the upper borders and the long borders are considered to be too small to be anything other than small variations resulting from the skill of the tile maker or different degrees of shrinkage during manufacture.

In general, Corinthian pan tiles have a higher raised border along their long sides than in the present reconstruction (Fig. 235).[6] It may be argued that the upper short side in the reconstruction is more likely part of the long sides, but until more diagnostic fragments are uncovered the present reconstruction stands.[7]

Comparable tile material from other shipshed excavations is limited. From the publications of Oiniadai and Kition, only one Corinthian pan tile fragment from each site has been illustrated. The tile from Oiniadai appears to have a raised border, but it is not possible to determine the height of the border from the drawing.[8] The tile from Kition appears to have a higher raised border along one side and a lower raised border along the opposite side; the perpendicular side between them has no raised border, and it is difficult to determine the orientation of the tile from the photo (and perhaps from the state of preservation).[9] From Sicilian Naxos two Corinthian pan tiles have been illustrated in the publication. The tiles have a raised border along the two long sides and a cutting on the underside of the lower short side.[10] Thus these pan tiles differ from the reconstructed shape of the Zea pan tiles in the height of the long side borders, but they share the cutting of the underside of the lower short side, although the cuttings are of different lengths and depths.

In the reconstruction of the pan tile (Fig. 235) the average widths and heights of the borders of the preserved tiles have been applied (see the catalogue for the entries of their border measurements): the upper raised border is 2.7 cm wide and 2.3 cm high above the surface of the tile; the long raised border is 2.3 cm wide and rises 0.2 cm above the surface of the tile; the lower raised border is 2.7 cm wide; and the cutting is 5.1 cm wide and 1.4 cm deep.

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3. Wikander 1988: 208, fig. 3, C2a, 2b; Winter 1993: 209–210.
4. The height of the upper short borders of nos. **95–98**, **103** and **104** fall within 0.5 cm; only **99** and **100** are somewhat lower, but both are very worn, and some of the original height may have been reduced.
5. The average height of the long sides of nos. **92–94**, **96**, **99**, **101** and **14** is 0.21 cm.
6. Winter 1993: ii, 82; Wikander 1988: 208.
7. The staff at the Agora Excavations, Athens, kindly allowed the present author to study their collection of roof tiles; type A tiles found at the Tholos have a similarly low raised edge, while the perpendicular underside has a wide cutting; see Thompson 1940: 67, fig. 52. The Tholos tiles are obviously of a very special design, yet they do indicate that the reconstruction of the Zea tiles, with low raised border along the long sides, is not without precedent in special buildings. Possibly shipsheds, with their multiple roofs sloping in three directions (i.e., the combination of lateral and longitudinal slopes), required tiles suited to their peculiar designs. The Tholos is dated to *ca* 470–460 BC (Camp 1986: 76).
8. Sears 1904: fig. 51.
9. Yon 2000: fig. 5.
10. Blackman & Lentini 2003: figs. 36–38.

2.3. Eaves Tile (?)

The lower left corner of **92** is not preserved, but enough of the two sides are preserved to establish that the angle of the corner was greater than 90º (in fact it measures 96.8º), and that the left long side of the pan tiles tapers towards the lower side.[11] The oblique shape suggests that this pan tile may have had a special position on the roof, along the eaves/valley or in the area next to the gables. No. **92** has remains of slip on both edges, demonstrating that it was moulded in this shape and not cut on site to fit an unexpected angle of the roof. Thus, in place of a common pan tile fragment, we may have the fragment of an eaves tile. However, it is likely that the upper short side and the two long sides of both tile types are similar to one another, not only because the upper short side of the eaves tile would have to fit with the lower short side of the pan tile above it, but also because the long sides on both tiles would be covered by the same kind of cover tile.

At present, **92** is the only one of its kind from the excavations at Zea, and it would be presumptuous to expect that the design of the underside of the lower short side of **92** applies to all regular pan tiles. But in assuming that regular pan tiles would have had a similar cutting along the underside, two pan tiles would be joined by the raised border of the upper short side, thus locking into the corresponding slot on the underside of the lower short side of the next tile (Fig. 237). These features would prevent the tiles from sliding apart.

The width of the slot in **92** is wider than the raised borders of the upper short sides in **95–100, 103** and **104**. Similar features on regular pan tiles provided some flexibility when the tiles were originally laid out, thus permitting the tiles to be slid back and forth to adjust to the total length (eaves to ridge) of the sloping roof. This would had left room to compensate for irregularities in the individual tiles. The overlap between **92** and **96** is about 5.0 cm. Assuming that the cutting along the underside of **92** is unique, its function could be related to fitting the tile to the battens of the wooden roof construction or fitting to the gutter. The total length and width of the Zea pan tiles are unknown. The preserved length of **92** is 38.6 cm and the preserved width of **94** is 33.7 cm. According to Wikander,[12] the most common lengths of Corinthian tiles vary between 36.0 and 117.0 cm, and the widths between 20.0 and 85.0 cm. Tiles from Rhamnous and the Kerameikos are between 60.0 and 73.0 cm long and between 48.5 and 55.0 cm wide.[13] The tiles from the shipsheds in Sicilian Naxos are 55.7 x 84.5 cm.[14] In Assos, a standard measurement of 40.0 x 45.3 cm was found for Corinthian tiles.[15] It is likely that the tiles from Zea fall within the above pan and eaves tile groups. The pan tiles in the Phase 3 reconstruction at Zea measure 54.0 x 79.8 cm. The measurements are based on the interaxial spacing (2.16 m) of the colonnade carrying the eaves of the roof and the length of the sloping rafter (6.40 m) (Figs. 235, 238–239). The Phase 2 (v1) tiles are also of a rectangular shape and are reconstructed at 49.6 x 69.0 cm while the reconstructed size of the Phase 2 (v2) tiles is 56.7 x 78.6 m. These measurements are based on the interaxial spacing (3.97 m) of the colonnade carrying the eaves and the ridge of the roof and the length of the sloping rafters (3.26 and 6.60 m, Phase 2 [v1 and v2, respectively]) (Pls. 30–31). (For a more detailed description of the layout of the wooden elements that aid in determining the size of the pan tiles, see Vol. I.2, pp. 66–69.) The reconstructed size of the pan tiles of Phase 3 and Phase 2 (v2) is very similar to the size of the pan tiles from the shipsheds at Sicilian Naxos (see above).

11. The angle of the corner on nos. **96** and **99** is 90°.
12. Wikander 1988: 208.
13. Winter 1993: 221.
14. Blackman & Lentini 2003: 414.
15. Bacon *et al.* 1902–21: 71.

Catalogue of Corinthian Pan Tiles

92 (L72.01 and L72.02) Fig. 2.1, Fig. 163a-b
Land, U:2 north of S17:R13, 2002.

Two joining fragments of a Corinthian pan tile; part of the lower short side and the left long side are preserved. Along the left long side there is a low, raised border *ca* 2.1 cm wide and raised *ca* 0.3 cm above the tile surface. The underside is divided into three parts: a raised border along the lower short side, a transverse cutting, and the surface of the tile. The border is 2.7 cm wide and slopes at two intervals towards the cutting which is 5.1 cm wide. The width of the tile tapers towards the lower short side.

L.: 38.6 cm, W.: 27.9 cm, T.: 3.4–4.7 cm.

The clay is hard, laminar and coarse levigated, with frequent large- to very large-sized pieces of chamotte and few medium- to very large-sized black particles. The colour is very pale brown to light yellowish brown (10YR7/4–6/4). The top surface is smooth and covered with a thick very pale brown slip (10YR8/4) in a band *ca* 8.4 cm wide along the long side on top of a yellow slip (10YR7/6), which also covers the rest of the surface. The two colour areas are divided by a slightly raised border *ca* 0.1 cm wide and 0.1 cm high. The difference of colour probably indicates the area that was covered by the overlapping cover tile and the area that was exposed to the elements. The underside is less smooth than the upper side and is not slipped.

Date: 5th to 4th century BC.

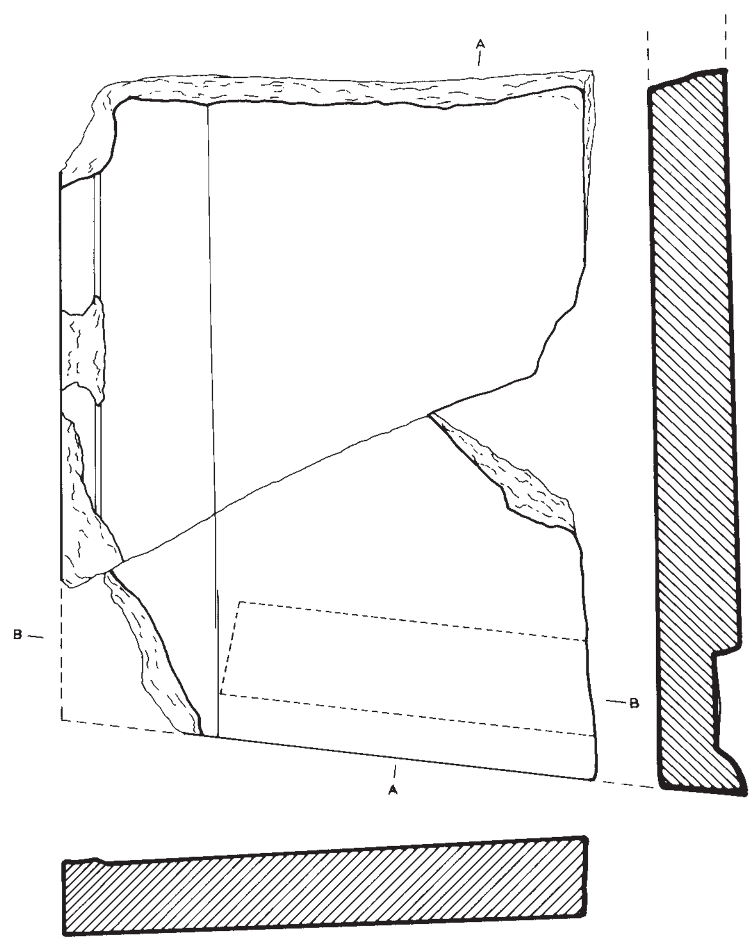

Fig. 2.1, **Cat. 92** (1:4)

93 (L72.04, L72.05 and L72.06) Fig. 2.2
Land, U:2 north of S17:R13, 2002.

Three joining fragments of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 3.0 cm wide and raised *ca* 0.3–0.4 cm above the tile surface. The height and shape of the border suggest that the fragments derive from the long sides of the tile.

L.: *ca* 24.9 cm, W.: *ca* 19.5 cm, T.: 3.8–4.3 cm.
The clay is hard, hackly and coarse levigated, with common large-sized lime particles, few very large-sized pieces of chamotte and frequent medium- to large-sized black particles. The colour is light yellowish brown (10YR6/4). The top surface is covered with a worn thick, pale yellow slip (2.5Y8/4).
Date: 5th to 4th century BC.

94 (L72.07) Fig. 2.3
Land, U:2 north of S17:R13, 2002.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 2.5 cm wide and raised *ca* 0.2 cm above the tile surface. The height and shape of the border suggest that the fragment is part of one of the long sides of the tile.

L.: 28.4 cm, W.: 33.7 cm, T.: 3.2–3.9 cm.
The clay is hard, laminar and coarse levigated, with few medium- to large-sized lime particles, few very large-sized pieces of chamotte and frequent medium- to large-sized black particles. The colour is reddish yellow (7.5YR6/6). The top surface has remains of a thick very pale brown to pale brown slip (10YR7/3–6/3). Gravel is imbedded in the underside.
Date: 5th to 4th century BC.

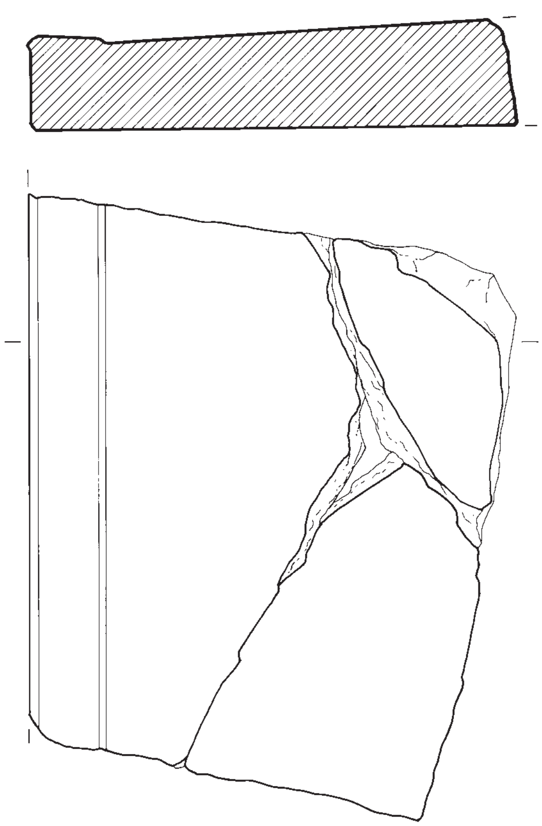

Fig. 2.2, **Cat. 93** (1:3)

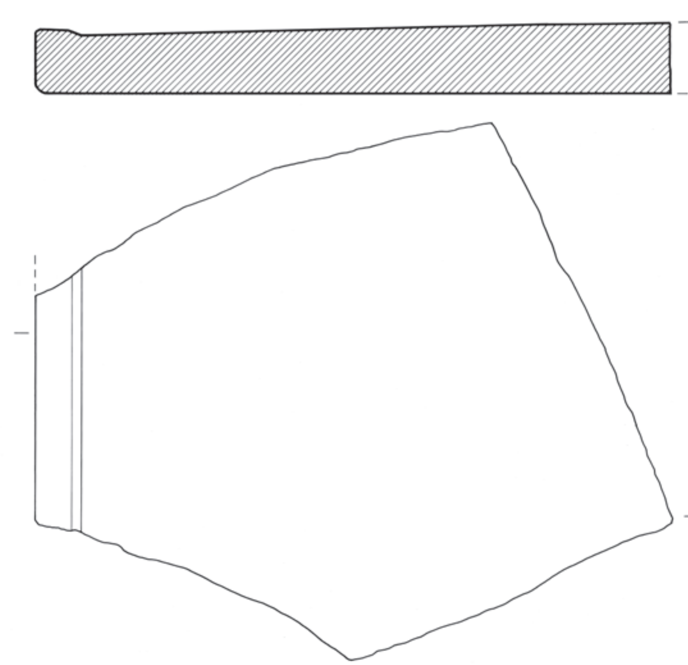

Fig. 2.3, **Cat. 94** (1:4)

95 (L76.01) Fig. 2.4
Land, C17/18:10, disturbed fill, 2002.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 2.2 cm wide and raised *ca* 2.5 cm above the tile surface. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 22.1 cm, W.: 15.5 cm, T.: 4.0–6.3 cm.

The clay is hard, laminar and coarse levigated, with few large-sized lime particles, common very large-sized pieces of chamotte and frequent medium- to large-sized black particles. The colour is light yellowish brown (10YR6/4). The top surface is covered with a thick, pale yellow slip (2.5Y8/2).

Date: 5th to 4th century BC.

Fig. 2.4, **Cat. 95** (1:2)

96 (S32.03.1) Fig. 2.5, Fig. 164
Sea, U:14A, disturbed fill, 2003.

Fragment of a Corinthian pan tile; parts of two sides are preserved. The tile has two raised borders: the upper border and the right border. The upper border is *ca* 2.5 cm wide and the maximum height is *ca* 3.0 cm above the tile surface. The right border is *ca* 2.3 cm wide and raised *ca* 0.2 cm above the tile surface; the right border gradually merges with the upper border.

L.: 21.1 cm, W.: 17.0 cm, T.: 2.9–6.3 cm.

The clay is soft, hackly and coarse levigated, with a few medium-sized lime particles, common very large-sized pieces of chamotte and a few medium-sized black particles. The colour is pale yellow (5Y7/3). The top surface and the underside have remains of a thick pale yellow slip (5Y7/4), and the upper border has the remains of a brown slip (7.5YR5/4). This difference in colour is caused by the upper raised border being covered by the overlapping underside of the next tile, while the rest of the top surface was exposed to the elements.

Date: 5th to 4th century BC.

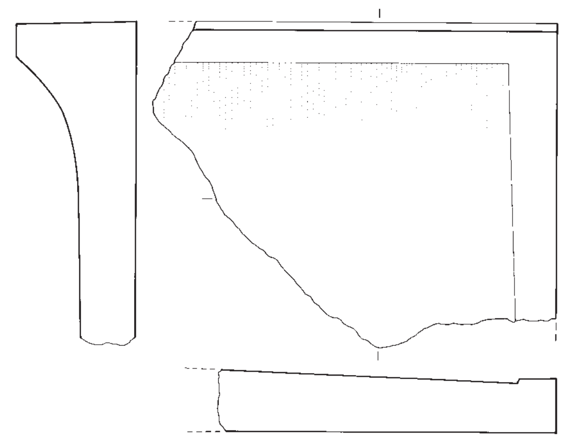

Fig. 2.5, **Cat. 96** (1:4)

97 (S32.03.2) Fig. 2.6
Sea, U:14A, disturbed fill, 2003.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 2.5 cm wide and raised *ca* 3.0 cm above the tile surface. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 10.4 cm, W.: 10.0 cm, T.: 2.9–6.0 cm.

The clay is hard, hackly and coarse levigated, with frequent medium- to large-sized lime particles and few medium-sized black particles. The colour is reddish brown (2.5YR4/4). The top surface has remains of a pale yellow to a light yellowish brown slip (2.5Y7/4–6/4).

Date: 5th to 4th century BC.

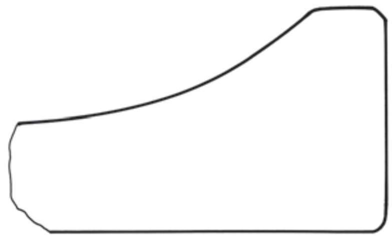

Fig. 2.6, **Cat. 97** (1:2)

98 (S42.01) Fig. 2.7
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 3.6 cm wide and raised *ca* 2.8 cm above the surface of the tile; the border is chipped. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 11.3 cm, W.: 6.8 cm, T.: 3.9–6.6 cm.
The clay is medium-hard fired, hackly and coarse levigated, with frequent medium- to large-sized lime particles, rare very large-sized pebbles and frequent large- to very large-sized pieces of chamotte. The colour is pink (7.5YR7/3). The top surface carries remains of a thin matt brown slip (7.5YR5/4).
Date: 5th to 4th century BC.

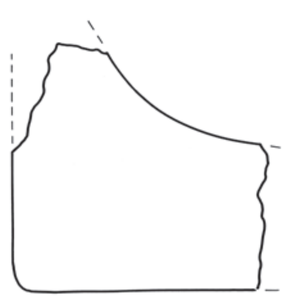

Fig. 2.7, **Cat. 98** (1:2)

99 (S62.01.1) Fig. 2.8
Sea, C10/11:2, disturbed fill, 2004.

Fragment of a Corinthian pan tile; parts of two sides are preserved. The tile has two raised borders: the upper border and the left border. The upper border is *ca* 2.6 cm wide and the preserved height is raised *ca* 1.2 cm above the surface of the tile. The left raised border is *ca* 2.3 cm wide and raised *ca* 0.1 cm above the surface of the tile; the right border gradually merges with the upper border. Submergence and wave action has rounded the edges of the borders.

L.: 7.3 cm, W.: 7.1 cm, T.: 2.9–4.0 cm.
The clay is soft fired, granular and coarse levigated, with frequent medium- to large-sized black particles and rare very large-sized lime particles. The colour is pink to light brown (7.5YR7/4–6/4).
Date: 5th to 4th century BC.

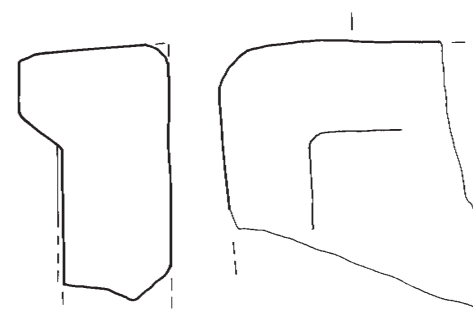

Fig. 2.8, **Cat. 99** (1:2)

100 (S62.01.2) Fig. 2.9
Sea, C10/11:2, disturbed fill, 2004.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 3.3 cm wide and raised *ca* 1.7 cm above the surface of the tile. The underside is chipped. The height and shape of the border suggest that the fragment is part of the upper short side. The border is worn.

L.: 6.2 cm, W.: 5.3 cm, T.: 2.4–4.1 cm.
The clay is medium-hard fired, conchoidal and coarse levigated, with frequent medium- to large-sized black particles, rare medium-sized lime particles and few medium- to very large-sized pieces of chamotte. The

colour is very pale brown (10YR7/4). The top surface and the underside carry a very thin matt light yellowish slip (10YR6/3).
Date: 5th to 4th century BC.

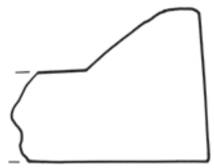

Fig. 2.9, **Cat. 100** (1:2)

101 (S78.01) Fig. 2.10
Sea, U:24, disturbed fill, 2004.

Fragment of a Corinthian pan tile; one side is preserved. The tile has a raised border *ca* 2.1 cm wide and raised *ca* 0.1 cm above the surface of the tile. The height of the border suggests that the fragment is part of one of the long sides.

L.: 9.7 cm, W.: 9.0 cm, T.: 3.3–3.7 cm.
The clay is medium-hard fired, hackly and coarse levigated, with frequent medium- to large-sized black particles. The colour is light yellowish brown (10YR6/4). The top surface has a thin matt pale yellow slip (2.5Y8/2).
Date: 5th to 4th century BC.

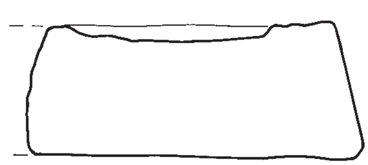

Fig. 2.10, **Cat. 101** (1:2)

102 (S36.02.1) Fig. 2.11
Sea, C7/8:3 (C16/17:9), disturbed fill, 2003.

Fragment of a Corinthian pan tile; part of one side is preserved. The tile has a raised border *ca* 3.6 cm wide and raised 1.0 cm above the surface of the tile. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 9.1 cm, W.: 8.8 cm, T.: 3.1–4.3 cm.
The clay is medium-hard fired, granular and coarse levigated, with common medium- to large-sized lime particles, few medium-sized black particles and rare very large-sized pebbles. The colour is dark reddish gray (10R3/1). The top surface carries remains of a thick matt light yellowish brown to pale yellow slip (2.5Y8/3).
Date: 5th to 4th century BC.

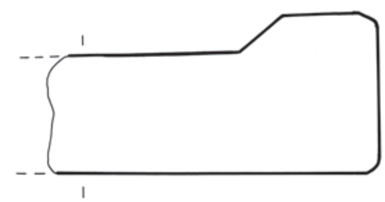

Fig. 2.11, **Cat. 102** (1:2)

103 (S271.03.1) Fig. 2.12
Sea, C14/15:1, disturbed fill (layer 2), 2006.

Fragment of a Corinthian pan tile; one side is preserved. The tile has a raised border *ca* 2.3 cm wide and raised 2.9 cm above the surface of the tile. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 10.5 cm, W.: 7.5 cm, T.: 3.0–5.3 cm.
The clay is medium-hard fired, hackly and coarse levigated, with few large- to very large-sized pieces of chamotte, frequent medium- to large-sized black particles and few very large-sized lime particles. The colour is reddish brown (5YR5/4). The top surface carries remains of a thin matt reddish brown slip (2.5YR5/4).
Date: 5th to 4th century BC.

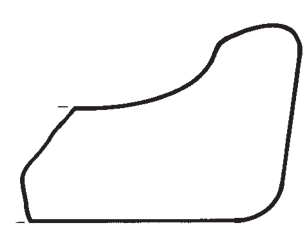

Fig. 2.12, **Cat. 103** (1:2)

104 (S274.02.1) Fig. 2.13
Sea, C14/15:1, disturbed fill (layer 2), 2006.

Fragment of a Corinthian pan tile; one side is preserved. The tile has a raised border *ca* 2.0 cm wide and raised *ca* 3.0 cm above the surface of the tile. The height and shape of the border suggest that the fragment is part of the upper short side.

L.: 9.6 cm, W.: 7.4 cm, T.: 4.0–6.6 cm.

The clay is medium-hard fired, granular and coarse levigated, with frequent very large-sized pieces of chamotte, few medium- to large-sized lime particles, few small-sized black particles and rare medium-sized silver mica particles. The colour is pale yellow (2.5Y7/2). The top surface carries remains of a thin matt dark reddish brown slip (2.5YR3/3).

Date: 5th to 4th century BC.

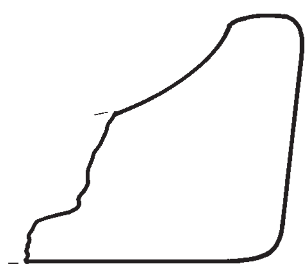

Fig. 2.13, **Cat. 104** (1:2)

105 (S277.01.1–2) Fig. 2.14
Sea, U:22, disturbed fill (layer 1), 2006.

Two joining fragments of a Corinthian pan tile; one side is preserved. The tile has a raised border *ca* 1.9 cm wide and raised *ca* 0.2 cm above the surface of the tile. The height of the border suggests that the fragment is part of one of the long sides.

L.: 16.3 cm, W.: 8.7 cm, T.: 3.0–3.3 cm.

The clay is soft fired, granular and coarse levigated, with few very large-sized pieces of chamotte, few medium- to large-sized lime particles and frequent small- to medium-sized black particles. The colour is light brown (7.5YR6/3). The top surface and the underside have remains of a thin matt very pale brown slip (10YR8/2).

Date: 5th to 4th century BC.

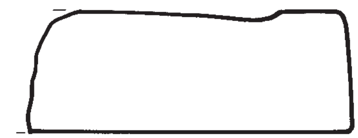

Fig. 2.14, **Cat. 105** (1:2)

106 (S46.01) Fig. 165
Sea, survey dive in the area of S20, 2003.

Fragment of a Corinthian pan tile; no edges are preserved.

L.: 19.2 cm, W.:15.4 cm, T.: 3.5–4.1 cm.

The clay is soft fired, hackly and coarse levigated, with few medium-sized lime particles, frequent medium-sized black particles, rare very large-sized pebbles and pieces of chamotte. The colour is very pale brown (10YR7/4). The top surface carries remains of a thin matt very pale brown slip (10YR8/3) and the underside carries remains of a thin matt brown slip (7.5YR4/4). Gravel is imbedded in the underside.

Date: 5th to 4th century BC.

107 (S79.01.1–2) Fig. 2.15
Sea, C14/15:4, disturbed fill, 2004.

Fragment of a Corinthian pan tile; one side is preserved. The edge is concave/convex, with no raised borders.

L.: 11.8 cm, W.: *ca* 11.2 cm, T.: 1.6–3.3 cm.

The clay is soft fired, conchoidal and coarse levigated, with rare small-sized lime particles, rare very large-sized pebbles and frequent very large-sized pieces of chamotte. The colour is yellowish brown (10YR5/4). The top surface has remains of a thin matt light reddish brown slip (2.5YR7/3) and the underside has remains of a thin matt brown slip (7.5YR4/3).

Date: Unknown.

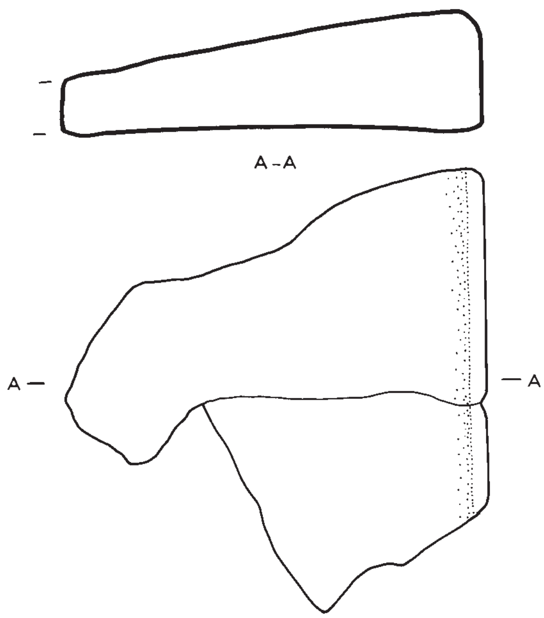

Fig. 2.15, **Cat. 107** (1:2)

108 (S306.01.1) Fig. 2.16
Sea, S14:R1, disturbed fill (layer 1), 2006.

Fragment of a Corinthian pan tile; one side is preserved. The edges slope outward towards the underside. There is no raised border.

L.: 10.5 cm, W.: 15.8 cm, T.: 1.8–2.1 cm.

The clay is medium-hard fired, smooth and medium levigated, with few small- to medium-sized black particles and frequent small- to very large-sized pieces of chamotte. The colour is pale yellow (2.5Y7/4). The top surface and the underside have remains of a thin matt brown slip (7.5YR5/4).

Date: Unknown.

Fig. 2.16, **Cat. 108** (1:2)

2.4. Corinthian Cover Tiles

The 12 cover tile fragments found at Zea are of the Corinthian gable-shaped type. The top of the gable is preserved in **109–117**. The undersides of **109–111** and **113–117** are curved, and those of **119–120** are slightly curved. The bottom edge of the cover tile is preserved in **109**, **111** and **120**, partially preserved in **119**, and probably preserved in **118**. The total width of **109** is *ca* 20.0 cm and the estimated width of **119** is *ca* 18.2 cm. The width of the cover tiles is also indicated by a slip along the long side of the top surface of pan tile **92**, which has a different colour than the rest of the preserved top surface. This area was overlapped by a cover tile, while the rest of the tile was exposed to sun and precipitation. The width of the covered area measures *ca* 8.4 cm, which demonstrates that the cover tiles were at least 16.8 cm wide, thus fitting well with the widths of **109** and **119**. The general width of Corinthian cover tiles varies from *ca* 15.0 to 30.0 cm, with most falling between *ca* 15.0 and 20.0 cm.[16] Thus the width of **109** and **119** compares well with the most common measurement for Corinthian cover tiles, accordingly the cover tiles in the reconstruction are given the width of 20.0 cm. In contrast, the width of the cover tiles from Sicilian Naxos is 31.5 cm.[17]

The short side of the cover tile is preserved in **109** and **111**. They have a raised border *ca* 1.8–3.0 cm wide and *ca* 1.0–1.9 cm high. Along the underside of the tile, the border merges with the raised border of the long sides; this border is *ca* 1.7–1.9 cm wide and *ca* 1.0–1.9 cm high where it meets the border of the short side, but disappears completely where it meets the regular underside surface of the tile. In general two cover tiles were connected by giving the upper short side of the tile a kind of depression, either gable-shaped or semi-cylindrical or with no special connecting device at all.[18] There are no examples of upper short side depressions among the Zea cover tiles, but taking the raised border of **109** and **111** into account, a depression on the short side, perhaps with a raised border along the end of the top surface, is needed for them to interlock. Otherwise the raised border seems redundant. The raised border would be the end of the cover tile, covering the next cover tile and consequently **109** and **111** are parts of the lower short side of the cover tile (Figs. 236–237).

In the reconstruction the cover tiles have been given a depression on the upper short side, moulded so that it fits the border of the lower short side. The raised border in the reconstruction has been given the width of 2.0 cm and the height of 1.4 cm above the surface of the tile. The cover tiles are 20.0 cm wide and 9.4 cm high, with a reconstructed length of 69.0 cm, 78.6 cm and 79.8 cm (Phases 2, v1, v2 and 3, respectively).[19] To date no antefixes have been found. In the reconstruction (Phase 2, v1, v2 and Phase 3) the lower end of the lowest cover tile has been closed with a plaque of a simple gable-shaped design in keeping with the functional purpose of the shipsheds. The plaque is made as an integrated part of the cover tile; similar antefixes are known from the Pompeion in the Kerameikos.[20]

The pan and cover tiles in the reconstruction are arranged according to the material presented above, but the ridge (pan and cover) tiles and the *sima* tiles of the reconstruction are hypothetical and inspired by ridge and *sima* tiles studied by Wikander, Winter and Hellmann[21] (Fig. 237). The sizes of the ridge tiles are determined by the width of the pan and cover tiles and the upper-most ridge of the roof. The width of the pan ridge tile is 54.0 cm and the length is 39.6 cm (Phase 3), 49.6 cm and 42.0 cm (Phase 2, v1) and 56.7 cm and 46.0 cm (Phase 2, v2); the width of the cover ridge tile is 20.0 cm (all phases) and the length is 39.6 cm, 42.0 cm and 46.0 cm (Phase 2, v1, v2 and

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16. Wikander 1988: 210; Winter 1993: 212. The length of the cover tiles is equal to the length of the pan tiles.
17. Blackman & Lentini 2003: fig. 36, no. 43, scaled off the drawing.
18. Wikander 1988: 210–211; Winter 1993: 83–84.
19. Obviously the reconstructed widths of the pan tiles (49.6 cm [Phase 2, v1], 54.0 cm [Phase 3] and 56.7 cm [Phase 2, v2]) might have required cover tiles with a differentiated width, but due to the hypothetical measurements of the pan tiles the known cover tile width of 20.0 cm is applied in all three reconstructions.
20. Knigge 1988: 79; Hoepfner 1976: 78, abb. 105. The Pompeion is dated to the beginning of the 4th century BC.
21. Ridge tiles: Wikander 1988: 212, C2; Winter 1993: ii. See also the reconstructions from the Hephaisteion (Dinsmoor 1976: 239, ill. 19) and the Nemesis temple in Rhamnous (Marstrand 1922: 92, fig. 64). The Hephaisteion was begun *ca* 449 BC and completed *ca* 420 BC (Gruben 2001: 223, 228), the Nemesis temple is contemporary, but was left unfinished in 431 BC (Lawrence 1996: 131). *Sima* tiles: Hellmann 2002: figs. 413, 415, 416; Wikander 1986: fig 3; Orlandos 1977-78: fig. 423; Lawrence 1996: 72–73, fig. 98; Winter 1993: figs. 2a, 3, 4a, 5, 6.

Phase 3, respectively). The lengths and widths of the *sima* tiles are the same as the pan tiles: 54.0 x 79.8 cm, Phase 3; 49.6 x 69.0 cm, Phase 2, v1; and 56.7 x 78.6 cm, Phase 2, v2. The *sima* tiles have been reconstructed with an overlap similar to that of the regular pan tiles, in order to integrate them into the general layout of the tiles. Their overhang (measured from the outermost wooden roof member) is 22.2 cm in Phase 2 (both versions), and 31.2 cm in Phase 3.[22]

22. *Sima* tiles often have a joint of two straight edges, but in order to integrate our hypothetical *sima* tiles with the remaining part of the tile roof, this design had to be forgone, and thus their joint appears as a zig-zag overlap.

Catalogue of Corinthian Cover Tiles

109 (S280.01.1–2) Fig. 2.17a-b, Fig. 166
Sea, C14/15:2, disturbed fill (layer 2), 2006.

Two joining fragments of a Corinthian gable-shaped cover tile; the top of the gable connecting to one of the bottom edges, and part of one end of the tile are preserved. The end is constructed of two borders, one from the long side (1.9 cm wide) and one from the end (1.8 cm wide and 1.9 cm high), which gradually merge in the corner. It is likely that the end fragment is part of the lower short side. The width of half the cover tile is *ca* 9.4 cm. The underside is curved.

L.: 22.8 cm, W.: 17.0 cm, T.: 1.8–3.3 cm, H.: 9.4 cm. The clay is soft fired, granular and coarse levigated, with few small-sized lime particles, frequent small- to medium-sized black particles and frequent medium-

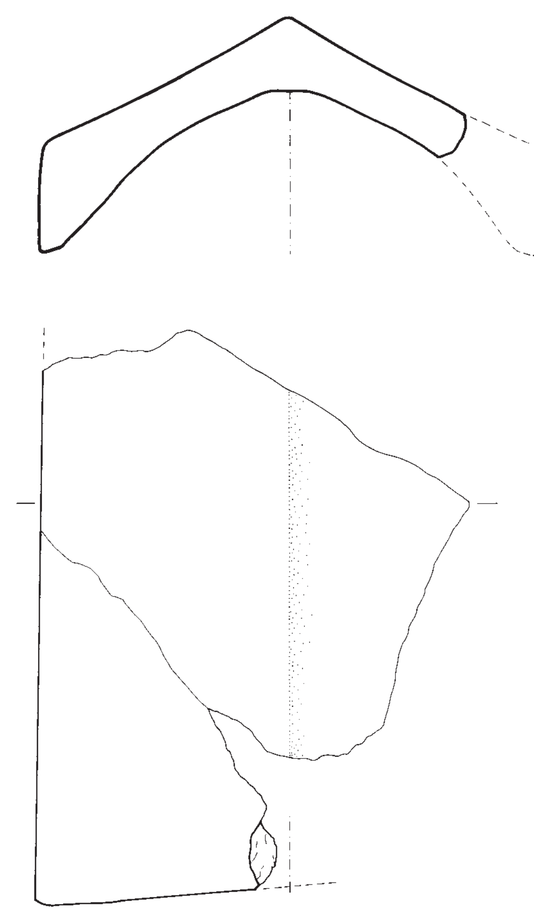

Fig. 2.17a-b, **Cat. 109** (1:3)

to very large-sized pieces of chamotte. The colour is pink (7.5YR7/4). The top surface and the underside carry remains of a thin matt very pale brown slip (10YR7/4).
Date: 5th to 4th century BC.

110 (S280.01.4)
Sea, C14/15:2, disturbed fill (layer 2), 2006.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is preserved. The underside is curved. The fragment probably belongs to the same tile as **109**, but does not join.
L.: 9.4 cm, W.: 10.0 cm, T.: 1.8–2.9 cm.
See **109** for clay analysis and drawing.
Date: 5th to 4th century BC.

111 (S280.01.3) Fig. 2.18
Sea, C14/15:2, disturbed fill (layer 2), 2006.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable is partly preserved and one end is preserved. The end is constructed of two borders, one from the long side (1.7 cm wide) and one from the end (2.0–3.0 cm wide and 1.0 cm high), which gradually merges in the corner. The underside is curved. The fragment probably belongs to the same tile as **109**, but does not join.
L.: 7.7 cm, W.: 11.9 cm, T.: 1.7–3.8 cm, H.: 9.4 cm.
See **109** for clay analysis.
Date: 5th to 4th century BC.

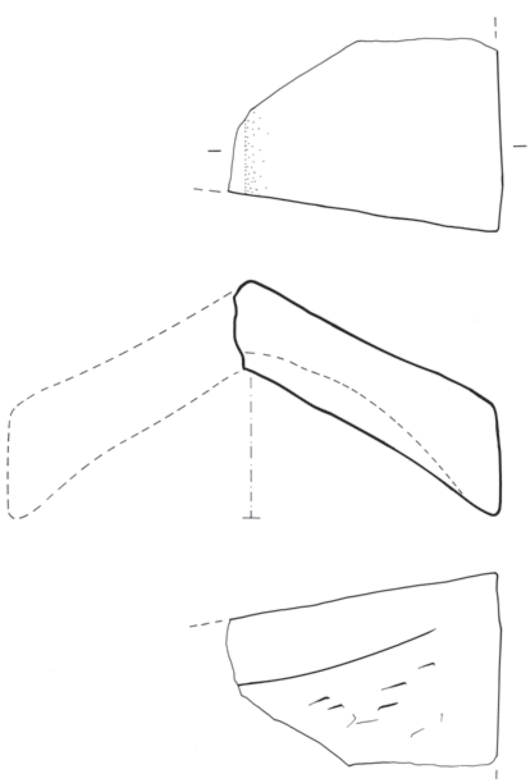
Fig. 2.18, **Cat. 111** (1:3)

112 (L62.01) Fig. 2.19
Land, S17:R6, east of S17:R11, disturbed fill, 2002.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is partly preserved. Parts of the top surface and the underside are very chipped.
L.: 12.9 cm, W.: 7.9 cm, T.: 2.4–4.1 cm.
The clay is hard fired, hackly and coarse levigated, with abundant medium- to very large-sized lime particles, few large- to very large-sized pieces of chamotte and common medium- to large-sized black particles. The colour is light reddish brown (2.5YR6/4). The top surface and the underside are smooth and covered with a very pale brown slip (10YR8/3).
Date: 5th to 4th century BC.

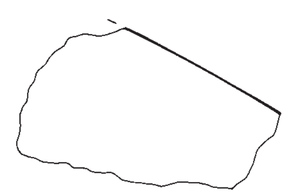
Fig. 2.19, **Cat. 112** (1:2)

113 (L65.01) Fig. 2.20
Land, M:10, disturbed fill, 2002.

Fragment of a Corinthian gable-shaped cover tile. The top of the gable, but no single bottom edge, is preserved. The underside is curved.
L.: 6.5 cm, W.: 8.9 cm, T.: 2.6–3.7 cm.
The clay is hard fired, hackly and coarse levigated, with few medium- to large-sized lime particles, frequent medium- to very large-sized pieces of chamotte, frequent medium-sized black particles and frequent medium-

to large-sized brown particles. The colour is very pale brown (10YR7/4). The top surface has remains of a thin pale yellow slip (2.5Y8/2).
Date: 5th to 4th century BC.

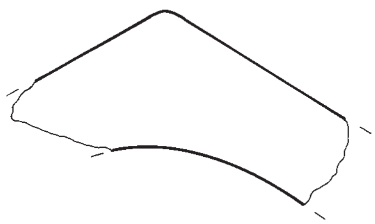

Fig. 2.20, **Cat. 113** (1:2)

114 (L74.01) Fig. 2.21
Land, C17/18:10, disturbed fill, 2002.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is preserved. The underside is curved.
L.: 8.7 cm, W.: 9.1 cm, T.: 1.9–3.4 cm.
The clay is hard fired, laminar and coarse levigated, with few medium-sized lime particles, few very large pebbles and frequent medium-sized black particles. The colour is very pale brown (10YR7/4). The top surface has remains of a thin pale yellow slip (2.5Y8/2).
Date: 5th to 4th century BC.

Fig. 2.21, **Cat. 114** (1:2)

115 (S25.02.2) Fig. 2.22
Sea, transition between U:14A and C7/8:4, disturbed fill, 2003.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is preserved. The top surface is chipped. The underside is curved and very eroded.
L.: 9.3 cm, W.: 3.8 cm, H.: 6.7 cm.
The clay is soft fired, granular and coarse levigated, with frequent medium-sized black particles and few medium- to large-sized red particles. The colour is pale yellow (2.5Y8/2). The top surface and the underside have remains of a pale yellow slip (2.5YR8/3).
Date: 5th to 4th century BC.

Fig. 2.22, **Cat. 115** (1:2)

116 (S33.03.3) Fig. 2.23
Sea, C7/8:4, disturbed fill, 2003.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is partially preserved. The top surface is very chipped. The underside is curved.
L.: 6.3 cm, W.: 6.8 cm, T.: 2.3–3.8 cm.
The clay is medium-hard fired, granular and coarse levigated, with few medium-sized lime particles and frequent medium- to large-sized black particles. The colour is reddish brown (2.5YR5/4). There are no remains of a slip.
Date: 5th to 4th century BC.

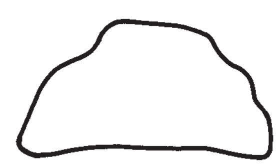

Fig. 2.23, **Cat. 116** (1:2)

117 (S33.03.7) Fig. 2.24
Sea, C7/8:4, disturbed fill, 2003.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable, but no single bottom edge, is partially preserved. The underside is curved.

L.: 7.3 cm W.: 4.8 cm, T.: 2.3–3.3 cm.
The clay is soft fired, hackly and coarse levigated, with frequent medium- to large-sized black particles, few medium-sized lime particles and common medium- to large-sized pieces of chamotte. The colour is light yellowish brown to very pale brown (10YR6/4–7/4). The top surface carries remains of a thick matt pale yellow slip (2.5Y7/4).
Date: 5th to 4th century BC.

Fig. 2.24, **Cat. 117** (1:2)

118 (S73.01.1–2) Fig. 2.25
Sea, area between OP/SWR3(S):1 and C10/11:3, surface cleaning, 2004.

Fragment of a Corinthian gable-shaped cover tile; one of the bottom edges, but not the top of the gable, is preserved.
L.: 10.6 cm, W.: 4.9 cm, T.: 2.6–3.6 cm.
The clay is medium-hard fired, granular and coarse levigated, with rare medium-sized black particles and rare medium- to large-sized pieces of chamotte. The colour is light gray (2.5Y7/2). The top surface carries a thin, matt pale yellow slip (2.5Y7/4), and the underside a thin matt yellowish brown slip (10YR5/4).
Date: 5th to 4th century BC.

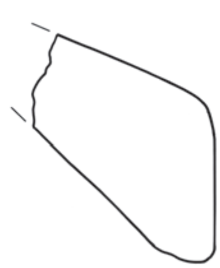

Fig. 2.25, **Cat. 118** (1:2)

119 (L27.01) Fig. 2.26
Land, W16/26:3, disturbed fill, 2002.

Fragment of a Corinthian gable-shaped cover tile; the top of the gable is chipped and one of the bottom edges is partially preserved. The underside is chipped and slightly curved.
L.: 10.0 cm, W.: 11.5 cm, T.: 1.9–3.1 cm.
The clay is hard fired, hackly and coarse levigated, with frequent medium- to very large-sized lime particles, few very-large sized pebbles, few large- to very large-sized pieces of chamotte and frequent small- to large-sized black particles. The colour is reddish brown (5YR5/4). The top surface is covered by a thick very pale brown slip (10YR8/4) and the underside is covered with a thin slip in the same shade.
Date: 5th to 4th century BC.

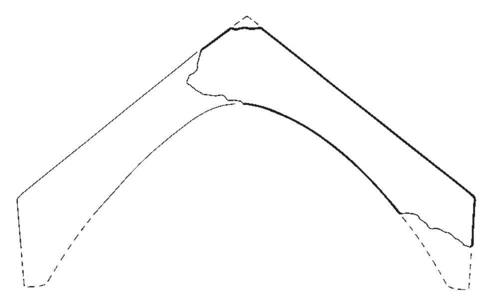

Fig. 2.26, **Cat. 119** (1:3)

120 (S25.02.1) Fig. 2.27
Sea, transition between U:14A and C7/8:4, disturbed fill, 2003.

Fragment of a Corinthian gable-shaped cover tile; one of the bottom edges, but not the top of the gable, is preserved. The underside is slightly curved.

L.: 12.3 cm, W.: 9.7 cm, T.: 2.0–3.1 cm.
The clay is soft fired, hackly and coarse levigated, with few medium- to large-sized lime particles, few medium-sized black particles and few very large-sized pebbles. The colour is reddish brown (5YR5/4). The tile carries remains of a thick matt very pale brown slip (10YR8/3) on the external surface. Gravel is imbedded in the underside.
Date: 5th to 4th century BC.

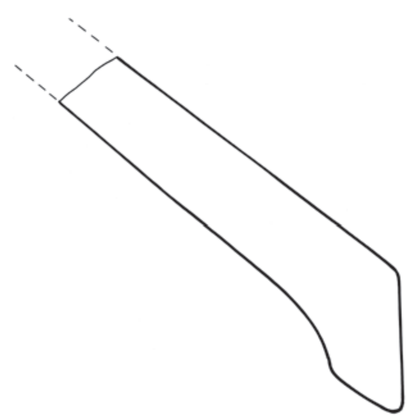

Fig. 2.27, **Cat. 120** (1:2)

2.5. Other Pan and Cover Tiles

Nos. **107** and **108** are Corinthian pan tiles with a different edge shape than **92–106**; the edge of **107** is concave/convex, with no raised border, and only slightly thicker than the rest of the tile. This shape of pan tile is rare in Area 1 at Zea, but more numerous in Area 2 (Fig. 2)[23] – an indication that this type of tile may belong to a different building phase of the shipsheds. The edge of **108** slopes outwards towards the underside and has no raised borders. The thickness of **107** is greater than that of **108**; both are thinner than **92–106**.

Nos. **121–123** are fragments of Laconian tiles with either one (**121–122**) or two (**123**) slightly concave/convex edges preserved. Considering the preserved width of **121** and its degree of curvature, the fragment appears to be a pan tile, with the edge belonging to the long side.[24] The curvature of **122** and the width of **123** (*ca* 11.6 cm) suggest identification as cover tiles;[25] **123** tapers towards the lower short side in the usual pattern of Laconian cover tiles.[26]

23. No. **107** is found close to the transition between Areas 1 and 2 (Fig. 2; Pl. 40). The shape and fabric of this type of tile will be discussed more thoroughly in the forthcoming publication of Area 2 in *The Ancient Harbours of the Piraeus, Vol. II*.
24. Wikander 1988: 210. The general width of Laconian pan tiles is *ca* 40–59 cm.
25. Wikander 1988: 211. The general width of Laconian cover tiles is *ca* 12–38 cm.
26. Wikander 1988: 211.

Catalogue of Laconian Pan and Cover Tiles

121 (S44.01.1) Fig. 2.28
Sea, C7/8:5 (C16/17:10), disturbed fill, 2003.

Fragment of a Laconian pan tile; one side is preserved. The curvature of the tile suggests that the edge is part of the long sides. The edge is slightly concave/convex.

L.: 16.6 cm, W.: 15.3 cm, T.: 1.6–2.3 cm.
The clay is soft fired, granular and medium levigated, with frequent medium-sized lime particles and few medium-sized black particles. The colour is light brown (7.5YR6/4).
Date: Unknown.

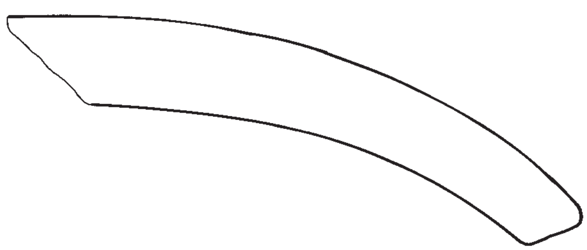

Fig. 2.28, **Cat. 121** (1:2)

122 (L54.05.2) Fig. 2.29
Land, area between C17/18:7 and C17/18:9, disturbed fill, 2002.

Fragment of a Laconian cover tile; one side is preserved. The curvature of the tile suggests that the edge is part of the long sides. The edge is slightly concave/convex.

L.: 12.3 cm, W.: 11.1 cm, T.: 1.6–2.1 cm.
The clay is very hard fired, laminar and coarse levigated, with few medium- to large-sized lime particles, few large- to very large-sized black particles and frequent large- to very large-sized brown particles. The colour is brown to strong brown (7.5YR5/4–5/6). The top surface carries a thick matt slip in different shades of dark gray, dark reddish gray and very dark gray (5YR4/1–4/2–2.5Y3/1).
Date: Unknown.

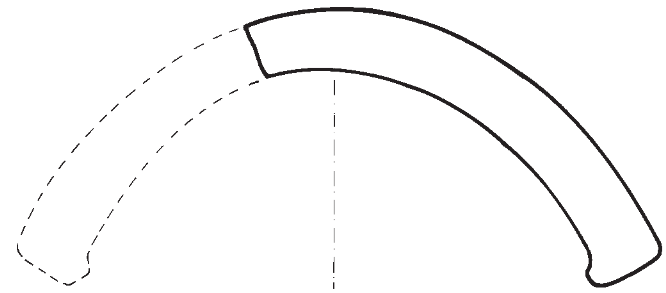

Fig. 2.29, **Cat. 122** (1:2)

123 (S23.02.1) Fig. 2.30
Sea, C7/8:3 (C16/17:9), disturbed fill, 2003.

Fragment of a Laconian cover tile; two sides are preserved. The curvature of the tile suggests that the edges are part of the long sides. The edges are slightly concave/convex and the cover tile tapers.

L.: 12.0 cm, W.: 13.2 cm, T.: 1.4 cm.
The clay is soft fired, granular and fine levigated, with rare medium-sized lime particles. The colour is strong brown (7.5YR6/6). The tile carries remains of a thick matt very dark gray slip (7.5YR4/1) on the external surface and a thin matt brown slip (7.5YR4/4) on the internal surface.
Date: Unknown.

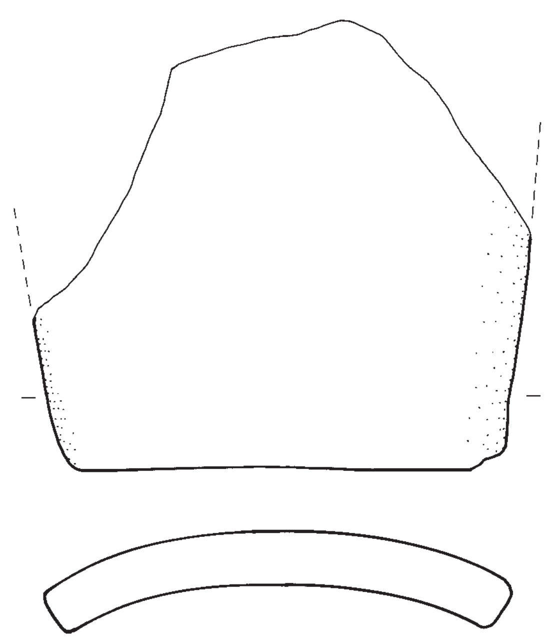

Fig. 2.30, **Cat. 123** (1:2)

2.6. Fabrics of the Corinthian Tiles

The various clay compositions of the tiles from Zea have some similarities. The tiles are divided into two groups according to clay colour. Group 1 (**92–93**, **95–96**, **100–101**, **104**, **106**, **113–115, 117–118**) is characterised by shades of beige ranging from very pale brown to light yellowish brown, yellowish brown, pale yellow and light gray. Group 2 (**94**, **97–99**, **103**, **105**, **109–112**, **116**, **119–120**) is characterised by a reddish beige colour ranging from reddish yellow to reddish brown, light reddish brown and pink. No. **107**, although a different shape of pan tile, has fabric characteristics similar to Group 1. No. **108** is similar in colour to Group 1. Both are medium levigated. The fabric colour of **102** does not match any of the groups.

The hardness of the fabric is divided roughly into three levels: hard (**92–95**, **97, 112–114** and **119**), medium-hard (**98**, **100–104**, **108**, **116** and **118**) and soft fired (**96**, **99**, **105–107**, **109–111**, **115**, **117** and **120**). The differences in hardness may well be due to their contexts: all tile fragments found on land are hard, while all of those found in underwater contexts (after desalination) are softer, a characteristic attributed to their having been waterlogged for centuries.[27] There is no connection between colour and hardness: all three levels of hardness are found in Groups 1 and 2.[28]

The clay is coarse levigated with a general composition of chamotte pieces, lime and black particles in different amounts and sizes. In addition, **113** has brown particles, **115** red particles, **104** silver mica and **98**, **102**, **107**, **114**, **119** and **120** pebbles. The fabrics of Groups 1 and 2 are similar to tiles found in the South Stoa I in the Athenian Agora,[29] as well as the general description of Attic tile fabric.[30]

The majority of the tile fragments (**92–97**, **100–102**, **105–106, 109–115** and **117–120**) have a yellowish to beige slip on the top surface.[31] The slip is well preserved on **92**, where the colour difference between the surface protected by the cover tile and the surface exposed to the sun and precipitation is considerable. No. **96** has a similar colour difference on the upper raised border, which was covered by the lower side of the next pan tile; this part has a darker colour than the rest of the tile. Tile fragments **96**, **115** and **119** also have remains of a beige slip on the underside. Three fragments (**98**, **107** and **108**) have a brown slip, while the top surfaces of **103** and **104** have, respectively, a reddish brown and dark reddish brown slip; of these five only **108** has remains of a slip on the underside as well.

The undersides of tiles are, in general, of coarser composition than the top surface, a phenomenon likely caused by the manufacturing process. The tiles were formed in a wooden frame, and the ultimate shaping took place on a worktable.[32] The table was covered with grit in order to prevent the clay from sticking to the working surface. Some of the grit is embedded in the tiles, leaving impressions as seen on the undersides of tiles **94**, **106** and **120**.

The tile fabric of the three Laconian pan tile fragments (**121–122**) is a brown colour, while that of the possible cover tile fragment (**123**) is dark gray; they all contain lime particles, but beyond that the material is too limited for further analyses.

2.7. A Hypothetical Reconstruction of the Shipshed Roof Arrangements in Phase 2 and Phase 3

A full reconstruction of the Phases 2 and 3 roofs of the Area 1 shipsheds at Zea is currently not possible due to lack of evidence.[33] The hypothetical reconstructions presented here are based on evidence available at

27. The present author is indebted to conservator K. Lovén, pers. comm., 2007, at the Athenian Agora for the information on the impact of sea water on ceramic finds.
28. See Vol. I.2, Chapter 1, n.3.
29. The present author has studied several cover tiles found in room 6 in the South Stoa I. The tiles are mentioned in Thompson & Wycherley 1972: 76, n.217. Thompson (1968: figs. 2–3) shows a reconstruction of the roof. They neither discuss the cover tiles in detail nor include any photos. The South Stoa I is dated to 430–420 BC (Camp 1986: 122).
30. Sparkes & Talcott 1970: 220, n.7.
31. See the catalogue for specific colour codes, and whether the slip is present on the underside as well.
32. Wikander 1993: 104–105.
33. The present author is indebted to R.C. Anderson, former architect at the Athenian Agora, and Drs. J. Pakkanen and H. Gerding for discussing the roof construction with her. Special thanks goes to architect B. Klejn-Christensen for his dedication and enthusiasm in making the reconstruction of the roof design. Any mistakes, however, are entirely the author's own.

present, scant as it may be. This qualification is prudent, since it is unlikely that further information will be gleaned from Area 1 in the foreseeable future.

The shipshed complex at Zea Harbour was one of the largest roofed building complexes of the Classical period. A roof of Corinthian tiles covered one or more building phases of the shipsheds in Area 1. A superstructure covered with tiles is durable and offers protection from fire caused either by natural, hostile or accidental means. Compared with a thatched roof or one made with wooden shingles, a tiled roof was an expensive solution. Superstructures covered by Corinthian pan and cover tiles always sloped in at least one direction. The alternating shorter/longer interaxial spacing of the colonnades in the upper half of the Phase 3 Area 1 shipsheds suggests a saddle roof design (i.e. sloping on two sides) and indicates that a saddle roof covered two ramps: the columns with the narrow interaxial spacing (2.16 m) carried the eaves, while the columns with the larger interaxial spacing (3.38–3.39 m) carried the ridge (Pls. 15–16, 33, 37).[34] The longer intercolumniation provided more light, space and ease of passage inside the shipsheds.

By contrast, the parallel colonnades of the earlier Phase 2 shipsheds exhibit a uniform interaxial spacing of 3.97 m (Pls. 13–14). This suggests that the columns were of the same height. The greater interaxial spacing of the Phase 2 shipsheds indicates that the superstructure was lighter than that of the Phase 3 shipsheds, but whether the saddle roof design covered just one ramp, as in the case of the shipsheds at Oiniadai, or two ramps, as in Phase 3 at Zea, remains unknown.[35] In favour of the argument that the roof covered just one ramp in Phase 2 is the similarity in the layout of colonnades (i.e. parallel columns; Fig. 44; Pls. 13–14) in Zea and Oiniadai, and the very different layout of the colonnades between Phases 2 and 3 at Zea.

On the other hand, a saddle roof supported by a central colonnade is a well-known design used in stoai from the Archaic period onwards. The similarity in design between a simple stoa and a shipshed may have factored in the choice of the Greek architect(s) to choose the same type of roof construction.[36] If so, the large alteration in the intercolumniation (Phase 2: 3.97 m; Phase 3: 2.16 m/3.38–3.39 m) and in the height of the eaves-carrying columns between Phases 2 (6.71 m) and 3 (5.37 m; see Vol. I.1, pp. 162–165) may have been made to reduce the total height of the shipsheds (which may have been unnecessarily high compared to the height of the *triremes*), and to carry a heavier architrave and gutter. The total height of Phase 2, v1 and Phase 2, v2 (from the lowest column drum to the ridge of the roof) is 8.73 m and 9.54 m high, respectively; in comparison, the total height of the Phase 3 shipshed is 7.98 m high. Consequently the hypothetical reconstruction of the Phase 2 roof has two possibilities. In the first version (v1), a saddle roof covers one ramp; in the second version (v2) a saddle roof covers two ramps (Pl. 29).

The shipsheds of Phase 3 and probably those of Phase 2 were built on a slope inclined towards the sea (Pl. 37). The combination of lateral and longitudinal slopes may have demanded a special placement and special types of tile.[37] The shipsheds of both phases were built directly adjacent to one another, with one colonnade carrying the eaves of two adjoining roofs (Pls. 29, 33). This arrangement, known also as a butterfly roof, created peaks and valleys requiring some kind of solution for shedding rain water.

In investigating the arrangements of the roofs of the Zea shipsheds, comparative material from other shipsheds and other similar ancient buildings such as stoai (primarily) and temples (secondary) have been taken into consideration. The sizes assigned to the majority of the various modules of the superstructure are estimations based on the height (5.37 and 6.71 m) and upper diameters (0.55 and 0.53 m) of the Phase 3

34. Dörpfeld's section drawing (in Dragátsis 1885: pl. 2) shows a saddle roof construction.

35. Dr. J. Pakkanen, pers. comm., 2007, finds it unlikely that the roof of the Phase 2 shipsheds covered only one ramp, but that the roofs of the Phases 2 and 3 shipsheds were very much alike, aside from the length and lighter construction of the Phase 2 shipsheds.

36. In stoai, the internal colonnade usually has a larger interaxial spacing than the external colonnades, even if the internal and external columns are of the same height, as in the Abaton in Epidaurus (dated to the first half of the 4th century BC); see Coulton 1976: 193–198. The internal columns, however, are often higher than the external columns and would thus more easily support the ridge of the roof as in the Phase 3 shipsheds.

37. The present author is indebted to Dr. J. Pakkanen, pers. comm., 2007, for pointing out that complex tile shapes would have been necessary unless the roof was built of horizontal sections.

eaves and ridge columns, respectively, and the height (6.71 m) and upper diameters (0.44 m) of the Phase 2 columns. Thus changes in the size of the columns may well be reflected in the different roof elements placed above. It must be emphasised that these measurements are merely estimations.

The volume of empirical evidence for the Phase 3 columns is much larger than that of Phase 2. As a result the hypothetical reconstructions of Phase 2 are less certain than those of Phase 3.

2.8. Slope

The inclinations from ridge to eaves of the slanting roofs of Phases 2 and 3 are unknown.[38] In general, pan tiles were not fastened to the wooden roof construction (as suggested in Thuc. 3.22.4, 2.4.2 and 4.48.2) and none of the 409 tile fragments found at Zea have signs of attachment holes.[39] Some of the tiles do, however exhibit rough undersides (**94**, **106** and **120**), which increased the friction coefficients between the tiles and the roof framing woodwork, and between overlapping tiles, thus reducing their risk of falling off the roof.

The lack of fastenings in pan tiles limits the degree of the roof's inclination, since the higher gradient would apply more lateral force to the tiles and cause them to slide apart more easily. Scholars have calculated the maximum inclination of a tile roof. Brodribb[40] considers 30° as a maximum angle, and Rook 35–40°.[41] The angle of roof inclination in Greek Archaic temples is, according to Gàbrici,[42] 17° on average and temples from the 5th century BC average 14.5°. The roofs of the private houses at Olynthos had an inclination of *ca* 18°.[43] According to Wikander,[44] roofs from the Archaic and Classical periods rarely exceed 15° to 25° of slope, and the known roof slopes of 5th-century BC buildings in Athens range from 13° to 14°.[45] Known roof slopes of 4th-century BC buildings in mainland Greece are scarce, but the few examples vary from 12° to 15°.[46] Stoai with known roof slopes include the South Stoa of the Argive Heraion (*ca* 13°),[47] the Stoa of Philip at Delos (*ca* 13°),[48] the South Stoa in Corinth (12°),[49] and the Stoa of Attalos in Athens (11°).[50]

The roof inclination of the shipsheds at Sounion has been reconstructed from a gable block at 31°.[51] A similar inclination is used in the reconstruction of the shipsheds from Kition and Oiniadai.[52] The shipsheds from Mandraki Harbour on Rhodes have been

38. At a relatively early stage in the identification process it was proposed that **119** could be part of a ridge tile. It was, however, shown to be a cover tile, and consequently there is no indication of the inclination of the saddle roof.
39. The majority of these tile fragments are not included in this publication.
40. Brodribb 1987: 10.
41. Rook 1979: 295. According to Bennett & Pinion (2000: 132), the minimum inclination on modern tile roofs is 35°. Schunck *et al.* (2003: 143, fig. 2.4.6.19) consider 25° to be the minimum slope for modern tiles in order for them to be rainproof.
42. Gàbrici 1933: 181–182.
43. Robinson & Graham 1938: 236.
44. Wikander 1988: 207–208.
45. See, for instance, the Hephaisteion and the Parthenon (Gàbrici 1933: 181). The roof of the Erechtheion seems to have roughly the same inclination (scaled off Stevens in Paton 1927: pl. XIII), while the roof of the Propylaia has a slightly less severe slope of 13°+ (Dinsmoor 2004: 265). The Parthenon was built between 447 and 432 BC, the Erechtheion was built between 421–414 BC and 409–406 BC and the Propylaia between 437 and 432 BC (Lawrence 1996: 112; Gruben 2001: 192–193, 209).
46. The roof of the temple of Athena Alea in Tegea is 12.5° (scaled off Dugas 1924: pl. XII); the temple is dated to 350–325 BC (Gruben 2001: 137). The roof of the temple of Zeus in Nemea is 12° (scaled off Hill 1966: pl. X); the temple is dated to 330–320 BC (Gruben 2001: 133). The roof of the temple of Asclepius in Epidaurus is 15° (scaled off Defrasse & Lechat 1895: 54); the temple was begun in 390 BC (Gruben 2001: 135).
47. Coulton 1973: 71, table I. The South Stoa is dated to *ca* 450–425 BC (Coulton 1976: 217).
48. Vallois (1923: fig. 98) gives the height of several parts of the *tympanum*; the angle is scaled off this section. The original Stoa of Philip was probably built in 216–200 BC, with an addition from the second quarter of the 2nd century BC (Coulton 1976: 234).
49. Scaled off Broneer (1954: 96, pl. XI); Broneer (1954: 96–97) dates the South Stoa to the second half of the 4th century BC, while Coulton (1976: 228) dates it to the early 3rd century BC.
50. R.C. Anderson, former architect at the Athenian Agora, provided the information on this angle. The Stoa of Attalos was built during Attalos II's reign, 159–138 BC (Camp 1986: 172).
51. Kenny 1947: 199. It is questionable whether the *geison* fragment is from the shipshed roof, as another fragment was found re-used in the wall of the shipsheds at Sounion (Goette 2000: 48). They were probably built in the Hellenistic period.
52. Kition: Callot 1997: fig. 8. Oiniadai: Sears 1904: pl. XI. Callot and Sears both do not give any indications on what the 31º measurement is based; the roof angle is scaled off their respective reconstructions. The shipsheds in Oiniadai and Kition are dated to the 4th century BC and the end of the 5th century BC, respectively.

reconstructed with a roof inclination of *ca* 17°.[53] Finally, Dörpfeld employed an angle of *ca* 15° for his roof reconstruction of the shipsheds in Zea.[54]

The relatively high raised border along the upper sides of the pan tiles from Zea may suggest a steeper angle of roof slope, and could serve to reduce the risk of tiles sliding apart. On the other hand, the lower limit of a tiled roof is at least 10°, to prevent water from backing up under the tiles in heavy rain and wind.[55]

The economics of roof arrangements is another aspect to consider: the greater the degree of slope the more tiles would be required for complete coverage. This would have been an important factor behind the relatively low inclinations prevalent among the known roofs of the Classical period.

In the hypothetical reconstruction of the Phase 3 roof an inclination of 13° is applied (Pl. 33). This value is based on the reconstructed heights of the Area 6 columns (5.37 and 6.71 m; see Vol. I.1, pp. 162–165) and the roof elements placed above. It differs from Dörpfeld's reconstruction of the Phase 3 shipsheds (based on a 15° slope) but is comparable with the majority of contemporary buildings in Athens and mainland Greece and the stoai mentioned above.

The hypothetical reconstructions of both versions of the Phase 2 roof are more difficult. The reconstructed height of the columns (6.71 m) is based on the Area 6 column drums, and the lower diameter of the columns (0.67 m) (see Vol. I.1, p. 93; Table 6.9). The closest parallels to the Phase 2 (v1) roof are the steep, 31° reconstructed roofs from Kition and Oiniadai, which like Phase 2 (v1) at Zea covered only one slipway. Unfortunately, there is no discussion in their respective publications regarding the evidence on which the slope is based. The 31° inclination of the roof at Sounion is, as discussed above, questionable. An inclination of 31° seems rather high when compared with other examples of roof inclinations on ancient buildings. In addition, such a steep angle, and therefore taller roof, seems unnecessary and uneconomical unless the steep inclination was needed to provide more storage.

Consequently, an inclination of 14º is chosen for the Phase 2 (v1) roof at Zea; this is equivalent to the inclination applied to the Phase 2 (v2) roof, which in turn is based on comparisons with the above-mentioned contemporary local buildings and thus disregards the two comparable shipshed roof reconstructions (Pl. 29).

The longitudinal slope of the Phase 3 roofs at Zea is unknown in absolute terms, but it can safely be assumed that it followed, at least approximately, the gradient of the wall dividing Shipsheds 16 and 26(?); the wall's gradient is calculated with a mid-range of 1:12.3 (4.65º) (Pl. 35a; see Vol. I.1, pp. 104–108).

It is most likely that the roof was built in one continuous slope to the sea, as reconstructed by Dörpfeld,[56] and not in sections as seen in the roof of the shipsheds at Sounion and in Sicilian Naxos.[57] Also, the Phase 2 roof in all probability sloped towards the sea, but the architectural remains are of such a poor quality that it is extremely difficult to ascertain its gradient (see Vol. I.1, pp. 117–119). The Phase 2 roof has thus been reconstructed without a gradient.

There is some question as to whether the columns could actually carry the weight of a tiled roof that is reconstructed at a maximum of about 70 m in length in Phase 2 and *ca* 89.58 m (see Appendix 4) in Phase 3 (Pls. 14, 37). However, in our reconstruction, the architrave, ridge and valley beams together distributed the weight of the roof, including the tiles, equally to each column without adding pressure on the columns at the seaward end of the shipsheds (Fig. 238; Pls. 29–30, 33).[58]

2.9. Capitals

Capitals remain undiscovered to date at Zea, but would in all probability have been employed in both Phase 2 and Phase 3. The size and shape of the Doric capitals

53. Blackman, Knoblauch & Yiannikouri 1996: 398–399. Knoblauch does not stipulate on what grounds this reconstruction has been constructed. The roof angle is scaled off his reconstruction. The shipsheds from Mandraki are dated from the 4th to 2nd centuries BC.
54. Dörpfeld's plan drawing in Dragátsis 1885: pl. 2.
55. Dr. H. Gerding, pers. comm., 2006; see also Schunck *et al.* 2003: 145.
56. Dörpfeld's plan drawing in Dragátsis 1885: pl. 2; see Vol. I.1, p. 160.
57. Kenny 1947: 199. Dr. J. Pakkanen has kindly allowed the present author to see his preliminary roof reconstructions of the shipsheds in Sicilian Naxos.
58. The present author is indebted to architect B. Klejn-Christensen, pers. comm., 2007, for explaining the facts of building stability.

applied in the Phase 3 reconstruction are based on the capital found at Oiniadai and the general development of the Doric capital;[59] while the Doric capital of the Phase 2 reconstructions is based on the capitals from the east front of the Propylaia[60] (for the reconstructed upper diameters of the Zea columns of both phases, see Appendices 2–3, pp. 113, 115).

The reconstructed lower diameter of the *echinus* on the eaves columns in Phase 3 is 0.55 m (the same as the upper diameter of the column); the upper diameter of the *echinus* is calculated to 0.68 m, which is nearly equal to the lower diameter of the columns (0.64 m; see Vol. I.1, pp. 95–97). The height of the *echinus* is estimated at 0.16 m, the same height as that estimated for the *abacus*. The *abacus* is estimated at 0.71 x 0.71 m. The reconstructed upper diameter of the ridge columns is 0.53 m (0.02 m narrower than the eaves columns), which equals the lower diameter of the *echinus*. The upper diameter of the *echinus* is calculated at 0.65 m, the height at 0.20 m. The *abacus* is calculated at 0.68 x 0.68 m and the height is the same as that of the *echinus* (see Appendix 2 for the discussion of the measurement and calculations of the *echinus* and *abacus* from the Oiniadai capitals).

This level of precision in all of these architectural elements may very well have been unlikely and it is probable that there was a range of sizes for the capitals of both types of colonnades for two reasons. First is the skill of the stone mason: one or two centimetres of imprecision on the eaves capitals would almost equal the ridge capitals or vice versa. Second, making just one size of capital would ease and streamline the manufacturing process. Even so, the height and upper diameter of the Phase 3 eaves and ridge columns at Zea are based on strict comparison with the columns of the Oiniadai shipsheds. As a matter of consistency, it was decided to continue this level of precise proportions for the capitals and as far as possible for the other parts of the roof.

The reconstructed lower diameter of the *echinus* on the Phase 2 columns is 0.44 m (see Appendix 3, p. 115). The upper diameter is calculated at 0.59 m and the height at 0.19 m. The *abacus* is estimated at 0.61 x 0.61 m with a height of 0.24 m (see Appendix 3 for calculations of the Phase 2 *echinus* and *abacus* based on the capitals from the eastern front of the Propylaia).

If it is assumed that the roof maintained a continuous slope, then certain architectural elements would have been required between the top of the capital and the valley/"lower ridge beam"/ridge beam to accommodate it – either a sloping *abacus* or a horizontal *abacus* with an additional wedge-shaped block.[61] The latter may be the more simple solution, but as the architect B. Klejn-Christensen points out, the wedge-shaped block, as a separate element, whether made of wood or stone, would compromise the stability of the roof modules placed above the capitals especially in case of an earthquake. As a sloping *abacus* in no way overtaxed the skills of Greek architects this solution is chosen for the reconstruction of Phase 3 (Fig. 239). The sloping *abacus* is not shown in the Phase 2 reconstructions, since the gradient towards the sea, as mentioned above, is unknown in absolute terms.

2.10. Gutters

At present there has been no evidence found in Area 1 for the gutters that would have been positioned in the valleys between two adjoining roofs, but some sort of arrangement was clearly required to prevent water from running into the shipsheds and drenching the wooden elements of the roof construction. Several solutions are possible:

Laconian pan tiles could have served as a gutter. This solution may have been adopted at Oiniadai,

59. Sears 1904: 231; Lawrence 1996: 70; Coulton 1977: fig. 41. The size of the *abacus* in Oiniadai is 0.80 x 0.80 x 0.20 m. The *echinus* (*torus*) is 0.20 m high, the lower diameter is 0.62 m and upper is 0.76 m and equals the lower diameter of the column. Based on the reconstructed height of the columns at Oiniadai and Zea, respectively, the Zea capital is diminished accordingly (see Vol. I.1, pp. 162–165 for the discussion of the height of the Zea and Oiniadai columns). More capitals have been found at Oiniadai, but are not described in detail. See Kolonas 1990: 156.

60. It is difficult to find a column of an equal height to the columns at Zea and with a full preserved capital from a 5th-century BC building in Athens. The columns from the east front of the Propylaia have been chosen despite the fact that they are taller than the reconstructed columns at Zea. The measurements of the Propylaia are given by Dinsmoor & Dinsmoor 2004: 93–94, 100–101, 373–374.

61. Sears (1904: pl. X) applies a wedge-shaped block on the colonnade at Oiniadai.

where both Corinthian and Laconian tiles were discovered.[62]

The gutter was made of terracotta and rested on the wooden valley beam underneath. The disadvantage of a terracotta gutter would have been its composite construction: unless the gradient of the gutter towards the sea was rather considerable, some water could penetrate the joins and damage the wooden construction underneath.[63]

The gutter was cut from wood and made waterproof with sheets of metal. This method, however, would have been very costly.[64]

The gutter was cut in stone, either integrated into the stone architrave, which, in lieu of a wooden valley beam, would have been used as a support for the wooden rafters, or a separate stone gutter placed atop a regular stone architrave or wooden valley beam.

For the gutters of Phase 2 (v1 and v2) the first or the second solution is most likely, as the larger intercolumniation, as mentioned above, suggests a lighter superstructure than that of Phase 3. In the reconstruction, as there are no parts identifiable as terracotta gutters, a gutter made of Laconian pan tiles is chosen. The tiles are given a width of 40.0–42.0 cm,[65] a thickness of 2.0 cm and a depth of 9.0 cm, based on Wikander's general measurements of Laconian pan tiles.[66] The pan tiles were likely attached to the wooden sheathings with some kind of mortar (Pls. 29, 31).

A separate stone gutter lying atop a stone architrave has been chosen for the reconstruction of the Phase 3 roof, as this solution allows the wooden rafters to be supported in the corner created by the architrave and the gutter, and thus gives more support than just placing the rafters atop the architrave (Pl. 33; Fig. 239). Interestingly, during the investigations of the shipsheds in Mounichia, a stone block with a carved channel was found. Milchhöfer interprets it as a gutter, but does not mention any slots for wooden rafters along the exterior side of the block (Fig. 28b).[67] The gutter of our reconstruction has certain similarities with the block from Mounichia.

A stone gutter carved into the top of the architrave, on the other hand, has been judged by Klejn-Christensen to compromise the strength of this important load-bearing architectural element. On these grounds this alternative has been ruled out.

The width of the Phase 3 stone gutter is determined by its requirement to accommodate the amount of water collected from a roof area of *ca* 1,184.25 m^2. The internal width and depth of the gutter are estimated at 0.20 m and 0.20 m, respectively. The walls of the gutter add an additional width of 0.09 m, resulting in a total width of 0.29 m, and an additional depth of 0.05 m resulting in a total depth of 0.25 m. The area section of the gutter is *ca* 40,000 mm^2 (see Appendix 4).

While expensive and cumbersome in terms of weight, a stone gutter has the merit of being less likely to have had water penetration in the joins. An argument for a stone architrave design is the support offered by the narrower intercolumniation in the columns carrying the eaves and thus the ability of the columns to carry a heavier weight than those with higher intercolumniation.[68]

An alternate scenario is worth mentioning. Rainwater may have been diverted into the interior of the shipsheds via drain pipes placed at some interval in the stone gutter, then collected in large vessels to be used for drinking, ship maintenance or in case of fire.[69]

In the reconstruction of Phase 3 a plain stone outlet serves as the termination of the gutter; in Phase 2 (v1 and v2) an extra Laconian pan tile serves the same

62. Kolonas 1996: 165. The number of Laconian pan tiles found at Zea amounts to less than 10% of the complete corpus.
63. See n.41.
64. It has been suggested by Dr. J. Pakkanen that terracotta gutters could also have been made waterproof with lead lining. His theory was presented at the John Morrison Memorial Conference, held in Oxford in 2005.
65. The pan tile tapers slightly.
66. Wikander 1988: 210. See n.42, this volume.
67. Milchhöfer 1881: 62, no. 69. Von Alten (1881: 15) interprets the block as belonging to a ramp/keel-runner. The block is illustrated in Von Alten 1881: fig. 9b, and its whereabouts, to the knowledge of the present author, is unknown.
68. It would, of course, be possible to imagine a wooden architrave on stone columns. This combination is known from stoai from the Archaic period, but only rarely later (Coulton 1976: 144). The wooden valley beam is chosen for the Phase 2 shipsheds despite this statement because of the high interaxial spacing of the columns, which would probably not have been able to carry a stone architrave.
69. The drain pipes would have had to lead from the gutter between a pair of rafters and into the shipsheds. To drill a hole through the bottom of the gutter and through the architrave would have been impractical and probably would have compromised the strength of the architrave.

purpose. A delicate lion water spout would not have been able to cope with the volume of water collected by such long gutters (Fig. 239; Pl. 31).[70]

At the northern end of the Phase 3 shipshed complex (the wall dividing Shipsheds 16 and 26(?)) the same type of gutter as on the eaves columns is chosen, although this gutter would collect only half the amount of rainwater and despite the fact that the roof looks somewhat "unfinished". The reason is that another possible section of the shipshed complex (Phase 4) was built adjacent to Wall 16/26(λ). This gutter thus had to cope with the same amount of water as the gutters on the eaves columns. If, however, the complex terminated at Wall 16/26(λ) for a period of time it is possible for the reconstruction to include eaves tiles, regular *simae* and perhaps even water spouts. This scenario is also possible at the termination of both sides of the Phase 2 (v1 and v2) shipshed complex.[71]

2.11. Architraves and the Wooden Roof Construction

Stone blocks with slots for wooden roof elements have not as of yet been found at Zea, and so the present reconstruction is based on other buildings covering similar spans, mainly stoai.[72] The sizes of the primary and secondary roof members are obviously unknown. The reconstructed sizes of the primary roof members have, when possible, been calculated from comparison with a number of stoai (see Appendix 5). Other primary roof members as well as the sizes of all the secondary roof members are reconstructed according to the strength needed to carry the roof members above.[73]

In the Phase 2 (v2) and Phase 3 shipsheds at Zea the roof was supported by columns at the ridge and at the eaves. If the columns were of the same height, it is possible that a post-and-lintel construction was used. This was probably the case in Phase 2 (v2) (Pl. 29). The span of the roof on each side of the central colonnade averages 6.48 m (Phase 2 (v2) and Phase 3). Such spans in temples were easily accomplished with cross beams and the post-and-lintel system, without the use of internal columns.[74] The roof of Phase 2 (v1) has been reconstructed with a post-and-lintel construction like that of Phase 2 (v2) (Pl. 29). Such post-and-lintel designs are know from stoai; in comparison the roof of the shipsheds at Oiniadai was reconstructed simply by joining the rafters.[75] The total span of the Phase 2 (v1) roof is 6.48 m.

In the Arsenal of Philon, the purlins were supported directly on internal colonnades, with the cross beams lying at the same level, and with only a block (instead of a post) between them and the rafters.[76] In the Phase 3 shipsheds at Zea, with their central colonnade, it is likely that the columns carrying the ridge were higher than those carrying the eaves, and the ridge beam was placed directly on them (Pl. 33). This arrangement would make the horizontal cross beam unnecessary. Similar arrangements with a saddle roof carried by columns of different heights are known from stoai.[77] However, the span of these stoai is smaller than the span of the Zea shipsheds. In the Stoa of Attalos in the Athenian Agora, for example, the roof, which is of post-and-lintel construction, has a false ceiling inserted above the inner aisle of the upper colonnade.[78] The ceiling of the aisle has a span of 6.60 m (interaxial).[79] Large spans required wood of good quality, which

70. During torrential rains in present-day Athens, which occur especially in October-November, as much as 80–120 mm of precipitation can accumulate during a six-hour period. The present author is much indebted to Dr. G. Kallos, pers. comm., 2008, at the Atmospheric Modelling & Weather Forecasting Group at the Dept. of Physics, University of Athens for this information. Pine, cypress and olive trees grew around Athens in the ancient times; this may have resulted in a climate with more precipitation than today. See Appendix 3.
71. See n.21.
72. Coulton 1976: 211–294.
73. Architect B. Klejn-Christensen has assisted in the estimations of the strength needed in the various roof members.
74. Hodge 1960: 39.
75. The Abaton in Epidarus and the Stoa of Philip in Megalopolis (dated 340–330 BC) are reconstructed with post-and-lintel roofs carried by an internal colonnade, of the same height as the external colonnades. The colonnades of the Abaton and the Philip Stoa are placed in parallel, but in the case of the Abaton the internal colonnade excludes every second column as compared to the external colonnade. The Stoa of Philip at Delos is reconstructed with a post-and-lintel roof carried only by external colonnades. These stoai are mentioned as comparison to the two versions of the Phase 2 roof, though these stoai are from different centuries. See Coulton 1976: 188, fig. 10, 208, fig. 42, 209, fig. 244, 234, 238, 256.
76. Lorenzen 1964: fig. 11; Marstrand 1922: 87–88, figs. 61–62.
77. Coulton 1976: figs. 11–12, 39, 41.
78. Camp 1986: fig. 145.
79. Travlos 1971: fig. 638.

must have been imported into Attica, thus making the construction more expensive;[80] this may help explain how even in the Hellenistic period roof spans of stoai rarely exceeded 7 m.[81]

If the cross beams were omitted in the Phase 3 shipsheds at Zea, further roof support could have been applied by adding a beam running at an angle between the upper part of the columns in the ridge colonnade and the rafters. A similar arrangement of ceiling support is found in the Erechtheion, where struts were inserted between the wall and purlins,[82] and in the hypothetical reconstruction of the roof of the Megaron of Demeter in Gaggera, but without the use of a truss.[83]

On the colonnade carrying the eaves would have been either a wooden valley beam (Phase 2, both versions) (Pls. 29–30) or a stone architrave (Phase 3) (Fig. 238; Pl. 33). On the internal colonnade of the Phase 2 (v2) reconstruction a wooden beam (lower ridge beam) was placed, serving to stabilise the building.[84]

The maximum width of the valley beam of Phase 2 (both versions), like that of the stone architrave, is determined by the width of the *abacus* below (0.61 m in both Phase 2 versions; 0.71 m in Phase 3). On the other hand it must have been sufficiently strong and wide to carry the gutter and the upper elements of the roof. In the reconstructions the valley beam (Phase 2, v1) and the valley beam and the "lower ridge beam" (Phase 2, v2) rest on the *abacus* with the cross beam placed in between at the centre of the *abacus* (Pl. 30).[85] Sockets have been cut into the valley beam and cross beam (Phase 2, both versions) and into the architrave (Phase 3) to provide support for the rafters, which then support the stone gutter (Phase 3) (Fig. 238). In the reconstruction the estimated width of the stone architrave is 0.60 m and its height is 0.43 m while the reconstructed valley beam of Phase 2 (both versions) is 0.51 m wide and 0.37 m high (Pls. 29, 33). These measurements are calculated from architrave measurements of stoai (see Appendix 5). The reconstructed size of the "lower ridge beam" is 0.30 x 0.30 m, thus smaller than the valley beam of Phase 2 (both versions), as its function is stabilising rather than load bearing.

The ridge beam in the reconstructions of Phase 2 (both versions) and Phase 3 is made of wood to lessen the weight on the higher columns (Phase 3) and to lessen the weight of the roof construction altogether (Phase 2, both versions). Also the size of the ridge beams is smaller than the stone architrave (Phase 3) and the valley beam (Phase 2, both versions).

The reconstructed width is thus 0.50 m and the maximal height is 0.36 m (Phase 3), 0.24 x 0.25 m (Phase 2, v1) and 0.34 x 0.33 m (Phase 2, v2).[86] The ridge beams are otherwise the same shape as the valley beam/architrave except that the top surface has been given a sloping upper profile.[87] The ridge beam in the Phase 3 reconstruction rests directly on the ridge columns (Pl. 33), while the ridge beams of the Phase 2 reconstructions rest on the central post of the post-and-lintel arrangement (Pl. 29).

80. Coulton 1976: 163–164, argues that the limited use of large spans in buildings in mainland Greece was due to a lack of "better material" and difficulties with transportation. After the earthquake at Rhodes in the 2nd century BC, the city received several valuable donations from Hellenistic rulers; Antigonus Dorson donated, among other things, timber especially for the roof of the new shipsheds, thus signifying the value of good wood (Polyb. 5.89).

81. Coulton 1976: 162.

82. Paton 1927: 76–77, fig. 49.

83. Hodge 1960: fig. 8(b), no. 3.

84. In stoai with the roof carried by at least one wall, such "extra support" was redundant, but an open building like the shipshed complex requires the extra support to increase stability.

85. During the reconstruction of the Phase 2 roof, a problem regarding the placing of the rafters was discovered. If the rafters were placed at the centre of a column on top of the valley beam and on top the cross beam, there was a "missing link" for the rafters placed in between the columns that were not resting on a cross beam. Several options were discussed and dismissed; adding to the number of cross beams to fit the number of rafters would only cause extra weight and use of wood that was unnecessary to carry the roof. Omitting the rafters between the cross beams or adding an extra wooden member between the rafters and the valley beam would compromise the stability of the roof modules placed above. In the reconstruction the rafters thus rest on the valley beam and on the cross beam, and the valley beam and cross beam are placed at the same level on top of the capitals.

86. In the reconstruction of the valley beam in both Phase 2 versions, the "lower ridge beam" of Phase 2 (v2) and the ridge beam of Phase 3 are all made in one piece. It is clearly possible that the beams were constructed in two parts and then joined.

87. Hodge (1960: table 2) lists the size of ridge beam sockets from various buildings. There seem to be no logic as to whether the beam was higher than it was wide or the other way around. The size of the sockets leaves room for the beam to expand, when water logged, and for the other wooden members of the roof. The heavy load bearing wooden elements of the roof tend to be nearly square (Hodge 1960: 92). Wooden roof beams with a sloping surface are known from several stoai (Coulton 1976: figs. 39–40, 42–44) (see Appendix 5).

The cross beam of the post-and-lintel design rests on the centre of each of the eaves columns (Phase 2, v1) and each eaves/ridge columns (Phase 2, v2); their reconstructed size is 0.30 x 0.30 m (the same as the size of the "lower ridge beam" of Phase 2, v2). Additional support for the roof is provided by purlins placed on each side of the ridge beam; the purlins rest on two additional posts and have a sloping upper profile (Pl. 29). The width of the reconstructed purlins (Phase 2, v1) is 0.24 m and the maximal height is 0.24 m – approximately the same as than that of the ridge beam; the width of the purlins (Phase 2, v2) is 0.34 m and the height is 0.25 m. The widths of the central and secondary posts are 0.20 m (Phase 2, v1) and 0.30 m (Phase 2, v2); the heights of the central posts are 0.54 m (Phase, 2, v1) and 1.28 m (Phase 2, v2) and the heights of the secondary posts are 0.21 m (Phase 2, v1) and 0.54 m (Phase 2, v2).[88]

The wooden rafters in Phases 2 and 3 would have created a slope between the top of the ridge beam and the valley beam/architrave (Fig. 239; Pls. 29, 31, 33).[89] The rafters of both phases are reconstructed at 0.20 x 0.20 m.[90] The rafters of Phase 3 are placed on the centre of each of the eaves columns with an additional three rafters in between, leaving a space of 0.34 m between each rafter. The rafters of Phase 2 (both versions) are placed on the centre of each of the eaves columns, with an additional seven (Phase 2, v1) and six (Phase 2, v2) rafters between the two, leaving a space of 0.30 m (Phase 2, v1) and 0.37 m (Phase 2, v2) between each rafter. The rafters are reconstructed with sloping lower and upper ends that fit into the sockets cut into the valley beam/architrave and the ridge beam, respectively. The sockets have a flat bottom.[91]

Generally the number of rafters depends on the width of the pan tiles, as the heaviest load occurs at each join of the long sides of two pan tiles and the cover tile above and thus require more support.[92] Consequently, the interaxial spacing of the Phase 3 eaves columns (2.16 m) combined with the reconstructed width of the rafters (0.20 m) is used to calculate the width of the pan tiles. Four rows of pan tiles, 54.0 cm wide, fit an interaxial spacing of 2.16 m (Fig. 238). Eight rows of pan tiles with a width of 49.6 cm fit the interaxial spacing of 3.97 m of the Phase 2 (v1) roof, while seven rows of pan tiles with a width of 56.7 cm fit the interaxial spacing of 3.97 m of the Phase 2 (v2) roof (Pl. 30). These calculations are a strong indication of the width of the pan tiles.

In both phases the battens would have been placed atop the rafters and at right angles to them (Figs. 238–239; Pls. 30–31). The number of battens in the reconstructions is calculated according to the reconstructed length of the pan tiles, as the join of the short side of two pan tiles require the support. The size of the battens has been estimated at 0.12 x 0.10 m (height and width). The battens are placed in sockets cut into the rafters, in order to secure their position on the roof.[93] The length of the sloping rafter is 3.26 m (Phase 2, v1), 6.60 m (Phase 2, v2) and 6.40 m (Phase 3); the battens are placed at an interval of *ca* 0.61 m (Phase 2, v1), *ca* 0.71 m (Phase 2, v2) and *ca* 0.60 m (Phase 3). This results in a reconstructed length of the pan tiles of 69.0 cm (Phase 2, v1), 78.6 cm (Phase 2, v2) and 79.8 cm (Phase 3).

The tiles would have been positioned either directly on the battens, as in the Erechtheion and the Pinakotheke, or atop a layer of sheathing (Figs. 238–239; Pls. 30–31).[94] A layer of rushes may have been

88. The ratios between ridge beam and purlin sockets from Hephaisteion and the temple of Poseidon at Sounion (Hodge 1960: table 2) have been taken into consideration.

89. Coulton (1976: 157–158) calls this rafter a sloping cross beam and emphasises that this arrangement is only possible in constructions where the roof ridge is carried by a colonnade or a wall.

90. Sockets for square rafters are known from the temple of Poseidon in Paestum: 26.5 x 24.0 cm (Hodge 1960: 8, fig. 2); the temple of Zeus in Nemea: width 25 cm (Hill 1966: pl. XVI); and the Erechtheion in Athens: 23.1 x 24.0 cm (Paton 1927: 77). The rafters would have been slightly smaller than the sockets in order to fit into them. There are several examples of sockets that indicate rafters wider than they were high (Hodge 1960: 93–94). There is no technical reason for making rafters wider than they are high; on the contrary wooden beams are stronger when they are built higher than they are wide. This technique was not applied regularly until the Roman period (Hodge 1960: 92–93). The Poseidon temple in Paestum is dated to the early or mid-5th century BC (Lawrence 1996: 69).

91. Sockets with a sloping bottom are known, but mainly from outside Athens (Hodge 1960: 80–81).

92. Hodge 1960: 60.

93. Similar sockets are seen in the reconstruction of the roof of the Erechtheion (Paton 1927: pl. XXIV).

94. The Erechtheion (Paton 1927: 368–369) and the Pinakotheke of the Propylaia were built between 437 and 432 BC (Gruben 2001: 192–193). Hodge *et al.* (1960: fig. 15) gives a description of the secondary timbers of the roof.

laid atop and in between the sheathing, like in the gallery of the Long Walls of Athens.[95] The tiles in the Arsenal of Philon rested on clay bedding.[96] Clay bedding seems also to have been used in constructing the gallery of the city's walls,[97] but may not have been the case for other buildings. Hodge points out that the weight of the roof would have been doubled, if not trebled, by a bed of clay spread all over it; he also believes that clay was used mainly as a coating around awkward joins, such as those along the ridge and under cover tiles.[98] This is supported by several ancient writers who mention the use of tiles as weapons.[99]

In the reconstructions of the roof from Zea, the sheathing is included, even though it is unnecessary as a load-bearing support for pan tiles. The reconstructed size of the sheathing is estimated at 0.05 x 0.05 m. They are placed at an interval of *ca* 0.14 m in sockets cut into the battens (Fig. 238; Pl. 30). The sheathing makes the positioning of tile rows much more flexible compared with the constraints encountered if every join between the two long sides of the pan tiles had to be placed precisely over each rafter. In the Phase 2 roof (both versions) the sheathing supports the Laconian tile gutter. The use of rushes and the clay bedding is omitted in the reconstruction, with the proviso that an open building like the shipsheds (as the roof of the city walls) may have required an additional foundation to secure the tiles sufficiently; obviously, clay could have been applied to secure some or several of the tiles, particularly, for instance, along the horizontal and sloping eaves and on and around the roof ridge.

Consequently rafters, battens and sheathing only are applied on the wooden valley and ridge beams in Phase 2 (both versions) (Pls. 30–31) and on the stone architrave and wooden ridge beam in Phase 3 (Figs. 238–239).

Given the functional purpose of the shipsheds at Zea, it is unlikely that a ceiling was added under the roof.[100]

No kind of dowels, pins, wooden pegs, iron nails or other kinds of fastenings, nor fastening methods, such as rabbeting or notching, have been included in the reconstructions, although several of these materials and techniques may have been used among the different wooden members of the roof.[101]

2.12. Drainage and the Placement of Angled Tiles

How did the tiles facilitate drainage? H. Gerding has proposed that special tiles were required for efficient drainage since the shipshed roof sloped both laterally and longitudinally.[102] Thus, instead of pan tiles lying in vertical lines, these special tiles would have been positioned at slight angles in proportion to the seaward gradient of the roof slope. Such placement would prevent rain water from spilling over the edges of the tiles as it runs down the roof. This theory requires the placement of specially cut tiles along the ridge and the eaves. No. **92**, with its apparent oblique shape, could support this theory.[103] However the angle (96.8º) on the lower side of **92** does not seem to correspond with the angle between the battens and the assumed downhill gradient of the Phase 3 gutter at this level of the roof (it is less than 1º). The angle of the lower side of the tile is thus too big to support this theory. However, the 0.05 m cutting on the underside of **92**, which would allow the tile to be fitted to the gutter with some room for manoeuvring, would also allow

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95. See IG *II*^{1} 167, 68. The general use of rushes has been questioned by Hodge (1960: 62–65). It is interesting, however, that reeding was frequently used in barns and farm buildings in England in the middle of last century, i.e. buildings where the wind blows in and pushes roof tiles up from underneath and causes them to strip (Bennett & Pinion 2000: 129, fig. 88). Perhaps rushes would have been similarly applied in "windy" buildings such as the gallery of the fortification walls and in shipshed buildings. The inscription describing the gallery of the walls is related to a repair in 306 BC (Caskey 1910: 298).
96. See IG *II*^{2} 1054, 58–59; Jeppesen 1958: 73; Hodge (1960: 65–67) questions on practical and linguistic grounds the interpretation of the extensive use of clay in Corinthian tile roofs. The Arsenal of Philon was built between 340 and 330 BC (Dinsmoor 1950: 241).
97. See IG *II*^{1} 167, 68–69; Caskey 1910: 305, pl. VI.
98. Hodge 1960: 68, 75. Broneer (1954: 83) mentions that roof tiles have been found from the South Stoa in Corinth with traces of clay.
99. For example, Thuc. 2.4.2, Xen. *Hell.* 6.5.9, Dion. Hal. 6.92.6.
100. According to Coulton (1976: 167) there is very little evidence for ceilings in stoai.
101. Hodge 1960: 97–98.
102. Dr. H. Gerding presented this theory at the John Morrison Memorial Conference in Oxford in 2005. Further discussion on this topic regarding the Zea shipsheds has taken place between Dr. H. Gerding and the present author.
103. Schaldemose 2006: 49.

the tile to be placed at a slight angle. The downhill gradient of the Phase 2 roof slope is, as discussed above, too hypothetical to allow this test to be conducted. The evidence is too slim at this time to suggest that the tiles of the Zea shipsheds were laid in anything other than vertical lines. Although angled tiles are an attractive suggestion, vertically positioned tiles are chosen for the reconstructions.

2.13. *Opaion* Tiles (?)

The Zea shipsheds were open at the seaward end and to some extent along the sides. Interior longitudinal walls did, however, replace at least one colonnade of the Phase 3 shipsheds (the wall dividing Shipsheds 16 and 26(?)), and a back-wall separated the shipsheds from the city beyond.

In Phase 2 there is evidence of at least five shipsheds constructed directly adjacent to one another (reconstructed maximum length about 70 m), and the Phase 3 shipshed complex consisted of at least ten adjacent shipsheds (reconstructed maximum roof length 89.58 m; see Appendix 4). The interior of these large, covered areas must have been poorly lighted. In the reconstruction of the Phase 3 shipsheds the back-wall has been built to the top of the ridge (Pl. 37). An alternate scenario is worth mentioning. It is possible that the "pediment" at the upper end of the shipsheds was opened to allow light into the interior, and thus that the top-most height of the back-wall would have been placed at the level of the architrave and valley beam. Such a solution, however, would require grills or the like to secure the shipshed complex from unguarded entry.[104] The present author finds that the need for "extra" light and air would have been essential and that this solution of an open "pediment" secured with a grill is an attractive possibility. There is no evidence as to the means of termination at the upper end of the Phase 2 shipshed.

Pan tiles with skylight holes, or *opaion* tiles, have not yet been found at Zea, but are known from several sites in mainland Greece and seem to have been used in stoai (such as at Corinth), temples (Tegea, Bassai and Olympia), secondary buildings (Nemea), private houses (Olynthos) and public buildings (the Tholos in the Athenian Agora).[105] Although *opaion* tiles typically have a raised edge around the opening to prevent rainwater from dripping into the building (at Acquarossa, *opaion* tiles with lids have been found),[106] their hypothetical usage at Zea, while letting in more light, would also have let in at least some rainwater, thus negating one of the primary purpose of the building – to protect *triremes* from rain. On the other hand, *opaion* tiles would have brought in more light for maintenance workers and more ventilation for drying out ships. If the roof had *opaion* tiles, the use of rushes and clay bedding (and perhaps sheathing as well) would likely have been omitted as these would have minimised the effects or completely annulled the concept of *opaion* tiles;[107] at the least they would have been omitted in the area beneath the *opaion* tiles. Due to the lack of empirical material it has been chosen not to use *opaion* tiles in the general reconstructions, although the present author believes that they were most likely utilised.

There are still many open questions regarding the reconstruction of the shipshed roofs in Phase 2 (both versions) and Phase 3 at Zea. Many may never be answered. The reconstructions (Figs. 238–239; Pls. 29–31, 33) are based on what little information is preserved combined with the most likely solutions. They remain hypothetical, however, and may be adjusted as more evidence is brought to light.

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104. In the Oiniadai shipsheds an opening was cut close to the back-wall, suggesting that between the back-wall and the roof it was possible to drain this part of the shipsheds. See Sears 1904: 232, n.1.
105. Dinsmoor 1950: pl. 51, n.3; Wikander 1983: 84–85. On the South Stoa at Corinth, see Broneer 1954: 87, fig. 61. On the temples at Tegea, Bassai and Olympia, see Dörpfeld 1892: 17, fig. 10a. The temple of Apollo in Bassai was begun after 429 BC (Gruben 2001: 128), and the temple of Zeus in Olympia dates to 470–456 BC (Gruben 2001: 56). On Nemea, see Miller 1976: 184–186; the house has a complex stratigraphy with several building phases, thus the tile fragment is undated. On Olynthos see Robinson 1946: 49–50; the house is dated to the first half of the 4th century BC (Robinson 1946: 6, 42, 49). On the Athenian Agora, see Thompson 1940: 78, fig. 61. The tiles are ascribed to the second period of the kitchen building of the Tholos. Tsakirgis (2001: 174) noticed that the tiles bear no evidence of smoke and states that their function could have been for general building ventilation rather than fire and smoke ventilation.
106. Wikander 1986: 38–41; 1983: 92.
107. Hodge 1960: 72.

2.14. Final Remarks Regarding the Tile Material

Did the tiles discovered at Zea cover the Zea shipsheds, and if so, is it possible to date them and/or ascribe them to either Phase 2 or Phase 3? How does the tile material and the quantity found compare with the tile material from other shipsheds and finds in general from the Piraeus?

The Corinthian tiles of Groups 1 and 2 were the only common types found during the excavations in Area 1 at Zea. They were found both on land and in the sea, and their distribution pattern strongly suggests that the tiles belong to these or nearby shipsheds.

The tile fragments found in the pit U:2 probably belong to a building phase in the 5th or 4th century BC, while the pit was closed in the 4th century BC. In the top of the fill above the tiles a black glazed kantharos rim fragment (**1**) was found, dated to 375–350 BC.[108]

The tiles in the pit had been used. The slip on the top surface of **92** shows which part of the tile was covered by the cover tile and which part was exposed to the elements. Perhaps the tile fragments lay scattered around Area 1 after the probable demolition of the Phase 2 shipsheds in 404/3 BC, or they were destroyed and deposited during a building phase or during repairs in the first half of the 4th century BC. On practical grounds, it is highly probable that the ramp of Shipshed 17(η) was constructed before the superstructure. The tiles were placed intentionally in the pit, and it is reasonable to assume that tiles **92** and **93** either lay broken nearby or were broken during construction of the shipsheds and placed inside. At the bottom of the pit and beneath the tile fragments was found an undiagnostic black glazed fragment with incised letters. The epigraphical evidence suggests a date in the 6th to 5th century BC (see Vol. I.2, pp. 3–4).

The tiles (**109–111**) found in the Phase 2 rock-cut foundation trench C14/15:2 for the column base dividing Shipsheds 14 and 15 (Pls. 39–40) could have been deposited during the building or repair of the Phase 3 shipsheds, but whether they belonged to Phases 2 or 3 is unknown. The surfaces of the tiles are too worn to detect any traces of exposure to the elements like **92**. No. **96**, found during the excavation of the Shipsheds 8 and 17(η) and other fragments such as **97–105**, are equally impossible to assign to either Phases 2 or 3.

The written sources offer valuable information on construction work on the naval installations in the Piraeus at large, but to tie them to the sequence of the presently-known four building phases identified in Area 1 in Zea Harbour is not an easy task (see Vol. I.1, pp. 9–14, 168–173). The overall lack of dateable ceramic material and clear stratigraphy offers little support to any theory ascribing the tiles to either Phase 2, in the 5th century BC, or Phase 3 in the 5th or 4th centuries BC.

Thus it may be concluded that the tiles found in the pit probably belong to the 5th- or, less likely, the 4th-century BC shipsheds. Similar tiles found in disturbed contexts on both land and in the sea could belong to the same tile phase, but it is not possible to ascribe them to a precise building phase in either the 5th or 4th centuries BC.

The amount of tiles found in Area 1 at Zea may be considered rather small considering that the shipsheds were one of the largest roofed building complexes of the Classical period. One can only speculate as to where all the tiles that were once covering the shipsheds have gone. Some tiles obviously have been used as fill in the foundation cuttings of the column bases, ramps, etc., during the construction or latter repairs of the shipsheds. But other possibilities of re-use are plausible. The tiles could have been used again in the construction of other buildings (public as well as private) in and around the Piraeus, either as foundation fill or in actual roof construction. Using the tiles to cover graves is another possibility, as well as crushing the tiles for chamotte in tile and pottery manufacture.

Relevant comparable tile material is limited. Tiles have not been published in large numbers from any other excavations that have taken place in the Piraeus,[109] and thus locally discovered comparative material is

108. The dating of black glazed ware is highly dependant on Sparkes & Talcott (1970). According to Hayes (1984: 21), the chronology is very precise down to the middle of the 4th century BC, while the later dates may need to be moved down 25 years or so. But until the update of *Athenian Agora* Vol. XII has been published, the current edition is used with this proviso in mind

109. This is based on von Eickstedt's thorough study of all excavations carried out in the Piraeus up until 1990, and the reports from Piraeus in Αρχαιολογικόν Δελτίον until the present. Von Eickstedt 1991: 147–257.

virtually nonexistent. Roof tiles were found during Dragátsis' and Dörpfeld's excavation of the Area 1 shipsheds in 1885, but it has not been possible to locate these finds either in the National Museum of Athens or the Archaeological Museum in the Piraeus. Unfortunately the 1885 publication lacks illustrations of these tiles.[110]

Only a few tiles from private buildings in the Piraeus have been published. Interestingly, one of them is a house located on Sirangiou, i.e. in the vicinity of the landward end of the Area 1 shipsheds.[111] The other tile fragment bears a stamp of Roman date and is thus of little bearing on the present discussion.[112]

Tile fragments have been found in the excavations of shipsheds at Oiniadai, Sicilian Naxos, Kition and the possible shipsheds at Corfu; the material from Oiniadai consists of both Laconian and Corinthian tiles, while the other three sites possess only Corinthian tiles. As outlined above very little information on these tiles is available; the tiles from Oiniadai and Corfu are interesting mainly because of their stamps.[113] The tiles from Sicilian Naxos and Kition are contemporary with the tiles from Zea but have only some similarity in shape with the Zea material. The reconstructed size of the Zea pan tiles is, incidentally, very close to the size of the tiles found at Sicilian Naxos. The excavations of the shipsheds at Sounion, Rhodes and Carthage revealed no tile material. In Carthage the roof consisted of cement-rendered terrazzo. At Sounion fragments of the gable and a *sima* block have been found, indicating a saddle roof design. In the reconstruction, the roof is made with roof tiles, despite the lack of tile finds. Also the reconstruction of the roof of the Rhodian shipsheds has been made with roof tiles.[114]

Tile finds from multiple shipshed sites, then, are universally interpreted as elements of the roofs of shipsheds. This strongly suggests that, despite difference in construction and date, a tiled roof was a standard feature of shipshed complexes.

110. Dragátsis 1885: 69.
111. Von Eickstedt 1991: 187, 1.131.
112. Von Eickstedt 1991: 176, 1.94.
113. On Oiniadai, see Sears 1904: 235–236; Kolonas 1990: 157–158; 1996: 165; the several stamps on the tiles from Oiniadai will not be discussed any further here. On Sicilian Naxos, see Blackman & Lentini 2003: 414, figs. 36–38. On Corfu, see Preka-Alexandri 1996: 255, pl. 99b, d, e. On Kition, see Yon 2000: 111, fig. 5c.
114. On Carthage, see Hurst 1994: 33. On Sounion, see Kenny 1947: 199; Goette 2000: 48. On Rhodes, see Blackman, Knoblauch & Yiannikouri 1996: fig. 27.

Chapter 3
Catalogue: Phase 1 Slipways, Phases 2–3 Shipsheds, and Possible Phase 4 Shipsheds

Bjørn Lovén

Measurements of features not given in the catalogue were either impossible to take or are not listed due to the feature's poor state of preservation.

Key to Abbreviations

(N)	North	**L**	Length
(E)	East	**W**	Width
(S)	South	**H**	Height
(W)	West	**D**	Depth

BW Bottom width
PL Preserved length
PW Preserved width
IA Interaxial spacing
IC Intercolumniation (intercolumnar spacing)
CW Clear width
BD Bottom diameter
TD Top diameter

S Shipshed
SW Slipway
R Ramp
C Colonnade
CP Column position
NSP Northern side-passage
SSP Southern side-passage
OP Open-passage
P Passage
U Unidentified feature
M Modern feature

MoP Margin of Precision
HMoP Horizontal Margin of Precision
VMoP Vertical Margin of Precision
LOE Limit of Excavations

G1-HB Average gradient of **highest** preserved **bottom** surfaces
G2-T Linear regression through points representing the best preserved **top** surfaces on a given section
G3-B Linear regression through points best representing the **bottom** surfaces on a given section

Examples
S26(?) Possible Shipshed 26
S8:NSP1 Shipshed 8, northern side-passage, feature 1
OP/SWR1&2:1 Open-passage between slipway ramps 1 and 2, feature 1
OP/SWR3(S):1 Open-passage south of slipway ramp 3, feature 1
C14/15:1a. Colonnade dividing Shipsheds 14 and 15, feature 1, sub-feature 'a'. (Sub-features are designated by a lower-case letter after the main feature number.)
SW2:R3 Slipway 2, ramp feature 3
SW4:R4(?) Feature not securely identified
U:2 Unidentified feature 2
M:1 Modern feature 1

Greek letters in parenthesis cross-reference the feature names on Dörpfeld's plan. See, for example, C17(η)/18(χ) and C17/18:7(δ) (Pls. 15, 17).

Other Abbreviations

ZHP	Zea Harbour Project
Z-G1	Zea Harbour, Shipshed Group 1
M-G1	Mounichia Harbour, Shipshed Group 1
Sec	Section (for example, Sec 47 refers to Section 47)
87DZ	Ε.Γ.Σ.Α. 87 Datum Zero. Datum zero of the Greek Geodetic Reference System (G.G.R.S. 1987)
est.	estimated
ave.	average
max.	maximum

In the tables throughout this publication, features in very poor condtion or not clearly identified are listed in *italics*, and are not included in the average calculations (see for example Table 5.1 in Vol. I.1, p. 57). Features not securely identified will not be included in the discussion.

Numbers in brackets express the number of feature measurements on which an average calculation or dimension range is based, for example: 1.10 m in width ([4], range: 0.86 to 1.30 m) (see for example Table 5.4 in Vol. I.1, p. 61).

Elevations are given in this catalogue under the individual features; they are not noted on plans.

3.1. Catalogue: Phase 1, Slipways 1–3 & 5–6

Slipway 1, Phase 1
(Pls. 3, 40; Figs. 167, 179, 183–184, 185b, 185d)

Ramp

SW1:R1. Rock-cut slot for a transverse timber sleeper. Only a small section of the feature remains; the northern and southern ends are destroyed by later features S8:R2 and U:19B.

Dimensions: top width: *ca* 0.17 m; bottom length: *ca* 0.69 m; bottom width: *ca* 0.14 m; depth: *ca* 0.11 m; bottom level: -0.68 to -0.69 m.

Open-passage

OP/SWR1&2:1–2. These features are defined as the worked and inclined bedrock preserved between S17:R7 and S8:R2 on the northern side, and U:19 on the southern side. To the east OP/SWR1&2:1 continues under the modern quay, and to the west OP/SWR1&2:2 is destroyed by modern dredging. U:14A divides the two features.

Preserved max. length: *ca* 6.98 m
Preserved max. width: *ca* 0.65 m

Slipway 2, Phase 1
(Pls. 3, 40; Figs. 105–110, 168, 186, 190, 192b)

Ramp

SW2:R1. Rock-cut slot for a transverse timber sleeper. Only a small section of the southern part is preserved. The eastern side is fragmented to the north, but in better condition towards the south end. The south end is cleanly cut. The western side is slightly eroded, and its northern part is eroded away. The bottom is very flaky and light orange-red in colour. The northern part of feature is destroyed by a later ramp feature S9:R3.

Dimensions: bottom length: *ca* 0.15 m; bottom width: *ca* 0.10 m; depth: *ca* 0.10 m; bottom level: -0.71 m.

SW2:R2. Rock-cut slot for a transverse timber sleeper. The feature is in poor condition and not well defined. The east side and south end are badly eroded and flaky. The western side is in a slightly better condition, and the forms a clear edge with the bottom. The bottom is very flaky and light yellow in colour with orange patches. The three shallow indentations in the north-western part were created either by marine organisms or are tool marks. The northern part of the feature is destroyed by S9:R3.

Dimensions: top length: 0.43 m; top width: *ca* 0.17 m; bottom length: 0.37 m; bottom width: 0.11 m; depth: *ca* 0.07 m; bottom level: -0.83 to -0.84 m.

SW2:R3. Rock-cut slot for a transverse timber sleeper. Fragmented, low edges indicate east and west sides that run up to a low, raised structure which probably forms the southern end. The fairly flat bottom is well preserved. The northern part of the feature is destroyed by S9:R3.

Dimensions: top length: 0.28 m; top width: *ca* 0.15 m; bottom length: 0.26 m; bottom width: 0.10 m; depth: 0.01–0.03 m; bottom level: -0.82 to -0.83 m.

SW2:R4. Rock-cut slot for a transverse timber sleeper. The poorly preserved top parts of the eastern and western sides are almost entirely destroyed by later feature S9:R3, leaving only a shallow depression up to *ca* 0.02 m deep. The feature is clearly defined across the full preserved length. The northern part is destroyed by S9:R2. Just before SW2:R4 meets the foundation cutting for S9:R2, an area of damage is evident, producing a slightly concave section that at first glance may look like the point of closure of SW2:R4. However, the east and west edges can be seen running through to meet S9:R2. The bottom is well preserved in some areas, while heavily eroded or damaged by modern anchor scars in others. The surface of the bedrock is dark red/orange and, where damaged, light yellow.

Dimensions: top length: 1.38 m; top width: 0.12–0.13 m; bottom length: 1.34 m; bottom width: 0.09–0.10 m; depth: 0.01–0.05 m; bottom level: -0.89 m (S) to -0.91 m (N).

SW2:R5. Rock-cut slot for a transverse timber sleeper. The poorly preserved eastern side runs north where it has been destroyed by the later rock-cut foundation trench S9:R2. The southern end is square cut and represents the original end. The entire western side is destroyed by a later feature S9:R4.

Dimensions: top length: *ca* 1.32 m; top width: *ca* 0.14 m (S); bottom length: *ca* 1.33 m; bottom width: 0.11 m (S); depth: 0.05 m (S), 0.01–0.02 m (N); bottom level: -0.90 m (S), -0.92 m (N).

SW2:R6. Rock-cut slot for a transverse timber sleeper. The small, almost square cutting is closed on three sides, curving upwards north to south. The east side is fairly well defined. The west side is damaged. The southern end is fairly well preserved; 0.05–0.07 m to the east of SW2:R6 a raised rock-cutting runs north-south representing the transition between S9:R4–R5.

Dimensions: top length: *ca* 0.12 m; bottom length: *ca* 0.12 m; bottom width: 0.10 m; depth: 0.05 m; bottom level: -0.93 to -0.94 m.

SW2:R7. Rock-cut slot for a transverse timber sleeper. The southern part of the feature is preserved with clearly defined sides and bottom. East and west sides taper downwards towards the north until only a shadow of the cutting can be seen disappearing farther to the north.

Dimensions: top length: 0.62 m; top width: *ca* 0.17 m; bottom length: 0.60 m; bottom width: 0.10–0.14 m; depth: 0.11 m; bottom level: -0.97 to -0.98 m.

SW2:R8(?). A possible rock-cut slot for a transverse timber sleeper. There seems to be a straight side to the west, and possibly to the east as well, but they do not run parallel to each other and were formed possibly due to uneven erosion.

Dimensions: bottom length: 0.24 m; bottom width: *ca* 0.10 m; depth: 0.01–0.02 m; bottom level: -0.96 to -0.98 m.

Open-passage

OP/SWR2&3:1–2. These features are defined as the worked and inclined bedrock between ramp features SW2:R1 and R5–R7, and the northern sides of C9/10 and C18/19. The construction of later colonnade features has obliterated the southern part of the open-passage. To the west the feature is destroyed by modern dredging.

Preserved max. length: *ca* 5.43 m
Preserved max. width: *ca* 1.37 m
(measured at SW2:R3, R5).

Slipway 3, Phase 1
(Pls. 3, 40; Figs. 111–119, 169, 193, 197, 198b-e, 199)

Ramp

SW3:R1. Rock-cut slot for a transverse timber sleeper. The east side is well preserved along its length. The southeast corner is well defined but tapers off to the southwest corner. The west side is mostly lost due to erosion and other damage. The slot is open to the north where it is destroyed by S10:R2. The southern part of the bottom is even and well preserved, while the northern part is poorly preserved. Parts of the feature have red/orange patches.

Dimensions: top length: 0.31 m; top width: 0.11–0.14 m; bottom length: 0.29 m; bottom width: 0.08–0.09 m; depth: 0.05 m; bottom level: -0.68 to -0.69 m.

SW3:R2. Rock-cut slot for a transverse timber sleeper. Only a very short section is preserved. The southern end is destroyed by U:24 and U:25. The northern end is destroyed by S10:R2. The east side is slightly better preserved than the west side, although the top edge curves downward, probably due to erosion. The western side does not appear to have been cut cleanly, with the base curving up to the side from its centerline. The bottom of the feature varies in height across its length and is poorly defined, partly due to erosion and partly because it is not cut evenly.

Dimensions: top length: 0.20 m; top width: 0.14–0.15 m; bottom length: 0.21 m; bottom width: 0.07–0.08 m; depth: *ca* 0.02–0.04 m; bottom level: -0.75 to -0.76 m.

SW3:R3. Rock-cut slot for a transverse timber sleeper. The southern part is closed on three well defined sides. The eastern well defined side tapers off towards the north due to erosion at a distance of 0.41 m from the southern end. The vertical south end and west side are well preserved. Where the west side meets the bottom it is less well defined; the side tapers down towards the east. The northern part is destroyed by S10:R2. The bottom is eroded at the northern end with indentations towards the southern end, due probably to erosion. Drill holes are visible in the bottom in the southeast corner of the cutting.

Dimensions: top length: 0.56 m; top width: 0.12 m; bottom length: 0.62 m; bottom width: 0.13 m; depth: 0.10 m; bottom level: -0.79 m.

SW3:R4. Rock-cut slot for a transverse timber sleeper. The east side is well preserved except for erosion in the area around the transition between S10:R1-R2. The southern well defined side is most likely a result of the later rock cut feature U:27. The original end may be preserved *ca* 0.13 m to the north of the existing southern side of U:27, indicated by a faint vertical line. The southern part of the bottom begins to curve up from this point to meet the southern side of U:27. A patch of small beach-rock containing beach stones is concreted to the feature on its curving face. The southern part of the west side is destroyed by U:27; the preserved part is clearly defined. SW3:R4 runs off into the bedrock to the north, with clearly defined sides running for a short distance. The depth of these cuttings decreases towards the north where the top part of the feature is destroyed by S10:R2. The bottom is fairly even along its length with a few tool marks. To the north a deeper cut coincides with red/orange patches in the limestone. The remains of this section appear to be in relatively good condition. Possible drill holes are evident at the bottom along the sides and centre line throughout its length.

Dimensions: top length: 1.26 m; top width: 0.12–0.13 m; bottom length: 1.24 m; bottom width: 0.11–0.12 m; depth (OP/SWR(S):1): 0.12 m; depth (S10:R1): 0.04–0.05 m; bottom level: -0.86 to -0.88 m.

SW3:R5. Rock-cut slot for a transverse timber sleeper. The east side tapers off to the north due to erosion. In the area of S10:R2 the top part of SW3:R5 is shaved off by this later feature. The south end is well defined. The southern part of the west side is eroded. The northern part is heavily eroded, but the continuation is still clearly defined until it is removed by S10:R1. Possible drill holes are evident in the bottom along the sides in the northern third of the feature. The bottom is flaking and cut unevenly. In the area of S10:R2 the feature is very damaged and most of the eastern and western edges are broken away. The feature is clearly defined for a length of *ca* 0.93 m from the end towards the north. Traces of the western bottom edge of the feature can be followed for a total length of *ca* 1.47 m.

Dimensions: top width: 0.16–0.17 m; bottom length: *ca* 1.47 m; bottom width: 0.08–0.11 m; depth (OP/SWR3(S):1): 0.07–0.12 m; depth (S10:R1): 0.05 m; bottom level: -0.88 to -0.89 m.

SW3:R6. Rock-cut slot for a transverse timber sleeper. The east side is well defined with some damage to the top edges. It curves slightly to the bottom in the south-east corner. The southern end is cut square. Slight erosion on the west side and some damage just where U:28 abuts. The top part of SW3:R6 is destroyed by S10:R2. The northern part of the feature is destroyed by S10:R1. The bottom is not cleanly cut and is slightly undulating, with beach-rock containing small stones concreted to the bottom in the southern part. Three probable drill holes are evident in the north bottom end of the east side. A shallow depression along the bottom edges of the southern-most *ca* 0.40 m is identified as evidence of tool marks/drill holes related to the construction of the feature.

Dimensions: top length: 1.34 m; top width: 0.13 m; bottom length: 1.33 m; bottom width: 0.08 to 0.10 m; depth (OP/SWR3(S):1): 0.11 m; depth (S10:R1): 0.05 m; bottom level: -0.88 to -0.90 m.

SW3:R7. Rock-cut slot for a transverse timber sleeper. The east side is well preserved with a damaged area about 0.45 m from the well defined southern end. The bottom surface undulates along its entire length. Possible drill holes are evident along the bottom of the west side and in the centre of the feature. At the south bottom end there are three wide-stepped chisel marks. In the bottom along the southern-most end are three drill holes near the eastern side. The top of the northern part is shaved off by S10:R2, and in the northern part of the area covered by S10:R2 the eastern and western sides are eroded away. The northern part of this feature is destroyed by S10:R1.

Dimensions: top length: 1.45 m; top width: 0.14 m; bottom length: 1.44 m; bottom width: 0.10 m; depth (OP/SWR3(S):1): 0.07 m; depth (S10:R1): 0.05 m; bottom level: -0.92 to -0.94 m.

Open-passage

OP/SWR3(S):1. This feature is defined as the worked and inclined bedrock in the transition zone between ramp features R1–R7, and U:31 and the colonnade foundation trenches C19/20:3(?) and C10/11:2. The latter features have destroyed the southern part of the open-passage OP/SWR3(S):1. To the east the feature is possibly removed by U:14C(?) and towards the west this feature is destroyed by dredging.

Preserved length: 7.60 m
Preserved width: 2.62 m

Slipway 5, Phase 1
(Pls. 3, 40; Figs. 170, 200, 204, 205b, 205d)

Ramp

SW5:R2. Severely eroded rock-cut slot for a transverse timber sleeper. The remains of the eastern and western sides are eroded away leaving a worn edge. The northern and southern parts of SW5:R2 are not preserved.

Dimensions: preserved for a length of *ca* 0.20 m (E), *ca* 0.48 m (W); bottom width: *ca* 0.14 m; bottom level: -0.41 m.

SW5:R3. Severely eroded rock-cut slot for a transverse timber sleeper. Only a faint outline remains of the sides and northern end. From the northern end the feature is preserved for *ca* 0.17 m in length before being cut by machine damage to the bedrock (0.16–0.17 m wide). The feature continues for a further *ca* 0.36 m before being lost due to machine damage.

Dimensions: total length 0.69 m; bottom width: 0.12–0.15 m; bottom level: -0.44 to -0.45 m.

SW5:R4. Rock-cut slot for a transverse timber sleeper. The feature is poorly preserved. Parts of the middle of the western side are destroyed. The slot continues under the concrete foundations of a sewage pipe to the south. Here the feature is heavily eroded and may have suffered damage from the construction of the sewage pipe.

Dimensions: top length: *ca* 1.77 m; bottom excavated for a length of 2.08 m; top width: 0.15–0.22 m; bottom width: 0.13–0.16 m; preserved to a depth of 0.01 m to 0.08 m; bottom level: -0.53 m (N) to -0.59 m (S).

SW5:R5. Small section of a rock-cut slot for a transverse timber sleeper. The feature has rounded edges due to erosion, and continues north under the foundations of the sewage pipe.

Dimensions: bottom width: 0.19 m; depth: 0.02 m; bottom level: -0.61 to -0.62 m.

SW5:R6. Rock-cut slot for a transverse timber sleeper (northern part). The bottom of the feature is relatively well preserved. The top edges are eroded. The feature continues under the concrete foundations of a sewage pipe to the south.

The southern end of SW5:R6 is destroyed by the foundation trench C13/14:2. The total preserved length of SW5:R6 is 4.34 m.

Dimensions (northern part): excavated for a length of 2.77 m; top width: 0.16–0.21 m; bottom width: 0.12–0.14 m; preserved to a depth of 0.03 to 0.10 m. SW5:R6 increases in depth towards the south; bottom level: -0.63 m (N) to -0.69 m (S).

Dimensions (southern part): Preserved length: *ca* 0.21 m; depth: *ca* 0.02 m (W), *ca* 0.08 m (E); bottom width: *ca* 0.13 m; bottom level: -0.70 m.

SW5:R7. Rock-cut slot for a transverse timber sleeper. The bottom of the feature is relatively well preserved, its edges heavily eroded. The cutting is destroyed towards the south, just before the concrete foundations of a sewage pipe.

Dimensions: bottom preserved for a length of 2.38 m in excavated area; top preserved for a length of 2.30 m; top width: 0.15–0.23 m; bottom width: 0.11–0.15 m; preserved to a depth of 0.01 to 0.08 m; bottom level: -0.69 m (N), -0.74 m (S).

SW5:R8. Rock-cut slot for a transverse timber sleeper. The bottom of the feature is relatively well preserved. The eastern top edge is heavily eroded; the western top edge is relatively well preserved. The southern end of SW5:R8 is destroyed near the concrete foundations of the sewage pipe. The northern end has been destroyed by modern dredging, however, a slight raise of the bottom may indicate the end of the feature.

Dimensions: bottom preserved for a length of 1.85 m; top width: 0.17–0.20 m; bottom width: 0.12–0.13 m; preserved to a depth of 0.01 to 0.06 m; SW5:R8 deepens towards the south, bottom level: -0.68 m (N) to -0.74 m (S).

Open-passage

OP/SWR5(N):1(?). Raised rock-cut feature. Severely damaged and eroded, with no apparent original top surface preserved. This feature is defined as the worked and inclined bedrock between the southern side of C12/13:1 and C21/22:6 and the northern side of ramp features SW5:R3–R4. The northern side is destroyed by later colonnade features. To the west the feature is destroyed by U:14D; to the east it continues under the modern quay.

Preserved length: *ca* 3.54 m
Preserved width: *ca* 1.68 m

Slipway 6, Phase 1
(Pls. 3, 40; Figs. 121, 171, 206, 210, 211b, 211d)

Ramp

SW6:R1. Rock-cut slot for a transverse timber sleeper. The south end slopes upwards and is not defined, probably as a result of erosion. The east and especially the west sides taper to the bottom, particularly at the south end. The top of SW6:R1 is shaved off by S14:R1. Both features are destroyed farther to the north by dredging.

Dimensions: preserved top length: *ca* 0.34 m; top width: *ca* 0.14 m; preserved bottom length: *ca* 0.53 m; bottom width: 0.04 m (S), 0.08 m (N); depth: *ca* 0.11 m; bottom level: -0.36 m.

SW6:R2(?). Possible rock-cut slot for a transverse timber sleeper. It is open to the north where it is destroyed by S14:R1. The three other sides of the slot are severely eroded.

Dimensions: rough dimensions consist of a preserved bottom length: *ca* 0.12 m; bottom width: *ca* 0.12 m; preserved depth: *ca* 0.06 m; bottom level: -0.36 to -0.37 m.

Open-passage

OP/SWR6(S):1. Raised rock-cut platform. The top surface is eroded and heavily encrusted with rock-boring marine organisms. The delineation towards the north (i.e. the ramp) is defined by the western end of SW6:R1. The western part of the southern side forms the transition to the C23/24:8. This part and especially the southeastern part of OP/SWR6(S):1 are very eroded and parts are destroyed. To the east the feature continues under the modern concrete quay, towards the west it is destroyed by U:14E.

Preserved length: 3.66 m

OP/SWR6(S):2. Raised rock-cut platform. Top surface eroded and heavily encrusted with rock-boring marine organisms. To the north this feature is delineated by the Phases 2 (C14/15:1) and 3 colonnade (C23/24:8) foundations. To the south it continues into the unexcavated area. Total excavated width of OP/SWR6(S):1–2: 3.41 m.

Excavated length: 6.16 m

3.2. Catalogue: Phase 2, Shipsheds 7–15

Colonnade dividing Shipsheds 7(?) and 8, C7/8, Phase 2
(Pls. 4, 13, 17, 25a, 40; Figs. 167, 180, 183, 184a)

C7/8:1–2 descriptions based on Dörpfeld 1885: pl. 2.

C7/8:1. Rock-cut foundation trench. Extended west to accommodate the 10th Phase 3 column position (C16/17:7; Pls. 15, 25a).

Dimensions: length: 2.78 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 1.14 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); bottom level: -0.05 m (printed, Dörpfeld 1885: pl. 2, calibrated -0.12 m).

C7/8:2. Rock-cut foundation trench. Extended west to accommodate the 11th Phase 3 column position (C16/17:8; Pls. 15, 25a)

Dimensions: length: 3.85 m (Dörpfeld 1885: pl. 2 and ZHP; *MoP*: 0.05 m); width: 1.14 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m). Bottom level: -0.45 m.

C7/8:3. Rock-cut foundation trench. Extended west to accommodate the 13th Phase 3 column position (C16/17:9; Pls. 15, 25a).

Dimensions: top width: 1.43–1.50 m; bottom length: 3.99 m; bottom width: 1.32–1.36 m; bottom level: -0.66 m.

C7/8:4. Rock-cut foundation trench. The northwestern corner is destroyed by erosion.

Dimensions: top width: 1.14–1.18 m; bottom length: 1.40 m; bottom width: 1.04–1.08 m; depth: 0.23 m (E), 0.08 m (W); bottom level: -0.89 m.

C7/8:5. Rock-cut foundation trench. It is very eroded, and parts of the top edges are not preserved. The western end, apart from the southwestern corner, is entirely destroyed. Extended east to accommodate the 14th Phase 3 column position (C16/17:10; Pls. 15, 25a).

Dimensions: top width: 1.17–1.28 m; bottom length: 2.06 m; bottom width: 1.04–1.12 m; depth: *ca* 0.24 m (E), while the bedrock slopes down towards the western end reducing the depth of the structure to *ca* 0.03 m; bottom level: -1.07 m.

Shipshed 8: Ramp, S8:R, Phase 2
(Pls. 4, 13, 40; Figs. 167, 180, 183, 185a, 185d)

S8:R1. Northern part of rock-cut foundation trench.

Dimensions: length: 2.99 m; depth: *ca* 0.04–0.06 m. The bottom of the feature inclines from -0.39 m (E) to -0.53 m (W).

S8:R2. Rock-cut foundation trench.

Dimensions: length: 3.17 m; south side depth: *ca* 0.10 m (E) to 0.06 m (W); north side depth: *ca* 0.03 m (E) to 0.07 m (W). The bottom of the feature inclines from -0.65 m (E) to -0.73 m (W) over 2.60 m.

Colonnade dividing Shipsheds 8 and 9, C8/9, Phase 2
(Pls. 4, 13, 17, 20b, 23a, 40; Figs. 167, 180, 183, 185c, 186a, 187)

Descriptions of C8/9:1(?), 2–3, 4(?)–5(?) are based on Dörpfeld's plan and section (1885: pls. 2, 3).

C8/9:1(?). Possible rock-cut foundation trench.

Dimensions: bottom level: +0.88 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.01 m, calibrated +0.81 m).

C8/9:2. Rock-cut foundation trench for block C8/9:3.

Dimensions: length: 1.28 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.01 m); width: 1.04 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04

m); bottom level: +0.27 m (printed, Dörpfeld 1885: pl. 2, calibrated +0.20 m).

C8/9:3. Rectangular block set in C8/9:2.

Dimensions: length: 0.88 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 cm); width: 0.54 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.01 m); the height of this feature is calculated as the height difference between top levels C8/9:2 (+0.61 m) and C8/9:1 (+0.27 m) of 0.34 m; top level +0.61 m (printed, Dörpfeld 1885: pl. 2, calibrated +0.54 m).

C8/9:4(?) and **C8/9:5(?)**. Rock-cut foundation trench. Parts of the bottom surfaces of the 4th and 5th Phase 2 column positions may be preserved in the Phase 3 foundation trench C17/18:14.

Dimensions: bottom level: -0.06 m (printed, Dörpfeld 1885: pl. 2, calibrated -0.13 m).

C8/9:6. Rock-cut foundation trench. A small part of the bottom surface is preserved along the northern part of the feature. Probably extended west to accommodate the 19th Phase 3 column position (C17/18:15B; Pl. 15).

Dimensions: bottom level: -0.66 m.

C8/9:7. Rock-cut foundation trench. At the transition between C8/9:7 and C17/18:15B there is a *ca* 0.10 m step down. The western side is eroded. Possibly extended west to accommodate the 20th Phase 3 column position.

Dimensions: top length: 1.33–1.36 m; top width: 1.05–1.21 m; bottom length: 1.29–1.31 m; bottom width: 1.18 m; depth: 0.05–0.12 m (E), 0.00–0.03 (W); bottom level: -0.85 m.

Shipshed 9: Ramp, S9:R, Phase 2
(Pls. 4, 13, 40; Figs. 168, 187, 190, 191b-c)

S9:R1. Rock-cut foundation trench with three blocks (S9:R6–8) and parts of a fourth block (S9:R9) *in situ*. The northern side is well preserved; to the west the southern side of the feature is defined by a shallow raised edge. The part to the east of S9:R6 was not excavated due to the poor condition of the bedrock.

Dimensions: length (excavated): 5.21 m; bottom width: 0.71–0.74 m; depth: 0.14 m (E, north side), *ca* 0.01–0.03 m (W); bottom level: -0.88 m.

S9:R1a. Pry mark: length: 0.15 m; width 0.06 m; depth: 0.02–0.03 m.

S9:R2. Rock-cut foundation trench. To the east it forms a step (0.07 m) up to S9:R1. Towards the west the structure is destroyed by modern dredging.

Dimensions: preserved length: *ca* 3.23 m; width: 0.71–0.73 m; depth: 0.07 m (E); bottom level: -0.95 m.

S9:R3. Rock-cut foundation trench. This feature is defined as the level bedrock between SW2:R2–R3 and the step down (*ca* 0.03 m) to S9:R4 to the west. S9:R3 destroyed the northern part of the Phase 1 features SW2:R1–R3, and shaved the tops off SW2:R4–R5. The area to the east of S9:R3 was not excavated due to the poor condition of the bedrock.

Dimensions: length (excavated): *ca* 3.59 m; width: *ca* 0.70–0.79 m; bottom level: -0.85 to -0.88 m.

S9:R3a. Pry mark: length: 0.12 m; width 0.08 m; depth: 0.03–0.06 m.

S9:R3b. Pry mark: length: 0.13 m; width 0.11 m; depth: 0.03–0.04 m.

S9:R3c. Pry mark: length: 0.12 m; width 0.07 m; depth: 0.02 m.

S9:R4. Rock-cut foundation trench. This feature is delineated to the north by S9:R1; S9:R3 (E) and towards west by the step down (*ca* 0.03–0.05 m) to S9:R5. S9:R4 destroyed the western side of SW3:R5.

Dimensions: preserved length: 0.61 m; bottom level: -0.92 to -0.91 m.

S9:R4a. Pry mark: length: 0.09 m; width 0.06 m; depth: 0.01–0.02 m.

S9:R5. Rock-cut foundation trench. To the west the feature was destroyed by modern dredging.

Dimensions: preserved length: 1.23 m; bottom level: -0.92 to -0.91 m.

S9:R6. Rectangular limestone block (*in situ* S9:R1). Southern top part broken off and is not preserved.

Dimensions: length: 1.28 m; width: 0.72 m; height: est. 0.36 m; top level: -0.52 m.

S9:R7. Rectangular limestone block (*in situ* S9:R1).

Dimensions: length: 1.13 m; width: 0.62 m; height est. 0.36 m; top level: -0.52 m.

S9:R8. Rectangular limestone block (*in situ* S9:R1).

Dimensions: length: 1.21 m; width: 0.57 m; height est. 0.37 m; top level: -0.53 m.

S9:R9. Part of a limestone block.

Dimensions: preserved length: 0.50 m; preserved width: 0.60 m; height est. 0.34 m; top level: -0.54 m.

Colonnade dividing Shipsheds 9 and 10, C9/10, Phase 2
(Pls. 4, 13, 40; Figs. 168, 187, 190, 192c, 193a)

C9/10:1. Rock-cut foundation trench with C9/10:2 *in situ*. The preservation of the feature is poor. Hardly any original top edge surface is preserved on the eastern, western and southern sides. Towards the south, the preservation is extremely poor and the bedrock is crumbling. The bottom is also crumbling, and no original surface is visible. The sides of the foundation trench are well preserved, although the eastern side is eroding and breaking off from the bottom. The southeastern corner was not excavated due to the poor condition of the southeast corner of block C9/10:2.

Dimensions: top length: 1.45–1.53 m; top width: 0.92–0.95 m; bottom length: 1.38–1.43 m; bottom width: 0.91 m; depth: 0.11 m to 0.16 m; bottom level: -1.11 m.

C9/10:2. Limestone foundation block *in situ*. The block is in very poor condition. The southeastern corner is detached and held together only by the fill in the trench, and therefore this part of the trench was not excavated. The top part of C9/10:2 was shaved off by C18/19:4B, and the top surface of this later feature is in a very bad condition due to erosion and damage from anchors and anchor chains.

Dimensions: top length: 1.21 m; top width: 0.85 m; bottom width: 0.87 m (W); length: 1.25 m (N); height: 0.19 m; top level (highest preserved top surface): -0.91 m.

Shipshed 10: Ramp, S10:R, Phase 2
(Pls. 4, 13, 40; Figs. 11, 120, 169, 194, 197, 198a-b, 199c-d)

S10:R1. Rock-cut foundation trench. The top surface is nearly horizontal. The western part of the transition to S10:R2 is damaged, and the northern part of S10:R2 is probably destroyed by U:22. S10:R1 was not excavated further east due to the poor condition of the bedrock.

Dimensions: preserved length: 4.59 m; max. bottom width: 0.83 m; bottom level: -0.92 m to -0.93 m; height of step between S10:R1–R2: 0.07–0.10 m.

S10:R2. Rock-cut foundation trench. The top surface is nearly horizontal. The eastern part is destroyed by erosion and the western part is destroyed by modern dredging. In the western part of the feature, the transition to S10:R1 is severely damaged. S10:R2 was hewn through the northern part of Slipway 3, and in this area has both destroyed SW3:R1–R3 and shaved off the upper part of SW3:R4–R7. The southern side of S10:R2 slopes from a height of 0.20 m (E) to 0.06 m (W).

Dimensions: preserved length: 5.30 m; width: 0.75–0.78 m; bottom level: -0.82 to -0.86 m.

Colonnade dividing Shipsheds 10 and 11, C10/11, Phase 2

(Pls. 4, 13, 40; Figs. 111, 169, 194, 197, 199a-b, 199d)

C10/11:1. Rock-cut foundation trench. Only the north-western corner and parts of the adjacent bottom surface of the feature are preserved. The top edges of the feature are severely eroded and flaking.

Dimensions: depth *ca* 0.15–0.24 m (N); preserved depth: 0.11 m (W); bottom level: -0.84 m.

C10/11:2. Rock-cut foundation trench with C10/11:3 *in situ*. The northern top edge is well preserved; the western top edge is chipped. The bedrock in the southern part is very porous, and this side appears to be preserved to half of its original height. The bottom and the remaining sides of C10/11:2 are very well preserved, with tooth chisel marks visible on the bottom surface and on the southern side.

Dimensions: top length: 1.34–1.37 m; top width: 1.16–1.22 m; bottom length: 1.28–1.29 m; bottom width: 1.15–1.16 m; depth: 0.37 m; bottom level: -1.09 m.

C10/11:3. Limestone foundation block *in situ*. The block is in overall good condition. The top surface is preserved, the top edges are slightly worn. The northern and western sides of C10/11:3 were not surveyed because the block is set too close to the foundation trench. A lifting hole is situated approximately in the centre of the eastern side. Rock-cut slots are preserved at the bottom of the eastern and southern sides.

Dimensions: top length: 1.12 m; top width: 0.89 m; bottom length: 1.13 m; bottom width: 0.90 m; max. height: 0.38 m; bottom level: -1.09 m; top level: -0.71 m.

Colonnade dividing Shipsheds 11 and 12, C11/12, Phase 2

(Pls. 4, 13, 17, 20a, 25b)

Descriptions of C11/12:1–10 are based on Dörpfeld's plan and section (1885: pls. 2–3).

C11/12:1(?). Horizontal rock-cut foundation trench for C11/12:2(?) and C20/21:12 (Dörpfeld 1885: pl. 3).

Dimensions: length: 1.52 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom level: +1.28 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +1.21 m).

C11/12:2(?). Rectangular block. On Dörpfeld's plan the western part of C11/12:2(?) is visible under C20/21:12, and is illustrated on the section of C20(π)/21(Δ) (including C11/12, Dörpfeld 1885: pl. 3). The feature was either re-used or incorporated in the Phase 3 colonnade.

Dimensions: length: 1.28 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.98 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.48 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.84 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.77 m).

C11/12:3. Horizontal rock-cut foundation trench for C11/12:4 (Dörpfeld 1885: pl. 3).

Dimensions: length: 1.48 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom level: +0.90 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +0.83 m).

C11/12:4. Rectangular block. The western part of C11/12:4 is visible under C20/21:13 (Dörpfeld 1885: pl. 2), and is illustrated on the section of C20(π)/21(Δ) (including C11/12, Dörpfeld 1885: pl. 3). The feature was incorporated in the Phase 3 colonnade as the foundations of C20/21:13.

Dimensions: length: 1.26 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.90 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.54 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.44 m (*VMoP*: 0.03 m, calibrated +1.37 m).

C11/12:5. Horizontal rock-cut foundation trench for C11/12:6 (Dörpfeld 1885: pl. 3). Extended east to accommodate the 7th Phase 3 column position (C20/21:14–16).

Dimensions: bottom level: +0.50 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +0.43 m).

C11/12:6. Rectangular block. The western part is visible under column base C20/21:16 (Dörpfeld 1885: pl. 2), and is illustrated on the section of C20(π)/21(Δ) (including C11/12, Dörpfeld 1885: pl. 3). The feature was incorporated in the Phase 3 colonnade as the foundations of C20/21:16.

Dimensions: length: 1.10 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.90 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.56 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.06 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +0.99 m)

C11/12:7. Horizontal rock-cut foundation trench for C11/12:8 (Dörpfeld 1885: pl. 3).

Dimensions: length: 1.16 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom level: +0.14 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +0.07 m).

C11/12:8. Rectangular block. On Dörpfeld's plan C11/12:8 appears to consist of two adjacent blocks with a slot(?) in the northern side (Dörpfeld 1885: pl. 2). On the section the feature is shown as one block (Dörpfeld 1885: pl. 3).

Dimensions: length: 1.12 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.92 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.52 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +0.66 m (printed, Dörpfeld 1885: pl. 2, calibrated +0.59 m).

C11/12:9. Horizontal raised rock-cut foundation (perhaps a block).

Dimensions: length: 1.68 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom level: +0.26 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +0.19 m).

C11/12:10. Horizontal raised rock-cut foundation. The structure is shown submerged on Dörpfeld's section. Dörpfeld extends the interaxial spacing of 3.39 m to this location, but does not highlight it as a feature on the plan (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 1.02 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom level: -0.42 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m; calibrated -0.49 m).

Shipshed 12: Ramp, S12:R, Phase 2
(Pls. 13, 17)

S12:R1. Most probably a block.

Dimensions: exposed length: 2.30 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); exposed width: 0.32 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); top level: +1.90 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.83 m).

Colonnade dividing Shipsheds 12 and 13, C12/13, Phase 2
(Pls. 4, 13, 40; Figs. 170, 201, 204, 205a)

C12/13:1. Rock-cut colonnade foundation trench. The area surrounding C12/13:1 is in a poor state due to damage by modern construction, general erosion and rock-boring marine organisms. Remains of the eastern and southern side-walls of C12/13:1 are preserved. Towards the north and west the feature is destroyed by a cut in the bedrock running roughly north-east/south-west. The east side-wall has a max. preserved height of *ca* 0.15 m. The southern top edge is very eroded. Towards the north, the top edge of the eastern wall is badly damaged by the aforementioned cut. The south side-wall measures *ca* 0.13–0.15 m in depth; it is eroded along its length. The bottom is generally uneven, eroded and damaged, but parts are fairly well preserved. Extended west to accommodate the 13th Phase 3 column position (C21/22:6; Pl. 16).

Dimensions: preserved width: *ca* 1.39 m; bottom level: -0.54 m.

Colonnade dividing Shipsheds 13 and 14, C13/14, Phase 2
(Pls. 4, 13, 40; Figs. 171, 201, 204, 205c-d, 206a, 207, 210)

C13/14:1. Traces of the eastern side-wall of a rock-cut foundation trench. There is an area of damage at the foot of the modern harbour wall and along the first metre or so of the sewage outlet. A line of damage runs from the sewage outlet in a southwestern direction; east of this line the bedrock is partially broken up. The colonnade is preserved to the west of the line of damage. C13/14:1 was probably extended west to accommodate the 13th Phase 3 column position (C22/23:5; Pl. 16).

Dimensions: bottom level: -0.70 m.

C13/14:2. Rectangular rock-cut foundation trench. The north side-wall is vertical with a max. depth of 0.14 m. The western part is eroded, its top edge obscured by a modern concrete sewage outlet. The west side-wall measures a max. of 0.06 m in depth: the northwestern corner is broken away, with an area of damage just behind and running under the modern sewage outlet. The east side-wall has a max. depth of 0.06 m. The south side-wall has a max. depth of 0.07 m. The bottom has a few tool marks, but is otherwise smooth.

Dimensions: top length: 1.29–1.37 m; top width: 1.01–1.07 m; bottom length: 1.24–1.31 m; bottom width: 0.94–0.97 m; bottom level: -0.82 m.

Shipshed 14: Ramp, S14:R, Phase 2
(Pls. 4, 13, 40; Figs. 171, 207, 210, 211a, 212)

S14:R1. Rock-cut foundation trench. The trench is inclined on two sides, towards the west and north. The northern side is not defined to the east, and the feature continues under the modern jetty. To the west S14:R1 continues into the unexcavated area. Several tool marks of a single-pointed chisel (one stroke) are visible on the bottom surface (*ca* 0.02 m wide).

Dimensions: length (excavated): 3.12 m; distance of southern side of S14:R1 to centre of C14/15:1: 2.51 m; gradient: 1:11.4 (-0.54 to -0.32 m over a length of 2.51 m).

Colonnade dividing Shipsheds 14 and 15, C14/15, Phase 2
(Pls. 4, 13, 23c, 40; Figs. 171–172, 207, 210, 211c, 212, 213, 216)

C14/15:1. Roughly square rock-cut foundation trench. The sides of C14/15:1 are vertical and preserved with well defined faces. There are no tool marks. On the north side-wall (height, sloping east-west: *ca* 0.29 m to *ca* 0.12 m), the top edge is damaged and eroded along its length. At the corner of the east (height: *ca* 0.32 m) and south side-walls (height *ca* 0.30 m) there is a large crack running in a general east-southeast direction up to the quay wall. The west side-wall (height: 0.04–0.05 m) forms the transition to C23/24:9, and the latter has cut through the western side and reduced it in height. The bottom is relatively flat, with a few tool marks near the southeast and northwest corner. Part of this feature is illustrated on Dörpfeld's plan (Pl. 17).

Dimensions: top length: 1.47–1.52 m; top width: 1.42–1.45 m; bottom length: 1.37–1.46 m; bottom width: 1.29–1.34 m; bottom level: -0.63 m.

Two pry marks are present in the bottom of C14/15:1:

C14/15:1a. Pry mark: length: 0.11 m; width: 0.02–0.05 m; depth: 0.02 m.

C14/15:1b. Pry mark: length: 0.11 m; width: 0.02–0.04 m; depth: 0.02 m.

C14/15:2. Rectangular rock-cut foundation trench. Along the north side-wall (height, sloping east-west: *ca* 0.30 to *ca* 0.15 m), the northwest corner is undercut. Top edge and the whole side surface is eroded. The east side-wall (height: 0.36 m) is heavily damaged across the top edge, with a deep break in the north corner. Most of the south side-wall (height, sloping east-west: *ca* 0.26 to *ca* 0.10 m) is in poor condition and was left unexcavated as a measure of protection. The western half has a quarry-like rock-cutting. The exposed part appears vertical. The west side-wall (height, north part: 0.16 m; south part: 0.26 m) is undercut, its top edges damaged along its length. Tool marks are visible on its surface. As described above, the central, southern side is covered with unexcavated material, but to each side (E and W) the edges are exposed. Deep, single-point chisel marks can be seen in the floor near the southern wall; adjoining and immediately to the north are more well defined tooth-chisel marks. The heavier tool marks seen in this feature seem to be single point marks (*ca* 0.02 m wide) for roughing surfaces.

Dimensions: top length: 1.44–1.47 m; top width: 1.12–1.19 m; bottom length: 1.37–1.41 m; bottom width: 1.06–1.20 m; bottom level: -0.95 m.

West of C14/15:2 the exposed bedrock is inclined upwards towards the west. It appears to be higher to the south. There are no tool marks beyond the damage extending from the western wall of C14/15:2, which suggests that the original surface has been lost. The bedrock is also in relative poor condition due to erosion and other damage.

C14/15:3. Traces of a rock-cut foundation trench. At the reconstructed 8th Phase 2 column position there is a highly-eroded depression in the bedrock that is in all probability the *shadow* of the rock-cut foundations (Pl. 23c). West of C14/15:3 a destruction line runs north-east/south-west. The destruction line creates a step of 0.15 m, with the lower side to the south-east. Continuing west beyond the line of destruction the bedrock is also in poor condition, eroded and heavily encrusted with marine organisms. There are no signs of any worked areas until reaching C14/15:4. Bottom level: -1.07 to -1.12 m.

C14/15:4. Rock-cut foundation trench. Extended west to accommodate the 24th Phase 3 column position (C23/24:10; Pls. 16, 23c). Towards the south the feature is only vaguely defined by a severely-eroded edge, which outlines the southeastern corner of the foundation trench. On the southern side the bedrock is destroyed about 0.15 to 0.35 m from the south edge of C14/15:4. The destruction is probably related to the construction of the T-shaped jetty. Towards the east the feature is severely damaged. In the northeastern part of C14/15:4 a large circular pit (C14/15:4a; see below) was found. Near the northeastern corner the bottom surface is very well preserved. The northern side of the foundation trench is deepest at its eastern end (*ca* 0.10–0.14 m), while the bedrock slopes down towards the western end, thus reducing the depth of the structure to *ca* 0.03 m.

Dimensions: top width: 1.51 m; bottom width: 1.25 m; bottom level: -0.96 m.

C14/15:4a. Rounded rock-cut pit. Top diameter: *ca* 0.67–0.75 m; bottom diameter: *ca* 0.42–0.49 m; depth: 0.07–0.11 m; bottom level: -1.03 to -1.07 m.

Two pry marks are present in the bottom of C14/15:4:

C14/15:4b. Pry mark: length: 0.15 m; width: 0.02–0.06 m; depth: 0.03 m.

C14/15:4c. Pry mark: length: 0.18 m; width: 0.05–0.08 m; depth: 0.03 m.

C14/15:5. Rock-cut foundation trench defined on two sides. Extended west to accommodate the 26th Phase 3 column position (C23/24:11; Pls. 16, 23c).

Dimensions: bottom level: -0.91 m.

3.3. Catalogue: Phase 3, Shipsheds 16–25

Back-wall, BW, Rock-cut Foundations, Phase 3
(Pls. 6–8, 15; Figs. 70, 72, 75–78, 173a)

BW:1. Rock-cut foundation trench.

Dimensions: length: 2.90 m; width: 0.92–1.02 m; max. depth: 0.34 m; bottom level: +4.36 to +4.37 m.

BW:2. Rock-cut foundation trench.

Dimensions: length: 7.62 m; width: 1.01–1.05 m; depth: 0.34 m (E), 0.00–0.08 m (W); bottom level: +4.19 to +4.20 m.

BW:3A. Rock-cut foundation trench.

Dimensions: length: 1.58 m; depth: 0.01–0.10 m (W); bottom level: +4.11 m.

BW:3B. Rock-cut foundation trench.

Dimensions: length: 0.68 m; depth: 0.02–0.08 m (W); bottom level: +4.11 to +4.12 m.

BW:4. Rock-cut foundation trench.

Dimensions: length: 0.70 m; depth: 0.01–0.03 m (W); bottom level: +4.20 m.

Back-wall, BW, 1st Course, Phase 3
(Pls. 6–8, 15; Figs. 67, 69, 76–77)

BW:5. Partly preserved square limestone block. Top removed by horizontal break.

Dimensions: length: 0.59–0.64 m; width: 0.65 m; max. preserved height: 0.18 m; bottom level: +4.19 m.

BW:6. Rectangular limestone block. Two-thirds of northern side has been removed by a break.

Dimensions: length: 1.16 m; width: 0.63 m; height: 0.70 m; bottom level: +4.20 to +4.21 m.

BW:7. Rectangular limestone block.

Dimensions: length: 1.23 m; width: 0.62 m; height: 0.72 m; bottom level: +4.19 m.

BW:8. Rectangular limestone block.

Dimensions: length: 1.20 m; width: 0.63 m; height: 0.72 m; bottom level: +4.19 to +4.20 m.

BW:8a. Lifting hole.

BW:9. Rectangular limestone block.

Dimensions: length: 1.21 m; height: 0.71 m; bottom level: +4.19 m.

BW:9a. Lifting hole.

BW:10. Rectangular limestone block.

Dimensions: length: 1.18 m; height: 0.72 m; bottom level: +4.18 to +4.19 m.

BW:10a. Lifting hole.

BW:11. Rectangular limestone block.

Dimensions: length: 1.12 m; height: 0.72 m; bottom level: +4.18 to +4.20 m.

BW:12. Rectangular limestone block.

Dimensions: length: 1.20 m; height: 0.80 m; bottom level: +4.11 to +4.12 m.

BW:13. Rectangular limestone block.

Dimensions: length: 1.15 m; height: 0.80 m; bottom level: +4.11 to +4.12 m.

BW:14. Rectangular limestone block. Towards the south the bottom of the block is cut away to accommodate the step between BW:3B and BW:4.

Dimensions: length: 1.14 m; height: 0.77 m (N), 0.70 m (S); bottom level: +4.13 (N), +4.21 m (S).

BW:15. Rectangular limestone block. On the western side the southern part is covered by the concrete foundations M:13.

Dimensions: length: 1.19 m; height 0.70 m; bottom level: +4.20 m.

BW:16. Rectangular limestone block.

Dimensions: length: 1.20 m; height: 0.70 m; bottom level: +4.20 m.

BW:17. Rectangular limestone block. Continues into the modern wall to the south.

Dimensions: exposed length: 0.56 m; height: 0.69 m; bottom level: +4.20 m.

Back-wall, BW, 2nd Course, Phase 3
(Pls. 6–8, 15; Figs. 67, 69, 78)

BW:18–23 have a 0.005–0.010 m concrete layer top surface, so 0.01 m should be subtracted from the listed height below, in order for the preserved height.

BW:18. Rectangular limestone block.

Dimensions: length: 1.25 m; width: 0.58 m; height: 0.59 m.

BW:19. Rectangular limestone block.

Dimensions: length: 1.15 m; width: 0.58 m; height: 0.59 m.

BW:20. Rectangular limestone block.

Dimensions: length: 1.03 m; width: 0.59 m; height: 0.58–0.59 m.

BW:21. Rectangular limestone block.

Dimensions: length: 0.84 m; width: 0.58 m; height: 0.59 m.

BW:22. Rectangular limestone block.

Dimensions: length: 1.17 m; width: 0.60 m; height: 0.59 m.

BW:23. Rectangular limestone block. On the western side the southern part is mostly covered by the concrete foundations M:13.

Dimensions: length: 1.19 m; height: 0.58 m.

BW:24. Rectangular limestone block. Continues into the modern wall to the south.

Dimensions: exposed length: 0.98 m; height: 0.59 m.

Wall dividing Shipsheds 16 and 26(?), W16/26(λ), Phase 3
(Pls. 5–7, 9, 15, 17, 34a; Figs. 61–63, 71, 173a, 177–178)

W16/26:1. Inclined rock-cut foundation trench. The northern side is destroyed. The western area of the bottom and parts of the step down to W16/26:2a are not preserved.

Dimensions: bottom length: 2.14 m; length (west of intersection with BW:1): *ca* 1.09 m; preserved bottom width: *ca* 0.90 m. East of the intersection with the back-wall the poorly preserved southern top edge slopes down towards the west; eastern edge: *ca* +4.50 m; western edge: *ca* +4.31 m. The bottom of the feature inclines from +4.37 m (E) to +4.21 m (W). Gradient G3-B: 1:13.5 (4.2°; Fig. 220a). At the intersection with the western side of the foundation cutting BW:1 (+3.36 m) the inclining W16/26:1 is cut to a lower level (+3.28 m).

W16/26:2A and **W16/26:2B**. Rock-cut foundation trench. The top edges are very damaged.

Dimensions: bottom length: 4.47 m (S), 4.61 m (N); bottom width: 0.94–0.97 m; height at intersection with W16/26:1: 0.39 m. The bottom of the feature inclines from +3.60 m (E) to +3.16 m (W). The easternmost 1.20 m of the feature (W16/26:2A) has a markedly steeper inclination (G3-B, 1:7.4/7.7°; Fig. 220b) than the remaining part of the foundation cutting, W16/26:2B (G3-B, 1:11.8/4.9°; Fig. 220c).

W16/26:3. Rock-cut foundation trench for three *in-situ* blocks in W16/26. On the south side it was not possible to excavate the narrow space between the first course and W16/26:3, and to the west of W16/26:11 the feature may continue into the limit of the excavation. The exposed length (southern top edge) is 3.77 m.

W16/26:4. Crown of raised inclined rock-cut foundation. It is heavily eroded with its western end removed either by a break or by erosion. Towards the east, W16/26:4 continues under the modern quay. Only the crown of this feature was excavated due to its poor state of preservation. The top surface is very eroded.

Dimensions: exposed top length: 1.36 m; top width: 1.03 m; height above LOE: 0.08–0.15 m; top level surface: see Figs. 177–178, 221b.

W16/26:5. Rock-cut feature, either the heavily-eroded remains of the continuation of the raised rock-cut foundations W16/26(λ) between W16/26:4 and 6, or a rock-cut foundation trench for a block levelling the space between the aforementioned structures. Feature is heavily eroded and the only discernible part of this structure is a quarry-like rock-cutting clearly aligned to the northern side of W16/26(λ). This may signify that this section of the wall foundations was created using quarrying methods. The delineation to the south was not found, as the area was only surface cleaned in order not to compromise this poorly-preserved feature.

Dimensions: bottom length: 1.49 m; preserved bottom width: 1.14 m.

W16/26:6. Crown of raised inclined rock-cut foundation. To the north-east, a clear square section can be seen adjacent to the feature, suggesting a rock-cutting. Following the northern side west, the bedrock seems to taper off due to erosion and a northwestern corner is unclear. The eastern and southeast corners of the cutting are eroded away along about half its length. A quarry-like rock-cutting was found near the southwestern corner of W16/26:6. This cutting continues to the southwest corner. Part of top surface, for 1.79 m, is fairly well preserved.

Dimensions: preserved bottom length: 2.90 m; top width: 1.09 m; max. preserved height: *ca* 0.32 m; top level surface: see Figs. 177–178, 221b.

W16/26:7. Rock-cut foundation trench. Feature heavily eroded.

Dimensions: bottom length: 1.71 m; bottom width: *ca* 1.09 m; max. preserved depth: *ca* 0.25 m. Bottom level (near SE corner): *ca* -0.80 m.

W16/26:8. Southern side of rock-cut foundation trench of W16/26(λ). The remains of the feature are very eroded. No clear preserved original bottom surface.

Dimensions: preserved length: *ca* 1.34 m.

W16/26:9. Rectangular limestone block. Exposed top surface, edges and corners are worn.

Dimensions: length: 1.14 m; protruding (S): 0.09 m below W16/26:12–13.

W16/26:10. Rectangular limestone block. Exposed top surface, edges and corners are worn.

Dimensions: length: 1.11 m; protruding: 0.10 m below W16/26:13–14.

W16/26:11. Rectangular limestone block. Exposed top surface, edges and corners are worn.

Dimensions: length: 1.11 m; protruding: 0.10 m below W16/26:14.

W16/26:12. Rectangular limestone block. The top edges are very worn; part of the northern bottom edge is not preserved. Top surface has four indentations, three of which are unlikely to be man-made, whereas W16/26:12a is identified as a pry mark.

Dimensions: length: 1.22 m; width: 0.64 m; height: 0.53 m.

W16/26:12a. Pry mark. Length: 0.09 m; width: 0.07 m.

W16/26:13. Rectangular limestone block. The southern top edge and all four corners are very worn. The rest is well preserved.

Dimensions: length: 1.14 m; width: 0.61 m; height: 0.60 m.

One pry mark in top surface:

W16/26:13a. Pry mark. *Dimensions:* length: 0.07 m; width: 0.03 m.

W16/26:14. Rectangular limestone block. Top corners are chipped; other accessible parts are well preserved.

Dimensions: length: 1.01 m; width: 0.62 m; height: 0.60 m.

Shipshed 16: Ramp, S16:R, Phase 3
(Pls. 6–7, 15; Figs. 92–93, 173b)

S16:R1. Traces of rock-cut foundation trench. Feature is almost completely destroyed.

Dimensions: preserved bottom length: *ca* 1.24 m; preserved bottom width: 0.58 m; possible bottom level: +3.57 to +3.58 m

S16:R2. Rock-cut foundation trench. Western part is destroyed.

Dimensions: preserved length: 0.64 m; preserved width: 0.66 m; max. depth: 0.12 m; bottom level: +3.99 m.

S16:R3. Rock-cut foundation trench. Northern and eastern part destroyed by modern foundation trenches for M:2 and M:3. Eroded raised edge towards south. Step down (height: 0.07–0.08 m) at transition to S16:R4.

Dimensions: preserved bottom length: 0.67 m; bottom level: +4.14 m.

S16:R4. Rock-cut foundation trench. North and west parts mostly destroyed. Eastern and southern sides clearly defined.

Dimensions: preserved bottom length: 1.47 m; preserved bottom width: 0.90 m; max. depth: 0.10 m; bottom level: +4.01 m.

S16:R5. Rock-cut foundation trench. Western part damaged.

Dimensions: preserved bottom length: 0.76 m; bottom width: 0.72–0.75 m; max. depth: 0.09 m; bottom level: +3.87 m.

S16:R6. Rock-cut foundation trench. Western part destroyed.

Dimensions: preserved length: 0.60 m; width: 0.59 m; max. depth: 0.12 m; bottom level: +3.61 m.

Shipshed 16: Side-passages, Phase 3
(Pls. 6–7; 15, Fig. 92)

S16:NSP1. Feature is defined as the severely eroded, worked and inclined bedrock between the south of W16/26:1, 2 and the northern side of the possible ramp feature S16:R1. The eastern part is destroyed by M:2.

Dimensions: width: *ca* 1.42 m.

S16:NSP2. Feature is defined as the severely eroded, worked and inclined bedrock south of W16/26:3.

S16:SSP1. Feature is defined as the worked and inclined bedrock between the southern side of S16:R3–R6 and the northern side of C16/17:1. Feature is severely eroded, and no original surface was found.

S16:SSP2(?). Possible rock-cut side-passage feature.

Dimensions: length: 2.95 m; top width: 0.29 m.

S16:SSP3(?).Possible rock-cut side-passage feature.

Dimensions: length: 3.00 m; top width: 0.25 m.

Colonnade dividing Shipsheds 16 and 17(η), C16/17(η), Phase 3
(Pls. 6–7, 9, 15, 17, 25a, 34b; Figs. 82–83, 93, 167, 174a, 181, 183, 184a, 188)

Descriptions of features C16/17:5–8 are based on Dörpfeld's plan (Pl. 17, see also Pl. 15).

C16/17:1. Rock-cut foundation trench for column position 1. Part of the top northern edge is not preserved.

Dimensions: top length: 1.02–1.04 m; top width: 1.08 m; bottom length: 0.98 m; bottom width: 1.03 m; the top of the cutting slopes down towards the west; eastern edge + 4.11–4.12 m and western edge: +4.02–4.02 m; bottom level: +3.60 m (E).

C16/17:2(θ). Limestone column base for column position 1 (labelled θ in Dörpfeld 1885: pl. 2). Top surface edges are damaged. The middle part of column base is well preserved and there appears to be a shadow of the bottom column drum.

Dimensions: top length: 0.82 m; top width: 0.89 m; height: 0.47 m; top level +4.07 m.

C16/17:3. Rock-cut foundation trench for column position 2. The eastern side and the eastern-most part of the northern side are destroyed by the foundation trench for M:5.

Dimensions: bottom length: 0.95–1.01 m; bottom width: 0.87–0.97 m; bottom level: +3.23 m.

C16/17:4(ι). Limestone column base for column position 2 (labelled ι in Dörpfeld 1885: pl. 2). C16/17:3 was moved, probably during the construction of Sirangiou 1, resulting in a 0.01 m upward inclination to the west: +3.75 m (E) to +3.76 (W). *Top*: The surface is worked very smooth with a few indentations due to damage. There is a cross-shaped incision in the top surface. The southwestern and northwestern corners are broken away. Flat chisel marks can be seen across the top surface, and traces of cement are also present. *North face*: the central area is roughed out to a relatively smooth surface. A lifting boss remains (length: 0.14 m; width: 0.13; height: 0.02 m). Along the edges there is a chiselled band. *Eastern face*: this area was not fully excavated in order not to undermine the modern foundations. The exposed part has a smoothed area. The bottom edge is broken away along its length. A lifting-boss is evident, centrally located (laterally) but below the central point (vertically) (length: 0.14 m; width: 0.13 m; height: 0.01 m). The central area has been roughed out to the same standard as the north face and seems to extend to the top of the block. *South face*: This face is finished like its northern counterpart. The top of the western edge is broken off. Vertical tool marks are present on the three smoothed edges, whilst the top edge is not smoothed to the same extent. A lifting-boss is placed just off centre in both directions (length: 0.14 m; width: 0.14; height: 0.02 m). *West face*: the edges of this side are less well defined, with only the southern edge below the broken corner showing signs of smoothing. The bottom edge is damaged along its length with no signs of having been smoothed. The north and top edges appear not to have been smoothed. The central area has been roughed to the same extent as the others. The column base does not fit flush to the footing on this side. It has a lifting-boss (length: 0.16 m; width: 0.15 m; height: 0.02 m).

Dimensions: top length: 0.81 m; top width: 0.81 m; height: 0.52 m; originally the top level was +3.75 m, reconstructed from height of column base (0.52 m).

C16/17:5. Most probably a column base for column position 3 (labelled κ in Dörpfeld 1885: pl. 2).

C16/17:5 may have been removed when the basement was constructed in the late 1950s. No excavations were conducted to confirm whether evidence of a foundation trench is preserved.

C16/17:6. Rock-cut foundation trench for column position 9.

Dimensions (Dörpfeld 1885: pl. 2): length: 1.42 m (*MoP*: 0.04 m); width: 1.14 m (*MoP*: 0.04 m); bottom level: +0.53 m, calibrated +0.46 m.

C16/17:7. Rock-cut foundation trench for column position 10 extending C7/8:1 westward.

Dimensions (Dörpfeld 1885: pl. 2): length: 2.78 m (*MoP*: 0.04 m); width: 1.16 m (*MoP*: 0.04 m); bottom level: -0.05 m, calibrated -0.12 m.

C16/17:8. Rock-cut foundation trench for column position 11 extending C7/8:2 westward. Immediately west of the modern quay, 0.10 m of C16/17:8 is visible at a level of -0.45 m.

Dimensions: length: 3.85 m (Dörpfeld 1885: pl. 2 and ZHP; *MoP*: 0.05 m); width: 1.16 m (*MoP*: 0.04 m).

C16/17:9. Rock-cut foundation trench for column positions 12–13 extending C7/8:3 westward. On Dörpfeld's plan the western part of C16/17:9 is illustrated as a structure may be disappearing into the silt towards the west (Pl. 17). In the southwestern part of C16/17:9 there are two pry marks.

Dimensions: top width: 1.43–1.50 m; bottom length: 3.99 m; bottom width: 1.32–1.36 m; bottom level: -0.66 m.

C16/17:9a. Pry mark.

Dimensions: length: 0.12 m; width: 0.02–0.04 m; depth: 0.01–0.02 m.

C16/17:9b. Pry mark.

Dimensions: length: 0.10 m; width: 0.02–0.04 m; depth: 0.01–0.02 m.

C16/17:10. Rock-cut foundation trench for column position 14 extending C7/8:5 eastward to accommodate part of the the 14th column position in the Phase 3 colonnade.

Dimensions: top width: 1.17–1.28 m; bottom length: 2.06 m; bottom width: 1.04–1.12 m; depth: *ca* 0.24 m (E), while the bedrock slopes down towards the western end reducing the depth of the structure to *ca* 0.03 m. bottom level: -1.07 m.

Shipshed 17(η): Side-passages, Phase 3
(Pls. 6–7, 15; Figs. 73, 81, 94, 174a, 176a)

S17:NSP1. The side-passage area is severely eroded, and no original surface is visible.

S17:SSP1. The side-passage area is severely eroded, and no original surface is visible.

Shipshed 17(η): Ramp, S17:R(η), Phase 3
(Pls. 6–7, 15; Figs. 81, 91, 94, 167, 175, 183, 185d)

S17:R1. Rock-cut foundation trench. Level feature only clearly defined on south side.

Dimensions: preserved bottom length: *ca* 1.09 m; bottom level: +4.17 to +4.20 m.

S17:R2. Rock-cut foundation trench.

Dimensions: preserved bottom length: *ca* 4.95 m; bottom width: 0.53 m; depth: 0.04 m.

S17:R3. Rock-cut foundation trench. Inclined towards west. No clear delineation of feature towards north. Single-point chisel marks visible in bottom.

Dimensions: bottom length: 0.79 m (S); preserved bottom width: 0.47 m; depth: 0.12 m.

S17:R4. Rock-cut foundation trench. Inclined towards west. Excavation of fill stopped in order not to compromise surrounding ancient and modern structures.

Dimensions: exposed bottom length: 1.12 m; exposed bottom width: 0.54 m; depth (below LOE): 0.19 m.

S17:R5. Rock-cut foundation trench. The southern part of the feature is destroyed by the foundation trench for M:12.

Dimensions: preserved bottom length: 1.21 m; bottom width: 1.23 m; max. depth: 0.09 m; bottom level: +4.11 m.

S17:R6. Rock-cut foundation trench. Inclined towards west. The southeastern part of the feature is destroyed by the foundation trench for M:12.

Dimensions: exposed bottom length: 6.56 m; bottom width: 0.72 m; depth: 0.24 m (E), 0.10 m (W).

S17:R7. Rock-cut foundation trench. Inclined towards west. The feature continues under the modern jetty to the east. The western part was destroyed by U:14A.

Dimensions: exposed length: 3.16 m; width: 2.26 m; depth: *ca* 0.14 m (N), *ca* 0.17 m (S); gradient: 1:12.4 (-0.38 m to -0.61 m over a length of 2.77 m).

S17:R8. Partly preserved limestone block. Southern part removed by break.

Dimensions: length: 0.40 m; preserved width: 0.34 m; height: 0.13 m.

S17:R9. Limestone block. The top surface is worked roughly flat. The north side is worked flat; it has deteriorated to the point that the original texture is undeterminable. The east side, where it is exposed due to the break in block C17:R8 to its east, is worked flat and fairly smooth. The south side is worked very smooth with tool marks on the lower western side. Under the southern end of the block, the foundation cutting drops down to a lower level and the block is supported by a rubble fill of small rocks and dirt.

Dimensions: length: 0.75 m; preserved width: 0.45 m; height: 0.14 m.

S17:R10. Limestone block. The top of the block is worked roughly flat. The top surface is even for 0.31 m from the east end. At this point the top surface increases in height to 0.04 m. The block continues at the new height for 0.66 m until the block meets the modern wall, which is built on top of S17:R10. This platform is a cutting for a block in the course above. The northern side of the block is worked roughly flat. The southern side of the wall is roughly cut into a curve.

Dimensions: exposed length: 1.02 m; width: 0.40 m; height (max. above LOE): 0.26 m.

S17:R11. Limestone column drum re-used as block. The top face has a smooth finish with some damage; the southeastern corner removed by break. The northern face is mostly obscured by foundation pillar M:10 and rounded. The east face is concave.

Dimensions: length: 1.07 m; top width: 0.34 m; height: 0.42 m.

S17:R12. Limestone block (possibly a re-used column drum). The north face is rounded. Both east and west edges on the southern side sit flush against adjoining blocks, but open slightly on the northern side by 0.01 m to the west and 0.005 m to the east. 0.15 m from eastern side what appears to be a wear line may indicate the position of a feature that sat on top. The south face is damaged by large cracks.

Dimensions: length: 1.20 m; top width: 0.46 m; max. width: 0.50 m; height: 0.39 m.

S17:R13. Limestone block (possibly a re-used column drum). The top of the block is cut coarsely flat. The north side of the block, which faced into the ramp's fill, is roughly cut into a rounded shape. The south side is coarsely cut with a single point chisel.

Dimensions: length: 1.23 m; top width: 0.42 m; max. width: 0.52 m; max. height: 0.39 m.

S17:R14. Limestone block (possibly a re-used column drum). The top of the block is cut roughly flat. The north side of the block is rounded. The south side is coarsely cut with a single point chisel. The tool marks on the south side are from a single point chisel. The north side of the block, which faces into the ramps fill, is roughly cut into a rounded shape.

Dimensions: preserved length: 1.11 m; top width: 0.42 m; max. width: 0.50 m; max. height: 0.40 m.

S17:R15. Feature in the ramp area (Dörpfeld 1885: pl. 2).

Dimensions: length: 1.08 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.76 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); top level: +1.68 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.61 m).

S17:R16. Feature in the ramp area (Dörpfeld 1885: pl. 2).

Dimensions: length: 0.46 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.90 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

S17:R17. Feature in the ramp area (Dörpfeld 1885: pl. 2).

Dimensions: length: 5.32 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.82 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

Colonnade dividing Shipsheds C17(η) and 18(χ), C17(η)/18(χ), Phase 3
(Pls. 6–7, 8a–d, 9, 15, 17, 20, 23a, 34c; Figs. 68–69, 73–74, 79, 81, 167, 176b, 181, 183, 185c, 188)

Descriptions of C17/18:12–14, 15A are based on Dörpfeld's plan and section (1885: pls. 2–3). The spur-wall (C17/18:1–5) is labelled (γ) in Dörpfeld 1885: pl. 2.

C17/18:1. Rock-cut foundation trench for a spur-wall. The feature cuts through the western-most side of the foundation cutting for the back-wall (BW: 3A). Part of the top and western top edge are not preserved.

Dimensions: top length: 2.08 m; top width: 0.86–0.91 m; bottom width: 0.77–0.78 m; bottom length: 2.15 m; depth: 0.02–0.20 m; bottom level +4.03 to +4.04 m.

The first course of blocks is 2.13 m long measured from the western face (inside) of the back-wall. The length of the second course is 1.95 m.

C17/18:2. Limestone block in spur-wall (eastern-most, first course).

Dimensions: length: 0.99 m; width: 0.65 m; height: 0.87 m.

C17/18:3. Limestone block in spur-wall (western-most, first course).

Dimensions: length: 1.14 m; width: 0.65 m; max. height: 0.87 m.

C17/18:4. Limestone block in spur-wall (eastern-most, second course).

Dimensions: length: 1.27 m; width: 0.63 m; max. height: 0.60 m.

C17/18:5. Limestone block in spur-wall (western-most, second course).

Dimensions: length: 1.26 m; width: 0.61 m; max. height: 0.59 m.

C17/18:6. Rock-cut foundation trench for column position 1. The feature is roughly square and the bottom surface is relatively smooth.

Dimensions: top length: *ca* 1.24–1.37 m; top width: *ca* 1.28–1.46 m; bottom length: *ca* 1.16–1.32 m; bottom width: *ca* 1.25–1.41 m; depth: 0.03–0.46 m; bottom level: +3.61 m.

Two pry marks are located to the west of column base C17/18:7.

C17/18:6a. Pry mark located 0.12 m from western side of C17/18:7.

Dimensions: length: 0.09 m; max. width: 0.03 m; depth: 0.03 m.

C17/18:6b. Pry mark located 0.04 m from western side of C17/18:7.

Dimensions: length: 0.12 m; max. width: 0.04 m.

C17/18:7(δ). Limestone column base for column position 1 (labelled δ on Dörpfeld 1885: pl. 2). The top of the block is worked extremely smooth. Chisel marks are evident all over the top of the base, especially in the northwest corner. The sides of the block are worked flat with a rough chisel, creating a generally flat but rough surface; chisel marks are cut as deep as 5 mm. A 3.0–9.0 cm-wide chiselled band along the sides and the bottom forms well defined bottom and the side edges. It appears that two different tools were used. Chisel marks similar to those found on top of the block can be seen on the right edge of the west side of the column block. On the bottom edge of the west side, the tool marks are different; the first set of tool marks appear as a grid of chisel cuts (about 1 cm in length). The second set of tool marks are diagonal cuttings that run the entire width of the worked edge. These varieties of tool marks could indicate either the use of different tools or different uses of the same tool. It appears that one type of tool marks were made with a small pointed chisel, whereas other marks were made with a flat-ended chisel employed at an angle.

Dimensions: top length: 0.80 m; top width: 0.81 m; bottom length: 0.80 m; bottom width: 0.81 m; height: 0.47 m; top level: +4.08 m.

Two pry marks are located on the top surface of column base C17/18:7. They are oriented at an angle facing the reconstructed column drum.

C17/18:7a. Pry mark. Length: 0.08 m; max. width: 0.04 m; depth: 0.04 m.

C17/18:7b. Pry mark. Length: 0.08 m; max. width: 0.03 m; depth: 0.03 m.

C17/18:8. Rock-cut foundation trench for column position 2. The feature is roughly square and the horizontal bottom of the rock-cut foundation trench is well preserved. The top edges are fairly well preserved. The eastern side is damaged.

Dimensions: top length: 1.37–1.40 m; bottom length: 1.23–1.31 m; bottom width: 1.11–1.28 m; height: top of surrounding bedrock slopes down towards the west; northern side: depth: 0.26 m (E), 0.10 m (W); bottom level: +3.37 m.

C17/18:9(ε). Limestone column base for column position 2 (labelled ε on Dörpfeld 1885: pl. 2). The top is relatively smooth with very thin layer of cement in confined areas. There are indentations all across the surface from damage and wear. *North face*: Very uneven. A deep groove runs across the width *ca* 0.10 m down from the top face. The top edge lacks definition and is damaged across its width. Both the east and west edges have been chiselled smooth slightly below the central, rougher section. Both edges are damaged; neither appears to extend to the top of the face, starting *ca* 0.07 m from the top edge. The east edge bears deep, horizontal chisel marks. The west edge is less carved, its marks more criss-crossed in appearance. The central area is uneven but raised slightly when compared to the edges. The bottom edge is broken away across the width of the block. *Eastern face*: Well preserved with only bottom edge damaged along its length. The bottom edge may have been smoothed off as the sides were, but most of it is now lost. Both vertical edges were smoothed in a criss-cross pattern, thus creating a stippled effect. The top face does not appear to have been smoothed, but roughed out as the central area and slightly raised as compared to the edges. *South face:* The edges of this face are damaged all around. Less care seems to have been taken in smoothing the edges here, both on the vertical faces and along the bottom edge. Where smoothing is present a stippled effect is seen. Less care overall has been taken and the rough central area runs into the smoothed edges. The top edge does not appear to have been smoothed. The top 0.15 m of this edge has been covered in cement. *West face:* Very roughly cut. The bottom edge may have been smoothed but its original state is now unclear due to damage along its length. Only a small area more than half-way down and beyond has been smoothed on the north edge, with tool marks running in a horizontal manner. Above this it looks as if no smoothing had taken place (lost due to damage?). The southern side has been smoothed, but again, not much care was taken and it is patchy in places with horizontal tool marks. The top edge and central section were roughed out.

Dimensions: top length: 0.81 m; top width: 0.81 m; bottom length: 0.80 m; bottom width: 0.84 m; height: 0.49 m; top level: +3.86 m.

C17/18:9a. Pry mark.

Dimensions: length: 0.06 m; max. width: 0.02 m; depth: 0.015 m.

C17/18:9b. Pry mark.

Dimensions: length: 0.06 m; max. width: 0.02 m; depth: 0.015 m.

C17/18:9c(?). Possible pry mark.

Dimensions: length: 0.09 m; max. width: 0.03 m; depth: 0.015 m.

C17/18:10. Rock-cut foundation trench for column position 3. The feature is roughly square and the bottom has been cut with a relatively smooth floor. Marks are present that may prove to be tool marks, but no slip cuts can be seen. The northeast corner is *ca* 0.20 m deep, is cut into the bedrock and tapers to the northwest. The northwest corner is worn or eroded away. This edge is not well defined. The southwest corner has been cut through by the wall footings for the modern building above. The southeast corner is 0.18 m deep.

Dimensions: top length: 0.93–0.97 m; top width: 1.13–1.15 m; bottom length: 0.87–0.95 m; bottom width: 1.07–1.10 m; depth: the top of surrounding bedrock slopes down towards the west; northern side, depth: 0.19 m (E), *ca* 0.02 m (W); southern side, depth: 0.16 m (E), 0.03 m (W); bottom level +3.12 m.

C17/18:11(ζ). Limestone column base for column position 3 (labelled ζ on Dörpfeld 1885: pl. 2). Top: Covered by a thin layer of concrete, which extends to *ca* 0.08 to the top faces of each side (limit of excavation before 2002). This covers the finer details on the block. Deeper cuts, possibly tool marks from chiselling, can still be seen. *North face*: Smooth edges cut on three sides (east, west, bottom) up to *ca* 0.015 m deep. Its top edge appears to taper but is not smooth. This does not seem to be due to the concrete covering a less well defined edge. The remaining central area is roughly finished with deep cut marks. The central area itself is raised over the edges. *East face*: Exhibits same characteristics as the north face: raised central area, roughly cut, and with smooth edges on three sides. The top face is poorly worked. The tool marks on the smooth edges are horizontal. *South face*: Similar to north and east faces. The smoothed western edge was cut wider and more deeper. Both vertical smoothed edges have tool marks that are aligned nearly horizontally. A large crack is running from the bottom (central) up and towards the eastern face. It may correspond to the groove on the top face. At the bottom it is 0.016 m deep whilst at the top *ca* 0.06 m deep. *West face*: Similar to the other sides. The top edge is unclear but may have been smoothed. Both of the smoothed vertical faces exhibit horizontal tool marks. The bottom corner on the south side, extending 0.50 m to the north, has not been cut away and stands *ca* 0.015 m proud of the smoothed edges. The rest of the central section is roughly finished and stands nominally 2–3 mm proud of the smoothed edges. The top edge on the north side has been broken.

Dimensions: top length: 0.81 m; top width: 0.81 m; height: 0.52 m; top level: +3.64 m

C17/18:12. Rock-cut foundation trench for column position 11. There is a discrepancy between Dörpfeld's section and plan, as this feature is not shown on the plan. May be re-using and extending parts of an earlier Phase 2 column in position 3.

Dimensions: bottom level: +0.98 m (scaled Dörpfeld 1885: pl. 3; *VMoP*: 0.01 m, calibrated +0.91 m).

C17/18:13. Rock-cut foundation trench for column position 12.

Dimensions: bottom length: 0.88 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.01 m); bottom level (scaled): +0.60 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.01 m, calibrated +0.53 m). Top surface lines up with top surface of C8/9:2 at +0.61 m (printed, Dörpfeld 1885: pl. 2, calibrated +0.54 m).

C17/18:14. Rock-cut foundation trench for column positions 14–16. Probably either re-using, extending (east and west) or removing the two possible Phase 2 features C8/9:4(?) and C8/9:5(?).

Dimensions: bottom length: 6.18 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.01 m); bottom level: -0.06 m (printed, Dörpfeld 1885: pl. 2, calibrated -0.13 m).

C17/18:15A. Rock-cut foundation trench for column position 17 (Dörpfeld 1885: pl. 3). Probably extending C8/9:6 towards the east.

Dimensions: preserved bottom length: 1.42 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.01 m); bottom level: -0.54 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.01 m, calibrated -0.61 m).

C17/18:15B. Rock-cut foundation trench for column positions 18 and 19. The bottom is preserved to a width of 1.07 m, with no clear delineation of the feature to the south. The step up to the north forming the northern side of C17/18:15B is eroded. Its height is about 0.20 m. The eastern part is totally destroyed except for a patch of flat bedrock which represents the original bottom surface of C8/9:6 which C17/18:15B probably extended towards west. The features were not fully excavated due to the very poor condition of the bedrock in the eastern and southern parts.

Dimensions: bottom length: 2.96 m; bottom width (excavated): 1.07 m; preserved depth: 0.20 m; bottom level (best preserved): -0.66 m.

In the western part of C17/18:15B are two pry marks in the bottom:

C17/18:15a. Pry mark.

Dimensions: length: 0.07 m; width: 0.02–0.04 m; depth: 0.03–0.04 m.

C17/18:15b. Pry mark.

Dimensions: length: 0.09 m; width: 0.02–0.06 m; depth: 0.03–0.04 m.

Shipshed 18(χ): Ramp, S18:R(χ), Phase 3
(Pls. 6, 15)

S18:R1. Rock-cut foundation.

Dimensions: bottom level: +4.15 m.

S18:R2. Limestone block. The northeastern corner of the block is projecting out of the modern wall.

Dimensions: length: 1.43 m; width: 0.62 m; height: 0.61 m; top level: +4.78 m.

S18:R3. Part of limestone block. The northeastern corner of the block is projecting out of the modern concrete wall.

Colonnade dividing Shipsheds 18(χ) and 19(ϕ), C18(χ)/19(ϕ), Phase 3
(Pls. 15, 17; Figs. 168–169, 188, 190, 192c, 195)

C18/19:1(τ). Bottom column drum in column position 1 (labelled τ in Dörpfeld 1885: pl. 2). The column drum is preserved in a small, fenced-in area on the northern pavement of Sirangiou 1. The heavily eroded top has a badly damaged *empolion*.

Dimensions: top diameter: 0.598 m; top surface: +5.35 m.

C18/19:2(υ). Column base for column position 2 (labelled υ in Dörpfeld 1885: pl. 2).

Dimensions: top level: +3.82 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.75 m).

C18/19:3. Bottom column drum in column position 2. The column drum is preserved in a small, fenced-in area on the northern pavement of Sirangiou 1. The top has been completely removed by a horizontal break. The diameter of 0.606 m was measured 0.10 m below the break on a well preserved surface.

Dimensions: top level: +4.82 m.

C18/19:4A. Rock-cut foundation trench for column position 14. The feature was excavated for 1.46 m and continues into the unexcavated area to the east.

Dimensions: length (excavated): 1.46 m; bottom level: -0.92 to -0.93 m.

C18/19:4B. C18/19:4A and 4C cut through the *in-situ* Phase 2 block C9/10:2 creating C18/19:4B at -0.91 m.

C18/19:4C. Rock-cut foundation trench for column position 15.

Dimensions: length (excavated): 2.12 m; bottom level: -0.92 to -0.93 m.

Colonnade dividing Shipsheds 19(ϕ) and 20(π), C19(ϕ)/20(π), Phase 3
(Pls. 15, 17; Figs. 169, 195, 197, 199a-b)

Dragátsis mentions that parts of this colonnade ϱ and σ were found during road works in 1886 (Dragátsis 1885: 70). On Dörpfeld's plan the two first columns are labelled ϱ and σ, clearly indicating that these features were known to him (Dörpfeld 1885: pl. 2). The *in-situ* column drum C18/19:1(τ) is illustrated in a similar way by Dörpfeld.

C19/20:1(ϱ). Column drum in column position 1 (Dragátsis 1885: 70, labelled ϱ in Dörpfeld 1885: pl. 2).

C19/20:2(σ). Possible column drum in column position 2 (labelled σ in Dörpfeld 1885: pl. 2). Dragátsis describes it as a column base (Dragátsis 1885: 70).

C19/20:3(?). Worked inclined bedrock between C10/11:1–2. Slope may have been caused by erosion.

Dimensions: preserved length: 2.68 m. height of face between C19/20:4(?) and OP/SW3(S):1: 0.08–0.12 m; bottom level: -0.69 m (E) to -0.83 m (W).

C19/20:3a(?). Rock-cutting.

Dimensions: top length: 0.55–0.57 m; top width: 0.11–0.13 m; bottom length: 0.32–0.35 m; bottom width: 0.09 m; bottom level: -0.86 to -0.89 m.

C19/20:3b(?). Rock-cutting.

Dimensions: top length: 0.42 m; top width: 0.14–0.17 m; bottom length: 0.33–0.36 m; bottom width: 0.14–0.18 m; bottom level: -0.84 to -0.89 m.

Colonnade dividing Shipsheds 20(π) and 21(Δ), C20(π)/21(Δ), Phase 3
(Pls. 16–17, 20a, 32h-j)

C20/21:1. Rock-cut foundation trench for column position 1 (Dörpfeld 1885: pl. 3).

C20/21:2(H). Column base for column position 1 (labelled H in Dörpfeld 1885: pl. 2).

Dimensions: length: 0.98 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.46 m (Dörpfeld 1885: pl. 2, *MoP*: 0.04 m); height: 0.42 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +4.15 m (printed, Dörpfeld 1885: pl. 2, calibrated +4.08 m).

C20/21:3. Bottom column drum in column position 1 (Dörpfeld 1885: pls. 2–3).

Dimensions: height: 1.20 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top diameter: 0.64 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); 0.70 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m).

C20/21:4. Rock-cut foundation trench for column position 2 (Dörpfeld 1885: pl. 3).

C20/21:5. Column base foundation block for column position 2 (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 0.88 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.86 m (Dörpfeld 1885: pl. 3; *MoP*: 0.04 m); height: 0.48 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m).

C20/21:6(Θ). Column base for column position 2 (labelled Θ in Dörpfeld 1885: pl. 2).

Dimensions: length: 0.90 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.86 m (Dörpfeld 1885: pl. 2, *MoP*: 0.04

m); height: 0.52 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +3.82 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.75 m).

C20/21:7. Bottom column drum in column position 2 (Dörpfeld 1885: pls. 2–3).

Dimensions: height: 1.46 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top diameter: 0.64 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); 0.70 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m).

C20/21:8. Rock-cut foundation trench for column position 3 (Dörpfeld 1885: pl. 3).

C20/21:9(I). Column base for column position 3 (labelled I in Dörpfeld 1885: pl. 2).

Dimensions: length: 0.90 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.84 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.52 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +3.50 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.43 m).

C20/21:10. Bottom column drum in column position 3 (Dörpfeld 1885: pls. 2–3).

Dimensions: height: 1.20 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top diameter: 0.64 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); 0.68 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m).

C20/21:11. Raised rock-cut foundation for column position 4 (Dörpfeld 1885: pl. 3).

Dimensions: length: 0.94 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); top level: +2.54 m (scaled Dörpfeld 1885, pl. 3; *VMoP*: 0.03 m, calibrated +2.47 m).

C20/21:12. Trapezoidal foundation block for column position 5 set on C11/12:2(?) (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 0.86 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.98–1.12 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.47 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +2.31 m (printed, Dörpfeld 1885: pl. 2, calibrated +2.24 m).

C20/21:13. Foundation block for column position 6 set on C11/12:4 (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 1.02 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 1.00 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.54 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +2.02 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.95 m).

C20/21:14. Rock-cut foundation trench for column position 7 (Dörpfeld 1885: pl. 3). Extending C11/12:5 east.

C20/21:15. Foundation block forming the foundations for foundation block C20/21:16, together with C11/12:6.

Dimensions: length: 0.86 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); height: 0.50 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.04 m (scaled Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m, calibrated +2.47 m).

C20/21:16. Foundation block for column position 7 set on C11/12:6 and C19/20:15 (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 0.88 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 1.10 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.56 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.66 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.59 m).

C20/21:17. Rock-cut foundation trench for column position 8 (Dörpfeld 1885: pl. 3).

C20/21:18. Foundation block for column position 8 (Dörpfeld 1885: pls. 2–3).

Dimensions: length: 0.86 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 1.08 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.56 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +1.00 m (printed, Dörpfeld 1885: pl. 2, calibrated +0.93 m).

C20/21:19. Raised rock-cut foundation for column position 9 (Dörpfeld 1885: pl. 3).

Dimensions: length: 0.72 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 0.72 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); height: 0.44 m (Dörpfeld 1885: pl. 3; *VMoP*: 0.03 m); top level: +0.36 m (scaled Dörpfeld 1885: pl. 2, calibrated +0.29 m).

C20/21:20. Rock-cut foundation for column position 10 (Dörpfeld 1885: pl. 3).

Dimensions: length: 1.52 m (Dörpfeld 1885: pl. 3; *HMoP*: 0.02 m); width: 1.10 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); top level: -0.24 m (scaled Dörpfeld 1885: pl. 2, calibrated -0.31 m).

C20/21:21. Rock-cut foundation for column position 12 reusing C11/12:10 (Dörpfeld 1885: pl. 3).

Dimensions: top level: -0.42 m (scaled Dörpfeld 1885: pl. 2, calibrated -0.49 m).

Shipshed 21(Δ): Ramp, S21:R(Δ), Phase 3
(Pls. 16–17, 32b)

S21:R1. Feature number includes all blocks and the fill in the frame constructed upper part of Shipshed 21(Δ)'s ramp.

Dimensions: length: 10.12 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 3.03 m (printed, Dörpfeld 1885: pl. 2); elevation: +4.89 m (printed, Dörpfeld 1885: pl. 2, calibrated +4.82 m).

S21:R2. Most probably a ramp feature.

Dimensions: length: 4.56 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.26 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

S21:R3. Most probably a ramp block, probable re-used column drum.

Dimensions: length: 1.34 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.66 m (E), 0.64 m (W) (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); elevation: +3.17 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.10 m).

S21:R4. Most probably a ramp block, probable re-used column drum.

Dimensions: length: 1.34 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.68 m (E), 0.66 m (W) (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

S21:R5. Most probably a ramp block, probable re-used column drum.

Dimensions: length: 1.24 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.60 m (E), 0.58 m (W) (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

S21:R6. Most probably a ramp block.

Dimensions: length: 0.76 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.58 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

S21:R7. Most probably a ramp block.

Dimensions: length: 1.30 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.58 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); elevation: +1.86 m (printed, Dörpfeld 1885: pl. 2, calibrated +1.79 m).

Colonnade dividing Shipsheds 21(Δ) and 22(N), C21(Δ)/22(N), Phase 3
(Pls. 16–17, 32k; Figs. 170, 202, 204, 205a)

C21/22:1(Γ). Raised rock-cut foundation for spur-wall (Dörpfeld 1885: pl. 2). The feature is illustrated in light brown and outlined with a black line, except for the western end which is closed with a stippled black line probably indicating that C21/22:1 was not preserved here. The thin black line above the Γ indicate that the feature was stepped.

Dimensions: length: 1.98 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.66 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C21/22:2(Γ). Most probably a block in the spur-wall adjoining the back-wall (labelled Γ in Dörpfeld 1885: pl. 2).

Dimensions: length: 0.66 m (measured from inside of back-wall on Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.64 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C21/22:3(K). Column base for column position 1 (labelled K in Dörpfeld 1885: pl. 2).

C21/22:4(Λ). Column base for column position 2 (labelled Λ in Dörpfeld 1885: pl. 2).

C21/22:5(M). Column base for column position 3 (labelled M in Dörpfeld 1885: pl. 2).

C21/22:6. Rock-cut foundation trench for column positions 18 and 19. Re-used and extending C12/13:1 westward. Towards the north and west the feature is destroyed by a cut in the bedrock running roughly north-east/south-west, and no remains were found of the northern or western side-walls. Most of the bottom is generally uneven, eroded and damaged.

Dimensions: preserved length: *ca* 4.67 m; preserved width: *ca* 1.39 m; bottom level: -0.54 to -0.55 m.

In the southwestern part of C16/17:9 there are two pry marks.

C21/22:6a. Pry mark.

Dimensions: length: 0.10 m; max. width: 0.04 m; depth: 0.02–0.03 m.

C21/22:6b. Pry mark.

Dimensions: length: 0.12 m; max. width: 0.06 m; depth: 0.03–0.04 m.

Shipshed 22(N): Ramp, S22:R(N), Phase 3
(Pls. 16–17, 32c)

S22:R1. Feature number includes all rock-cut features in the upper part of Shipshed 22(N)'s ramp.

Dimensions: exposed length: 7.26 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 3.12 m (printed, Dörpfeld 1885: pl. 2); elevation: +5.53 m (printed, Dörpfeld 1885: pl. 2, calibrated +5.46 m).

Colonnade dividing Shipsheds 22(N) and 23(Π), C22(N)/23(Π), Phase 3
(Pls. 16–17, 32m; Figs. 170–171, 202, 204, 205d, 208)

C22/23:1(Ξ). Column base for column position 1 (labelled Ξ in Dörpfeld 1885: pl. 2).

C22/23:2. Bottom column drum in column position 1. A small part is visible in PIR6 (Pl. 32m).

Dimensions: bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C22/23:3(O). Column base for column position 2 (labelled O in Dörpfeld 1885: pl. 2).

C22/23:4. Bottom column drum in column position 2.

Dimensions: bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2, *MoP*: 0.04 m).

C22/23:5. Rock-cut foundation trench for column positions 12–13. In the eastern part broken pieces of bedrock abutted the line of destruction. C22/23:5 is preserved from this point westward. To the west of the line of destruction the original bottom remains in relatively good condition, with tool marks evident across the whole bottom. To the north a raised section runs the full length of the preserved part of C22/23:5, forming the northern boundary to Slipway 5 (depth: *ca* 0.17 m (E), 0.12 m (W)). There is no indication of a southern wall. The bottom of C22/23:5 is preserved for a length of 3.16 m; its preserved width is *ca* 1.30 m; and its bottom level is -0.69 to -0.71 m.

Five pry marks are present in the bottom of C22/23:5; all have tapered edges, and thus there are no clear indications of push direction:

C22/23:5a. Pry mark coincides with white line running north-south, probably as a result of more modern damage.

Dimensions: length: 0.08 m; width: 0.03–0.05 m; depth: 0.02 m.

C22/23:5b. Pry mark with its edges broken away.

Dimensions: length 0.11 m; width: 0.05 m; depth: 0.02–0.04 m.

C22/23:5c. Pry mark.

Dimensions: length: 0.11 m; width: 0.03–0.07 m; depth: 0.03–0.05 m.

C22/23:5d. Pry mark, tapering on all sides; there are tooled beach marks around pry marks cut in all directions.

Dimensions: length: 0.15 m; width: 0.06 m; depth: 0.03–0.04 m.

C22/23:5e. Pry mark, with the top edge and surrounding area damaged.

Dimensions: length: 0.16 m; width: 0.07 m; depth: 0.04–0.05 m.

Shipshed 23(Π): Ramp, S23:R(Π), Phase 3
(Pls. 16–17, 32d; Figs. 172, 214–215, 216b)

S23:R1. Feature number includes all features in the upper part of Shipshed 23(Π)'s ramp.

Dimensions: exposed length: 7.08 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 3.14 m (printed, Dörpfeld 1885: pl. 2); elevations: +5.45 m, +5.37 m, +4.30 m (printed, Dörpfeld 1885: pl. 2, calibrated +5.38 m, +5.30 m, +4.23 m).

S23:R2. Rock-cut foundation trench.

Dimensions: preserved bottom length: 1.45 m; preserved bottom width: 1.75 m; bottom elevation: -0.94 to -0.96 m.

Shipshed 23(Π): Possible Side-passage, Phase 3
(Pl. 16; Figs. 172, 214–215, 216b)

S23:SSP1(?). Possible rock-cut side-passage feature.

Dimensions: preserved top length: 3.85 m; preserved top width: 0.33 m; top elevation: -0.87 to -0.88 m.

Colonnade dividing Shipsheds 23(Π) and 24(Φ), C23(Π)/24(Φ), Phase 3
(Pls. 16–17; Figs. 171, 208, 210, 211c, 213a, 214, 215–216)

C23/24:1. Rock-cut foundation for spur-wall C23/24:2. The feature is outlined in light brown around spur-wall (Dörpfeld 1885: pl. 2).

Dimensions: length: 2.04 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.90 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C23/24:2A–2B(P). Spur-wall (labelled P in Dörpfeld 1885: pl. 2). The thin white line probably illustrates that the spur-wall was constructed in a similar way to the spur-wall behind colonnade C17/18:1–5(γ).

Dimensions: length: 1.98 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.66 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C23/24:3(Σ). Column base for column position 1 (labelled Σ in Dörpfeld 1885: pl. 2).

Dimensions: top level: +4.14 m (printed, Dörpfeld 1885: pl. 2, calibrated +4.07 m).

C23/24:4. Bottom column drum in column position 1 (Dörpfeld 1885: pl. 2).

Dimensions: bottom diameter: 0.70 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C23/24:5(T). Column base for column position 2 (labelled T in Dörpfeld 1885: pl. 2).

Dimensions: top level: +3.93 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.86 m).

C23/24:6(Υ). Column base for column position 3 (labelled Υ in Dörpfeld 1885: pl. 2).

Dimensions: top level: +3.72 m (printed, Dörpfeld 1885: pl. 2, calibrated +3.65 m).

C23/24:7. Most probably a rock-cut foundation trench for column position 17.

Dimensions: length: 1.00 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.90 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C23/24:8. Rock-cut foundation trench for column position 19. The northern side of the cutting is defined from the eastern end by the continuation of C14/15:1's northern side, which continues west towards C14/15:2. This northern side is 0.05–0.07 m high and runs *ca* 1.57 m towards the west, where it forms a *ca* 0.17 m-high corner with an eroded step down to the western parts of OP/SW6(S):1. The southern side of C23/24:8 is also the continuation of the southern wall of C14/15:1. The height of this side decreases down towards the west from *ca* 0.23 m to *ca* 0.06 m, and it ends just before reaching C14/15:2. To the south the bedrock seems to rise slightly, with no obvious edge. The top edge of C14/15:2 to the south seems flush with this level. Erosion is evident along the length of the southern side. On the bottom, marks from a tooth-chisel are evident across the whole feature. Most of the toolmarks run in an east-west direction. In the area around the northeastern corner there are tool marks in all directions. The marks seem to be generated from one stroke of a tooth-chisel, *ca* 0.02 m wide, and are most likely finishing cuts. The western end of C23/24:8 is damaged by cracks and erosion to a depth of *ca* 0.10 m below the original bottom surface. On Dörpfeld's plan a rectangular feature is highlighted at the same location (Pl. 17). Probably only the top edges of the feature were exposed when Dörpfeld documented this part of the colonnade; this may explain the rectangular shape of the feature.

Dimensions: bottom length: 1.45–1.51 m; bottom width: 1.37 m; bottom level: -0.60 m.

Four pry marks are present in the bottom of C23/24:8:

C23/24:8a. Pry mark. *Dimensions:* length: 0.12 m; width: 0.02–0.05 m; depth: 0.03 m.

C23/24:8b. Pry mark. *Dimensions:* length: 0.11 m; width: 0.01–0.05 m; depth: 0.02–0.03 m.

C23/24:8c. Pry mark. *Dimensions:* length: 0.08 m; width: 0.02–0.04 m; depth: 0.02–0.03 m.

C23/24:8d. Pry mark. *Dimensions:* length: 0.09 m; width: 0.03–0.04 m; depth: 0.02 m.

All four of these have a vertical face to the west and a tapered eastern side. This suggests that the push direction was easterly.

C23/24:9. Rock-cut foundation trench for column position 24 extending C14/15:4 towards west. No clear delination towards south.

Dimensions: preserved length: 3.77 m; bottom level: -0.96 m.

In the eastern part of C23/24:9 there are two rock-cut pry marks:

C23/24:9a. Pry mark. *Dimensions:* top length: 0.16 m; max. width: 0.07 m; depth: 0.02–0.03 m.

C23/24:9b. Pry mark. *Dimensions:* top length: 0.19 m; max. width: 0.08 m; depth: 0.02 m.

C23/24:10. Rock-cut foundation trench for column positions 25–26 extending C14/15:5. No clear delineation towards south. Destroyed by a dredging cut towards west.

Dimensions: preserved length: 3.36 m; bottom level: -0.96 m.

Shipshed 24(Φ): Ramp, S24:R(Φ), Phase 3
(Pls. 16–17)

S24:R1. Feature number includes all rock-cut features in the upper part of Shipshed 24(Φ)'s ramp.

Dimensions: exposed length: 7.02 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 3.05 m (printed, Dörpfeld 1885: pl. 2).

Shipshed 24(Φ): Possible Side-passage, Phase 3
(Pls. 16; Figs. 172, 214)

S24:NSP1(?). Possible rock-cut side-passage feature.

Dimensions: preserved bottom length: 1.42 m; preserved bottom width: 0.67 m; top level: -0.99 m.

Colonnade dividing Shipshed 24(Φ) and Possible Shipshed 25, C24/25, Phase 3
(Pls. 16–17)

C24/25:1(X). Column drum (labelled X in Dörpfeld 1885: pl. 2).

C24/25:2(Ψ). Column base (labelled Ψ in Dörpfeld 1885: pl. 2).

3.4. Catalogue: Phase 4, Possible Shipsheds 26–27

Possible Shipshed 26: Side-passage, Phase 4
(Pls. 6, 10, 15)

S26:SSP1(?). Feature is defined as the severely eroded worked and inclined bedrock between the northern side of W16/26:2 and the modern wall.

Dimensions: exposed length: 4.61 m; exposed width: 0.28 m.

S26:SSP2(?). Possible rock-cut side-passage feature.

Dimensions: exposed bottom length: 1.20 m; exposed bottom width: 0.82 m; bottom level: -0.57 m.

Colonnade dividing Possible Shipsheds 26 and 27, C26/27(?), Phase 4
(Pls. 15, 17)

C26/27:1. Spur-wall.

Dimensions: length: 1.10 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.64 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C26/27:2(μ). Most probably a column base (labelled μ in Dörpfeld 1885: pl. 2).

Dimensions: length: 1.30 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 1.30 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C26/27:3–4(ν). Two blocks set side-to-side, most probably forming a column base (labelled ν on Dörpfeld 1885: pl. 2).

Dimensions: length: 1.42 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 1.30 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C26/27:5(ξ). Most probably a column base (labelled ξ in Dörpfeld 1885: pl. 2).

Dimensions: length: 0.94 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m); width: 0.84 m (Dörpfeld 1885: pl. 2; *MoP*: 0.04 m).

C26/27:6(?). Block, possible feature in C26/27(?).

Dimensions: exposed top length: 0.30 m; exposed top width: 0.67 m; top level: -0.05 m.

Possible Shipshed 27: Side-passages, Phase 4
(Pls. 10, 15)

S27:SSP1(?). Block, possible side-passage feature.

Dimensions: exposed top length: 0.38 m; exposed top width: 0.22 m; top level: -0.18 m.

S27:SSP2(?). Block, possible side-passage feature.

Dimensions: top length: 1.06 m; top width: 0.57 m; top level: -0.15 m.

3.5. Catalogue: Architectural Elements (AE)

AE:1. Limestone block with inclined top (Pl. 6; Figs 95, 173a). Fairly well preserved top surface with tooth-chisel marks.

Dimensions: length: 1.13 m; width: 0.60 m (W), 0.62 m (E); height: 0.42 m (W), 0.62 m (E). Inclination of top surface 1:5.7 (9.0º).

AE:2. Rectangular limestone block (Pl. 6; Fig. 173a).

Dimensions: length: 1.19 m; width: 0.52 m; height: 0.59 m.

AE:3. Rectangular limestone block (Pl. 6; Figs. 96, 173a).

Dimensions: length: 1.31 m; width: 0.62 m; height: 0.62 m.

AE:4. Limestone block (Pl. 6; Figs. 99, 173a). The top of the block is cut flat. Any tool marks are either hidden under a thin layer of cement or erode away. Southern and northern faces are worked flat. Eastern part of block is broken off.

Dimensions: length: 0.84 m; width: 0.69 m; height: 0.43 m.

Top surface of block has four pry marks all oriented north to south:
AE:4a. length: 0.07 m; width: 0.02 m; depth: 0.03 m.
AE:4b. length: 0.09 m; width: 0.02 m; depth: 0.03 m.
AE:4c. length: 0.09 m; width: 0.02 m; depth: 0.03 m.
AE:4d. length: 0.08 m; width: 0.03 m; depth: 0.03 m.

AE:5. Limestone block (Pl. 6; Figs. 98, 173a). The face facing up is worked roughly flat. The sides are all worked flat; however they are much smoother than the top. The block is wider and shorter to the east side than it is on the west side. The northwestern corner missing.

Dimensions: length: 1.33 m; width: 0.73 m (E); width before broken NW corner (0.95 m from E face): 0.67 m; height: 0.40 m (W), 0.34 m (E).

AE:6. Limestone block (Pl. 6; Fig. 173a).

Dimensions: length: 0.95 m; width: 0.57 m; exposed height: 0.69 m.

AE:7. Part of limestone block (Pls. 6, 8a–b). *Anathyrosis* on southern face, along west and bottom edges (width: 0.10-0.11 m).

Dimensions: length: 0.86 m; width: 0.47 m; height: 0.56 m.

AE:8. Limestone block (broken in two parts), northern part missing (Pls. 6, 8a–b). *Anathyrosis* along eastern, bottom and western edge. Plaster on western face.

Dimensions: length: 1.02 m; width: 0.65 m; height: 0.55 m.

AE:9. Rectangular limestone block (Pls. 6, 8a–b; Fig. 101). Corners damaged, surfaces well preserved, except for western side. Pry mark in top surface (length: 0.08 m; width: 0.06 m; depth: 0.02 m).

Dimensions: length: 1.28 m; width: 0.58 m; height: 0.61 m.

AE:10. Rectangular limestone block (Pls. 6, 8a–b; Fig. 102). Has three rectangular cuttings on west face.

Dimensions: length: 1.17 m; width: 0.58 m; height: 0.58 m.

AE:10a. Rock-cutting. *Dimensions:* length: 0.07 m; width: 0.05 m; depth: 0.02 m.

AE:10b. Rock-cutting. *Dimensions:* length: 0.10 m; width: 0.05 m; depth: 0.02 m.

AE:10c. Rock-cutting. *Dimensions:* length: 0.12 m; width: 0.10 m; depth: 0.03 m.

AE:11. Limestone block with inclined top. Surfaces roughly worked with pointed chisel (Fig. 103).

Dimensions: length: 0.73 m; width 0.71 m; height: 0.63 m (E), 0.53 m (W). Inclination of top surface 1:7.3 (7.8º).

AE:12. Fragment of limestone block with inclined top 1:4.1 (13.7°; Fig. 104).

AE:13. Column drum (Pl. 6; Fig. 73)

Dimensions: top diameter: 0.54 m; bottom diameter: 0.57 m; height: 1.01 m