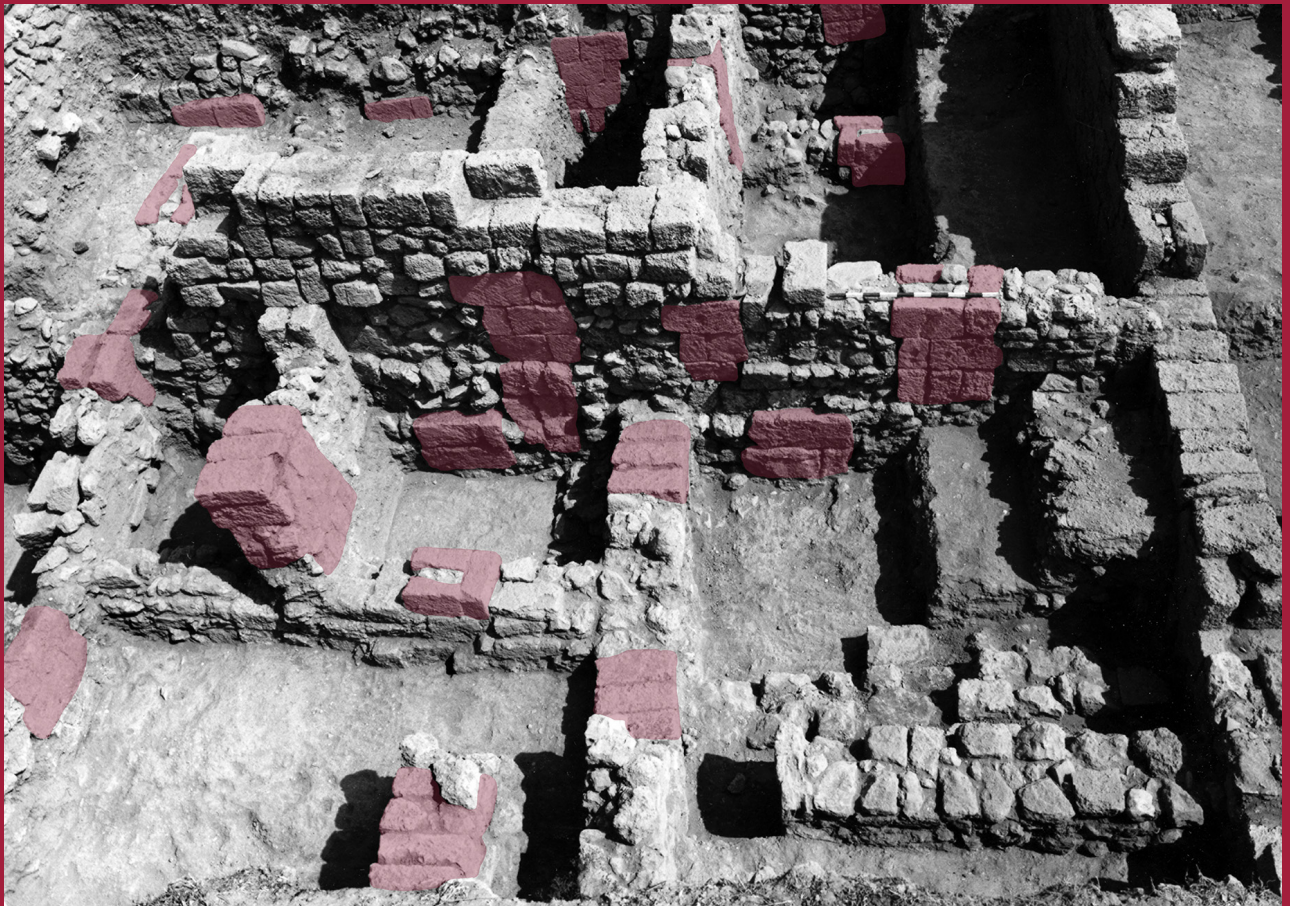


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PIER-AND-RUBBLE?

'PHOENICIAN' BUILDING TECHNIQUES IN THE FIRST
MILLENNIUM BCE LEVANT AND THE MEDITERRANEAN



Maximilian Felix Rönnerberg

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Martin Bartelheim and Thomas Scholten

Maximilian Felix Rönnerberg

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Preface

This book is a result of my employment as a post-doctoral researcher in project A 06 of SFB 1070 RESSOURCENKULTUREN at the University of Tübingen in 2021–2022. This project deals with “Connectivity, Interregional Networks and Cultural Contacts: Late Bronze Age and Iron Age ResourceCultures in the Eastern Mediterranean”, and my research focused on what building techniques, especially the so-called pier-and-rubble technique, can contribute to this topic. But since the ‘Phoenician’ world extends far beyond the eastern Mediterranean, I decided to broaden the geographical dimension of the study. This book thus gives a detailed overview of the evidence for the ‘pier-and-rubble technique’ and related building techniques from the Levant and a slightly more casual overview of the evidence from the central and western Mediterranean (partly from a Levantine perspective). This collection and classification of the evidence is intended as a resource for future researchers. I hope that my general conclusions will not only encourage further research on ancient building techniques, but also provide ideas for those dealing with other aspects of ‘Phoenician’ connectivity.

First of all, I would like to thank Martin Bartelheim and Jens Kamlah for the chance to participate in this project. Jens Kamlah continuously supported my research throughout this period and encouraged me to adjust its focus to the changing circumstances, and my colleagues, especially Meryem Büyükyaka and Elena Revert Francés, made it fun to do so. I received unpublished information, valuable comments and advice from numerous other researchers, including Marion Bolder-Boos, Christiane Brasse, Stefano Floris, Hermann Genz, Sophie Helas, Gunnar Lehmann, Becky Martin, Adriano Orsingher, Frerich Schön and Ilan Sharon. Further thanks go to the anonymous reviewers for their helpful comments. A large number of individuals and institutions made this publication possible in the present form by permitting the reproduction of photographs. I owe the many redrawn plans and sections to the diligence of Anna Galeano Araque, and numerous scans and requests for the publication of images to Jonathan Gaukesbrink. This book is dedicated to my three younger siblings, Emil, Enno and Ronja, who all took their first steps into adulthood and higher education in the years I have been working on this project.

1 Introduction

1.1 What is the Pier-and-Rubble Technique? Definition and Terminology

The term ‘pier-and-rubble technique’ and its equivalents in other languages are commonly used for various Levantine building techniques in which ashlar and rubble masonry alternate. Thus, the very first thing this study of such building techniques needs to do is to deal with questions of terminology: Which building techniques have been described as pier-and-rubble, how can they be differentiated and how will they be called in the present book? Basically, at least seven different techniques have sometimes been called pier-and-rubble or at least equated with this technique (*fig. 1*):

- (1) Walls in which ashlar piers, that is sections built of multiple courses of ashlars, mostly laid as headers and stretchers, with multiple ashlars per course, alternate with sections in rubble masonry. The ashlars are not standing upright, but were laid on one of their narrow sides (*fig. 1: 1*).
- (2) Walls in which corners, the frames of doors and possibly the intersections of walls were strengthened with ashlars or built as ashlar piers, but in which ashlars do not appear within straight walls, which consist entirely of rubble (*fig. 1: 2*).
- (3) Walls in which individual ashlar blocks, often only roughly squared, were inserted as headers, sometimes standing on their short sides, into rubble walls. In successive courses, the ashlars were not placed above each other, but staggered; every ashlar is surrounded by rubble (*fig. 1: 3*).
- (4) Walls in which massive, squared ashlars standing upright but still covering the entire width of the walls, alternate with sections of rubble masonry. In subsequent courses, the ashlars were placed above each other (possibly alternatingly in a standing and a lying position). Every pier has only a single ashlar per course (*fig. 1: 4*).

- (5) Walls in which massive, squared ashlars standing upright but still covering the entire width of the walls alternate with sections of rubble masonry merely in the socles (with the upper parts consisting of mudbricks). Ashlars were not placed above each other (*fig. 1: 5*).
- (6) Walls in which a series of sometimes roughly squared, but mostly roundish, column-like standing monolithic ashlars are connected to each other with rubble walls. The height of the standing columns or ashlars mostly makes up the entire height of the ground floor (*fig. 1: 6*).
- (7) Walls in which the space between two ashlar faces was filled with rubble (*fig. 1: 7*).

The first technique is what was originally called ‘pier-and-rubble masonry’ and is still called that way throughout. This technique is the main focus of the present book. All the evidence pertaining to it has been collected in the catalogue (chapter 6),¹ and the larger part of the book is devoted to the evaluation of this data. The ashlar sections of the pier-and-rubble masonry have been commonly called ‘piers’ or ‘pillars’ (*Pfeiler, piliers, pilares*)² or ‘pilasters’ (*pilastre, pilastri*).³ The latter term seems unsuitable, since it generally refers to projecting (decorative) elements and the ashlar piers do not project. The term ‘pier’ is likewise somewhat problematic because it and its equivalents in German and French mostly refer to free-standing

¹ For the organisation of the catalogue and the abbreviations used for its individual entries, see chapter 6.1. The spelling of site names follows the guidelines of the German Society for the Exploration of Palestine. Uncommon names transcribed from Arabic or Hebrew are printed in italics.

² The first use of the term ‘pier’ for the ashlar sections may have been by Hamilton (1934, 78); he was followed by Braidwood (1940, 190) and then by most authors writing in English. ‘Pillars’ may have been first used by Stern (1968, 213), although he preferred the more suitable term ‘pier’ in later publications (e.g. Stern 1977). Peckham (2014) now uses pier-and-rubble alongside ‘pillar-and-rubble’.

³ The first use of the term *pilastre* may have been by Barrois (1939, 116, 265); more recently, it has only rarely been used (but see e.g. Ussishkin/Woodhead 1992, 19, 36, 38; Khries 2016, 205). The term is more common in Italy (see especially Camporeale 2014).

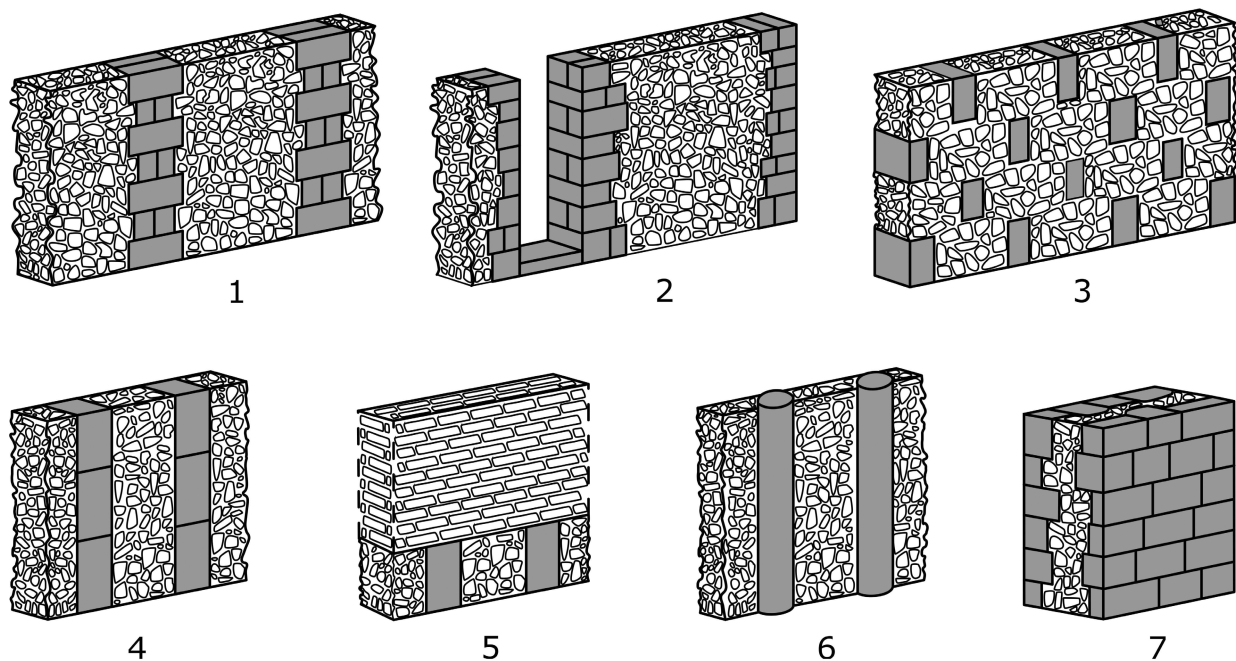


Fig. 1. Typology of building techniques combining ashlars and rubble. 1. pier-and-rubble technique; 2. ashlar piers only at corners, doors and intersections of walls; 3. staggered-reinforcing-header technique; 4. *a telaio* in walls of full height; 5. *a telaio* in mere stone socles; 6. monolithic-column technique; 7. two-faced ashlar walls with rubble infill.

structures;⁴ but since no better word exists and

⁴ The Cambridge Dictionary states that a 'pier' is 'a strong thick column used to support a wall, roof, or other structure'. The Duden gives '[frei stehende] senkrechte Stütze [aus Mauerwerk, Beton o. Ä.] mit meist eckigem Querschnitt zum Tragen von Teilen eines größeren Bauwerks' as the definition of *Pfeiler*. The Dictionnaire de l'Académie Française defines *pilier* as 'ouvrage de maçonnerie isolé et massif, de section carrée, ronde, cruciforme, etc., destiné à soutenir un édifice ou une partie d'une construction' and the Dictionnaire Larousse as 'support isolé en maçonnerie, élevé pour recevoir une charge (arcade, voûte, plafond, charpente, etc.)'. More inclusive definitions of 'pier' exist in English; the Merriam Webster gives 'a vertical structural support: such as, a, the wall between two openings, b, pillar, pilaster, c, a vertical member that supports the end of an arch or lintel, d, an auxiliary mass of masonry used to stiffen a wall'. The Collins Dictionary states that in British English, a 'pier' is 'a pillar that bears heavy loads, esp. one of rectangular cross section', 'the part of a wall between two adjacent openings' or 'another word for a buttress', but the similar definition of the same word in American English includes 'a portion of wall between doors, windows, etc.' and 'a support of masonry, steel, or the like for sustaining vertical pressure'. The Oxford English Dictionary defines a 'pier' as a 'solid support designed to sustain vertical pressure; spec. (a) a square pillar or pilaster; (b) each of the pillars on which an arch rests' or 'The solid masonry between doors, windows, and other openings in a wall'. We thus see that a 'pier' is meant to be an isolated, free-standing element in French and German and is mostly used that way in English, even if sections of walls between openings may also be called that way.

the term is commonly used, it will be adopted.⁵ The term 'rubble' carries no negative connotations, since this material was most common for all types of buildings (or their socles) in the Eastern Mediterranean, and it is meant as an inclusive term covering unworked roundish fieldstones, broken fragments of such stones, roughly hewn stones of small sizes, but also at least partly squared small stones. The rubble sections of walls in the pier-and-rubble technique have often been called 'filling' or 'fill' in English (or *remplissage* in French), but this, again, is somewhat problematic because it confuses independently standing rubble walls with the common rubble 'infill' between two faces of ashlar blocks (the seventh technique above);⁶ this study will thus avoid these terms. The general term 'pier-and-rubble' for the technique

⁵ See Elayi 1980, 167, 'Le terme de 'pilier' n'est pas tout à fait satisfaisant, mais il est le plus couramment admis et aucun des termes proposés par les différents auteurs ne paraît plus adéquat'. For other terms used in research on the western Mediterranean, see the extensive note 2 in Pittaccio 2004–2007, 48 f.

⁶ See Elayi 1980, 166, note 4 using the term *blocage* instead of *remplissage*.

(and the French and Spanish equivalents, ‘mur à piliers’ and ‘muro de pilares’),⁷ lastly, may be somewhat problematic because of the above-mentioned free-standing associations the term pier evokes, and this may be the reason why E. Gubel chose to call such walls ‘mur à (pseudo-)piliers’ in his contribution on domestic architecture in the ‘Dictionnaire de la civilisation phénicienne et punique’ (Gubel 1992, 37). But other than that, the use of this term is common and there is no better solution, so that it will be retained in the present book.

The second technique is much less specific and will not be comprehensively dealt with here. Buildings in which ashlar blocks were used only at the corners and the doors were often included in discussions of the pier-and-rubble technique (see e.g. Sader 2009, 62 f.; Woolmer 2011, 24; Sader 2019b, 156). But this is a very common technique with a chronological and geographical distribution far too wide to be sketched here, which often antedates the emergence of pure ashlar masonry and does not require organised quarrying activity, at least not on a large scale.⁸ Since the placement of the largest and most accurately dressed blocks at structurally important corners and doors

makes much sense, it is best to join I. Sharon in stating that the value of this ‘technique’ as a cultural indicator is low (Sharon 1987, 28; see also e.g. Camporeale 2014, 205). Even if knowledge of the true pier-and-rubble technique (as defined above) may well have stimulated the strengthening of corners not only with few ashlars, but more massive ashlar piers in cases like the Iron Age II fort at *Ḥorvat Rōš Zayit* (see note 12), it would be hard to draw a dividing line between the pier-and-rubble technique and more casually strengthened corners, especially if cases in which ashlar piers occur only at corners, doors and intersections of walls were considered examples of the pier-and-rubble technique.⁹ Thus, it makes more sense to make the more unusual but highly significant occurrence of ashlar piers within straight walls the defining factor of the pier-and-rubble technique. Sites in which ashlars were only used in corners (including intersections of multiple walls within buildings) and doorways have thus not been included in the catalogue and will be excluded from the present discussion. But since the placement of pier-like combinations of ashlars at corners, intersections of walls or doorways may be considered a preliminary stage of the pier-and-rubble technique, or at least a prerequisite, cases in which ashlars were used in such a way before the erection of ashlar piers within straight lines of walls in the same contexts will be dealt with in some detail below (see chapter 2.1).

This definition means that quite a few walls included in earlier studies on the pier-and-rubble technique will be excluded here: ashlars in the Persian period sanctuary in *Makmiš* (North of *Tēl Mikāl*) have only been used framing doorways (Avigad 1960, 91, pl. 9a).¹⁰ In Hazor, corners have been reinforced in various ways, with ashlars forming pier-like structures, but there are no piers

7 The French ‘mur à piliers’ is a term created by Elayi 1980, 167 and accepted e.g. by Cecchini 1995, 390 in his discussion of the architecture of Phoenicia in the ‘Manuel de recherche’. The term ‘ribbed wall’ was sometimes used in older research following Hamilton 1935, 2, who called the piers ‘ashlar ribs’, and Pritchard 1971, 19, who called the walls in the pier-and-rubble technique at Sarepta ‘rib construction’ and is meanwhile uncommon (but see Elayi 2010, 159). The use of the term *a telaio* for walls in the pier-and-rubble technique at Jezreel by Franklin 2006, 108 seems to be a misunderstanding, and the terms ‘ashlar framed masonry’ or even *opus punicum* by Wright 1985, 407, 426 did not catch on. In his discussion of residential architecture in the ‘Oxford Handbook of the Phoenician and Punic Mediterranean’, Docter 2019, 448 uses ‘pier-and-rubble-masonry’ and equates it with *opus africanum*.

8 See e.g. Wright 1985, 397; Sharon 1987, 28; Kreimerman/Devolder 2020, 6 f. for general remarks. In Byblos and *Tell Fadaūs Kfar ‘Abidā*, corners were strengthened with larger, more regularly cut blocks already in the Early Bronze Age (see Lauffray 2008, 68, 72, 192, 284, fig. 31, 34, 151, plan 4, 9–17; Genz et al. 2016, 81, 88 f., fig. 4, 5, 11, 12, 15; Kreimerman/Devolder 2020, 16 f.). In Late Bronze Age Levant, this was very common at Ugarit (see note 84, 85), but is also known e.g. from *Tell Kazel* (see Badre/Gubel 1999/2000, 170) or *Tell el-Burak* (see note 81). The strengthening of corners with ashlars is also known from mudbrick buildings (see e.g. Petrie 1928, 8, pl. 15,2). See also e.g. Ussishkin 1978, 46 f.; Stern 1995b, 29; Sharon/Gilboa 2010; Gilboa et al. 2015, 64 for Iron Age fortification walls built partly of stone and partly of mudbrick.

9 See also the thoughts of Helas (et al. 2011, 40 note 20), who note that larger blocks were sometimes used at corners, doors and intersections of walls in the earlier Greek houses of Selinunte, but only within straight walls in the later Punic phases, ‘Die aufrecht gestellten Quader übernehmen eine stabilisierende Funktion an anfälligen Punkten wie Eingängen und Mauerwinkeln. Sie bilden aber nicht die Textur der Mauer; sie werden nicht zum Konstruktionsprinzip’.

10 This building has been included in the list of buildings with ‘ashlar piers’ of Sharon 1987, 30 and Stern 1992b, 303; but see already the remarks of Elayi 1996, 80, 84.

set within straight wall segments (Yadin et al. 1958, 30, pl. 21: 4, 5; 177; 1960, 45, pl. 204, 205; Yadin 1975, 163).¹¹ The fort at *Horvat Rōš Zayit* likewise features ashlar at corners and doorjambs; although the excavators thought that the relatively short walls of the building are the only reason that no piers have been used along stretches of rubble walls, this seems doubtful, since some walls reach a length of more than 3.5m (Gal/Alexandre 2000, 20, but see W19, W22, W22, W36).¹² At *Šiqmōnā*, (monolithic) piers have only been used at corners and in one intersection of walls (Elgavish 1974; Khries 2016, 86–88, plan 2: 43). In other cases, there have been simple misunderstandings:¹³ the casemate walls in *Tēl Məgādīm* are comparable to those in *Tēl Məvōraḳ* in their general layout, but only consist of low bases of small fieldstones (Broshi 1968, 256 f.; Stern 1982b, 50, fig. 48; Broshi 1977).¹⁴ There seem to be no such walls in *el-Ḥarāyeb*,¹⁵ *Tēl Gīlam (Ḥirbet er-Rujm)*,¹⁶ Ashdod¹⁷ or Taanach (*Tell*

Ta'annek).¹⁸ A ‘wall’ in *Tell Kēsān* was shown to be a series of Byzantine pillars, and the identification of other walls at this site as examples of the pier-and-rubble technique remains distinctly doubtful.¹⁹

The third technique described above, with single headers inserted into rubble walls, partly appears at the same sites (or even the same buildings) as pier-and-rubble masonry, but is much less widespread; it is known so far from only five Hellenistic sites in the southern Levant,²⁰ even though the setting of single headers into rubble masonry at regular intervals makes much sense, since it increases the solidity of the wall (see e.g. Wright 1985, 397; Camporeale 2014, 206). Although the technique is only comparable to pier-and-rubble in the respect that ashlar are used within rubble walls, it is considered in the present book because it is generally called ‘pier-and-rubble’ and first seems related to the fourth technique as defined above (see e.g. Hartal 2016, 54).²¹ It will be called

11 These walls have been considered examples of the pier-and-rubble technique (Elayi 1980, 168 note 24; Briquel-Chatonnet 1992, 343; Stern 1992b, 303; Elayi/Sayegh 2000, 203), but see already the remarks of Elayi 1996, 80.

12 See Gal 1990, 93 f. with fig.; 1993, 1290; Gal/Alexandre 2000, 14, 16 f., 19, 198, fig. II.4, 6, 11, 17, 23–26, plans 3–6. The fort was also considered an example of the pier-and-rubble technique (Briquel-Chatonnet 1992, 344; Sader 2019b, 156).

13 See also Bonghi Jovino 2000, 92, who referred to buildings from *Tell Tayinat*, erected not in the pier-and-rubble technique, but with orthostates and a rubble core, as well as to rubble walls on ashlar foundations at Tamassos on Cyprus (see note 219). Bonghi Jovino 1997, 170 furthermore refers to the so-called house of Qurdi Nergal at Sultantepe and illustrates this with a photograph supposedly showing this building (her pl. 147,2), but the image in fact shows structures entirely different from the so-called house of Qurdi Nergal (Lloyd/Gokçe 1953), most probably modern field walls and/or animal-pens at an unknown site. Jigoulov 2010, 120 referred to Al Mina, where the technique is not documented. Huylmans 2019, 87–90, fig. 87–90 referred to the Iron Age temple (phase C) at the College Site at Sidon based on Bordreuil/Doumet-Serhal 2013, 88, fig. 5–7, but the final report (Doumet-Serhal 2021/2022) shows no evidence of the pier-and-rubble technique; some ashlar were incorporated into the rubble walls in a less systematic way.

14 These have been considered an example of the pier-and-rubble technique by Elayi 1980, 167 based on Stern 1982b, 50, but see already Elayi 1996, 80.

15 See Elayi 1996, 81 contra Sharon 1987, 31, who refers to Chehab 1952, plan B, not showing such walls.

16 Edrey 2019, 81 refers to Stern 1970, but Stern himself, in his many later publications on the pier-and-rubble technique, never mentioned the results of his own excavations at this site (including ancient ashlar).

17 Fischer et al. 2008, 134 referred to the Hellenistic wall W4059 from Stratum 3 in Area G (Fortuna et al. 1971, 141, plan 17, pl. 66,1), but even though this seems to include a few

larger blocks, the reconstruction of an ashlar pier is hardly possible and there seem to be no other piers at this site.

18 Shiloh 1979, 63 refers to Sellin 1904, 21, plan I, which does not show a combination of ashlar and fieldstones.

19 Elayi 1980, 170, note 37; 177 (see also Beyl 2013, 96) referred to the preliminary report (Prignaud 1972, 235 note 24), but the wall in question has now been shown to be a series of pillars of the Byzantine basilica by the final report (Briend/Humbert 1980; see also Elayi 1996, 90 f. note 19). Nevertheless, it is not impossible that some of the badly preserved Persian or Hellenistic structures at *Tell Kēsān* featured walls built in the pier-and-rubble technique (see the larger stones shown in Briend/Humbert 1980, fig. 30, 32; compare Khries 2016, 84 f.), but the descriptions and the photographs in this final report offer no confirmation of this possibility. According to Gunnar Lehmann (personal communication, 2022), no walls in pier-and-rubble masonry (as defined in the present book) have yet been found at *Tell Kēsān*.

20 *Tēl Anafa* (14-AN, pier-and-rubble masonry in the same building, plan 16, fig. 52–54); *Tēl Qedeš* (16-KE, pier-and-rubble masonry possibly in the same building, plan 18); Acco (20-AK-03, 20-AK-04, 20-AK-05 and 20-AK-06, pier-and-rubble in other parts of the site, fig. 57–60); Dor (24-DO-03, 24-DO-08, 24-DO-10, pier-and-rubble very widespread in many other buildings, plan 32, fig. 78, 79); Iotapata (21-IO-01 and 21-IO-02, plan 22, 24). It may also be documented in *Tell Twēnī* (01-TW*, plan 1, fig. 26), although this is doubtful; even more problematic is the interpretation of one such block in *Šiqmōnā* (see Elgavish 1974, pl. 3. Since only one such – reused – block is to be seen, this site was not added to the catalogue; see also Carayon 2008, 76).

21 Sharon 2009, 294* calls the technique ‘pseudo-a-telaio’, but argues against a direct link (see also e.g. Ciafaloni 2006, 147). Camporeale 2014, 196 includes more or less the same technique (although in the central Mediterranean, the blocks more often stand upright) into his typology of a *telaio* (type 1B).

the staggered-reinforcing-header technique. The few instances have been added to the catalogue, but cases in which the large ashlar were not inserted into rubble walls but into walls faced with smaller ashlar have been excluded.²²

The fourth technique above, in turn, is not documented in the Levant,²³ but is common in ‘Punic’ as well as Roman sites in the western Mediterranean, where it is mostly called *a telaio* or *opus africanum*.²⁴ Even though the areas of distribution hardly overlap, *a telaio* resembles the pier-and-rubble technique in the fact that ashlar piers alternate with sections in rubble masonry. The two techniques have thus not only been often equated²⁵ and

sometimes confused,²⁶ but have also been taken as indirect evidence of the ‘Phoenician-ness’²⁷ of the pier-and-rubble technique (even though *a telaio* may be closer to the staggered-reinforcing-header technique, from which it cannot be safely distinguished in some badly preserved examples). The pre-Roman evidence of *a telaio* is certainly relevant to questions about ‘Phoenician’ technology transfers and will be discussed in chapter 4, albeit not in the same depth as the examples of the pier-and-rubble technique.

The fifth technique above is almost always subsumed under the terms *a telaio* and *opus africanum* in discussions of ‘Punic’ and Roman building techniques in the central and western Mediterranean (and thus related to pier-and-rubble by those linking the two techniques),²⁸ but it seems quite different from the fourth technique above in its basic approach. This distinction will be dealt with in more detail below (see chapter 4.2).

The sixth technique described above, which has sometimes been dealt with together – or even confounded – with the pier-and-rubble technique,

22 The Hellenistic city walls of Dor resemble the staggered-reinforcing-header technique because single monolithic standing slabs are inserted staggered into a wall, but this wall was built out of smaller squared blocks (see e.g. Stern 1988, 11, 13, fig. 3; Sharon 1995, 142, fig. 5: 25, photo 5: 43, 44, 49, 116, 177, plan 5: 11, 21, 22, 26, 27). See also Stern 1994, 163, fig. 97; 1998, 377 for another building in Area G and Stern et al. 1991, 54 for further remarks on this unusual ‘ashlar pier and ashlar fill technique’ at Dor.

23 One context in Acco (20-AK-03) comes close to *a telaio* (fig. 57), but still differs, as the ashlar were not placed directly above each other; the same may apply to the less well-preserved contexts 20-AK-04, 20-AK-05 and 20-AK-06. Furthermore, two photographs in the preliminary reports on the 2009 and 2010 seasons at Area D4 at Dor (Sharon/Gilboa 2010, fig. 14; 2011, fig. 6, 16) show a wall (W07d4-061) which may have been erected in *a telaio*, but an identification as a very regular form of the staggered-reinforcing-header technique seems most likely: massive ashlar placed upright (at least ca. 0.45m high and up to ca. 0.35m wide), alternating with short (ca. 0.40–0.55m) sections of partly squared random rubble. Only one course was preserved, though, and the wall has multiple phases, partly consisting of a disorganised assortment of partly squared blocks (phase D) and of ashlar (phase C). Since the wall was dated to the Roman period (using *spolia*) and no further information is available, the context was not added to the catalogue.

24 The distinction in the usage of the two terms is difficult. Although *opus africanum* is most common in publications analysing Roman constructions in northern Africa and Spain, and *a telaio* is much more common when ‘Punic’ architecture in Sicily and Sardinia, or the ‘stone framework’ of Pompeii, is dealt with, the distinction is often less chronological than according to the language of the publication (or the mother tongue of the researcher). The term *opus africanum* is consistently used for example by Montanero Vico 2014, although he deals with ‘Punic’ Sicily and Sardinia, while Camporeale 2014; 2016 uses *a telaio* also for Roman Imperial buildings in northern Africa (see chapter 4.2 for further remarks).

25 See e.g. Isserlin 1973, 142; Isserlin/Du Plat-Taylor 1974, 90 f.; Fantar 1984, 335–344; Ruiz Mata 1984, 540; Stager 1985, 13; Fernández Miranda 1986, 236; Díes Cusí 1994; Escacena Carrasco 2002, 79; Ruiz Mata 2002, 269; Pittaccio 2003, 53; Prados Martínez 2003, 18, 46; Herbert/Berlin 2003, 120; Pittaccio 2004–2007, esp. 39, 41, 44, 47; Wright 2005, 60; Cialfoni

2006, 147; Morigi 2006, 32, fig. 3, 4; Niemeyer et al. 2007, 111; Prados Martínez 2007, 22; Prados Martínez/Blánquez Pérez 2007, 66; Bonetto 2009, 120; Sader 2009, 63; Bianchini 2010, 142; Di Luca/Cristilli 2011, 464; MacIntosh Turfa 2012, 270; Lancaster/Ulrich 2014, 189; Morstadt 2015, 42; Potts 2015, 107; Docter 2019, 448; Bolder-Boos 2020, 107, 422, 432; Winter 2020, 160; López-Ruiz 2022, 37, 164; Torres Gomariz 2022, 375. See also e.g. Wright 2009, 169, who may rather think of the monolithic-column technique than pier-and-rubble.

26 ‘The ashlar were used [...] as ‘strengthening ashlar piers’ (the *a telaio* technique)’, describing walls of the pier-and-rubble technique (Franklin 2006, 108). ‘The main difference between the mainland [‘Phoenicia’] and Punic techniques was the manner in which the upright piers were constructed; in Phoenicia proper they were monolithic carved blocks, while in Carthage they were built up from individual ashlar blocks stacked in a ‘header’ and ‘stretcher’ fashion’ (Woolmer 2011, 24). ‘Walls constructed with large spaced ashlar stones used as framework, and in between them undressed fieldstones fill, known as the ‘pier-and-rubble’ technique’ (Edrey 2019, 74, based on Raban/Stieglitz 1993, 14*).

27 A short note on terminology: Since the question of ‘Phoenician’ identity is a vexed one (see chapter 3.5, esp. note 202) because the term ‘Phoenicians’ may be considered a modern construct based on an etic and not an emic description, this book follows the advice of Oggiano 2019, 591 to use it in inverted commas. The same is true for ‘Punic’, but much less for Greek and Roman, which stay without inverted commas.

28 The only really diverging voice is Karlsson 1992, 95; see the discussion in chapter 4.2.

will be called ‘monolithic-column technique’ here.²⁹ In their paper on the subject, G. and O. van Beek considered the monolithic-column technique and the pier-and-rubble technique as two different but closely connected building styles of ‘Phoenician’ origin, even though the first has not yet been found in the northern or central Levant, but is only common in the Iron Age in the southern Levant (van Beek/van Beek 1981; see also Wright 1985, 427; Bonghi Jovino 2000, 91, note 23; Ciafaloni 2006, 146). Although this opinion has been justly criticised, for example by Sharon (1987, 38), examples of the monolithic-column technique still appeared in later discussions of the pier-and-rubble technique.³⁰ In contrast to the other techniques outlined above, the ashlar

of the monolithic column technique of Iron Age Israel and Jordan were only used in two specific contexts: firstly, they were used separating three aisles in large buildings commonly interpreted as stables, storage facilities or multi-functional buildings.³¹ In this case, they are either free-standing or only connected through low walls or drinking or feeding troughs (and thus not parts of walls in any meaningful sense). Secondly, such monolithic piers are used in Iron Age houses, mostly so-called four-room houses and their variations, where they delimit one long side of the courtyard, creating a roofed part or a side-room; in smaller houses, they internally divide the single or the largest rooms.³² Accordingly, the piers can be free-standing or connected to each other by rubble walls. These walls, however, may often have been added at a later date (see e.g. discussion in Braemer 1982, 119 f.). In some instances, only some of the spaces between the pillars have been walled. In the instances in which the gaps between the piers were (mostly) walled, these walls may superficially resemble pier-and-rubble walls or a *telaio* walls, but they are fundamentally different from them for a number of reasons: firstly, one block makes up the entire height of the ground floor level, with lintels (rarely conserved) following immediately on top.³³ This, secondly, means that the rubble fillings did not need to be erected together with the pillars (and often were not added at all). Thirdly and most importantly, this technique is used only in a very specific context: not a single building features them in its outer walls. This means – and this is the crucial point – that the monolithic-column technique is fundamentally different from the pier-and-rubble technique or the *telaio* technique in that it is not a technique widely used in a variety of contexts in different types of buildings, and thus cannot be considered a building technique

²⁹ Since the piers are sometimes squared and not rounded, ‘monolithic-pier technique’ would be a better term for this technique in some instances, if this did not create confusion, since it would approximate it to the later monolithic piers of the *a telaio* technique.

³⁰ This is partly due to the fact that preliminarily published cases of the monolithic-column technique have been taken for examples of the pier-and-rubble technique (Briquel-Chatonnet 1992, 343 refers to *Tell Bēt Mirsim*, *Tell el-Fār’a* (North), *Rāmat Maṭrēd*, *Rēfed* and *Ḥatīrā*). At *Tell Bēt Mirsim*, monolithic piers are very commonly used in the way described above in houses (Albright 1943, 50–55), but are only rarely connected by rubble walls (Albright 1943, 50–55, pl. 45b, 47c, 49b). At *Tell el-Fār’a* (North), numerous houses use monolithic ‘columns’ alongside their courtyards, the gaps between them are mostly not walled up (de Vaux 1955, pl. 6, 11, 12; see also <<https://www.tellefara.com/>>). Building B and C at *Rāmat Maṭrēd* likewise feature a series of pillars partly connected through rubble walls as an internal division (Aharoni et al. 1960, 34–36, fig. 9), but these walls may again be later in date than the pillars. The fortress at *Rēfed* (10th cent. BCE) is almost entirely built of rubble masonry, but features roughly shaped pillars in the inner wall of Room 4 (Meshel/Cohen 1980, 72, pl. 24,2). The spaces between the piers were probably walled up in a second phase, since the casemate room is inaccessible from its other sides, but includes a floor on which pottery was found. This may also apply to *Ḥatīrā* (Meshel/Cohen 1980, 77, fig. 4). In *Rēfed* Village, a house featured four pillars (built from numerous slabs) at the western side of the courtyard (Meshel/Cohen 1980, 79, pl. 27,4). Meshel/Cohen 1980, 79 refer to a similar, but better-preserved 10th cent. BCE building at *’Ātār Ha-Ro’ā*, where identically built piers still carry architrave-like beams (Cohen 1970, 11, fig. 6, pl. 2, 4). Already van Beek and van Beek mistook some walls built in the pier-and-rubble technique for such of the monolithic-column technique (see van Beek/van Beek 1981, 72 for Akko, Area A [20-AK-01] and Akko, Area D [20-AK-02]). See also Ciafaloni 2006, 146, fig. 3 referring to the ‘administrative building’ at *Tēl Māvōrak* as an example for ‘muri a pilastri’ or e.g. Fantar 1984, 340; Escacena Carrasco 2002, 86; 2005, 199; see also van Dongen 2010, 475.

³¹ See Weippert/Weippert 2014; see also e.g. Shiloh 1970, 182, fig. 1; 1973, 278; van Beek/van Beek 1981, 73 with note 35–37; Currid 1992, esp. 107–118; Herzog 1987, 223–228.

³² Shiloh 1970; 1973; van Beek/van Beek 1981, 71 f.; Braemer 1982, 119–122, 124–129 (and catalogue); Netzer 1987, esp. 193. Some of these ‘courtyards’ may not be courtyards, but closed rooms (Netzer 1987, 196).

³³ Sometimes, the lintels lie so low that the room beneath must have been used as a low storage (or removed the room above from the ground to offer protection).

as such, but is rather a specific solution for separating aisles, creating partly-covered spaces next to courtyards or spatially differentiating various parts of rooms in simple buildings. Even though both techniques may resemble each other superficially in the fact that the 'walls' at least seem to bear loads only in specific points, it is most unlikely that they are closely related³⁴ or that the pier-and-rubble technique evolved from the monolithic-column technique, therefore the latter can be readily excluded from the remainder of this study. Furthermore, the distribution areas of the two techniques largely differ, with the pier-and-rubble technique largely confined to coastal sites and the monolithic-column technique in the inland.³⁵

The last one of the techniques described above will not be considered here because it is very widespread but unspecific and ashlar and rubble are not really alternatingly used. Even though such walls have sometimes been called pier-and-rubble walls,³⁶ designations as 'shell-walls' or 'two faced ashlar masonry' are preferable (see Kreimerman/Devolder 2020, 7 on terminology regarding ashlar masonry); they may be considered

one variant of 'pure' ashlar masonry. Harbour moles in this technique at *Ātlīt* and other sites, which were recently described as a 'marine' form of the pier-and-rubble technique, will thus not be dealt with (Haggi 2006, 49; Haggi/Artzy 2007, 77, 82; Haggi 2009, 35; Haggi/Artzy 2009, 288*; Haggi 2010, 279, 284; 2015, 53, 58; Manolova 2020, 1200).

Having defined what the term pier-and-rubble means, we can now turn to the history of research on this technique. Since the multiple techniques described above have often been confounded or taken as the same thing, the following sketch of past research deals not exclusively with the first of the above techniques, of course.

1.2 Pier-and-Rubble and the 'Phoenicians': A Short History of Research

The first pier-and-rubble walls were excavated in Megiddo and published by G. Schumacher in 1908, although he did not extensively comment on the building technique (Schumacher 1908, 98 f. 115, fig. 174, pl. 29; neither did Fisher 1929, 68). This was first done by his successor, P. O. L. Guy, who noticed and described the 'curious succession of dressed stone to rubble' in his preliminary report published in 1931 (Guy 1931, 32–35, fig. 22–24, quotation on p. 32). R. W. Hamilton excavated very similar walls in *Tell Abū Ḥawām* only a few years later and noted the similarities with the walls in Megiddo (Hamilton 1934, 78 f.). He quoted Guy, who thought that the technique was borrowed 'from a north Syrian school of building in the tenth century' and survived 'among the Phoenician inhabitants of the coastal region down to Hellenistic times' (Hamilton 1934, 79). A few years later, Guy himself excavated similar walls in *Tell Kudādi*, comparing them to those from Megiddo and *Tell Abū Ḥawām* (Guy 1938, 16). Up to this point, walls of the pier-and-rubble technique (not yet named in this way) were only known from the southern Levant; but this changed when R. J. Braidwood published his excavations in *Tabbat el-Ḥammām* and compared the walls he found with those in *Tell Abū Ḥawām* (Braidwood 1940, 190). In the first final report of the excavations in Megiddo, R. S. Lamon and G. S. Shipton repeatedly referred

³⁴ A possible link would be wall W1075 of the phase A2 (7th cent. BCE) 'Northern Unit' at *Tell Ar'ara*, which was included in her list of pier-and-rubble masonry by Elayi 1980, 170 note 38 (see also e.g. Ruiz Mata 1984, 540; 2002, 269) based on Biran/Cohen 1977, 274 and is now more fully published in Thareani et al. 2011, 18, 25, fig. 2: 2, 12. The wall included four piers made of stacked, sometimes roughly squared and sometimes roundish blocks, connected by rubble walls. This seems to be a variant of the monolithic-column technique, but seems little connected to what is called the pier-and-rubble technique here. It is also known from other sites (see e.g. Callaway/Livingston 1970, 14–18, fig. 5, 6 for Ai [*et-Tell*] or Daviau et al. 2008, 344 f., 349 f., fig. 5; 2012, 280–283, fig. 27, 28 for *Hirbet el-Mudeyne el-'Aliye*), but cannot be dealt with in more detail in the present context.

³⁵ See Sharon 1987, 38, who noted that both techniques occur only in *Tell Abū Ḥawām* and Megiddo (add now *Tēl Māvōraḳ*), but never in the same buildings. In *Tell Abū Ḥawām* and *Tēl Māvōraḳ*, monolithic columns/piers are used in buildings predating the first evidence of the pier-and-rubble technique by numerous centuries, while monolithic piers were only used as (semi-)free-standing pillars in the 'stables' at Megiddo. The monolithic-column technique was sometimes combined with the use of ashlar at corners and/or doors (see e.g. Gal/Alexandre 2000, 163, fig. IV: 1, 2, plan 9), but as has been argued above, this is too widely used to be significant.

³⁶ 'The double ashlar walls with a filling of field stones used in the construction of the moles is a technique common to the Phoenicians known as the pier-and-rubble technique' (Haggi/Artzy 2007, 82).

to the ‘typical Salomonic ashlar piers’ (Lamon/Shipton 1939, 11 f., 33, 49, quotation on p. 49), and M. Noth called the technique typically ‘Salomonic’ in his book ‘Die Welt des Alten Testaments’ published in 1957 (Noth 1957, 116, fig. 5c).³⁷ Its wide distribution was increasingly acknowledged and M. Dunand and R. Duru could state in 1962 in their publication of the sanctuary of *Umm el-‘Amed* (Dunand/Duru 1962, 34, note 3) that the technique was widely used during the Hellenistic period along the ‘Phoenician’ coast and in Palestine (without referring to specific sites). E. Stern agreed with Guy’s ‘Phoenician’ connection in a side note of his re-evaluation of Stratum II at *Tell Abū Ḥawām*, noticing that ‘this early building technique [... is] considered even in the Israelite period to be Phoenician [... and that] Hamilton is evidently correct in regarding the technique as a continuation of the older building tradition, preserved by the Phoenicians’ (Stern 1968, 213, note 3).

This ‘Phoenician’ interpretation was strongly supported by J. B. Pritchard’s excavations in Sarepta. In a first short but widely read and cited paper with the programmatic title ‘The Phoenicians in their Home-Land’, he not only published pier-and-rubble walls (of uncertain chronology) from this site, but also first considered (only roughly comparable) analogies in Motya, Carthage and Nora, concluding that building with a combination of ashlar and rubble in Nora obviously ‘was the perpetuation of a building tradition from the homeland that had been maintained faithfully at this new site’ because the ‘Phoenicians’ liked its aesthetic appearance (Pritchard 1971, 19 f.; see also Pritchard 1983, 522 f.). Only slightly later, B. S. J. Isserlin and J. Du Plat-Taylor made the same connection starting from Motya (Isserlin/Du Plat-Taylor 1974, 90 f.). While scholars could either call the technique ‘Phoenician’ or ‘Salomonic’ earlier on, Pritchard’s influential paper and his connection of the examples of the pier-and-rubble technique in the Levant with seemingly similar building styles in ‘Phoenician’ or ‘Punic’ sites

in the western Mediterranean clearly shifted the focus to the ‘Phoenician-ness’ of the technique. M. Dothan excavated further examples in Acco and stated that the style is ‘usually called Phoenician or Punic’ (Dothan 1973, 258), and J. Kaplan published such walls at Jafo and referred to them as ‘Sidonian’ (Kaplan 1976, 537).

In 1977, Stern was the first to deal with the technique *en detail* and to offer a first collection of the known occurrences in a paper devoted to ‘Late Phoenician Elements in the Archaeology of Palestine’ based on his excavations in *Tēl Māvōrak* (Stern 1977). He referred to walls from Sarepta, Achzib, Acco, *Tell Abū Ḥawām*, Megiddo, *Tēl Māvōrak*, *Tell Kudādi* and Jafo, and insisted that they are to be considered ‘Phoenician’ (Stern 1977, 18–22). The only really diverging voice was the one of Y. Shiloh, who understood pier-and-rubble as one variety of ashlar masonry, the origins of which he located in Iron Age II Israel (Shiloh 1979, 63, 83–86). Almost concurrently, J. Elayi published the first (and maybe most well-received) study dealing only and thoroughly with the pier-and-rubble technique, offering a first typology of ashlar piers and collecting evidence from 21 different sites.³⁸ She considered the technique ‘Phoenician’, pinpointed its origins in Late Bronze Age Ugarit (under Hittite influence), briefly referred to similar walls in ‘Phoenician’ and ‘Punic’ sites in the western Mediterranean and concluded that these confirm its ‘Phoenician’ origin (Elayi 1980, 177–180). Almost simultaneously, G. and O. van Beek published an article dealing with the pier-and-rubble technique as well as the monolithic-column technique; they concluded that ‘the chronological and geographical correspondence to Phoenician expansion and settlement seems to make certain a ‘Phoenician’ origin and development’ (van Beek/van Beek 1981, 75 f.). They also shortly referred to similar styles in ‘Phoenician’ and ‘Punic’ sites in the western Mediterranean and deduced that the technique was ‘spread far and wide from their Canaanite homeland by enterprising Phoenician settlers, who created a new Phoenicia wherever

³⁷ ‘[...] les procédés de construction des maîtres d’œuvre de l’époque salomonienne’ (Barrois 1939, 265). See also Albright 1961, 125, commenting on the pier-and-rubble technique and remarking, ‘Solomonic masonry shows clear indications of having been borrowed from the Phoenicians’.

³⁸ Elayi 1980: Ugarit (see note 85–91), Hazor (see note 11), *Tell Kēsān* (see note 19), *Tēl Magādīm* (see note 14) and *Tell ‘Ar‘ara* (see note 34), which are not included in the catalogue because of the slightly narrower typological approach.

they went' (van Beek/van Beek 1981, 76; also Di Luca/Cristilli 2011, 464). In the same years, the renewed excavations at Dor revealed some of the most spectacular evidence of the pier-and-rubble technique, and the excavator, Stern, who had before been the first one who dealt with the technique in more detail and concluded that it was 'Phoenician', repeatedly referred to the newly found walls as 'typically Phoenician'.³⁹ In his handbook 'The Material Culture of the Land of the Bible in the Persian Period', he suggested that the pier-and-rubble technique allows us to 'isolate Phoenician building [...] from the other building styles' (Stern 1982b, 67). The 'Phoenician-ness' of the pier-and-rubble technique was now common archaeological knowledge,⁴⁰ and new evidence from *Yoqna'am* and *Tell Sūkās* was published as 'Phoenician'.⁴¹

In an important paper published in 1987, I. Sharon dealt with various ashlar construction techniques used at Dor, including pier-and-rubble, and offered a new typology as well as a new overview of the evidence, featuring 16 sites with pier-and-rubble (Sharon 1987).⁴² He subsequently compared the various techniques with evidence from Egypt, Greece, Anatolia, Persia, Cyprus as well as 'Phoenician' and 'Punic' sites in the western Mediterranean, and on this basis, discussed the origin and the spread of ashlar masonry in Israel. Equally refuting Shiloh's conviction of an Israelite origin, Elayi's result of a Hittite-inspired emergence in Late Bronze Age Ugarit, van Beek and van Beek's connection of pier-and-rubble and the

monolithic-column technique as well as the common equation of Levantine pier-and-rubble and *a telaio* or *opus africanum* in the west, he came to the conclusion that pier-and-rubble as well as other techniques of ashlar masonry had their origin in Phoenicia and spread to Israel, but have not been directly transmitted to the western Mediterranean (Sharon 1987, 36–38). F. Briquel-Chatonnet likewise argued against Shiloh's Israelite origin and dissociated Levantine pier-and-rubble and *a telaio* from the western Mediterranean, but thought that pier-and-rubble was so close to its predecessors from Ugarit that it must have originated in the northern Levant and have been spread to the south by 'Phoenicians' in the 10th/9th and then again in the 6th cent. BCE (Briquel-Chatonnet 1992, 344–346).

Stern repeated his earlier views on the 'Phoenician' origin and dissemination of the technique in Israel and the west in two papers on 'Phoenician' architectural elements in Palestine published in 1992 and 1998 (Stern 1992b; 1998). Since the first building in the staggered-reinforcing-header technique had meanwhile been uncovered at Dor, he divided the evidence into an 'eastern style' of pier-and-rubble and a 'western style' comprising *a telaio/opus africanum* as well as the staggered-reinforcing-header technique (but not separating the latter techniques from each other; Stern 1998, 379).⁴³ Many others concurred with the 'Phoenician' interpretation while adding new evidence,⁴⁴ even though R. Reich remarked that discussions of the 'Phoenician' or Israelite origin of ashlar masonry should not exclude other regions such as northern Syria (Reich 1992, 212).⁴⁵ Elayi returned to the topic in 1996 in an addendum to her first paper, updating her collection of sites, discussing dubious cases, adding to her typology, refuting

³⁹ See e.g. Stern 1980, 211 ('Phoenician' technique); 1981/1982, 19 ('typical Phoenician style'); 1982a, 113 ('typical Phoenician style'); 1988, 14 ('classical Phoenician construction methods'); 1991, 87 ('typical Phoenicio-Israeli method'); 1993b, 46 ('Phoenician style of building'); 1995a, 439 ('typical Phoenician style').

⁴⁰ See e.g. Balensi et al. 1985, 122 (*Tell Abū Hawām*: 'À partir de la strate III [...], le mode de construction à piliers donne un cachet 'phénicien' aux structures, cela jusqu'à la fin du niveau II'); Stager 1985, 13 ('Phoenician technique'); Wright 1985, 426 ('considered to derive from Phoenician building').

⁴¹ Ben-Tor et al. 1983, 33 (*Yoqna'am*: 'This phenomenon is typical of Phoenician architecture'); Lund 1986, 142 (*Tell Sūkās*: '[...] considered the hallmark of a special kind of Phoenician architecture').

⁴² This includes *Makmiš* and *el-Ḥarāyeb*, where no such walls can be found, but dismisses some other of the dubious cases collected by Elayi 1980 (see note 38).

⁴³ See Stern 1993b, 46 addressing the technique called the staggered-reinforcing-header technique, here, a 'Punic or western style'.

⁴⁴ See e.g. Porath et al. 1993, 1045 ('some wall segments whose construction technique is Phoenician'); Herbert 1994, 18 (*Tēl Anafa*: 'characteristic of Phoenician settlements in Syro-Palestine'); Wolff 1998, 787 (*Yavnē Yām*: 'Phoenician technique'); Gal/Alexandre 2000, 20 (*Ḥorvat Rōš Zayit*: 'considered to be Phoenician in origin'), 198 ('a style of Phoenician affinity').

⁴⁵ See also Barkay 1992, 316, who noted that Israelite ashlar masonry may have been inspired from Phoenicia or from Egypt.

Shiloh's view and re-stating her conclusions (Elayi 1996). She further elaborated on her typology of piers in her detailed publication of one of the most comprehensive contexts, the Persian-period habitation quarter Bey 010 at Berytos, and underlined her view that the technique is justly called 'Phoenician' because of its origin as well as its area of distribution (Elayi/Sayegh 2000, 207). The 'Phoenician-ness' of the technique was enshrined in various handbooks appearing in the 1990s and early 2000s,⁴⁶ and is a fact hardly any publication of new examples appearing in the new millennium has so far missed to address.⁴⁷ In 2007, S. Pittaccio followed Elayi in assuming Bronze Age antecedents for pier-and-rubble, connected it to multiple other techniques and ascribed their distribution in the Mediterranean to the 'Phoenicians' (Pittaccio 2004–2007).⁴⁸ Others stressed that the 'Phoenicians' may not have invented pier-and-rubble, but that they certainly spread the technique in the

Mediterranean.⁴⁹ Only most recently has the connection between Levantine pier-and-rubble and 'Punic' *a telaio* been doubted by I. Sharon, disassociating the staggered-reinforcing-header technique from *a telaio/opus africanum* (Sharon 2009, 377), and G. Camporeale, working on the phenomenon of *a telaio* in the central and western Mediterranean (Camporeale 2014, 204; 2016, 64 f.).

In the most recent assessment of the Levantine technique, H. Sader proposed that pier-and-rubble developed from the use of ashlar at corners and entrances during the 8th to 6th cent. BCE and then spread to the Mediterranean, where it was adapted in 'Phoenician colonies'.⁵⁰ M. Edrey, in his study of 'Phoenician Identity in Context', likewise called the technique 'a hallmark of Phoenician architecture' (Edrey 2019, 73). All in all, the 'Phoenician' character and origin of the pier-and-rubble technique is meanwhile unequivocally affirmed. This reasoning is based on the problematic supposition that a recurring set of archaeologically visible elements of material culture hints at a group with a shared identity. In this spirit, the presence of such masonry has sometimes even been implicitly taken as a proof that a certain site was inhabited (mostly) by 'Phoenicians'; sometimes, this was even explicitly stated.⁵¹

⁴⁶ Gubel 1992, 37 ('dite phénicienne'); Cecchini 1995, 390 ('une technique de construction attribuée à l'influence phénicienne [...] il est vraisemblable que ce furent des maîtres-ouvriers phéniciens qui diffusèrent ces techniques'), 395 ('dite 'phénicienne'); Herzog 1997, 362; Wright 1997a, 365; 1997b; Markoe 2000, 83 ('a hallmark of Phoenician construction in the Persian and ensuing Hellenistic periods' = Markoe 2003, 83, 'ein Markenzeichen der phönizischen Bauweise in der Perserzeit und der darauf folgenden hellenistischen Epoche'); Sader 2019b, 158 ('characteristic feature of Phoenician architecture'). See also e.g. Carayon 2008, 93, 340 ('la technique phénicienne du mur à piliers'); Herzog 2009, 41 ('typical Phoenician ashlar masonry'); Jigoulov 2010, 114, 119 f.; Woolmer 2011, 24, 91; Beyl 2013, 74; Peckham 2014, 64 ('the standard Phoenician pier-and-rubble style'), 395 ('the Phoenician pier-and-rubble fashion'), 397 f. ('standard Tyrian pier-and-rubble style'), 479.

⁴⁷ See e.g. Lehmann 2002, 80 (*el-Kabrī*: 'This technique has been identified as a Phoenician architectural element'); Kamlah/Sader 2003, 149 (*Tell el-Burak*: 'typical feature of Phoenician architecture'); Kamlah/Sader 2004, 128 (*Tell el-Burak*: 'für die phönizische Architektur der späten Eisenzeit typisch'); Cimadevilla 2005, 410 (*Yoqna'am*: 'This construction method is typical of Phoenician architecture'); Fischer et al. 2008, 129 (*Tēl Ya'ōz*: 'technique known as 'Phoenician'); Hartal 2016, 27 f. (Acco: 'Phoenician pier-and-rubble technique'), 54 ('typical of Phoenician construction'); Stern 2016, 102 (Acco: 'Phoenician construction technique'); Tsuf 2018, 12 (republishing of Kaplan's excavations at Jafo, the wording influenced by his publications: 'typical style of so-called 'Sidonian masonry'); see also Franklin 2006, 108 (Jezreel: 'the a telaio technique').

⁴⁸ His paper mixes a large number of widely differing building techniques, all taken to be variants of *a telaio*.

⁴⁹ Braemer 1992, 37, ('Les Phéniciens, qui n'en sont pas nécessairement les inventeurs, ont répandu cette technique dans toute la Méditerranée'). See also Stager 1985, 13; Wright 2005, 60, but also Shiloh 1979, 74, who noted that the western evidence is later in date and thus cannot solve the question of the origins.

⁵⁰ See Sader 2009, 62 ('This type of masonry developed in the Persian period into the well-known 'pier and rubble' technique' – this is based on Houses 1 and 2 of *Tell el-Burak*); 2019b, 158 ('A major development occurred in Phoenicia in the sixth century BCE when a new building technique was introduced, the so-called pier-and-rubble walls, which spread all over the homeland and became another characteristic feature of Phoenician architecture. [...] The earliest evidence known so far for this technique is attested in the *Tell el-Burak* first enclosure wall in Area 3, which is dated to the end of the eighth century BCE'); see also Khries 2016, 205.

⁵¹ Stern 1981/1982, 19; 1982a, 113; 1988, 14; Herbert 2003, 324; Carayon 2008, 75 f., 80, 82, 84, 93; Peckham 2014, *passim*, esp. 359 f.; Khries 2016, 205; Winter 2020, 332. See also e.g. López-Ruiz 2022, 37 ('typically used by Phoenicians'). Similarly, Di Luca/Cristilli 2011, 465 suggest either Greek influences or the unsuitability of the local stones as reasons for the lack/rarity of *a telaio* in 'Punic' sites on Malta and in Spain, without considering the idea that not every 'Phoenician' had reasons to use this or a similar technique.

But many questions require a closer look: When and where did the technique develop? What role can we assume for Late Bronze Age Ugarit? Which are the earliest examples of pier-and-rubble and is there a formal or technological development or a successive dissemination we can see when collecting the evidence? Is there a connection between Levantine pier-and-rubble or the staggered-reinforcing-header technique and the techniques called *a telaio* or *opus africanum* in the central and western Mediterranean? How broad is the spectrum of the techniques combining ashlar and rubble in ‘Phoenician’ and ‘Punic’ sites in the western Mediterranean to begin with? And how ‘Phoenician’ is all this? Is this the common way ‘Phoenicians’ used to build? Are walls to be equated with people and the use of pier-and-rubble in a specific site proves that it was inhabited by ‘Phoenicians’? Or is this too simplistic? How can we, then, imagine the spread of the technique (or, rather, of the various techniques) to have happened? And what are the structural advantages, disadvantages and the functions of the various techniques, in the first place?

1.3 Scope and Structure of the Present Book

The present book aims to provide answers to the above-mentioned questions. Its methodological backbone is a collection of all the relevant evidence and its typological classification, with a close look at the geographical and chronological distribution of the various technical aspects. This classification, though, should not be taken as an end in itself, but rather as a basis to deal with more extensive questions. This study has its origin in the author’s participation in project A 06 of SFB 1070 RESSOURCENKULTUREN ‘Connectivity, Interregional Networks and Cultural Contacts: Late Bronze Age and Iron Age Resource Cultures in the Eastern Mediterranean’. The main interest of the book lies thus in the question what the spread of the pier-and-rubble technique and related techniques can tell us about (eastern) Mediterranean connectivity. Its aim is to show how building techniques (as a specific facet of everyday culture) could spread in the wake of various other types

of exchange. While other studies originating in the same project focused on the distribution of specific groups of imported objects, the spread of pictorial media in Levantine sites⁵² or on the differing relevance of interregional exchange in various Levantine sites through the Late Bronze Age/Iron Age transition (Millek 2019), it is this study’s intention to exemplify how far the intangible elements of these exchange processes can be detected via the analysis of an exchange of technological know-how. Based on the framework of the aforementioned project, including a constructivist perspective on ‘culture’, the present book will concurrently challenge ‘ethnic’ interpretations of a specific dimension of material culture, shifting the emphasis to functional aspects of the analysed building techniques as well as on the exchange processes behind their distribution. This also helps to focus more specifically on the actors involved and their motivations.

The rest of this book is divided into three main parts. The second chapter deals with the genesis of the pier-and-rubble technique, its prerequisites, its possible predecessors in the Late Bronze Age and its functions. The third chapter focuses more closely on the known Levantine contexts in which the pier-and-rubble technique is documented; this evidence, collected in detail (and illustrated) in the catalogue at the end (chapter 6), is typologically classified and its technical characteristics are analysed. Subsequently, a chronological and geographical overview of the known contexts is given. After a short excursus on the staggered-reinforcing-header technique, some thoughts on the distribution of the technique (and remarks on its ‘ethnic’ interpretation) will be offered. The fourth chapter, finally, broadens the view and

⁵² This includes G. Paradiso’s dissertation on sculpture in architectural contexts of the Late Bronze and Iron Age in the northern Levant (‘The Development of Syro-Hittite Sculpture as a Resource from the Late Bronze to the Iron Age’, in preparation), S. Faust’s dissertation on figured cylinder seals of the Middle and Late Bronze Age and Iron Age in the Central and Southern Levant (‘Rollsiegel der südlichen und zentralen Levante. Ikonographie, Fundkontexte und Ressourcenfunktion’, in preparation), M. Büyükyaka’s dissertation on Cypriot pottery in the central Levant from the Late Bronze Age to the Persian period (in preparation) as well as the author’s studies of Greek pottery imports of the 7th–4th cent. BCE in the central Levant (in preparation).

focuses on the evidence for the pier-and-rubble technique and related techniques (especially *a telaio/opus africanum*) in the central and western Mediterranean, first discussing the little evidence available for the pier-and-rubble technique from Andalusia and Tarquinia and then giving a short overview and typological classification of the pre-Roman *a telaio* from North Africa, the Iberian Peninsula, Sicily, Sardinia, Etruria and Campania. As in the preceding chapter, some remarks on the

distribution of the various techniques will close the chapter, before a set of general conclusions, focusing on the 'Phoenician-ness' of pier-and-rubble and its relevance for questions regarding Mediterranean connectivity, finishes the book. The catalogue at the end (chapter 6) presents all the known contexts with evidence for the pier-and-rubble technique, provides the accompanying graphical documentation and ends with a tabular display of the evidence.

2 The Genesis of Pier-and-Rubble Masonry

2.1 Prerequisites: Quarries, Stones and Tools

The pier-and-rubble technique has an important prerequisite: ashlar masonry – and this has another important prerequisite: the organised quarrying of stone (Wright 2009, 143–145; Goshen 2020, 169). Pure rubble walls could have been and were built from unworked or only roughly worked fieldstones, which could be picked up almost anywhere, but as soon as ashlar were systematically integrated into walls, the quarrying of stone was a necessity.

The stone used for the ashlar piers in the pier-and-rubble technique was mostly *ramleh* or *kurkar* – the two terms stem from Palestinian Arabic and Lebanese Arabic and refer to the same type of stone in Israel and Lebanon/Syria.⁵³ This Pleistocene calcareous sandstone was formed by the consolidation of old dunes and is widely distributed along the Levantine coast, reaching from around Gaza in the South to the Syrian coast in the North (Blake 1935; Ben Tor 1960, 58; Por 1989, 46 f., 54; Shadmon 1972, 28; Horowitz 1979, fig. 5: 58; Wright 1985, 340; Marriner et al. 2014, 5; Fantalkin/Tal 2015, 13–18; Bessac/Matoian 2020, 278). It could thus be quarried in the immediate vicinity of almost every site dealt with here. Furthermore, it is rather soft and thus can be rather easily worked.⁵⁴ This relatively good workability surely was an important ‘selling point’ for the stone when the large-scale use of ashlar was

only beginning. A comparable case would be the emergence of pure ashlar masonry in Iron Age II Israel: although the ashlar used in buildings in Megiddo, Samaria, Hazor, *Rāmat Rāḥēl*, Taanach and Gezer were not quarried from *kurkar*, because this ‘beach rock’ was mostly not available in the vicinity, their builders preferred the relatively soft *nari* limestone over the harder *meleki* or *mizzi* stones more common in the immediate vicinity – unlike their successors.⁵⁵ In a similar way, the easily obtainable and workable *ramleh/kurkar* may have contributed to the popularity of the pier-and-rubble technique, being an economising building technique itself.⁵⁶ It may thus not be a coincidence that the distribution of *ramleh/kurkar* and of walls built in the pier-and-rubble technique closely match. The wide availability of easily workable stone along the Levantine coast probably contributed to the spread of the technique.

But did the quarrying only start when the first ashlar piers were erected, or was the pier-and-rubble technique used in contexts in which ashlar were already quarried for other purposes? In many cases, the second scenario seems more plausible. At Sidon (?), *Tell el-Burak*, *el-Kabrī* and Megiddo, the first use of the pier-and-rubble technique dates back to Iron Age II, but ashlar masonry was already known there in the Late Bronze Age.⁵⁷ It is hard to tell whether ashlar were continuously used at Sidon and *el-Kabrī* due to the state of research, they certainly were not at *Tell el-Burak*, while pure ashlar masonry and ashlar piers were concurrently used at Megiddo (*plan 34, 35*).⁵⁸ In Sarepta, the first ashlar piers date back to the 11th–9th cent. BCE, but small numbers of

53 *Ramleh/kurkar*: 06-MR (H. Genz, personal communication); 07-BE-02 (Elayi/Sayegh 2000, 218: quarried locally); 08-JI (Waliszewski et al. 2012, 434); 09-BS (personal observation); 11-BU-01-03 (personal observation); 15-OU (Dunand/Duru 1962, 34); 24-DO-01-15 (Sharon 1987, 23); 30-KU (Fantalkin/Tal 2015, 18); 33-YY-02* (Fischer 2008, 2074); 34-AS* (Stager et al. 2008, 287); sandstone (= *ramleh/kurkar*?): 22-AH (Hamilton 1934, 78); limestone (= *ramleh/kurkar*?): 10-SI-01* (Doumet-Serhal 2006, 2); 27-TM (Stern 1977, 18); calcaire (= *ramleh/kurkar*?): 02-SU-01-04 (Riis 1965, 68); limestone: 14-AN (Herbert 1994, 18) *nari*: 25-ME-01-04? (Shiloh 1979, 52). Several other sites (e.g. 17-AH and 31-JA) are situated directly on *kurkar* ridges and the ashlar were almost certainly carved from this stone, even though this is not explicitly stated in the publications.

54 The stone is not quarried on a large scale in Israel anymore; see Shadmon 1972, 27 f.

55 This was different not only in later periods, when ashlar masonry was more widely used, but also in the Bronze Age, when it was the absolute exception (Shiloh/Horowitz 1975, 37; Shiloh 1979, 60; Wright 1985, 343).

56 This is further argued for in chapter 2.3.

57 See 10-SI-01*, 10-SI-02*, 18-KA-01, 18-KA-02*, 25-ME-01, 25-ME-02, 25-ME-03, 25-ME-04 and note 77–79, 81 for the earlier Late Bronze Age evidence.

58 Lamon/Shipton 1939, fig. 12, 14–16, 21–23, 27, 29, 30; Shiloh 1979, 52–56; Ussishkin 2018, 351, fig. 16: 8, 10–13. For the other sites, see below note 90.

ashlars were already used during the Late Bronze Age. A larger number of ashlar may be seen in a context of the 10th/9th cent. BCE and at least one pier seems to reuse bossed ashlar from an earlier building (**12-SA-01**, **12-SA-02**, **12-SA-03**). At Dor, it is doubtful whether the first ashlar piers can be dated to Iron Age II, but in any case, ashlar (sometimes of *kurkar*) were used in other contexts in this period, for example in the inner face of a city gate, parts of the city walls and a monumental (public?) building in Area D2.⁵⁹ In the harbour constructions at Dor, ashlar were in use at least from the 11th cent. BCE onwards.⁶⁰ At *Yavnê Yām* and *Tēl Māvōrak*, the pier-and-rubble technique is documented only in the Persian period, but ashlar masonry was already used in Iron Age II (and concurrently in pure ashlar masonry).⁶¹ In *Bustān eš-Šēh*, a wall in the pier-and-rubble technique was erected during the Persian period alongside a massive podium in ashlar masonry (**09-BS**, *fig. 44*).⁶² The building at *Tēl Miḳmoret*, which possibly includes walls in the pier-and-rubble technique, seems to also feature longer stretches of ashlar masonry (**29-MI***). Evidence to the contrary is harder to find, since we can hardly be sure that possible earlier buildings have been found, but in some cases, at least, it seems possible that the first ashlar were quarried for ashlar ‘piers’: one example would be Jezreel – even if the use of ashlar in the 9th cent. BCE casemate walls at this site is quite limited (**26-JE**, *plan 37, 38*). In *Tell el-Burak*, no structures dating between the 13th and the later 8th cent. BCE are known, and amongst the structures of the first Iron Age phase (E), ashlar were used in the (rare) piers within the ‘surrounding wall’ (**11-BU-01**, *plan 9, fig. 45*), but also in a more consistent manner in a wine press.⁶³ On a more

general level, we may observe that the same combinations of headers and stretchers often appear in walls in pure ashlar masonry at the same sites and in the same periods (Elayi/Sayegh 2000, 206 f.; see also Shiloh 1979, 63; Pittaccio 2004–2007, 40). ‘Pure’ ashlar masonry and ashlar piers are certainly closely connected, and it seems probable that ashlar were quarried for simultaneous use in both techniques.

However, not every block used in ashlar piers was originally quarried for this purpose; ashlar from earlier buildings could also be reused (and possibly recut). This is reasonably certain only in those few instances where only few blocks within ashlar piers are bossed (*fig. 75, 87, 96*)⁶⁴ or feature holes or mouldings which must come from earlier uses (*fig. 28, 48, 61*).⁶⁵ But this will have been the case in many more instances; if present in earlier buildings already destroyed or dismantled to be rebuilt, ashlar constituted an easily exploitable resource, especially in the context of more limited building activities such as repairs, enlargements, etc., and many if not most sites in which the pier-and-rubble technique is documented feature earlier building phases. In some instances, the availability of reusable ashlar may have contributed to the decision to build or re-build a specific building or wall in the pier-and-rubble technique, but this can hardly be proven in individual cases. If the dimensions of the blocks used in the ashlar piers of a specific structure are more or less consistent, it seems probable that at least most of them were quarried for this use (even though individual blocks could have been recut to fit or larger amounts of ashlar from specific older buildings may have been reused). This is indeed true for most of the buildings dealt with here, even though the degree to which the individual blocks conform to their ‘ideal’ dimensions is often not significantly large. But it is rather uncommon that no such

59 See **24-DO-07**, **24-DO-11** and **24-DO-12** as well as Sharon 1987, 22 f.; Stern 1988, 6–8, *fig. 1*; Stern 1994, 111, 114, *fig. 59*; Sharon/Gilboa 2005; Sharon/Gilboa 2007; Sharon/Gilboa 2008; Sharon/Gilboa 2009; Sharon/Gilboa 2010; Matskevich et al. 2013.

60 See most recently and comprehensively Arkin Shalev et al. 2019; see also Raban 1995; Yasur-Landau/Arkin Shalev 2018, 154; Lazar et al. 2021, 205.

61 *Yavnê Yām*: see **33-YY*** and note 90 below; *Tēl Māvōrak*: see **27-TM** and Stern 1977, 17, *fig. 1*.

62 See Stucky 2005 for an in-depth analysis of the site’s architecture.

63 See Orsingher et al. 2020, esp. 1226 f., *fig. 2, 3* for the wine press (now dated to phase E).

64 See 9th cent. BCE ashlar piers at Megiddo (**25-ME-03**), 6th/5th cent. BCE ashlar piers at Sarepta (**12-SA-03**), 5th/4th cent. BCE ashlar piers at Dor (**24-DO-05**) and possibly a 6th–4th cent. BCE ashlar pier at *Tēl Ya’ōz* (**32-YA-02**) and 3rd cent. BCE ashlar piers at Ashkelon (**34-AS***).

65 See 4th cent. BCE ashlar piers *Tell Sūkās* (**02-SU-03**) and *Tell Abū Ḥawām* (**22-AH**) as well as probably at least one block in an 6th cent. BCE ashlar pier at *Tell el-Burak* (**11-BU-03**).

effort of standardisation is visible.⁶⁶ Overall, it seems reasonable to suppose that most ashlar used in new large-scale constructions in the pier-and-rubble technique were quarried for this purpose, but that reused blocks also often played a role, especially in contexts where only a limited number of ashlar were needed.

There is little that can be said about specific quarrying techniques visible in the blocks used for pier-and-rubble masonry, since quarries of *kurkar/ramleh* have not yet been subject to much research.⁶⁷ Very probably, the ashlar come from channel extractions with copper alloy tools; this was the common way to quarry and work rather soft stones in the Levant.⁶⁸ The blocks were surely also dressed with metal tools; in Berytos (07-BE-04), traces of various pointed and slat chisels were observed,⁶⁹ and this certainly applies for other sites, the blocks of which did not yet get a detailed look (fig. 50, 84).⁷⁰ The extent to which the ashlar were worked, however, varies widely; this will be dealt with more in detail below (see chapter 3.2). Although clamps (e.g. dovetail clamps) were already current in the ashlar masonry of Late Bronze Age Ugarit (Bessac/Matoïan 2020, 275, note 13, fig. 10: 14, 15) and are also known from Late Bronze Age Sidon (Doumet-Serhal/Williams 2011/2012, 298–300, fig. 5; Doumet-Serhal 2013,

105, fig. 97), no clamps were used in the ashlar piers of pier-and-rubble masonry.⁷¹ Dowel holes have neither been noted in publications of walls in the pier-and-rubble technique so far and cannot be identified on the basis of the existing documentation. Smaller blocks may have been moved manually, but an ashlar of the very common size of ca. 0.5 × 0.2 × 0.2m weighs already ca. 44kg,⁷² and in some sites, individual blocks measure one meter or more in length (see note 168), so that some sort of lifting device must have been used – this is another prerequisite not necessary in pure rubble masonry.

2.2 Predecessors? Building with Ashlars in the Late Bronze Age Levant

Quarried, rectangularly cut blocks are common in Egypt from the Early Bronze Age onwards⁷³ and were gradually introduced into the architectural repertoire of northern Syria,⁷⁴ the northern Levant,⁷⁵ the central Levant⁷⁶ and the southern Levant⁷⁷ in the Middle Bronze Age. Pure, coursed ashlar masonry, sometimes consisting of alternating headers and stretchers, became more common in the Late Bronze Age in public buildings in Sidon,⁷⁸ Megiddo⁷⁹ and Hazor;⁸⁰ in Ugarit, it was

66 See the overview in chapter 6.4. This seems to be the case in the very preliminarily published case of 'Amrit (03-AM), in an uncertain record of the pier-and-rubble technique in Sidon (10-SI-01*), some of the badly published walls at Sarepta (12-SA-02; 12-SA-03), the earliest use of the technique in a short stretch of wall at Dor (24-DO-13), in parts of Building 338, in the earliest ashlar pier at Jafo (31-JA) and possibly a short stretch of wall in Acco (*Tell el-Fuḥḥār*, 20-AK-01).

67 See Bessac/Matoïan 2020, 281 f. for an exception from Late Bronze Age Ugarit. A photograph from a 'Phoenician' quarry at 'Ātlīt is published in Shadmon 1972, 27, but the pier-and-rubble technique (as defined above) was not used at this site (see chapter 1.1 on the putative 'maritime' pier-and-rubble technique).

68 See e.g. Kreimerman/Devolder 2020, 3–5 as well as Bessac/Matoïan 2020, 278–289 for a detailed study. For a photograph of a 'Phoenician' quarry where channel extraction was practiced, see note 67.

69 See Elayi/Sayegh 2000, 218 for 07-BE-04. See also Bessac/Matoïan 2020, 289–292 for a detailed analysis of cutting and dressing tools for Late Bronze Age Ugarit.

70 See e.g. Pritchard 1971, fig. 20: 1 (12-SA-02, fig. 50); Hartal 2016, fig. 2: 38 (20-AK-04); Sharon 1995, fig. 5: 28 (24-DO-02); 5: 167 (24-DO-05); Lamon/Shipton 1939, fig. 13 (25-ME-02, fig. 84).

71 One reason for this may be seen in the fact that the ashlar, which were mostly neither connected with mortar, could shift in the case of earthquakes; see chapter 2.3.

72 The composition and the relative weight of *kurkar/ramleh* surely differed in different sites, but a weight of ca. 2.2g per cm³ may be considered an average for sandstone.

73 See Kreimerman/Devolder 2020, 10–15 with bibliography.

74 Kreimerman/Devolder 2020, 19; Maner 2020 (Alalakh, Tilmen Höyük etc.); Pinnock 2020 (Ebla).

75 Ugarit: Marchegay 2008, 103, 105; Callot 2011, esp. fig. 15, 37, 66; Kreimerman/Devolder 2020, 24; Bessac/Matoïan 2020, 266; *Tell Twēnī*: Bretschneider/van Lerberghe 2008, 22, fig. 22.

76 Byblos: see Kreimerman/Devolder 2020, 23 with references.

77 Wright 1985, 342; Kreimerman/Devolder 2020, 19 f.; Goshen 2020, 169, 172–182 (rough ashlar in Ashkelon and Lachish, large orthostats in Gezer and Shechem, orthostats and paving slabs in *el-Kabrī*, rough slabs in *Tell el-Aḡḡūl*).

78 Doumet-Serhal/Williams 2011/2012, 298, pl. 4; Doumet-Serhal 2013, 105, fig. 96–98.

79 Loud 1948, 16, 22, 102, fig. 39, 40, 42–45, 53, 59–63, 65, 67, 69, 247–250, 252, 253; Ussishkin 2018, 210–214, 245, fig. 10: 8, 10, 12–16; 12: 5, 9, 10.

80 Ben-Tor et al. 2017, 85, 104 f., 108, photos 4: 3, 4, 24, 25, 57, 62, 63, 69, plan 4: 7, 9, 11, 20, 22, 23, 26, 27.

used in many different types of structures, including many houses.⁸¹ It is even more common in Cyprus, with connections to Minoan Crete (Negbi 2005, 7 f., note 6; Fisher 2020; Kreimerman/Devolder 2020, 39–43), and ashlar masonry at Ugarit may have also been inspired by Minoan models, even though it continuously evolved from the Middle Bronze Age onwards (Schaeffer 1933a, 115–118; Yon 1999, 133; Yon 2003, 43; Bessac/Matoïan 2020, 277).

The case of Ugarit in the 14th/13th cent. BCE is an important one, since Elayi has argued that it is here that we see the first use of the pier-and-rubble technique, developed in Ugarit from Hittite prototypes (Elayi 1980, 177 f.; 1996, 79, 88; Elayi/Sayegh 2000, 207; Elayi 2010, 159).⁸² Others have not accepted this point and instead located the first use of the technique in 9th cent. BCE Megiddo.⁸³ It is thus necessary to have a look at the evidence from Ugarit again; fortunately, the state of research is now much better than in 1980, when Elayi's first article on the matter appeared.

⁸¹ Ugarit: see note 84, 85; see also Wright 1985, 343; summary in Kreimerman/Devolder 2020, 24. At *Tell el-Burak*, the tower-like corner of the enigmatic Late Bronze Age 'Retaining Structure' was built from twelve courses of large, carefully hewn ashlar blocks partly set as headers and stretchers (see Kamlah/Sader 2010, 96, pl. 18b, 19b with mistaken Iron Age dating; Kamlah/Michelau 2019, 171, 174, 177, fig. 7: 69, 70, 72–81, plan 9, 10.)

⁸² Elayi was followed e.g. by Ruiz Mata 1984, 540; Belén 1986, 272; Bonghi Jovino 1991, 180; Gubel 1992, 37; Ruiz Mata 2002, 269; Prados Martínez 2003, 18, 46; Pittaccio 2004–2007, esp. 41; Bianchini 2010, 141; see also Briquel-Chatonnet 1992, 345. The possible Hittite prototypes Elayi refers to (see also Pittaccio 2003, 60, fig. 18, 19) are not built with ashlar blocks, but with piers in bricks alternating with rubble and will thus not be dealt with here. Even though it is impossible to entirely exclude that the idea that such walls in 'mixed' technique reached the Levant from Anatolia in the Late Bronze Age, any connection of the first Iron Age ashlar piers with the earlier Hittite piers of mudbrick (not including any ashlar blocks) seems distinctly doubtful. The same is true for connections of ashlar piers with timber framing (which has a long tradition in the Levant, Mesopotamia, Egypt and other areas of the eastern Mediterranean, see Pittaccio 2003; see also Pittaccio 2004–2007, 39 for the connection); piers from ashlar blocks laid in headers and stretchers and half-timbered construction with slim wooden vertical posts and horizontal beams are two building techniques entirely different in their conception – not least because of the much-diverging structural capacities of wood and stone in terms of strength in tension and compression.

⁸³ van Beek/van Beek 1981, 74; Sharon 1987, 31; Stern 1992b, 303; 1998, 373. See also Stern 1977, 19; Shiloh 1979, 73. See Elayi 1996, 79 f. for a reply.

In Late Bronze Age Ugarit, large ashlar blocks were commonly used in corners and doors and sometimes also at the intersections of walls.⁸⁴ In well-built and well-conserved buildings, they are often placed in multiple courses of headers and stretchers in such corners and next to doorways.⁸⁵ The use of ashlar blocks at the nearby sites *Mīnet el-Bēḏā* and *Rās Ibn Hānī* is similar.⁸⁶ In few instances, it may seem like ashlar piers were also inserted into straight walls, but this is misleading (Callot 1994, fig. 85, 97, 105, 151, 228).⁸⁷ In any case, they are never regularly integrated into such walls. Most importantly, the use of ashlar blocks in Ugarit is fundamentally different from the later pier-and-rubble technique in that it is confined to a socle of three to four courses above which wooden posts were set, which constrained the rubble walls. The purpose of the sections built in ashlar (beyond strengthening corners and doors) was to form a solid base for the wooden posts. Hence, they are

⁸⁴ Callot 1983, 28, 46, fig. 4, 11, 21, 22, 25, 31, photos 4–6, 16, 23; Calvet/Geyer 1987, fig. 7, 9, 10, 13; Salles 1987, fig. 3, 15, 20, 22; Yon et al. 1987, fig. 3, 4, 6b, 9, 10, 14, 15, 40a, 42a, b, 45–48, 50, 62, 63, 67, 71–73, 82, pl. 1, 2, 6; Callot 1994, 123, fig. 3, 4, 18, 20, 24, 25, 27, 30, 32–34, 37, 39, 43, 45, 54, 56, 58, 64, 65, 73, 74, 76, 84, 85, 93, 94, 96, 97, 105, 120, 126, 133–137, 141, 149, 151, 164, 173–175, 180, 182, 187, 188, 203–211, 221, 228, 229, 234, 235, 237, 242–244, 249, 258, 261, 266, 267, 315, 323–327, 335, 337–341, 354, 355, 370, 374, 376, 378, 386, 397; Callot/Calvet 2001, fig. 1, 2, 7, 8; Mallet/Matoïan 2001, fig. 1–6; Pittaccio 2004–2007, 42, fig. 2, 9; Bounni et al. 2012, fig. 5; Callot 2013, fig. 2, 3; Geyer et al. 2013b, fig. 2; Monchambert 2013, fig. 3, 4; Al-Bahloul 2016, fig. 2, 6, 7, 10, 12, 28; Bessac/Matoïan 2020, 266, fig. 10, 19. The same applies to tombs, see p. e. Salles 1987, fig. 7, 10, 12; Marchegay 2008, 99, 103, fig. 2. See also Callot 2011 for the sanctuaries, where ashlar blocks are more frequently used. An overview over the occurrences in earlier publications (not cited here) is given in Elayi 1996, 79, note 10.

⁸⁵ Callot 1983, fig. 10, 21, 22, 25, 31, photos 5, 6, 16, 23; Calvet/Geyer 1987, fig. 9, 10, 13; Yon et al. 1987, fig. 9, 10, 42a, 45, 47, 63, 67, pl. 1, 2; Callot 1994, 123, fig. 25, 27, 30, 43, 45, 54, 56, 73, 74, 93, 94, 133–137, 173, 174, 205, 228, 242, 249, 258, 261, 266, 267, 315, 323–325, 354, 355, 370, 374, 376, 378; Bounni et al. 2012, fig. 5; Geyer et al. 2013b, fig. 2; Monchambert 2013, fig. 3, 4; Al-Bahloul 2016, fig. 6, 7, 10, 12, 28.

⁸⁶ Schaeffer 1933a, 106 f., pl. 13: 3; 1933b, 106 f., fig. 2, pl. 13; Bounni 1982, 150, 153, fig. 3; Bounni et al. 1998, 17 f., fig. 9, 11, 13, 14, 21, 28, 37, 61; Pittaccio 2004–2007, 42, fig. 11; Bessac/Matoïan 2020, 265–268, fig. 10: 2, 8, 11.

⁸⁷ The impression these plans give is not corroborated in other plans of the same units, or these show that the respective piers are set where two walls meet, belong to closed doorways, or similar. The only exception may be the staircase in Callot 1994, fig. 4, 11, where a short section of rubble is shown between two piers with ashlar blocks, but even this seems to be reconstructed (Callot 1994, fig. 7, 8).

rarely wider than two blocks (although the socles of some walls, mostly façades, were built of pure ashlar masonry⁸⁸). Pier-and-rubble masonry is very different in this respect.⁸⁹ Accordingly, the Late Bronze Age buildings of Ugarit cannot be reasonably called the first examples of this technique. Although they show that the prerequisites – the organised quarrying of stone, finely worked ashlar blocks laid as headers and stretchers, the strengthening of specific parts of walls with ashlars – were available, the technique this book deals with was not yet used. Even though, regarding ashlar masonry, ‘Ugarit was a true ‘testing laboratory’ in what was still a new field in this region in the Bronze Age’ (Bessac/Matoïan 2020, 302), we have to look elsewhere for the first examples of the pier-and-rubble technique as defined above.

A differing suggestion for the origins of the style was offered by Shiloh (1979). He dealt with the many occurrences of pure ashlar masonry in Iron Age II Israel⁹⁰ and noted that pure ashlar masonry and pier-and-rubble are tightly related and that the early occurrences of the latter prove that it cannot be considered ‘a decline in the ashlar technique but rather is one of the several methods of using it’ (Shiloh 1979, 63; see also Stern 1992b, 303; 1998, 373–375). Accordingly, Shiloh

locates the origin of the pier-and-rubble technique in Iron Age II Israel. This view has meanwhile been frequently argued against, as has already been stressed above (see chapter 1.2). The fact that Iron Age II walls in this style are meanwhile known from numerous sites in northern and central Levant (*map 2*),⁹¹ despite the problematic state of research, with the first use of the technique in Sarepta probably going back to Iron Age I,⁹² pre-dating the use of ashlar masonry in Iron Age Israel, is the best argument against Shiloh’s suggestion.

Another suggestion regarding the ‘emergence’ of the pier-and-rubble technique was made by Sader and Kamlah: based on the situation at *Tell el-Burak*, where ashlars were used in the corners and doors of House 1 in phase D (2nd half of the 7th cent. BCE), but then in phase C (6th cent. BCE) also in ashlar piers within straight walls in Houses 1 and 2 (*fig. 47, 48*), they suggested that the use of ashlars in corners, doors and intersections of walls may be classified as an early stage of the pier-and-rubble technique (Kamlah/Sader 2003, 149; Kamlah/Sader 2004, 128). Sader later proposed that this technique ‘developed in the Persian period into the well-known ‘pier and rubble’ technique’ (Sader 2009, 62, 63; see also Sader 2019b, 158; Bolder-Boos 2020, 422; Jigoulov 2021, 40). Although her chronology is not correct in view of the many occurrences of the technique in Iron Age II,⁹³ her thought that the pier-and-rubble technique ‘is a Levantine building technique, which developed from the tradition of using ashlars to strengthen a wall structure built with fieldstones’ (Sader 2009, 63) surely has some truth in it. The use of ashlars may be considered a prerequisite for pier-and-rubble masonry, and this use of ash-lars is known from various sites in the Levant at least from the Late Bronze Age onwards (see note 78–81); but the use of ashlars only at corners

⁸⁸ Callot 1983, 56, 60, *fig. 4–13, 18, 19, 24, 26, 29, 30, photos 2–12, 18, 19, 21, 22, 24*; 1994, 123 f., *fig. 19–23, 30, 45, 47, 97, 98, 105–107, 111, 112, 115, 126, 136, 151, 153, 154, 258, 261, 262, 314, 317, 318, 325, 327, 333, 334, 337, 341, 343, 359, 367, 383*; Callot/Calvet 2001, *fig. 1, 2, 5*; Bessac 2013, *fig. 9, 12–14, 20–25, 28, 29*; Callot 2013, *fig. 2, 3, 5–9, 11, 12*; Monchambert 2013, *fig. 9, 10*; Bessac/Matoïan 2020, 266, *fig. 10: 1, 3, 4, 6, 9, 12, 13, 16, 24, 25, 29–33*. For tombs, see Salles 1987; Marchegay 1999 (*non vidi*); 2008, 99, 102 f., *fig. 3–5, 14*; Bessac/Matoïan 2020, *fig. 10: 2, 8, 11, 36–43*. For the temples, see Callot 2011; for the bridge-dam, see Geyer et al. 2013a. For quarrying techniques see Bessac 2013; Bessac/Matoïan 2020, 281–289, on the stones used Bessac/Matoïan 2020, 278–281, on tools used for dressing the blocks Bessac/Matoïan 2020, 289–292. See also generally Wright 1985, 343–347.

⁸⁹ The sole exception may be Building 338 at Megiddo (25-ME-03), where wooden posts stood on ashlar piers just three courses high. Contrary to the situation at Ugarit, these piers were not socles of rising walls, but only delimited the massive podium of a building, with the rising walls only commencing above. The use of the pier-and-rubble technique in the retaining Wall 1626 of the ‘Southern Stables’ of Megiddo (25-ME-01) is comparable.

⁹⁰ Shiloh 1979, 51–59, referring to buildings at Dan, Hazor, Megiddo, Taanach, Beth-Shean, Samaria, *Rāmat Rāhēl*, Jerusalem, Gezer; see also Briquel-Chatonnet 1992, 341; Barkay 1992, 316 f. Add now e.g. *Yavnē Yām* (Fischer et al. 2008, *fig. 9*) and Dor (Gilboa et al. 2015, 63–65, *fig. 5*).

⁹¹ *Tell Mīrhān* (06-MR, 9th–7th cent. BCE); Sidon (10-SI-02*, 9th/8th cent. BCE); *Tell el-Burak* (11-BU-01, late 8th cent. BCE); Sarepta (12-SA-01, probably starting in the 11th cent. BCE, 12-SA-02, probably contemporaneous, and 12-SA-03, 9th–7th cent. BCE); Tyros (13-TY, later 9th or 8th cent. BCE).

⁹² 12-SA-01 (starting in the 11th cent. BCE).

⁹³ See *Tell Mīrhān* (06-MR), Sidon (10-SI-02*), *Tell el-Burak* (11-BU-01), Sarepta (12-SA-01; 12-SA-02; 12-SA-03), Tyros (13-TY), *el-Kabrī* (18-KA-01, 18-KA-02), Dor? (24-DO-07, 24-DO-11, 24-DO-12), Megiddo (25-ME-01, 25-ME-02, 25-ME-03, 25-ME-04), Jezreel (26-JE).

and doors is a very widespread and unspecific phenomenon certainly not automatically leading to the pier-and-rubble technique (see chapter 1.1, type 2, esp. note 8). Hence, it is not surprising that the use of ashlar at corners and doors antedates the creation of ashlar piers within straight walls at various sites, but that this ‘transition’ seemingly occurred at different sites in widely diverging periods in time.⁹⁴ At *Tell el-Burak*, likewise, the first use of ashlar piers in straight walls of houses may postdate the first use of ashlar in corners and doors (**11-BU-02**, **11-BU-03**), but the first use of ashlar piers at the site (in the ‘surrounding wall’) antedates all uses of ashlar in house walls (**11-BU-01**, *fig. 45, 46*). It surely is probable that the pier-and-rubble technique first emerged at a site where corners and doors were already strengthened with ashlar beforehand, but since the distribution of the technique is already wide in Iron Age II and the available data certainly is incomplete, it seems problematic to identify a specific site where the technique was invented. In any case, it is doubtful that there was any general move from ashlar used in corners and doors to pier-and-rubble in a specific period; the wide distribution and widely differing chronology of the technique rather indicates the gradual spread of a technique subsequently gaining prominence but reaching different sites at different points of time. This diffusionist view of a spread of the building technique will be dealt with more in detail below. But what were its advantages, in the first place?

⁹⁴ See e.g. House 1 in *Tell el-Burak* (**11-BU-02**) with ashlar used in corners and doors in the 7th and also in at least one pier in the 6th cent. BCE; Sarepta, Area II Y (**12-SA-03**) with ashlar used in corners and doors in the 13th and in piers from the 9th–7th cent. BCE onwards (but at **12-SA-01** starting in the 11th cent. BCE); *Acco* (*Tell el-Fuḥḥār*) (**20-AK-01**) with ashlar used in corners and doors in the 5th cent. BCE and in piers in straight walls in the 4th cent. BCE; *Tabbat el-Ḥammām* (**04-TH**), with ashlar used in corners and doors from the 10th–7th and also in ashlar piers in the 4th cent. BCE; *Tell Kazel* (**05-TK***) with ashlar used in corners and doors and possibly only subsequently in piers in the 5th and 4th cent. BCE. At Dor, the use of ashlar in corners is documented in Area D2 (**24-DO-10**) in the 11th and 10th cent. BCE, but the dating of the first occurrences of the pier-and-rubble technique from Areas D1 (**24-DO-07**), D5 (**24-DO-11**) and E (**24-DO-12**) is doubtful; it may be Iron Age II, but also Persian. At *Yavnê Yām* (**33-YY-01**), the pier-and-rubble technique seems to be documented only in the Persian period, but pure ashlar masonry was known in the 7th cent. BCE.

2.3 Cheap, Strong and Pretty? The Function of Pier-and-Rubble Masonry

Basically, three different approaches to account for the use of the pier-and-rubble technique may be identified in previous research. The first explanation addresses the aesthetic qualities of the style. Guy already argued that ‘the rubble was plastered over and the ashlar left to show as ornament’ in the first analysis of pier-and-rubble from Megiddo, and his successors Lamon and Shipton partly agreed (Guy 1931, 32).⁹⁵ In his first influential report on the discovery of such walls in Sarepta, Pritchard concluded that it ‘is difficult to see how this particular type of ‘rib’ construction served any utilitarian function; it added little if any strength to the wall. Yet to the modern eye the resulting design is pleasing; it may have been also to the taste of the Iron Age inhabitants who lived within these walls’ (Pritchard 1971, 19). Van Beek and van Beek likewise stressed the ‘unusual attractiveness in the regular alternation between the hewn and the unhewn’ (van Beek/van Beek 1981, 76). But already Elayi, in her first paper on the matter, voiced numerous doubts as to whether the aesthetic aspect was a major reason for the use of the technique (Elayi 1980, 174 f.; see also Elayi/Sayegh 2000, 204 f.), and these became ever more important with the increase of data: even though most ashlar used in the piers have been rather carefully cut (surely not least because this improves their fit and thus the robustness of the piers), many of them have not been carefully smoothed (or even left in their only roughly worked state on their view faces; see chapter 3.2). Furthermore, differences between their outer and their inner faces are hardly visible.⁹⁶ Both facts militate against any importance of the aesthetic aspect. In addition, numerous walls in at least six

⁹⁵ See also Lamon/Shipton 1939, 49, ‘But the fact that the same method was used even in concealed walls would indicate that the ashlar piers had a structural as well as a decorative purpose’.

⁹⁶ This is stressed by Elayi/Sayegh 2000, 204 for the large and important context **07-BE-04** and seems to be valid also in the even more extensive and well-published contexts at Dor (**24-DO-02**, **24-DO-03**, **24-DO-04**, **24-DO-05**, **24-DO-06**); in most other sites, a comparison of multiple faces of the same blocks is hardly possible at the current state of publication.

sites still preserved remains of plaster or even stucco, and these were not confined to the sections in rubble, but also covered the ashlar piers (*plan 7, 12, 16, 28, 43, fig. 34, 49*; see chapter 3.2).⁹⁷ Even though this was sometimes documented only in individual rooms, which needed to be plastered for functional reasons (see **12-SA-01** and **32-YA-02** as well as possibly **24-DO-04**), the fact that, at *Tēl Anafa* (**14-AN**), ashlar piers were especially common in the representative Room 10 and the Bath 6, which were both thickly plastered and stuccoed, is telling (*plan 16, fig. 53, 54*). What is more, remains of plaster were surely preserved and documented only rarely; in the ‘harbour quarter’ of Berytos (**07-BE-04**), it was noted only in some rooms, but the excavators thought that at least most of the buildings were originally plastered.⁹⁸ All in all, the aesthetic qualities of pier-and-rubble are very probably only a minor reason for the spread of the technique (if at all).

The second explanation is obvious: ashlar piers added to the stability of rubble walls.⁹⁹ Already the authors of ‘Megiddo I’ noted that ‘the fact that the same method was used even in concealed walls would indicate that the ashlar piers had a structural [...] purpose’ (Lamon/Shipton 1939, 49) and many others called them ‘piliers de renforcement’¹⁰⁰ or used similar expressions. This structural function is obvious where the ashlar piers are systematically placed at corners, doors and intersections of walls, points that are most

heavily stressed.¹⁰¹ Beyond that, the specific static function of ashlar piers seems to have varied. In the podium of Building 338 at Megiddo (**25-ME-03**), the ashlar piers constituted the bases for wooden posts and thus had to carry the bulk of the vertical load of the building (*plan 35, fig. 85–87*).¹⁰² In the ‘surrounding wall’ at *Tell el-Burak* (**11-BU-01**, *plan 9, fig. 45*) and the casemate walls at *el-Kabrī* (**18-KA-01**, *plan 20*) and Jezreel (**26-JE**, *plan 37, 38*), few piers seem to have inserted into one face of thick walls, strengthening them in a way comparable to the staggered-reinforcing-header technique. In the retainment wall surrounding the courtyard of the ‘Southern stables’ of Megiddo (**25-ME-01**, *plan 33, fig. 84, 85*), a terrace wall at Tyros (**13-TY**, *plan 15, fig. 51*) and the ‘Phoenician retaining wall’ at *Bustān eš-Šēh* (**09-BS**, *fig. 44*), the rather regularly placed piers helped to increase the stability of the wall regarding horizontal loads originating from the massive earth fill they retained.¹⁰³ In some cases, where most ashlars were used in corners and doors, and only a limited amount of piers within straight walls are documented, these will have added some stability to individual points (see e.g. *plan 10, fig. 47*).¹⁰⁴ Protection against erosion may also have played a role, especially in hill-side locations.¹⁰⁵ In many badly preserved or badly

⁹⁷ Although this may be surprising, the very first ashlar walls in the Bronze Age were also often plastered; see Kreimerman/Devolder 2020, 8 f.

⁹⁸ See Elayi/Sayegh 2000, 205 on **07-BE-04**. There seems to be no reason to suppose that the technique was used only to increase the aesthetic value of the buildings during the construction process (Busen 2022).

⁹⁹ See the somewhat similar case of the Late Antique city walls of Dara-Anastasiopolis, where vertical rows of single ashlars formed piers (within the core of the wall faced with ashlars), which strengthened the walls in places where it had to be especially solid (Zanini 1990, 233 f., fig. 4, 9, 17, 21; Brasse 2017, 239, fig. 10; Hof 2020, 134, fig. 31: 4). I thank Christiane Brasse and Sophie Helas for discussing this matter with me.

¹⁰⁰ Riis 1965, 68. See already Hamilton 1934, 78, ‘the consolidation of rubble walls with ashlar piers’; Braidwood 1940, 190 as well as e.g. Stern 1968, 213.

¹⁰¹ See **02-SU-03**, **02-SU-04**, **03-AM**, **04-TH**, **07-BE-04** (partly), **11-BU-03**, **12-SA-01**, **12-SA-03**, **14-AN**, **18-KA-01**, **24-DO-02**, **24-DO-04**, **24-DO-06**, **25-ME-03**, **26-JE**, **27-TM**, **32-YA-01**, **32-YA-02**. See chapters 1.1 (type 2) and 2.2 for the use of ashlars only in these contexts, not considered as examples of pier-and-rubble here.

¹⁰² This use of the pier-and-rubble technique not in rising walls but a podium is so far exceptional, though.

¹⁰³ **09-BS** (the context and thus the function of the wall is not entirely clear), **13-TY** (context unclear, but function as terrace wall very probable in view of the diverging care taken for the two faces of the wall). This may likewise be true for the long wall at *Tell Kudādi* (**30-KU**), although it may have belonged to a building, too; the context is unclear. In such retaining walls, the pier-and-rubble technique may have also been preferable to pure ashlar masonry because the segments in rubble provided much better drainage.

¹⁰⁴ **02-SU-01**; **11-BU-02** (it seems relevant that the only pier in a straight wall was built into a wall which had just collapsed before); **12-SA-03**; **25-ME-04**. If the use of piers seems utterly unsystematic, their presence may have to be explained with the reuse of ashlar blocks from previous buildings.

¹⁰⁵ See e.g. **11-BU-02** and **11-BU-03**, where there is secure evidence for ashlar piers only in the walls facing the hill slope, erected after a building further down had just collapsed.

published examples, the function can only be guessed.¹⁰⁶ But mostly, ashlar piers were regularly spaced in the walls (*plan 3, 4, 7, 8, 12, 15, 17, 24, 25–31, 39, 41–43*).¹⁰⁷ In these cases, one could presume that they provided the major or even the only support for upper stories and/or roofs, with the rubble sections being mere screen walls¹⁰⁸ – and the rather low quality of most rubble sections could be taken as a confirmation.¹⁰⁹ That would mean that the horizontal beams would have been placed on top of the piers only. Unfortunately, the known walls in the pier-and-rubble technique are not preserved well enough to examine the placement of such beams: some walls at *Tell Sūkās* (**02-SU-04**, *fig. 29, 30*), *Berytos* (**07-BE-01**, *fig. 34, 35*), *Tell Abū Hawām* (**22-AH**, *fig. 61*) and *Jafo* (**31-JA**, *fig. 93*) are conserved to a considerable height, but do not reach the upper end of the ground floor.¹¹⁰ At Dor, the walls sometimes even surpass the height of 3m, but only because multiple walls of subsequent phases with piers in the same positions are superposed (*fig. 63, 65, 68–71, 73, 76, 77*) and no wall reaches a height which can without doubt be considered the original height of the room, so that no beam holes can be identified. Still, it is possible to analyse the placement of the piers inside the walls, in order to assess whether their location

in opposite walls corresponds. This seems to be the case in some instances, such as the building in Area C at *Tēl Ya'ōz* (**32-YA-01**, *plan 44*),¹¹¹ but the distribution of piers often does not fit this conjecture.¹¹² In the most comprehensively understandable contexts, Areas A0 and C0–2 at Dor (**24-DO-04, 24-DO-05, 24-DO-06**, *plan 25–31*), some piers could have carried roofing beams, but many could have not; overall, the placement is too unsystematic to be explained with a function as supports. This, on the contrary, indicates that at least in some cases, the major function of regularly spaced piers must have been to increase the stability of the entire wall, that is without depriving the section in rubble of their load-bearing function. This may explain why the surrounding wall 1693 at Megiddo (**25-ME-02**, *plan 34, fig. 84*), which carried only its own weight and had to withstand little if any lateral pressure, was built in this technique. One way how ashlar piers helped to strengthen rubble walls is that they reduced the effects of thermal stress (e.g. related to variations between day and night). Besides that, it has been often proposed already that the ‘selling point’ of walls in the pier-and-rubble technique was their tremor-resistance: L. E. Stager supposed that the building method ‘was designed to ‘ride out’ shock waves better than rigid, solid stone construction could have done. Its resilience to vertical thrust minimized damage caused by earthquakes or tremors, a constant hazard throughout the Mediterranean basin’ (Stager 1985, 13). Gubel and Elayi likewise concluded that the main advantage of pier-and-rubble was its sturdiness in the case of earthquakes, which Elayi also explained with the frequent absence of binder between the ashlar, giving the piers some flexibility.¹¹³

106 05-TK*, 07-BE-02*, 07-BE-03, 07-BE-05*, 08-JI, 10-SI-01*, 10-SI-02*, 12-SA-02, 17-AH, 19-NA*, 20-AK-01, 23-YO, 24-DO-03, 24-DO-07, 24-DO-09, 24-DO-10, 24-DO-11, 24-DO-12, 24-DO-13, 24-DO-14, 24-DO-15, 28-CA, 29-MI*, 33-YY-01*, 33-YY-02*, 34-AS*.

107 02-SU-02, 02-SU-03, 03-AM (?), 04-TH, 07-BE-01, 07-BE-04 (partly), 12-SA-01, 13-TY (?), 15-OU, 20-AK-02 (?), 22-AH, 24-DO-02, 24-DO-04, 24-DO-05, 24-DO-06, 24-DO-10, 27-TM, 30-KU (?), 31-JA (?), 32-YA-01, 32-YA-02.

108 This thought seems implied in van Beek/van Beek 1981, 76, ‘Functionally, they provided an adaptable support system that could be used in both exterior and interior building walls, as well as in open construction in the interior of a building to carry a roof, a second floor or a clerestory – or to bear the weight of a heavy roof around an open courtyard’. See also Díes Cusí 1994, 36, note 8; Pittaccio 2004–2007, 39; Bianchini 2010, 141. Wright 1985, 426 concluded, ‘Whether [...] the roofing beams were set directly on the pillars (their spacing would be consonant with this) or whether the piers were capped by a ‘wall plate’ to effect a completely framed wall is not clearly revealed in the surviving remains’; see also Wright 2005, 60; Di Luca/Cristilli 2011, 464.

109 Coursed random rubble is rather rare, and squared rubble even rarer, but uncoursed random rubble is the rule; see chapter 3.2.

110 Hamilton 1935, 2, pl. 2.1 supposes the walls at *Tell Abū Hawām* all to be mere foundations, but this seems unlikely; see also Elayi 1980, 172.

111 See also the less well conserved building in Area D (**32-YA-02**).

112 See for example **02-SU-02** (where the piers cluster around an open courtyard), **12-SA-01** (where the piers cluster around two covered rooms, but their locations do not correspond in opposite walls) or **07-BE-04** (where the locations of the piers do not correspond at all).

113 Gubel 1992, 37; Elayi/Sayegh 2000, 206 ‘on peut se demander si la présence de piliers formés de blocs non liés entre les sections en blocage de moellons liés ne procurait pas aux murs une certaine souplesse en cas de séisme’; Elayi 2010, 159 ‘They made the walls more solid, and the frequent absence of binder between the stones gave them some flexibility in case of earth tremors’. These thoughts on the

Indeed, while the walls normally had to carry only vertical loads, earthquakes will have temporarily added horizontal and tensile loads, and pure rubble walls are unsuitable for this. The ashlar piers will have received and transmitted such loads much better because of their larger bearing surfaces and because they were not joined to each other.¹¹⁴ The only prerequisite was that the height of the blocks within every course was consistent, so that the ashlars could slightly shift – but despite the large spectrum of differing characteristics and techniques used in pier-and-rubble walls, this indeed is one recurring trait.¹¹⁵ This (if only slightly) increased resistance against tremors (not necessarily earthquakes, but also e.g. passing transport, nearby building activities, etc.) and the general increase in robustness (especially lateral thrust) may explain the rather haphazard distribution of ashlar piers in many contexts. It is not their specific placement which mattered, but their presence. All in all, ashlar piers could increase the sturdiness of rubble walls in many ways.

Thus, the pier-and-rubble technique provided a plus on stability without being as laborious as pure ashlar masonry. This economic aspect is the third approach – and certainly an important one – to the reasons behind the use of the technique.¹¹⁶ It has been first proposed by A.-G. Barrois, who considered the podium of Building 338 at Megiddo one of a new kind of such ‘constructions à bon marché’, because only the piers had to be built by specialised masons (‘maçons spécialistes’), while the rest of the walls could have been walled up by simple hired labourers (‘équipes de tâcherons’;

Barrois 1939, 116). Barrois’ example may have been badly chosen, because these walls did not only restrain the podium’s filling, but in addition carried wooden posts and thus fulfilled a double static function (25-ME-03, fig. 85, 86, see also note 102). His assumption of two separated groups of masons may also be considered unlikely in view of the limited space available and the fact that at least if ashlar piers and rubble sections interlock, as is most often the case, both must have been built at the same time.¹¹⁷ But it is certainly correct that a wall in the pier-and-rubble technique was much less expensive or much less laborious than a wall in pure ashlar masonry because less ashlars had to be quarried and transported to the site and fieldstones could be much more easily obtained. It thus does not come as a surprise that this economic aspect has often been taken as the prime motivation in the creation of walls in the pier-and-rubble technique; they retained ‘the strength and durability of ashlar construction at a considerable discount of raw material’.¹¹⁸ Its distribution makes clear that it cannot be considered an ‘ad hoc economizing measure’ (Stager 1985, 13) but a popular technique consciously exploited. It seems doubtful if walls in the pier-and-rubble technique have often been considered aesthetic by their builders, but they surely offered a good compromise between inexpensive rubble and strong ashlar walls. The same compromise may be behind the use of the same technique in an ‘isolat de culture phénicienne’ in 20th cent. CE Lebanon (Elayi 1986; 1996, 90, pl. 3; 2013, 310).

‘elasticity’ of pier-and-rubble walls in the event of an earthquake resemble the explanation of Schaeffer (1962, 9) for the use of wooden posts in the architecture of Late Bronze Age Ugarit.

114 I thank Christiane Brasse for discussing this problem with me.

115 See chapter 3.1 for a typology of the piers and 3.2 on further technical characteristics.

116 See the similar explanations for the use of ‘stone framework’ at Late Antique Keloşk Kale in Roos 2009, 545 or Republican *a telaio* at Pompeii in Peterse 1999, 13.

117 See chapter 3.2, where it will be argued that pier-and-rubble walls were usually pulled up in a single step even if the ashlar piers and the rubble are not or only slightly dovetailed.

118 Sharon 1987, 28; see also e.g. Shiloh 1979, 66; van Beek/van Beek 1981, 76; Briquel-Chatonnet 1992, 341; Elayi/Sayegh 2000, 206; Pittaccio 2004–2007, 41; Beyl 2013, 123, 264; Huylmans 2019, 91.

3 Pier-and-Rubble and Similar Techniques in the Levant

This chapter deals with the pier-and-rubble technique as well as the staggered-reinforcing-header technique in the Levant. Since most of the contexts feature the first technique, this will be the main focus of the following pages. At first, the ashlar piers will be analysed according to their typology, and technical characteristics beyond the typological classification will be dealt with. Afterwards, a chronological, geographical and functional survey of the Levantine occurrences of the pier-and-rubble technique will be given. After a short excursus on the little evidence for the staggered-reinforcing-header technique at the Levant, some first thoughts on the interpretation of the spread of the technique will be presented.

3.1 Typological Classification

In her first paper on the technique, Elayi offered a typology of the ashlar piers in pier-and-rubble masonry, based on the way in which the individual blocks are combined, that is on the pattern headers and stretchers form in the individual courses as well as the view faces of the piers (Elayi 1980, 167–169, fig. 1a–c; 2a–c; 3a).¹¹⁹ In her later publications on the same topic, she has expanded her typology (Elayi 1996, 88, fig. 1–3; Elayi/Sayegh 2000, 200 f., fig. 43a–c; 44a–c). Her approach is certainly useful, but the number of types has meanwhile grown further, and simply adding more letters would create confusion, since widely diverging types would then be given consecutive letters. It was thus deemed necessary to create a new, coherent typology for the purposes of this study. The known types of piers have thus been renumbered, starting with the simplest types (that is with the type including the smallest number of blocks per course), with the following types arranged

according to their complexity (fig. 2).¹²⁰ Since many piers are preserved in one course only (or published only in plans, but not in elevations or photographs showing their sides), not every pier can be unequivocally classified, of course.

With the simplest type (A), the courses are alternately formed by one header and two stretchers (one of them visible per face), with the stretchers projecting into the adjacent rubble masonry (fig. 2: A). It was used in Berytos, Megiddo, Jezreel, Jafo and *Tēl Ya'ōz*.¹²¹

The next type (B) is similar but has two headers or two stretchers each per course, so that either two headers or one stretcher are visible on each side (fig. 2: B). It is the most common of all types and documented in a 'regular' version (B1), in which the two headers and the stretcher have the same width, in *Tell Sūkās*, *Tabbat el-Hammām* and Sarepta,¹²² and in an 'irregular' version (B2), in which the stretchers are wider than the two headers and thus project into the rubble, in Berytos, *Ġīye*, *Tell el-Burak*, Sarepta, Tyros, Acco, *Tell Abū Ḥawām*, Megiddo, *Tēl Ya'ōz* and possibly *Tēl Qedeš*.¹²³ Either of those two types or type A was used in *Tell Mīrhān*, Berytos, Sarepta, *Tēl Anafa*, Achzib (?), *el-Kabrī*, Dor, Megiddo, Jafo and *Tēl Ya'ōz*.¹²⁴ The distinction between 'regular' and 'irregular' types was first made by Elayi and is adopted here, because it seems relevant if the

¹²⁰ Specifically, the types have been arranged according to the total number of blocks visible in two consecutive courses in their view faces, starting from two (type A) to finally reach eight (type M).

¹²¹ See **07-BE-04** (one pier), **25-ME-02** (at least two piers), **26-JE** (at least one pier), **31-JA** (at least one pier), **32-YA-02** (at least six piers).

¹²² See **02-SU-04** (two piers), **04-TH** (one pier?), **12-SA-02** (at least two piers).

¹²³ See **07-BE-04** (two piers), **08-JI** (at least two piers), **11-BU-03** (at least four piers), **12-SA-02** (at least one pier), **13-TY** (three piers), **16-KE** (up to 6 piers?), **20-AK-01** (at least four piers), **22-AH** (27 piers?), **25-ME-03** (at least 15 piers), **32-YA-01** (two piers).

¹²⁴ See **06-MR** (up to two piers), **07-BE-04** (at least seven piers), **12-SA-01** (twelve piers?), **12-SA-03** (eight piers?), **14-AN** (one pier?), **17-AH** (two piers?), **18-KA-02*** (one pier?), **24-DO-02** (one pier), **24-DO-04** (up to six piers), **24-DO-05** (one pier?), **24-DO-06** (two piers), **25-ME-04** (two piers), **31-JA** (one pier?), **32-YA-01** (eight piers), **32-YA-02** (one pier).

¹¹⁹ See also Sharon 1987, 27 f., fig. 2, whose typology follows a similar approach, but is limited to a smaller number of types.

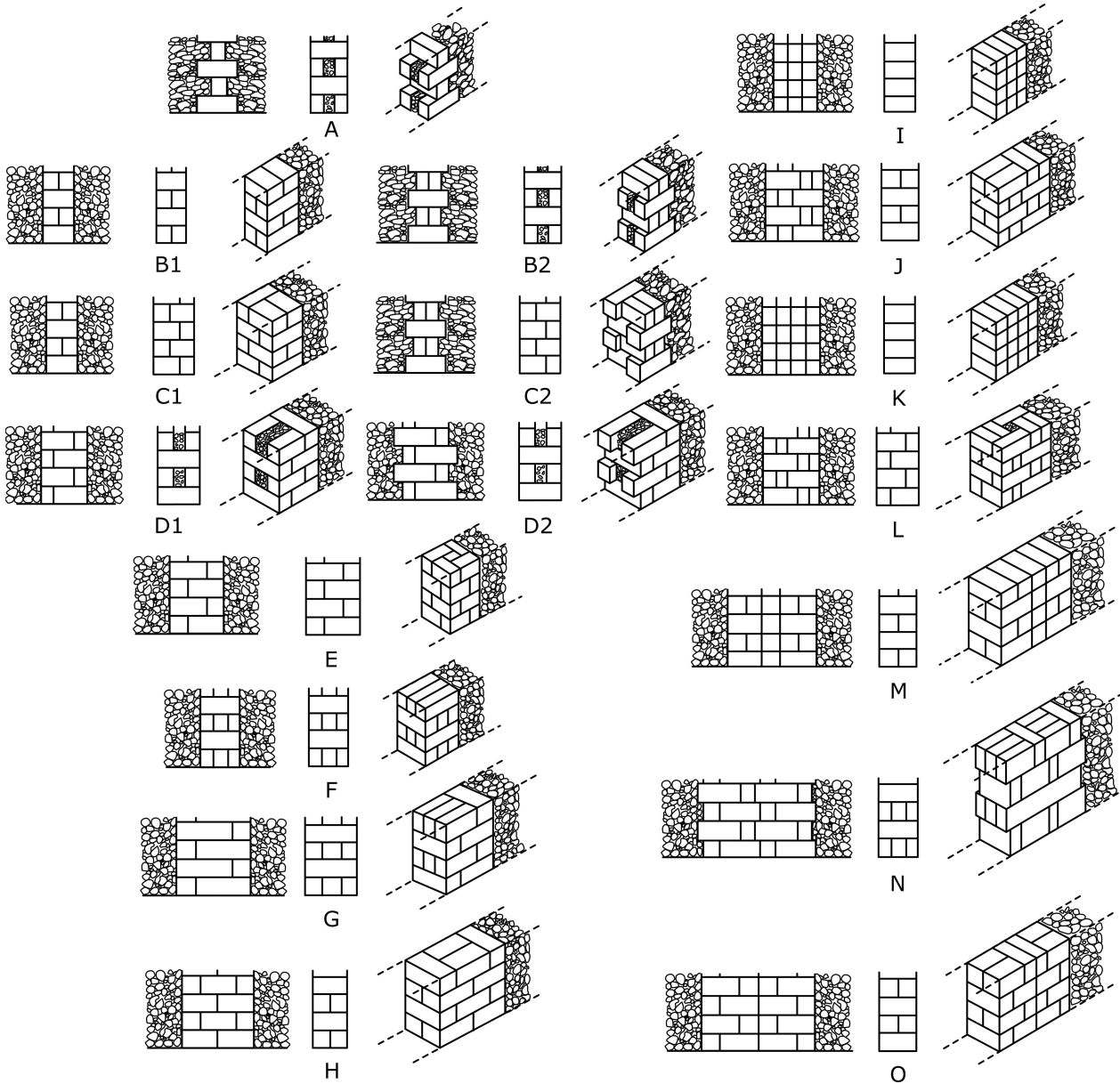


Fig. 2. Typology of ashlar piers.

ashlar piers and the sections in rubble had to be erected together or could have also been erected independently, but this does not mean that the ‘regular’ form is more common or more carefully made; indeed, the benefits in steadiness of the ‘irregular’ types are obvious. In the ‘irregular’ variants of this and other types, the gaps between two stretchers of one course are filled with earth or rubble.

The subsequent type (C) resembles type B but is adapted for walls of greater strength: in every course, two headers run against one stretcher, with the stretchers being alternately placed on the

two faces of the wall (fig. 2: C). This type is known in its ‘irregular’ form (C2) from *Tell Sūkās*, *‘Amrīt* and *Megiddo*¹²⁵ and in either its ‘regular’ (C1) or its ‘irregular’ form from *el-Kabrī* and *Jezreel*.¹²⁶ The large width of the walls of *‘Amrīt* results in an unusual fill of rubble and earth between the headers and the stretcher.

With the following type (D), every course is composed of two stretchers (one on every face)

¹²⁵ See **02-SU-04** (two piers?), **03-AM** (three piers), **25-ME-01** (at least three piers).

¹²⁶ See **18-KA-01** (at least two piers), **26-JE** (three piers).

and one header, with the header placed alternately on the left and the right side of the pier (*fig. 2: D*). If the length of the header is larger than the width of the two stretchers, the gap created between the two stretchers is filled with rubble or earth. Type D is the second most common one and was used in its ‘regular’ form (D1) in *Tell Sūkās*, Berytos, Sarepta, *Umm el-‘Amed*, Dor, *Tēl Māvōrak*, Jafo and *Tēl Ya’ōz*,¹²⁷ in its ‘irregular’ form (D2) in Berytos, *Bustān eš-Šēh*, Sarepta and Dor,¹²⁸ and in either of these in *Tell Sūkās*, Berytos, Sarepta, Akko (?), Dor, Megiddo, Jezreel, Caesarea, Jafo, *Tēl Ya’ōz* and possibly *Tēl Qedeš*.¹²⁹

The successive type (E) is square in plan and features one header and one stretcher in each of its four faces (thus four blocks in total in each course) (*fig. 2: E*). The centre of the pier may be filled with earth or rubble or built with a small ashlar. Type E is rare and may be identified only in *Tell Sūkās* and Dor.¹³⁰

The ensuing type (F) is also square, but its courses are alternately assembled from three headers and three stretchers. It is likewise infrequent and has been documented only in *Tēl Anafa* and possibly *Tell Sūkās*, *Tabbat el-Ḥammām*, *Tēl Qedeš*, Achzib, Dor and Jafo.¹³¹

The courses of the next type (G) are composed of three stretchers and one header, placed on alternating sides (*fig. 2: G*). It was used in *Tēl Anafa*, Dor, Jafo and possibly Akko.¹³²

The succeeding type (H) is rather oblong and its courses are interchangeably composed of four stretchers (two on each face) or two stretchers between two headers (*fig. 2: H*). It seems to be always at least slightly ‘irregular’ and is known from *Tell Sūkās*, *Tabbat el-Ḥammām*, Berytos, *Umm el-‘Amed*, Dor, Caesarea and possibly *Tēl Qedeš*.¹³³ Possible gaps between multiple stretchers are filled with rubble or earth, as in the ‘irregular’ types, some cases of type D as well as types J, M, N and O.

The subsequent type (I) is only made of headers, with three of them placed in each course (*fig. 2: I*). Being less stable than most other types, it is rather rare and documented only in Dor and possibly in *Tell Sūkās*, *Tabbat el-Ḥammām*, *Tēl Qedeš*, Achzib and Jafo.¹³⁴

The following type (J) again was more popular; each of its courses is composed of two headers next to two stretchers, changing sides after every course (*fig. 2: J*). It seems to have been more or less ‘regular’ in every case and may be identified in Berytos, Sarepta (?), *Tēl Anafa*, Akko (?), Dor and Jafo.¹³⁵

The successive type (K) again is only made of headers, but four of them are placed in every course, here (*fig. 2: K*). It was used in Berytos, Dor, Jafo and possibly Achzib and Megiddo.¹³⁶

The ensuing type (L) was called the ‘braid pattern’ by Sharon (1987, 27 f.) and resembles type E; each one of its courses features two headers next to one stretcher, with the two headers of one side running against the stretcher of the other side, resulting in an interlocked pattern (*fig. 2: L*).

127 See **02-SU-02** (one pier), **02-SU-03** (one pier), **07-BE-04** (three piers), **12-SA-02** (at least two piers), **15-OU** (two piers), **24-DO-02** (nine piers), **24-DO-05** (five piers), **24-DO-06** (eight piers), **24-DO-09** (two piers), **27-TM** (five piers), **31-JA** (at least one pier), **32-YA-02** (one pier).

128 See **07-BE-01** (at least three piers), **07-BE-04** (five piers), **09-BS** (six piers), **12-SA-02** (at least two piers), **24-DO-04** (27 piers), **24-DO-06** (one pier), **24-DO-10** (one pier).

129 See **02-SU-01** (two piers), **07-BE-04** (at least nine piers), **12-SA-01** (one pier?), **12-SA-03** (one pier?), **16-KE** (one pier of type D or H?), **20-AK-01** (one pier?), **24-DO-11** (one pier), **24-DO-15** (one pier), **25-ME-02** (one pier), **26-JE** (at least one pier), **28-CA** (one pier), **31-JA** (two piers), **32-YA-02** (one pier).

130 See **02-SU-03** (one pier) and **24-DO-04** (three piers).

131 See **14-AN** (one pier), **24-DO-05** (one pier?). Additionally, piers of either type F or I were used at **02-SU-01** (two piers), **04-TH** (one pier?), **16-KE** (one pier?), **17-AH** (two piers?), **20-AK-01** (one pier?), **24-DO-04** (at least two piers), **31-JA** (two piers).

132 See **14-AN** (two piers), **20-AK-01** (one pier?), **24-DO-06** (one pier), **24-DO-15** (one pier?), **31-JA** (three piers).

133 See **02-SU-02** (three pier), **04-TH** (one pier), **07-BE-04** (one pier), **15-OU** (one pier), **16-KE** (one possible pier of type D or H), **24-DO-01** (one pier), **24-DO-04** (eight piers), **24-DO-05** (one pier?), **24-DO-09** (one pier), **24-DO-10** (three piers), **28-CA** (one pier).

134 See **24-DO-04** (at least one pier, another one is very similar and has three headers placed on their wider long sides in some and four headers placed on their shorter long sides in other courses). Additionally, piers of either type F or I were used at **02-SU-01** (two piers), **04-TH** (one pier?), **16-KE** (one pier?), **17-AH** (two piers?), **20-AK-01** (one pier?), **24-DO-04** (at least two piers), **31-JA** (two piers).

135 See **07-BE-04** (one pier), **12-SA-03** (one pier of type D or J), **14-AN** (one pier), **20-AK-01** (two piers?), **24-DO-04** (three piers), **24-DO-06** (one pier), **24-DO-11** (one pier?), **31-JA** (three piers).

136 See **07-BE-04** (one pier), **17-AH** (one pier?), **24-DO-04** (four piers), **24-DO-09** (one pier), **25-ME-03** (one pier?), **31-JA** (one pier).

As in type E, the centre may be filled with earth or rubble or a small square block. Type L is known only from Dor, possibly Jafo and in a modified form from *Tell Kudādi*.¹³⁷

The next type (M) is made of five headers in some and two groups of two stretchers flanking a header in the other courses (*fig. 2: M*). Although being of problematic strength, it is known from different areas in Berytos and Dor.¹³⁸

The following type (N) is amongst the most massive; each of its courses is composed of two stretchers, a header, another two stretchers and another header (*fig. 2: N*). It thus doubles type D, but interlocks the two parts since its lateral sides are not entirely 'regular'. Type N was used only at *Umm el-Amed* and Dor.¹³⁹

The penultimate type (O) likewise features two groups of two stretchers and two headers in every course, but the headers are alternately placed both in the middle or both on the outsides (*fig. 2: O*). Since it is only documented in a single instance in Berytos (**07-BE-04**, Wall 439/531), it seems doubtful if this can be classified as an individual type or whether two piers of type D1 were placed next to each other.

A last type (CH) is only used at intersections of walls and may be classified as a mixture between types C and H (*fig. 2*). Its first course features one stretcher between two headers on its plain side, and two projecting ashlar blocks at the back, which form two stretchers in the branching wall. It is documented at Dor and *Tēl Māvōrak* and in a slightly diverging version at Megiddo.¹⁴⁰

Finally, still other forms of ashlar piers were used in at least ten contexts: in *Tell Sūkās* (**02-SU-02**), *Čiye* (**08-JI**), Sidon (?) (**10-SI-01***) and *Tell el-Burak* (**11-BU-01**, **11-BU-02**), the ashlar piers were not systematically composed (that is, the individual courses are not based on recurring patterns). In Megiddo (**25-ME-03**) and Jafo (**31-JA**),

only single courses are known and it seems unclear how to reconstruct the entire pier; at Jezreel (**26-JE**), only a single course of one pier is known and seems not to form a systematic pattern. The piers at *Tell Kudādi* (**30-KU**) show a significant degree of formalisation, with various combinations of blocks, most often diverging on the two faces of an individual course, interlocking into each other in a braid-like pattern, but no standardised sequence of patterns in the consecutive courses of the single piers can be identified (*fig. 90, 91*). At *Tēl Anafa* (**14-AN**), the courses of two piers are alternately built from two stretchers or two headers, but these blocks are not placed next to each other, but incorporate a fill of rubble, resulting in a particular framework-like impression. In Megiddo and Dor, various idiosyncratic solutions were chosen for piers situated at intersections of walls and corners.¹⁴¹

All in all, it seems that the degree of typological variation tangible in the ashlar piers is very large. Basically, the choice of a specific pier may have been dictated by its position in a wall and by the amount of strength it was supposed to provide: the larger a pier (and, by consequence, the larger the share of the wall the piers account for), the sturdier.¹⁴² But since the sizes of multiple types of piers correspond or are at least roughly comparable, this explanation for the large number of types seems not entirely sufficient. That makes the question of chronological or geographical preferences for specific types even more relevant.

When looking at the spatial distribution of the various types, the results are meagre;¹⁴³ even though many types are known only from few sites, most of them are located in the northern (where the amount of data is small) or central as well as the southern Levant. The rare type L (the 'braid pattern') and type CH were used only in the southern Levant, and the creation of special types for

¹³⁷ See **24-DO-05** (six piers), **24-DO-15** (one pier), **31-JA** (one pier?) as well as **30-KU**.

¹³⁸ See **07-BE-01** (two piers), **07-BE-04** (at least one pier), **24-DO-02** (one pier), **24-DO-05** (one pier?).

¹³⁹ See **15-OU** (one pier), **24-DO-10** (three piers).

¹⁴⁰ See **24-DO-02**, **24-DO-04**, **24-DO-06**, **24-DO-15**, **27-TM** and **25-ME-03** (with two stretchers behind each other on the front and three projecting blocks at the back, resulting in a wall of larger strength).

¹⁴¹ See **24-DO-04**, **24-DO-06**, **25-ME-03**. See also the thick variant of type N at **24-DO-12**.

¹⁴² See already Elayi/Sayegh 2000, 206, 'Les piliers semblent avoir été placés dans tous les endroits où l'on avait jugé utile de renforcer la solidité des murs; le type d'appareillage du pilier était sans doute choisi en fonction du degré de solidité recherché'.

¹⁴³ See already Elayi/Sayegh 2000, 202, who noted that individual types are not characteristic for specific regions.

intersections of walls generally seems to be a phenomenon common mainly or exclusively in the southern Levant. But this is a minor particularity. All in all, the large number of different types used in the most comprehensively excavated contexts in Berytos (**07-BE-04**), Dor (**24-DO-02**, **24-DO-04**, **24-DO-05**) and Jafo (**31-JA**), and their overlap, is telling.

Looking at the chronological distribution, the fact that the largest amount of data known dates back to the (Late) Persian and the (Early) Hellenistic periods is a minor drawback. In most early occurrences (Iron Age II), especially in the northern and central Levant, only the simpler types of piers have been used; this is true especially for type B.¹⁴⁴ Their more complex counterparts became common only during the Persian period, but without superseding the simpler types. Even though the spectrum of types used in the Persian period was large, some sites still used only or at least mainly one simple type.¹⁴⁵ In Berytos (**07-BE-04**) and Dor (**24-DO-02**, **24-DO-04**, **24-DO-06**), where the typological spectrum is particularly large, piers of type D are now dominant. In the Hellenistic period, the degree of standardisation seems to be even lower (see **02-SU-01**, **02-SU-02**, **02-SU-04**, **14-AN**, **15-OU**, **28-CA**). Thus, a general development from the more consistent use of the simpler types to more variation coming with the increase of known types is noticeable. This remains true even if specific types are not characteristic for specific periods as such.¹⁴⁶

¹⁴⁴ See **06-MR** (type B, 8th cent. BCE), **11-BU-01** (unsystematically created pier most similar to type B, 8th cent. BCE), **12-SA-01** (mainly type B in the earlier phases, starting in the 11th and often dating to the 8th cent. BCE), **12-SA-03** (mainly type B and one type D in the 9th–7th cent. BCE), **13-TY** (type B2, 9th/8th cent. BCE), **18-KA-01** (type C, 9th cent. BCE), **18-KA-02*** (possibly type B, 9th–7th cent. BCE), **25-ME-01** (type C2, 9th/8th cent. BCE), **25-ME-02** (mainly types A and B, one example of type D, 9th cent. BCE), **25-ME-03** (mainly type B2, but also unique, more complicated types, 9th cent. BCE), **25-ME-04** (type B2, 9th/8th cent. BCE), **26-JE** (types B, C and D, 9th cent. BCE). The early dating of **24-DO-12** (thick variant of type N) is doubtful.

¹⁴⁵ See e.g. **09-BS** (six piers of type D2), **12-SA-03** (nine piers of type B and 1 of type D/J), **22-AH** (27 piers of type B2?), **27-TM** (five piers of type D1 and one of type CH), **32-YA-01** (ten piers of type B), **32-YA-02** (at least six piers of type A and one each of types B, D and D1).

¹⁴⁶ This was already noted by Elayi/Sayegh 2000, 202.

During the Persian and the Hellenistic periods, multiple types have often been used in individual buildings or even rooms.¹⁴⁷ More generally, the same types were often chosen for interior as well as exterior walls.¹⁴⁸ Multiple types of corresponding or at least closely similar sizes were used in the very same contexts.¹⁴⁹ This suggests that Elayi's idea of builders strictly following a known typology cannot be affirmed.¹⁵⁰ Even though the required strength and the available space to a certain degree predefined the possible types, this did not always lead to the same choices. Although it surely makes sense to assume that builders had a number of types in mind, the realisation of their projects seems to have been somewhat haphazard. This may imply a rather low degree of specialisation on the part of the masons.

Similar observations on the only partial standardisation may be made when looking at the occurrences of the 'regular' and the 'irregular' variants of specific types: in some contexts, both variants of the same type were used interchangeably. This is valid for type B (**07-BE-04**, **12-SA-02**)¹⁵¹ as well as for type D (**07-BE-04**, **24-DO-06**)¹⁵² and may mean that the distinction between 'regular' and 'irregular' types is overly schematic – at least some degree of inaccuracy is always present, the extent to which projecting blocks reach into the rubble is variable and it seems difficult to define a dividing line (and exact measures are lacking). Even though it has often been rightly stressed that the projecting of stretchers into the adjacent rubble helped to dovetail the individual segments into each other, and thus added strength to the wall (e.g. Wright 1985, 407; Sharon 1987, 28), bulky fieldstones could also be wedged into the spaces between piers if the stretchers only

¹⁴⁷ This was already noted in **07-BE-04** by Elayi/Sayegh 2000, 205.

¹⁴⁸ See already Elayi/Sayegh 2000, 205 f. for **07-BE-04**.

¹⁴⁹ Two or three of the comparable types H, J and K were used at **07-BE-04**, **24-DO-02**, **24-DO-04**, **31-JA** and types M and O were both used at **07-BE-04**.

¹⁵⁰ See Elayi/Sayegh 2000, 206, 'Il ne semble pas avoir été indispensable que le type d'appareillage du pilier ait été régulier et soit entré dans une typologie connue [...]'.
¹⁵¹ This may be true for many more contexts, but on the current state of research, a distinction between both types is not necessary at least for most piers visible in plans.

¹⁵² This may also be true for many more contexts; see preceding note.

projected slightly and their lateral surfaces were not smooth.¹⁵³ Furthermore, the varying functions of the piers have to be taken into consideration. The bonding of ashlar and rubble was most important in retaining walls burdened by lateral loads – and all piers in such walls are ‘irregular’ –, but less essential where the piers carried nearly the entire amount of (vertical) loads, because the horizontal beams of the roofs rest only on the sections in ashlar, and even more unimportant (if not counterproductive) where the ashlar piers were mainly included to increase resilience to earthquakes. What the result that ‘regular’ and ‘irregular’ variants were used next to each other does suggest, though, is that at least most walls in the pier-and-rubble technique were erected in a single step.

In a nutshell, the typological analysis of the ashlar piers suggests that walls in the pier-and-rubble technique were erected in a single step by not very specialised masons and boasted a surprisingly large amount of variation, which increased with the growing popularity of the technique during the Persian period. This low degree of standardisation gets even more pronounced when turning to other technical characteristics of pier-and-rubble walls.

3.2 Technical Characteristics

The placement of the piers differs much between the individual contexts. In many cases, only one or two piers are preserved and their context is unknown;¹⁵⁴ in other cases, only few piers are documented, but they were clearly placed in an unsystematic way.¹⁵⁵ But in most better-published contexts, the ashlar piers were at least roughly systematically or rather regularly emplaced – even though the distance between two examples may vary. This distance between two adjacent piers ranges between 0.35 and 4m, but most

often measures between 0.6 and 1.5m;¹⁵⁶ in a smaller group of examples, it ranges between 1.5 and 3m.¹⁵⁷ The distances do not correlate with the types used, but simply vary.¹⁵⁸

Regardless of the various types of piers used and their placement, there are different ways to work the ashlar used within them. Usually, they are worked to a rectangular shape on all sides, but individual blocks are often not rectangular.¹⁵⁹ Their visible face(s) can be worked to various extents; sometimes, they are only roughly hewn, that is not even roughly smoothed. This may be noted rather often (e.g. *fig. 27, 29*), but sometimes only on individual blocks (e.g. *fig. 75, 92, 94*).¹⁶⁰ Sometimes, though, the blocks are quite finely smoothed (e.g. *fig. 28, 39, 41, 64, 65, 71, 87*). This seems rather rare, but it is impossible to verify this impression based on the published documentation.¹⁶¹ Most ashlar used in pier-and-rubble walls have been roughly smoothed. Even though ashlar with central bosses from earlier buildings have sometimes been reused, it seems that no bossed blocks were created for walls in the pier-and-rubble

¹⁵³ See similarly e.g. Roos 2009, 541 on Late Antique ‘stone framework’ at Keloşk Kale.

¹⁵⁴ See 05-TK*, 08-JI, 10-SI-01*, 10-SI-02*, 20-AK-01, 23-YO, 24-DO-12, 28-CA, 33-YY-01*, 33-YY-02*.

¹⁵⁵ See 06-MR, 11-BU-01, 11-BU-02, 12-SA-03, 14-AN, 16-KE (?), 18-KA-01, 25-ME-04, 26-JE.

¹⁵⁶ See 02-SU-02 (0.65–1.1m), 06-MR (1.1m), 07-BE-04 (1–3.5m), 09-BS (ca. 1m), 11-BU-03 (0.55–1.25m), 12-SA-01 (1.3–1.4m), 12-SA-02 (1–1.5m), 12-SA-03 (0.9–1.1m), 13-TY (< 1m), 15-OU (0.6–0.9m), 17-AH (0.7–0.9m), 20-AK-03 (0.7–0.9m), 24-DO-02 (0.9–1.6m), 24-DO-03 (ca. 1.1m), 24-DO-04 (partly 0.6–1m, partly 1.3–1.8m), 24-DO-05 (1.1–1.2m), 24-DO-06 (1.1–1.2m), 24-DO-10 (0.5–1m), 27-TM (0.8–1.1m), 28-CA (0.9m), 32-YA-01 (0.7–1.1m), 32-YA-02 (0.5–1m). See also 02-SU-03 (1.1m), 02-SU-04 (0.45–1.1m), 08-JI (ca. 1m), 20-AK-01 (0.6m). Even smaller: 07-BE-01 (0.35–0.55m); see also 12-SA-03 (0.5m).

¹⁵⁷ See 03-AM (2.3m), 07-BE-04 (1–3.5m), 22-AH (2–3m), 24-DO-04 (partly 1.3–1.8m), 30-KU (1.5–2m). See also 02-SU-01 (3.3m). The largest distances may be found in 25-ME-02 (2.5–5m), which is a surrounding wall, which did neither have any fortificatory function, nor support anything.

¹⁵⁸ Camporeale 2014, 195 noticed that in a *telaio* in Etruria and Campania, the distances between the piers tend to be larger and more uniform if the rubble was mortared; this seems not to be the case in Levantine pier-and-rubble technique.

¹⁵⁹ See 02-SU-04, 06-MR, 07-BE-04, 08-JI, 11-BU-03, 14-AN, 17-AH, 18-KA-02*, 27-TM, 32-YA-01.

¹⁶⁰ See 02-SU-01, 02-SU-02, 02-SU-04, 03-AM, 06-MR, 07-BE-04, 08-JI, 10-SI-01*, 11-BU-01, 11-BU-03, 15-OU, 18-KA-02*, 22-AH, 24-DO-02, 24-DO-03, 25-ME-03, 27-TM, 28-CA, 31-JA.

¹⁶¹ See 02-SU-03, 07-BE-04, 12-SA-02, 12-SA-03, 14-AN, 20-AK-01, 25-ME-03.

technique;¹⁶² marginal dressing likewise is only very rarely documented (probably only on reused blocks; *fig. 87*).¹⁶³ All this suggests that the aesthetic appearance of the blocks was of secondary importance and that the amount of work should be limited. In quite a few instances, ashlar from earlier buildings were reused (see note 64, 65).

The masonry of the ashlar piers is at least most often more or less isodomic. Widely differing heights of courses are rare.¹⁶⁴ Although the use of this term has been criticised, because it carries the hidden assumption that the masonry should have been isodomic and that the builders had this on their mind, but that this often seems not have been the case (Wright 2009, 160 f.; Kreimerman/Devolder 2020, 7), the ashlar piers compiled in the present book seem to confirm that roughly uniform course heights have been the rule. The reason may have been aesthetic, but also practical: if the height of the blocks is always the same, individual blocks are not intended for a specific place, but can be used in many locations. This facilitates the construction process, especially in smaller piers, where the stretchers irregularly bind into the rubble sections, so that their position in the wall was neither dictated by their width.¹⁶⁵ Almost every block at hand could be used in a specific position.

The largest ashlar often measure ca. 0.4–0.65m;¹⁶⁶ sometimes, they are slightly larger, measuring 0.7–0.8m,¹⁶⁷ and in nine instances, they are even 0.95–1.3m long.¹⁶⁸ This seems to be mainly an early phenomenon, with the 9th/8th cent. BCE buildings at Megiddo including particularly large blocks. But generally, the dimensions of the ashlar are more or less standardised, with their length corresponding to the width of the walls (see note 66). This width mainly ranges between 0.4 and 0.6m;¹⁶⁹ except for the surrounding wall at *Tell el-Burak*, the casemate walls at *el-Kabrī* and Jezreel, the Retaining Wall 1626 at Megiddo and a possible fort at *Tēl Mikmoret*,¹⁷⁰ only few walls are considerably thicker.¹⁷¹ The strength of the walls and the maximum size of the ashlar are thus usually related. No clear development in the length-width-height-relations of ashlar may be noted.¹⁷²

The fact that the ashlar piers and the rubble sections are most often bonded into each other (albeit to varying degrees, with the lateral edges of the piers sometimes being roughly ‘regular’, while in other cases, the stretchers project far into the adjoining rubble) proves that they have been erected together.¹⁷³ There are various forms of

162 Two adjacent blocks in Sarepta (**12-SA-03**, see Pritchard 1975, *fig. 37,1*; Anderson 1988, pl. 42,2) seem to feature one irregularly shaped boss each, but may be reused. The same applies to one block at *Tēl Yaʿāz* (**32-YA-02**, see *fig. 95, 96*). See also above chapter 2.1 note 64 for bossed spolia.

163 Two blocks in Sarepta (**12-SA-03**, see Pritchard 1978, *fig. 92*) show marginal dressing, but it remains unclear whether they belonged to an ashlar pier (although this seems probable) – they may be reused. Some blocks at Megiddo (see *fig. 87, 25-ME-03*) are likewise most probably reused.

164 See **11-BU-02** (partly), **12-SU-02** (partly), **13-AM** (rarely), **08-JI** (?), **10-SI-01***, **12-SA-02** (partly), **14-AN** (rarely), **20-AK-01**, **24-DO-05** (partly), **25-ME-03** (rarely). Sometimes, different course heights may be explained with the reuse of blocks from earlier structures (see e.g. **25-ME-03**).

165 Nevertheless, the placement of the blocks was sometimes accurately planned; at **24-ME-03**, a fine line in sanguine helped to place the piers and scratches in the lower blocks indicated the placement of the upper ones; see Lamon/Shipton 1939, 53; Barrois 1939, 266; Elayi 1980, 171.

166 See **02-SU-01**, **02-SU-02**, **06-MR**, **07-BE-01**, **08-JI**, **10-SI-01***, **11-BU-02**, **12-SA-01**, **12-SA-03**, **17-AH**, **20-AK-01**, **22-AH**, **23-YO**, **24-DO-02**, **24-DO-03**, **24-DO-04**, **24-DO-06**, **24-DO-10**, **24-DO-12**, **27-TM**, **28-CA**, **30-KU**, **31-JA**, **32-YA-01**, **32-YA-02**.

167 See **14-AN**, **15-OU**, **24-DO-05**, **31-JA**.

168 See **02-SU-03** (4th cent. BCE), **07-BE-04** (6th–4th cent. BCE), **18-KA-01** (9th cent. BCE), **25-ME-01** (9th/8th cent. BCE), **25-ME-02** (9th cent. BCE), **25-ME-03** (9th cent. BCE), **25-ME-04** (9th/8th cent. BCE), **26-JE** (9th cent. BCE), **29-MI*** (5th–4th cent. BCE).

169 See **02-SU-01**, **02-SU-02**, **06-MR**, **07-BE-01**, **07-BE-04**, **11-BU-02**, **11-BU-03**, **12-SA-01**, **12-SA-03**, **13-TY**, **15-OU**, **17-AH**, **20-AK-01**, **23-YO**, **24-DO-02**, **24-DO-04**, **24-DO-05** (mainly), **24-DO-05**, **27-TM**, **31-JA** (mainly), **32-YA-01**, **32-YA-02**.

170 See **11-BU-01** (2.8m), **18-KA-01** (1.6m), **25-ME-01** (ca. 1.5m), **26-JE** (1.5m); **29-MI*** (1–1.2m).

171 See **01-TW*** (0.65–0.75m), **03-AM** (1.2m), **10-SI-01*** (2m?), **10-SI-02*** (1.4m), **14-AN** (0.8m), **22-AH** (0.7–1m), **24-DO-05** (rarely up to 0.8m), **24-DO-12** (0.75m), **25-ME-02** (1m), **25-ME-03** (1m), **25-ME-04** (1m), **30-KU** (0.75m), **31-JA** (up to 0.85m).

172 Sharon (1987, 37) noticed a possible tendency that ashlar got thinner and higher in the Persian and the Hellenistic period, but the entirety of the known contexts does not seem to bear out this assumption (even though exact measurements of the individual blocks would be necessary to be sure).

173 See chapter 3.1, where it is argued that pier-and-rubble walls were commonly erected in one step.

rubble masonry. G. R. H. Wright distinguished uncoursed and coursed random rubble (with stones of all shapes and sizes), uncoursed and coursed squared rubble (with more or less squared stones), snecked rubble (with small stones used from time to time to make up the course height) and uniform coursed rubble (Wright 1985, 398). Snecked rubble and uniform coursed rubble have not been documented in walls of the pier-and-rubble technique, so far, and coursed and uncoursed squared rubble is rather rare.¹⁷⁴ Even in these contexts (large), parts of the rubble are unsquared (and often uncoursed), and in many cases, parts of a wall are coursed and/or squared and other parts are not. Most of the rubble is ‘random’ and thus more or less undressed, and even in many cases mainly uncoursed.¹⁷⁵ Generally, the individual stones are generally small.¹⁷⁶ The mainly squared and often coursed walls at *Tell Kudādi* (30-KU, *fig. 90, 91*) and Jafo (31-JA, W800, *fig. 92, 93*) as well as the walls uncovered close to the modern town hall of Beirut (07-BE-01, *fig. 34, 35*), which are partly squared and partly random, but always coursed, and the similar walls in Area C0 and probably D2 at Dor (24-DO-04, 24-DO-10) thus constitute exceptions (even though the quality of the rubble masonry at Dor seems to be overall rather high). The case of *‘Amrīt* (03-AM), where the rubble sections of thick walls are formed by more orderly placed ‘faces’ of partly coursed random rubble and an infilling of gravel (*fig. 31*) likewise is extraordinary

(see already Elayi 1980, 166). All in all, the rubble sections are generally of medium to low quality.

The rubble masonry was sometimes mortared and sometimes not; although the presence of mortar has only been noted in rather few instances,¹⁷⁷ this may have been the case much more often. Many photographs seem to show mortared rubble (e.g. *fig. 28, 56, 89*) but cannot be considered definite proof if the mortar has not been noted in the accompanying texts.¹⁷⁸ The ashlarers seem to have been only very rarely joined with mortar.¹⁷⁹

There is not much that can be said about the walls’ foundations in most cases: at least they have been described in considerable depth in the well-excavated Persian-period quarter at Berytos (07-BE-04; see Elayi/Sayegh 2000, 209 f.). There, they consisted of a thin layer of gravel laid upon the bedrock and two or three courses of large gravel and sometimes roughly worked blocks (*fig. 38–40*). The ashlar piers sometimes rested on larger, roughly cut blocks, but sometimes also on courses of gravel similar to the foundations of the adjacent rubble walls. The wall in the pier-and-rubble technique at Tyros (13-TY) likewise seems to have been based on small rubble (*fig. 51*). The walls of the podium of ‘Palace’ 338 at Megiddo (25-ME-03) seem to have been most often erected on a layer of small fieldstones, but this foundation was reinforced with large blocks at the corners. At *Ġiye* (08-JI), at least some walls seem to have been similarly based on gravel and fieldstones (*fig. 43*).¹⁸⁰ The wall at *Tell Kudādi* (30-KU) rests on two to three courses of roughly worked stones, which are slightly more regularly laid below the ashlar piers (*fig. 90, 91*). At *Tēl Māvōrak* (27-TM), the ashlar piers are founded on one course of larger blocks or roughly-cut ashlarers, while the sections in rubble partly reach below floor level, but do not have separate foundations (*fig. 88*). At *Tell Sūkās* (02-SU-02), a whole wall seems to

¹⁷⁴ The rubble is at least partly squared and coursed in 07-BE-01, 09-BS, 24-DO-04, 24-DO-10, 30-KU, 31-JA and at least partly squared, but uncoursed in 24-DO-05, 30-KU and 31-JA.

¹⁷⁵ Only uncoursed random rubble is published from at least 18 [19] contexts (01-TW, 02-SU-01, 02-SU-02, 02-SU-03, 02-SU-04, [10-SI-01*], 12-SA-01, 12-SA-02, 12-SA-03, 13-TY, 15-OU, 20-AK-01, 24-DO-03, 24-DO-06, 24-DO-12, 25-ME-01, 26-JE, 27-TM, 28-CA) and only coursed random rubble is known from five contexts (07-BE-01, partly squared; 24-DO-04, partly squared; 24-DO-10, partly squared; 25-ME-01, 26-JE), while uncoursed and coursed random rubble appear together (sometimes also with squared rubble) at least in 18 contexts (03-AM, 06-MR, 07-BE-04, 09-BS, 11-BU-01, 11-BU-02, 11-BU-03, 14-AN, 22-AH, 24-DO-02, 24-DO-05, 24-DO-10, 25-ME-02, 25-ME-03, 30-KU, 31-JA, 32-YA-01, 32-YA-02).

¹⁷⁶ The rubble stones at *Tell Abū Hawām* (22-AH) seem to be constantly rather large in the few published photographs, but in most other cases, where larger stones have been used, they are accompanied by small ones.

¹⁷⁷ See 06-MR, 07-BE-04, 10-SI-01*, 12-SA-01, 12-SA-02, 12-SA-03, 12-SA-04, 32-YA-01, 32-YA-02, 34-AS*. Mortar is also visible in 09-BS.

¹⁷⁸ See e.g. 02-SU-03, 08-JI, 20-AK-01, 27-TM, 28-CA.

¹⁷⁹ This has been noted only in 07-BE-04; it is hard to tell how often it has not been noted.

¹⁸⁰ See Waliszewski et al. 2012, *fig. 9* bottom; 2015, *fig. 3* top. See also Waliszewski et al. 2012, *fig. 3*, but Waliszewski et al. 2012, *fig. 9* top.

rest on boulders which seem to be particularly large below the piers (fig. 27). At Dor, most walls in the pier-and-rubble technique were built on top of earlier walls (fig. 63, 65, 68–71, 73, 76, 77) – although some of those could rather be rubble foundations – but in some instances, the piers clearly rested on virgin soil (fig. 64). Indeed, there seems to be no foundation at all in many cases (fig. 61, 89, 92–94).¹⁸¹ The spectrum of techniques followed in the construction of the foundations was wide.

The original look of the walls is hard to reconstruct since it is unknown how many of them were originally plastered. At Berytos (**01-BE-01**, **07-BE-04**, fig. 34), Sarepta (**12-SA-01**, fig. 49), *Tēl Anafa* (**14-AN**, plan 16), *el-Kabrī* (**18-KA-01**, **20-AK-05**), Dor (**24-DO-04**, plan 28) and *Tēl Ya'ōz* (**32-YA-02**), traces of plaster were recorded; some of the Hellenistic walls at *Tēl Anafa* even featured opulent, colourful stucco.¹⁸² Since this list contains most of the well-published sites, it seems plausible that walls in the pier-and-rubble technique were often plastered – although the rarity of stucco preserved on the well-conserved walls at Dor or *Tell Sūkās* indicate that this was not always the case. Some of the sites above have remains of plaster only in individual rooms, which may be either plastered because of their specific use (Sarepta, *Tēl Ya'ōz*, possibly Dor) or because they were representative rooms stuccoed over the plaster (*Tēl Anafa*, see also Acco). None of the plastered walls date back to before the Persian period.

Usually, the original height of walls in the pier-and-rubble technique cannot be given. In the surrounding and/or retaining walls at *Tell el-Burak* (**11-BU-01**, fig. 45), Tyros (**13-TY**, fig. 51) and Megiddo (**25-ME-01**, **25-ME-02**, fig. 83), the piers most probably reached up to the crests. Some walls at *Tell Sūkās* (**02-SU-04**, fig. 29, 30), Berytos (**07-BE-01**, fig. 34, 35), *Tell Abū Hawām* (**22-AH**, fig. 61), Dor (**24-DO-02**, **24-DO-03**, **24-DO-04**, **24-DO-05**, **24-DO-06**, fig. 63, 65, 68–71, 73, 76, 77) and Jafo (**31-JA**, fig. 92, 93) likewise are still over 2m high and thus prove that the piers extended at least

up to the top of the ground floor, even if no evidence for horizontal beams may be found and the final course may often not be preserved. It thus remains unclear whether a horizontal course of ashlar completed the walls at their top, as Wright considered – but nothing seems to indicate this (Wright 1985, 426; 2005, 60).¹⁸³ On the other hand, it is unclear if any and how many of the buildings compiled here had more than one storey. No clear remains of staircases may be identified, but upper floors may have been reached through ladders or similar constructions. We thus cannot exclude neither the possibility that individual buildings were constructed in the pier-and-rubble technique in multiple storeys nor the option that some may have carried an upper floor in mudbrick or similar above a ground floor in stone. But even if many contexts are too poorly preserved to allow conclusions, it seems that the piers generally reached at least to the top of the ground floor. No dowel holes for wooden posts, as they were used in Late Bronze Age Ugarit, or similar contraptions are recorded on the uppermost courses. Only the piers of the podium of Building 338 at Megiddo (**25-ME-03**, fig. 85, 86) may never have been higher than three courses.

All in all, the analysis of technical characteristics results in a strikingly heterogeneous picture. Even if most walls will have been at least one storey high and many may have been plastered, many different solutions were chosen for the foundations and the size and state of the individual ashlar varies accordingly. And although a general tendency is obvious to keep the amount of work required for the rubble masonry and the ashlar low, the placement of piers is similarly different, as are their types. The degree of standardisation of masonry in the pier-and-rubble technique was low, and this seemingly unprofitable result will be an important basis for an interpretation of the spread of the technique. But before turning to this interpretation, the evidence for the pier-and-rubble technique in the Levant must be evaluated chronologically and geographically.

¹⁸¹ **10-SI-01***, **22-AH**, **25-ME-02**, **28-CA**, **31-JA**, **32-YA-01** (?).

¹⁸² See also **20-AK-03** (staggered-reinforcing-header technique, stuccoed).

¹⁸³ Horizontal lines of ashlar at the top of pier-and-rubble walls may be seen in numerous photos from Dor, but these are interpreted as remains of later walls without exceptions.

3.3 Chronological and Geographical Evaluation

While earlier research sometimes suspected that the pier-and-rubble technique was a ‘Phoenician’ technique of the earlier Iron Age, which reappeared in the Persian and Early Hellenistic periods (see Stern 1977, 18; Briquel-Chatonnet 1992, 346, but Elayi 1980, 176), the enlargement of the dataset in the 1980s demonstrated that this masonry style was continuously used from the Iron Age II until the end of the Hellenistic period.¹⁸⁴ Since the example of Ugarit can be excluded, the earliest evidence dates to the 11th or 10th cent. BCE (**12-SA-01**), that is still to the end of the Iron Age I, while the latest seems to be Augustan (**07-BE-03**).¹⁸⁵ The pier-and-rubble technique may thus justly be called a technique of the (entire) 1st mill. BCE. In ten different sites, ashlar piers date back to the Iron Age II,¹⁸⁶ in 17 to 23 different sites into the Persian period¹⁸⁷ and in eleven to fourteen different sites into the Hellenistic period.¹⁸⁸ Since most Persian-period contexts date back to the later part of this epoch, the technique was most common in the 5th and 4th cent. BCE.

If adding the geographical dimension (*map 1*) to this chronological survey, we see that the first contexts may be located in Sarepta, a site in the central Levant. Until the end of the 8th cent. BCE, there is *Tell Mirhān*, Sidon, *Tell el-Burak*, Sarepta, Tyros,

el-Kabrī, Dor (?), Megiddo, Jezreel and possibly Achzib; the area of distribution still is more or less restricted to the central Levant (and the northern part of the southern Levant), to what is today Lebanon and northern Israel (*map 2*). This changes only in the (Late) Persian period (*map 3*), from which there is the first evidence from four sites in the northern Levant, in present-day Syria (**02-SU-03**, **03-AM**, **04-TH**, **05-TK***), as well as from numerous sites in the southern Levant (**27-TM**, **29-MI***, **30-KU**, **31-JA**, **32-YA-01**, **32-YA-02**, **33-YY-01***, **33-YY-02***, **34-AS***). During the Hellenistic period (*map 4*), the spread has already peaked, and the evidence from the northern as well as the southern Levant is more scarce (**02-SU-01**, **02-SU-02**, **02-SU-04**, **27-TM**, **28-CA**, **34-AS***); the latest evidence is known from Berytos (**07-BE-03**) at the centre of the eastern Mediterranean coast. Although the picture may not be entirely clear, it seems that the technique spread from the central Levant, was most widespread in this area and was thus used there for the longest time.¹⁸⁹ What is more, the distribution of sites is notably coastal: except for five cases,¹⁹⁰ every site where the pier-and-rubble technique is documented is less than 5km away from the coast, and most are right next to the sea. This pattern of distribution, and the successive spread just retraced, may suggest that we are indeed dealing with a ‘Phoenician’ phenomenon. More specifically, the technique seems to have been especially popular in the southern part of ‘Phoenicia’, starting in Berytos, and this is in line with the many occurrences in the settlements along the Mediterranean coast of present-day Israel, closely connected to the metropoleis of Sidon and Tyre.

If looking at the functions of the buildings (partly) erected in the pier-and-rubble technique,

¹⁸⁴ See already e.g. Stern 1992b, 303; 1998, 375 (correcting his earlier views); see also Elayi 1996, 88.

¹⁸⁵ The mention of 11th cent. BCE city walls built in the pier-and-rubble technique in Woolmer 2011, 24 seems to be a misunderstanding.

¹⁸⁶ See **06-MR**, **10-SI-02***, **11-BU-01**, **12-SA-01**, **12-SA-02** (?), **12-SA-03**, **13-TY**, **17-AH**, **18-KA-01**, **18-KA-02***, **24-DO-07** (?), **24-DO-11** (?), **24-DO-12** (?), **25-ME-01**, **25-ME-02**, **25-ME-03**, **25-ME-04**, **26-JE**.

¹⁸⁷ See **02-SU-03**, **03-AM**, **04-TH**, **05-TK***, **07-BE-02**, **07-BE-04**, **09-BS**, **10-SI-01***, **11-BU-02**, **11-BU-03**, **12-SA-01**, **12-SA-02**, **12-SA-03**, **17-AH**, **19-NA***, **20-AK-01**, **22-AH**, **23-YO**, **24-DO-02**, **24-DO-04**, **24-DO-05**, **24-DO-06**, **24-DO-07**, **24-DO-09**, **24-DO-11**, **24-DO-12** (?), **24-DO-13**, **27-TM**, **29-MI***, **30-KU**, **31-JA**, **32-YA-01**, **32-YA-02**, **33-YY-01***, **33-YY-02***, **34-AS***; see also **07-BE-01**, **07-BE-05**, **08-JI** (Persian or Hellenistic).

¹⁸⁸ See **02-SU-01**, **02-SU-02**, **02-SU-04**, **07-BE-02**, **07-BE-03**, **12-SA-01**, **12-SA-02**, **14-AN**, **15-OU**, **16-KE** (?), **17-AH**, **20-AK-02**, **24-DO-02**, **24-DO-03**, **24-DO-04**, **24-DO-06**, **24-DO-09**, **24-DO-10**, **24-DO-11**, **24-DO-13**, **24-DO-14**, **24-DO-15**, **28-CA**, **34-AS***; see also **07-BE-01**, **07-BE-05**, **08-JI** (Persian or Hellenistic).

¹⁸⁹ This somewhat confirms the thoughts of Elayi (1980, 175 f.), that the technique was most widespread in the southern Levant, but that new research will probably uncover much new evidence in the central Levant – it did, indeed, see **06-MR**, **07-BE-01**, **07-BE-02**, **07-BE-03**, **07-BE-04**, **07-BE-05**, **08-JI**, **09-BS**, **10-SI-01***, **10-SI-02***, **11-BU-01**, **11-BU-02**, **11-BU-03**.

¹⁹⁰ *Tēl Anafa* and Jezreel are ca. 40km distant from the coast (as the crow flies), Megiddo ca. 25–30km, Iotapata ca. 20km and *Yoqnaʿām* around 17–20km (depending on whether one measures to the open sea in the west or the gulf of Haifa).

there is no clear pattern. The assemblage includes residential complexes at a minimum of ten (but probably many more) sites,¹⁹¹ some of which also included workshops (**02-SU-01**, **07-BE-04**, **12-SA-01**, **12-SA-02**, **12-SA-03**, **31-JA**), shops (**07-BE-03**, **07-BE-04**), administrative (**16-KE** (?)) or storage (**16-KE** (?), **22-AH**, **24-DO-10**) spaces.¹⁹² At least three retaining walls (one of them in a sanctuary; see **09-BS**, **13-TY**, **25-ME-01**),¹⁹³ at least one (high) wall delimiting a courtyard (**25-ME-02**)¹⁹⁴ and at least three fortifications (**18-KA-01**, **26-JE**, **27-TM**) add the picture.¹⁹⁵ Finally, the pier-and-rubble technique was used in a possible temple and a portico in a sanctuary (**07-BE-04**, **15-OU**).¹⁹⁶ The technique was thus not restricted to specific types of buildings (see already Elayi 1980, 173), even if ‘ordinary’ buildings in residential quarters (comprising smaller shops and workshops) are predominant and the limited number of other contexts precludes any meaningful analysis of the chronological or geographical distribution of other functional uses. What this pattern does suggest, is that the technique was rarely used in prestigious buildings¹⁹⁷ – and this again militates against any aesthetic interpretation of the phenomenon¹⁹⁸ – but was mainly used in ‘common’ private construction. This may be one reason for the fact that the pier-and-rubble technique was rarely used

in sanctuaries, where pure ashlar masonry was more common.¹⁹⁹

3.4 The Staggered-Reinforcing-Header Technique

The staggered-reinforcing-header technique has been defined above as walls in which individual ashlar blocks, surrounded by rubble, are inserted as headers, standing on their short sides, into rubble walls in a staggered pattern (see chapter 1.1, type 3, *fig. 1: 3*). It has not been considered in the preceding chapters and will thus be shortly dealt with here. The technique is known from *Tēl Qedeš* (**16-KE**, around 300 BCE), Dor (**24-DO-03**, **24-DO-08**, **24-DO-10**, 3rd–2nd/1st cent. BCE), Iotapata (**21-IO-01**, **21-IO-02**, *Ḥirbat Ġifāt*, 3rd–2nd cent. BCE), Acco (**20-AK-03**, **20-AK-04**, **20-AK-05**, **20-AK-06**, 3rd–1st cent. BCE) and *Tēl Anafa* (**14-AN**, late 2nd cent. BCE) (*map 5*). Its use at a temple (?) at *Tell Twēnī* (**01-TW***, 9th cent. BCE) remains somewhat doubtful, since only one row of blocks is conserved (*plan 1, fig. 26*); but it is at least clear that a somewhat similar technique was used, in which headers were inserted on a regular basis into rubble walls.²⁰⁰ These ashlar blocks seem to have been only roughly squared, are up to 0.9m long and inserted into uncoursed random rubble. Even though it

¹⁹¹ See **02-SU-01**, **02-SU-02**, **07-BE-03**, **07-BE-04**, **11-BU-02**, **11-BU-03**, **12-SA-01**, **12-SA-02**, **12-SA-03**, **14-AN**, **16-KE** (?), **17-AH** (unsure in the residential phase 6), **22-AH**, **24-DO-02**, **24-DO-04**, **24-DO-05**, **24-DO-06**, **24-DO-10**, **31-JA**, **32-YA-01**, **32-YA-02**, **34-AS***. See also the likely residential complexes **24-DO-01**, **02-SU-03**, **02-SU-04**, **05-TK***, **24-DO-03** (and probably many buildings of unknown function).

¹⁹² Furthermore, at **24-DO-05**, the strengthened outer wall probably had a fortificatory function. See also the fort (?) at **29-MI*** and the residential building transformed into a commercial storage building (?) in the 7th cent. BCE at **17-AH**.

¹⁹³ See also the ‘surrounding wall’ **11-BU-01**, which may have had fortificatory functions, but surely also helped to level the area.

¹⁹⁴ See also **25-ME-01**, which mainly retained the fill behind.

¹⁹⁵ See also **24-DO-05**, **29-MI*** and **11-BU-01**.

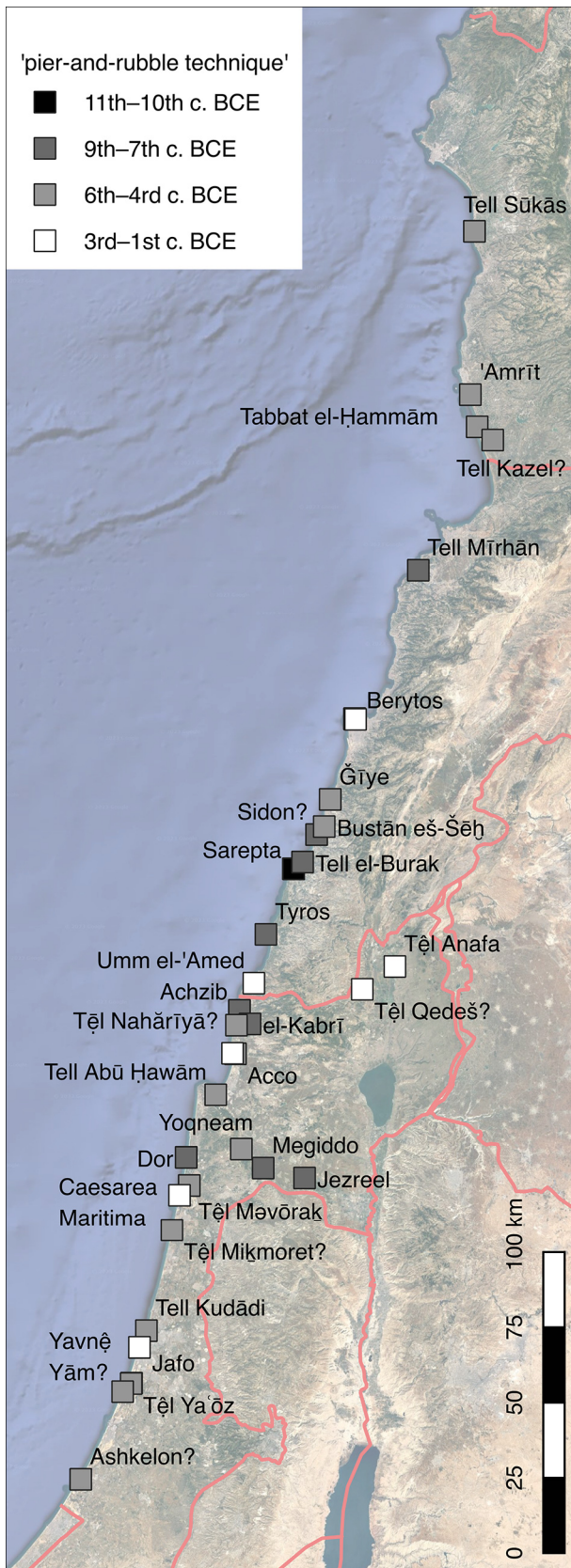
¹⁹⁶ See also **09-BS** for a retaining wall in a sanctuary.

¹⁹⁷ See e.g. the situation at **20-AK-01**, where a public (?) building close to buildings erected in rubble masonry or the pier-and-rubble technique was built in pure ashlar masonry. At **24-DO-06**, the façade was built of pure ashlar masonry, but the dividing walls were built in the pier-and-rubble technique.

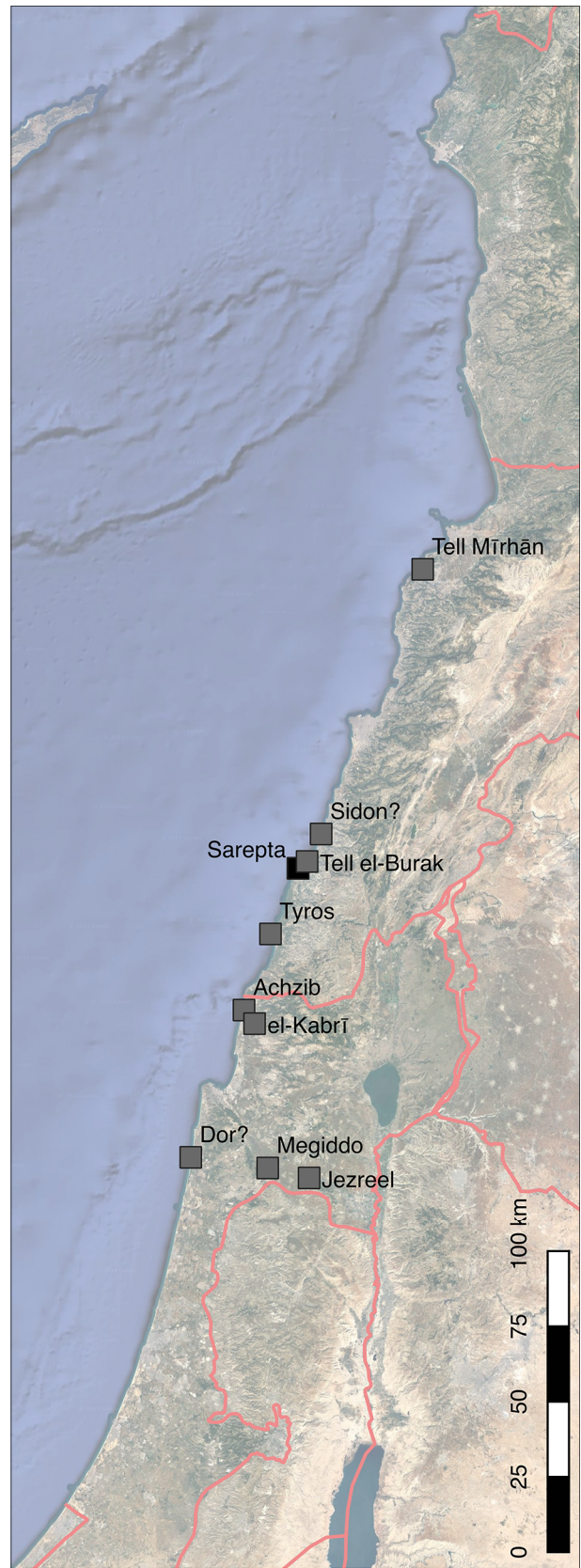
¹⁹⁸ This has been already argued against in chapter 2.3.

¹⁹⁹ See e.g. the temple at Tyros and its surrounding buildings, erected in pure ashlar masonry (Badre 2015; 2016; 2019), the sanctuary of *el-Ḥarāyeb*, the main building of which was also built with ashlar (Chehab 1952, plan 1, pl. 100: 4; Oggiano 2016, 194 f., 210, fig. 1, 4, 7; 2018, 21, fig. 10a), the temple at Sarepta, probably originally entirely built and/or faced with ashlar (Pritchard 1975, 15, fig. 33–35; 1978, 133, fig. 125, 126, 128) as well as most buildings within the sanctuaries at *Bustān eš-Šēh* (Stucky 2002; 2005; but see **09-BS**), *Amrīt* (Dunand/Saliby 1985) and *Umm el-‘Amed* (Dunand/Duru 1962, esp. pl. 90, 100; Vella 2000; Kamlah 2008; but see **15-OU**). See also a sanctuary (?) of the Persian period in Sidon in Doumet-Serhal 2013, 111, fig. 103.

²⁰⁰ A technique which may at first glance look very similar is known from Ugarit (see e.g. Callot 1983, fig. 30; Pittaccio 2004–2007, fig. 7), but only on one side of the wall, while the headers are part of a face of pure ashlar masonry on the other side of the wall. In any case, it seems problematic to draw a line from these occurrences in Late Bronze Age Ugarit to the Hellenistic evidence from the southern Levant. Sharon 2009, 372 now supposes a Greek origin, because the technique is known in the Levant only in the Hellenistic period.



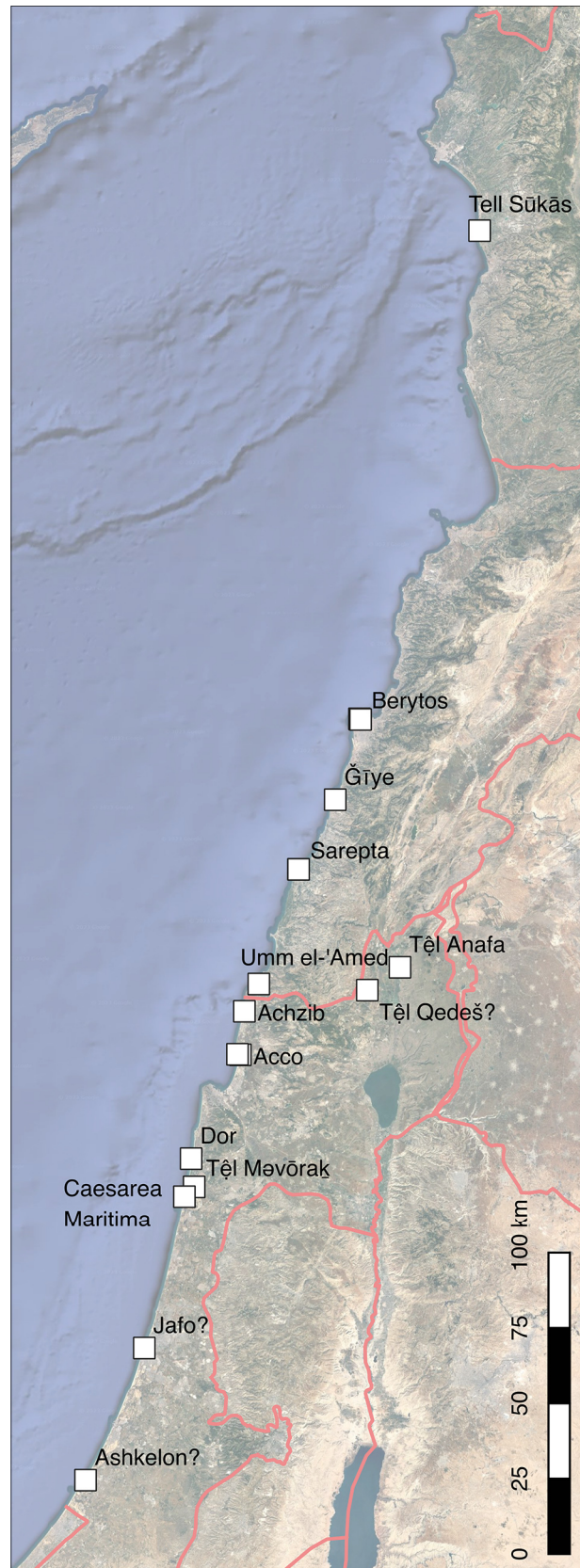
Map 1. Distribution of walls built with the pier-and-rubble technique in the Levant.



Map 2. Distribution of walls built with the pier-and-rubble technique in the Levant, Iron Age (11th–7th cent. BCE).



Map 3. Distribution of walls built with the pier-and-rubble technique in the Levant, Persian period (6th–4th cent. BCE).



Map 4. Distribution of walls built with the pier-and-rubble technique in the Levant, Hellenistic period (3rd–1st cent. BCE).



Map 5. Distribution of walls built with the staggered-reinforcing-header technique in the Levant.

remains doubtful whether the headers originally formed a staggered pattern, this context indicates that the origins of the idea to include individual headers into rubble walls in a roughly regular way is much older than the other examples of the staggered-reinforcing-header technique. The genesis of this type of masonry can hardly be reconstructed on this limited basis, though.

The ‘public’ building at Dor (**24-DO-08**, *plan 32*, *fig. 79*) cannot without doubt be considered the first classic example, since more recent excavations proved that it was erected only during the Hellenistic period. Here, the rubble seems rarely squared, but most often coursed in the first (Early?) Hellenistic phase and partly squared and partly coursed in the second, Late Hellenistic phase; the blocks are only roughly squared in both phases, but are more massive in the earlier one, with individual pseudo-ashlars probably around 0.5m wide. They are set as headers in walls ca. 1–1.2m strong and are placed apart ca. 1–1.2m. The walls of the Late Hellenistic phase are less thick and the blocks are not placed on their long, narrow sides, but on their short, narrow sides (*fig. 79*). Many will have been reused from the earlier phase.

The Hellenistic administrative building at *Tēl Qedeš* (**16-KE**), (newly) erected around 300 BCE (*plan 18*), has oblong, most often just roughly squared ashlars, which (most often) bind through walls consistently ca. 0.8m strong. More carefully hewn blocks were used flanking the doors. The headers were rather regularly placed, 0.4–1m apart, in parts of the building, but only rarely used in other parts. The rubble is coursed, but random. It is unsure whether the pier-and-rubble technique occurred alongside the staggered-reinforcing-header technique.

At Iotapata (**21-IO-01**), the oblong, only roughly squared ashlars are 0.45–0.65m high and reach 0.3–0.85m, most frequently 0.6–0.7m into the 2nd cent. BCE fortification wall, which is ca. 1.8m thick (*plans 22, 23*). The distance between two adjacent piers ranges from 0.65 to 0.95m, but they are not systematically placed along the entire length of the wall. The rubble is partly squared and partly coursed. A very similar technique

seems to have been used in earlier Hellenistic structures at the same site (*plan 23*), although the headers are more frequent in this case and cover the whole width of the wall; the composition of the rubble cannot be described at present.

At Acco (**20-AK-03**, **20-AK-05**), the technique is known from various domestic and industrial buildings dating back between the 3rd and the 1st cent. BCE (*fig. 57–60*). The rubble is partly squared and partly coursed, the ashlar are most often rather well-squared and rather well-smoothed. They act as headers within the walls, which are often ca. 0.55m wide, and most of them seem to be 0.50–0.75m high. The distance between two adjacent blocks seems to range between ca. 0.5 and ca. 1m; at least in one case, two ashlar are not staggered, but placed above each other (even though separated by one course of roughly squared rubble).

Building LHSB at *Tēl Anafa* (**14-AN**), a residential building of high rank constructed in the late 2nd cent. BCE, is the only secure context where the staggered-reinforcing-header technique appears alongside the more common pier-and-rubble technique (*plan 16*, *fig. 52–54*). The rubble is most frequently coursed and partly squared, and the ashlar seem to be more or less squared and not higher than 0.5m; they function as binders in walls 0.65–0.8m strong and sometimes protrude slightly. The distance between two adjacent blocks seems to range between ca. 0.55 and ca. 1.10m.

All in all, it seems that the staggered-reinforcing-header technique shows quite some amount of variation, too, even though it is only known from five or six sites. Generally, little care has been taken in shaping the ashlar, which are most frequently only roughly squared and the dimensions of which vary. On the other hand, the sections in rubble seem to be on average more carefully laid if compared to those of the pier-and-rubble technique. This is little surprising when taking into account that the demands of the staggered-reinforcing-header technique on the solidity of the rubble masonry will have been higher. Except of the unclear example from *Tell Twēnī*, the distribution area of the technique is restricted to the north of present-day Israel, with

the largest distance between two sites, Dor and *Tēl Anafa*, being ca. 110km (*map 5*). It thus seems that the staggered-reinforcing-header technique was a local solution of the Hellenistic period. It did not spread far and is only very distantly related to the pier-and-rubble technique in that it combines ashlar and rubble. That its inventors knew the more popular technique seems certain, since it was most common at Dor, where the possibly first building in the classic staggered-reinforcing-header technique was erected, and it is documented at Acco as well, where the chronologically next context is known from. At *Tēl Anafa* and possibly *Tēl Qedeš*, both techniques were used in the same building, with the staggered-reinforcing-header technique being probably confined to somewhat less prestigious rooms.²⁰¹ The joint occurrences of both techniques notwithstanding, their technical affinity seems low. The low degree of standardisation in the use of both techniques is comparable, though.

3.5 Interpretation of the Distribution

It has been remarked above that the notably coastal distribution area, reaching from modern Syria to Israel, fits the fact that the pier-and-rubble technique has mostly been taken as ‘Phoenician’ (*maps 1–4*; see chapter 3.3). Even though it is somewhat controversial which part of the Levant can truly be considered ‘Phoenicia’ (Edrey 2019, 13–24; but see e.g. Regev 2021, 7), or if this is even a useful perspective (Porzia 2018), a possible deduction from this geographical distribution of the technique would be that it was used by ‘Phoenicians’ (and carried by them to some of their neighbours). Although this ethnic interpretation of the phenomenon was rarely explicitly

²⁰¹ A functional interpretation of the rooms in which the staggered-reinforcing-header technique was used is not possible, but the two rooms in which the pier-and-rubble technique was most extensively used were the two rooms which stand out because of their stuccoed wall decorations; see **14-AN**. At *Tēl Qedeš*, the technique was used in rooms of very different uses (food preparation, storage, baths, dining, archive), see **16-KE**.

stated, it seems to loom largely in most previous research (see chapter 1.2). It is, of course, seriously compromised by recent studies disputing that ethnicity was of any significance for those inhabitants of the 1st mill. BCE Levant commonly called the ‘Phoenicians’ (by using a collective designation created by ancient non-‘Phoenicians’).²⁰² But even if these points are well-made, one may conceptualise the ‘Phoenicians’ rather as the sum of certain phenomena we can grasp in material culture (*pace* Edrey 2019), without pressing their ethnic interpretation too far or taking these as markers of ‘Phoenician’ identity, and the pier-and-rubble technique could provide one part of such an assemblage that is part of a modern archaeological definition of ‘Phoenician culture’ (van Dongen 2010, 475; Morstadt 2015, 42; Edrey 2019, 74). It is this idea that the systematic analysis of all the occurrences of this building style can test. Was the technique consistently used in ‘Phoenicia’, in the way similar to the popularity of certain fine wares or recurring sets of vessels deposited in graves?

If we have another look at the entirety of the data available so far, some reservations are justified. Even though the distribution area largely corresponds to what is commonly called ‘Phoenicia’, the pier-and-rubble technique has not been documented at some 1st mill. BCE sites within this geographical area, even if they are rather well excavated and partly considered ‘Phoenician’ because of other parts of their material evidence: this applies, for example, to *Tell Kēsān*, *Šiqmōnā*, *Tēl Māgādīm* or *Tēl Mikāl*.²⁰³ The pier-and-rubble

technique is neither known from the important ‘Phoenician’ cities of Arwad nor Byblos; the little evidence there is from Sidon (**10-SI-01***, **10-SI-02***) is problematic and the evidence from Tyros (**13-TY**) is limited to a single wall (*plan 15, fig. 50*). This is certainly due, to a large extent, to the very problematic state of research, but maybe not only. This book cannot, of course, provide a comprehensive list of sites where the technique was **not** used. What is more important is to look at the contexts of the known occurrences. Doing this, we see that the pier-and-rubble technique was used, for example, at various locations at *Tell Sūkās*, but only in a small number of the walls uncovered.²⁰⁴ At *Tell Kazel* (**05-TK***), the evidence is doubtful and most buildings uncovered surely did not feature ashlar piers. In the ‘quartier du port’ at Berytos (**07-BE-04**), the evidence for the technique is very substantial, but still, ashlar piers were not part of every building and only part of about 30% of the walls (*plan 8*).²⁰⁵ The same is true for *Tell Abū Hawām* (**22-AH, plan 24**).²⁰⁶ As has been already remarked above, in many other contexts, only few piers have been placed in an unsystematic way (see note 155). At Dor, the pier-and-rubble technique was most consistently used, but not in every wall (**24-DO-04, 24-DO-05, 24-DO-06, plan 25–31**);²⁰⁷ beyond Dor, ashlar piers appear most frequently at Jafo (**31-JA, plan 41**) and *Tēl Ya’ōz* (**32-YA-01, 32-YA-02, plan 42, 43**), that is on the fringe of the distribution area and ‘Phoenicia’. Generally, it seems that the pier-and-rubble technique was widely disseminated along the Levantine coast, but mostly not used consistently. Thus, we cannot affirm that it was **the** technique consistently used in ‘Phoenician’ walls. This suggests that its significance as a ‘cultural marker’ (and certainly as an

²⁰² This was most forcefully argued by Crawley Quinn 2019 and sparked lots of discussions, see e.g. Frendo 2018; Gzella 2018; Morstadt 2018; Oggiano 2019; Canuto 2019; Porzia 2019, even though the argument is far from being entirely new (see e.g. Baurain 1986, 7–28; Pastor Borgoñon 1988–1990; Winter 1995; Markoe 2003, 10 f.; Bonnet 2004, 7–13; Sommer 2005, 69; Prag 2006; Sommer 2010; van Dongen 2010; Bondi 2014; Vella 2014; Xella 2014; Morstadt 2015, 38–43). See also Martin 2016; Porzia 2018; Garbati/Pedrazzi 2019, 43 f.; Doak/López-Ruiz 2019, 3–8; Jigoulov 2021, esp. 11 f. Recent more optimistic voices include Edrey 2019 and especially Regev 2021, esp. 5–18.

²⁰³ See note 19 for earlier identifications of the technique at *Tell Kēsān*. One of the current excavators, Gunnar Lehmann, kindly confirmed that the technique is not yet recorded at the site. See note 13 for earlier suppositions that the technique was documented at *Šiqmōnā*, and note 14 for *Tēl Māgādīm*.

²⁰⁴ See especially **02-SU-01**, where the few ashlar piers are limited to some walls of a single building within a much larger excavation area (plan in Riis 1970, pl. 6). See also Lund 1986 for other areas.

²⁰⁵ Based on a rough count in sectors A and B; the evidence of sector C is too fragmented.

²⁰⁶ The percentage would be even lower if each of the rather badly preserved walls in the southern part of the excavation area were counted, but in any case, the piers are limited to some structures.

²⁰⁷ The use of the technique may have been more restricted, e.g. in the less well-published area **24-DO-09**.

‘ethnic’ marker) is low; their popularity along the Levantine coast notwithstanding, it seems problematic to take pier-and-rubble walls as a major element to archaeologically define ‘Phoenician culture’. What is more important, though, are the questions of how we may explain the rather haphazard distribution on the one hand and the spread of the technique on the other.

If looking at the distribution, first, we need to return to the question of the function of the technique. It was demonstrated that we certainly cannot explain its presence with aesthetic preferences of the inhabitants of the Levantine coast; quite to the contrary, the inclusion of ashlar piers into rubble walls added strength with a much lower effort and cost than ‘pure’ ashlar masonry (see chapter 2.3). But this was not done everywhere in the same way, and the size, placement and composition of piers, to some extent, depended on the demands of the specific construction: ashlar piers could be added systematically to carry the loads of roofs or upper stories, they could be placed more or less regularly to increase the resilience of walls in the event of earthquakes or to increase the walls’ resistance to lateral pressure in retaining walls and in one case, they formed the bases for wooden beams; but the ashlar piers could also be used less consistently to increase the stability of specific weak points. All this suggests that pier-and-rubble is not really a general, unconsciously used way of building reflecting a ‘tradition’ common to the Levantine coast, but, on the contrary, something we may comprehend as a resource,²⁰⁸ or rather, a ResourceComplex.²⁰⁹

The knowledge about the various (and varying) advantages of ashlar piers was widespread along the Levantine coast, however, these were not invariably used, but consciously exploited in specific contexts. We should not overstate the deliberateness of the use of ashlar piers in every context, since the overall pattern surely seems to some extent erratic, but the pier-and-rubble technique certainly was something widely known, which was used in individual constructions only if the need was felt.

If the temporal dimension is included, we need to remember that the technique seems to have spread from the central part of the Levant to the adjacent areas (see chapter 3.3). How may we conceptualise this dissemination? Some have drawn attention to the fact that the book of Kings (1 Kg 5:32) mentions ‘Phoenician’ builders in Jerusalem (Barkay 1992, 316; Briquel-Chatonnet 1992, 347).²¹⁰ We could thus assume that the pier-and-rubble technique was spread to new sites by specialised builders – but this seems little likely if the evidence is reconsidered. First of all, the ashlar piers and the adjacent sections of rubble masonry needed to be built at the same time,²¹¹ while the space available for the masons was limited if piers and sections in rubble follow closely upon one another. This militates against Barrois’ idea of two separate building crews responsible for the two parts of the masonry (Barrois 1939, 116). What is more important, though, is the striking amount of variation visible in almost every aspect of the technique: The typology of piers is wide (*fig. 2*)

²⁰⁸ In SFB 1070 RESOURCECULTURES, which this project belongs to, resources are defined as ‘The basis for a means to create, sustain and alter social relations, units and identities within the framework of culturally affected beliefs and practices’ (Hardenberg et al. 2017, 14, 16). Even if we acknowledge that the pier-and-rubble technique was probably not used to create, sustain or alter social relations (because it was used in a wide variety of contexts, although dwellings predominate, occurrences in representative buildings are rare and plaster probably hid most of the walls’ structural characteristics) and probably neither helped to create, sustain or alter identities, with its key function being static, in increasing the stability of walls of houses (and other constructions), it certainly helped to sustain units (households and various other forms of communities) in a most essential way.

²⁰⁹ Since the pier-and-rubble technique has various prerequisites (see chapter 2.1), ranging from stone, the possibil-

ities to quarry it and the tools needed to work the blocks to the technical knowledge how to best built piers from such ashlar and where to place these (see chapters 2.3 and 3.1), it may be conceptualised not as a resource, but a ResourceComplex (see Hardenberg et al. 2017, 15: ‘Resources do not exist as isolates but in combination with other resources as a ResourceComplex, which consists of a combination of objects, persons, knowledge, and practices. A specific resource requires other resources for its preservation, distribution or use’).

²¹⁰ This does not prove the presence of ‘Phoenician’ builders in 10th cent. BCE Jerusalem, but only that this idea was plausible during the time the text was written down, of course (which is difficult to define precisely).

²¹¹ See chapter 3.1, where it is argued that this probably does not apply only for piers, the stretchers of which project far into the adjacent rubble, but to most if not all walls built according to the technique.

and many different types were used next to each other in many contexts. Their placement varies, the foundations were created in different ways or omitted and the workmanship of the ashlar and the rubble is heterogeneous even within many contexts. All this implies a low degree of specialisation on the part of the masons and suggests that not the builders of ashlar piers travelled, but the concept itself (although this does not, of course, preclude the movement of people). The pier-and-rubble technique, then, was not spread by 'Phoenician' craftsmen, but it attests to a transfer of

technological know-how. Since the concept of ashlar piers inserted into rubble walls is rather simple, it may have been transmitted by word of mouth. Looking at other facets of the large degree of connectivity visible alongside the Levantine coast during the Iron Age, we may well imagine that such constructional knowledge accompanied other types of exchange.²¹² The pier-and-rubble technique then contributes to our understanding of the wide array of exchange processes (beyond simple 'trade')²¹³ linking the communities along the Levantine coast.

²¹² Agbe-Davies/Bauer 2010, 18 f. and Millek 2019, 98 note that archaeologists working on trade mostly focus on the circulation of things and thus overlook the intangible movements of traditions, values, ideas, etc.

²¹³ For a short history of research of these topics in a Levantine context, see Millek 2019, 89–105.

4 Pier-and-Rubble and Similar Techniques in the Central and Western Mediterranean

In the preceding chapters, we have seen that the pier-and-rubble technique, even if narrowly defined to include only examples where ashlar piers were placed within straight walls, was widely known along the Levantine coast during the entire 1st mill. BCE. Its notably coastal area of distribution matches the conventional ‘Phoenician’ designation of the technique; although not used with much consistency, pier-and-rubble walls were certainly common at ‘Phoenician’ or ‘Phoenician-influenced’ sites along the Levantine coast. Since the putative spread of the technique to ‘Phoenician’ sites in the central and western Mediterranean was often taken as further proof for the ‘Phoenician-ness’ of the technique (see chapter 1.2), it is now time to turn to this evidence.

It has already been stressed above that the pier-and-rubble technique and the technique called *a telaio* have often been taken to be the same thing or confounded (see chapter 1.1 type 4 and 5; note 25, 26). This very much impacts the way the occurrence of such techniques in the central and western Mediterranean and their relation to possible Levantine prototypes have been viewed. For example, R. Docter states in the recent ‘Oxford Handbook of the Phoenician and Punic Mediterranean’ that the ‘Oriental building type known as *Opus Africanum*, also known as ‘pier-and-rubble-masonry’, was introduced in Carthage around the middle of the seventh century BCE’ (Docter 2019, 448). He thus equates pier-and-rubble and *opus africanum* – but it was demonstrated above that these two techniques are quite different, and if looking at the early contexts at Carthage, we will note that only one form of *a telaio* (or *opus africanum*) is documented (see chapter 4.3). E. Gubel had already remarked that the pier-and-rubble technique was widespread in the west in the ‘Dictionnaire de la civilisation phénicienne et punique’ (Gubel 1992, 37). Similarly, in 1985 L. Stager wrote not only that the pier-and-rubble technique was ‘exported to other Phoenicio-Punic sites in the western Mediterranean’, where it ‘arrived with the Phoenicians’, but even that ‘classical archaeologists have erroneously dubbed the technique

opus Africanum’ (Stager 1985, 13) – Stager evidently would have preferred something more Levantine. Again, the equation of the two techniques is obvious. The earliest work which dealt with the supposed eastern origin of *a telaio* at considerable length but did so not from an eastern (see chapter 1.2, e.g. on Elayi 1980; van Beek/van Beek 1981) but from a western perspective, may be M. Fantar’s first volume of the final publication of the ‘Punic’ settlement at Kerkouane (Fantar 1984, 335–344). After equating some examples of *a telaio* from the western Mediterranean and of the pier-and-rubble technique as well as the monolithic-column technique from the Levant,²¹⁴ he concluded that *a telaio* may be considered an ‘Oriental’ technique brought to the west by the ‘Phoenicians’ without any doubt.²¹⁵ But again, the equation of two or even more rather dissimilar building styles may cloud our view. In fact, some researchers already clearly separated *a telaio* from Levantine pier-and-rubble. For example, Stern remarked that few examples of the pier-and-rubble technique are known to be from the west, but that *a telaio* was common there, for example at Carthage, Motya and Nora (Stern 1998, 377). Although concluding that ‘it is accepted that the first building style is peculiar to the eastern Mediterranean, i.e., to Phoenicia proper, while the second belongs to the western Phoenician colonies’ (Stern 1998, 377–379), he then referred to new finds of what is called the staggered-reinforcing-header technique in this book at Dor and, equating *a telaio* and the very different staggered-reinforcing-header technique, deduced that ‘in the East the ‘Western’ style existed as well – the unavoidable

²¹⁴ Fantar 1984, 339–341 furthermore referred to some examples from Hellenistic Gaul and Etruria as well as (mistakenly) to evidence from Cyprus and Greece; his very ‘inclusive’ definition of ‘maçonnerie à piédroits ou à harpes verticales’ means that his collection includes many different building styles.

²¹⁵ See Fantar 1984, 343, ‘Les témoignages de l’archéologie phénicienne, palestinienne et chypriote sont décisifs. Il n’est plus permis d’en douter. [...] Nous sommes donc en présence d’une technique architecturale introduite en Méditerranée occidentale certainement par les Phéniciens’.

conclusion being that the source of the so-called ‘Western’ style should also be traced to the East and the Phoenician coast. It seems certain to us that in the future more examples of the ‘eastern’ style will be found in the West and vice versa, but with earlier dates’ (Stern 1998, 379). Although the amount of evidence has indeed increased in the meantime, this prediction has not been confirmed; no certain evidence of a *telaio* is known from Levantine contexts.²¹⁶ The staggered-reinforcing-header technique is likewise unknown from ‘Phoenician’ or ‘Punic’ sites in the central and western Mediterranean (even though a similar technique was used in Etruria). This is not really surprising, since we have seen that it is a local particularity of what is today northern Israel in the Hellenistic period and thus postdates the ‘Phoenician expansion’ to the west for many centuries. It seems remarkable that Stern connected his ‘western’ and ‘eastern’ techniques even though he disassociated pier-and-rubble and a *telaio*. Similarly, the excavators of Carthage remarked that *opus africanum* is nothing less than an advancement of the pier-and-rubble technique.²¹⁷ This idea of an ‘advancement’ seems little convincing when taking into account that a *telaio* must be considered much less sturdy than its alleged predecessor, the pier-and-rubble technique, since the rubble and the ashlar are much less firmly connected; if at all, a *telaio* may qualify as a simplification of the pier-and-rubble technique. Be this as it may: diverging voices, who not only disassociated the various techniques, but

also concluded that these differences prevent us from assuming a direct spread from the Levant to the central and eastern Mediterranean, have been few; most important is I. Sharon’s result, ‘At this stage of research we have no proof of any exportation of building techniques to Phoenician colonies in the west. A *telaio* construction cannot be equated with ashlar piers’ (Sharon 1987, 39). F. Briquel-Chatonnet and S. Camporeale came to similar conclusions.²¹⁸ Again, this is a view which needs to be verified by the larger amount of evidence available to us 30–35 years later.

The following chapter will thus first deal with the little evidence there is for the pier-and-rubble technique in the central and western Mediterranean (*map 6*) and then provide an overview over the types and distribution of the dissimilar technique called a *telaio*. Against this background, the question of ‘Phoenician’ technology transfer can be addressed anew.

4.1 Pier-and-Rubble on the Iberian Peninsula and in Tarquinia

The pier-and-rubble technique (as defined in chapter 1.1) seems to be neither documented on Cyprus²¹⁹ nor at the ‘Phoenician’ and ‘Punic’ sites in the central Mediterranean (*map 6*), that is, in North Africa, Sicily and Sardinia (although a *telaio*

²¹⁶ See note 23 for at least one dubious case in Acco (20-AK-03).

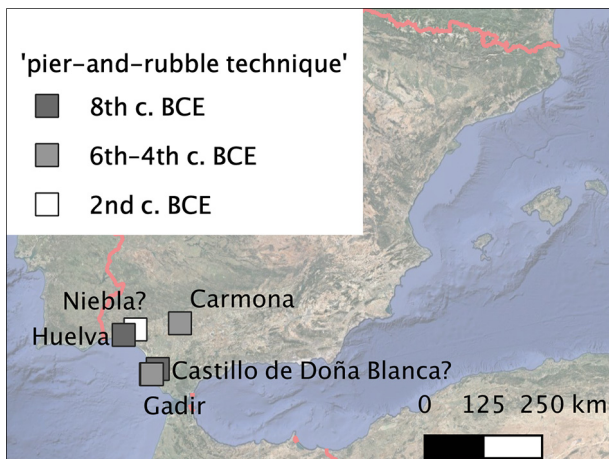
²¹⁷ ‘Diese Mauertechnik des Opus Africanum [...] ist nichts anderes als eine Fortentwicklung bzw. Variante der ‘pier-and-rubble-masonry’, wie sie aus dem spätbronze- und eisenzeitlichen Nahen Osten bzw. aus dem Levante-Raum bekannt ist. [...] Wie in Phase III die Hausgrundrisse, bezeugt in Phase IV die Übernahme der in der Levante erprobten stabileren Mauertechnik aufs Neue die Verflechtung der frühen Architektur Karthagos mit phönizischer bzw. nahöstlicher Baupraxis und -tradition’ (Niemeyer et al. 2007, 189). See similarly Niemeyer/Docter 1993, 210; Marzoli/Helas 2009, 13; Helas et al. 2011, 41; Woolmer 2011, 66; Montanero Vico 2014, 58; Araújo de Lima 2016, 254, n. 42; Bolder-Boos 2016, 84 (‘In der Einführung der opus africanum-Bauweise zeigt sich der anhaltende Kontakt mit dem levantinischem Mutterland’), 95 (‘Eine Anlehnung an levantinische Bautraditionen lässt sich zumindest in Karthago in der [...] Verwendung des auf die levantinische ‘pier-and-rubble’-Mauerwerkstechnik zurückgehenden opus africanum beobachten’). See also e.g. Bonghi Jovino 2000, 90 for Tarquinia.

²¹⁸ ‘Mais il faut sans doute dissocier des murs à piliers phénico-palestiniens les constructions a *telaio* caractéristiques des implantations puniques, dont les murs comportent des piliers faits d’un seul bloc par assise posé sur son petit côté. C’est un style différent qui se développera dans l’opus africanum’ (Briquel-Chatonnet 1992, 344); ‘Inoltre, se si osservano le tecniche a pilastri del Mediterraneo orientale [...], caratterizzate da blocchi in filari e dalla varietà delle apparecchiature, appare evidente la differenza fra queste opere e il tipo 1A [the simplest form of ‘a *telaio*’] che ha caratteristiche costruttive e statiche molto più semplici’ (Camporeale 2014, 204).

²¹⁹ Briquel-Chatonnet 1992, 344 may be understood to imply the use of the technique at Kition, but only refers to walls in pure ashlar masonry (Karageorghis 1971, pl. 52). Prayon 2001, 336 refers to such walls at Tamassos, interpreted as signs of contact to ‘the Phoenicians’, and seems to be based on Bonghi Jovino 2000, 92, but her references do not lead to walls in the pier-and-rubble technique or their interpretation (Buchholz 1973, 350; Buchholz/Untiedt 1996, 26 only take the plans as ‘oriental’ or ‘Phoenician’, but some walls were only erected with ashlar and some only with rubble, partly with strengthened corners). At Hellenistic Carpasia, the technique known as a *telaio* is documented; see chapter 4.4.



Map 6. Distribution of walls built with the pier-and-rubble technique in the Mediterranean.



Map 7. Distribution of walls built with the pier-and-rubble technique on the Iberian Peninsula.

is widespread here). Nevertheless, a technique, which is at least very similar to the pier-and-rubble technique, is known from the Etruscan site of Tarquinia (*06-TA*). This may be the most problematic of all occurrences, not because it comes from a non-‘Phoenician’ site, but because it does not fit well into the typology of techniques presented in the introduction. We will thus first turn to the Iberian Peninsula. Here, a series of excavations since the late 1970s uncovered (possible) examples of the pier-and-rubble technique at five sites (*map 7*): Huelva (*01-HU-01*, *01-HU-02**), Niebla (*02-NI*), Gadir (*03-GA-01*, *03-GA-02*), Castillo de Doña Blanca (*04-DB*) and Carmona (*05-CA*).

The most well-known context is the one at Huelva: a retaining wall built to terrace the Cabezo de San Pedro in the first half of the 8th cent. BCE, uncovered at a length of ca. 10m, includes one ashlar pier, preserved up to a height of five courses (*01-HU-01*, *plan 44*, *fig. 97, 98*).²²⁰ Unlike the roughly contemporary retaining walls at Tyre (*13-TY*, *plan 15*, *fig. 51*) and Megiddo (*25-ME-01*, *plan 33*, *fig. 83*), the ashlars did not cover the entire strength of the wall, and since only one pier is documented in 10m of wall, the piers were not regularly placed. Moreover, the pier at Huelva does not exactly correspond to one of the common

²²⁰ See also *01-HU-02**, which has not been excavated and for which no further information exists, but which may have belonged to the same period, had the same function and was built in the same way.

Levantine types. Even though the wall at Cabezo de San Pedro can be considered an example of the pier-and-rubble technique without any doubt, it is still unusual for a number of reasons. This may indicate that it was not erected by ‘Phoenician’ masons as some have proposed (González de Canales et al. 2006, 26), but may rather be the product of a less direct transfer of ‘Phoenician’ techniques.²²¹ In any case, it seems plausible that ‘Phoenician’ technical knowledge was necessary for the quarrying of the blocks in the area of Niebla, roughly 30km inland (González de Canales et al. 2006, 26; González de Canales 2018, 67). Even though ‘Phoenician’ pottery is already known from earlier strata at Huelva (González de Canales et al. 2006, 68), the pier-and-rubble wall was erected at a rather early phase of ‘Tartessian’-‘Phoenician’-interactions at a native site.

There seems to be evidence for the use of the pier-and-rubble technique in the 8th cent. BCE at Castillo de Doña Blanca (*04-DB*) as well. While most of the (preliminary) publications on the site and its architecture do not mention this particular building style (Ruiz Mata 1984, 543 f.; 1986; 1987; 2002, 274–286) and it is not visible on the accompanying pictures either, one article of D. Ruiz Mata states that ashlar piers were common in the walls of 8th cent. BCE houses in the ‘Barrio Fenicio’; he illustrates this with an image which may either show a pier of type A (*fig. 2: A*) (with widely diverging course heights and ashlar sizes) or something which may rather be considered a *telaio*.²²² Although a use of the pier-and-rubble technique in the 8th cent. BCE ‘Phoenician’ site of Castillo de Doña Blanca seems entirely possible in view of the wall at Huelva, the question must remain unanswered until the architecture from Castillo de Doña Blanca is fully published.

²²¹ In these characteristics, which may be summarised as a low formalisation of the technique, it is comparable to the slightly later retaining wall in Area 3 (but not Area 2) at *Tell el-Burak* (*11-BU-01*, *fig. 46*).

²²² Ruiz Mata 2001, 263, *fig. 1* (top right). The distinction between piers of type A and similar piers in a *telaio* (of Camporeale’s type 3B, see below *fig. 3*) depends on whether two stretchers and one header alternate or whether each course only has one block; this is not clear in the published photograph. Ruiz Mata’s *fig. 1* (bottom left) shows a wall mostly built from ashlars, his *fig. 2* (top) an ashlar pier at a corner.

The only coastal site from which the pier-and-rubble technique is known is Gadir (Cádiz); evidence pertaining to it has been found in two areas of excavation: on the island San Sebastián, several short stretches of walls of the 7th or 6th cent. BCE in an area with religious function include one or two ashlar piers possibly belonging to two different buildings (**03-GA-01**). They belong to our type B (*fig. 2: B*) and may thus be typologically close to some Levantine occurrences, although the bad state of preservation impedes a more detailed analysis. In the area known as ‘Casa do Bispo’, a strong sustaining wall of the 4th or 3rd cent. BCE in a subterranean complex of religious function connected to a late 6th cent. BCE tomb preserved numerous piers of type C2 (and adjacent walls probably of type G; *fig. 2: C2, G*) in a wall of only sometimes squared, but always coursed rubble (**03-GA-02**, *plan 46, fig. 102*). Although the structures were partly dismantled and rebuilt, some sections of it were still well-preserved and show that at least this evidence typologically closely corresponds to numerous Levantine parallels. The technique was roughly retained, but less carefully executed and modified (with mortared ashlar and diverging forms of piers) in the mid 1st cen. CE reconstruction, making this the last known occurrence of the building style.

The next context with secure evidence for the pier-and-rubble technique on the Iberian Peninsula is from Carmona, east of Sevilla and more than 100km inland from Gadir, Huelva and Castillo de Doña Blanca (**05-CA**, *plan 47, fig. 103*). Here, a very small sondage uncovered a badly preserved ashlar pier, possibly of type D, next to a section of mortared, squared, coursed rubble. This wall may have corresponded quite closely to evidence from the Levant, although we cannot exclude that the composition of the pier was less regular than the only preserved course suggests. The wall dates to the second half of the 6th cent. BCE, but its functional context remains unknown. While ceramic evidence indicates ‘Phoenician’ contacts to Carmona from the second half of the 8th cent. BCE onwards, the erection of the pier-and-rubble wall may be considered a (late) element of a process of rapid urbanistic development of the native site in the 7th and 6th cent. BCE (Belén et al. 2000, 1749 f.).

The last context on the Iberian Peninsula, in which the pier-and-rubble technique is clearly attested, is known from Niebla, some 30km up the Rio Tinto from Huelva, but dates only into the mid 2nd cent. BCE (**02-NI**, *plan 45, fig. 99–101*). One wall uncovered at a length of nearly 10m included four ashlar piers, preserved up to five courses, between sections of rubble; since the wall was later reused in Roman buildings, its original functional context is unknown. One of the piers consisted of an irregular assortment of headers and stretchers, while the other two or probably three piers had only one stretcher-like block in each of their courses. If only such piers were documented, one could categorise the wall as an example of an uncommon form of a *telaio* (see *fig. 3*), but in view of the more complex pier, it is also possible to consider the other piers a simplification of the pier-and-rubble technique, possibly influenced by the *a telaio* technique. This is especially true since a similar situation (with ashlar piers built sometimes with only one block per course and sometimes with multiple blocks) exists in Baelo Claudia from the 1st cent. CE (Sillières 2013, 17 f.) and has been taken as a variation of a *telaio* (Camporeale 2014, 198). Thus, it seems problematic to suggest that the pier-and-rubble technique, introduced to the architecture of the Iberian Peninsula in the 8th cent. BCE, survived for at least six centuries only because of the singular context from Niebla, separating it from the spread of a *telaio* in the ‘Punic-influenced’ areas of the Iberian Peninsula during the 3rd and 2nd cent. BCE. Generally, as at Castillo de Doña Blanca, the evidence we have for the pier-and-rubble technique is dubious.

It is this rareness of the technique – and the locations of its occurrences – which may be most striking when we consider the evidence for pier-and-rubble on the Iberian Peninsula in its entirety. Although there can be little doubt that the spread of the Levantine technique to this area must relate to the ‘Phoenician expansion’ in some way, the actual evidence is largely confined to the wider Guadalquivir area and the majority of the evidence is not from the ‘Phoenician’ settlements along the coast, but from ‘Phoenician-influenced’ native sites in the hinterland. This is not due to a lack of excavated architecture at the coastal sites commonly

considered ‘Phoenician’ or heavily ‘Phoenician-influenced’; although Iron Age architecture has been excavated to some extent, the pier-and-rubble technique is not documented at such sites east of Gibraltar, for example, at La Fonteta,²²³ Cabezo Pequeño del Estaño,²²⁴ Baria (Villaricos),²²⁵ Abdera,²²⁶ Altos de Reveque (López Castro et al. 2010b; López Castro et al. 2021), Las Chorreras,²²⁷ Toscanos and Alarcón,²²⁸ Morro de Mezquitilla,²²⁹ Cerro del Villar²³⁰ or Los Castillejos de Alcorrín.²³¹ This seems even more remarkable when we consider that the existence of rectangular, multi-roomed houses and casemate walls at these sites is ascribed to Levantine influence and that ash-lars were used in corners and staircases, and were thus available, at least in some of these settlements; at Toscanos, a fortification in pure ashlar masonry was even erected in the 6th cent. BCE.²³²

²²³ González Prats et al. 2002; Ruillard et al. 2007; González Prats 2011.

²²⁴ Bueno Serrano et al. 2013; García Menárguez/Prados Martínez 2014; Prados Martínez/García Menárguez 2017; Prados Martínez et al. 2020.

²²⁵ López Castro 2007a; 2007b; 2009, 422; López Castro et al. 2010c; López Castro 2021.

²²⁶ López Castro 2007a; 2009, 422; López Castro et al. 2010a; 2021.

²²⁷ Aubet Semmler 1974; Aubet Semmler et al. 1975; Schubart/Maass-Lindemann 1976; Aubet et al. 1979; Martín Córdoba et al. 2005; Arnold/Marzoli 2009, esp. 442.

²²⁸ Niemeyer/Schubart 1968; Niemeyer 1969; Schubart et al. 1969; García y Bellido et al. 1971, 150–153; Maass-Lindemann/Niemeyer 1972; Niemeyer/Schubart 1973, 224–227; Blázquez 1975, pl. 110a–112a; Niemeyer 1977; Maass-Lindemann 1982; Arteaga/Schulz 1997; Niemeyer 1997; Schubart 2002; Schubart/Maass-Lindemann 2007; Arnold/Marzoli 2009, esp. 434. Briquel-Chatonnet 1992, 344; Stern 1998, 379 remarked on ‘pier-and-rubble masonry’ at Toscanos, but only referred to the fortification wall built in pure ashlar masonry.

²²⁹ Schubart 1977; 1979; 1982; 1983; 1985; Maass-Lindemann 1997; Schubart 1997; Pineda de las Infantas et al. 2004; Schubart 2006; Arnold/Marzoli 2009, 434; Marzoli 2012; Schubart 2017.

²³⁰ Aubet Semmler 1990; 1991; 1997; Aubet 1997; Arteaga 1997; Delgado/Ferrer 2007. It is unclear why Peckham 2014, 362 refers to “pillar and rubble” from Cerro del Villar.

²³¹ Marzoli et al. 2009; 2010; Marzoli 2012; Suárez Padilla/Marzoli 2013; Marzoli et al. 2015; Marzoli 2017; Marzoli et al. 2020.

²³² For general treatments, see e.g. Díes Cusí 1994; Prados Martínez 2003 chapter 3; see also e.g. López Castro 2014; Marzoli 2020, 179 f. Ashlars are rather uncommon for example in Las Chorreras or Morro de Mezquitilla, but were used slightly more often in corners and staircases at Toscanos and a fortification wall in pure ashlar masonry was erected at this site during the 6th cent. BCE; tombs were also built from ash-lars. Camporeale 2016, 59 f. concluded that pure ashlar masonry in North Africa and on the Iberian Peninsula was

The pier-and-rubble technique was not used in some of the sites in western Andalusia where they could be expected either, for example at Cerro del Castillo²³³ or El Carambolo.²³⁴ Thus, it seems that the ‘Phoenician expansion’ brought entirely new architectural concepts to southern Spain, but the need to use the pier-and-rubble technique in these foundations was only rarely felt – while it still could spread to the surroundings. This underlines that the pier-and-rubble technique is not just the way ‘Phoenician’ houses were commonly built, but was a technique consciously exploited where it was deemed necessary. Other than that, the particularity of the few occurrences again militates against viewing the transmission of the technique as a process closely connected to the mobility of masons. The idea of pier-and-rubble masonry may have reached Iberian or ‘Tartessian’ communities with contacts to ‘Phoenician’ settlers or traders and was then used to add strength in individual cases like the retaining wall at Cabezo de San Pedro, Huelva – but seemingly, it never became popular on the Iberian Peninsula. Similar to what we have seen along the eastern Mediterranean Levant, the pier-and-rubble technique cannot be considered an indicator of ethnic ‘Phoenicians’,²³⁵ but rather an attest to various forms of a transfer of technology.²³⁶

As has been remarked above, another possible (but problematic) occurrence of the pier-and-rubble technique is known from the Etruscan site of Tarquinia: in multiple phases of the cultic

not introduced with the ‘Phoenician’ expansion, but only later. See furthermore Belén/Escacena 1993, 153–155; Belén et al. 1993, 225; 2000, 1749, arguing that mortared rubble walls with stones dressed to form regular faces in various sites in Spain show ‘Phoenician’ technology transfer, or e.g. Belén/Escacena 1993, 153; Belén et al. 1993 supposing that wall thicknesses of 0.55/1.1m may be explained with ‘Punic’ measures.

²³³ Bueno Serrano/Cerpa Niño 2008; Bueno Serrano et al. 2013; Bueno Serrano 2014; Bueno Serrano 2017; Bueno Serrano 2021.

²³⁴ Fernández Flores 2005; Fernández Flores/Rodríguez Azogue 2005; Fernández Flores/Rodríguez Azogue 2010; Fernández Flores et al. 2020.

²³⁵ See e.g. Escacena Carrasco (2002, 79), who wondered if the presence of two different types of possible fortification walls in Carmona, one of them pier-and-rubble, may indicate two separate ethnic communities living in two separate parts of the site.

²³⁶ See already e.g. Belén et al. 1993, 227, acknowledging this possibility.

Edificio Beta, dating to the early 7th to the 1st half of the 6th cent. BCE, some of the badly preserved rubble walls included piers made from superimposed ashlar (06-TA, plan 48, fig. 104–106). These walls were considered evidence for the technique called *a telaio* (Bonghi Jovino 1997, 188; Ciafaloni 2006, 147 f.), even though the ashlar were not placed upright and are only 0.4–0.5m in height. At least most of the piers are not composed of alternating headers and stretchers but feature only one block – sometimes stretcher-like, sometimes rather cubic – per course. In this, they differ from the Levantine pier-and-rubble technique. The excavator considered the technique a local solution heavily influenced by the ‘Phoenician’ pier-and-rubble technique (Bonghi Jovino 1991, 180–183) and this makes much sense, since it is unknown from earlier structures at Tarquinia and other Etruscan sites, but the first phase of Edificio Beta, dating to the height of the ‘Orientalising period’, also evokes Levantine prototypes in its plan (Bonghi Jovino 1991, 188; 2000, 94–102; Prayon 2001, 338 f.; Ciafaloni 2006, 147). Since the overall style of the walls is very different from what is seen along the Levantine coast, we should not suppose a participation of ‘Phoenician’ workmen,²³⁷ but rather a more indirect inspiration of the technique.²³⁸ Interestingly, two piers of the later phase dating to the 1st half of the 6th cent. BCE seem to have been built with alternating headers and stretchers and are thus closer to the Levantine examples. We are thus drawn to the somewhat counter-intuitive inference

²³⁷ Contra: ‘[...] è evidente che il passaggio di tecniche architettoniche, contrariamente a quanto avviene per il materiale mobile, non possa essersi verificato senza spostamento di maestri-costruttori. Deve essere ritenuto pertanto molto probabile l’arrivo a Tarquinia di un maestro-costruttore orientale’ (Bonghi Jovino 1997, 170); ‘[...] un ampio movimento non solo di idee ma anche di persone da Oriente verso Occidente’ (Ciafaloni 2006, 146, 149); but see ‘Inoltre la palese disorganicità, coniugata ad un sistema non tradizionale, induce a supporre ragionevolmente che maestranze locali, tarquiniesi, abbiano lavorato nell’ambito di un progetto che sembra fortemente influenzato da modelli e tecniche costruttive di importazione’ (Bonghi Jovino 1991, 188); see also Bonetto 2009, 121; Camporeale 2014, 201, 205.

²³⁸ Camporeale 2014, 205 even concludes that ‘l’uso della tecnica rappresenta probabilmente un’innovazione locale’. Although this can never be excluded, it seems improbable when the other Levantine features of the buildings are taken into account. Camporeale does not refer to the Tarquinian piers, which indeed show a superposition of header- and stretcher-like ashlar.

that the local adaption of the technique was stimulated by contact with ‘Phoenicians’ and that it was locally developed into something more closely resembling the Levantine prototypes a century later. All in all, the example from Tarquinia in a way reinforces the impression gained from the analysis of the few Andalusian contexts: even though basic knowledge of the pier-and-rubble technique travelled west with the ‘Phoenician expansion’, it was rarely used in the actual ‘Phoenician’ settlements. It then reached local settlements, where it was roughly adapted; it attests not to a direct transfer of technology by specialised workmen, but rather to a limited diffusion of basic constructional knowledge accompanying the mobility of people in various types of exchange.

4.2 A telaio: Preliminary Remarks, History of Research and Typology

The most common technique combining ashlar and rubble in the central and western Mediterranean, often taken as typically ‘Punic’ and ‘Phoenician’(-inspired), is known under the two terms *opus africanum* and *a telaio*. Although the Latin term may suggest otherwise and has already created some confusion,²³⁹ it is entirely modern, having been first used by A. Lézine (1956, 26).²⁴⁰ It soon gained ground and has been a common term in publications on ‘Punic’ and Roman architecture, at least in languages other than Italian, for many decades; a paper on Roman building techniques in North Africa by F. Rakob, published in 1982, and especially J.-P. Adam’s handbook on Roman Construction, first published in French in 1984 and reprinted in French, English, Italian and Spanish, may explain this (Rakob 1982, 111;

²³⁹ See e.g. Wright 2009, 169, writing that, ‘The Romans applied the term to the striking construction they observed of widespread occurrence in the Phoenician settled provinces of North Africa’ in a widely cited handbook, or Tomasello 1997, 22, ‘di questo apparecchio murario indicato dagli autori latini, appunto, come *opus africanum*’. See also ‘*opus africanum*, a name which implicitly demonstrates its nature and origin’ (Torres Gomariz 2022, 375).

²⁴⁰ Even though not yet calling it by this name, Pace (1925, 163) already considered *a telaio* to be ‘Punic’, while Whitaker (1921, 160) considered it to be ‘probably typically Phoenician’. The term *opus africanum* was not yet used in the widespread book of Lugli 1957, 379–382, 410–412.

Adam 1984, 129–132; Fantar 1984, 335–344).²⁴¹ On the other hand, the same technique has been called *a telaio* (literally: ‘in frames’) by Italian scholars working on ‘Punic’, Roman and Etruscan architecture. German and English studies sometimes used translated terms like ‘(Kalk-)Steinfachwerk’, ‘Gefachbauweise’ or ‘limestone framework’ (Peterse 1999; Helas et al. 2011; Mogetta 2016; 2021; see already e.g. Durm 1905, 212 f.; Mau 1908, 33, fig. 6), but the Italian term remains the most common even in publications in other languages and will be retained here for convenience; it is certainly preferable to the culturally charged and interpretative *opus africanum* or the even worse *opus punicum*.²⁴²

As has already been remarked above, *a telaio* and the pier-and-rubble technique have been often equated or confounded (see note 25, 26); others separated both techniques but considered *a telaio* in ‘Punic’ contexts, especially in the Archaic phases in Carthage, to be ‘inspired’ by its ‘Phoenician’ predecessor, the pier-and-rubble technique (see note 217). The occurrences of the technique in Sicily have been taken as evidence for ‘Punic’ residents,²⁴³ its distribution in Etruria has likewise been explained by contacts with the ‘Phoenician-Punic’ sphere (Stopponi 2006, 222; Di Luca/Cristilli 2011, 468–470; Camporeale 2014, 205) and its spread in Campania has been either ascribed to such contacts or a stimulus from ‘Phoenician-Punic’-influenced Etruria (Adam 1984, 131; Hanoune 2009, 30; Di Luca/Cristilli 2011, 470; Fentress 2013, 177 n. 119; Wallace-Hadrill 2013, 40; Revell 2014, 390; Mogetta 2021, 130 f.; Torres Gomariz 2022, 376). Similar to the situation in the Levant (see chapter 1.2), these links were first established based not on a full collection of all occurrences of the technique and their closer analysis and typological classification.

Contrary to the situation in the Levant, where the important papers by Elayi and Sharon provided such a solid foundation for further research, synthetic publications of the *a telaio* technique were completely lacking until few years ago. Still in 2011, G. Di Luca and A. Cristilli stated that a typology of the technique is lacking and that this already created quite some terminological confusion – but then considered such a typology useless (Di Luca/Cristilli 2011, 455). Only few years later, S. Camporeale first offered a typology of walls in *a telaio* (fig. 3) and, on this basis, dealt with its spread to Etruria and Campania (Camporeale 2014) and offered some thoughts on the spread of the technique in North Africa (Camporeale 2016). Although referring to many of the other contexts known from Sicily, Sardinia, Spain and North Africa and using his types to differentiate between various areas using the technique in differing ways, he exhaustively listed only the walls in this technique from Etruria and Campania, so that the potential of his typology has not yet been fully exploited. First of all, his typology (Camporeale 2014, 195–198, fig. 3; 2016, 63, fig. 5, 4) should be scrutinised.

It is based solely on the shape of the piers within the walls and does not consider the technique of the walls between them (various forms of rubble, but also e.g. *opus reticulatum*) or the distances between the piers, since these seem to be depending mostly on the requirements of the individual buildings. This makes much sense and corresponds to the approach taken to walls in the pier-and-rubble technique above. Regarding the piers, Camporeale separates five major types, some of them with two subtypes, that is a number of seven shapes (fig. 3): in his simplest type 1A, the piers only consist of a single ashlar each, set into the low walls horizontally or, more often, vertically, often reused. Because of the ashlars’ limited size, the walls of this type are not built in full height but remain mere foundations or socles of walls built from mudbrick or other materials above. Camporeale’s type 1B resembles his type 1A, but in this case, the walls reach full height; in consecutive courses, the ashlars, most often standing upright, are not set above each other, but staggered. This technique closely resembles the

²⁴¹ For recent overviews, see e.g. Wright 2005, 60; Roos 2009, 539, 547 f.; Wright 2009, 169.

²⁴² E.g. Ardeleanu 2016, 30. See also, ‘In generale, nelle diverse trattazioni che riguardano l’opus Africanum, anche a causa di tale denominazione, viene conferito particolare risalto agli aspetti etnici e culturali insiti nel suo utilizzo’ (Camporeale 2014, 192).

²⁴³ E.g. Sposito 1995, 21; Helas et al. 2011, 41; De Vincenzo 2013, 87, 93, 305; Montanero Vico 2014, 75 (but see Montanero Vico 2014, 97; Camporeale 2014, 204; 2016, 64).

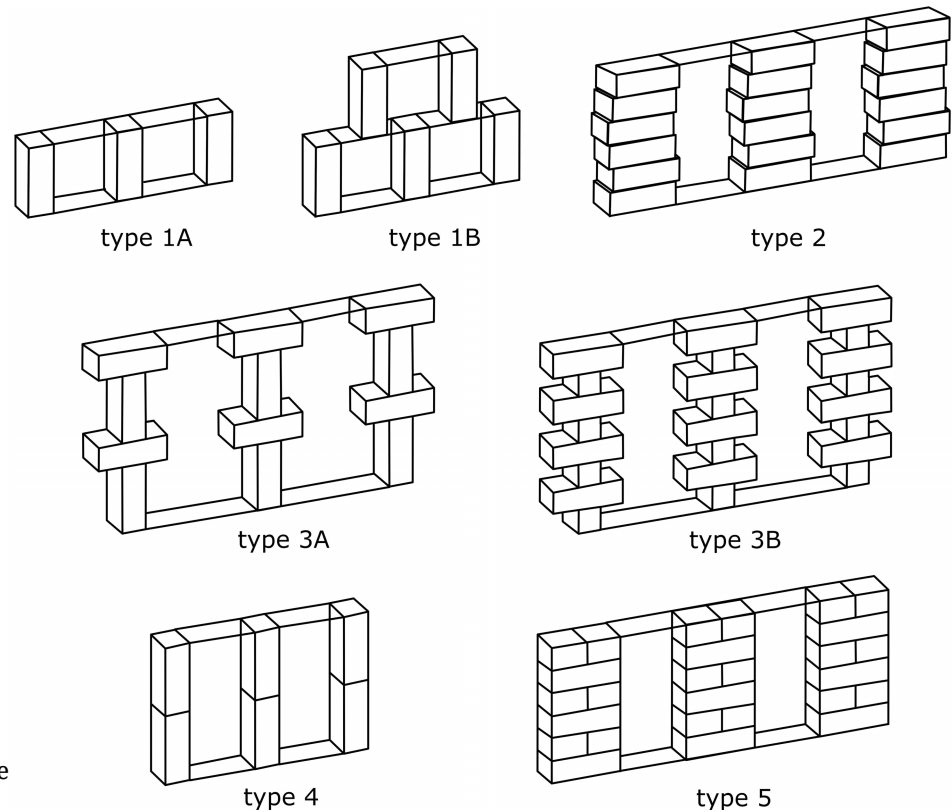


Fig. 3. Camporeale's typology of a *telaio* (redrawn after Camporeale 2014, fig. 3).

staggered-reinforcing-header technique as defined above. Camporeale's type 2 has piers built from multiple stretchers above each other, but has only one block per course. His type 3A is characterised by the alternation of one standing block and one stretcher, his type 3B by the alternation of lying headers and stretchers. Camporeale's type 4 features multiple vertical blocks standing on top of each other. His type 5 includes piers with multiple ashlars (headers and stretchers) per course, that is what has been defined as the pier-and-rubble technique above.

This typology seems problematic in various ways: first, Camporeale's type 1A is most problematic because it only represents the lower part of walls. Since most walls are not preserved at full height, piers of Camporeale's types 1B, 3A and 4 would all look like those of his type 1A if only the lowermost course is preserved. Even though many walls indeed originally reached only a meter or less in height, and thus featured piers made of single ashlars (or more rarely two superimposed ashlars of less longish form), many walls classified by Camporeale as belonging to

his type 1A may in fact have originally belonged to other types. It remains important to note that a *telaio* could also be applied to mere foundations or socles,²⁴⁴ but it seems better to differentiate the cases of Camporeale's type 1A into those where ashlars were confined to mere stone socles and those where the original height of the walls is unknown.²⁴⁵ This is especially relevant since the function of the ashlars is entirely different when used only in lower parts of the walls; in these cases, the ashlars were certainly not used to prevent the destruction of entire walls in earthquakes (see below) and the increased rigidity of the wall and the reduction of the outward pressure of the rubble (see below) likely also played a minor role in low

²⁴⁴ As could the pier-and-rubble technique (even though only very rarely), see 25-ME-03.

²⁴⁵ Even though it is not apparent in his typology, this differentiation is not foreign to Camporeale's approach, 'Inoltre, se si osservano le tecniche a pilastri del Mediterraneo orientale, caratterizzate da blocchi in filari e dalla varietà delle apparecchiature, appare evidente la differenza fra queste opere e il tipo 1A che ha caratteristiche costruttive e statiche molto più semplici' (Camporeale 2014, 204).

stone socles. Other than that, it has been supposed that the reason for the insertion of (very often reused) ashlar into stone socles was to facilitate the drainage of the mudbrick sections after heavy rains and to give them a slightly larger flexibility regarding changes in temperature.²⁴⁶ It thus seems that *a telaio* confined to mere stone socles and *a telaio* in stone walls reaching full height should be treated as two different techniques with differing functional backgrounds. This distinction has so far only been drawn (in passing) by L. Karlsson (although one should not follow him in calling the use in stone socles *a telaio* and that in walls reaching full height *opus africanum*).

A second problem affects Camporeale's type 5; as has already been noted, it equates the pier-and-rubble technique, differentiated from *a telaio*, above. Apart from a single, rather particular context in Roman (1st cent CE) Baelo Claudia (Sillières 2013, 17 f.), Camporeale assigns only the two above-mentioned contexts, Huelva (**01-HU-01**, plan 44, fig. 97, 98) and Tarquinia (**06-TA**, plan 48, fig. 104–106), to this type (Camporeale 2014, 198). It thus seems better to ignore Camporeale's type 5. When the very long period in which *a telaio* was used – well into the Medieval/Islamic period²⁴⁷ – is considered, it likewise seems necessary to pay attention to the chronology of the respective types. Camporeale recognised his rare type 3B as a particularity of western North Africa in the Imperial period (1st–3rd cent. BCE) (Camporeale 2008, 145 f.; 2014, 196; 2016, 65–68, fig. 5: 5–10; 2021, 132–135); it can thus be excluded from the present discussion

²⁴⁶ 'Die Gefachbauweise hat ihren Ursprung vermutlich im Lehm-mauerbau. Die größte Gefahr für Lehm-mauern stellt Wasser dar. Hier ist ein solcher Steinsockel von Vorteil, der den Mauerfuß gegen Ausspülungen schützt und zugleich hoch genug ist, um zu verhindern, dass Bodenfeuchtigkeit aufsteigen kann. Nach Regenfällen kann die durchnässte Lehmwand zudem gleichmäßig austrocknen, da die Gefache das Wasser nach unten leiten können. Auf einer Quader-mauer würde die Lehmwand hingegen im unteren Bereich aufweichen. Der Wechsel von Pfeiler und kleinsten Schichtung bewirkt außerdem, dass die Steinträger leicht beweglich sind, der Sockel 'arbeiten' kann. Das ist ein Vorteil bei Lehm-ziegelwänden, die größeren thermischen Schwankungen unterliegen als das Steinmaterial. Bei Druckveränderungen verhält sich der Sockel tolerant und reagiert dynamisch auf Temperaturwechsel' (Helas et al. 2011, 41).

²⁴⁷ Fantar 1984, 342; 1990, 68; Morigi 2006, 34 f.; Hanoune 2009, 30; León-Muñoz 2018; Gutiérrez Lloret/Sarabia-Bautista 2021; Vizcaíno Sánchez et al. 2021.

of pre-Roman *a telaio*. Camporeale's type 2, whose area of distribution he does not mention, likewise seems to be limited to Roman North Africa.²⁴⁸ Finally, Camporeale's type 1B, firstly, does not feature real piers because multiple ashlar were not set above another, but rather corresponds to what has been considered the staggered-reinforcing-header technique here. Secondly, it is only known from the region of Etruria, where the use of the technique is older than the first known examples of our staggered-reinforcing-header technique in present-day Israel. A direct link between the 6th–4th cent. BCE examples from Etruria and the 3rd–1st cent. BCE contexts from the southern Levant seems little convincing (not only because its specific form at the earliest Levantine contexts at *Tēl Qedeš* and Dor is very different from the Etruscan examples).²⁴⁹ Moreover, the Etruscan technique seems much less tightly connected to the other forms of *a telaio* than to another Etruscan technique commonly called *a scacchiera* ('chessboard').²⁵⁰ It thus seems best to also exclude this Etruscan particularity from our discussion of pre-Roman *a telaio*.

This basically leaves us with only two of Camporeale's types, his type 3A (with an alternation of horizontal and vertical elements) and his type 4 (with only vertical elements). To prevent further confusion, these two basic forms of *a telaio* will

²⁴⁸ The only exception seems to be the problematic case of edificio beta in Tarquinia (**06-TA**), where some piers consist of only one ashlar per course, but these roughly squarish ashlar cannot be considered stretchers in any meaningful sense. See also chapter 4.1.

²⁴⁹ See already Camporeale about **24-DO-08** (with incorrect chronology; add now **16-KE**), 'la somiglianza fra le due tecniche si limita all'aspetto esteriore del muro ma il procedimento costruttivo è del tutto differente: Anche in questo caso la tecnica fenicia appare più complessa poiché la muratura è dotata di un nucleo chiaramente distinto dai paramenti esterni e i blocchi svolgono la funzione di diatoni, cioè di elementi di collegamento fra i paramenti' (Camporeale 2014, 204).

²⁵⁰ Stopponi 2006 and Pizzuti 2016 considered both techniques together; Camporeale 2014, 196, note 18 separated them by arguing that the ashlar are frequently in contact with each other in *a scacchiera*, so that the wall may be considered an ashlar wall with fills of rubble, while the ashlar are rarely in contact with each other in his *a telaio* type 1B, being a rubble wall with strengthening ashlar. This observation may be correct, but the separation of the two techniques is not always easy, and the limited geographical distribution of Camporeale's type 1B of *a telaio* forcefully strengthens its link to *a scacchiera*.

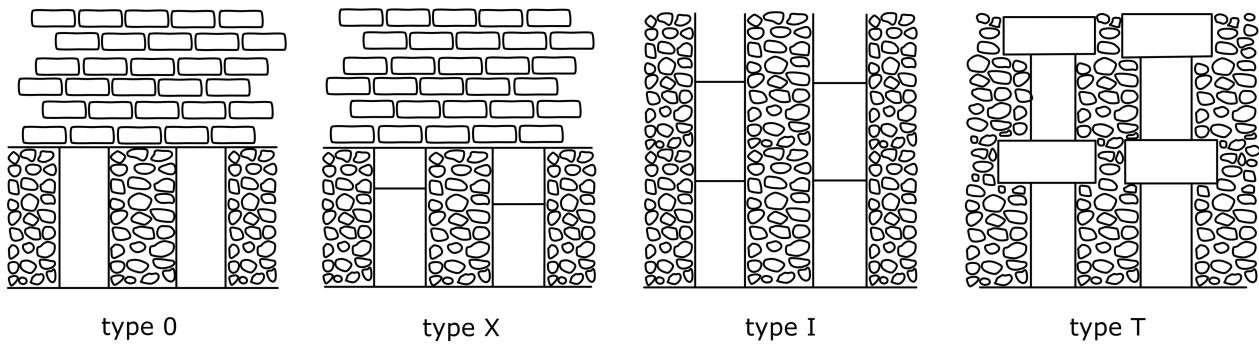


Fig. 4. Basic typology of ashlar piers in pre-Roman *a telaio*.

be called types I and T in what follows, with the shape of the letters reflecting the shape of the piers (fig. 4).²⁵¹ Walls in which only the lowermost course of ashlars is preserved and which may have originally belonged to either type I or T will be called type ?, while those in which it seems reasonably certain that the ashlars were confined to mere stone socles will be called type 0. The few cases in which (often only individual) piers within mere stone socles consisted of two superimposed smaller (often less longish, sometimes rather squarish) ashlars will be called type X. This typology is in line with our definition of *a telaio* as a technique in which the piers are composed of massive, squared ashlars covering the entire width of the walls, but have only one ashlar per course (see chapter 1.1, type 4 and 5; fig. 1: 4–5).

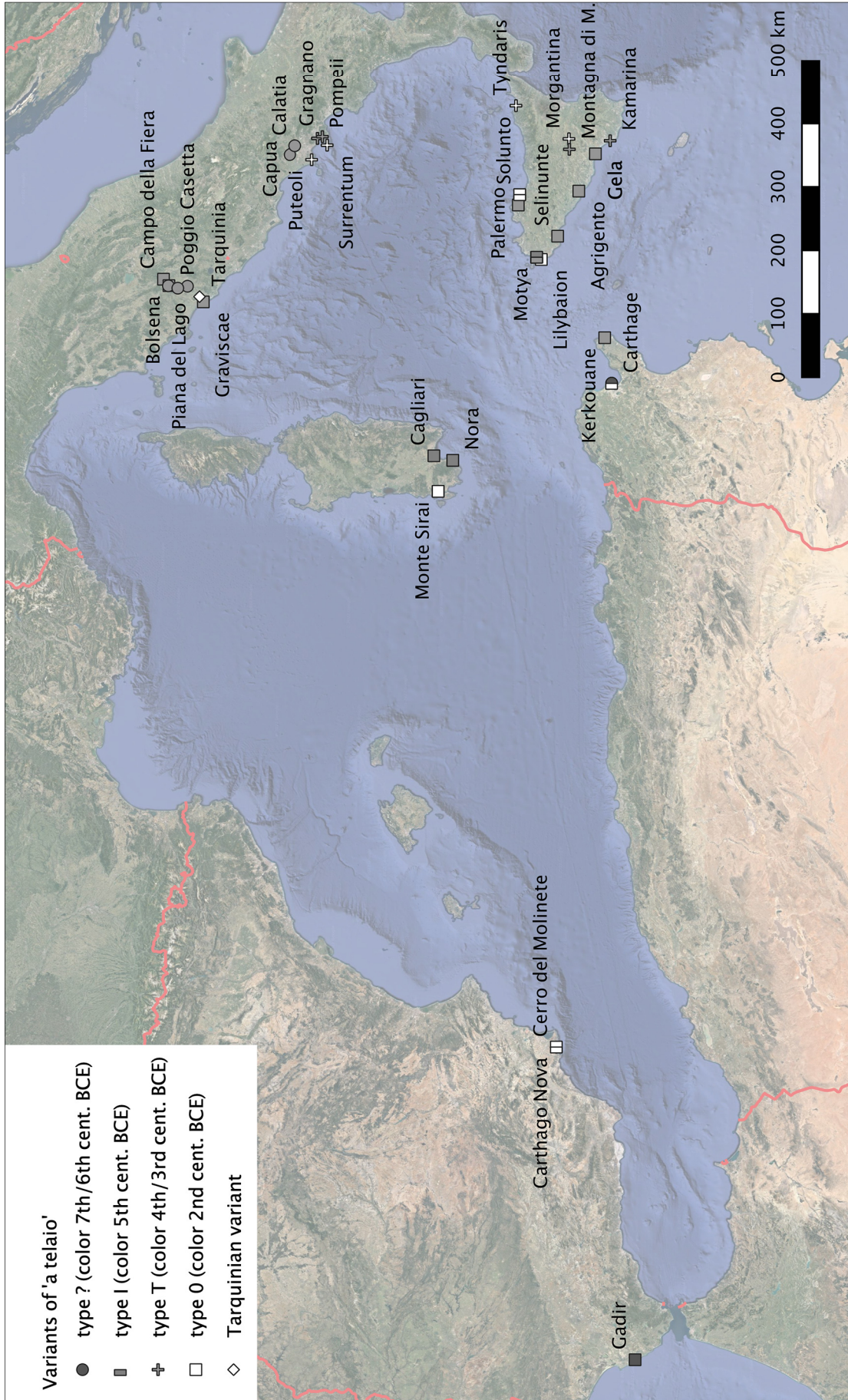
This opens the question regarding the function of these ashlar piers. In many ways, our observations on the pier-and-rubble technique above, can be transferred to *a telaio*: the aesthetic aspect very probably played only a minor role, since many walls were plastered or even stuccoed (fig. 7, 22a, 25).²⁵² What is much more important is that the piers increased the stability of the walls, with the dressed stone serving two purposes, ‘It directly provides the wall with additional strength in compression and also it augments the stability, rigidity of the construction by compartmentalizing

the rubble and so reducing its outward pressure’ (Wright 2009, 169; also e.g. Camporeale 2014, 205 f.; 2016, 65; Mogetta 2021, 15). What *a telaio* is lacking when compared to the pier-and-rubble technique is much of its tremor-resistance: with only one ashlar per course, the ashlars can only very slightly shift on top of each other to absorb temporarily added horizontal and tensile loads.²⁵³ Since this was identified as a major ‘selling point’ of the pier-and-rubble technique, it is a major difference from *a telaio*. Nevertheless, the danger of earthquakes may have still played a role in the use of this second technique: F. Prados Martínez noted that the regular placement of ashlar piers could have helped to prevent ‘domino effects’ during earthquakes, so that only part of the wall collapsed rather than the whole, thanks to being divided into sections by the piers (Prados Martínez 2003, 46; 2014, 17; see also Camporeale 2014, 205). This does not apply to cases where only the socles were built in *a telaio*, with much of the remaining walls (or eventual upper stories) built in mudbrick, of course. All in all, the ashlar piers in *a telaio* strengthened the walls in various ways. Just like the pier-and-rubble technique, *a telaio* provided this additional stability at a considerable discount of raw material when compared to pure ashlar masonry. This has already been perceived as a major advantage of the technique for a long time (Pace 1925, 163).

²⁵¹ Cases of Camporeale’s type 1A (only one ashlar standing upright per pier), in which it is reasonably certain that the piers were never larger than what is preserved, may be considered a reduced variant of our type I.

²⁵² Note e.g. Peterse 1999, 13 with note 46; Busen 2022, 55 on Pompeii, Di Stefano 1993, 27 on Hellenistic Lilybaion or Helas et al. 2011, 39 on 4th/3rd cent. BCE Selinunte.

²⁵³ See, though, Tomasello 1997, 22, who argued that *a telaio* has a structural advantage in earthquakes because the piers carried vertical loads, while the weaker sections in rubble could have absorbed vertical loads.



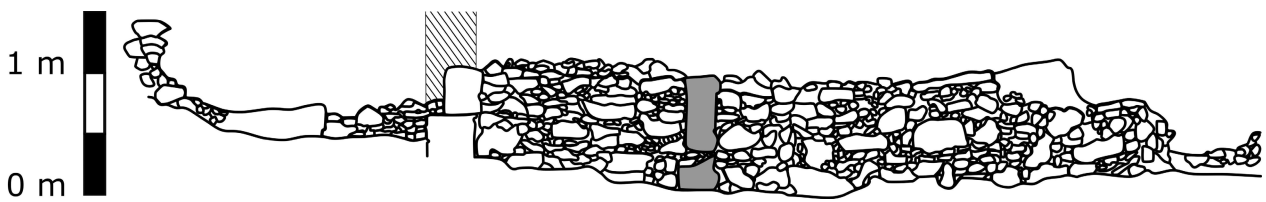


Fig. 5. Wall with pier of a *telaio* type I (?), 8th–6th cent. BCE, Cadiz, Teatro Cómico (redrawn after Gener Basallote et al. 2014b, fig. 27, top).

4.3 A *telaio* in the Pre-Roman Central and Western Mediterranean

Against this background, we can now turn to the pre-Roman evidence for a *telaio* from the central and western Mediterranean (*map 8*), starting with the earliest evidence from the Iberian Peninsula and northern Africa.

At Gadir (Cádiz), the *a telaio* technique is documented in a single pier, very probably of type X, in a wall of period III, dated to the mid 8th to early 6th cent. BCE (*fig. 5*; Gener Basallote et al. 2014b, 38 f., *fig. 27, 28*; Gener Basallote/Núñez 2015, 11; Bolder-Boos 2020, 107) – this is the only site in which a *telaio* and the pier-and-rubble

technique have both been used within a few centuries (*03-GA-01*). In the excavations below the *decumanus maximus* at Carthage, the technique is known first in phase IVa of the 2nd half of the 7th cent. BCE, during which it was already quite common; it was built at this site at least up to Stratum VIIa of the 2nd half of the 4th cent. BCE and remained in use until the end of the ‘Punic’ settlement in the 2nd cent. BCE (Stratum VIII; *fig. 6–9*).²⁵⁴

²⁵⁴ Niemeyer/Docter 1993, 210, pl. 52, 53; 2, 54; 2, 4, 55; 2; Niemeyer et al. 2007, 96–99, 101, 106, 108 f., 111, 113 f., 118–120, 127 f., 132, 136 f., 143–145, 147, 149, 155, 161, 165, 189, *fig. 9, 16, 17, 23, 24, 27, 36b, 37, 50a*, Beil. 5–11, pl. 2, 3b; 7c–e; 8a–c; 9b; 11e; 12, 13, 14e, f.; 15d–f; 16a; 20a, b; 21d, e.



Fig. 6. Carthage, Hamburg excavations, general view from the north (after Niemeyer et al. 2007, pl. 2a, adapted).

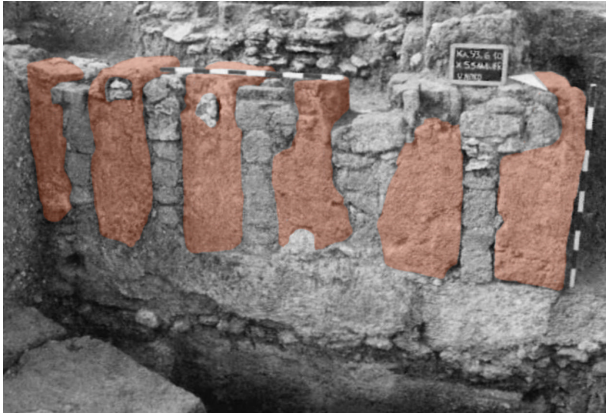


Fig. 7. Carthage, Hamburg excavations, Wall x5,5 (after Niemeyer et al. 2007, pl. 14e, adapted).

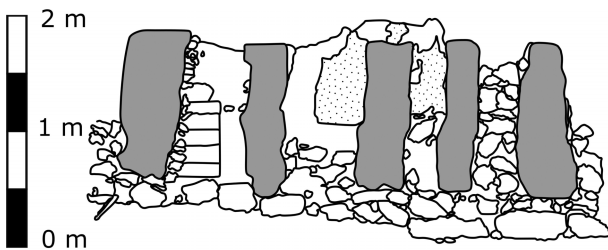


Fig. 8. Carthage, Hamburg excavations, layer IVa, Wall y13,5 (redrawn after Niemeyer et al. 2007, fig. 9).

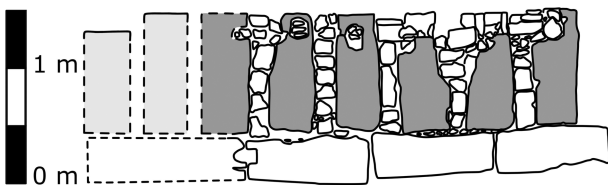


Fig. 9. Carthage, Hamburg excavations, layer IVb, Wall x5,5 (redrawn after Niemeyer et al. 2007, fig. 50a).

Even though the number of preserved piers is large, not a single one preserves more than its lowermost block (standing upright); it thus remains unclear whether the piers can be assigned to type 0 or rather type I or T (as well as how high the walls were built in *a telaio*). The technique is not documented in the area excavated at Rue Ibn Chabâat, which has been explained by the fact that only the area at the *decumanus maximus* was that densely settled to make it necessary to add upper stories, and that *a telaio* was a technique used to facilitate this.²⁵⁵ At Carthage, type I was very common in numerous Late Punic K (2nd cent. BCE)

houses on Byrsa hill (fig. 10),²⁵⁶ but seemingly only used in few of the houses excavated elsewhere (Tang 2005, 302–310). At the quartier Magon, there is some evidence from the Middle and Late ‘Punic’ phases, and the technique was also adopted (mostly type I, but partly also with smaller ashlars on top of each other) in the Julio-Claudian refoundation (Holst et al. 1991, 111–115, 211 f., pl. 32f, 33f, 34a, 34e, 35g).

At present, early contexts seem to be lacking in northern Africa outside of Carthage; the next context is the settlement of Kerkouane, with Middle Punic phases dating to the 4th/3rd cent. BCE (Fantar 1985, 335–344). The use of *a telaio* is confined to the socles of walls built with mudbrick, corresponding to our type 0 (fig. 11). All other evidence from northern Africa seems to date to the Imperial period (e.g. Stutz 2002, 115–119).²⁵⁷ In Spain, the situation is similar: even though numerous examples of the Imperial period are known, the technique is, apart from the single pier at Cádiz, rare in pre-Roman contexts, all of them Late Punic: an unknown type (possibly limited to the socles) was used at Cerro del Molinete, Cartagena during the 3rd cent. BCE (Antolinos Marín 2003, 119, 122, pl. 4, 6; Prados Martínez 2003, 46) and at Cartagena (Carthago Nova) during the late 3rd cent. BCE (fig. 12).²⁵⁸ There is evidence for type I from Cartagena dating to the 2nd cent. BCE (Fernández Díaz/Antolinos Marín 1999, 251, pl. 2: 1) and from Sevilla dating to the 1st cent. BCE (Tabales Rodríguez 2010, 76, fig. 3). In the Imperial period, the technique was much more widespread, even though it did not reach the distribution it enjoyed in northern Africa,²⁵⁹ and it seems problematic to take this continued use of *a telaio* as evidence for a continued ‘Punic’ substratum in the population

²⁵⁶ Lancel 1979; 1982; 1983, fig. 11, 14, 16, 17, 19–23, 27; 1995, fig. 79, 82–88; Tang 2005, 287–295.

²⁵⁷ An early occurrence from Bulla Regia is problematic, since the wall dated to the 2nd cent. BCE and, as published by Hanoune 1990, 414; Broise/Thébert 1993, 209–216, fig. 195, 210, 214, 215, cannot be classified as *a telaio*, as it consists entirely of ashlars, which do not form regular piers.

²⁵⁸ Fernández Díaz/Antolinos Marín 1999, 250 f., pl. 1: 2, 3; Ramallo Asensio 2003, 332; Antolinos Marín 2003, 122, 124, pl. 7, 8; Ramallo Asensio/Ruiz Valderas 2009, 534, fig. 4b.

²⁵⁹ e.g. Belén/Escacena 1993, 153; Belén et al. 1993, 226; Fernández Díaz/Antolinos Marín 1999, 251 f., pl. 2: 2, 3; Rodríguez 2001, 244; Antolinos Marín 2003, 124, 134, 141 f., fig. 2, pl. 17; Sillières 2013, 17 f.; Noguera Celadrán 2021, 102.

²⁵⁵ Niemeyer et al. 2007, 189 f.; Camporeale 2014, 204; Bolder-Boos 2016, 91; Camporeale 2016, 64; Bolder-Boos 2020, 373 f.; also Montanero Vico 2014, 75.



Fig. 10. Carthage, Late Punic habitation quarter on Byrsa hill (photo by author).

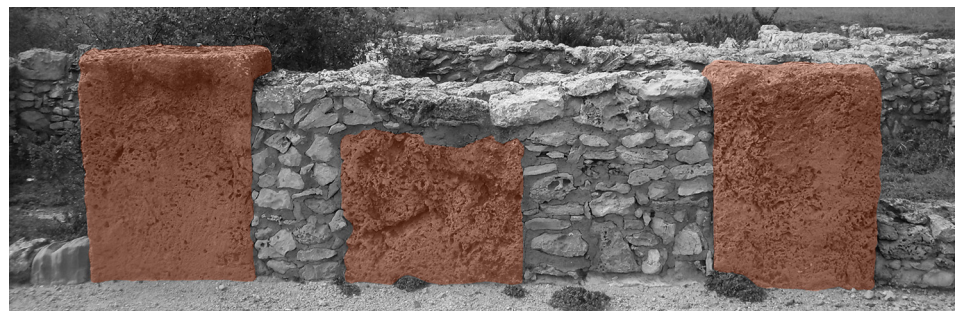


Fig. 11. Kerkouane, wall in a *telaio* (after <https://upload.wikimedia.org/wikipedia/commons/4/47/Kerkouane_opus_africanum.jpg>, adapted).

(Noguera Celadrán/Madrid Balanza 2014, 27). The technique was used far beyond the end of antiquity on the Iberian Peninsula.²⁶⁰ At present, evidence from the Balearic Islands is almost completely lacking (Ramon Torres 2014, 214, but see Jiménez et al. 2021, 46, fig. 12).

Beyond North Africa and Spain, there is lots of evidence for a *telaio* from Sicily, Sardinia, Etruria and Campania. In Sicily, the technique is rare in Roman Imperial contexts (Morigi 2006, esp. 47 f., #41), but seems to have been widely used in the pre-Roman phases of multiple sites (Morigi 2006).

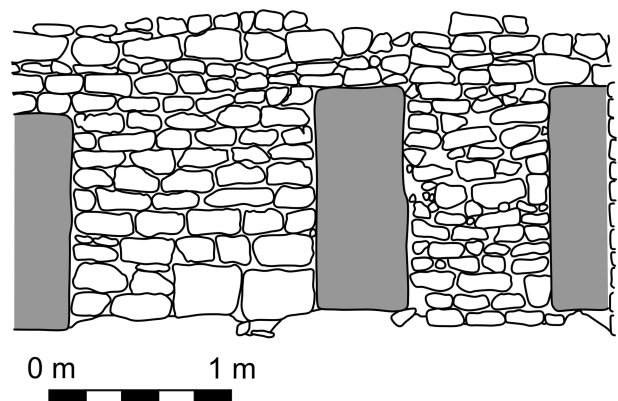


Fig. 12. Cartagena, wall in a *telaio* at Plaza San Ginés (redrawn after Fernández Díaz/Antolinos Marín 1999, pl. 1, fig. 3).

²⁶⁰ León-Muñoz 2018; Gutiérrez Lloret/Sarabia-Bautista 2021, 540 f., 544, 549, 553, fig. 4e–f, 5, 6; Noguera Celadrán 2021, 102, fig. 9; Vizcaíno Sánchez et al. 2021.



Fig. 13. Motya, zona A, muro 4 (redrawn after Famà et al. 2002, fig. 45).



Fig. 14. Motya, building next to south-east staircase (after Whitaker 1921, fig. 14, adapted).

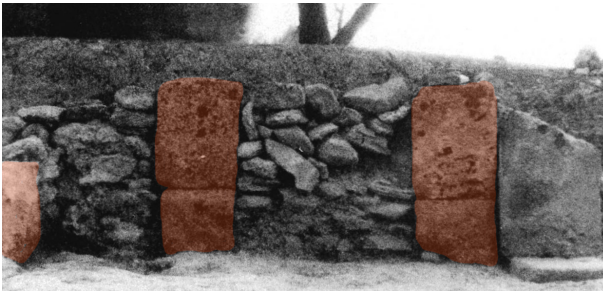


Fig. 15. Motya, zona A, muro 6 (after Famà et al. 2002, fig. 46, adapted).



Fig. 16. Motya, wall in *a telaio*, Casa dei Mosaici (after Morigi 2006, fig. 7, adapted).

It was very common at Motya, being documented in various locations on the island, mostly dating to the 6th and 5th, but partly also to the 4th and 3rd cent. BCE (fig. 13–16).²⁶¹ In the carefully

analysed zona A, it is clear that the use of *a telaio* starts in the late 6th cent. BCE and became more common in the 5th and 4th cent. BCE (Famà et al. 2002, 52–56, fig. 42–43, 45–48; Morigi 2006, 49, #47; Montanero Vico 2014, 63 f., fig. 10). Except for very few occurrences of type X, almost the entire evidence relates to type 0; ashlar piers were thus only used in the stone socles of mudbrick walls (fig. 13, 15). There is at least one exception, however: in the relatively well-preserved building next to the southeastern staircase known as ‘Casermetta’, dating to the 6th/5th cent. BCE, multiple regularly spaced piers of type I are preserved (fig. 14; Whitaker 1921, 160, fig. 14, plan B; Isserlin/Du Plat-Taylor 1974, 90; Ciasca 1989, 54 f.; Morigi 2006, 49, #49). This is the earliest confirmed evidence so far known for this type of wall.

Beyond Motya, the technique is known from numerous cities in Sicily. At Selinunte, various walls in the eastern residential quarter, on the acropolis and in the so-called ‘Punic’ quarter date to the 4th and 3rd cent. BCE, that is the ‘Punic’ phase of the site (Di Vita 1953, 43 f.; Morigi 2006, 50, #52, 53; Helas et al. 2011, 37–42, 221–224; De Vincenzo

²⁶¹ Cappiddazzu sanctuary, 4th/3rd cent. BCE: Morigi 2006, 49 f., #50; Casa dei Mosaici, 5th cent. BCE: Ciasca 1989, fig. on p. 53; Morigi 2006, 49, #48, fig. 7, 8; zona A, starting in the late 6th cent. BCE, mostly 5th/4th cent. BCE: Famà et al. 2002, 52–56,

fig. 42, 43, 45–48; Morigi 2006, 49, #47; Montanero Vico 2014, 63 f., fig. 10; zona industriale K/K EST, 6th/5th cent. BCE: Ciasca 1989, 34 f.; Morigi 2006, 49, #46; wall behind fortifications close to Tophet, 6th–4th cent. BCE: Morigi 2006, 48, #45; ‘Casermetta’, 6th/5th cent. BCE: Whitaker 1921, 160, fig. 14, plan B; Isserlin/Du Plat-Taylor 1974, 90; Ciasca 1989, 54 f., fig. 19; Morigi 2006, 49, #49.

2013, 305; Montanero Vico 2014, 85). All of the preserved piers belong to type 0 with only one ashlar in the lower parts of the walls and its upper parts erected in mudbrick (*fig. 17, 18*; smaller stones were sometimes placed on top of less high piers in walls of mixed technique (*fig. 18*).²⁶²

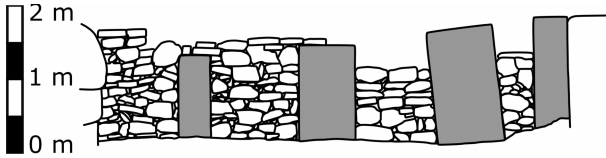


Fig. 17. Selinunte, wall cat. no. 1/6 (redrawn after Helas et al. 2011, fig. IX 5).

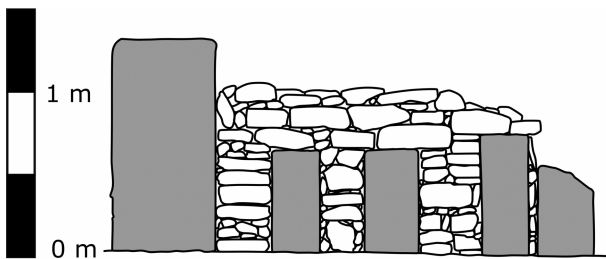


Fig. 18. Selinunte, wall cat. no. 1/7 (redrawn after Helas et al. 2011, fig. IX 7).

At Agrigento, walls in the same technique are documented in the southeastern quarter close to Porta II, dated between the end of the 5th and the 3rd cent. BCE (Morigi 2006, 47, #42; De Vincenzo 2013, 87–89, fig. 28; Montanero Vico 2014, 86 f.). Furthermore, it is known from the Hellenistic quarter, likewise dating to the 4th/3rd cent. BCE (*fig. 19*; De Vincenzo 2013, 89 f., fig. 29; Montanero Vico 2014, fig. 27). At Gela, the same type of walls were in use in the 5th–3rd cent. BCE (*fig. 20*; Congiu 2011, 195–197, fig. 3; De Vincenzo 2013, 92 f., fig. 32; Montanero Vico 2014, 88, fig. 29), at least in one case antedating the Carthaginian destruction (Fiorentini 2002, 156). In Solunto, similar walls were dated to the 3rd and 2nd cent. BCE (*fig. 21*); at least some of these seem to have included piers of type I and the walls may have been built entirely from stone (at least regarding the ground floor;

Wiegand 1997, 22, 25, fig. 7, 9, pl. 16; Wolf 2003, 7 f., 50 f., fig. 1, pl. 35: 2; Morigi 2006, 50 f., #54; De Vincenzo 2013, 110).

At Morgantina, type T was used in multiple buildings (western Stoa, eastern Stoa, Bouleuterion, Prytaneion, Potter's Workshop, Macellum, various houses) of the later 4th to early 2nd or even 1st cent. BCE (Tsakirgis 1984, 317 f., pl. 94b; Sposito 1995, 21–29, 51–56, 58, 64, 67; Sposito/Fernandez 2008). Beyond the (sometimes rather irregular) ashlar piers, the walls' techniques differ significantly, ranging from irregular rubble of mostly small sizes to veritable ashlars of heterogeneous format (*fig. 22*). This is precious evidence for the early large-scale use of type T. Karlsson connected these occurrences to what he calls the 'chain technique', that is the integration of vertical 'chains' of alternating headers and stretchers in *emplekton* walls (that is walls with a rubble fill between two faces consisting entirely of ashlars),²⁶³ common in the military architecture of Classical and Hellenistic Sicily (and elsewhere; Karlsson 1992, 70–94), but even if the idea to build ashlar piers in the 'chain' pattern may have been stimulated by such 'chains' in *emplekton* walls, it seems better to disassociate our *a telaio* (with ashlar piers set covering the entire width of the wall surrounded by less regular masonry) from mere 'chain' patterns in double shell walls, the faces of which consist entirely of ashlars. Beyond Morgantina, Karlsson's 'chain technique' was also used in walls not entirely consisting of ashlars in a few other sites in eastern Sicily, dating to the 3rd or 2nd cent. BCE: Montagna di Marzo, Kamarina and Tyndaris (Karlsson 1992, 88 f., 93, fig. 75, 76, 81, 82, 87).

At Palermo, one badly-published wall (type ?) in piazza Vittoria has been dated to be older than the 3rd cent. BCE (Morigi 2006, 50, #51). At Lilybaion, various contexts with piers of type 0 (and partly type X) are documented, most of them belonging to the 2nd cent. BCE, which is already a period of Roman domination.²⁶⁴

²⁶² The image only generally published as evidence for *opus africanum* in Mertens 1997, 318, pl. 37,1 seems to show multiple piers consisting of two or three blocks, but S. Helas (personal communication 2022) kindly informs that they likely belonged to a doorway closed in a second phase and that in general, no large ashlars set on top of one another are known from the *a telaio* walls in Selinunte.

²⁶³ See Karlsson 1992, 67–70 for the problematic question of what Vitruvius 2,8,7 calls *ἐμπλεκτον*.

²⁶⁴ Capo Boeo, San Girolamo, via delle Ninfe, viale Isonzo: Bisi 1967a, 396. 401 f., fig. 6, 7, 11, 22, 25, 26; Bisi 1967b, 316, fig. 1, pl. 82: 1; Di Stefano 1993, 27 f., pl. 2: 4; Giglio/Vecchio 2006, 124, n. 7–11, fig. 4, 5; Morigi 2006, 48, #43, 44; Cusenza



Fig. 19. Agrigento, walls in *a telaio* in the Hellenistic quarter (after De Vincenzo 2013, fig. 29, adapted).



Fig. 20. Gela, wall in *a telaio* in the acropolis quarter (after De Vincenzo 2013, fig. 32, adapted).



Fig. 21. Solunto, wall in *a telaio*, Casa del Deposito a Volta (D-DAI-ROM-SOL-98.0056, photo by R. Wiczorek, adapted).

In general, the evidence for *a telaio* from pre-Roman Sicily is particularly rich, but also quite varied. Most of the evidence seems to belong to our type 0 (or rarely type X), that is to be

confined to mere stone socles.²⁶⁵ This dates back to the late 6th cent. BCE at least at Motya, but mainly belongs to the 4th–2nd cent. BCE. Walls built entirely from stone are much rarer, but one context from

et al. 2012, 50, fig. 20; De Vincenzo 2013, 314, fig. 187; Montanero Vico 2014, 79 f.

²⁶⁵ This contrasts with the statement of Camporeale 2014, 196, stating that our type T was common in Sicily during the 5th–3rd cent. BCE, which was based on Karlsson 1992, 70–94, for which see above; but see Karlsson 1992, 95.

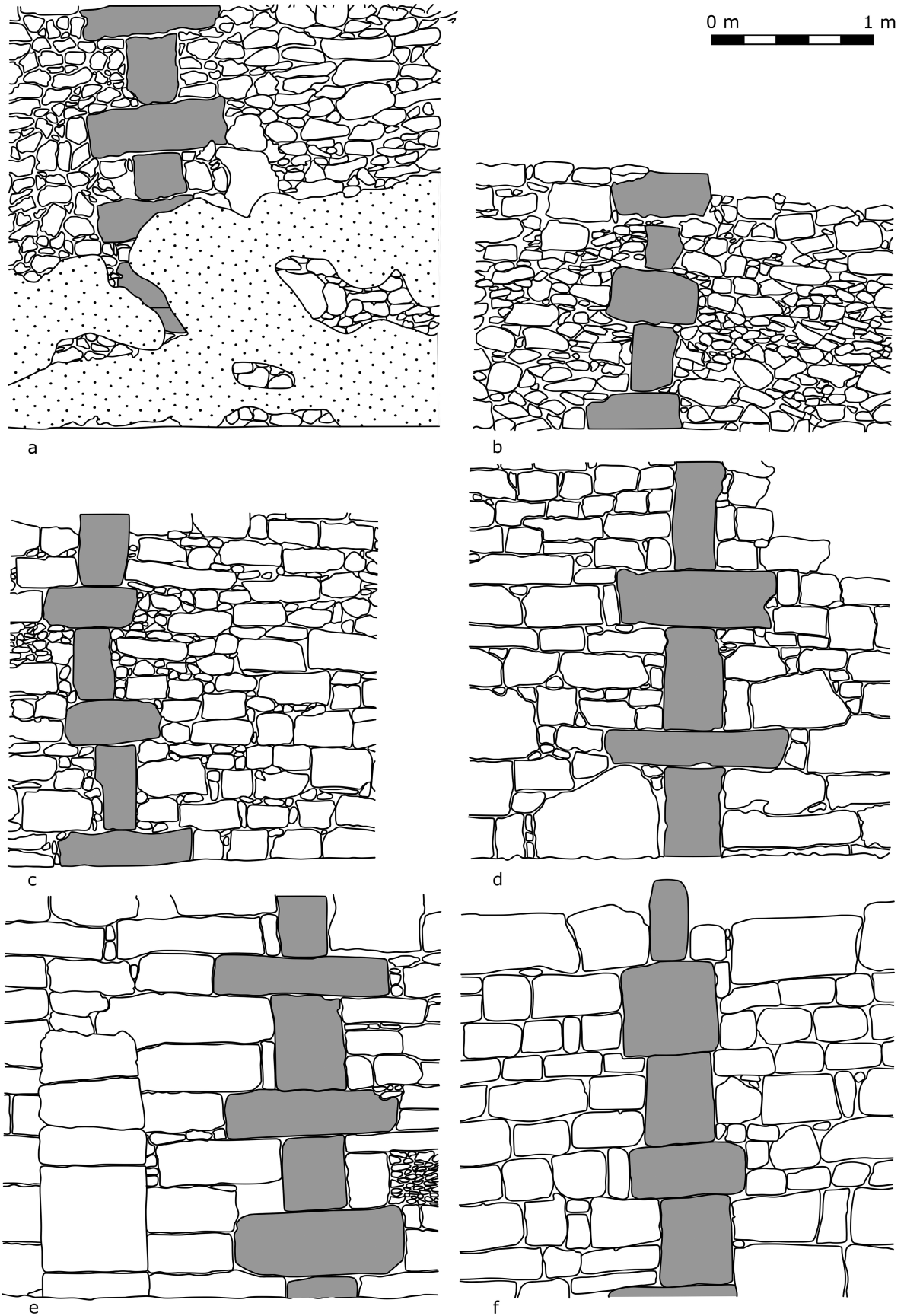


Fig. 22. Morgantina, various forms of walls in the *a telaio* technique: a. Prytaneion; b. Bouleuterion; c. west Stoa, southern end; d. west Stoa, interior; e. west Stoa, retaining wall; f. east Stoa, retaining wall (redrawn after Sposito 1995, camp. 1: 5; 8: 2; 3: 1; 3: 3; 3: 4; 1: 3).



Fig. 23. Nora, forum, walls in Sector I, Trench PD (after Bonetto 2009, fig. 60, adapted).

Motya proves that type I was already used during the 5th cent. BCE at the latest, and numerous walls at Morgantina provide evidence for type T starting in the 4th cent. BCE. The possible role of Sicily in the genesis and spread of *a telaio* will be dealt with in more detail below (see chapter 4.4).

In Sardinia, *a telaio* was quite common, mainly in the Roman period and Late Antiquity as it seems, reaching into the Medieval period (Mezzolani 1996, 996–999; Ghiotto 2004, 13 f.; Morigi 2006). Some 15 years ago, A. Morigi listed many of these Roman and later contexts from Cagliari, Carbonia, Cornus, Fordongianus, Mogoro, Neapolis, Nora, Nurachi, Oschiri, Porto Torres, Tharros (Morigi 2006, 38–47, #1, 2, 4–6, 8, 10, 11, 13, 16–22, 24–30, 36–38). A number of other contexts from Carbonia, Giara di Gesturi, Campananissa, Pantaleo, San Pietro and Villasimius cannot be dated with any certainty (Morigi 2006, 39 f. 45–47, #7, 12, 31–33, 40) – many datings to the ‘Punic’ period were based on the building technique itself (Morigi 2006, 36 f.). When focussing on the Sardinian evidence certainly pertaining to pre-Roman phases, only few contexts can be referred to: most importantly, numerous walls in the area of the later forum of Nora date back to the late 6th and early 5th cent. BCE (fig. 23) – but *a telaio* was only used in the walls’ socles here (type 0: Bonetto 2009, 120–122, fig. 1, 48, 53, 55, 57, 60, 62–64, 87, 88, 90, pl. 4; Morigi 2006, 38, #3; Montanero Vico 2014, 68, fig. 12). This also seems to apply to the area

excavated in Via Brenta at Cagliari, where a wall in *a telaio* (type ?) has been dated to the 5th cent. BCE (Tronchetti 1992, 26, pl. 8: 2; Montanero Vico 2014, 67). Finally, numerous houses at Monte Sirai were partly built in *a telaio* – but again, the technique was only used for (rather low) socles (type 0). This evidence dates already to the 3rd–1st cent. BCE (Bartoloni 1994, 80, fig. 4; Perra 2001, 129; Morigi 2006, 41, #15, n. 21; Montanero Vico 2014, 93). All in all, it seems that even though building styles generally called *a telaio* were very common on Sardinia after the Roman conquest, and although walls’ socles were sometimes regularly strengthened with single ashlar piers from the late 6th cent. BCE onwards, there is no evidence for the use of more complex ashlar piers of one of the types defined above in the pre-Roman past of the island.

There is evidence related to *a telaio* from Etruria as well; the problematic case of Edificio Beta (06-TA, plan 48, fig. 104–106) has already been dealt with above (see chapter 4.1). This is not the only evidence from Tarquinia. Some centuries later, probably in the Hellenistic period, the original Tarquinian style with piers of superimposed cubic ashlar was used in other buildings at the same site, close to the Porta Romanelli; some of these walls were conserved up to a height of ca. 2.6m (fig. 24).²⁶⁶

²⁶⁶ Romanelli 1948, 206 f., 224–226, 229, fig. 18; Bonghi Jovino 1991, 183–186, fig. 10; Massabò 1994, 70 f. pl. 2: 3; Baratti et al. 2008, 160; Camporeale 2014, 201, fig. 12.



Fig. 24. Tarquinia, Building C next to Porta Romanelli (after Bonghi Jovino 1991, fig. 10, adapted).

Other than that, a technique called a *telaio* is rather widely known from contexts of the 5th to the 3rd cent. BCE (as well as Late Antiquity) from Etruria.²⁶⁷ Still, it seems that it was only used in socles.

At Campo della Fiera, there is evidence of type 0 from the 5th/4th cent. BCE;²⁶⁸ at Graviscae dating to the 4th cent. BCE;²⁶⁹ at Bolsena (Volsinii) dating to the 4th/3rd cent. BCE;²⁷⁰ at Rosellae dating from the Early Imperial period to Late Antiquity (Camporeale 2014, 200). Furthermore, remains of walls of type 0 (or of walls in a *scacchiera*) may be documented at Musarna, probably belonging to the 4th/3rd cent. BCE,²⁷¹ at Poggio Casetta (Bolsena/Volsinii) in the 3rd cent. BCE²⁷² and at Piana del Lago in the 3rd/2nd cent. BCE.²⁷³

The problems with Camporeale's type 1B, somewhat similar but very probably not connected to our staggered-reinforcing-header technique, have already been mentioned above. This technique, in which individual headers were inserted into rubble walls forming a staggered pattern in successive courses, but not acting as *diatons*, is known, most often together with the technique called a *scacchiera*, from walls and cisterns in Orvieto in the 6th–4th cent. BCE,²⁷⁴ from a cistern at Castellina del Marangone probably in the 5th/4th cent. BCE,²⁷⁵ from Cività del Fosso d'Arlena in the 5th/4th cent. BCE²⁷⁶ and from Vulci in the early 3rd cent. BCE.²⁷⁷ All in all, it seems that, apart from the highly idiosyncratic evidence from Tarquinia, a *telaio* with multiple ashlar above each other is lacking in Etruria.

A final area where a *telaio* is known from multiple contexts is Campania; without doubt the most important site is Pompeii. Here, the building technique called a *telaio*, 'Steinfachwerk' or 'limestone framework', typically plastered, is very common in the 'Samnite' building phases, that is especially

²⁶⁷ Summary in Camporeale 2014; see also Stopponi 2006; Pizzuti 2016.

²⁶⁸ Stopponi 2006, 216 f., fig. 17; 2009, 430, fig. 16; Camporeale 2014, 199.

²⁶⁹ Torelli 1971, 198; 1977, 417; 1978, 408; Bonghi Jovino 1991, 186, fig. 11; Fiorini 2005, esp. 38, fig. 8, pl. 27, 28; Camporeale 2014, 200.

²⁷⁰ Gros 1971, 64–66, fig. 25; Stopponi 1991, 214, fig. 162; 2006, 213 f; Camporeale 2014, 199.

²⁷¹ Andreau et al. 2002, 7 f.; Stopponi 2006, 217, n. 49; Camporeale 2014, 200.

²⁷² Bloch 1972, 167, fig. 63, 64; Tamburini 1998, 100 f., fig. 187, 188; Camporeale 2014, 200.

²⁷³ Tamburini 1998, 88 f., fig. 159; Berlingò/D'Atri 2003, 245, fig. 9; Stopponi 2006, 214 f.; Camporeale 2014, 200. Camporeale 2014, 200 also mentions 6th/5th cent. BCE walls in San Giovenale as evidence for a *telaio*, but even if the connection to 'Phoenician' pier-and-rubble or a *telaio* was already made in the primary publication (Belelli Marchesini 2013, 163), it seems very dubious because the few ashlar placed upright (and partly above each other) are not clearly separable from the surrounding masonry, partly consisting of ashlar.

²⁷⁴ Roncalli 1987, 51–53, fig. 14–16, 17, 19–22, 28, 30, 31; Stopponi 1991, 213 f., fig. 156–158, 160, 161; 2006, 209–213, fig. 5; Camporeale 2014, 199 f.

²⁷⁵ Stopponi 2006, 213; Prayon 2008, 280 f.; Camporeale 2014, 199.

²⁷⁶ Bloch 1955, 60, fig. 2; 1963, 413, fig. 10, 11; 1972, 167, fig. 62, pl. 21–23; Stopponi 1991, 214, fig. 163; Camporeale 2014, 200, fig. 5.

²⁷⁷ Moretti Sgubini/Ricciardi 2001, 65 f.; Stopponi 2006, 215; Camporeale 2014, 201.

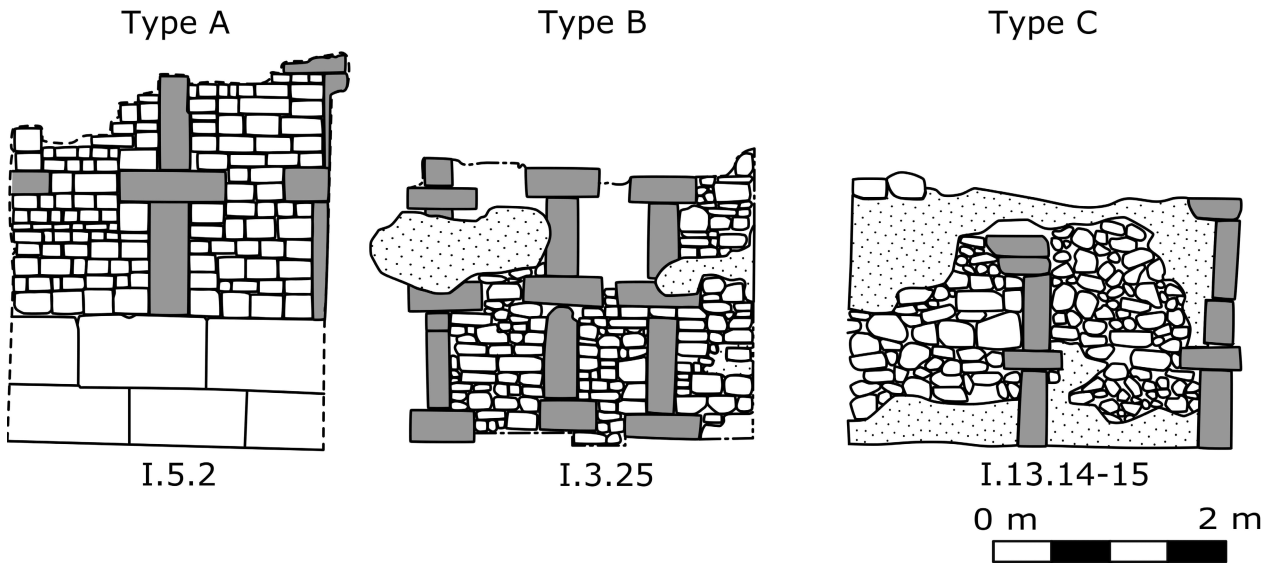


Fig. 25. Pompeii, examples of a *telaio* of Peterse's three types (redrawn after Mogetta 2016, fig. 1).

during the 3rd and 2nd cent. BCE,²⁷⁸ while the earliest evidence may be a wall dating to the first half of the 5th cent. BCE (Coarelli/Pesando 2011, 47; Camporeale 2014, 203). Typologically, the evidence from Pompeii is rather homogeneous; only our type T seems to be documented (fig. 25). A detailed study by K. Peterse could nevertheless differentiate three evolutionary types, which differ in the accuracy of the masonry between the ashlars, the amount of mortar used and the distances between the ashlars, which seem to have chronological significance (Peterse 1999; fig. 25) – although his evolutionary perspective and especially his chronological conclusions have recently met rejection (Mogetta 2016, 48–55; Mogetta 2021, 129–136). This discussion is of little relevance here; what is important is that a *telaio* was used at Pompeii possibly from the first half of the 5th cent. BCE onwards and was very common in the 3rd/2nd cent. BCE, but still remained typologically very restricted.

The technique was not only used at Pompeii, but also at various other sites in Campania. At Gragnano and Surrentum, the same variant of a *telaio* (type T) is documented, dating probably to the 4th/3rd and the 2nd cent. BCE respectively.²⁷⁹

At Calatia and Capua, only remains of the lowermost ashlars, vertically placed, are preserved in contexts dating to the 4th/3rd cent. BCE (type ?), but it is entirely possible that they were originally part of piers of type T.²⁸⁰ At Puteoli, numerous walls of the (early) 2nd cent. BCE may be partly assigned to type T (with only slightly projecting horizontal blocks), while in other cases, the type cannot be identified, the majority of them retaining walls (Proietti 2017; see also De Franciscis 1971, 110; Di Luca/Cristilli 2011, 459 f.; Camporeale 2014, 204). A case from Cumae, in which the horizontal blocks likewise project only slightly and the piers may have served as supports of wooden posts, dated to the mid 1st cent. BCE, seems dubious (Caputo et al. 1996, 158; Di Luca/Cristilli 2011, 459, fig. 1; 472; Camporeale 2014, 202). At Paestum (Pittaccio 2004–2007, 48, fig. 20; Camporeale 2014, 202) and Velia (Cicala 2006, 257, pl. 5: 2; Di Luca/Cristilli 2011, 469; Camporeale 2014, 204), the technique was probably still used during the 1st/2nd cent. CE. In general it seems that – even though the state of preservation differs – only type T was common but frequently used in Campania, mostly in the 4th–2nd cent. BCE.

²⁷⁸ Peterse 1999; Adam 2007, 105; Pesando 2013; Camporeale 2014, 202 f.; Mogetta 2016, 48–55; 2021, 129–136.

²⁷⁹ Gragnano (4th/3rd cent. BCE?): Miniero et al. 1991/1992, 21, fig. 5–7; 1995, 247; Di Luca/Cristilli 2011, 463; Camporeale 2014, 202; Surrentum (2nd cent. BCE?): Budetta 1996, 132 f., fig. 11; Di Luca/Cristilli 2011, 463; Camporeale 2014, 204.

²⁸⁰ Calatia (4th/3rd cent. BCE): Zevi 1982; Quilici Gigli/Rescigno 1996; Di Luca/Cristilli 2011, 458 f.; Camporeale 2014, 202; Capua (4th/3rd cent. BCE): De Franciscis 1956, 74 f., fig. 12; 1971, 110; Di Luca/Cristilli 2011, 458; Camporeale 2014, 202.

4.4 Interpretation of the Distribution

Contrary to the common view of the pier-and-rubble technique as a – or even **the** – ‘Phoenician’ building technique, the ‘Phoenician expansion’ only rarely brought the pier-and-rubble technique to newly founded sites in the central and western Mediterranean. Thus, the technique is lacking in classic ‘Phoenician’ foundations and ‘trading stations’ in northern Africa, Sicily and Sardinia (map 6). It is notable that the pier-and-rubble technique was not used in most of the well-known ‘Phoenician’ sites in this area, despite the unequivocal evidence for the transfer of the pier-and-rubble technique to a few ‘Phoenician-influenced’ sites on the Iberian Peninsula and other indicators that the ‘Phoenician expansion’ brought new architectural concepts to Southern Spain. This reaffirms our above-mentioned contention that the pier-and-rubble technique is anything but **the** common way ‘Phoenicians’ built their edifices. Instead, it was rather a technique commonly known, but used in specific contexts only when it was deemed necessary. What is more, the particularities of the few contexts with walls in the pier-and-rubble technique documented on the Iberian Peninsula (map 7) underline that, in most cases, the technique very probably did not spread with specialised masons, but rather by word of mouth accompanying other types of exchange. A highly idiosyncratic context in the Etruscan site of Tarquinia further strengthens this view. Thus, the little evidence for genuine pier-and-rubble from the central and western Mediterranean in many ways verifies the results obtained in the discussion of the Levantine examples and their distribution.

When turning to the technique commonly called *a telaio*, things get more complicated (map 8). First of all, it must be stressed that the pier-and-rubble technique and *a telaio* seem very different in many ways and should not be confused. If there is a connection at all, the knowledge of pier-and-rubble may have stimulated the creation of the technique called *a telaio* in ‘Phoenician/ Punic’ sites in the central and western Mediterranean some time after the foundation of these settlements in phases of expansion or transformation, in which economic ways to conduct large-scale building activities were sought (Camporeale 2014, 204).

The distribution of *a telaio* in ‘Punic’ Carthage and Kerkouane, in southern Spain as well as in Sicily and Sardinia may strengthen this view of a ‘Punic’ origin, but only on a first glance. A closer look reveals that the technique must be divided into three variants, which may have been created independently. In the first variant, our type 0 (and type X), the ashlar piers were confined to mere socles of walls (the upper parts of which were constructed in mudbrick); this technique was common in Sicily from the late 6th, especially in the period from the late 5th to the 2nd cent. BCE (Motya, Selinunte, Agrigento, Gela, Solunto, Lilybaion), but was also used at Nora (from the late 6th/early 5th cent. BCE onwards) and Monte Sirai (3rd–1st cent. BCE) on Sardinia, at various sites in Etruria (5th–3rd cent. BCE), at Kerkouane (4th/3rd cent. BCE) and probably at Gadir (8th–6th cent. BCE) and Cartagena (3rd cent. BCE) on the Iberian Peninsula, although it is possible that it was already used at Carthage from the 7th cent. BCE onwards.²⁸¹ The origin of this technique must remain uncertain; considering the possible evidence from Carthage, the probable evidence from Gadir, the relatively early evidence from Nora and Motya as well as the extensive evidence from ‘Punic’ Selinunte, a ‘Punic’ derivation seems likely. Nevertheless, the evidence from Etruria quite obviously suggests that this type of wall could at least spread to different areas and does not merit an overly strict ethnic interpretation. Individual occurrences in Hellenistic Carpasia on Cyprus (Du Plat-Taylor 1980, 161, fig. 4, pl. 26: 2; Tatton-Brown 1997, 22; Pittaccio 2004–2007, 46, fig. 16; Wright 1992, 415 f., 523, fig. 266; López-Ruiz 2022, 265, n. 70) as well as in the *oppidum* of Énserune in Southern Gaul (Jannoray 1955, 108, pl. 29: 1; see also Fantar 1984, 341) confirm this. It thus seems problematic that e.g. the evidence from Agrigento or Gela has been taken as proof of ‘Punic’ residents (e.g. De Vincenzo 2013, 87, 93, 305); we certainly need to consider the possibility of a transfer or an adaption of the technique across (alleged) cultural boundaries (Bonetto

²⁸¹ Since the technique was widespread in nearby Kerkouane, it is possible that at least parts of the earlier evidence from Carthage, where no superimposed ashlar were preserved, belonged to such walls in which only the socles were built from stone and the remainder from mudbrick; but this must remain uncertain. See also n. 306.

2009, 121; Montanero Vico 2014, 98). Finally, it can be hardly excluded that this simple type of *a telaio* was ‘invented’ multiple times at multiple sites completely independent of each other (Camporeale 2014, 204; 2016, 64); as may be the case of a basic form of *a telaio* built from Ancient spolia in Langobardic Benevento (Brogiolo 2009, 225, fig. 6; Camporeale 2014, 202; see also the thoughts in Hanoune 2009).

With the second and third techniques, the entire walls (at least of the ground floors) were built of stones and included ashlar piers. In type I, multiple ashlars were placed above each other in a standing position; this technique is documented at Carthage (2nd cent. BCE), Cartagena (2nd cent. BCE), Sevilla (1st cent. BCE), Motya (6th/5th cent. BCE) and Solunto (3rd/2nd cent. BCE) as well as in numerous Roman Imperial contexts. A ‘Punic’ origin of this variant – possibly at Carthage, where the technique may have already been used from the 7th cent. BCE onwards,²⁸² appears likely (although this does not have to imply that it was only utilised by ‘Punic’ builders). In type T, the ashlars were alternatingly placed in a standing and a lying position. It is known from the central Sicilian site of Morgantina from the 4th cent. BCE onwards as well as from Pompeii (possibly going back to the 5th cent. BCE) and was also common in other sites in Campania. Even though most common in North Africa in the Roman Imperial period, this variant is yet unknown from pre-Roman phases in ‘Punic’ sites.²⁸³ Although the earliest evidence known may originate from Pompeii, an origin in the Greek cities of Sicily of the Classical period may be considered likely in view of Karlsson’s study of the popularity of ‘chains’ in pure ashlar masonry of that region (Karlsson 1992). Even if this question may remain open, it appears quite possible that the technique

emerged in Sicily as a fusion of the ‘chains’ used in ashlar walls and the idea of *a telaio* which had first reached the ‘Punic’ sites in the western part and then other cities on the island.²⁸⁴ The technique thus very probably did not reach Pompeii from the ‘Punic’ world,²⁸⁵ but rather from the Greek cities on Sicily (Camporeale 2014, 205 f.; see also Stutz 2002, 119 n. 66) – even though Karlsson’s idea of a transmission through home-coming mercenaries, who had served on Sicily, remains questionable (Karlsson 1992, 95). The way in which the various forms of *a telaio* reached northern Africa in the Roman Imperial period lies beyond the reach of this book; but it is interesting to note that a stimulus from Sicily has already been suggested (Karlsson 1992, 95; Stutz 2002, 119 note 66).

All in all, we do not have to extend the view to the Roman Imperial period, in which the technique was most frequently used in North Africa, but also e.g. in Sardinia, Sicily and on the Iberian Peninsula, or even into Late Antiquity and into Early Medieval Sardinia or Early Islamic North Africa, to state that *a telaio* was a technique which, even though probably at least in some of its variants originating from the ‘Punic’ world, frequently spread between various regions and beyond (alleged) cultural or even ethnic boundaries. Just as the pier-and-rubble technique, *a telaio* does not allow conclusions regarding the cultural identity of its builders, and specialised masons may not have played any major role in its dissemination. Even though this may be true in many individual cases, we thus should not generally ‘assign walls in *a telaio* to Punic builders without a doubt’ (Helas et al. 2011, 41) or suppose that the technique was introduced in all areas where it is known from by Carthaginians (Sposito 1995, 21), but rather take the spread of *a telaio* as a phenomenon linking a diverse set of communities in the central and western Mediterranean.

²⁸² Since type I is documented in later ‘Punic’ phases at Carthage, but type T is not, and type I is documented in 6th/5th cent. BCE Motya, but otherwise uncommon in Sicily, it is quite possible that the extensive evidence of *a telaio* in the excavations by the university of Hamburg, dating back to the 7th cent. BCE, originally belonged to type I; nevertheless, the question cannot be answered with any degree of certainty. On the contrary, Rakob 1982, 111 calls the technique ‘punisch-hellenistisch’ and Camporeale 2014, 205 likewise supposes that it was invented in the Hellenistic period.

²⁸³ This has been stressed, albeit in passing, by Tsakirgis 1984, 318 as well as Karlsson 1992, 95, but is a fact which has not been considered in research dealing with the supposedly ‘Punic’ origins of *a telaio/opus africanum* more extensively.

²⁸⁴ This idea may already be found in a side note in Tsakirgis 1984, 318 (‘It is possible that the Punic walls gave the Morgantinoi the idea of how to strengthen their walls, and that the Greeks slightly changed the mode of construction’); unfortunately, Tsakirgis’ study was never adequately published.

²⁸⁵ More specifically, a transmission of the technique by prisoners of war or mutual visits between elites has been proposed (see Fentress 2013, 177, n. 119; Wallace-Hadrill 2013, 40; see also Di Luca/Cristilli 2011, 470 for a transmission through Etruria). Adam 2007, 105 leaves the question open.

5 Summary and Conclusions

This book focused on the pier-and-rubble technique, defined rather narrowly (chapter 1.1) as a building technique in which sections built with multiple ashlar per course, mostly placed as headers and stretchers, alternate with sections in rubble within straight walls. Cases in which ashlar were only used to strengthen corners, doorways or intersections of walls, and cases in which rubble was used to fill the spaces between two ashlar faces, were thus not considered in detail. Neither was the monolithic-column technique of Iron Age Israel. A further technique common in the southern Levant during the Hellenistic period, for which individual ashlar were inserted into rubble walls in a staggered pattern, the staggered-reinforcing-header technique, was briefly included (esp. chapter 3.4). The pre-Roman evidence for another set of techniques called *a telaio* or *opus africanum*, common in the central and western Mediterranean and defined by squared ashlar standing upright placed above each other in multiple courses, was dealt with, albeit less in depth, in the final part of the book (chapter 4). A summary of the history of research traced how the ‘Phoenician-ness’ of the pier-and-rubble technique evolved into common archaeological knowledge, but showed that many questions related to it are still unanswered (chapter 1.2). These were addressed in the successive chapters.

Chapter 2 dealt with the genesis of pier-and-rubble masonry, turning first to its prerequisites, most importantly the availability and possibility to quarry easily workable soft stone (*ramleh/kurkar*) – albeit ashlar were also frequently reused. It then emerged that the pier-and-rubble technique, as defined above, cannot be traced back to Ugarit or other sites of the Late Bronze Age, but was also not invented in early 1st mill. BCE Israel; the first evidence is known from the earlier parts of the Iron Age (11th cent. BCE) in the central Levant. Even though previous uses of ashlar, e.g. in corners, doors, etc., are known from many of the sites at which the pier-and-rubble technique is documented, no clear pattern in the move from the first to the second technique can be recognised

(chapter 2.2). Almost with certainty, aesthetic aspects played a very minor role in the creation of ashlar piers; on the contrary, these could provide added sturdiness in multiple ways, including increased solidity in the case of earthquakes, compared to pure rubble walls at a considerable discount of raw material when contrasted with pure ashlar masonry (chapter 2.3).

The third chapter more closely analysed the known occurrences of the pier-and-rubble technique (and the staggered-reinforcing-header technique) in Levantine sites by first typologically classifying the ashlar piers, then dealing with other technical characteristics and finally evaluating the techniques’ chronological and geographical distribution. Basically, it seems that the technique spread from the central Levant to other parts of the Levant during Iron Age II and the Persian period, reaching its widest distribution in the 5th and 4th cent. BCE, before becoming less common in the Hellenistic period; the latest evidence belongs to the turn of the millennium. The technique was not confined to buildings of specific functions. It could be demonstrated that the workmanship of the known occurrences is very heterogeneous. This means that the technique was very likely not spread by specialised masons, but by word of mouth accompanying various forms of exchange. The significance of the phenomenon as an ‘ethnic’ indicator is very low, since the pier-and-rubble technique was not **the** way of ‘Phoenician’ building, but rather something like a resource widely known along the eastern Mediterranean littoral and consciously exploited when and where the need arose.

Chapter 4 then turned to the evidence from the wider Mediterranean. It was shown that although architectural concepts were transmitted during the ‘Phoenician expansion’, the pier-and-rubble technique only very rarely found its way into the western Mediterranean, with only six (possible) occurrences; five of these are located on the Iberian Peninsula, the sixth (unconventional) one in the Etruscan site of Tarquinia. The lack of such walls in the Classic ‘Punic’ sites in the

central Mediterranean, as well as in most ‘Phoenician’ sites close to the Andalusian coast, supports the view that the pier-and-rubble technique was not **the** ‘Phoenician’ way of building but rather a technique consciously exploited where it was deemed necessary, and the particularities of the few known contexts underline that the technique was mostly not transmitted by specialised workmen but rather by word of mouth in the wake of various exchange processes. The analysis then turned to the pre-Roman evidence of what is commonly called *a telaio* or *opus africanum*, stressing that this set of techniques is quite different from the pier-and-rubble technique. In fact, the pre-Roman occurrences may be assigned to three different types, one of them confined to mere stone socles, the other two varying forms of piers in which individual blocks were placed above each other. The first variant was used at least from the 6th cent. BCE onwards in a wide area, being widely used in Sicily, but also known e.g. from southern Sardinia, southern Etruria, Carthage (?), Kerkouane and parts of the Iberian Peninsula; it may be ‘Punic’ in origin, but certainly travelled across (alleged) cultural boundaries. The second one, in which multiple ashlar blocks were placed vertically above each other, is first confirmed in 6th/5th cent. BCE Motya and may likewise originate from Carthage; the more limited area of distribution, which is confined to Carthage, eastern Sicily and the Iberian Peninsula likewise suggests a ‘Punic’ origin. The third technique, in which individual ashlar blocks were placed above each other alternately in a vertical and a horizontal position, though, is lacking from ‘Punic’ sites, but widely distributed in Campania and eastern Sicily. It may have been developed in Classical Sicily and, from there, reached Campania in the Classical or early Hellenistic period and northern Africa as well as

other areas of the Mediterranean in the Roman Imperial period. It thus seems that *a telaio* is a category uniting multiple related techniques, the origin of which at least partly is the ‘Punic’ world, but which successively spread to a wider region. Just as the pier-and-rubble technique, *a telaio* is a poor ‘cultural’ or even ‘ethnic’ indicator, but its study highlights the multi-directional links across the Mediterranean.

In conclusion, the ‘Phoenician-ness’ of pier-and-rubble is something we may affirm but, in any case, something we induce. The technique originated in ‘Phoenicia’ and spread from there, but was never generally used by ‘Phoenicians’, and not exclusively (if we consider the construction of such ethnic groups appropriate, in the first place). Thus, it should not be generally included in a set of ‘Phoenician’ elements of material culture. Nevertheless, the wide spread of the technique in the 1st mill. BCE Levant in a way is characteristic for this period and region. The case of *a telaio* in the west is similar. Even though it should not be confused with the ‘Phoenician’ pier-and-rubble technique – albeit possibly being vaguely inspired by it –, *a telaio* spread within, but also beyond the ‘Punic’ world. We may overcome cultural determinism and ethnic generalisations by focusing on the structural advantages, the economic aspects and the particularities of the local contexts and thus the reasons why both techniques were often chosen. The high degree of interconnectedness of the Levantine sites, but also of those in the central Mediterranean, was a basis for the distribution of these building techniques. At the same time, the analysis of such aspects of everyday culture can reveal connections beyond the movement of objects and thus add to the picture of interregional exchange in the eastern as well as in the central and western Mediterranean.

6 Catalogue

6.1 Introductory Remarks

The following catalogue includes all occurrences of the pier-and-rubble technique and the staggered-reinforcing-header technique as defined above. It is split into a first part on the Levant and a second part on the western Mediterranean. To differentiate the two parts of the catalogue, catalogue numbers printed in **bold** refer to the first and those printed in **bold and italics** refer to the second. Every catalogue number consists of a consecutive number for the site and an abbreviation of the site's name in two letters. The numbers start from zero in both cases; the sites are arranged in topographical order, starting from the north in the first part on the Levant (with rising numbers reflecting falling latitudes) and from the west in the second part on the wider Mediterranean (with rising numbers reflecting rising longitudes). Even though this system of number and abbreviation may seem redundant, it was chosen to allow the reader coming across catalogue numbers in the text a rough guess at the position of the specific site and its identification. If the evidence for the occurrence of the pier-and-rubble technique (or the staggered-reinforcing-header technique) at a site is doubtful, an asterisk is added at the end of the catalogue number. **01-TW*** thus refers to *Tell Twēnī*, the northernmost site in the first part of the catalogue, where the occurrence of the staggered-reinforcing-header technique is uncertain.

If the pier-and-rubble technique (or the staggered-reinforcing-header technique) is known from more than one context at a specific site, the catalogue numbers of these multiple contexts are distinguished by the addition of another consecutive number added to the site number and the site abbreviation (and starting from zero at every site). The term 'context' is used in a very inclusive way; multiple interrelated walls in a specific area of excavation (like the habitation 'areas at Dor' or the 'harbour quarter' at Berytos) and several phases of such architectural ensembles or individual buildings are treated together as one context (even though multiple phases are distinguished within the catalogue entries, wherever possible). Numerous parts of the same architectural structures excavated in different areas (like the 'surrounding wall' of *Tell el-Burak*) are likewise aggregated in a single catalogue entry. Only if individual structures, the walls of which are not interconnected, can be identified within an area of excavation (like the 'monumental building' and the habitation quarters in Area D1 at Dor or the 'surrounding wall' and House 1 in Area 3 at *Tell el-Burak*), multiple catalogue entries were created. The catalogue is thus arranged according to something we could loosely define as an 'architectural unit'.

A separate tabular overview of all sites with pier-and-rubble technique is given at the end of the catalogue.

6.2 The Levant

01-TW* (plan 1, fig. 26)

Tell Twēnī, Area A, Iron Age II Building A

Technique: staggered-reinforcing-header technique or similar.

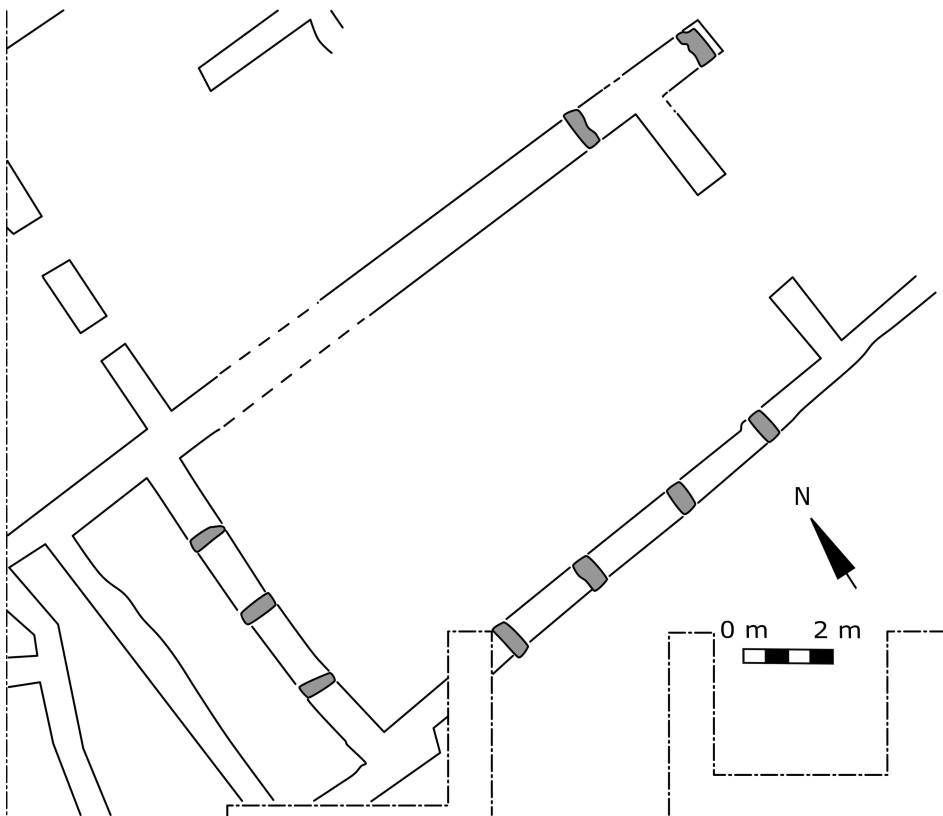
Function: temple?

Date: phase 6D (9th cent. BCE).

Building A is a large, elongated building comprising a large hall and a short anteroom and measuring ca. 16.5 × 9.5m. Its walls are ca. 0.65–0.75m thick and were built from random rubble strengthened at fairly regular intervals of 1.5–2.75m with roughly squarish elongated headers.

Since the building (partly founded on earlier walls) is only conserved to a limited height, it is unknown whether more blocks were placed on these headers and thus whether they formed simple ashlar piers, or whether the headers were inserted in a staggered pattern. The building, which was erected in the early 9th cent. BCE, was preliminarily interpreted as a temple because its paving with stone slabs and the find of an imported figurine of a naked goddess. The surrounding buildings were all built only from rubble.

Bretschneider/van Lerberghe 2008, 44, fig. 49, 50, 55, 59; Al-Maqdissi et al. 2010, 45, fig. 40, 41, 46, 50.



Plan 1. *Tell Twēnī*, Area A, Iron Age II Building A (01-TW*) (redrawn after Al-Maqdissi et al. 2010, fig. 46).



Fig. 26. *Tell Twēnī*, Building A (01-TW*) (after Bretschneider/van Lerberghe 2008, Ill. 50, adapted).

02-SU-01 (plan 2)**Tell Sūkās, eastern sector, Square J13, phase E**

Technique: pier-and-rubble technique.

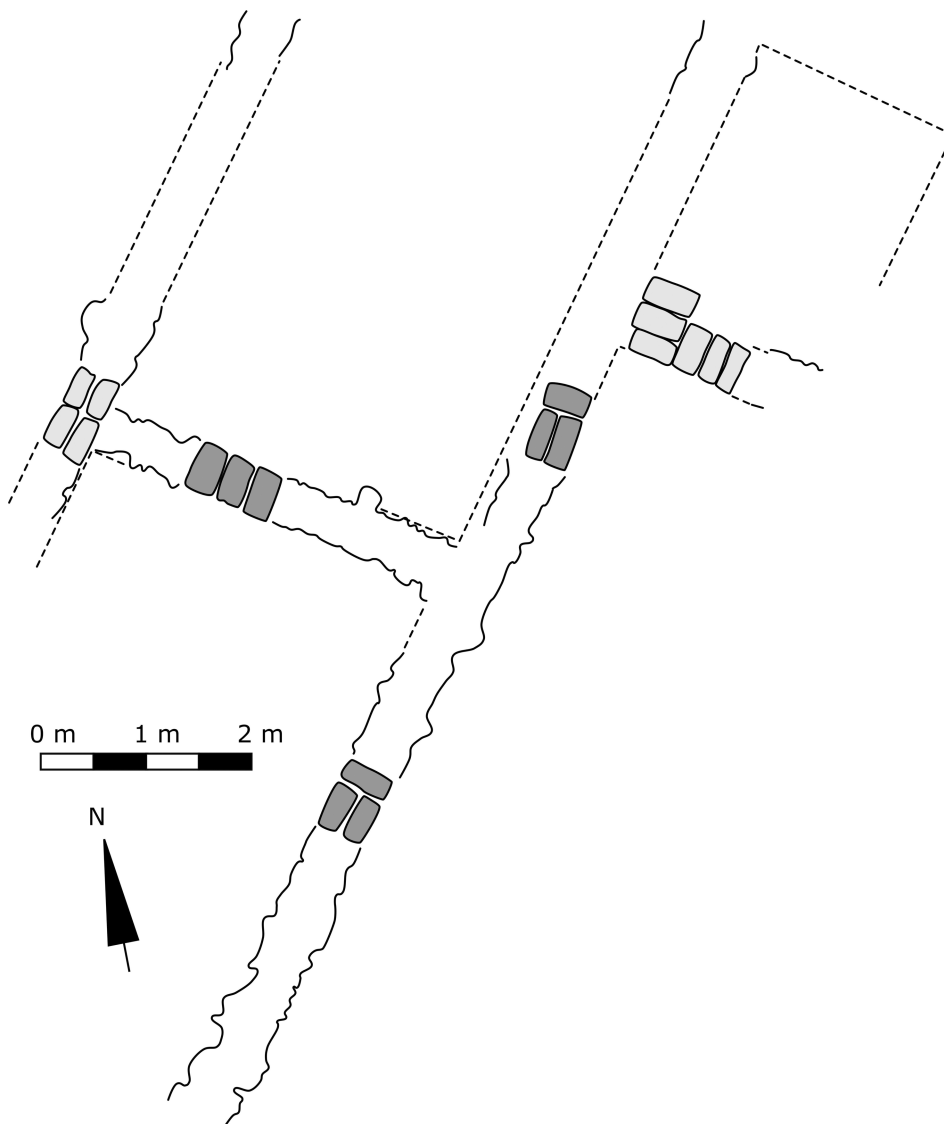
Function: residential and workshops.

Date: phase E (2nd/1st cent. BCE).

In square J13, an older building was renovated in phase E; just as in the preceding phases, its longest wall was erected from mostly small rubble, but it now also included two ashlar piers of type D, 3.3m apart. In two adjacent walls, combinations of three headers next to each other may be seen; they may belong to piers of type F or I. All of these walls

were 0.45–0.5m thick and conserved only to a low height (one course of ashlar). The ashlars seem to have been mostly rather finely cut and partly only roughly hewn and partly roughly smoothed. The building in J13 probably had domestic as well as economic functions; an adjacent room contained an oil press and numerous amphorae. One wall in a neighbouring building was erected in pure ashlar masonry; in other edifices of phases F and E, single ashlars were used (Riis 1970, 98, 104, 106, pl. 6).

Riis 1970, 107 f., fig. 38, 39b, c, pl. 6.



Plan 2. *Tell Sūkās*, eastern sector, Square J13, phase E (02-SU-01) (redrawn after Riis 1970, pl. 6).

02-SU-02 (plan 3, fig. 27)**Tell Sūkās, Square H 11 NW**

Technique: pier-and-rubble technique.

Function: residential.

Date: phase E2 (2nd cent. BCE).

In Square H 11 NW, the three walls delimiting the open area between Rooms 12 and 19 were destroyed at the end of phase F and subsequently reconstructed. The northern wall of Room 27 includes two piers of type H at its western corner and in its centre. Another pier of this type may be seen in the centre of the western wall of Room 19 (fig. 27); at its southern end, a pier alternatingly composed of four headers and four stretchers was used (with widely diverging course heights). The opposite eastern wall of Room 12 includes one pier of type D1 as well as a section composed of at least six headers placed next to each other. The distances between the individual piers measure 0.6–1m and the walls' strength ca. 0.5m. The ashlar were finely cut and partly only roughly hewn and partly roughly smoothed; the rubble is uncoursed and random. At least the western wall

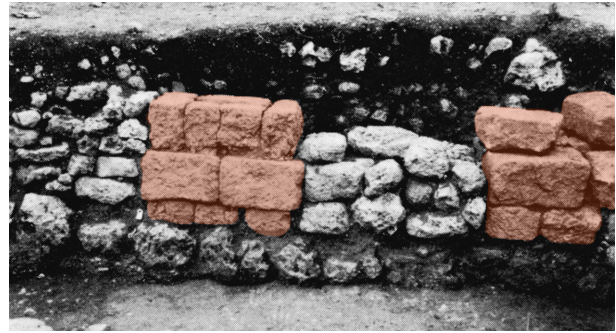
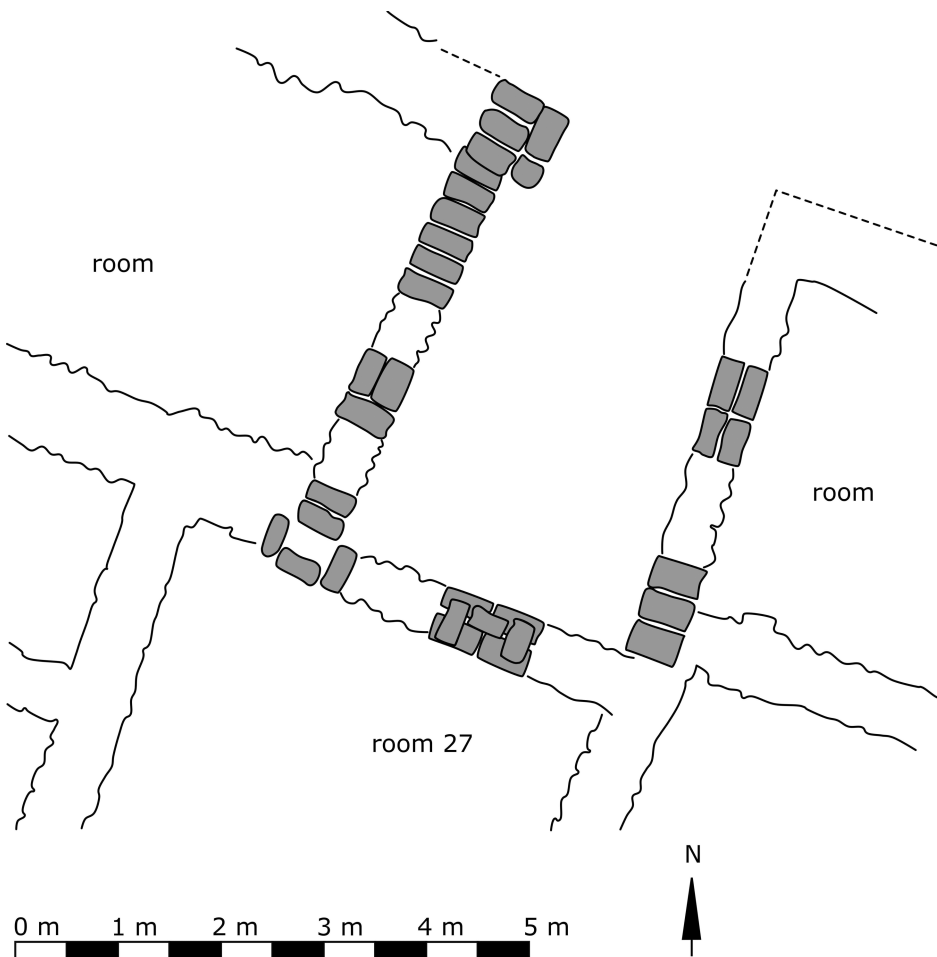


Fig. 27. *Tell Sūkās*, H 11 NW, west wall of Room 19, view from the west (02-SU-02) (after Lund 1986, fig. 136, adapted).

of Room 19 seems to be entirely based on boulders, which seem to be particularly large below the piers. In other parts of Complex IX, two ashlar placed next to each other strengthened corners (northeastern corner of Room 26, corner between Rooms 18 and 31). Complex IX is interpreted as a domestic building and was erected during the 2nd cent. BCE.

Riis 1960, 120, fig. 10a, b; Lund 1986, 166, fig. 130, 135, 136, pl. 48, 49.



Plan 3. *Tell Sūkās*, Square H 11 NW (02-SU-02) (redrawn after Lund 1986, pl. 48).

02-SU-03 (*plan 4, fig. 28*)**Tell Sūkās, Square L 8 SE**

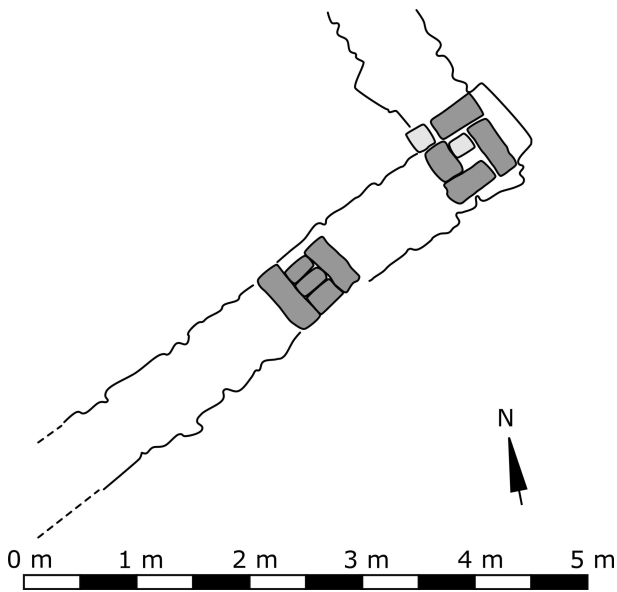
Technique: pier-and-rubble technique.

Function: unknown (residential?).

Date: phase F (4th cent. BCE).

Excavations in the small (5 × 5m) Trench L 8 SE uncovered the corner of a building. This corner was designed as an ashlar pier of type E and conserved up to three courses high. On both sides of this pier, sections in rubble connect to it, while the

wall excavated at a greater length features another ashlar pier of type D1, ca. 1.1m away from the first one. The ashlars were finely cut and roughly squared and placed in courses of uniform height, and the rubble is uncoursed and random. Two ashlars in the pier of type D1 feature mouldings and thus most probably come from an earlier building. The complex is dated to phase F, which is the 4th–2nd cent. BCE and its function remains unknown. Lund 1986, 142, fig. 103, pl. 43.



Plan 4. *Tell Sūkās, Square L 8 SE (02-SU-03)* (redrawn after Lund 1986, pl. 43).

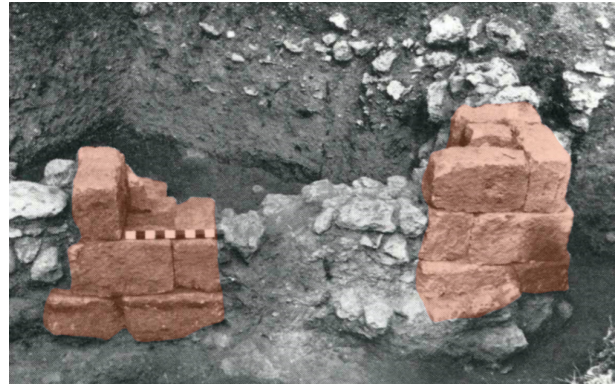


Fig. 28. *Tell Sūkās, L 8 SE, view from the southeast (02-SU-03)* (after Lund 1986, fig. 103, adapted).

02-SU-04 (plan 5, fig. 29, 30)**Tell Sūkās, Square L 11 SW**

Technique: pier-and-rubble technique.

Function: unknown (residential?).

Date: phase E (2nd–1st cent. BCE).

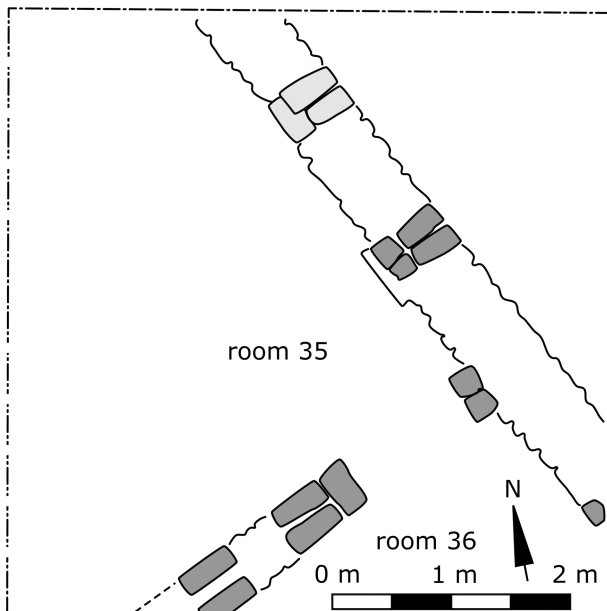
Two walls of a building were excavated in the small (5 × 5m) Trench L 11 SW. They meet at a right angle and are preserved up to a height of 1.8m (six courses of ashlar). The wall between Rooms 35 and 36 is ca. 0.45m wide and includes a door flanked on both sides by ashlar piers. On one side, it almost immediately connects to the other wall (in a pier of type C2?), while on its other side, a pier of type B1, a short section of uncoursed random rubble, another pier of type B1 and another section of rubble may be seen. Only the uppermost course of the central pier consists of a header and two stretchers projecting far into the adjacent rubble. The second wall is ca. 0,6m wide and seems to include at least two piers of type C2. The ashlars were mostly finely cut and either roughly hewn or roughly smoothed; the height of the courses is largely consistent. The building cannot

be functionally interpreted and was erected in the 2nd or the 1st cent. BCE.

Riis 1960, 120, fig. 9a, b; Lund 1986, 177 f., fig. 139–141, pl. 53.



Fig. 29. *Tell Sūkās*, Square L 11 SW, Room 35 from the northwest (02-SU-04) (after Lund 1986, fig. 139, adapted).



Plan 5. *Tell Sūkās*, Square L 11 SW (02-SU-04) (redrawn after Lund 1986, pl. 53).



Fig. 30. *Tell Sūkās*, Square L 11 SW, door between Rooms 35 and 36 from the southeast (02-SU-04) (after Lund 1986, fig. 140, adapted).

03-AM (fig. 31)**‘Amrīt, area excavated in 1954**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 5th/4th cent. BCE.

At this site, a large, multi-roomed edifice of 24.2 × 21.8m was excavated in 1954, but the excavators did not offer a functional interpretation, even if they argued that the size suggests a public building. The walls consisted of a combination of rubble and ashlar piers of type C2 placed at the corners as well as within the walls at a consistent distance of ca. 2.3m. Since the width of the walls amounts to up to 1.2m, the stretcher is separated from the two headers by some rubble; the rubble walls themselves consist of more orderly placed ‘faces’ of partly coursed random rubble and an infilling of gravel. The composition of the piers at the corners seems to have been irregular. The ash-lars were finely cut and partly roughly hewn and partly roughly smoothed, and the height of the courses ranges from 0.2 to 0.3m. The building has been dated to the 5th or 4th cent. BCE.

Dunand et al. 1955, 193–196, pl. 1; Elayi/Sayegh 2000, 204.



Fig. 31. ‘Amrīt, excavations in 1954, western wall of building (03-AM) (after Dunand et al. 1955, pl. 1: 4, adapted).

04-TH (fig. 32)**Tabbat el-Ḥammām, TT-1**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 4th cent. BCE (?).

The excavators assign two rooms of ca. 10m² each, belonging to a larger building, to the late ‘Syro-Hellenic’ period, probably the 4th cent. BCE. The walls were preserved up to a height of only 0.35m and partly consisted of ash-lars and partly of rubble; the ash-lars were set at the corners, but also formed piers, even though the total amount of ash-lars used was rather large. The only photograph published shows that the ash-lars were set as headers and stretchers, even though the types of the individual piers (B1?, H, F/I?) cannot be determined without a doubt. The ash-lars were finely cut and roughly or even finely smoothed. In an earlier (Iron Age II) building at the same site, ash-lars were already used to strengthen a door (Braidwood 1940, 191, pl. 21,2).

Braidwood 1940, 190, pl. 21,1; Elayi 1980, 169; Sharon 1987, 31; Stern 1992b, 303; Elayi 1996, 80.

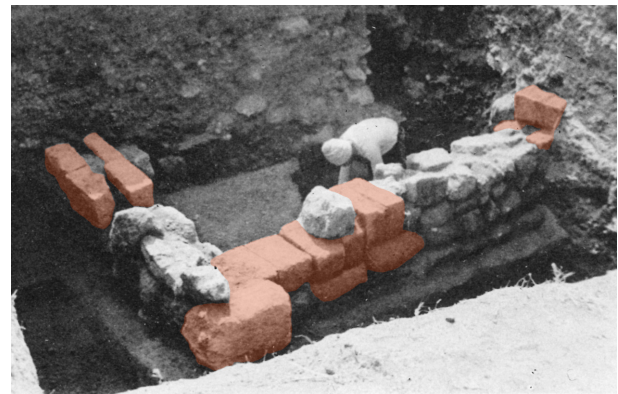


Fig. 32. Tabbat el-Ḥammām, TT-1 (04-TH) (after Braidwood 1940, pl. 21: 1, adapted).

05-TK****Tell Kazel, various locations***

Technique: pier-and-rubble technique?

Function: residential?

Date: 5th/4th cent. BCE.

Dunand excavated a building dated to the Persian period. Its walls consisted of small rubble, but the corners and doors were strengthened with roughly hewn ashlar partly used as headers and stretchers. During the more recent excavations of 1985–1987, numerous ashlar were found in the upper layers; Gubel suggests that these belonged to ashlar piers of buildings of the Persian period, but it remains unclear whether the ashlar were used beyond corners and doors. The excavations of 1988–1992 seem to have uncovered at least one wall in the pier-and-rubble technique, which has not yet been published in detail.

Dunand et al. 1964, pl. 4: 1–3; Elayi 1980, 169 f.; Gubel 1990, 40; Briquel-Chatonnet 1992, 344; Stern 1992b, 303; Badre et al. 1994, 267; Elayi 1996, 80.

06-MR (*plan 6, fig. 33*)***Tell Mīrhān, Areas A/I-b/29–30 and c/30***

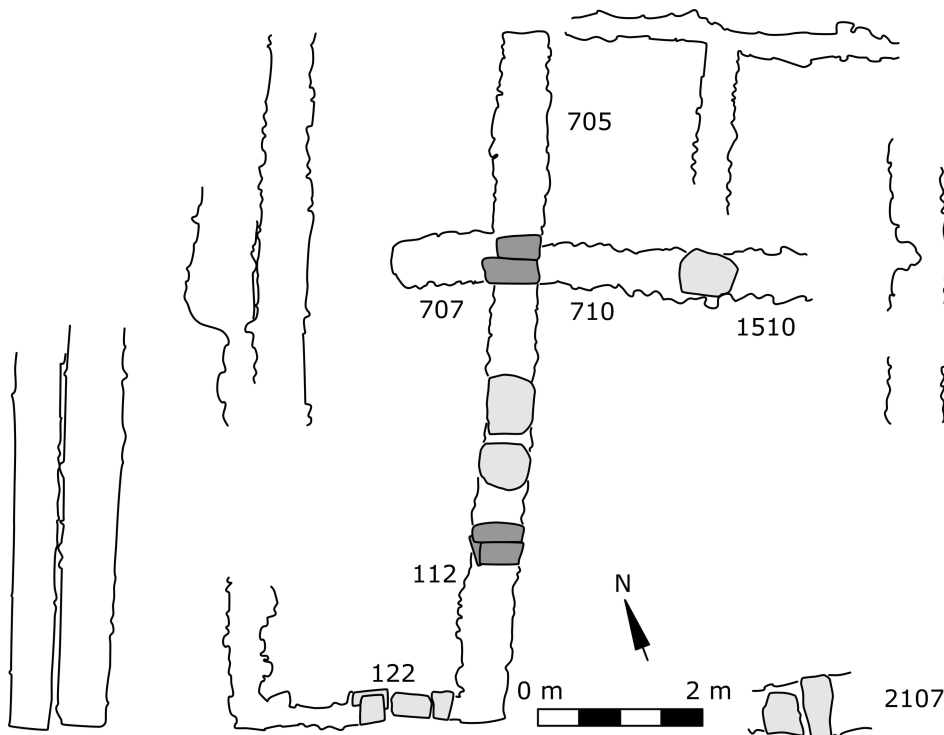
Technique: pier-and-rubble technique.

Function: unknown.

Date: phase II (8th cent. BCE).

In 2018, excavations uncovered parts of an Iron Age II building dating back to the 8th cent. BCE at *Tell Mīrhān*; they were extended in 2019 and have meanwhile revealed multiple rooms, unfortunately disturbed to a large degree by numerous Roman period pits. A large pseudo-ashlar marks the intersection of walls 1510 and 1522 and an ashlar pier of type B, of which only the first course is conserved, can be seen at the intersection of walls 705, 707 and 710. Its *kurkar* blocks are roughly worked and roughly smoothed. Another pier-like structure may be seen at a distance of ca. 1.1m within Wall 705. It is composed of two courses of two only roughly worked, partly squarish blocks of weathered sandstone each, which span the entire width of the wall of ca. 0.6m – it remains unclear whether these blocks formed part of an ashlar pier. This is also true for two further blocks, following in the same wall, which resemble the more carefully worked ashlar in the pier of type B above, but which are located within a Roman period pit and thus cannot be stratigraphically connected to the Iron Age building without a doubt. At least two ashlar within Wall 122 may likewise have belonged to piers. Two blocks in the short stretch of Wall 2107 may have formed an ashlar pier of type B, as well, probably not set at an intersection of multiple walls, but within a straight wall, but the context is mostly lost. More ashlar may have been removed in the Roman period. The rubble is random and possibly partly coursed.

Kopetzky et al. 2019, 120, fig. 23; H. Genz (personal communication, 2022).



Plan 6. *Tell Mīrhān*, Areas A/I-b/29-30 and c/30 (06-MR) (redrawn after documentation of Tell Mīrhān Excavations).



Fig. 33. *Tell Mīrhān*, Area A/I-b/29-30 and c/30 (06-MR) (photo courtesy of Hermann Genz).

07-BE-01 (plan 7, fig. 34, 35)**Berytos, excavations next to the modern town hall**

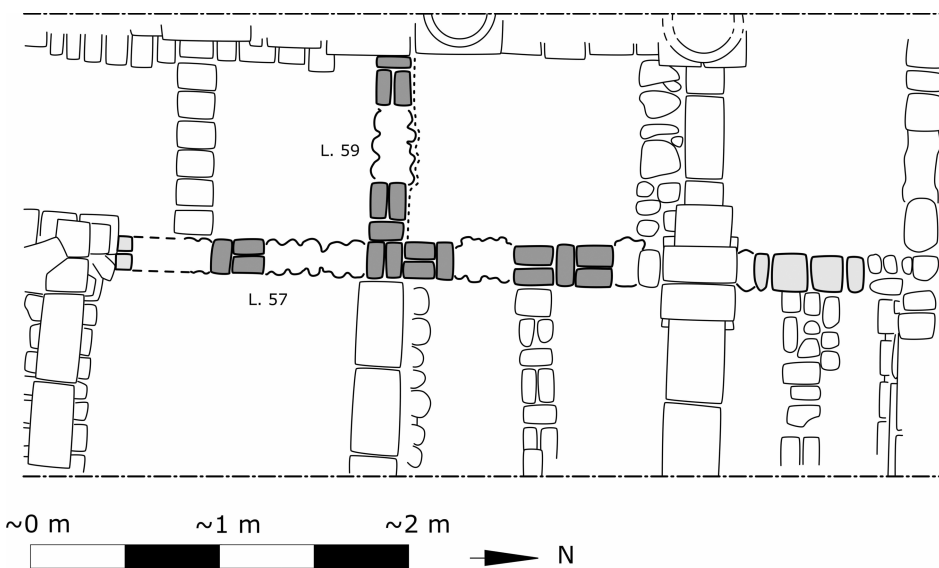
Technique: pier-and-rubble technique.

Function: unknown.

Date: phase V (6th–2nd cent. BCE?).

In 1977, multiple walls preserved up to a height of ca. 2m (five courses of ashlar) were excavated close to the city hall of Beirut. They seem to have belonged to a multi-roomed building, the dating of which is problematic; most probably, it was erected in the Persian (or the Hellenistic) period.

The walls are ca. 0.4m wide and consist partly of small, coursed, sometimes squared rubble and partly of ashlar piers; other walls seem to have been erected entirely in rubble or in pure ashlar masonry (although it seems uncertain which of these walls belong to the same phase). Wall L.57 includes three to five piers (fig. 35), two of which appertain to type M and a third one to type D2. Wall L.59, meeting wall L.57 in a roughly right angle, has two more piers of type D2 (fig. 34) flanking a section of rubble and seems to have been completely plastered (this militates against



Plan 7. Berytos, excavations next to the town hall (07-BE-01) (redrawn after Forest/Forest 1982, fig. 5).



Fig. 34. Berytos, excavation next to town hall (07-BE-01), south Wall L.59 of Room L.65 with remains of plaster from the north (after Forest/Forest 1982, fig. 32, adapted).

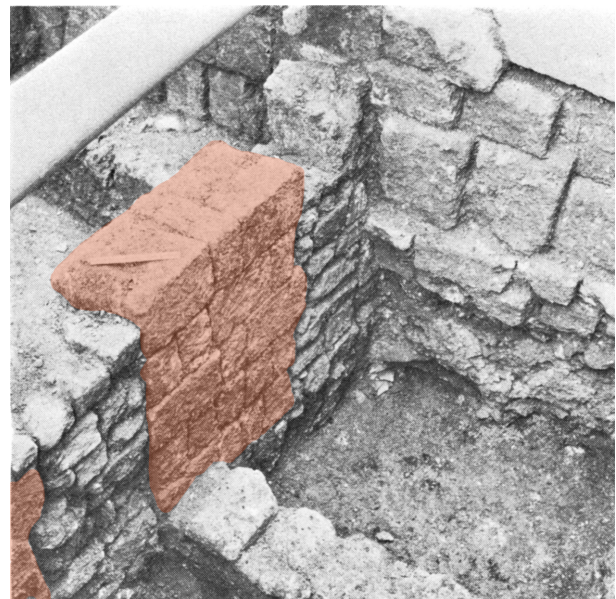


Fig. 35. Berytos, excavation next to town hall, pier in Wall L.57 from the east (07-BE-01) (after Forest/Forest 1982, fig. 33, adapted).

the excavators' interpretation of all of these walls as mere foundations). The ashlar are all finely cut, roughly smoothed and comparably sized. No functional interpretation of the building can be given. The scale seems to be wrongly indicated in the published plans and was adapted, here, according to the measures given in the excavation report.

Forest/Forest 1982, 13 f., fig. 5, 29–34; Will 1982, 371; Elayi 1990b, 86, 99, n. 44; 1990a, 19; 1996, 81; Elayi/Sayegh 2000, 205.

07-BE-02*

Berytos, Area Bey 002

Technique: pier-and-rubble technique?

Function: unknown.

Date: 4th–1st cent. BCE.

According to Perring et al. 2003, note 44, Hellenistic walls built in the pier-and-rubble technique (called *opus africanum* by these authors) have been uncovered in Area Bey 002; they refer to Aubert 1996, but this publication does not mention such walls.

Perring et al. 2003, 199, n. 44.

07-BE-03

Berytos, Area Bey 006, Area 2, Building 3

Technique: pier-and-rubble technique.

Function: residential/commercial.

Date: late 3rd/early 2nd cent. BCE–late 1st cent. BCE.

While the external walls of Building 3, featuring shops and living quarters and erected around 200 BCE, consisted of pure ashlar masonry, the partition walls were built in the pier-and-rubble technique (called *opus africanum* by the excavators). There seems to have been partial remodelling within the first half of the 2nd cent. BCE, although it is unclear whether this affected walls built in the pier-and-rubble technique. Further changes to the building can be seen in the Augustan period, including reconfiguration of the internal partitions. These walls were still constructed in the pier-and-rubble technique in the latest known occurrence of the technique. Since no photos have been published so far and the published plans are schematic, no detailed description of the walls is possible, so far.

Perring et al. 2003, 199, 203 f., 208.

07-BE-04 (plan 8, fig. 36–41)

Berytos, Area Bey 010

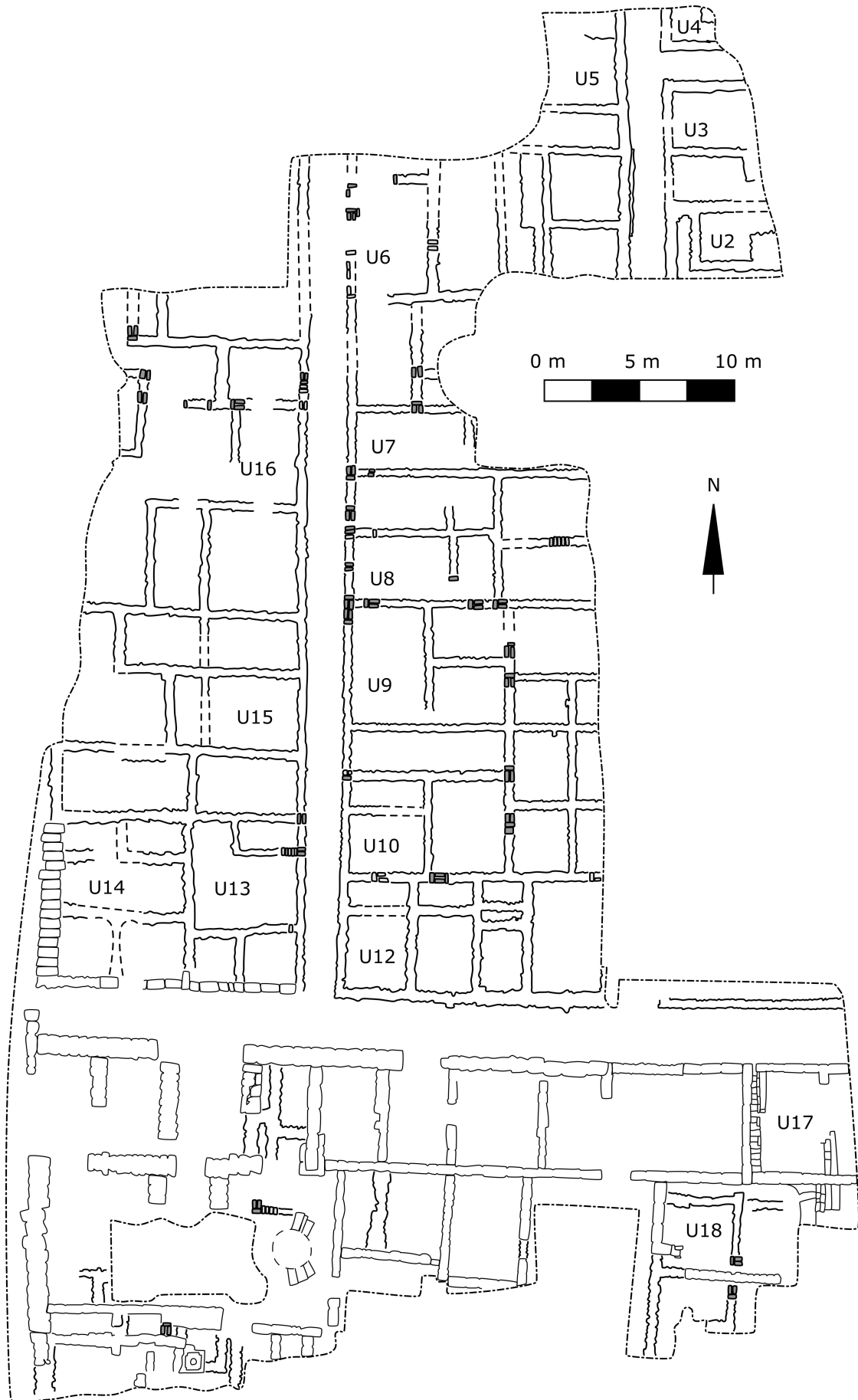
Technique: pier-and-rubble technique.

Function: mostly residential.

Date: phase IX (late 6th–early 3rd cent. BCE).

In excavation Area Bey 010 (Les Souks), extensive remains of Persian period buildings have been excavated in Sectors A and B (and, less well-preserved, in C) along two roads running in north–south and a third road running in east–west direction. Most buildings seem to have been dwellings, even though U8 also featured a workshop and U13 also a shop, U11 was only a shop and U16 has been interpreted as a sanctuary. The whole quarter was erected around the end of the 6th cent. BCE and destroyed (possibly by an earthquake) in the early 3rd cent. BCE and subsequently rebuilt above the older walls in differing techniques. The older walls were preserved up to a height of three courses of ashlar.

The largest parts of these 0.35–0.6m wide walls in Sectors A and B were erected in partly coursed, mortared random rubble, but some walls in both sectors also comprised ashlar piers. These were placed partly at corners, doors or intersections of walls, but often also within straight walls, sometimes even regularly. The distances between the piers varied from ca. 1 to ca. 3.5m, but were mostly more standardised within the individual rooms. The piers may be assigned to types: A (1+), B1 (1), B2 (2), B (6+), D1 (3), D2 (5) D (9+), H (1), J (1), K (1), M (1+) and O (1). The ashlar were mostly finely cut from *ramleh* (quarried in the vicinity) and roughly or even finely smoothed; the height of the courses was most often more or less uniform, at least within the individual piers and similar in adjacent piers. If two piers next to each other belonged to the same period, the position of their courses corresponded (and did not alternate). The ashlar were rarely connected to each other with mortar; their dimensions varied, with lengths of 0.42–0.95m. One room (9.3) still preserved parts of plaster on its walls; the excavators suggested that all of the walls may have been plastered. The foundations mostly consisted of a thin layer of gravel laid upon the bedrock and two or three courses of large gravel and sometimes roughly worked blocks.



Plan 8. Berytos, area Bey 010 (07-BE-04) (redrawn after Elayi/Sayegh 2000, fig. 64).

The ashlar piers sometimes rested on larger, roughly cut blocks, but sometimes also on courses of gravel similar to the foundations of the adjacent rubble walls.

Sayegh 1996, 242 f., fig. 1, 2, plan 3; Elayi/Sayegh 2000, esp. 200–207, fig. 27–35, 43–45, pl. 12,

13: 1; 14, 15, 18–21; Markoe 2000, fig. 27; 2003, fig. on p. 83; Perring et al. 2003, 199; Sader 2009, 59, fig. 5; Elayi 2010, 159 f., figs. 2, 6, 7; Jigoulov 2010, 120, fig. 4,2; Woolmer 2011, 37; Beyl 2013, fig. 4,1; Khries 2016, 176, plans 3: 7–12; Sader 2019b, 158.



Fig. 36. Berytos, Bey 010 (07-BE-04), view over Unit U10 from the south (after Elayi/Sayegh 2000, pl. 20: 1, adapted).



Fig. 37. Berytos, Bey 010 (07-BE-04), view over the southeastern part of Unit U10 (and in the background Unit U9) from the southwest, Wall M436 across (after Elayi/Sayegh 2000, pl. 19: 2, adapted).

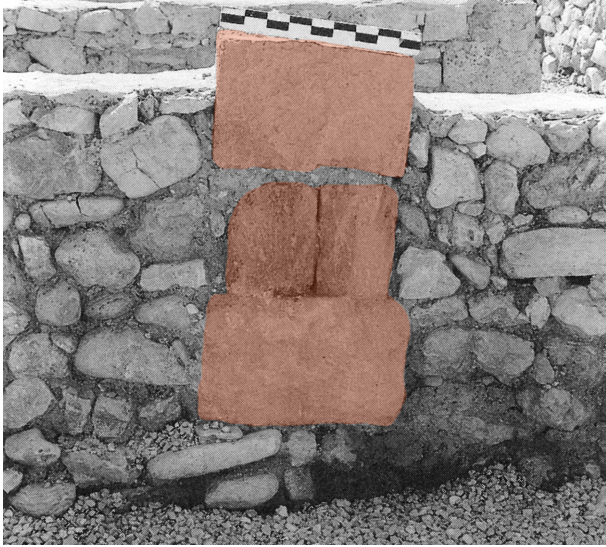


Fig. 38. Berytos, Bey 010 (07-BE-04), Unit U7, Room 7.1, Wall M524 (after Elayi/Sayegh 2000, pl. 14: 1, adapted).

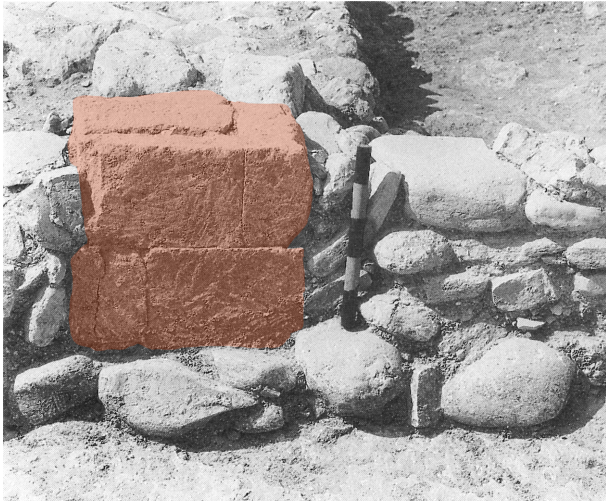


Fig. 39. Berytos, Bey 010 (07-BE-04), Unit U10, Room 10.5, Wall M444 (after Elayi/Sayegh 2000, pl. 21: 2, adapted).

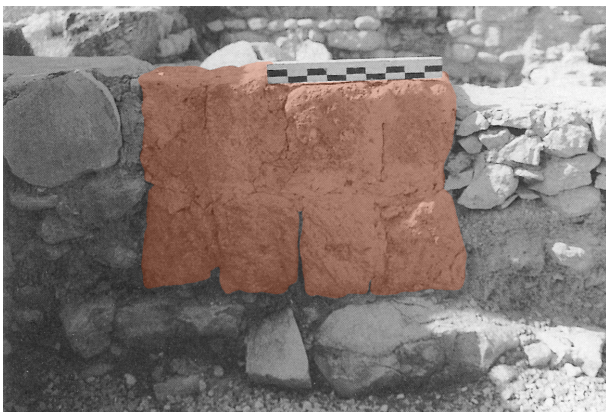


Fig. 40. Berytos, Bey 010 (07-BE-04), Unit U13, Room 13.1, Wall M361 (after Elayi/Sayegh 2000, pl. 25: 1, adapted).

07-BE-05*

Berytos, Area Bey 045

Technique: pier-and-rubble technique?

Function: unknown.

Date: 4th–1st cent. BCE.

According to Perring et al. (2003, n. 44), Hellenistic walls built in the pier-and-rubble technique (called *opus africanum* by these authors) have been uncovered in Area Bey 045; they refer to Thorpe 1998/1999, but this publication does not mention such walls.

Perring et al. 2003, 199, n. 44.

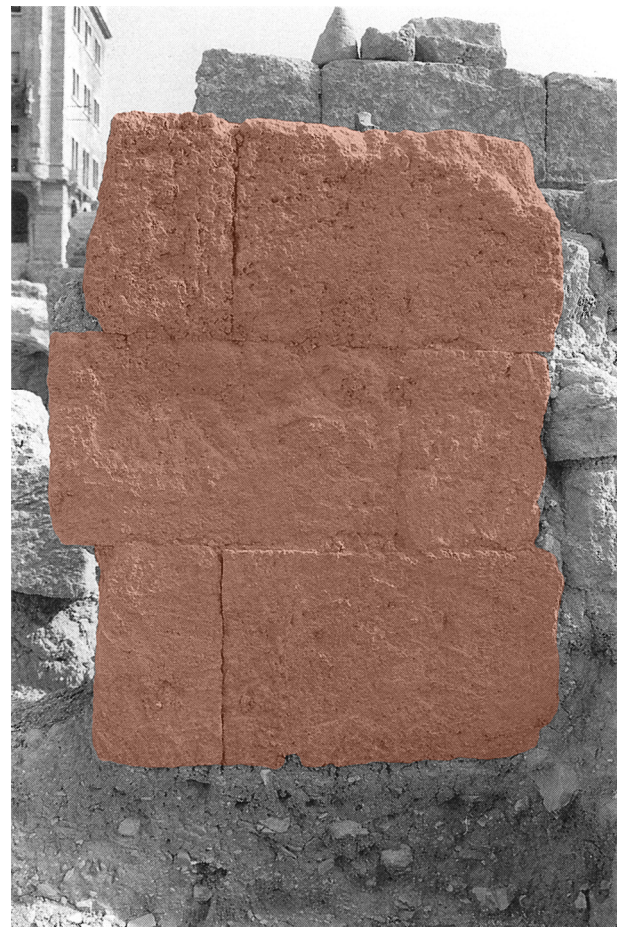


Fig. 41. Berytos, Bey 010 (07-BE-04), Unit U16, Room 16.5, Wall M581 (after Elayi/Sayegh 2000, pl. 30: 2, adapted).

08-JI (fig. 42, 43)**Ġiye, Area D**

Technique: pier-and-rubble technique.

Function: unknown (residential?).

Date: 5th–1st cent. BCE?

Excavations in Area D mostly uncovered a Late Roman/Early Byzantine habitation quarter, but soundings in some of its rooms revealed that the late walls are partly based on earlier buildings. At least in the cases of the Trenches D4, D20, D37, D44, D63, D68 and D90, these earlier walls were erected in the pier-and-rubble technique. The dating of these walls is so far not entirely clear; the wall in D20 has been assigned a date in the Late Persian or the Early Hellenistic period, and the other walls are only generally dated to the Persian or the Hellenistic epoch. At the current stage of

publication, a more detailed analysis of the building techniques is hardly possible; a photograph of D90 at least shows a pier (fig. 43) formed of four courses of roughly smoothed stretchers and slim, slab-like standing headers, somewhat heterogeneous in its composition. The wall in D37 shows two piers of type B1, ca. 1m apart (fig. 42); the ashlar seem to be only roughly cut and hewn. Two other photographs of walls in D37 and D44 hardly reveal the composition of the piers. The rubble seems to be partly coursed, but always random; the foundations seem to have at least partly consisted of gravel and small fieldstones.

Waliszewski et al. 2012, 431 f., 434, fig. 7, 9; Waliszewski/Wicenciak 2015, fig. 3; Waliszewski et al. 2015, 467, fig. 1, 3; Sader 2019b, 158; Gwiazda/Waliszewski 2019/2020, 173.

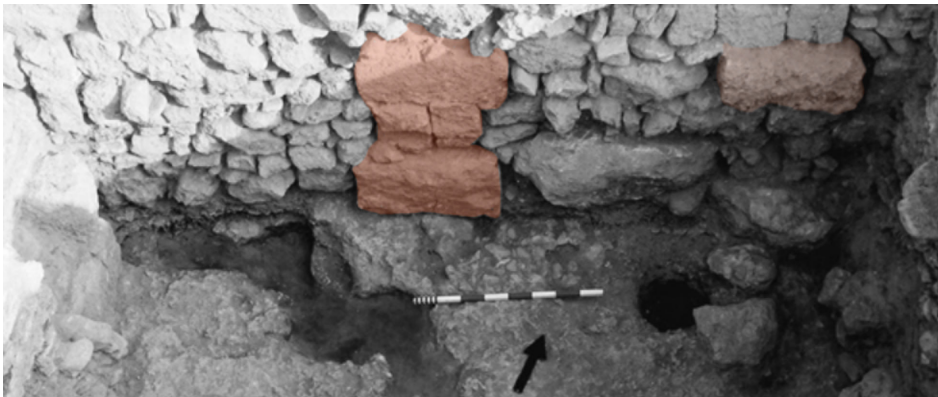


Fig. 42. Ġiye, pier-and-rubble wall in Trench D37 from the south (**08-JI**) (after Waliszewski et al. 2012, fig. 7, adapted).



Fig. 43. Ġiye, north wall of Building D90 (**08-JI**) (after Waliszewski et al. 2015, fig. 3, adapted).

09-BS (fig. 44)***Bustān eš-Šēh*, ‘Phoenician retaining wall’ west of north-corner of Podium II**

Technique: pier-and-rubble technique.

Function: retaining wall?

Date: 5th–4th cent. BCE.

To the west of the northern corner of Podium II, a retaining wall with a total length of ca. 20m is preserved up to a height of six courses of ashlar. Stucky calls this wall the ‘Phoenician retaining wall’ in his publications but does not deal with it in more detail. It seems that the wall is connected

to the water channel in front of it. The north-eastern part of the wall was built in pure ashlar masonry, while the larger southwestern section comprises ashlar piers and sections of partly coursed, partly squared mortared rubble. The six preserved piers of type D2 are ca. 1m apart, and the ashlars have been more or less finely cut and roughly smoothed. The wall must have been erected after Podium II, that is in the 5th or 4th cent. BCE.

Dunand 1973, 16; Elayi 1996, 82 f., pl. 1, 2; Elayi/Sayegh 2000, 204; Stucky 2005, Beil. 1, 6: 2; 7: 1.



Fig. 44. *Bustān eš-Šēh*, ‘Phoenician retaining wall’ (09-BS) (photo by author).

10-SI-01***Sidon, 'College Site', Trench 28, Wall 1042/1043**

Technique: pier-and-rubble technique?

Function: unknown.

Date: 4th cent. BCE.

Wall 1042/1043, built from limestone and running in northwest–southeast direction, can be dated to the 4th cent. BCE. According to the excavation report, it was ca. 1.66m wide (but according to the published plan around 2m); it was uncovered to a length of 2.62m and conserved up to a height of 1.38m. The published plan may indicate that it comprised two walls set directly next to another, the width of which would have been ca. 1m (but the short report does not discuss this possibility). The wall(s) seems to have been built partly with ashlar and partly with unsquared blocks of varying sizes, at least partly connected with pink mortar. The only published photograph seems to show an ashlar pier, the lowermost course of which consisted of two short stretchers or two headers, while the second course comprises a larger stretcher and a header (?). The headers did not cover the entire width of the wall. Due to the problematic state of publication, it remains unclear whether the wall included multiple piers between sections of rubble or whether stones of various sizes were more unsystematically mixed. Since the same trench revealed robbed walls in lower levels (see **10-SI-02***), the ashlar may have been reused. Doumet-Serhal 2006, 2, fig. 2, 3; Huylmans 2019, 87, 89, fig. 84.

10-SI-02***Sidon, 'College Site', Trench 28, robbed Wall 1112**

Technique: pier-and-rubble technique?

Function: unknown.

Date: 9th or early 8th cent. BCE or earlier (?).

Wall 1112 could be traced for 4.4m and was 1.4m wide, but mostly robbed. Floor 1171 abuts it and is superimposed by layers dating back to the 9th or early 8th cent. BCE, which provides a *terminus ante quem* for the wall. Its foundations are partly composed of large, accurately shaped ashlar and partly of only roughly hewn blocks of varying sizes; this may mean that the wall built on top of these foundations may have been built in the pier-and-rubble technique, but this is far from certain.

Doumet-Serhal 2006, 7 f.; Huylmans 2019, 86.

11-BU-01 (*plan 9, fig. 45, 46*)**Tell el-Burak, surrounding wall (Structure I) in Areas 3 and 2**

Technique: pier-and-rubble technique.

Function: surrounding wall (fortification or terrace wall).

date: phase E (late 8th cent. BCE).

The excavations at *Tell el-Burak* uncovered remains of strong Iron Age walls in Areas 2 and 3, which were first interpreted as fortification walls, but are now rather considered as large terrace walls partly surrounding the settlement, which may have additionally served a defensive function. The wall was erected in phase E (later 8th cent. BCE) and discontinued already at the beginning of phase D (second half of the 7th cent. BCE) in Area 3, but only in the 6th or 5th cent. BCE in Area 2.

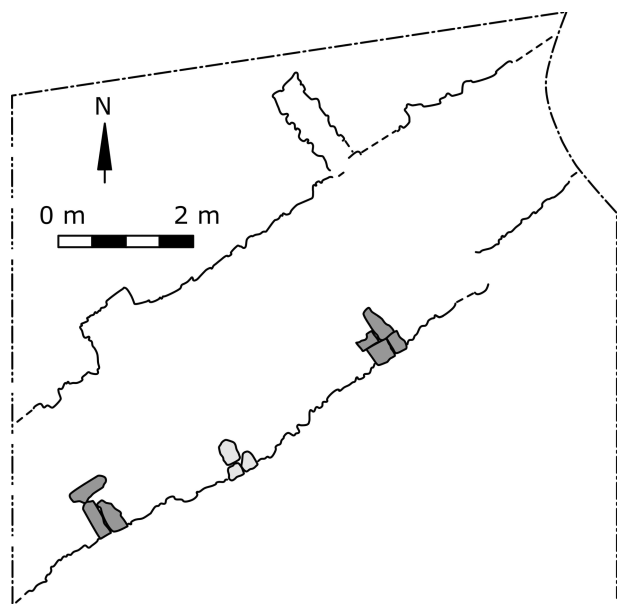
In Area 3, the wall was 2.8m wide and exposed to a maximum height of 1.9m and a total length approaching 12m (including a balk). In the centre of Area 3, a pier made of three layers of two ashlars each is to be seen (*fig. 45*). These ashlars are approximately square and thus cannot be considered either headers or stretchers. The lateral ends of the pier are ‘irregular’, the blocks are roughly smoothed. A second pier may be situated in the area covered by the balk; nevertheless, it seems that such piers were either not regularly placed or placed in considerable distance to each other.

In Area 2, the wall is 3–4m wide and preserved until a total height of 1m (*plan 9, fig. 46*). It includes two or three ashlar piers. One of them is still preserved in three layers, with one stretcher between two headers each (type B2); the other one is only badly preserved, but two headers appear to be visible and a stretcher seems to have been placed

behind them (type D?); in the middle of them, two to three blocks may belong to a third pier, although this seems doubtful. The lateral ends of the piers are irregular, the blocks are roughly smoothed. Again, there is no sign of further piers, which may have existed some meters away.

Another 9m long, but rather badly preserved part of the same wall has been explored in Area 4, but it did not feature ashlar piers.

Finkbeiner et al. 2001, 186, fig. 18; Kamlah/Sader 2003, 155 f., fig. 10; 2004, 130; 2008, 20; Neumann 2014, 86, 89, 93, fig. 94, 95, 97, 100; Kamlah et al. 2016a, 139, 142, fig. 4, 14, 21, 22, plan 1; 2016b, 81 f., 86, fig. 2, 4–6, 9; Khries 2016, 183; Edrey 2019, 79; Sader 2019a, 130, fig. 10: 1; 2019b, 158, fig. 4: 7; unpublished documentation of the Tell el-Burak Archaeological Project.



Plan 9. *Tell el-Burak*, surrounding wall (Structure I) in Area 2 (**11-BU-01**) (redrawn after documentation of Tell el-Burak Archaeological Project).



Fig. 45. *Tell el-Burak*, segment of Structure I with ashlar pier in Area 3 (11-BU-01) (photo by Tell el-Burak Archaeological Project).



Fig. 46. *Tell el-Burak*, Structure I in Area 2 (11-BU-01) (photo by Tell el-Burak Archaeological Project).

11-BU-02 (*plan 10, fig. 47*)**Tell el-Burak, House 1 in Square 29/24**

Technique: pier-and-rubble technique.

Function: residential.

Date: phase C/B (6th–5th cent. BCE).

The at least five-roomed House 1 (which had at least one adjacent side room) and the directly adjacent House 3 were rather carefully erected during **phase D** (2nd half of the 7th cent. BCE); multiple corners and doors were strengthened with ashlar, but no ashlar piers were used within straight walls (a pier visible in the inner face of Wall 6 is the strengthened corner of the directly adjacent House 3, since Houses 1 and 3 share

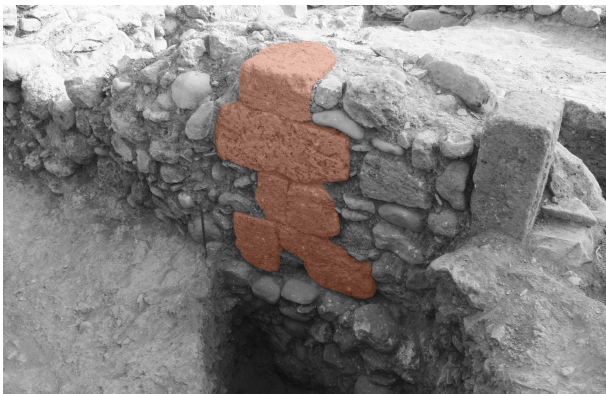
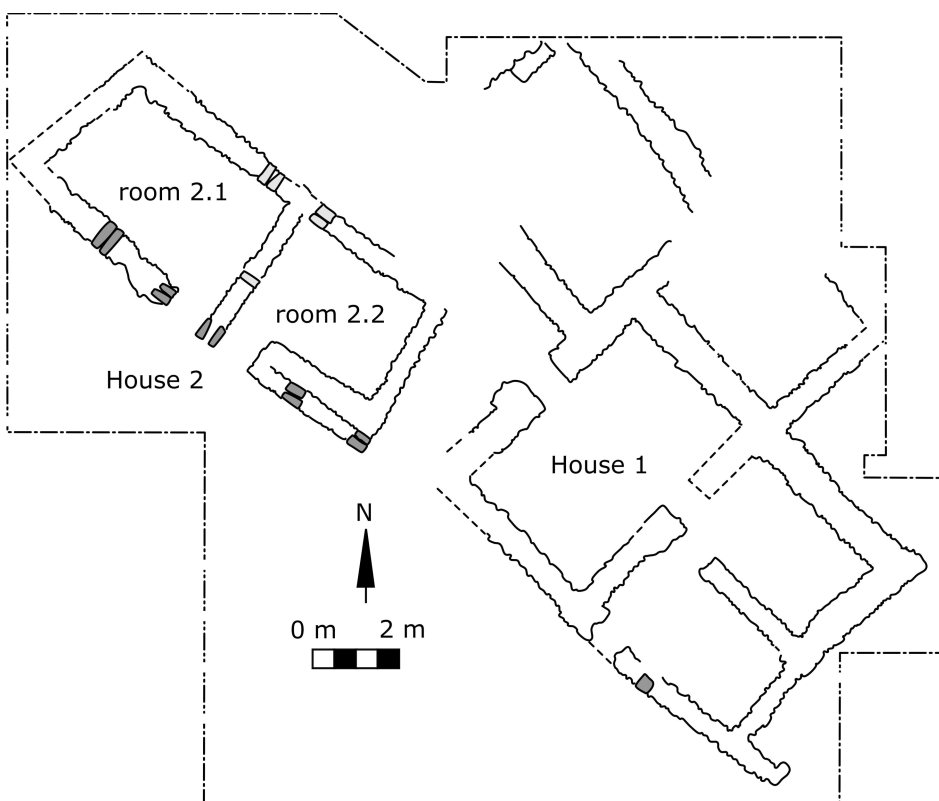


Fig. 47. *Tell el-Burak*, ashlar pier in phase C1 rebuilding of southern wall of House 1 (**11-BU-02**) (photo by Tell el-Burak Archaeological Project).

Wall 6). House 3 was destroyed at the end of **phase D**, possibly in an earthquake or a landslide, and House 1 was subsequently renovated (at the beginning of **phase C**, 1st half of the 6th cent. BCE, with House 2, replacing House 3, erected at the same time). Wall 6 now included an ashlar pier in its outer face, which, though, did not cover the entire width of the wall, just about 0.6 m (*fig. 47*). It was preserved up to four courses, the heights of which diverged. Its lower courses consisted of two header-like blocks placed upright, the third had a wide stretcher, and the fourth a small, slab-like stretcher. The dimensions of the ashlar varied greatly and the blocks have only been roughly smoothed. Possibly, another pier, of which only the lowermost course would have been preserved, was erected in Wall 8c in **phase B2** (2nd half of the 6th cent. BCE, context 29/24-141). It consisted of four stretchers and a header, but the wider context is unclear.

Kamlah/Sader 2003, 149; 2004, 126, 128; Sader 2009, 62, *fig. 10*; Kamlah et al. 2016a, *fig. 4, 14*; 2016b, 93, 96, *fig. 18, 26, 27*; Khries 2016, 185; Huylmans 2019, 37, 47, 65–67, 89–92, *fig. 14, 15, 21, 22, 32, 52, 53, 57, 63*; Sader 2019a, *fig. 10: 1, 2*; 2019b, 148, *fig. 4: 6*; unpublished documentation of the Tell el-Burak Archaeological Project.



Plan 10. *Tell el-Burak*, Houses 1 and 2 in area 3, phase C1 (1st half of 6th cent. BCE) (**11-BU-02**) (redrawn after documentation of Tell el-Burak Archaeological Project).

11-BU-03 (*plan 10, fig. 48*)**Tell el-Burak, House 2 in Square 28/25**

Technique: pier-and-rubble technique.

Function: residential.

Date: phase C/B (6th cent. BCE).

House 2 was erected during phase C (6th cent. BCE), probably replacing the destroyed House 3. Its southern wall, built in coursed rubble, was ca. 0.45m wide and included two ashlar ‘piers’ of type B2 in the part bordering Room 2.2. The first pier was placed at the corner, but the second in the middle of the wall; the distance between them was ca. 1.25m. The ashlars were similarly dimensioned, mostly finely cut and roughly smoothed. Further to the northwest, a door was flanked by a single slab-like header placed upright on one side and another pier (at the end of the transversal wall separating Rooms 2.2 and 2.1) on the other side. On its other side, a second door and probably two more piers of the same type may be recognised, although the identification of the second one, which

belongs to a rather careless renewal and consists of two roughly shaped headers, is doubtful. The wall was very badly preserved in its northeastern part and a sixth pier may well have existed, here. The remaining walls of the building mostly consist of small to medium-sized rubble, but another pier may have existed in the wall separating Rooms 2.2 and 2.1, and two more in the back wall; unfortunately, these walls are only preserved in their lowest course. The ashlars may have been reused from other buildings; a hole in one of the blocks at the southeastern corner of the building indicates this. The removal of ashlars is documented at *Tell el-Burak*, e.g. in the winepress, which was indeed abandoned in phase C (Orsingher et al. 2020, fig. 2, 3).

Kamlah/Sader 2003, 149, fig. 6; 2004, 128, pl. 10a, b; Kamlah et al. 2016a, fig. 4, 15; 2016b, 99, fig. 34; Huylmans 2019, fig. 8–11, 15, 42; Sader 2019a, fig. 10: 2; 2019b, fig. 4: 4, 5; unpublished documentation of the Tell el-Burak Archaeological Project.



Fig. 48. *Tell el-Burak*, House 2 from the southeast (11-BU-03) (photo by Tell el-Burak Archaeological Project).

12-SA-01 (*plans 11, 12, fig. 49*)**Sarepta, Area II, X, squares A8–B9**

Technique: pier-and-rubble technique.

Function: industrial and residential.

Date: phase VII–IX (11th–2nd cent. BCE).

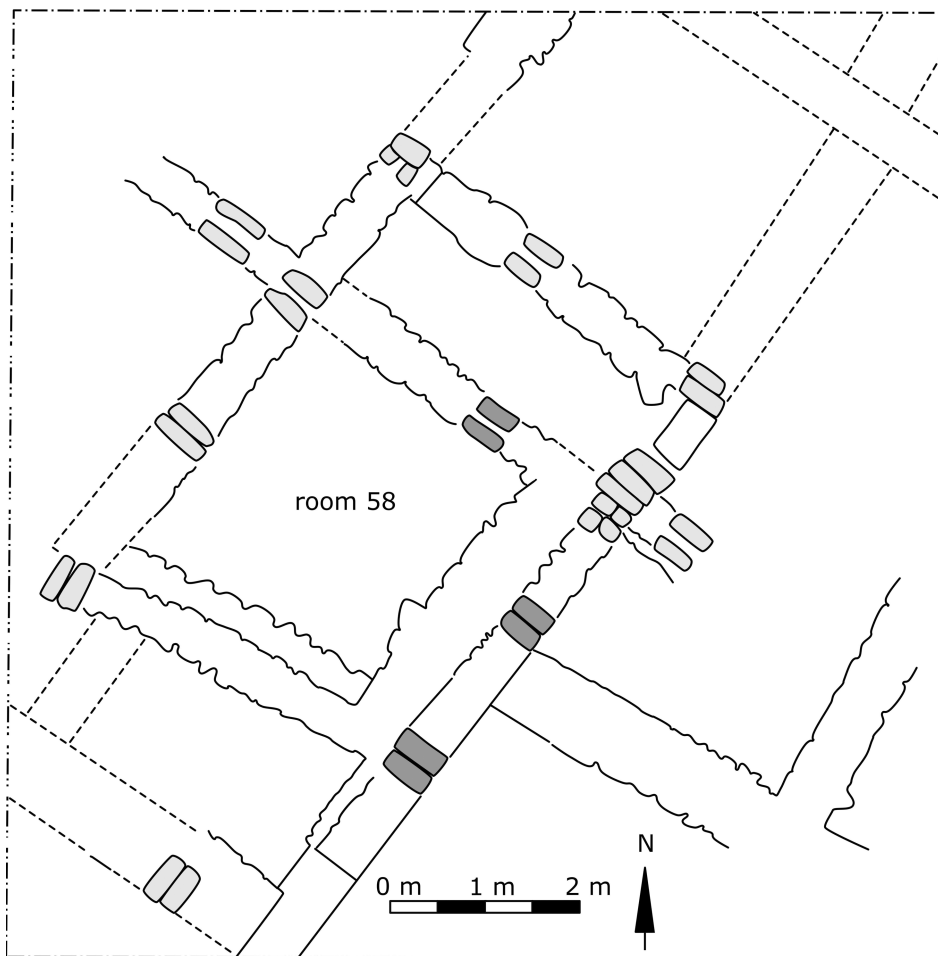
The small area (10 × 10m) excavated in Squares A8–B9 of Area II, X was first used by workshops; the first occurrences of the pier-and-rubble technique date back to phases VII–IX, but precedents are already documented in **phase VI** (12th–11th cent. BCE): at least in one intersection of walls, a possible ashlar pier composed of two headers is attested (Khalifeh 1988, 39. 113, pl. 8).

In **phase VII** (11th–9th cent. BCE; *plan 11*), numerous walls seem to have included ashlar piers in their mortared rubble masonry. The piers are partly located at intersections of walls, but often within straight walls also. The building techniques have not been described in detail and the composition of the piers and the workmanship of the

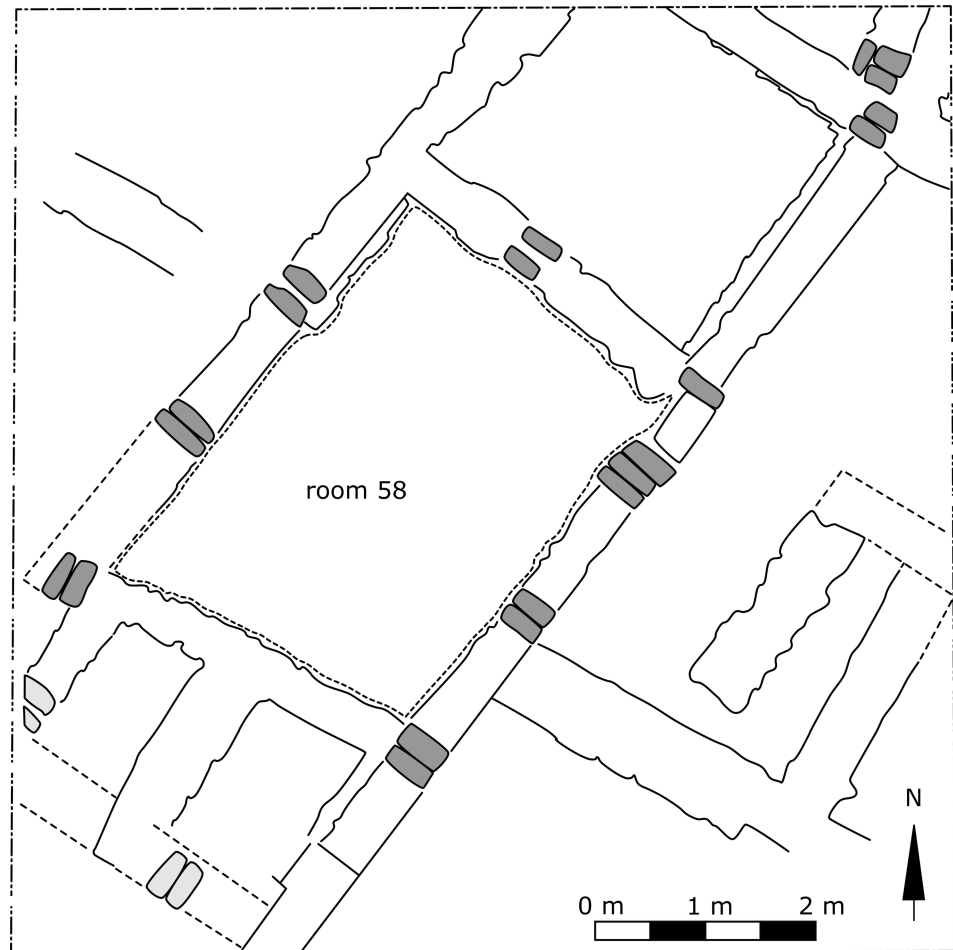
blocks can only be inadequately described according to the plan and a single photograph (*fig. 49*). The technique is comprehensible best in Room 58, in the centre of the area, which was used as a basin for clay preparation and was thus thickly plastered. Most piers (9?) probably can be assigned to type B, although one pier each of types D and E/I may also be documented. The distances between two piers seem to have been somewhat inconsistent, but mostly measured around 1.3–1.4m; the walls were 0.4–0.5m wide. The ashlars were finely cut and roughly smoothed.

In **phase VIII** (8th–4th cent. BCE; *plan 12*), many walls from phase VII were reused, but the buildings were transformed into habitations; the building techniques remained more or less the same. All in all, up to twelve piers of type B (and a possible pier of type E/D) can be identified. Many walls remained in use also in phase IX of the 4th to 2nd cent. BCE.

Khalifeh 1988, 39 f., 48, 113, 125, 140, pl. 8–11, fig. 13.



Plan 11. Sarepta, Area II, X, Squares A8–B9 (12-SA-01), period VII (redrawn after Khalifeh 1988, pl. 10).



Plan 12. Sarepta, Area II, X, Squares A8-B9 (12-SA-01), period VIIIA (redrawn after Khalifeh 1988, pl. 9).



Fig. 49. Sarepta, Area II, X Square 8-B9 (12-SA-01), Room 58 with plastered walls (after Khalifeh 1988, fig. 13, adapted).

12-SA-02 (fig. 50)**Sarepta, Area II, X, squares beyond A8–B9**

Technique: pier-and-rubble technique.

Function: industrial and residential?

Date: 11th–2nd cent. BCE?

In Area II, X, the squares beyond A8–B9 were not published in detail, but some photographs show parts of numerous walls built in the pier-and-rubble technique. For the most part, they cannot be exactly located and dated. A wall probably in Square D7 preserves two ashlar piers of type D2 up to a height of three or four courses (fig. 50; Pritchard 1971, fig. 19: 5; 20: 1). Another pier of type B2, preserved up to its fifth course, may be seen in Square A6 (Pritchard 1978, fig. 124). Another wall with two piers of type D1, which are preserved up to three courses, cannot be located (Pritchard 1978, fig. 91). Various other walls

cannot be described and located more precisely; at least one pier of type B1 is recognisable (Pritchard 1971, fig. 19: 5). The piers are said to have been placed ca. 1–1.5m apart, the uncoursed random rubble was mortared, the ashlars were finely cut and sometimes roughly and sometimes finely smoothed and the course heights were partly consistent. Since most walls seem to be positioned rather high within the trench, they may belong to the later phases VIII–IX of the 8th–2nd cent. BCE, but similar techniques have already been used in Squares A8–B9 in phase VII of the 11th–9th cent. BCE (12-SA-01), and this may well be valid for the other squares as well.

Pritchard 1971, 19 f., fig. 19: 5; 20: 1; Stern 1977, 20; Pritchard 1978, 93, fig. 91, 124; Shiloh 1979, 73; van Beek/van Beek 1981, 74 f.; Pritchard 1983, 522; Khalifeh 1988, fig. 16.



Fig. 50. Sarepta, Area II X beyond Square A8–B9 (12-SA-02), west wall of Room 56 (after Pritchard 1971, fig. 20: 1, adapted).

12-SA-03 (*plan 13, 14*)**Sarepta, Area II, Y**

Technique: pier-and-rubble technique.

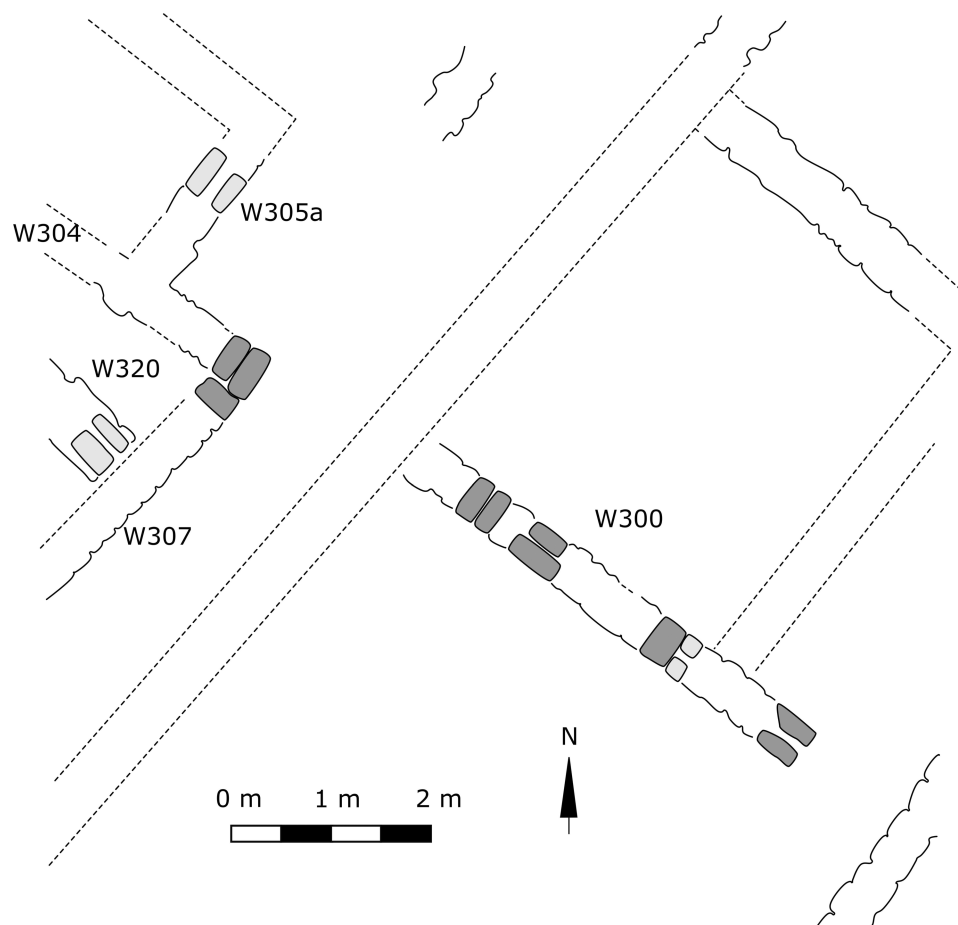
Function: industrial and residential.

Bate: phase D1–C (9th–5th cent. BCE).

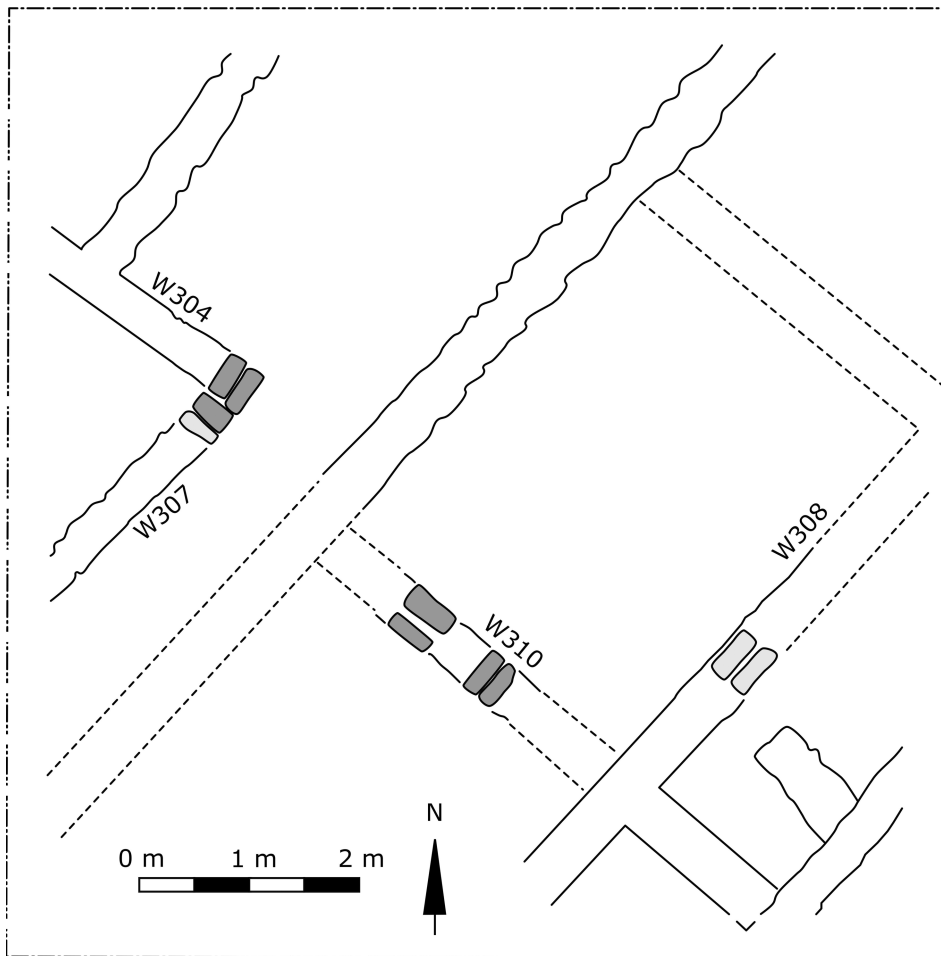
The evidence for the pier-and-rubble technique in Area II, Y dates back to phases C and B, but some precedents may be seen already in earlier phases: in **phase G1** (13th cent. BCE), individual large, roughly squared blocks were used to strengthen corners of rubble walls (Anderson 1975, 44, fig. 10; 1988, 77, pl. 5). In **phase D1** (Anderson 1975, 48, fig. 7; 37,2; 1988, 102 f., 397, pl. 9, 42a) of the 10th/9th cent. BCE, W317 of Room 35 (a courtyard?) was partly built from rubble and party from ashlar set regularly as headers and stretchers; this part of the wall is ca. 1.9m long and includes the intersection with W311. The second wall of the room, W319,

was entirely built from rubble. In the adjacent building (Room 33: workshop?), large ashlar and rubble were used next to each other, but W311 and W315 consist mainly of ashlar whereas W314 and W316 consist mainly of rubble; no clear evidence for the pier-and-rubble technique can thus be found in this phase.

The walls of **phase C** of the 9th–7th cent. BCE (*plan 13*) were most often built from rubble but include an ashlar pier of type D or J at the intersections of walls W304 and W307 and probably three piers of type B within walls W308 and W310. The walls were ca. 0.5m wide and rather badly preserved; the buildings' interpretation is obscure. According to the excavators, the ashlar were probably reused from earlier buildings. A more detailed description of the building techniques is impossible since no photographs or elevations have been published.



Plan 13. Sarepta, Area II, Y (12-SA-03), phase C (redrawn after Anderson 1988, pl. 11).



Plan 14. Sarepta, Area II, Y (12-SA-03), phase B (redrawn after Anderson 1988, pl. 10).

In **phase B** of the 6th and 5th cent. BCE (*plan 14*), the walls of phase C were partly continuously used. Wall W300 was newly erected and consisted of a mixture of ashlar and rubble; the only published photograph shows a pier of type B1 conserved up to its fifth course. On the plan, a pier of type D and up to six piers of type B are recognisable, with the

distance between them being ca. 0.9–1.1m. The walls were ca. 0.5m strong; the ashlar were finely cut and partly roughly and partly finely smoothed. Two blocks were bossed and were thus most probably reused from earlier buildings.

Anderson 1975, 51, fig. 5, 6, 37: 1; Pritchard 1978, 82, fig. 43d, e; Anderson 1988, 110, 408, pl. 10, 11, 42b.

13-TY (*plan 15, fig. 51*)**Tyros, Bikai's sondage, Square IC-6A, Stratum IX**

Technique: pier-and-rubble technique.

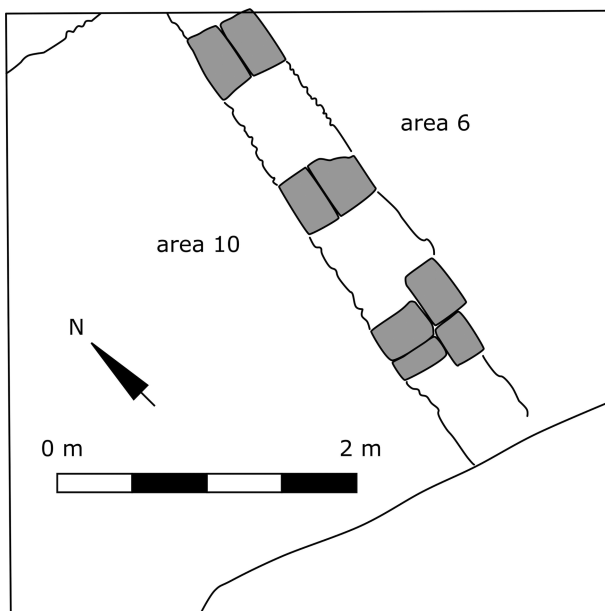
Function: terrace wall?

Date: layer IX (2nd half of the 9th/8th cent. BCE).

In square IC-6A, nearly 4m long parts of a wall have been excavated from layer IX (dating back to the 2nd half of the 9th or the 8th cent. BCE). It was ca. 0,6m wide and featured ashlar piers between uncoursed random rubble. The three piers of type B2 were less than 1m apart and preserved

to a height of six (roughly isodomic) courses; the blocks were finely cut and roughly smoothed on one face, but only roughly hewn on the other face, where the rubble was likewise less regular. Because of this, the wall is interpreted as a terrace wall. Its foundations consist of small rubble.

Bikai 1978, 11, pl. 89: 5, 6; Elayi 1980, 168, 171, 175 f.; Sharon 1987, 30; Elayi 1996, 78; see also e.g. Fernández Jurado 1988, 344; 1991, 170; Rufete Romico/García Sanz 1995, 12, 33 f.; Pittaccio 2004–2007, 42.



Plan 15. Tyros, Bikai's sondage, Square IC-6A, Stratum IX (**13-TY**) (redrawn after Bikai 1978, pl. 63, lower left).



Fig. 51. Tyros, Bikai's sondage, Area 10, Wall 3 from the southwest (**13-TY**) (after Bikai 1978, pl. 89: 5, adapted).

14-AN (plan 16, fig. 52–54)**Tēl Anafa (Tell el-Aḥḍar), Building LHSB**

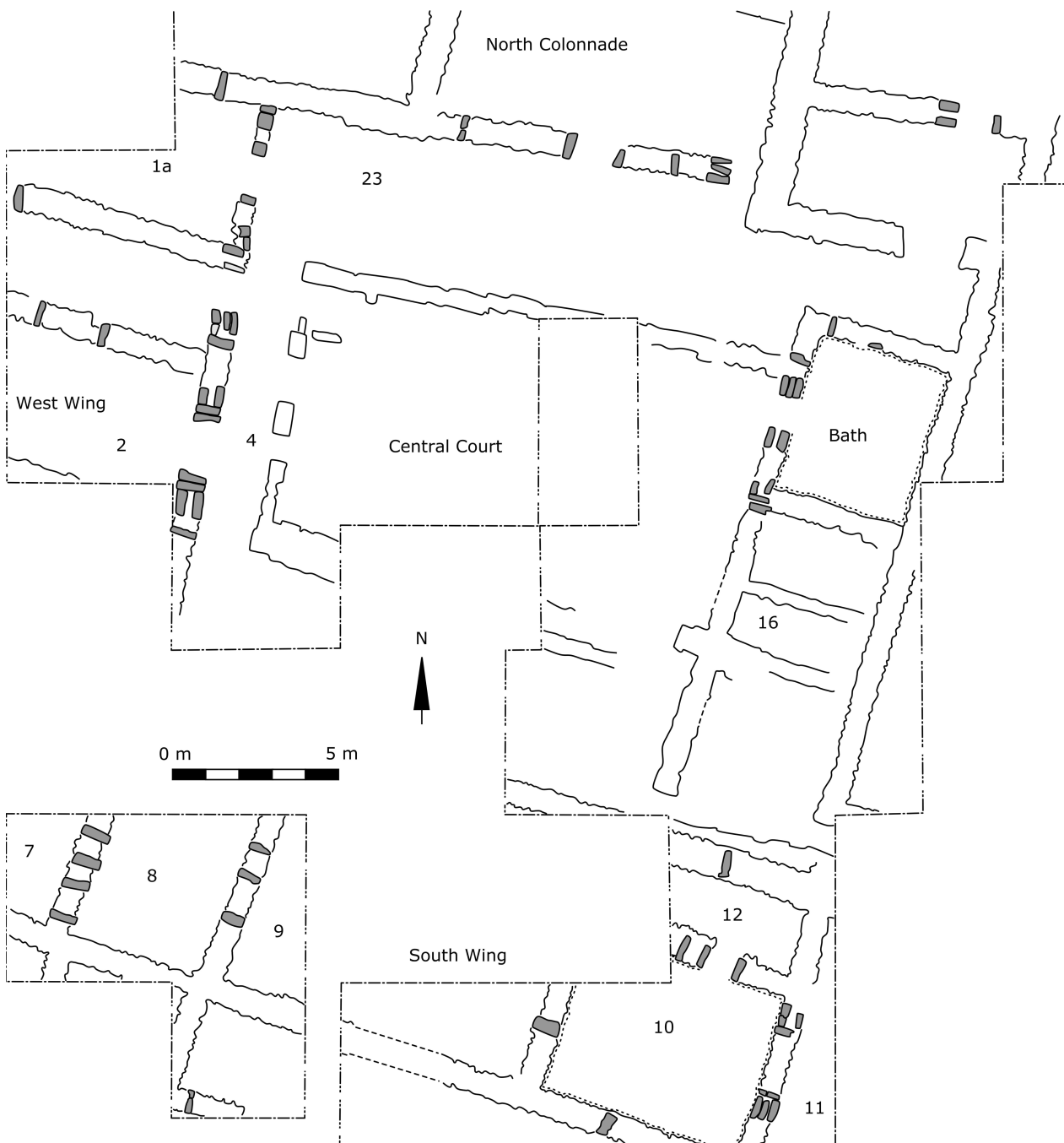
Techniques: pier-and-rubble technique, staggered-reinforcing-header technique.

Function: residential building of high rank.

Da^{te}: HELL 2A (late 2nd cent. BCE).

The palace-like domestic Building LHSB consists of multiple rooms arranged around a central court and was erected in the late 2nd cent. BCE. Most of its walls were ca. 0.8m wide and built from small to medium-sized fieldstones, but also strengthened

with ashlars in multiple ways. On the one hand, individual headers placed on their long narrow sides can be seen in many walls; sometimes, only single blocks were used, and sometimes, multiple headers were placed in fairly regular intervals, generally of ca. 0.5–1m. The comparably well-preserved Wall 7907 (fig. 52), the dividing wall between Rooms 7 and 8 and probably also Wall 2523, the dividing wall between Rooms 8 and 9, may be considered classic cases of the staggered-reinforcing-header technique. This technique is



Plan 16. *Tēl Anafa*, Building LHSB (14-AN) (redrawn after Herbert 1994, fig. 6).

also documented in numerous other walls, although less well-preserved. In Wall 7907, the headers slightly project from the wall (*fig. 52*).

On the other hand, ashlar piers exist in multiple points, mostly in walls delimiting the central court. They often flank doors; between Rooms 16 and 17, an ashlar pier of type J can be seen at the intersection of two walls. In Wall 5101 in the south wing, the dividing wall between Rooms 10 and 11, two piers of type G are placed within a straight wall (*fig. 53*). The southern pier unusually begins not at the ground level, but only in the middle of the preserved height of the wall. In the adjacent dividing wall between Rooms 10 and 12, the door is flanked by two most unusual piers in skeleton construction, which are built on a square plan of two headers or two stretchers per course, with the central parts of the pier filled in with rubble. Room 17 (*fig. 54*; bath complex) also seems to have originally featured an ashlar pier in its northern wall. In W 7412/8408 – between Rooms 1a and 23 – a door is flanked by monolithic blocks, next to which short sections of rubble as well as ashlar piers of unsystematic construction can be seen. The northern pier, preserved up to four courses, is heterogeneously structured (one square block and one standing header, two lying headers, two stretchers, three standing headers). In Wall 7105/7423, between Rooms 2 and 4 in the western wing, a door is flanked by two ashlar piers which



Fig. 52. *Tēl Anafa (Tell el-Aḥḍar)*, LHSB (14-AN), south wing, Rooms 7 and 8 from northeast (after Herbert 1994, pl. 26a, adapted).

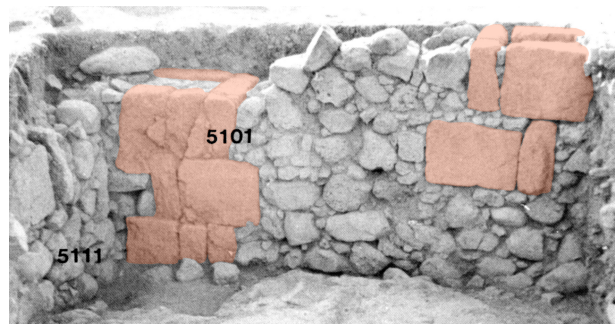


Fig. 53. *Tēl Anafa (Tell el-Aḥḍar)*, LHSB (14-AN), south wing, Wall 5101 in Room 10 from the west (after Herbert 1994, pl. 32b, adapted).

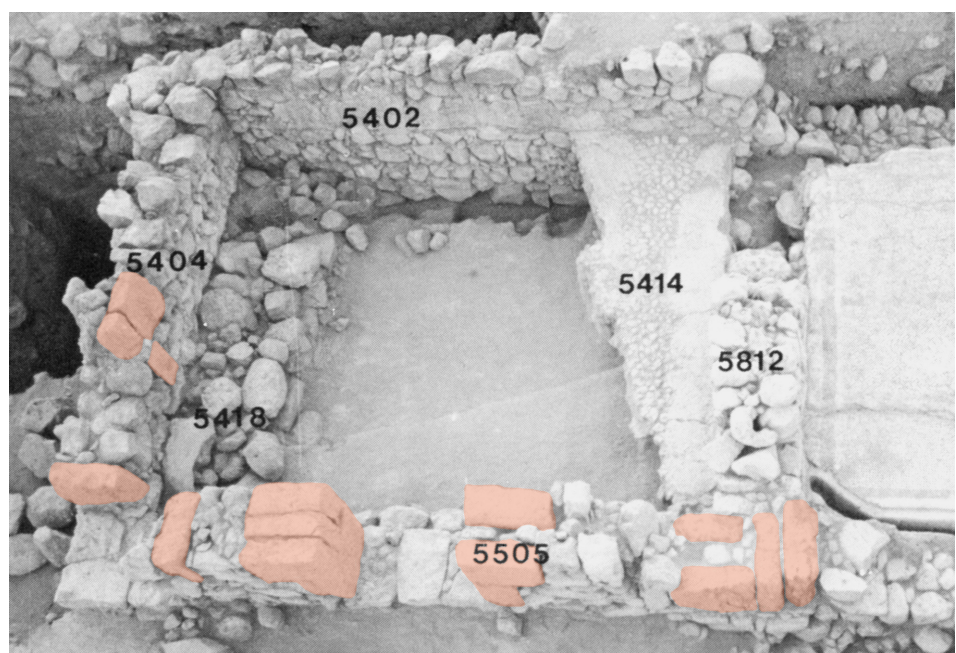


Fig. 54. *Tēl Anafa (Tell el-Aḥḍar)*, LHSB (14-AN), east wing, bath complex from the west (after Herbert 1994, pl. 35b, adapted).

are composed of two stretchers in their lower and two headers as well as two stretchers in their upper course. A pier of type F is connected by a short section of rubble with the northern pier. Numerous other doorways are flanked by ashlar piers, in which one header and two or three stretchers projecting far into the adjacent rubble alternate.

The many different techniques notwithstanding, almost all ashlar seem to have been finely cut, rather well smoothed and of similar dimensions. Various rooms, the walls of which include ashlar piers, have been plastered; the most extensive remains of coloured stucco have been found in Room 10, which is the room where the use of the pier-and-rubble technique is especially evident.

Herbert 1994, 18, 50 f., fig. 2: 12, pl. 3, 4, 8a, 11a, 12a, 13b, 14a, 15a, 19a, b; 20a, b; 21a, b; 22a, 23a, b; 26a, b; 32a, b; 35a, b; 36a, b; 40b, 41b, 42a, 46b, 47b, 48b, 51a, b; 52b, 54b, 62b, 64b, 89a, b; 96a, b; 98a, 100a, 101b, 103a, 107b, 108b, 116b, 141b, 142a, b; 145a, b; 146b; Elayi 1996, 84; Herbert 2003, 324; Kidd 2015, 78.

15-OU (*plan 17, fig. 55*)

Umm el-'Amed, back wall of portico in sanctuary

Technique: pier-and-rubble technique.

Function: portico in sanctuary.

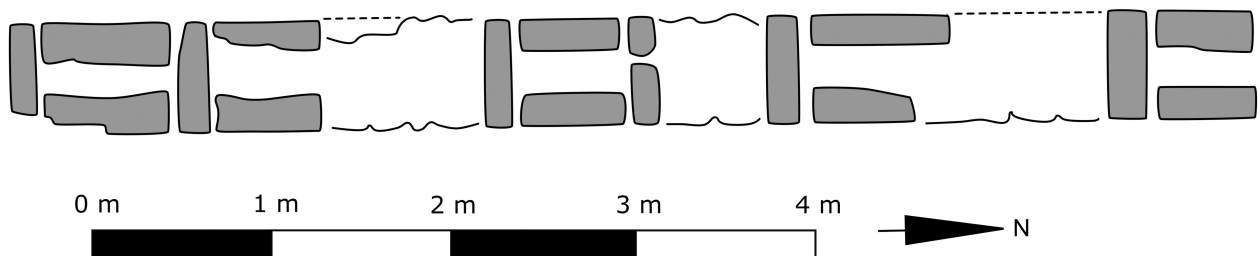
Date: 3rd/2nd cent. BCE.

The back wall of the Hellenistic portico in the sanctuary is ca. 0.6m wide and composed of ashlar piers between sections of uncoursed random rubble. The piers are 0.6–0.9m apart and may be assigned to types D1 (two piers), H and N, even though only one course is preserved in all but one case; only at the northeastern end, four courses were still in place. The ashlar seem to have been mostly finely cut and roughly smoothed.

Dunand/Duru 1962, 34, pl. 13: 1; 14: 2, plan 94; Elayi 1996, 80.



Fig. 55. *Umm el-'Amed, sanctuary, rear wall of portico (15-OU)* (after Dunand/Duru 1962, pl. 13: 1, adapted).



Plan 17. *Umm el-'Amed, back wall of portico in sanctuary (15-OU)* (redrawn after Dunand/Duru 1962, plan 94).

16-KE (plan 18)***Tēl Qedeš (Kydessos), Hellenistic administrative building***

Technique: staggered-reinforcing-header technique, possibly also pier-and-rubble technique.

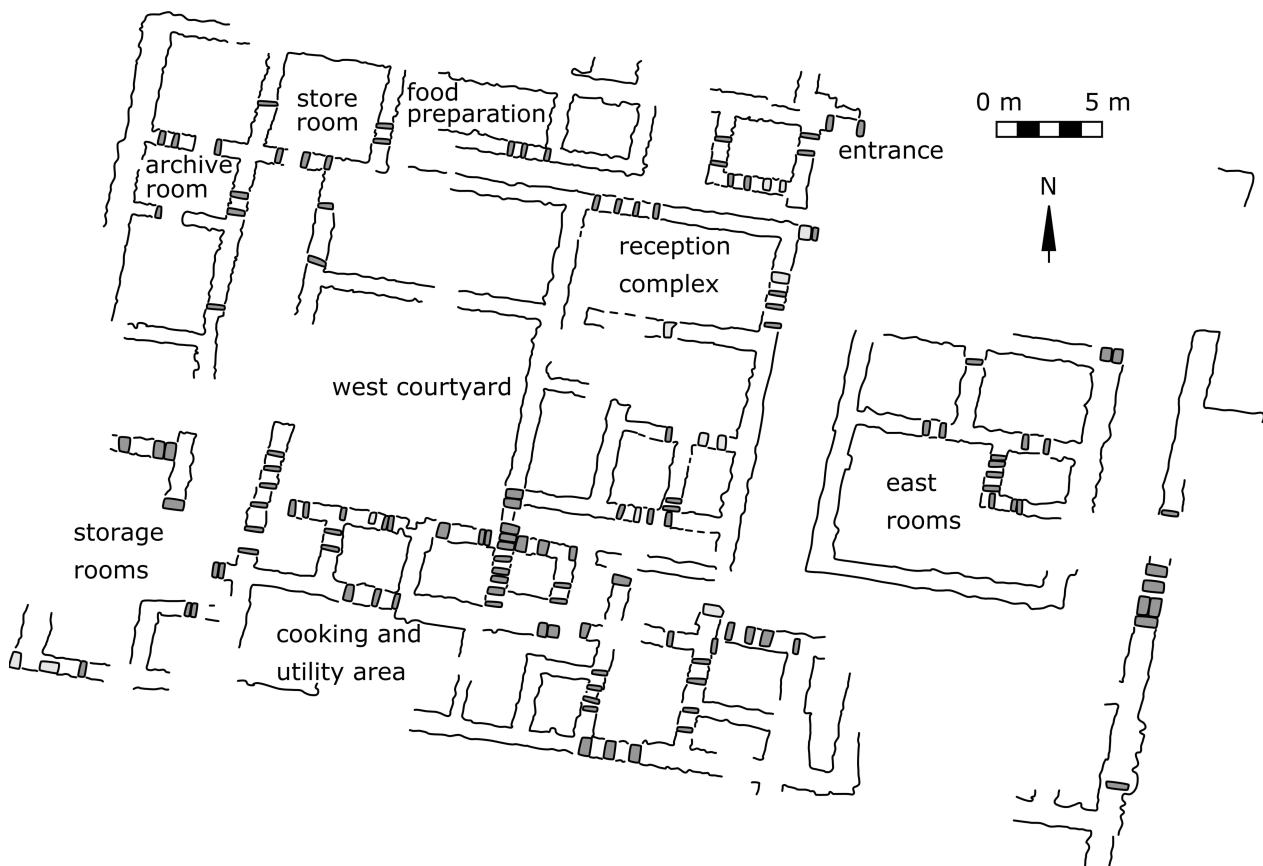
Function: administrative building including residential and storage uses.

Date: ca. 300 BCE.

A large administrative building was erected around 500 BCE, maybe temporarily abandoned in the context of the wars of Alexander the Great and then reoccupied and rebuilt around 300 BCE. This Hellenistic building remained in use until 144/143 BCE and was partly reused by squatters in the late 2nd cent. BCE. It functioned as an administrative centre, storage and distribution depot for agricultural goods and as a reception and feasting site. The excavations of 1997 to 2010 are not yet fully published. According to the preliminary reports, many internal partition walls of the Early Hellenistic building were built in the pier-and-rubble technique, but this seems to refer

(at least in most cases) to what is termed as the staggered-reinforcing-header technique, here. Few photographs show individual headers inserted into coursed random rubble. According to the plan, these headers seem to be rather regularly placed (0.4–1m apart) in many parts of the building but occur only rarely in other parts. The walls were consistently ca. 0.8m wide; the ashlar were most often roughly smoothed, but sometimes only roughly squared; some rooms were plastered and stuccoed. It remains unclear whether the pier-and-rubble technique was also used; the plan may show up to six piers of type B, one possible pier of type D or H as well as one possible pier of type F or I, but no photographs of these have yet been published. The building's walls include reused column drums from the Persian phase, so that it seems likely that some of the ashlar were likewise reused.

Herbert/Berlin 2003, 20, 29 f., 32, 40 f., fig. 10, 17; 2012; 2013a, fig. 2, 4, 5, 10, 11; 2013b, 377; Ehrlich 2017, fig. 3.



Plan 18. *Tēl Qedeš (Kydessos), Hellenistic administrative building (16-KE)* (redrawn after Ehrlich 2017, fig. 3).

17-AH (plan 19)**Achzib (ez-Zib), Area D**

Technique: pier-and-rubble technique.

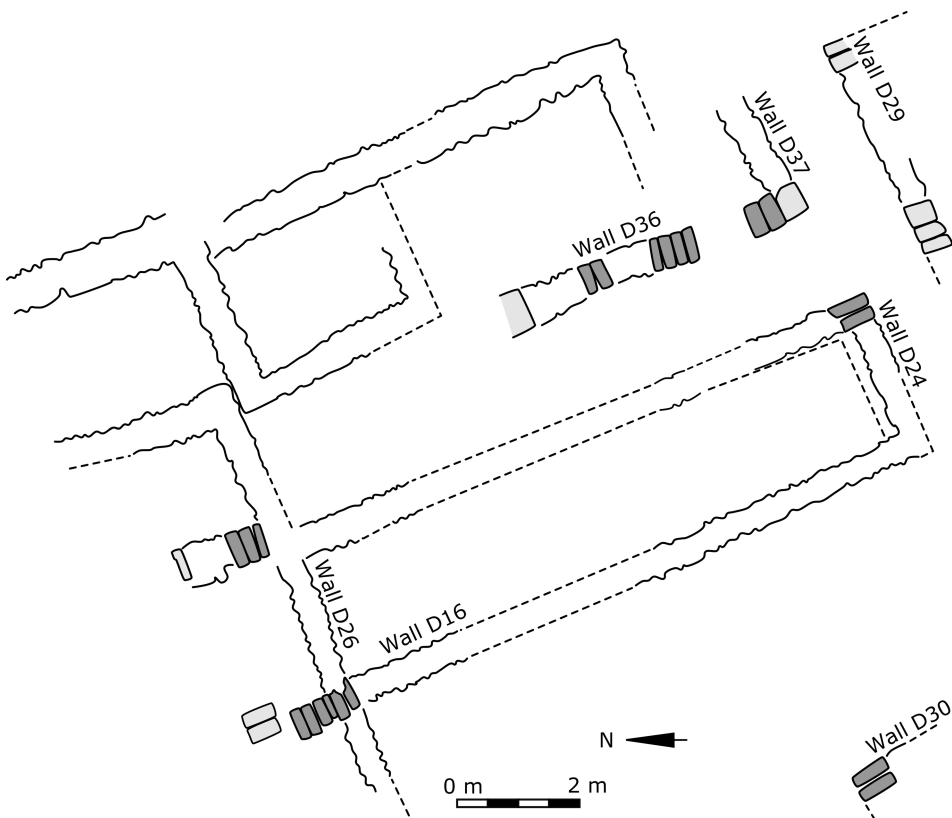
Function: unknown.

Date: 8th/7th–3rd cent. BCE.

According to Stern, M. Prausnitz found walls in the pier-and-rubble technique in multiple phases ranging from the late Iron Age to the Hellenistic period in his excavations within the settlement of Achzib. While most of these excavations of the years 1963 and 1964 have not been published and no documentation seems to exist for multiple trenches, the contexts from the largest area, Area D, are currently being analysed and a preliminary report has appeared in the meantime. Area D included a large, multi-roomed building, which was erected as a dwelling during phase 6 (later 8th cent. BCE), possibly transformed to a storage building during phase 5 (7th cent. BCE) and continuously used (with minor changes) until phase 4 (later 7th and early 6th cent. BCE). According to the

preliminary report, some walls added in phase 5 and (especially) phase 4 were built in the pier-and-rubble technique, but the plan of phase 6 already includes two blocks which may have belonged to a pier of type A or B in wall D6. Phase 5 seems to include numerous larger blocks, two of which may have appertained to a pier of type B; phase 4 (*plan 19*) has ashlar at numerous points, which may have formed piers of types B, F/I and K, although the identification of known types is somewhat problematic, since it is unclear whether the ashlar were laid as headers and stretchers or only as headers (alternatingly placed on their narrow and their wide long sides). Only one photograph has been published so far; it seems that the ashlar were worked to varying degrees. Two or three piers in wall D36 seem to be ca. 0.7–0.9m apart.

Stern 1978, 20; 1977, 20; Elayi 1980, 170, n. 38; Stern 1992b, 303; 1998, 375; Yasur-Landau et al. 2016, 201, 204 f., fig. 2, 7, 9.



Plan 19. Achzib (ez-Zib), Area D (17-AH), phase 4 (redrawn after Yasur-Landau et al. 2016, fig. 9).

18-KA-01 (plan 20)***el-Kabrī*, Area E**

Technique: pier-and-rubble technique.

Function: casemate wall of fort.

Date: phase E3–E2 (9th cent. BCE).

In both phases (E3/E2, dating to the 9th cent. BCE), the casemate walls at *el-Kabrī* were ca. 1.6m wide and erected from rubble but included few ashlar piers. Since even the final publication contains only one partly informative photograph, the composition of these piers is hard to define. According to the plan, they belong to type C and seem to have been at least partly placed in the outer faces of the wall in the positions where transverse walls connected to its inner face but did not cover the entire width of the wall. At least one wall (W863) was partly plastered on its outside.

Pastor 1990, xxx, fig. 13; Pastor Borgonon 1991, 12; Kempinsky 1993; Pastor Borgonon 1995, 211–213, fig. 2, 3; Elayi 1996, 83; Lehmann 2002, 74, 83, 87, fig. 4: 83, 88, 90; Edrey 2019, 79.

18-KA-02****el-Kabrī*, above the courtyard of the MBA palace**

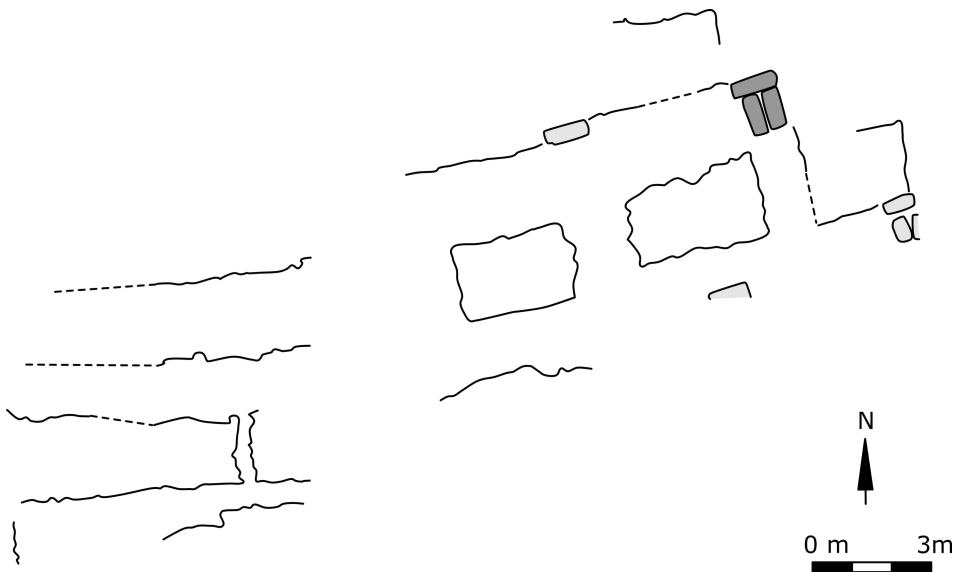
Technique: pier-and-rubble technique?

Function: unknown.

Date: 7th/6th cent. BCE.

The excavations in 2017, so far published only in a short preliminary report, uncovered parts of an Iron Age IIC building above the courtyard of the Middle Bronze Age palace. According to an aerial photograph, it was built from smallish stones, but strengthened at the corners with large blocks; furthermore, two only roughly shaped blocks may have belonged to a pier of type B.

Yasur-Landau et al. 2017, fig. 4.



Plan 20. *el-Kabrī*, Area E (18-KA-01) (redrawn after Lehmann 2002, fig. 4: 83).

19-NA***Tēl Nahāriyā, Stratum III**

Technique: pier-and-rubble technique?

Function: unknown.

Date: Stratum III (late 5th/early 4th cent. BCE).

At least parts of three walls may be assigned to the Late Persian Stratum III. According to various preliminary reports, they were composed of a combination of ashlar piers and sections in (smallish) rubble. Since the excavation has not been more fully published, a closer technical characterisation is impossible.

Yogev 1983; Briend 1990, 111; Yogev 1993, 1089; Elayi 1996, 93; Khries 2016, 82.

20-AK-01 (plan 21, fig. 56)**Acco (Tell el-Fuḥḥār), Area A**

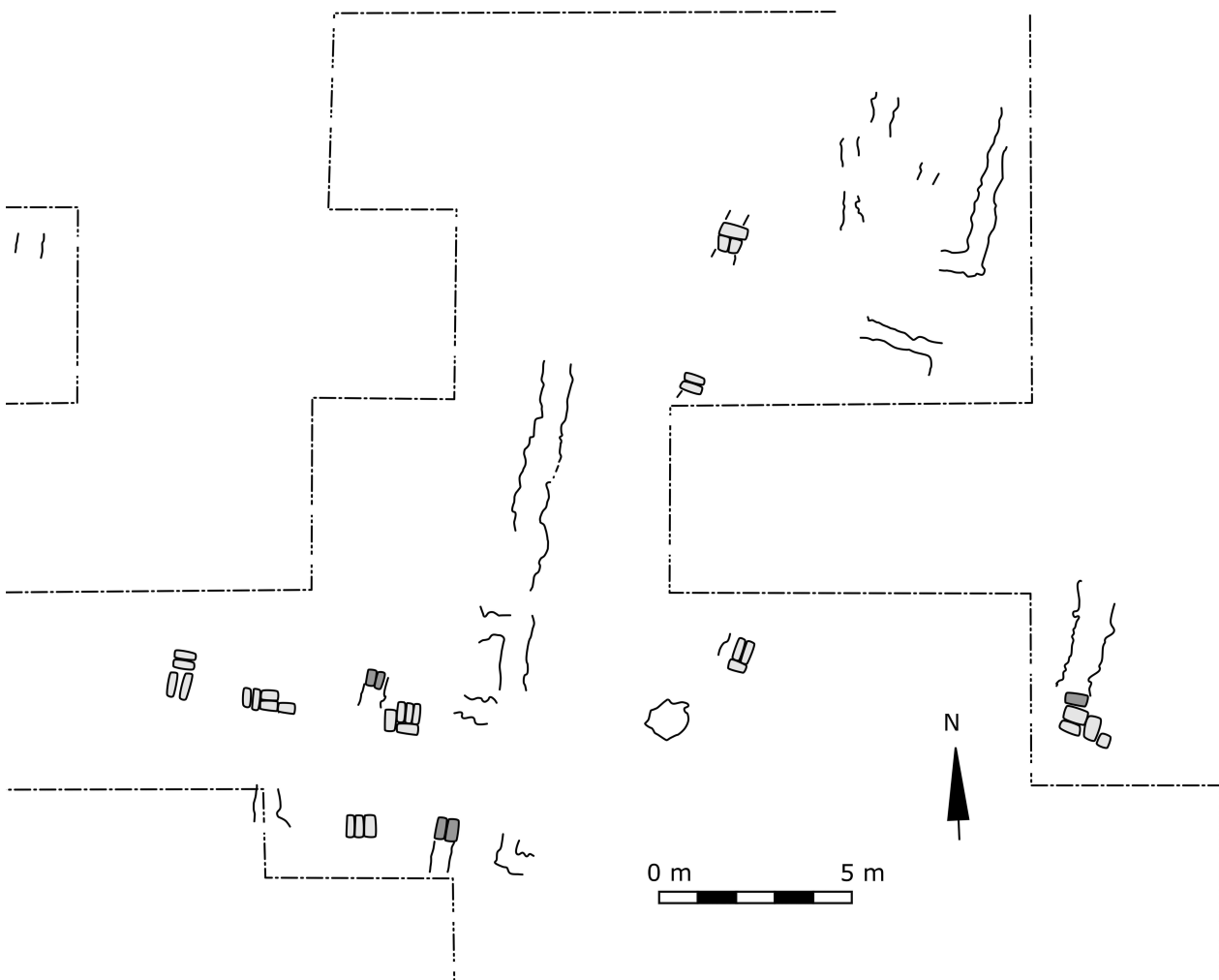
Technique: pier-and-rubble technique.

Function: unknown.

Date: layer 4 (5th/4th cent. BCE).

In Dothan's excavations (1973–1989), layers 6 and 5 were hardly separable and included a large (domestic?) complex with at least seven rooms arranged around a courtyard. It was probably erected in the 6th cent. BCE (layer 6) and continuously used in layer 5. According to the preliminary report, the walls were built with rubble, but strengthened with ashlar at the corners. The renewed excavations (2010–2016), which covered the directly adjacent area to the south, uncovered more walls of the same type.

Indisputable evidence for the pier-and-rubble technique can only be found in layer 4 (5th/4th cent. BCE). In Dothan's excavations, parts of a Late Persian wall were conserved to a height



Plan 21. Acco (Tell el-Fuḥḥār), Area A (20-AK-01) (redrawn after van Horn 2017, fig. 6).

of ca. 1m and a length of ca. 1.5–2m; the wall was connected to two floors, and an ‘oven’ was excavated on the upper one. The wall seems to have been ca. 0.5–0.6m wide and consisted of two ashlar piers of type B2 connected through a section of uncoursed random rubble ca. 0.6m long (*fig. 56*). The ashlar piers were finely cut and roughly or even finely smoothed; the course height was inconsistent. Numerous other buildings of layers 4/5 were renovated in the vicinity, but the preliminary report does not give details regarding their building techniques – they were probably entirely built in rubble masonry. In a distance of about 15m, a large (public?) building was erected in pure ashlar masonry. The renewed excavations revealed remains of at least 22 walls (most seemingly rather badly preserved), which included ashlar piers in at least ten cases. Mostly, only few ashlar piers were preserved, sometimes not connected to sections in rubble, so that it remains somewhat unclear whether all of these ashlar piers originally belonged to ashlar piers within rubble walls (as van Horn 2017, 23 suggests) – but this seems clear in at least two cases. The piers belong to types B (2+), D (?), F/I (?), G (?) and J (2?). Since the excavations are more or less unpublished, no further particulars can be given. The width of the walls ranged between 0.4 and 0.85m. Dothan 1973, 258; Dothan 1976, 21 f., 27, *fig. 23*, 29; van Beek/van Beek 1981, 72; Stern 1992b, 303; Dothan 1993, 22; Markoe 2000, 193; Killebrew 2009, 264; Jigoulov 2010, 195; Olson et al. 2013, *fig. 7*; Peckham 2014, 395; Quartermaine et al. 2014, *fig. 9*; van Horn 2017, 9, 16, 23, *fig. 6*.

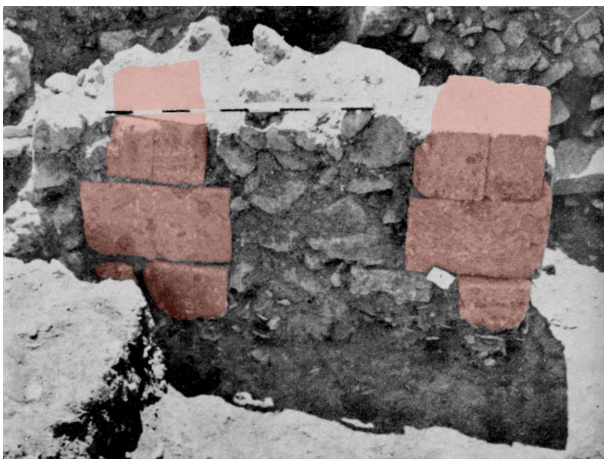


Fig. 56. Acco (*Tell el-Fuḥḥār*), Area A (20-AK-01), segment of Late Persian wall (after Dothan 1976, *fig. 29*, adapted).

20-AK-02

Acco, Area D

Technique: pier-and-rubble technique?

Function: unknown.

Date: Stratum 8 (3rd cent. BCE).

A wall conserved up to a height of more than 2.5m and belonging to the Early Hellenistic Stratum 8, which was excavated in Area D, is said to have been built with ashlar piers between sections of rubble masonry. Since no photographs or plans have been published, no technical details can be given.

Dothan 1974, 277; 1976, 35; van Beek/van Beek 1981, 72.

20-AK-03 (fig. 57–59)**Acco, ‘Courthouse Site’, Area TB**

Technique: staggered-reinforcing-header technique.

Function: residential.

Date: Stratum 9–6 (3rd–1st cent. BCE).

In Area TB, (parts of) nine walls belonged to Stratum 9 (3rd cent. BCE). They delimited a longish room and pertained to parts of various adjacent spaces; the complex can be interpreted as a dwelling of high rank. The walls were only ca. 0.3m strong and consisted of narrow, monolithic piers placed upright and in intervals of 0.7–0.9m within partly squared and partly coursed rubble. Wall W33 was preserved up to a height of ca. 1.1m, still featured one pier and was covered with opulent coloured stucco.

In Stratum 8, the Walls W4 and W32 were newly erected in the same technique. Wall 4 was revealed in a length of ca. 3m and preserved up to a height of more than 1.5m and included two monolithic piers placed above each other, but separated by a course of small, roughly squared stones (fig. 57). This is the Levantine context which comes closest to what is called a *telaio* in the west, but it cannot be really considered as evidence for a *telaio*, since the ashlar were not placed directly above each other; it may rather be a rare case of the staggered-reinforcing-header technique in which two successive ashlar were not placed in a staggered position. Some meters to the north, Wall W32, which had been preserved up to a height of 0.95m, was uncovered at a length of ca. 2m.



Fig. 57. Acco (*Tell el-Fuḥḥār*), ‘Courthouse Site’, Area TB (20-AK-03), Square K2, Wall W4 from the north (after Hartal 2016, fig. 2: 7, adapted).

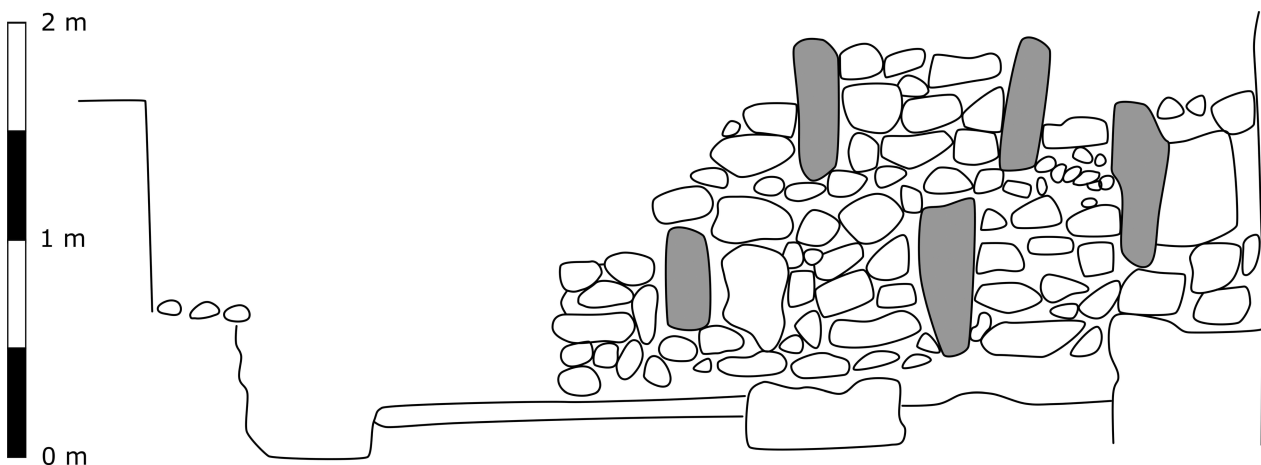


Fig. 58. Acco (*Tell el-Fuḥḥār*), ‘Courthouse Site’, Area TB (20-AK-03), elevation of Wall W11 (redrawn after Hartal 2016, profile 2: 2).

It included three monolithic piers at intervals of ca. 0.5m. The top of one of the piers seems to be broken off. The wall contained numerous spolia, for example parts of a Hellenistic grave stele, and can be dated to the late 3rd or rather the 2nd cent. BCE but was continuously used in Stratum 7 of the later 2nd cent. BCE. Remains of coloured stucco have been found in Stratum 7 in a room delimited by W32, which means that the wall was very probably stuccoed at least in its second phase.

In Stratum 6, the new Wall W11 was erected next to W4 (fig. 58, 59). It was preserved to a height of 1.35m and included a total of five only roughly squared monolithic piers placed staggered in two levels; they were furthermore horizontally separated by a course of small, roughly squared stones. The remainder of the wall consisted of small to medium-sized, mostly roughly squared blocks and was probably erected in two phases. Pieces of coloured stucco have been found on one of the adjacent floors; Wall W11 was thus probably plastered. It was probably erected within the 1st half of the 1st cent. BCE and remained in use until the end of the century.

Hartal 2016, 18–21, 23–25, 33–36, plan 2: 2, profile 2: 2, fig. 2: 4–7, 12, 27, 28.

20-AK-04

Acco, 'Courthouse Site', Area TC

Technique: staggered-reinforcing-header technique.
Function: residential/industrial.

Date: Stratum 9/7/6 (3rd–1st cent. BCE).

Few remains of walls belonging to Stratum 9 (3rd cent. BCE) have been uncovered in Area TC, and they were partly robbed. At least Walls W38 and W52 were built from small, partly squared blocks, but included at least one monolithic pier.

In the late 2nd cent. BCE (Stratum 7), numerous walls in the area, now used by workshops, were renovated or newly erected. Wall W37, preserved up to a height of 1.1m, but only in a limited length, featured two piers, which seem to have recesses in their top edges, which may stem from an earlier use.

In the 1st cent. BCE (Stratum 6), Walls W8 and W10 were erected in the area (Square L5), still used by workshops. They were both badly preserved but featured monolithic piers amongst rubble.

Hartal 2016, 21–23, 28, 40, plan 2-2, fig. 2: 2, 17, 18, 37, 38.

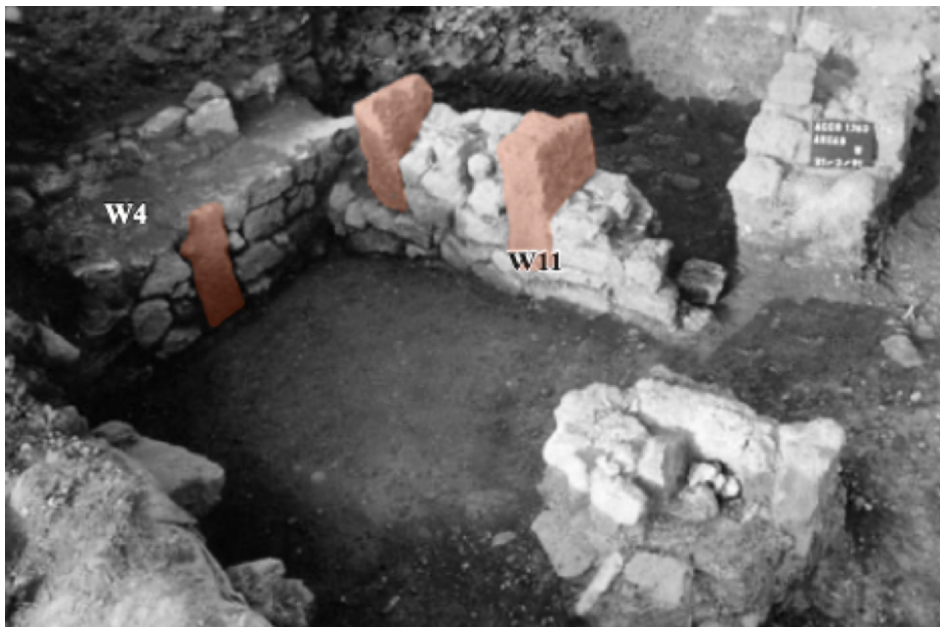


Fig. 59. Acco (*Tell el-Fuḥḥār*), 'Courthouse Site', Area TB (20-AK-03), Square K2, Wall W4 and W11 from the northeast (after Hartal 2016, fig. 2: 27, adapted).

20-AK-05 (fig. 60)**Acco, ‘Hospitaller Compound’, Unit B**

Technique: staggered-reinforcing-header technique.

Function: residential building of high rank?

Date: 3rd cent. BCE.

The excavations uncovered parts of three longish rooms, arranged one after the other, which probably belonged to a private dwelling of high rank erected in the 3rd cent. BCE. Even though the published plan indicates irregular rubble masonry, multiple walls are said to have been built in pure ashlar masonry. The three Walls W1603, W1604 and W40011, on the contrary, were erected from small, partly squared rubble and featured upright, monolithic piers. This technique may be seen in the published elevation of W40011, which shows four such piers placed ca. 0.7–0.9m apart. The blocks were ca. 0.55–0.8m high, but only ca. 0.1–0.2m wide and may have covered the whole width of the wall, probably around 0.6m. The sections between these piers were erected in mostly squared, but only partly coursed rubble. The sections between these piers were erected in mostly squared, but only partly coursed rubble. Since only a single row of piers is documented, it remains unclear whether they were arranged staggered or above each other in successive courses (but since other evidence for a *telaio* is lacking from Levantine sites, a staggered placement seems more probable). According to the excavation report, the walls were plastered on both sides, but this seems to be certain only in the case of W40011. This plaster was probably decorated, since W16011, the continuation of W40011 (erected without piers), still featured large tracts of a colourful decoration in the ‘masonry style’ (a series of small red ashlars above two courses of larger, grey ashlars).

Stern 2016, 101 f., plan 5: 2, profile 1-1.

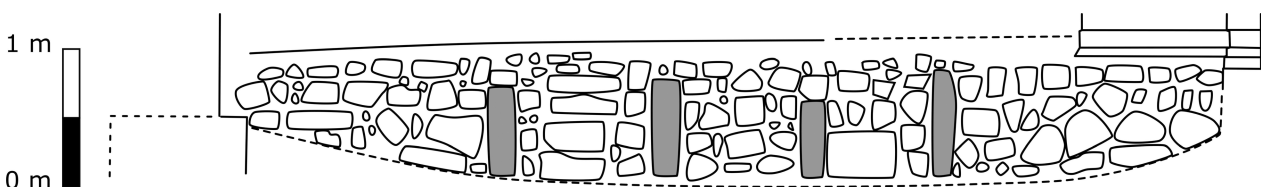


Fig. 60. Acco (*Tell el-Fuḥḥār*), ‘Hospitaller Compound’, Unit B (20-AK-05), elevation of Wall W40011 (redrawn after Stern 2016, profile 1: 1).

20-AK-06**Acco, ‘Hospitaller Compound’, Unit E**

Technique: staggered-reinforcing-header technique.

Function: unknown.

Date: 3rd cent. BCE.

The two walls W250 and W251, which met at a right angle, have only been described as ‘in Phoenician technique’ in the excavation report, but this seems to refer to what is here called the staggered-reinforcing-header technique. The published plan seems to show at least one slim, monolithic pier, probably placed upright and running through the entire width of the wall. No photographs have been published. The finds date the walls into the Hellenistic period, probably the later 3rd cent. BCE.

Stern 2016, 107, plan 5: 2.

21-IO-01 (plan 22, 23)**Iotapata (Ḥirbat Ġifāt), Hellenistic city walls**

Technique: staggered-reinforcing-header technique.

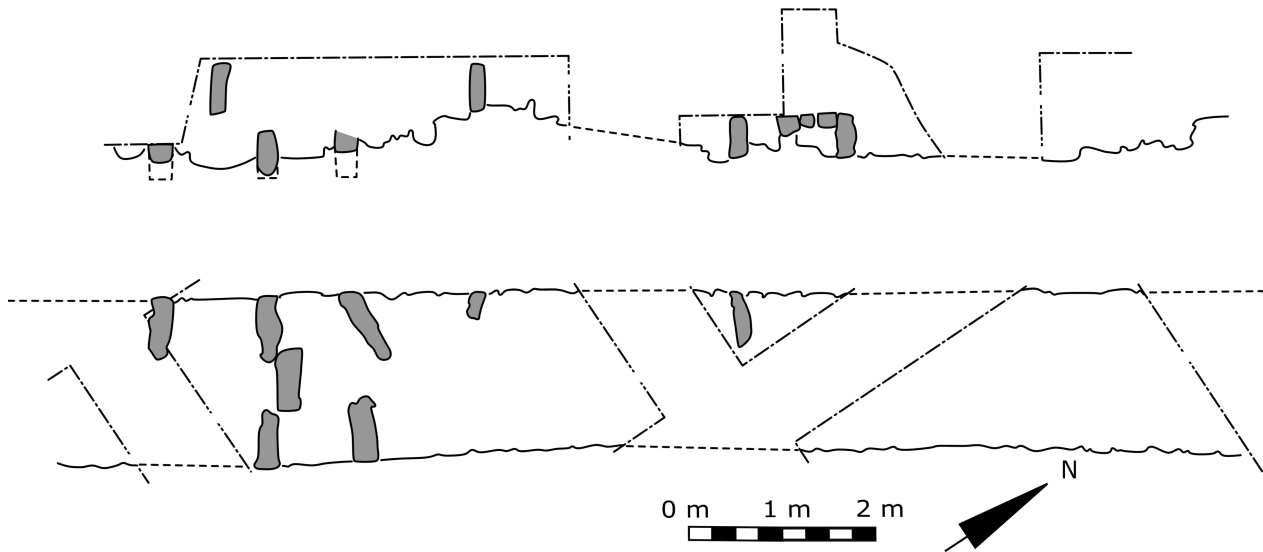
Function: fortification.

Date: Hellenistic 3 (middle of the 2nd cent. BCE).

The Hellenistic fortifications of Iotapata, dated to the middle of the 2nd cent. BCE, were preserved up to a height of 1.8–2.4m and mostly erected from small to medium-sized squared stones. Parts of the

wall included ashlar at roughly regular distances of 0.65–0.95m, which were placed staggered as upright headers on their longer narrow sides, reaching ca. 0.65–0.85m into the wall, which is ca. 1.8m wide. In some cases, two adjacent headers were compartment-like connected to each other via smaller blocks.

Elayi 1996, 84; Adan-Bayewitz/Aviam 1997, 137, 161, fig. 4, 7a, b; 8.



Plan 22. Iotapata (Ḥirbat Ġifāt), plan and elevation of a section of the Hellenistic city walls (21-IO-01) (redrawn after Adan-Bayewitz/Aviam 1997, fig. 7a).

21-IO-02 (plan 23)**Iotapata (Ḥirbat Ġifāt), Hellenistic structures**

Technique: staggered-reinforcing-header technique.

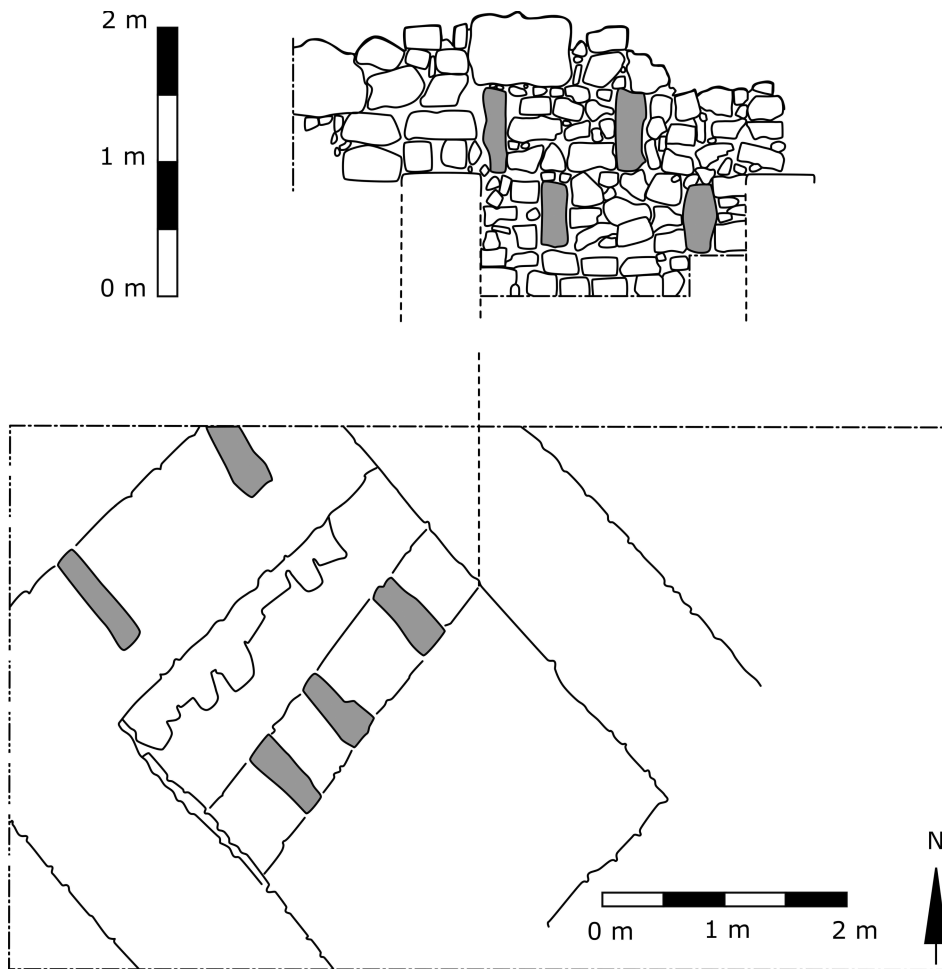
Function: unknown.

Date: Hellenistic 1/2 (3rd/2nd cent. BCE).

The walls of a Hellenistic, fort-like structure as well as a piece of wall excavated below the

Hellenistic fortifications were erected from small to medium-sized squared blocks, but include roughly hewn headers, standing upright, positioned in a regular fashion. No elevations or informative photographs have been published.

Elayi 1996, 84; Adan-Bayewitz/Aviam 1997, 135, 137, 161, fig. 4, 7b; 8.



Plan 23. Iotapata (Ḥirbat Ġifāt), plan and elevation of a section of the Hellenistic city walls (21-IO-01) above earlier Hellenistic structures (21-IO-02) (redrawn after Adan-Bayewitz/Aviam 1997, fig. 7b).

22-AH (plan 24, fig. 61)

Tell Abū Ḥawām, Stratum IIb

Technique: pier-and-rubble technique.

Function: agricultural estate/residential and storage buildings.

Date: Stratum IIb (4th cent. BCE).

Hamilton's excavations in 1932/1933 uncovered many buildings in Stratum II, which may partly be interpreted as dwellings and storage spaces. A large part of these walls was built in partly coursed random rubble masonry and included ashlar piers of type B2 at roughly regular intervals of 2–3m. Hamilton's plan shows 27 such piers, which were preserved to up to five courses (ca. 1.3m). The ashlars were finely cut and either only roughly hewn or roughly smoothed and seem to originate partly in earlier buildings, as various holes in their view faces suggest. The walls can be assigned to multiple sub-phases of Stratum II, which may all be dated into the 4th cent. BCE. Indications that the pier-and-rubble technique was already used at *Tell Abū Ḥawām* in Stratum III (Iron Age II) or even Stratum IVb (Iron Age I) (Balensi 1985, 68; Balensi et al. 1985, 122) cannot be verified; they probably confused this technique with the monolithic-column-technique indeed used at the site in at least one earlier building.

Hamilton 1934, 78 f., pl. 20, 21: 2; 1935, 2, pl. 1, 2: 1; Stern 1968, 213; 1977, 21; van Beek/van Beek 1981, 74 f., pl. 6c; Balensi 1985, 68; Balensi et al. 1985, 122, fig. 8, pl. 5a; Finkelstein 1989, 226 f., 232, fig. 10, pl. 11b, d; Balensi et al. 1990, 127, 134, 155, fig. 3; Stern 1992b, 303; Balensi et al. 1993, 9 with fig.; Carayon 2008, 75; Beyl 2013, 116; Khries 2016, 92, fig. 2: 53, plan 2: 55.

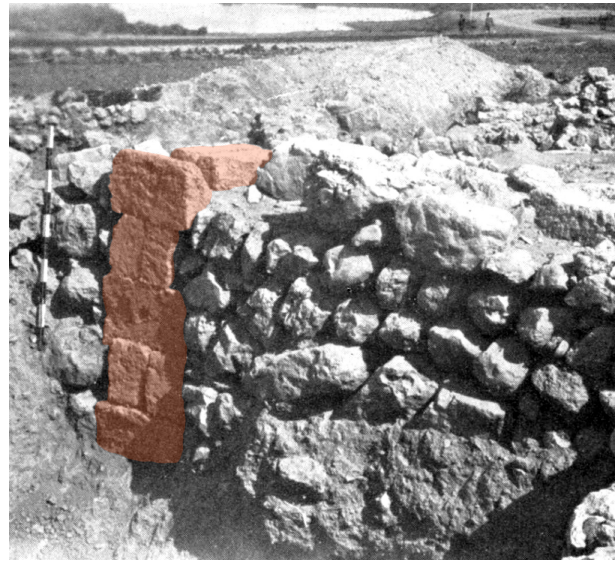
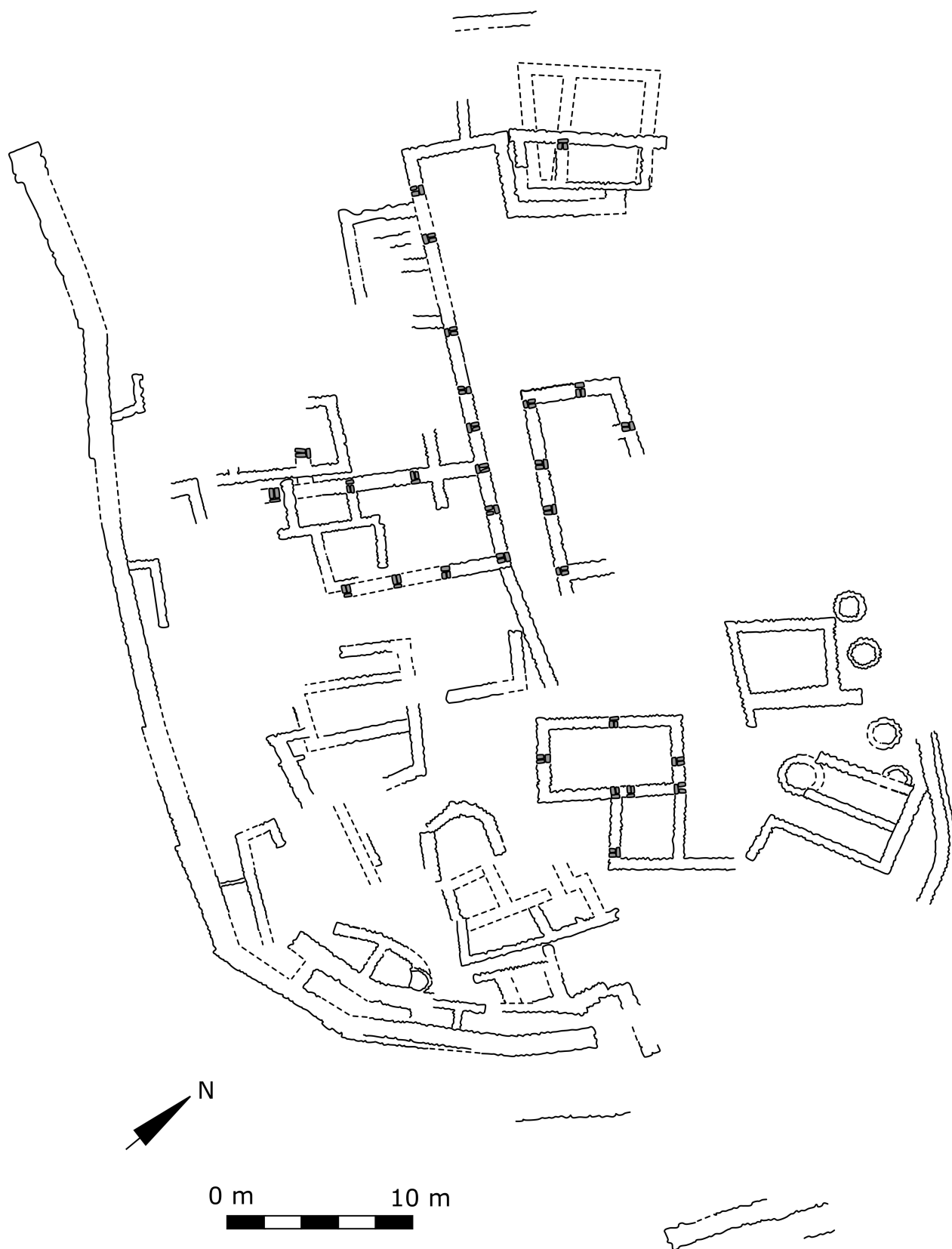


Fig. 61. *Tell Abū Ḥawām*, Stratum 2 (22-AH), wall in the northwest of Tell from the south (after Balensi et al. 1985, pl. 5a, adapted).



Plan 24. *Tell Abū Ḥawām*, Stratum IIb (22-AH) (redrawn after Hamilton 1935, pl. 1).

23-YO***Yoqna'am (Tell Qēmūn), Area A, Building 1558***

Technique: pier-and-rubble technique?

Function: unknown.

Date: phase X/IX (late 5th or early 4th cent. BCE).

The badly preserved walls W1022/1044 and 1051 of Building 1558 were, according to the excavation report, built from small rubble, but include multiple ashlar piers. They belong to phases X (W1022) and IX (W1044, W1051), which date back to the 5th and early 4th cent. BCE. The walls were ca. 0.6m wide and the plan suggests that none of them is preserved with more than one pier; the one in W1051 seems to have comprised two roughly cut blocks used as stretchers, while the one in W1022/W1044 may have consisted of a single squarish block. Since only a schematic plan and no photographs have been published, no technical details can be given.

Ben-Tor et al. 1983, 33, fig. 1; Briend 1990, 117; Elayi 1996, 84; Cimadevilla 2005, 410, plans IV: 1, 2; Khries 2016, 41 f., plan 2: 27.

24-DO-01***Dor, Area A0***

Technique: pier-and-rubble technique.

Function: residential?

Date: phase VI/6 (5th cent. BCE).

In the small Area A0, only some of the very badly preserved walls of phase 6 (5th cent. BCE) seem to have contained ashlar piers: W37 included a pier of type D, and remains of two more such piers probably belonged to walls W50 and W51.

Stern 1995b, plan 4: 2; Sharon 1995, 53 f., photos 5: 3, 5, 9, 11, plan 5: 6.

24-DO-02 (plan 25, fig. 62–65)**Dor, Area A1**

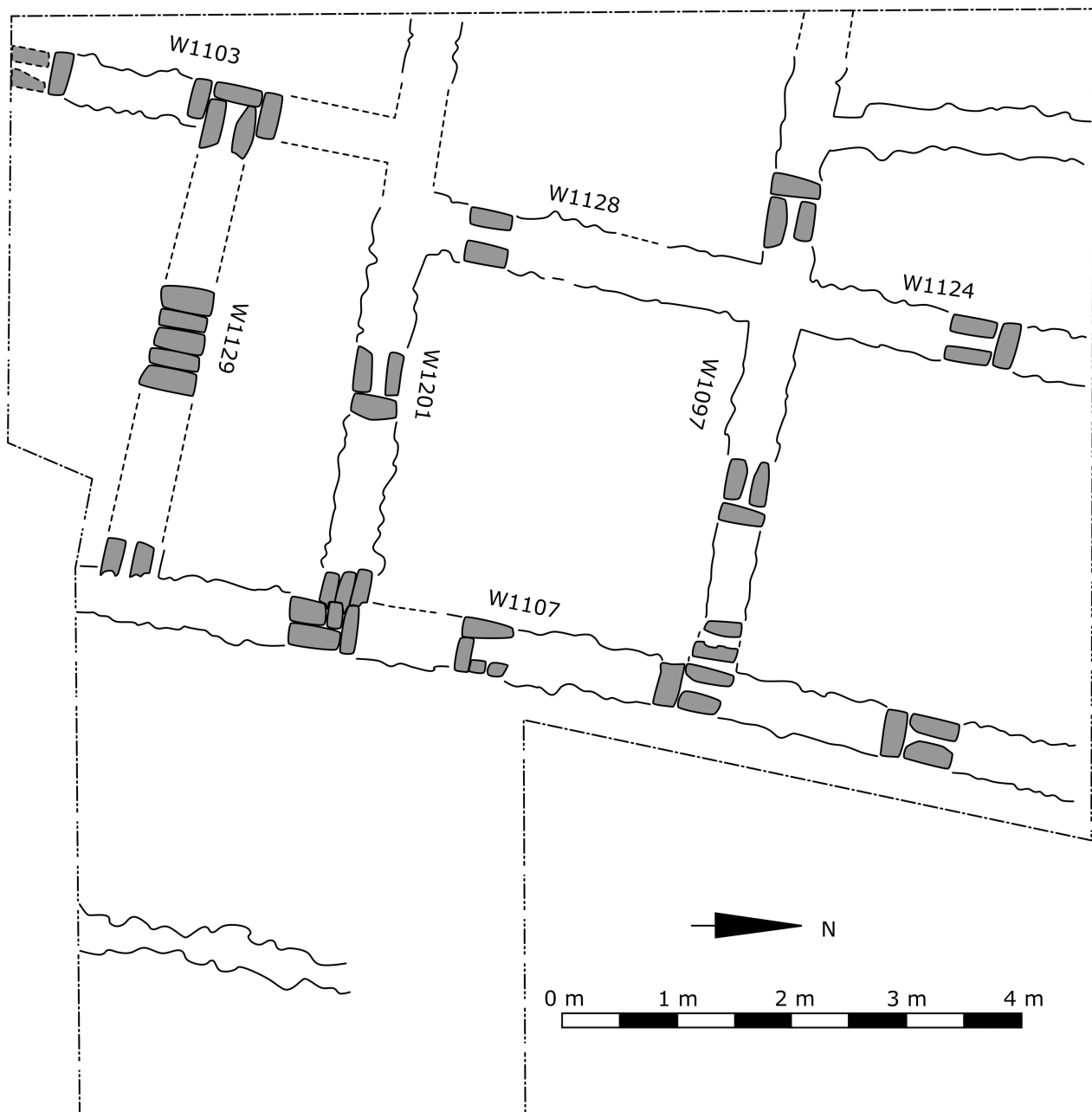
Technique: pier-and-rubble technique.

Function: residential.

Date: phase VI/6, V/5, IV/4–3, III/2 (5th–1st cent. BCE).

Parts of a well-preserved habitation quarter of the Persian and the Hellenistic periods with at least eight rooms have been excavated in Area A1. Most of the walls in all phases (6–2) were built in the pier-and-rubble technique; they were consistently ca. 0.45m wide and sometimes preserved to a height of more than 2m or

seven ashlar courses. At least some walls seem to have no foundations. The piers were mostly ca. 0.9–1.6m apart and of type D1 (nine piers), but individual piers of types B, H, J, M and CH are also documented. Two piers flank a doorway, and some others strengthen intersections of walls (especially those with the façade wall), but most are placed within straight walls. The ash-lars were of roughly uniform size, finely cut and sometimes roughly hewn and sometimes roughly smoothed; the course heights are more or less consistent and the random rubble is partly coursed.



Plan 25. Dor, Area A1 (24-DO-02), phase 5 (redrawn after Sharon 1995, plan 5: 5).

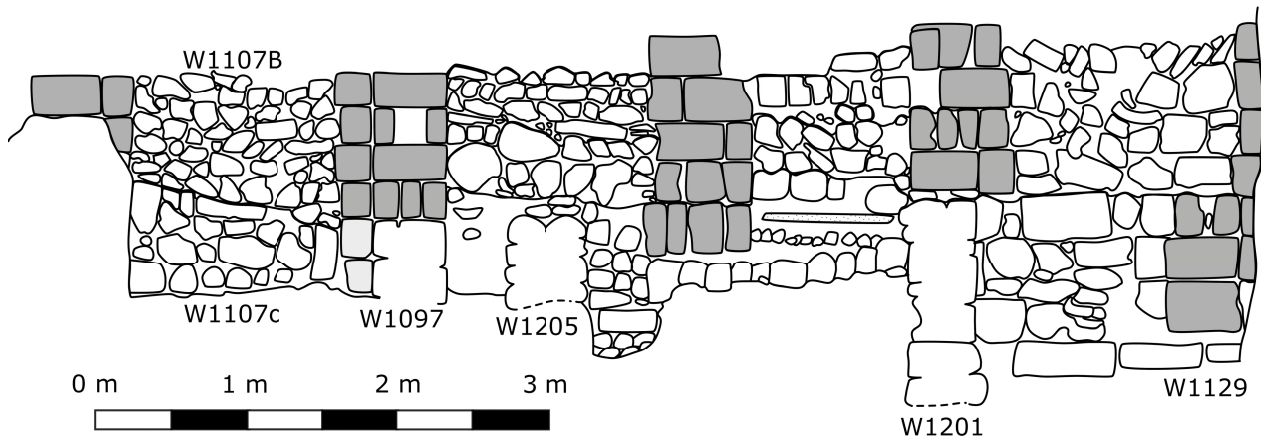


Fig. 62. Dor, Area A1 (24-DO-02), elevation of Wall W1107 (redrawn after Sharon 1995, section 5: 3).



Fig. 63. Dor, Area A1 (24-DO-02), façade W1107 with ashlar piers in W1107b above W1107c (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1037, adapted).



Fig. 64. Dor, Area A1 (24-DO-02), lower threshold of door in W1097 (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1034, adapted).

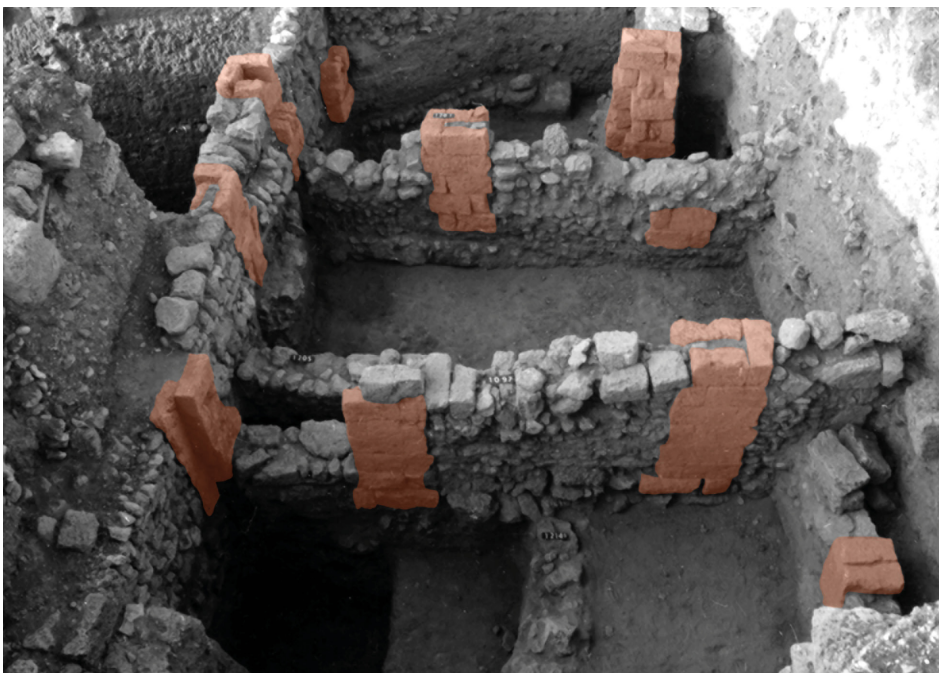


Fig. 65. Dor, Area A1 (24-DO-02), general view from the north, with walls W1097 and W1205 across (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1036, adapted).

The masonry and especially the composition and placement of the piers is more homogeneous in the earlier phases 6 (5th cent. BCE) and 5 (4th cent. BCE); in phase 4 (3rd/2nd cent. BCE), some of the piers got larger, while other walls did not have any piers, at all.

Stern 1980, 211; 1983, 260; 1985b, 61; Sharon 1987, 28; Stern 1990a, 151; Elayi 1996, 81; Stern 1994, 161, 213; 1995b, 32, 34, 37, plans 4: 2–6; Sharon 1995, 53 f., 60 f., 63 f., 67–69, fig. 5: 3, photos 5: 1, 2, 6–8, 12, 14, 15, 17, 20, 21, 24–41, plans 5: 2–6, profiles 5: 2, 3.

24-DO-03 (fig. 66)

Dor, Area B

Techniques: pier-and-rubble technique, staggered-reinforcing-header technique.

Function: residential?

Date: IV/III (3rd–2nd cent. BCE).

Remains of Hellenistic buildings excavated in the surroundings of the inner face of the city gate in Area B2 were partly erected in the pier-and-rubble technique, but no further particulars can be given. Just like in Area C1/A2, a row of edifices with strengthened outer walls for defensive purposes may have existed in the Late Persian and Early Hellenistic periods in Area B1, and these were likewise built in the pier-and-rubble technique (and seemingly partly in the staggered-reinforcing-header technique). The only photograph published so far shows parts of a wall (W2557) with two piers of type N, ca. 1.1m apart and conserved up to six courses. The ashlar seem to have been finely cut, but only roughly hewn; the rubble is random and uncoursed.

Stern 1982a, 116, fig. 4; 1984a, fig. 99; 1985a, 22 f.; 1985b, 62; 1990a, 151; Stern et al. 1992, 36, 38; Stern 1993a, 363; 1994, fig. 96; Stern/Gilboa 1994, 38; Sharon 2009, 375.



Fig. 66. Dor, Area B (24-DO-03), section of façade wall of Persian period building (photo by H. Goldfried, courtesy of Tel Dor Project, ID p21Z2-0482, adapted).

24-DO-04 (plan 26–28, fig. 67–71)**Dor, Area C0**

Technique: pier-and-rubble technique.

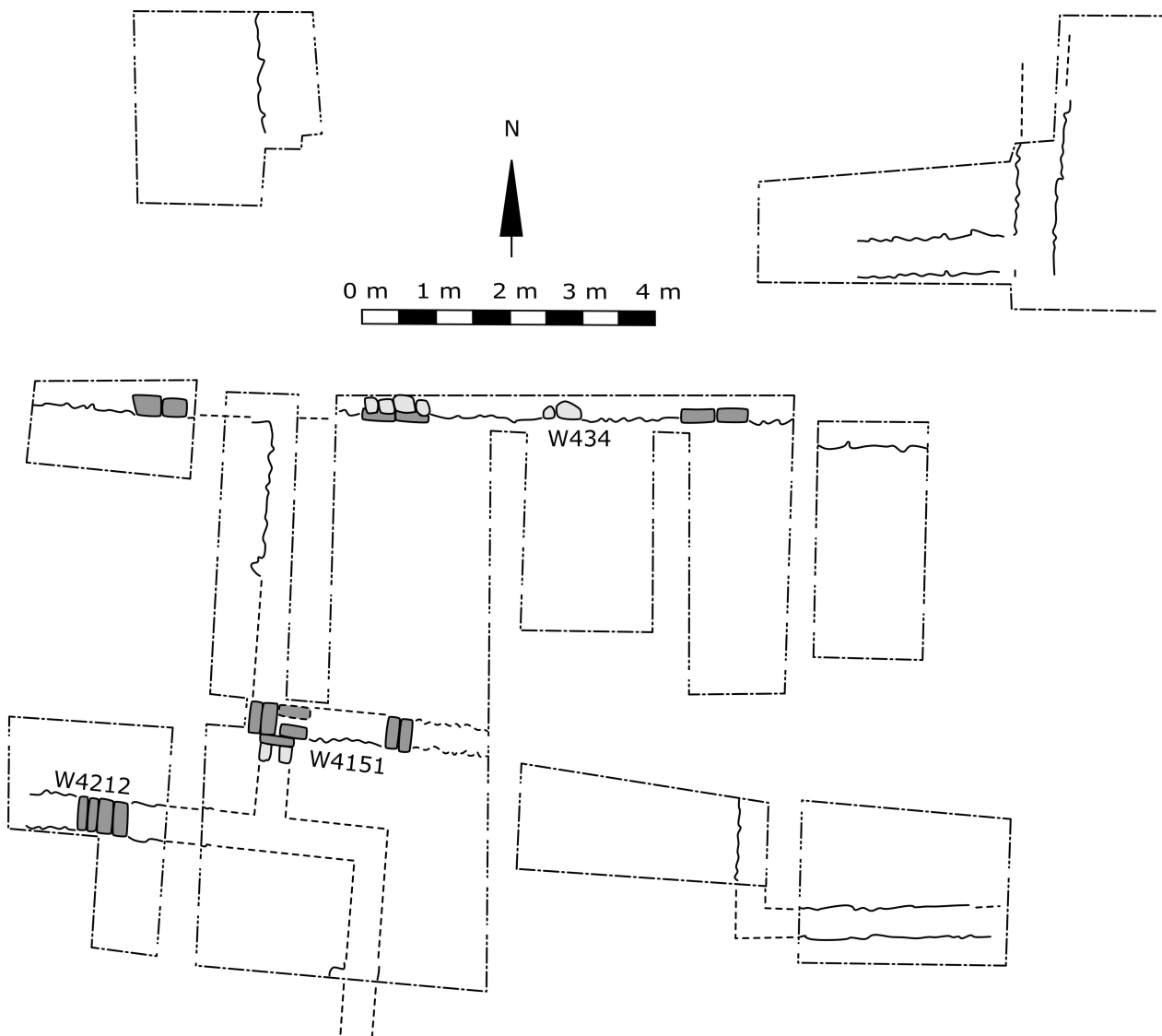
Function: residential.

Date: phase VI/6, V/5, IV/4, III/3 (5th–1st cent. BCE).

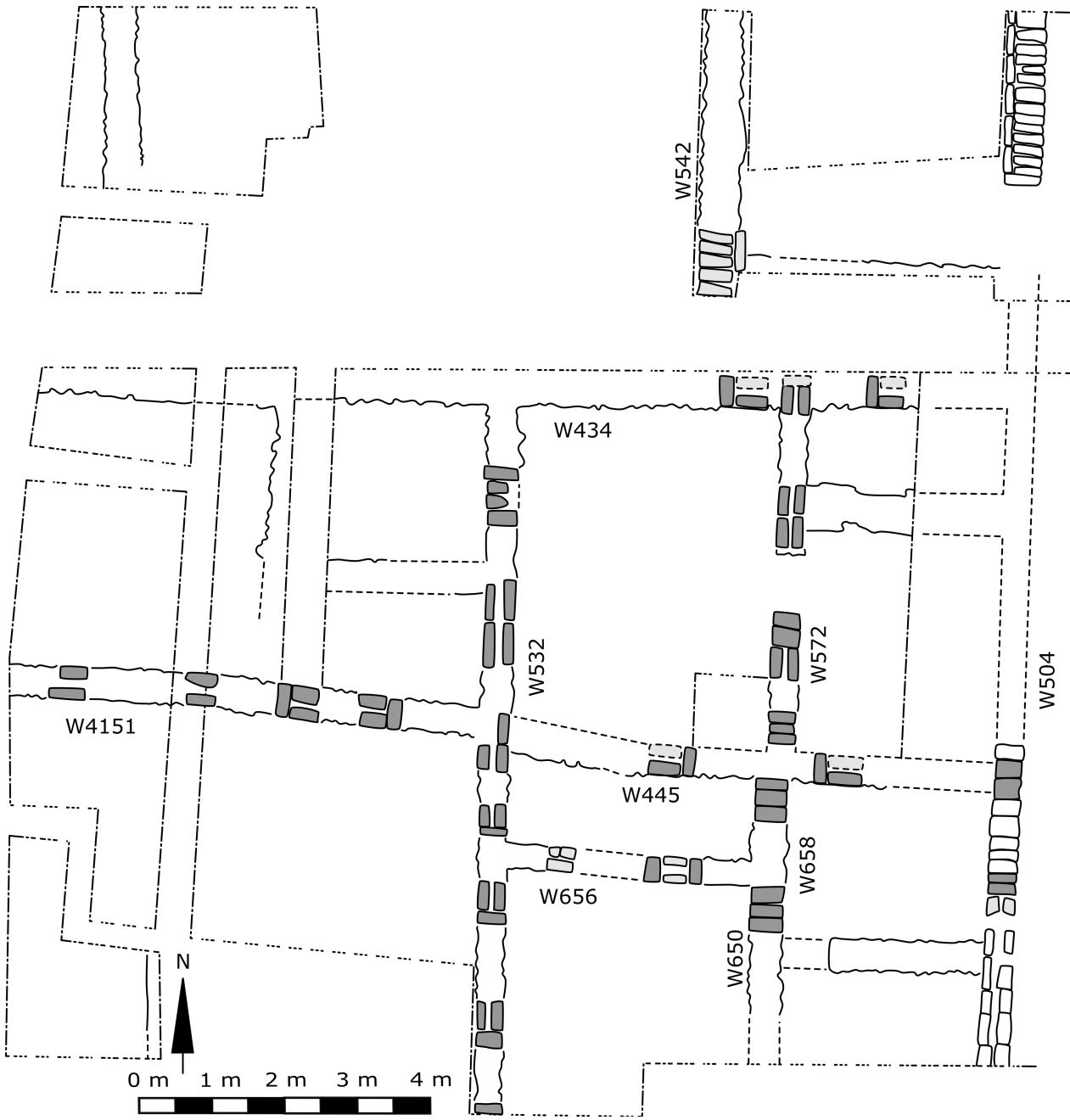
In Area C0, substantial parts of a habitation quarter of the Persian and Hellenistic period with at least 25 rooms (in phase 4) were revealed. Only few remains can be assigned to the earliest **phase 6** of the 5th cent. BCE (plan 26), but they prove that the pier-and-rubble technique was already used. At least three piers of types E/F, probably two piers of type D2 and K and one pier each of types B and probably J can be identified. The distances between the four piers of W434 amounted to 1.3–1.8m. As in the later phases, the walls were consistently

ca. 0.45m wide and the ashlar were finely cut and roughly smoothed; the course heights were not entirely but fairly consistent in the later phases.

Phase 5 of the 4th and 3rd cent. BCE can be grasped much better (plan 27). Most of its walls were erected according to the pier-and-rubble technique; only rarely, pure rubble masonry was used (especially in W434, which featured multiple piers in phase 6, see fig. 67), and the façade was mainly built of pure ashlar masonry. Most piers can be assigned to type D (at least ten), but types B (three?) and H (four) were common as well, and types F/I (two), I, J (two) and K were likewise present. A massive pier at the intersection of W498 and W542, made of four headers and a stretcher, is extraordinary. The piers were placed 0.6–1m apart.



Plan 26. Dor, Area C0 (24-DO-04), phase 6 (redrawn after Sharon 1995, plan 5: 16).



Plan 27. Dor, area C0 (24-DO-04), phase 5 (redrawn after Sharon 1995, plan 5: 17).

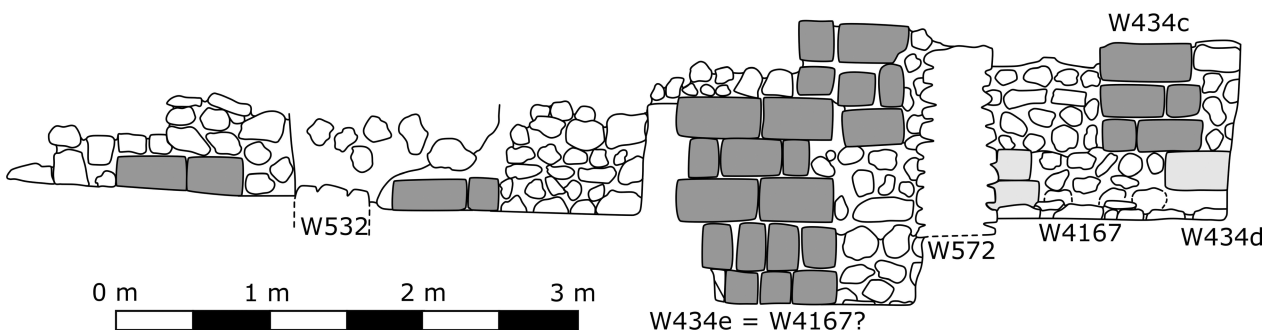
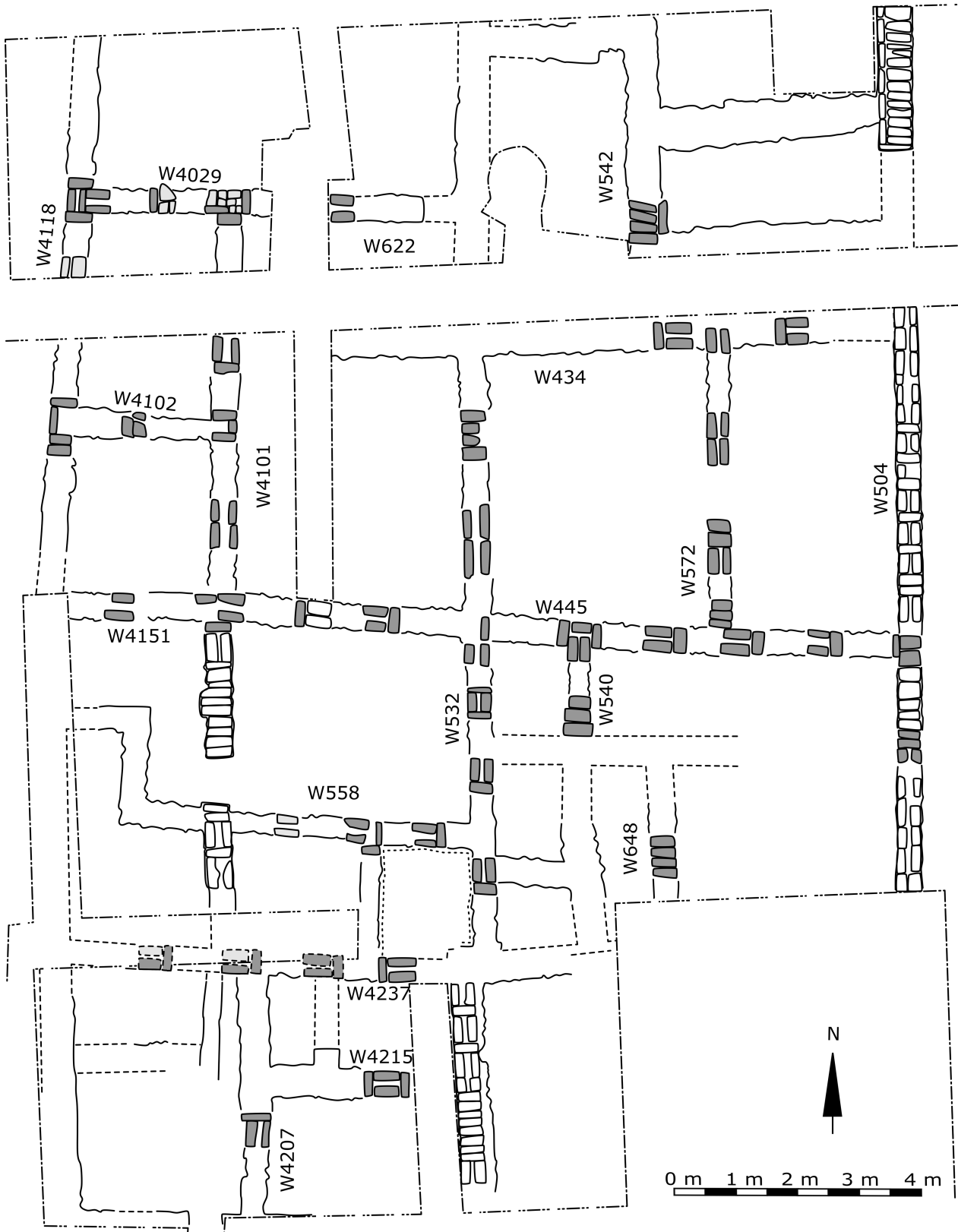


Fig. 67. Dor, Area C0 (24-DO-04), elevation of wall W434 (redrawn after Sharon 1995, section 5: 4).



Plan 28. Dor, Area C0 (24-DO-04), phase 4 (redrawn after Sharon 1995, plan 5: 18).

The largest amount of evidence is known from **phase 4** of the 3rd and 2nd cent. BCE (*plan 28*); the context pertaining to it was also called the ‘Phoenician House’ by the excavators. Many walls from phase 5 were reused and extended, with additional courses added to their piers, resulting in walls which were still more than 2m (or eight courses) high. The façade and some other walls were built of pure ashlar masonry, and few walls entirely of rubble, but most of the many walls included ashlar piers. Type D2 is most common with at least 20 occurrences, but also types B (at least two), H (at least four), I (one), J (one), K (two) and CH (at least three, one of them slightly diverging) are known, and few piers of other, less recurring types present. At least the small Room L593 was plastered.

In phase 3 of the 1st cent. BCE, the pier-and-rubble technique was not used anymore; most walls were now built entirely with ashlars.

Stern 1980, 212 f., fig. 2, pl. 26a; 1982a, 113, fig. 3, pl. 13a; 1984b, 22; Sharon 1987, 28, fig. 3; Stern 1990a, 151; Raban/Stieglitz 1993, fig. on p. 14; Stern 1993a, 361; 1994, 161, 213, fig. 171a; 1995b,

plans 4: 2–6; 1995a, 439; Sharon 1995, 90–134, photos 5: 50–52, 56–59, 61–63, 67–69, 71–73, 78–81, 84–86, 102, 108, 111, plans 5: 15–18, profile 5: 4.



Fig. 68. Dor, Area C0 (24-DO-04), W532 (at rear) and W4151 (foreground) (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1033, adapted).



Fig. 69. Dor, Area C0 (24-DO-04), general view from the northeast (photo by H. Goldfried, courtesy of Tel Dor Project, ID p22Z1-1016, adapted).



Fig. 70. Dor, Area C0 (24-DO-04), general view from the south-west (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1014, adapted).

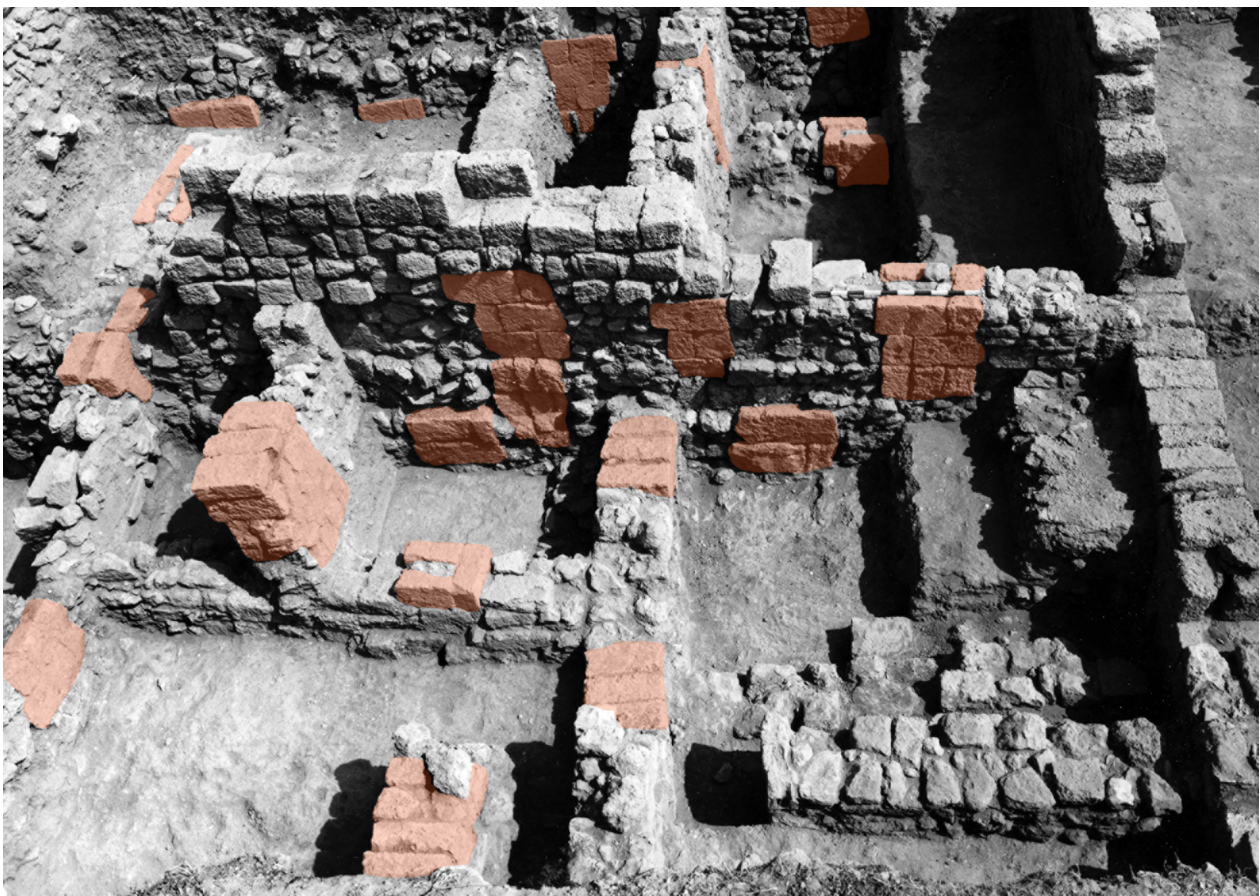


Fig. 71. Dor, Area C0 (24-DO-04), south-east unit, general view from the south, with W4151 across centre (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1013, adapted).

24-DO-05 (*plan 29, fig. 72–75*)**Dor, Area C1/A2**

Technique: pier-and-rubble technique.

Function: unknown/residential area with exterior wall reinforced for defensive purposes.

Date: phase VI/5a, VB/A/4 (5th or 4th cent. BCE).

Only the remains of a single wall (W4826) of **phase VI/5a** were uncovered in Square G45 (Area C1); it includes an ashlar pier of type D between tracts of rubble masonry. No technical details can be given.

An approximately 30m long stretch of the outer wall of the settlement (and parts of the adjoining buildings) of **phase VB/A** were revealed in Area C1 and the northern end of Area A2. It was first interpreted as a casemate wall and has often been called a fortification but seems to be only the (for defensive purposes) strengthened back wall the adjoining buildings (dwellings, workshops) have in common; Sharon calls this an ‘enclosed settlement’. The wall was only ca. 0.7–0.8m wide and consisted of ashlar piers and sections of small to medium-sized, partly coursed and partly squared rubble (although its northern part reveals a motley assortment of partly squared blocks of different sizes). There seem to be no foundations. The piers are fairly regularly placed in distances

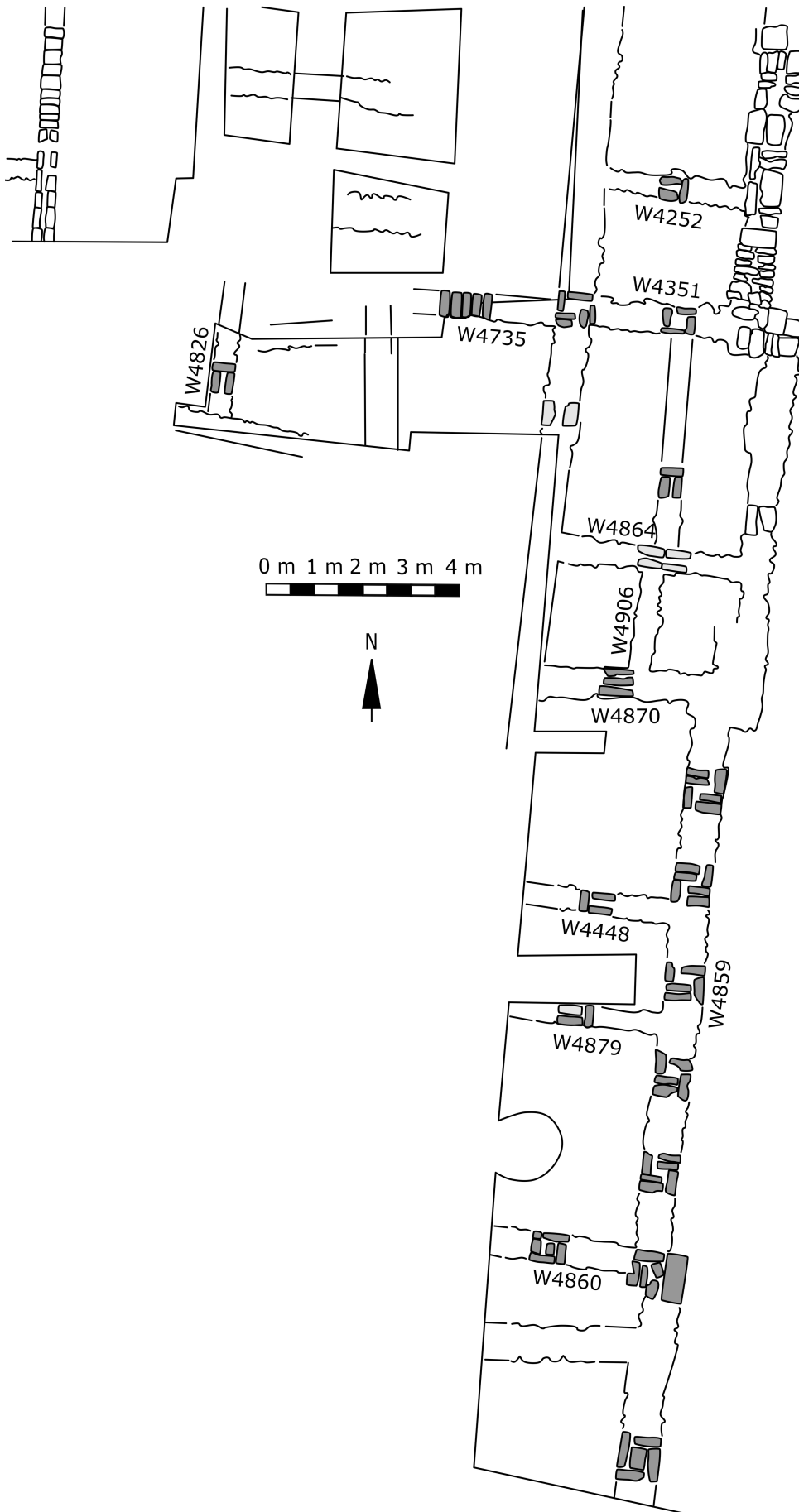
of ca. 1.1–1.2m and preserved up to four courses of mostly unequal height. Most of them pertain to type L (five piers), although a large example of type E as well as a massive pier of unusual type (integrating a very large ashlar on its outside) are also documented. The mostly longish ashlars were finely cut and at least roughly smoothed; some bossed blocks most probably stem from earlier buildings.

The transversal walls likewise were often built in the pier-and-rubble technique; their strength ranges between 0.4 and 0.5m. In the thinner walls, most piers can be assigned to type D1 (five piers), although types B (?), E (two piers), F, H (?), L and M (?) are also documented.

Stern 1984a, fig. 96; 1985a, 22; 1985b, 61 f.; Sharon 1987, 21, 27, fig. 6; Stern 1988, 9, 11, fig. 2, pl. 1c, 2b, c; 3a; Stern et al. 1988/1989, fig. 42; Stern 1989, 241, fig. 6, 7; 1990a, 153 f.; 1990b, 28, fig. 2, pl. 3c, 4a; Sharon 1991, 106 with fig.; Stern 1992a, 40; 1993a, 366; 1993b, 46; 1994, 155–157, fig. 73, 74, 90, 92; Sharon 1995, 77, 142–194, fig. 5: 25, 35, photos 5: 115, 117–119, 125, 166–169, 171, 177–179, plans 5: 12, 24, 28, 29, 32, profile 5: 6; Stern 1995b, 37, plans 4: 2–4, photos 4: 4, 7; 2001, 464 f.; Prados Martínez 2003, pl. 1 (top); Edrey 2019, 81.



Fig. 72. Dor, Area C1 (24-DO-05), general view from the west (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1028, adapted).



Plan 29. Dor, Area C1/A2 (24-DO-05), phase 4 (redrawn after Sharon 1995, plan 5: 28, 32).



Fig. 73. Dor, Area C1 (24-DO-05), general view from the north (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1015, adapted).

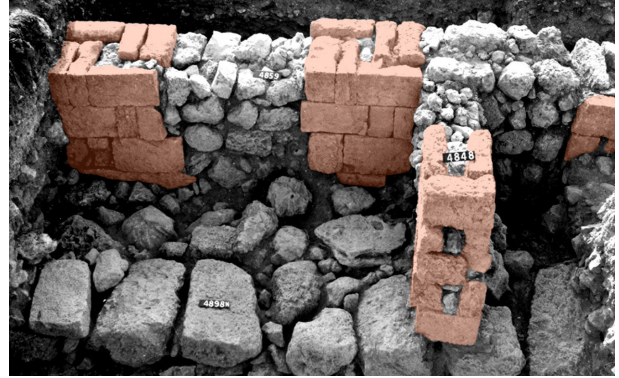


Fig. 74. Dor, Area C1 (24-DO-05), Unit E 43 from the west, W4859 at rear (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1027, adapted).

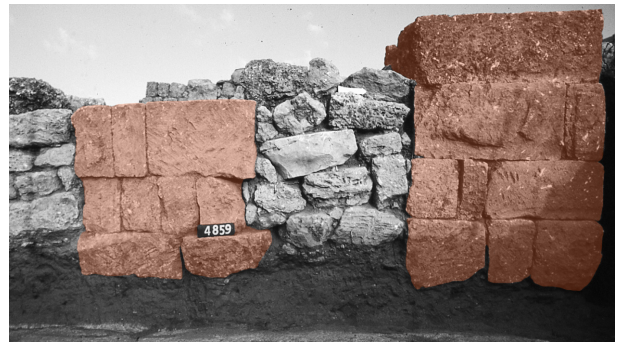


Fig. 75. Dor, Area C1 (24-DO-05), detail of façade W4859 (photo by H. Goldfried, courtesy of Tel Dor Project, ID p21Z2-1007, adapted).

24-DO-06 (plans 30, 31, fig. 76, 77)**Dor, Area C2**

Technique: pier-and-rubble technique.

Function: residential.

Date: phase VI/6a, VB/5, VA/4, IV/3 (6th–3rd cent. BCE).

In Area C2, well-preserved parts of a habitation quarter of the Persian and the Hellenistic periods with various rooms were excavated. Already in the early Persian **phase VI/6a** (late 5th/early 4th cent. BCE; *plan 30*), the walls, which were consistently ca. 0.45m thick, were erected in the pier-and-rubble technique. The six preserved ashlar piers were all of type D1 and were fairly regularly placed ca. 1.1–1.2m apart; at least W4527d was still conserved up to a height of ca. five courses (ca. 1.4m). The course heights were largely consistent, the ashlar were finely cut and roughly smoothed and the random rubble was uncoursed.

In **phase VB/5** (mid 4th cent. BCE?; *plan 31*), the walls of the preceding phase were mostly expanded on the same position; the position of the piers mostly, but not always, stayed the same. At least one pier in W4518 may now be assigned to type J, another one at the intersection of W4625 and W4632 to type G, and one at the intersection

of W4625 and W4518 did not correspond to a fixed type. At least two more piers of type D1 were also erected. Generally, the resulting image is less homogeneous than in the preceding phase, even though the technical characteristic stayed the same. The same applies to **phase VA/4** (later 4th cent. BCE), in which not all of the walls were reused. At least one pier of type D and another one of type CH were created.

The walls of **phase IV/3** (3rd cent. BCE) only included few ashlar piers, although this may be due to the fact that the ashlar have been removed later on. A pier of type D in W4564 was renewed and the newly erected walls W4151 and W4138 likewise included one pier of type B each (?). Even though the pier-and-rubble walls in Area C2 mostly have multiple phases, the preservation of the piers' positions ensures that individual examples were still over 2m high.

Stern 1981/1982, 19; 1983, 260; 1985a, 22; 1985b, 61; Sharon 1987, 28, fig. 7; Stern 1990a, 151; 1994, 161, 213, fig. 91; Sharon 1995, 213–228, fig. 5: 38, photos 5: 181, 183–186, 190, 192, 194, plans 5: 37–39; Stern 1995b, plans 4: 2–4; Elayi 1996, 81; Pittaccio 2004–2007, fig. 1.

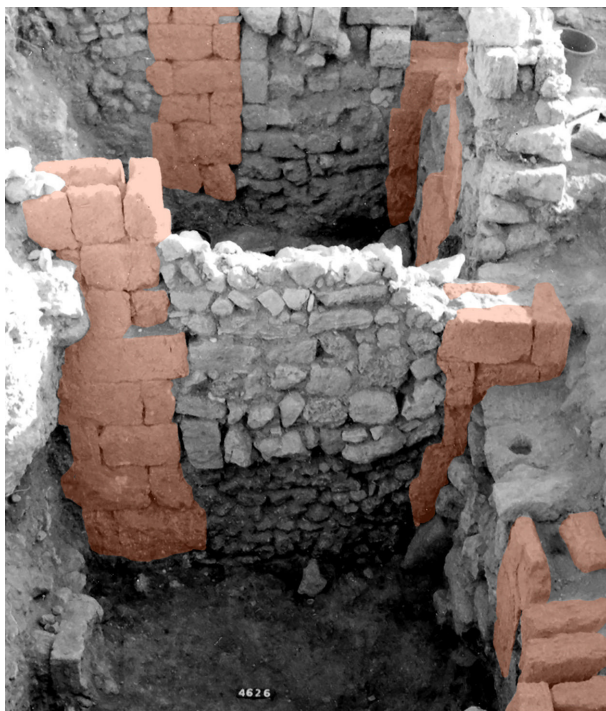


Fig. 76. Dor, Area C2 (**24-DO-06**), two lower phases of W4527 from the south, with ashlar piers in W4527c above W4527d (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1035, adapted).

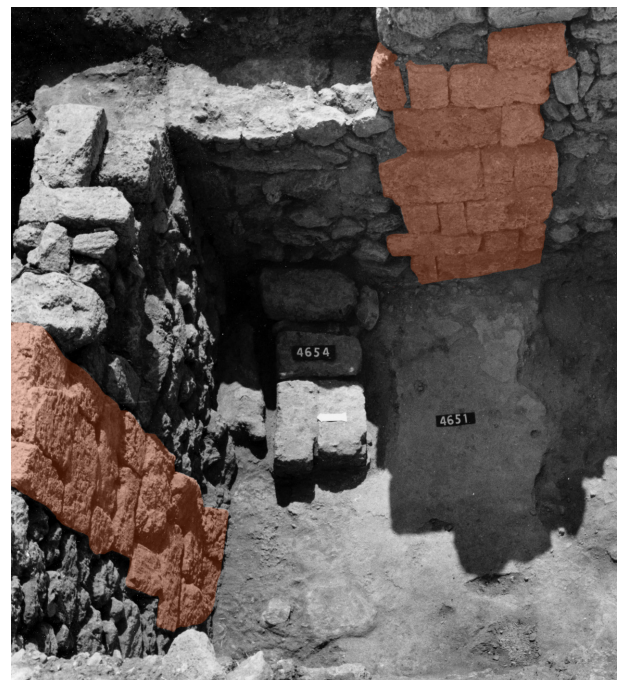
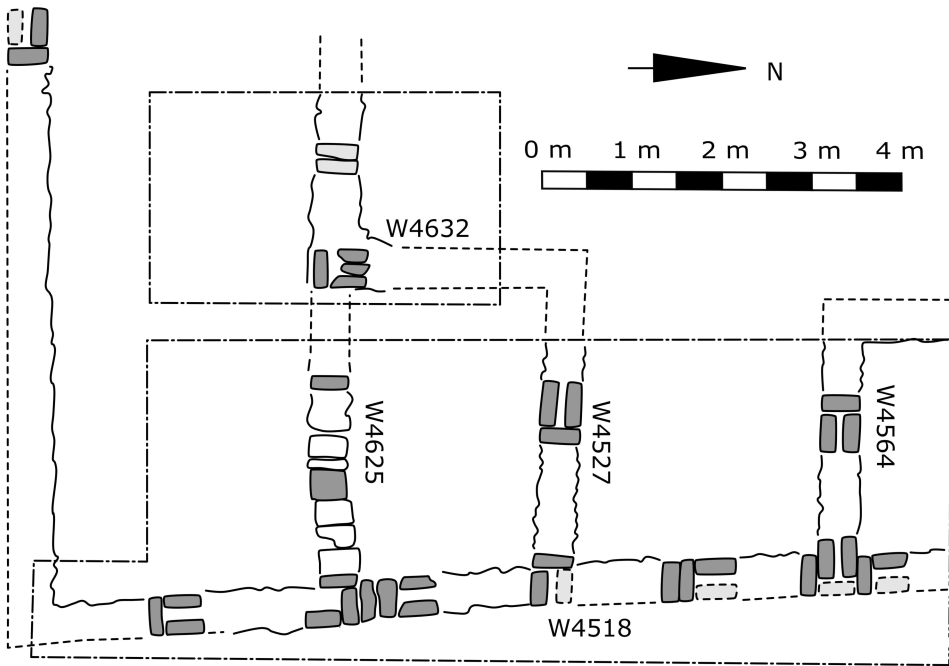
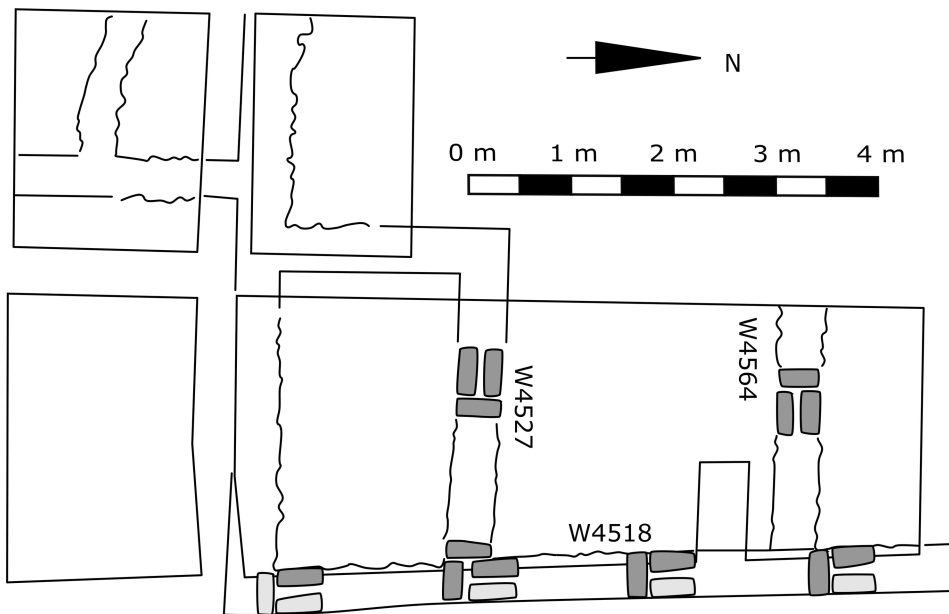


Fig. 77. Dor, Area C2 (**24-DO-06**), southern part of unit K 47 from the west, with W4527 on the right, W4564 on the left and W4518 across top (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1029, adapted).



Plan 30. Dor, Area C2 (24-DO-06), phase 6 (redrawn after Sharon 1995, plan 5: 40).



Plan 31. Dor, Area C2 (24-DO-06), phase 5 (redrawn after Sharon 1995, plan 5: 39).

24-DO-07**Dor, Area D1**

Technique: pier-and-rubble technique?

Function: unknown.

Date: 8th–5th cent. BCE?

Ashlar piers dating back to the Iron Age have been uncovered in Area D1. This could possibly be one of the walls which Stern 1991 assigns to Stratum VIII and thus dates back to the 10th cent. BCE, but I. Sharon kindly informed me that no secure evidence for the pier-and-rubble technique dating back to the Iron Age is known so far from Dor and that the wall may be Persian. Since no illustrations have been published, nothing more can be said about this possibly early occurrence of the pier-and-rubble technique.

Stern 1987/1988, 51; Stern 1990a, 151; Stern 1991, 86 f.

24-DO-08 (plan 32, fig. 78, 79)**Dor, Area D1, Hellenistic ‘public building’**

Technique: staggered-reinforcing-header technique.

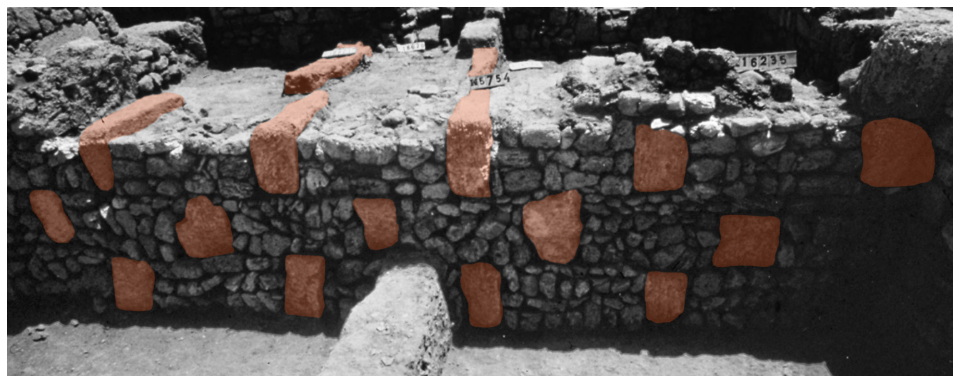
Function: public building?

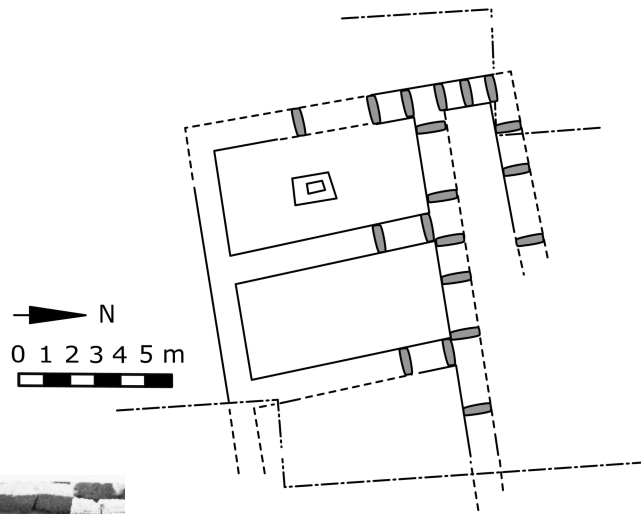
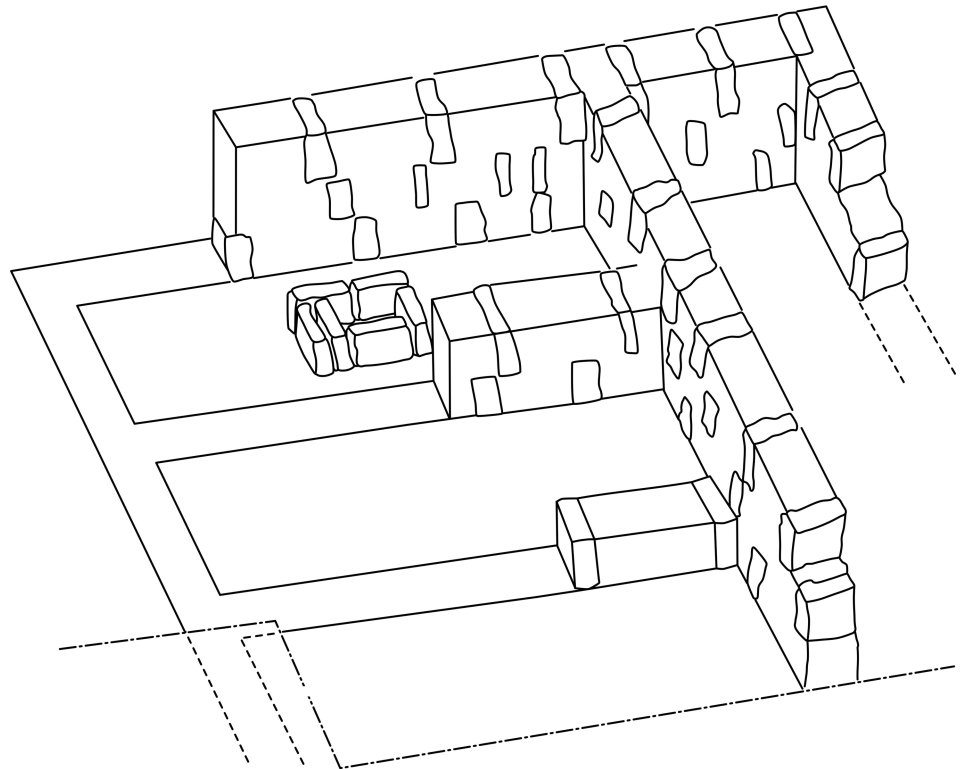
Date: 3/2 (3rd/2nd–1st cent. BCE).

This building in Area D1 was originally thought to have been erected in the Late Persian period and renewed in the Hellenistic period, but excavations in 2005 proved that its first phase is already Hellenistic (with the later being Late Hellenistic). It comprised four rooms arranged one after the other and connected by a corridor-like narrow room next to them. Its walls were all erected with mostly coursed, but rarely squared rubble and included multiple large, pier-like headers. The measures of these blocks vary, but they were fairly regularly placed, with distances of ca. 1–1.2m between them, and staggered in the successive course. While the walls of the original building were ca. 1m strong (one transverse wall even 1.2m), and the ashlar were set on their longer narrow sides, the walls of its Late Hellenistic renewal were less thick and the blocks were placed on their shorter narrow sides. The structure is interpreted as ‘public building’, but no functional interpretation is given.

Stern/Sharon 1987, 207 f., pl. 26b; Stern 1987/1988, 51; Stern et al. 1988/1989, 47 f.; Stern 1990a, 151 f.; 1993a, 361 f.; 1994, 161 f., 164; Stern/Gilboa 1995, 66; Stern et al. 1997, 33, 35 f., fig. 3, 4; Stern 1998, 379, photo 1, fig. 2; Stern et al. 1998, 38; Wolff 1998, 786; Stern 2001, 465; Sharon/Gilboa 2005; Ciafaloni 2006, fig. 7; Sharon 2009, 375–377, fig. 7; Camporeale 2014, 196.

Fig. 78. Dor, Area D1 (24-DO-08), wall in staggered-reinforcing-header technique (photo by H. Goldfried, courtesy of Tel Dor Project, ID p22Z1-1017, adapted).





Plan 32. Dor, Area D1, Hellenistic 'public building' (24-DO-08) (redrawn after Stern 1998, fig 2).



Fig. 79. Dor, Area D1 (24-DO-08), Hellenistic public building (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1018, adapted).

24-DO-09**Dor, Area D1**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 3/2 (4th–1st cent. BCE).

Numerous Late Persian and Hellenistic walls in the pier-and-rubble technique have been uncovered in Area D1 but have not yet been published in detail. The only photograph in Stern's book shows numerous walls, which include at least two piers of type D; photographs in a preliminary report show one pier each of types H and J. Some of the walls are Late Hellenistic.

Stern 1987/1988, 52; 1990a, 151 f.; 1994, fig. 148; Sharon/Gilboa 2005 (with fig.); Ciafaloni 2006, fig. 6; Sharon/Gilboa 2007 (with fig. 3. 5); Winter 2020, fig. 4: 2.

24-DO-10 (fig. 80)**Dor, Area D2**

Techniques: pier-and-rubble technique, staggered-reinforcing-header technique.

Function: residential/'warehouse'.

Date: 5th–3rd cent. BCE.

In Area D2, the 'Monumental Building' of phase D2/10 (11th cent. BCE) was erected from large boulders, but its only preserved corner was built with large, rather accurately cut ashlars about 1.3 × 0.6 × 0.6m in size (Sharon 2009, 373 f., fig. 2. 3; Sharon/Gilboa 2010, fig. 3; Gilboa et al. 2015, 59 f.). In Phase D2/8 (10th cent. BCE), another smaller building erected in the vicinity, called 'Benni's House', was built from rubble, but also featured accurately dressed ashlars at the corners (Sharon 2009, 374, fig. 2, 4; Gilboa et al. 2015, 60). Although Sharon considered these buildings 'the first appearance of this ostensibly Phoenician construction technique', they do not qualify as evidence for the pier-and-rubble technique.

On top of the Iron Age 'Monumental Building', remains of more walls in the pier-and-rubble technique partly belonging to the Persian period (and often robbed) are said to have been found. The northern wall of a (Late) Persian 'warehouse' or 'magazine' likewise included ashlar piers. This building is not yet published. Furthermore, an Early Hellenistic insula was discovered (*fig. 80*), the walls of which included many ashlar piers but



Fig. 80. Dor, Area D2 (24-DO-10), Hellenistic insula (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1019, adapted).

have not yet been published extensively. One photograph shows various walls where up to six courses of ashlar have been preserved; one transverse wall includes one pier of type D2 as well as two piers of type H, another wall a pier of type H (?) and two piers of type N. In the background, more walls are to be seen, within which one may identify at least one more pier of type N. The ashlar seem to have been finely cut and roughly smoothed and the rubble was partly coursed and squared. A second photograph shows remains of three piers of types D2 and H (two piers) in the background. One part of the northern front of the insula in D2 may include evidence for the staggered-reinforcing-header technique (Sharon 2009, 375).

Stern 1986, 25; Stern et al. 1989/1990, 31, fig. 26; Stern 1990a, 152; Stern et al. 1991, 52 f.; Stern 1993a, 361; 1994, fig. 149; Stern et al. 1997, 39 f.; 1998, 38 f.; Sharon et al. 2004; 2006; Sharon/Gilboa 2007; Sharon 2009, 374 f., fig. 2, 4; Sharon et al. 2009; Sharon/Gilboa 2011; Gilboa et al. 2014; Khries 2016, 100.

24-DO-11

Dor, Area D5

Technique: pier-and-rubble technique.

Function: unknown.

Date: phase 7/6/5/4 (8th/7th–3rd/2nd cent. BCE).

Numerous walls in the pier-and-rubble technique dating back to the late Iron Age, the Persian and the Hellenistic period were uncovered in Area D5 but have not yet been published in detail. The early dating seems doubtful. One photograph in a preliminary report seems to show to piers of types D and J in Squares AX 9–10.

Sharon/Gilboa 2007; 2009; 2011; Gilboa et al. 2014.

24-DO-12 (fig. 81)

Dor, Area E

Technique: pier-and-rubble technique.

Function: unknown.

Date: 6th cent. BCE?

According to the preliminary reports, Wall 6282, which was excavated in Area E in 1986 and included an ashlar pier, dates back to the Iron Age. One may presume that this is one of the walls which Stern (1991) assigned to Stratum VIII and was thus dated to the 10th cent. BCE – but the locus cards (kindly provided by I. Sharon) suggest a later dating. Context 6336 (a floor?), which borders the wall, had mostly Late Iron Age and some Persian pottery and a western extension of the wall, seemingly including a second pier, excavated and removed in 1989, likewise included Late Iron Age and Persian sherds. Thus, the wall most probably dates back to the end of the Iron Age at the earliest, with a date in the 6th cent. BCE being the most likely. The use of limestone instead of *kurkar* (?) and the walls' strength of ca. 0.75m, both unusual among the pier-and-rubble walls at Dor, may support such a rather early date. Two courses of the ashlar pier are conserved. At the visible front, two stretchers and two headers per course are visible, but since more headers may be seen behind the stretchers, the pier seems to represent a stronger variant of type N. The ashlar seem to have been rather roughly cut and roughly smoothed. The adjacent rubble is uncoursed and random.

Stern/Sharon 1987, 207, pl. 25c; Stern 1987/1988, 51; 1991, 86 f.; unpublished locus cards of Tel Dor project.



Fig. 81. Dor, Area E (24-DO-12), W6282 (photo by Z. Radovan, courtesy of Tel Dor Project, ID p22Z1-1020, adapted).

24-DO-13**Dor, Area E**

Technique: pier-and-rubble technique.

Function: unknown.

Date: VI–III? (5th–2nd cent. BCE?).

Various walls in the pier-and-rubble technique dating back to the Persian and the Hellenistic periods were excavated in Area E but remain largely unpublished and thus cannot be characterised in detail.

Stern 1987/1988, 52; Stern et al. 1991, 52, 54.

24-DO-14**Dor, Area F**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 4th–2nd cent. BCE?

Numerous Hellenistic walls in the pier-and-rubble technique were uncovered in Area F, but they are not yet published in detail.

Stern et al. 1989/1990, 31; 1991, 52; Stern 1993a, 363.

24-DO-15**Dor, Area G**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 4th–2nd cent. BCE?

Multiple Hellenistic walls in the pier-and-rubble technique were excavated in Area G but are not yet adequately published. Various photos show wall W9278 of phase 3, which includes three piers of types D, G (?) and CH between sections of random rubble; two other photos show a pier of type L in wall W9058. It seems very probable that remains of more piers existed, but this will be clarified with the publication of the Persian/Hellenistic phases.

Stern et al. 1989/1990, 31; Estes/Zorn 2018a, fig. 4: 1; 2018b, fig. 5: 1, 2; Estes 2018, fig. 7: 6; Zorn 2018, fig. 8: 3, 4.

25-ME-01 (*plan 33, fig. 82, 83*)

Megiddo (Tell el-Mutesellim), Area A, Stratum IVA, Surrounding Wall 1626 of 'South Stables'

Technique: pier-and-rubble technique.

Function: retainment wall surrounding courtyard.

Date: Stratum IVA (9th/8th cent. BCE).

The Surrounding Wall 1626 limits an area of more than 3000m² in front of the 'South Stables' 1576 and was more 1.5m strong (the western wall being even thicker), because it mostly served as a terrace wall providing levelling to the courtyard. At least the northern wall includes at least three ashlar

piers of type C2 within its coursed random rubble. The ashlars were finely cut and roughly smoothed; the course height seems to have been more or less consistent. At least in some instances, single layers of small fieldstones may be seen between the individual blocks of ashlar piers. Ashlars have also been used to strengthen the corners and flanking the entry to the courtyard.

Lamon/Shipton 1939, 33, fig. 34, 43; Kenyon 1971, 66; Shiloh 1979, 53, pl. 25: 1; Ussishkin/Woodhead 1992, 53; Franklin 2006, 108; Weippert/Weippert 2014, 15 (with bibliography).

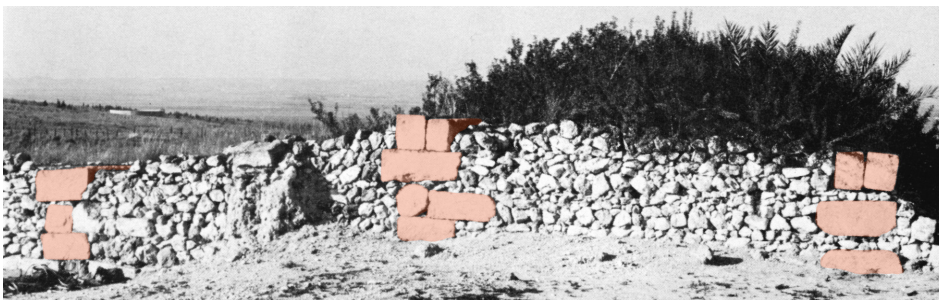


Fig. 82. Megiddo, A IVA 1626 (25-ME-01) (after Shiloh 1979, pl. 25: 1, adapted).

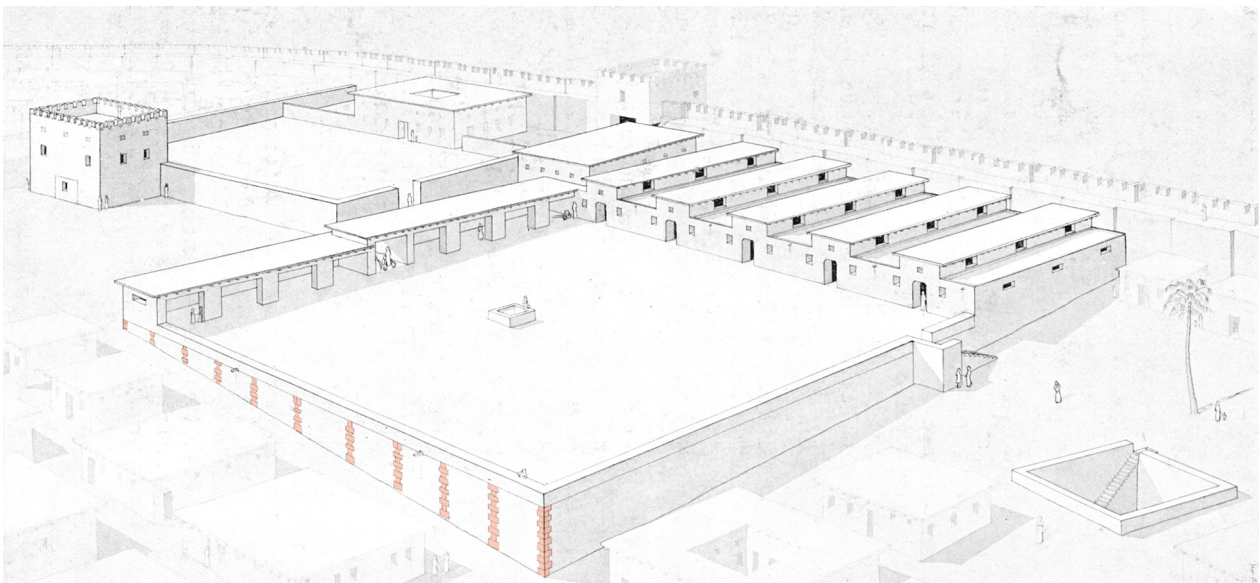
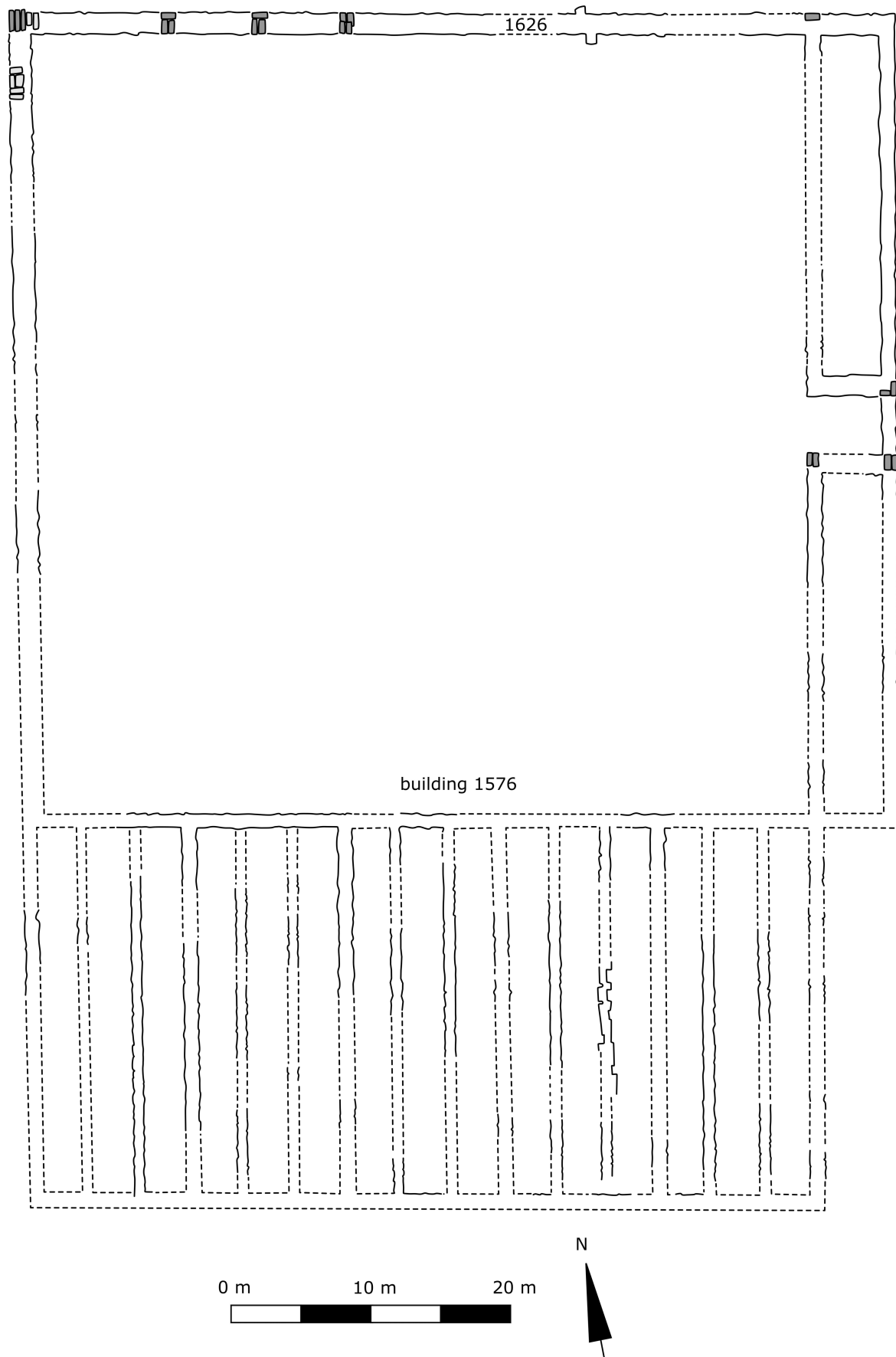


Fig. 83. Megiddo, A IVA 1626 (25-ME-01) (after Lamon/Shipton 1939, fig. 43, adapted).



Plan 33. Megiddo, Area A, Stratum IVA, Surrounding Wall 1626 of 'South Stables' (25-ME-01) (redrawn after Lamon/Shipton 1939, fig. 34).

25-ME-02 (*plan 34, fig. 84*)**Megiddo (Tell el-Mutesellim), Area B, Stratum IVB, Surrounding Wall 1693 of 'South Palace' 1723**

Technique: pier-and-rubble technique.

Function: surrounding wall.

Date: Stratum IVB (9th cent. BCE).

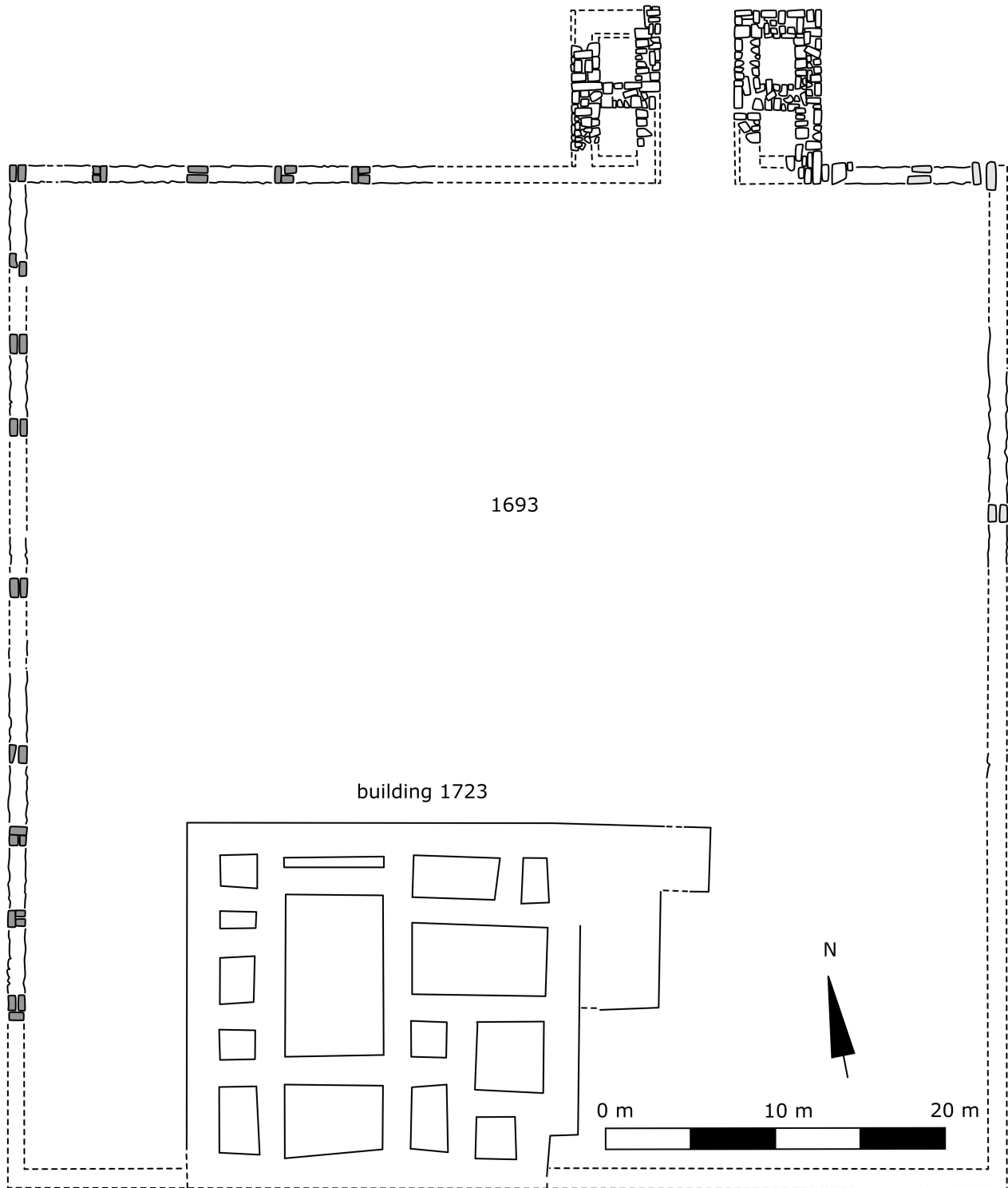
The Surrounding Wall 1693 limits an area of more than 3000m² around the 'South Palace' 1723, was ca. 1m strong and preserved up to four ashlar courses. It was built from partly coursed random rubble and included ashlar piers of types A (at least two piers), B (up to nine piers) and D at fairly

regular intervals of 2.5–5m. The ashlars were finely cut and roughly smoothed; the course heights seem to have been consistent. In the gate to the precinct, ashlars were more comprehensively used.

Schumacher 1908, 98 f., pl. 29; Lamon/Shipton 1939, 11 f., fig. 12, 13, 29; Kenyon 1971, 65 f., fig. 12, 22, pl. 35, 36; Shiloh 1979, 53, fig. 75; van Beek/van Beek 1981, 74; Wright 1985, fig. 322: 2; Stern 1992b, 303, fig. 2; Ussishkin/Woodhead 1992, 52; Wright 1997a, fig. 3: 3; Prados Martínez 2003, pl. I (middle); Ussishkin 2018, 338 f., fig. 16: 5, 6, 13.



Fig. 84. Megiddo, B IVB 1693 (25-ME-02) (after Lamon/Shipton 1939, fig. 13, adapted).



Plan 34. Megiddo, Area B, Stratum IVB, Surrounding Wall 1693 of 'South Palace' 1723 (25-ME-02) (redrawn after Lamon/Shipton 1939, fig. 12).

25-ME-03 (*plan 35, fig. 85–87*)**Megiddo (Tell el-Mutesellim), Area C, Stratum IVA, podium of ‘East Palace’ 338**

Technique: pier-and-rubble technique.

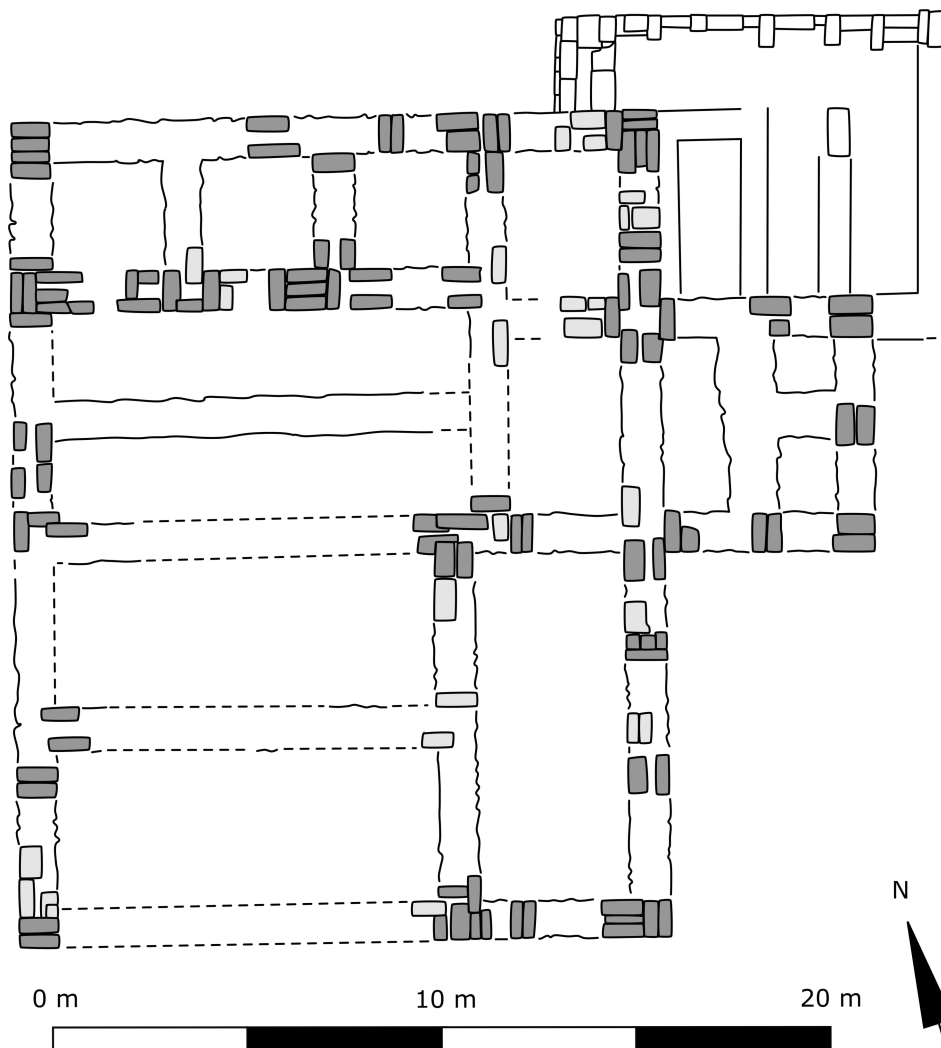
Function: podium of ‘palace’.

Date: Stratum VA–IVB or IVA (9th cent. BCE?).

Building 338 was erected with wooden posts and mudbricks on top of a platform built in stone, which was three ashlar courses or ca. 1 m high; a staircase on the outside provided access. Cross-walls subdivided the podium into at least ten ‘rooms’. The partly coursed random rubble masonry of this platform was reinforced at fairly regular intervals with ashlar piers, mostly of type B2 (at least 15 piers, furthermore one probable pier of type K and at least five piers of non-recurring types); the walls were ca. 1 m wide. The ashlars

were finely cut and at least roughly, sometimes finely smoothed; individual blocks are bossed and thus most probably were taken from earlier buildings. A layer of small fieldstones, reinforced with large blocks at the corners, served as foundation for the walls of the podium. Remains of the burnt wooden posts were found on top of the uppermost course.

Schumacher 1908, 115, fig. 174, pl. 35; Fisher 1929, 68, fig. 43; Guy 1931, 32–35, fig. 22–24; Barrois 1939, 116, 265–267; Lamon/Shipton 1939, 49, fig. 49, 57, 59–66; Noth 1957, 116, fig. 5c; Kenyon 1971, 95 f., fig. 21, pl. 64; Shiloh 1979, 53, fig. 76, pl. 24,2; van Beek/van Beek 1981, 74, pl. 6b; Kempinsky 1989, 167; Ussishkin/Woodhead 1992, 53; Wright 1997a, fig. 3,2; Pittaccio 2004–2007, 42; Franklin 2006, 108; Ussishkin 2018, 364–366, fig. 17: 2–6.



Plan 35. Megiddo, Area C, Stratum IVA, podium of ‘East Palace’ 338 (25-ME-03) (redrawn after Lamon/Shipton 1939, fig. 49).

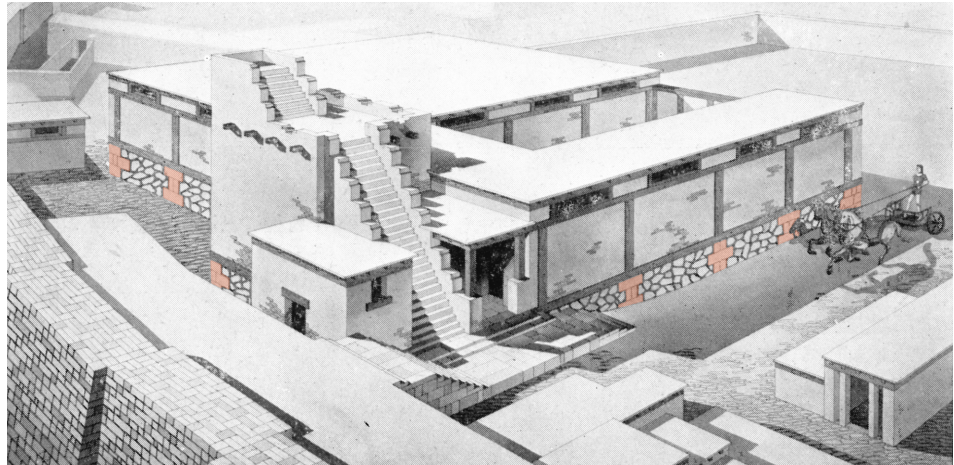


Fig. 85. Megiddo, C IVA 338 (25-ME-03) (after Lamon/Shipton 1939, fig. 59, adapted).



Fig. 86. Megiddo, C IVA 338 (25-ME-03) (after Lamon/Shipton 1939, fig. 64, adapted).



Fig. 87. Megiddo, C IVA 338 (25-ME-03) (after Shiloh 1979, pl. 24: 2, adapted).

25-ME-04 (plan 36)**Megiddo (Tell el-Mutesellim), Area C, Stratum IVA, 'Stables' 403**

Technique: pier-and-rubble technique.

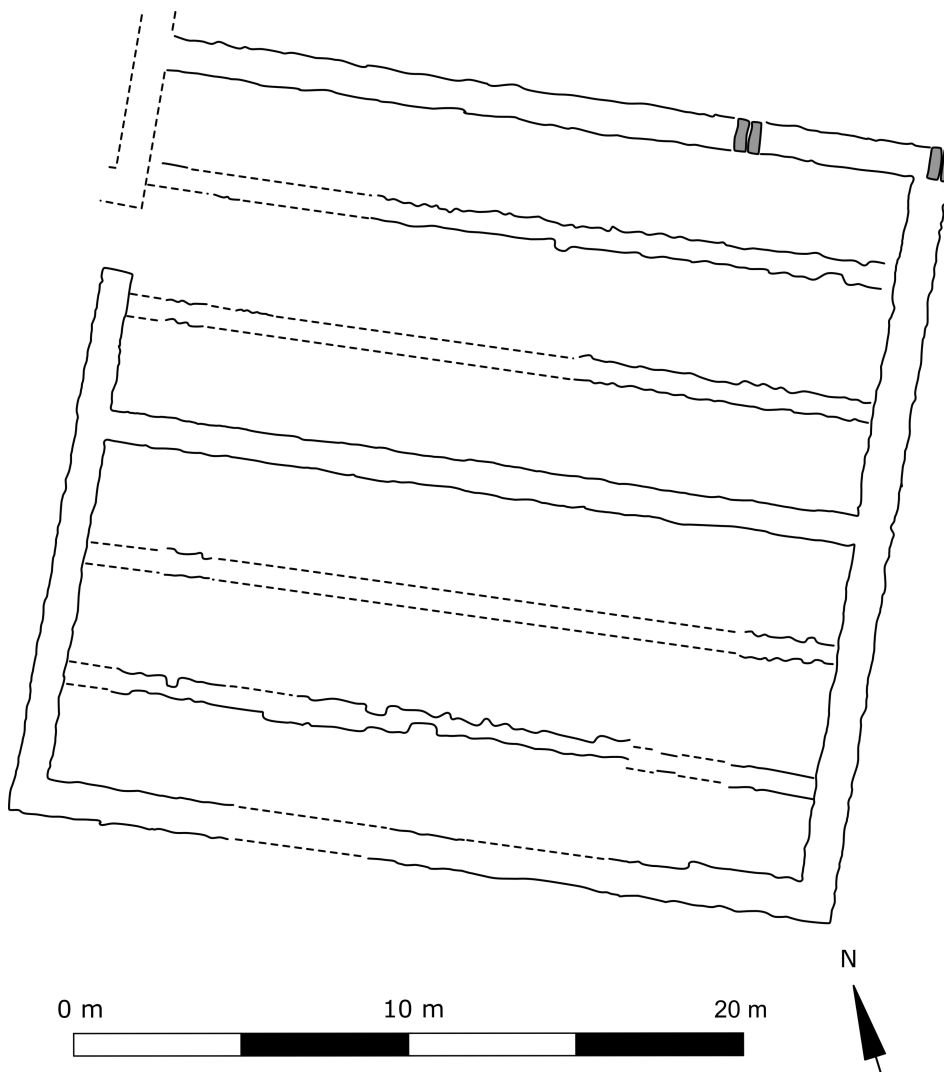
Function: stables?

Date: Stratum IVA (9th/8th cent. BCE).

Complex 403, usually interpreted as stables, was mostly erected from small to medium-sized

rubble, but its corners and the door were strengthened with ashlars. Furthermore, there seems to be at least one ashlar pier, probably of type B, in the northern wall, which is ca. 1 m wide.

Lamon/Shipton 1939, 42, fig. 49, 52, 56; Weippert/Weippert 2014, 16 f. (with bibliography); Ussishkin 2018, 401.



Plan 36. Megiddo, Area C, Stratum IVA, 'stables' 403 (25-ME-04) (redrawn after Lamon/Shipton 1939, fig. 49).

26-JE (plan 37, 38)

Jezreel (*Tēl Yēzrā'ēl*), casemate wall in Areas A and D

Technique: pier-and-rubble technique.

Function: casemate wall.

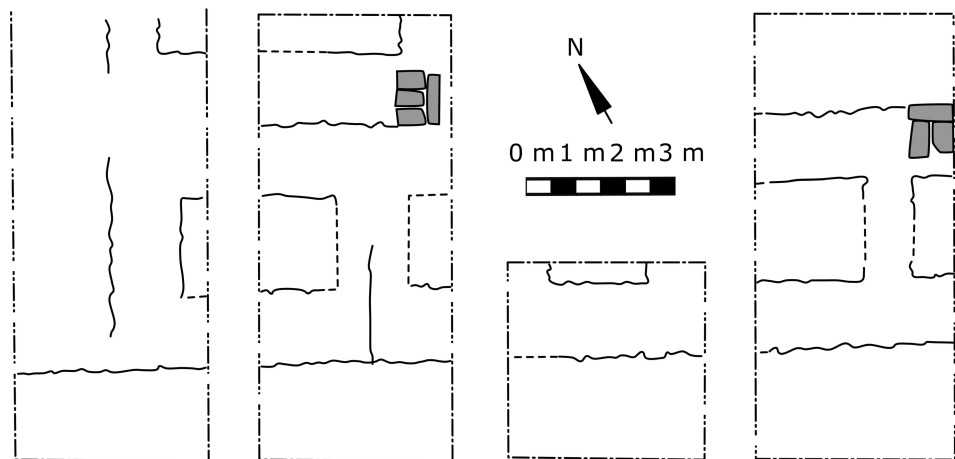
Date: 9th cent. BCE.

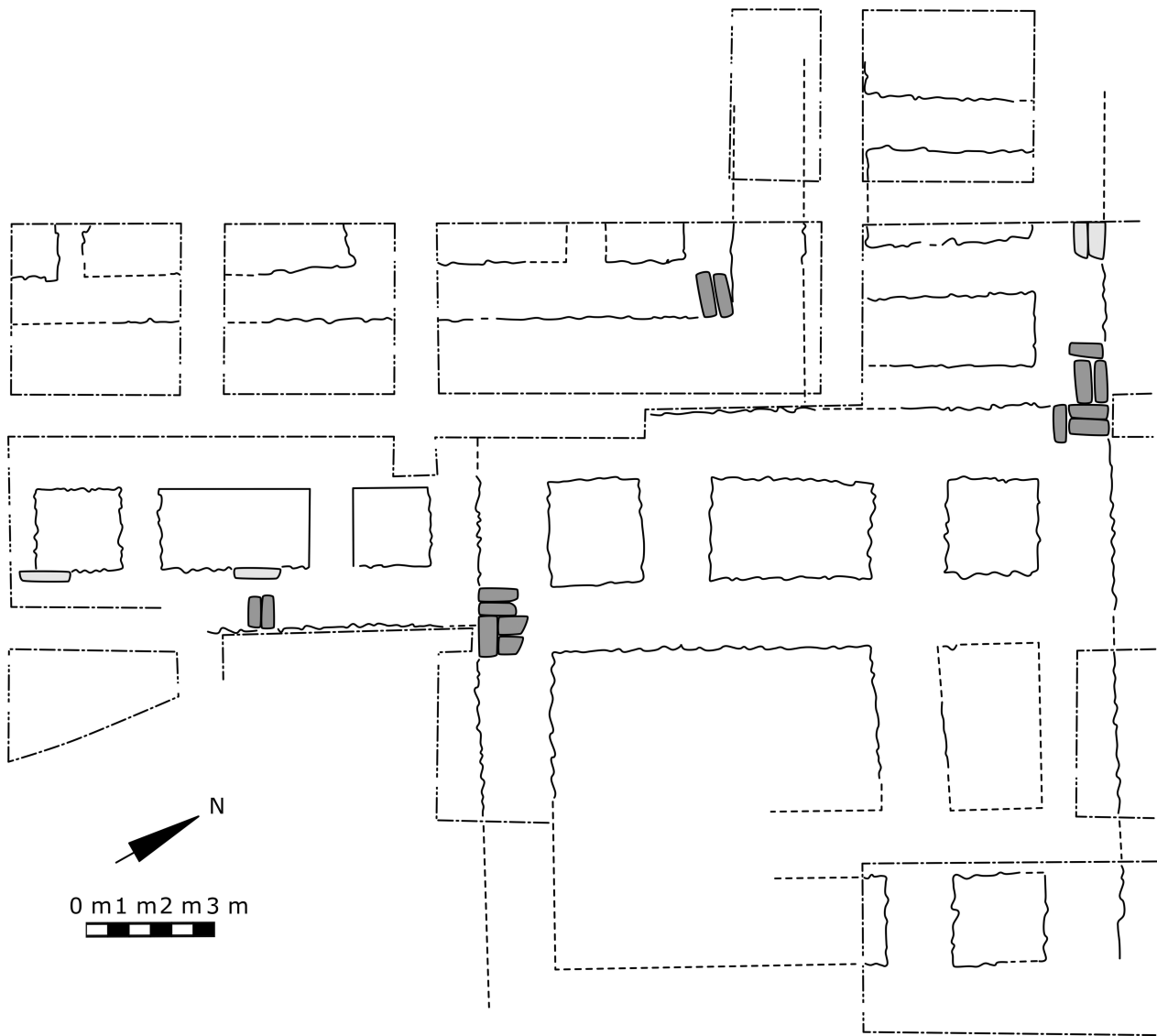
The Iron Age II casemate walls of Jezreel have been dated to the 9th cent. BCE and consisted mostly of small to medium-sized, partly squared rubble. In individual corners and doors, they were strengthened with ashlar, although these seem to have been rather erratically placed. In a small trench in Area A, the inner face of the inner wall (W30) included an ashlar pier of type C. The width of the pier makes up only ca. two thirds of the entire width of the wall of ca. 1.5m. In Area D, the eastern outer casemate wall (W735) seems to have had two piers of

type A in its inner face; one of them corresponds to two headers in the outer face and may be, together with these headers, classified as another pier of type C. The only photograph shows one of the 'piers' of type A (with a noticeable disproportion between the narrow header and the wide, slab-like stretcher). The northern casemate wall (W741) is reinforced at multiple points with roughly squared blocks or ashlar and seems to include one 'pier' of type C and two 'piers' of type D. The remaining parts of the casemate walls have been interpreted as mere foundations but may have functioned also as stone plinths reaching beyond ground level.

Ussishkin/Woodhead 1992, 19, 36, 38, 51, fig. 5, 10–12, 25, 28; Ussishkin/Woodhead 1994, fig. 6, 40; Oredsson 1998, 95, fig. 1; Ussishkin/Woodhead 2008, 1839; Franklin 2009, 47.

Plan 37. Jezreel (*Tēl Yēzrā'ēl*), casemate wall in Area A (26-JE) (redrawn after Ussishkin/Woodhead 1994, fig. 6).





Plan 38. Jezreel (*Tēl Yēzrāʿēl*), casemate wall in area D (26-JE) (redrawn after Ussishkin/Woodhead 1994, fig. 40).

27-TM (plan 39, fig. 88)

Tēl Māvōrak, Stratum IV, casemate wall

Technique: pier-and-rubble technique.

Function: casemate wall of a large agricultural estate?

Date: phase IV (4th cent. BCE, probably 2nd half).

Parts of a large, multi-roomed complex within a casemate wall; the excavators interpreted it as a 'large agricultural estate'. The walls are mainly composed of small to medium-sized rubble, but the outer part of the casemate wall is entirely built from ashlar and its inner wall as well as the only excavated transversal wall include ashlar piers of type D1 (five piers) and CH within the uncoursed random rubble. The width of these walls amounts to ca. 0.5m and the distances between the piers measure 0.8–1.1m. The piers are preserved only to

a height of two courses and their foundations are heterogeneous; while the pier of type CH is founded on one course of large ashlars, the other piers are set on top of a single course of only roughly squared blocks, and the sections in rubble do not have separate foundations. The ashlars were partly roughly and partly finely cut and sometimes only roughly hewn and sometimes roughly smoothed and the height of the courses is not entirely consistent. According to the finds, the walls may be dated back to the 4th cent. BCE, probably its 2nd half.

Stern 1977, 18, fig. 4–7; 1978, 26, 71 f., fig. VIII fig. 25, 29, pl. 10: 1, 2; van Beek/van Beek 1981, 75; Wright 1985, 404, fig. 321; Stern 1992b, 303, fig. 1; 1994, 37 f., fig. 14, 28; Pittaccio 2004–2007, 40 f., fig. 6; Ciafaloni 2006, 147, fig. 4, 5; Khries 2016, 115, fig. 2: 74–76, plan 2: 50.

Plan 39. *Tēl Māvōrak*, Stratum IV, casemate wall (27-TM) (redrawn after Stern 1978, fig. 25).

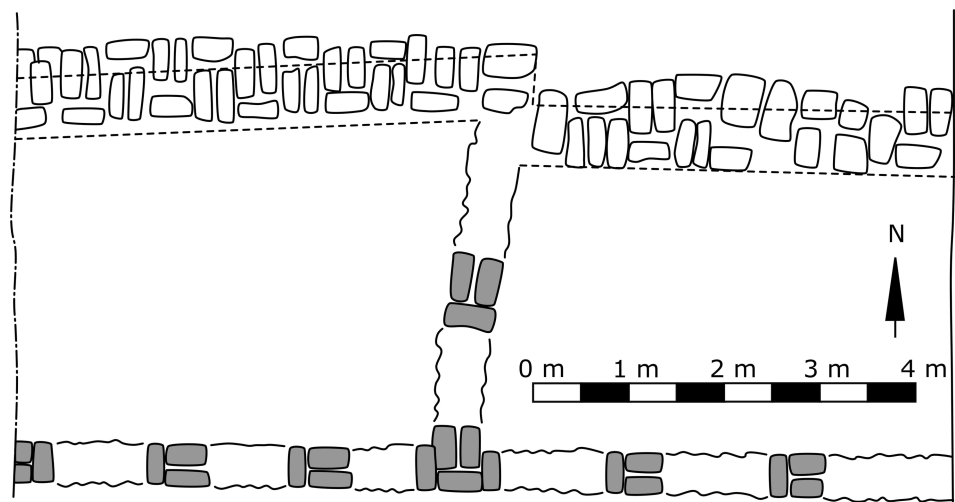
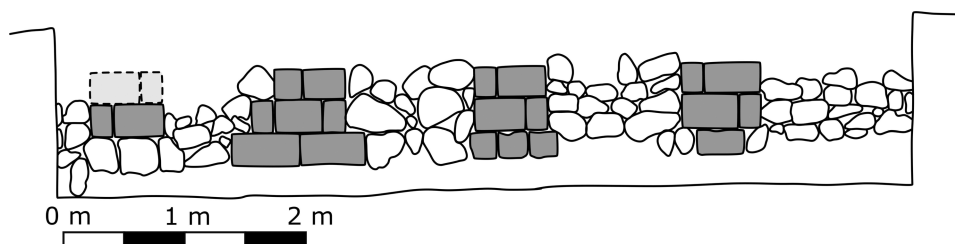


Fig. 88. *Tēl Māvōrak*, Stratum IV, elevation of inner part of casemate wall (27-TM) (redrawn after Stern 1978, fig. 29).



28-CA (fig. 89)**Caesarea Maritima, north of Tower 1**

Technique: pier-and-rubble technique.

Function: unknown.

Date: phase XIV (3rd/2nd cent. BCE).

Rescue excavations to the north of the medieval Tower 1 uncovered parts of a Hellenistic wall in 2016–2018 on top of which Roman walls were erected. The Hellenistic wall is dated to the 3rd or 2nd cent. BCE and includes two ashlar piers of types D and H between sections of uncoursed random rubble. One of the piers was still conserved up to a height of four courses (about 1m). The ash-lars seem to have been finely cut and partly only roughly hewn and partly roughly smoothed.

Ad et al. 2020, fig. 5.

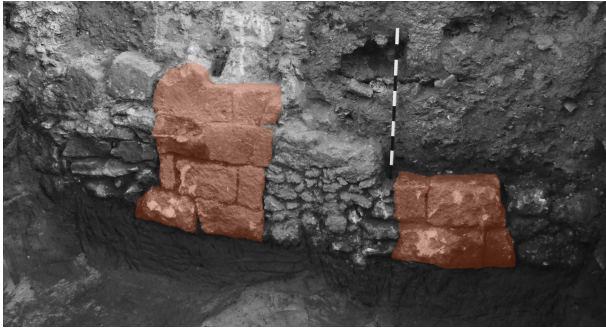


Fig. 89. Caesarea Maritima, north of Tower 1 (28-CA) (after Ad et al. 2020, fig. 5, adapted).

29-MI***Tēl Miḵmoret, Persian building**

Technique: pier-and-rubble technique?

Function: fort?

Date: 5th–4th cent. BCE.

During the years 1978, 1982 and 1984, parts of a large building of the Late Persian period were uncovered on Tēl Miḵmoret. It was interpreted as a fort or a building used for storage (these interpretations are not mutually exclusive). The walls were partly preserved to a height of more than 2m and are said to have been composed of alternating sections of ash-lars and roughly squared rubble. The only published plan suggests that the sections in ashlar masonry were sometimes rather extensive; in other cases, only individual ash-lars may be seen. The possible piers thus do not seem to have been placed in any regular manner. Since no photographs or elevations were published, it remains somewhat doubtful whether the pier-and-rubble technique can be identified here, and no technical details can be given. Excavations in the 1950s already uncovered ‘walls in Phoenician technique’, which may have been part of the same building, but have neither been published.

Paley et al. 1982, 261; Porath/Stieglitz 1983, 72; Paley et al. 1983, 266; Porath et al. 1984, 78; 1985, 126 f. (*non vidi*); Stern 1992b, 303, n. 16; Porath et al. 1993, 1044 f., fig. on p. 1044; Elayi 1996, 84; Carayon 2008, 82, 340.

30-KU (fig. 90, 91)**Tell Kudādi, northeast of the Iron Age fort**

Technique: pier-and-rubble technique.

Function: unknown.

Date: 5th–4th cent. BCE.

North of the small tell, a 17m long part of a wall of the Persian period was uncovered. It was 0.75m strong and preserved to up to four ashlar courses or ca. 1.2m and it featured four ashlar piers with-in mostly squared and often coursed rubble. The piers were composed of longish stretchers and narrow, slab-like headers, and partly resemble

type H in the elevation and type L on the plan but were not consistently structured. The blocks have been finely cut and roughly smoothed and the course heights were uniform. The foundation consisted of mostly only roughly squared stones, which were levelled only below the piers. Guy interpreted the wall as the outer wall of a house, but Fantalkin and Tal also considered a defensive function.

Guy 1938, 15 f.; Sukenik 1938, 167 f.; van Beek/van Beek 1981, 75; Avigad 1993; Fantalkin/Tal 2015, 6, 64, 204, fig. 9: 65, 66, 68.

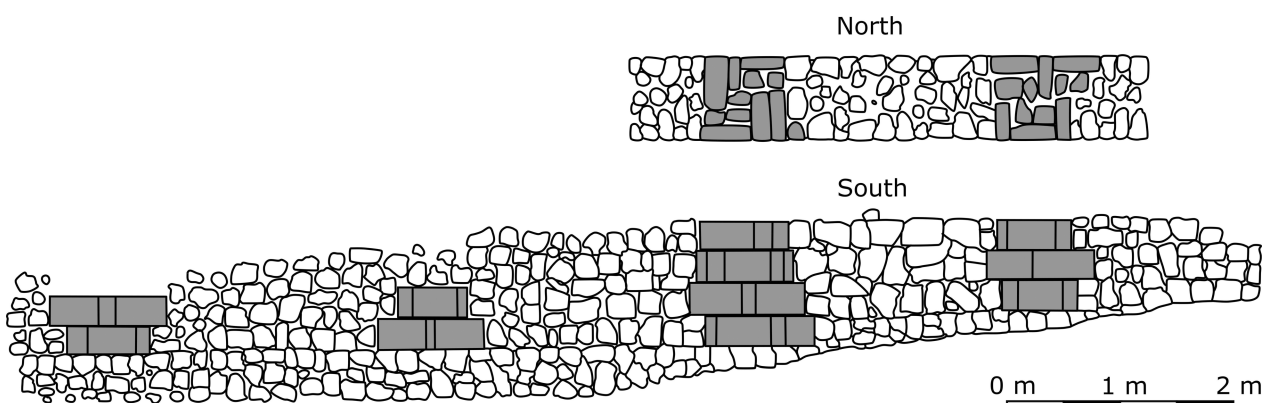


Fig. 90. *Tell Kudādi*, elevation of Persian wall north-east of Iron Age fort (30-KU) (redrawn after Fantalkin/Tal 2015, fig. 65).

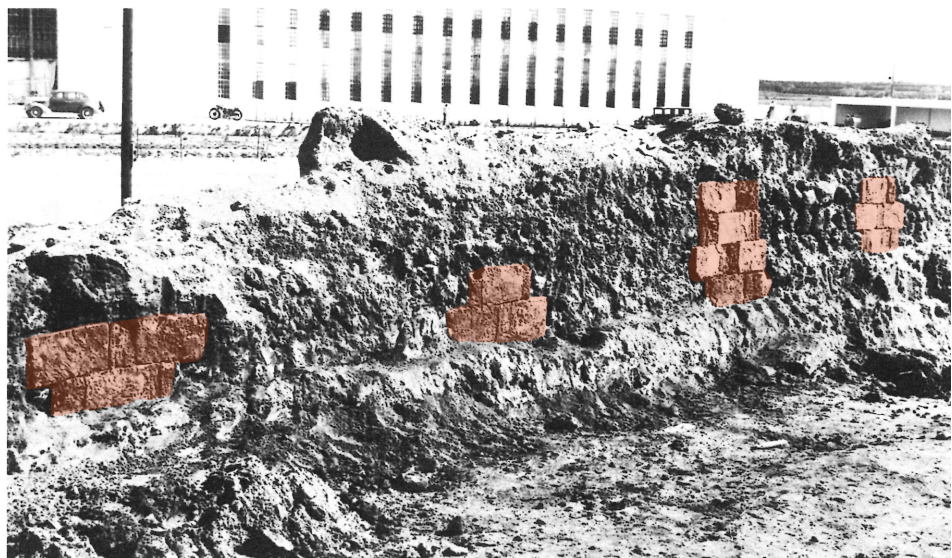


Fig. 91. *Tell Kudādi*, Persian wall north-east of Iron Age fort (30-KU) (after Fantalkin/Tal 2015, fig. 9, adapted).

31-JA (*plan 40, 41, fig. 92–94*)**Jafo, Area A**

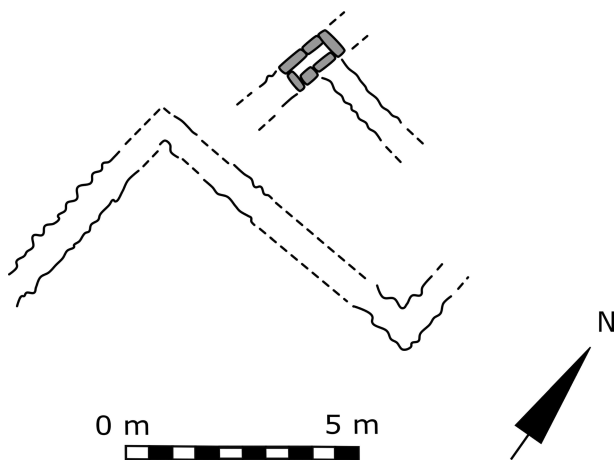
Technique: pier-and-rubble technique.

Function: residential and industrial?

Date: phase LT-4/IIb, LT-3b/a and IIa/Ib (6th and 5th cent. BCE).

Only few architectural remains were preserved from the first Persian period **phase IIb / LT-4** uncovered in Kaplan's excavations in Area A at Jafo (*plan 40*). They belonged to five walls of one or multiple buildings. While the other walls consisted exclusively of small and medium-sized rubble, wall W.728, which was ca. 0.75m wide, included a pier-like section built of predominantly longish ashlar. This pier seems to have been ca. 1.2m wide and had two stretchers and one header on one side and two stretchers as well as two headers (only one of them making up the entire width of the wall) on the other side; the core of the pier was filled in with small stones. Since no photographs or elevations were published, no technical details can be given. The structure may be dated to the 6th cent. BCE and remained in use until the early 5th cent. BCE.

Kaplan's excavations further uncovered considerable remains dating back to the Late Persian period (*plan 41*). The excavators assigned them all to **phase IIa** and reconstructed a 'warehouse' (Building M) based on the many finds of pottery imported from Attica. A recent reconsideration of the contexts concluded that the walls did not all



Plan 40. Jafo, Area A (31-JA), level IIB/LT-4a (redrawn after Danielson 2020, fig. 6).

belong to phase IIa, but partly also to **phase Ib** and cannot have been part of the same building. The finds suggest that the area was used by houses and workshops.

Wall W.800 was originally preserved to up to a height of considerably more than 2m but was mostly removed during the excavations. It included three ashlar piers of type J, preserved to up to a height of eight ashlar courses (the published elevation inaccurately displays how the ashlar were arranged; *fig. 92, 93*). The immediate extension of W.800, W.707, integrated an ashlar pier of type D1, preserved to up to a height of six courses (*fig. 94*) – but the width of the pier was much smaller than the width of the wall. Two courses of an ashlar pier of type E/I may be seen in Wall W.704. The badly preserved walls W.711, W.719, W.720, W.721, W.722 and W.911 included ashlar piers of types A/B, D, E/I, G (three piers) and K.



Fig. 92. Jafo, Area A level IB/LT-3a (31-JA), Wall W.800 from the south (after Danielson 2020, fig. 21, adapted).

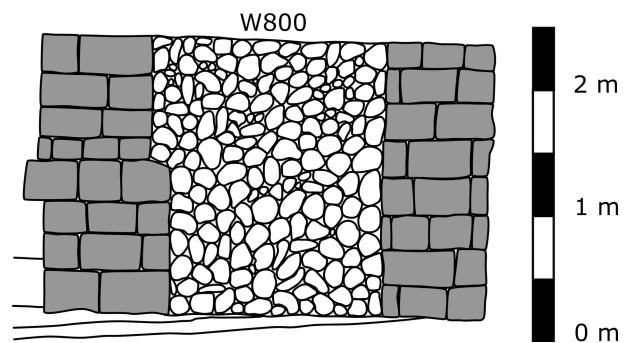
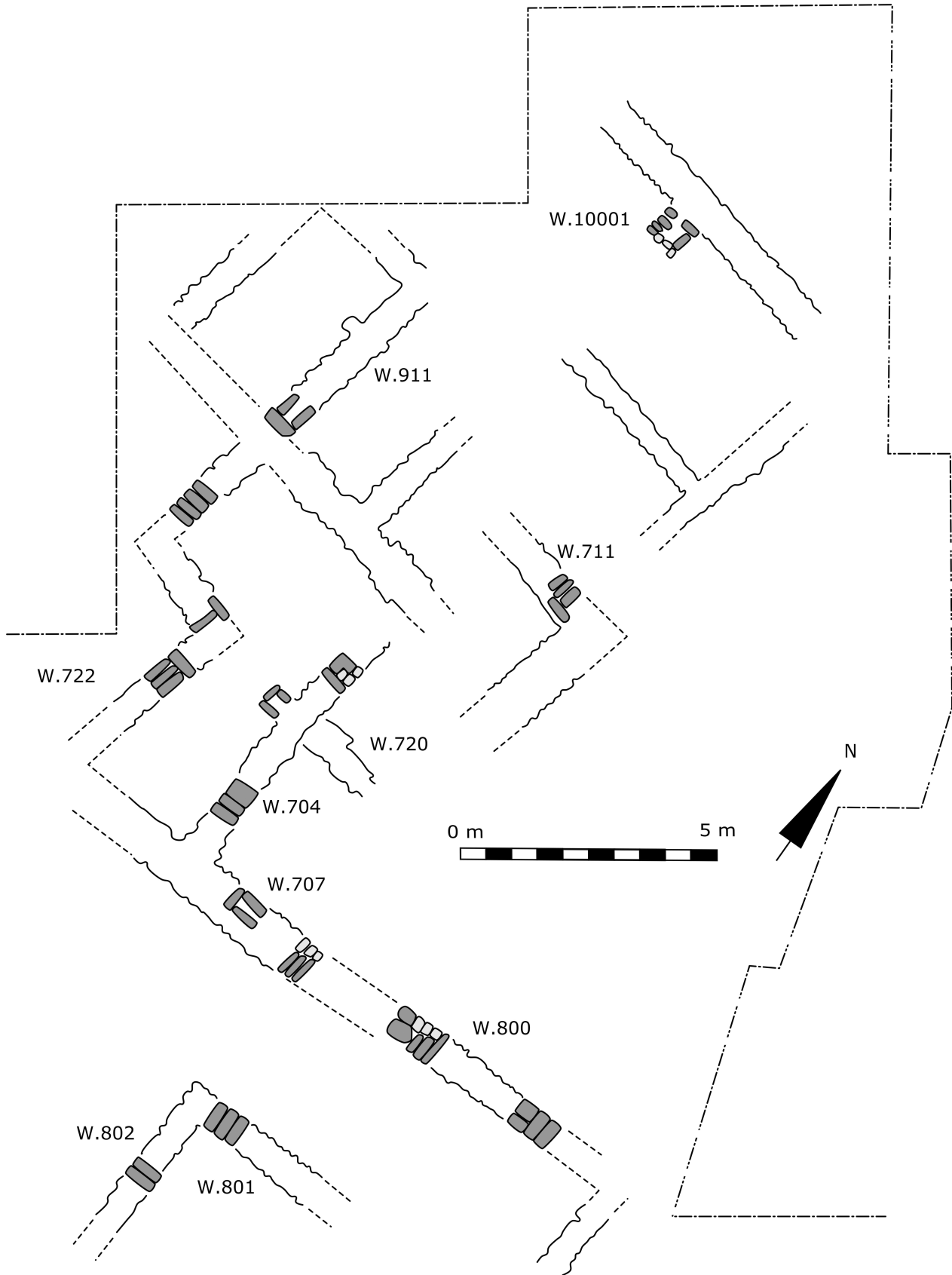


Fig. 93. Jafo, Area A level IB/LT-3a (31-JA), elevation of Wall W.800 (redrawn after Tsuf 2018, fig. 5: 7).



Plan 41. Jafo, Area A (31-JA), levels IIA/IB/LT-3b/3a (redrawn after Danielson 2020, fig. 22).

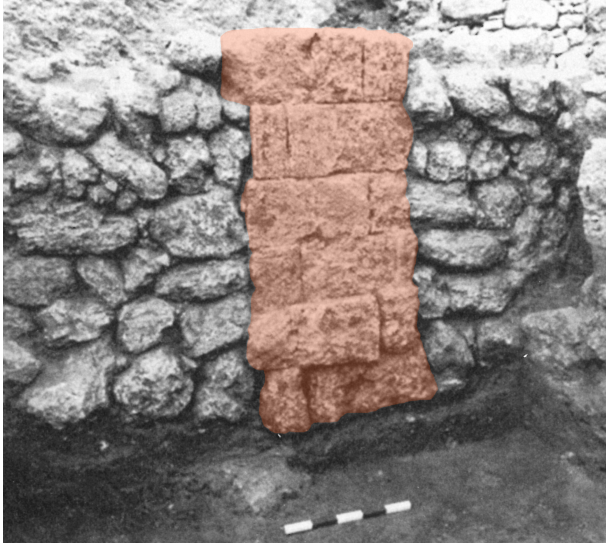


Fig. 94. Jafo, Area A level IB/LT-3a (31-JA), segment of W.800 from the north (after Tsuf 2018, fig. 5: 16, adapted).

The new excavations extend the area uncovered by Kaplan in northern direction. The architecture has not been published in detail up to now, but revealed multiple ashlar piers. The short walls W.10001 and W.10002 seem to have been completely erected from ashlars or may have formed

ashlar piers of types J and L. In W.10007, the corner seems to have been strengthened with ashlars. In W.10009, an ashlar pier has a diagonal outline in the elevation, but otherwise is similar to type D; in L.10010 a pier of type A is recognisable. The many walls erected in phase IIa (LT-3b) can be dated to the 5th cent. BCE; around the middle of the 4th cent. BCE, destructions are apparent, which seem not to have been very extensive, though, since many walls were continuously used or similarly rebuilt in the following phase Ib (LT-3a). These new walls likewise included ashlar piers and partly existed until phase Ia (LT-2) of the 2nd and 1st cent. BCE.

Kaplan 1970, 226; 1971, 20 (*non vidi*); 1972b, 9 (*non vidi*); 1972a, 88; 1974, 50 (*non vidi*); 1976, 537; Ritter-Kaplan 1982, 64 f. with fig.; Wright 1985, fig. 322: 3; Stern 1992b, 303; Kaplan/Ritter-Kaplan 1993, 657, fig. on p. 657, 658; Wright 1997a, fig. 3: 4; Carayon 2008, 84; Khries 2016, 124, fig. 2: 81, plan 2: 55; Burke/Peilstöcker 2017, 55, fig. 2: 34, 35; Tsuf 2018, 12, 65, 68, fig. 5: 4, 5, 7, 14–16; Danielson 2020, 193 f., 198, 200, 210, 213, 223–226, 230, 238, fig. 3, 4, 6, 7, 9, 10, 12, 14–17, 21, 22, 23, 31, 34.

32-YA-01 (plan 42)**Tēl Ya'ōz, Area C**

Technique: pier-and-rubble technique.

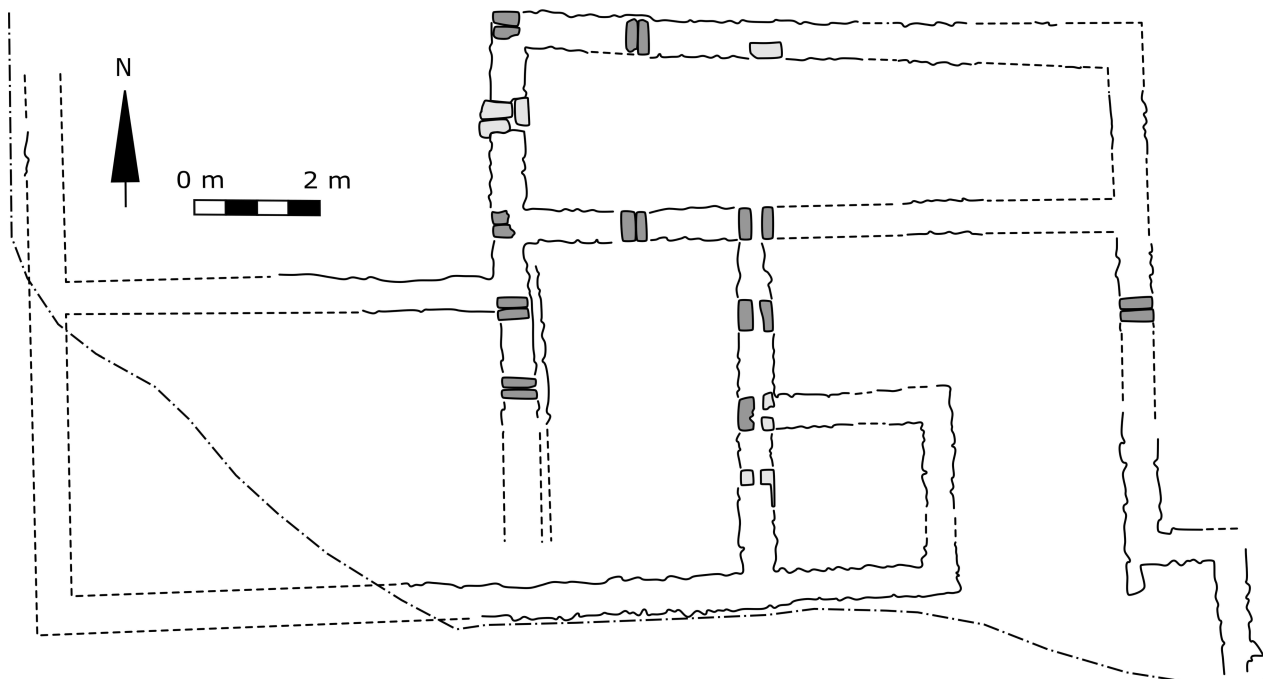
Function: residential.

Date: 5th cent. BCE.

In Area C, 13 walls of a 5th cent. BCE domestic building were excavated; three complete rooms and parts of two more rooms as well as a courtyard may be distinguished. The walls were ca. 0.5–0.6m wide, preserved to a height of up to three courses of ashlar and featured ten ashlar

piers of type B (at least two of them type B2) set at fairly regular distances of 0.5–1m in mortared, partly coursed random rubble masonry. Some of these piers are placed at corners, next to doors and at intersections of walls. The ashlars seem to be mostly finely, but sometimes only roughly cut and roughly smoothed, and their dimensions are fairly consistent.

Segal et al. 2006, 203, fig. 1–4, plan 1; Fischer et al. 2008, 134; Khries 2016, 127, 131, fig. 2: 85, plan 2: 58.



Plan 42. Tēl Ya'ōz, Area C (32-YA-01) (redrawn after Segal et al. 2006, plan 1).

32-YA-02 (*plan 43, fig. 95, 96*)**Tēl Ya'ōz, Area D**

Technique: pier-and-rubble technique.

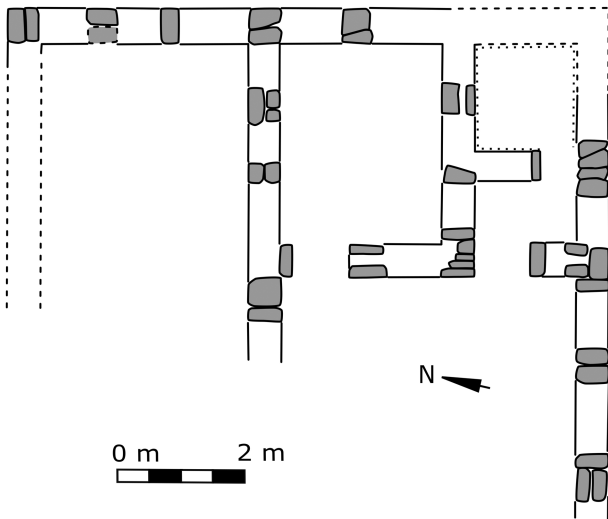
Function: residential.

Date: 6th–4th cent. BCE.

Eight walls of a structure interpreted and reconstructed as a residential building of the courtyard house type have been excavated in Area D; a small storage room (?) with a vestibule, a slightly larger room as well as parts of a broad room and of the courtyard may be distinguished. The walls were partly preserved up to a height of more than 1m and consistently feature ashlar piers set at

distances of ca. 0.7–1.1m between sections of mortared, partly coursed random rubble. The corners, doorjambs and intersections of walls likewise are built with ashlars. The piers mostly appertain to type A (at least six piers), but types B, D and D1 are also documented. The ashlars were finely cut and roughly smoothed and placed in courses of consistent height. The small bathing room 403 was thickly plastered. The construction of the building can only be roughly dated to the Persian period.

Fischer et al. 2008, esp. 129–134, fig. 7–13; Fantalkin/Tal 2015, 204; Khries 2016, 125, 127, fig. 2: 83, plan 2: 56; Birney 2017, 216, fig. 12.



Plan 43. *Tēl Ya'ōz*, Area D (32-YA-02) (redrawn after Fischer et al. 2008, fig. 7).

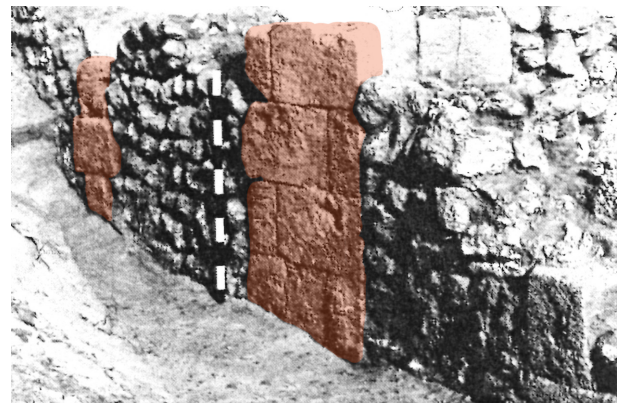


Fig. 96. *Tēl Ya'ōz*, Area D (32-YA-02), wall D1, from the east (after Fischer et al. 2008, fig. 9, adapted).



Fig. 95. *Tēl Ya'ōz*, Area D (32-YA-02), general view from the east (after Fischer et al. 2008, fig. 8, adapted).

33-YY-01***Yavnê Yām, Area A**

Technique: pier-and-rubble technique?

Function: unknown.

Date: phase VII (6th–4th cent. BCE).

In the 7th cent. BCE Stratum IX a building, seemingly erected in pure ashlar masonry, was uncovered (Fischer 2002a, 50, fig. 4; 2002b, 3 f. with fig.). In the Persian period, multiple walls ‘in the Phoenician style, combining ashlar piers of local *kurkar* with fieldstone cores’ (Fischer 2008, 2074) were erected. The evidence is not yet extensively published and the only photograph available does not allow a more precise definition of the technique or the identification of specific types of piers.

Wolff 1998, 787; Fischer 2002a, 52; 2002b, 4–6 with figs.; 2005, 183 f., fig. 13, 14; 2008, 2074; A. Fantalkin (personal communication, 2022).

33-YY-02***Yavnê Yām, Area B**

Technique: pier-and-rubble technique?

Function: unknown.

Date: phase VII (6th–4th cent. BCE).

Excavations in the southwestern corner of Area B uncovered Persian-period walls ‘in the Phoenician style, combining ashlar piers of local *kurkar* with fieldstone cores’ (Fischer 2008, 2074). One photograph may show a pier of type G. The evidence is not yet extensively published and the only photograph available does not allow a more precise definition of the technique.

Fischer 2002b, 4–6 with figs.; 2005, 183 f., fig. 12; 2008, 2074.

34-AS***Ashkelon, South Tell, Leon Levy Expedition, Area 38**

Technique: pier-and-rubble technique?

Function: residential.

Date: 10/9 (4th–2nd cent. BCE).

The residential buildings of **phase 10** (4th cent. BCE) in Area 38 are supposed to have been erected in the ‘pier-and-rubble construction technique that is widely attested around the Mediterranean in this period’ (Stager et al. 2008, 287), but subsequently, the excavation report only describes walls with corners built of finely dressed *kurkar*, and which continued in mudbrick in their upper parts. These structures were destroyed at the end of phase 10. The buildings of **phase 9** (from the early 3rd to the mid 2nd cent. BCE) are also supposed to have been built in the pier-and-rubble technique; in this case, the report at least mentions a ‘rubble fill’ between piers, which was mortared. Some bossed ashlar most probably stem from earlier buildings. Unfortunately, no further information on technical aspects can be given, since only schematic plans and no photographs have been published so far.

Stager et al. 2008, 287, fig. 15: 63, 64; Khries 2016, 138.

6.3 The Western Mediterranean

01-HU-01 (plan 44, fig. 97, 98)

Huelva, Cabezo de San Pedro

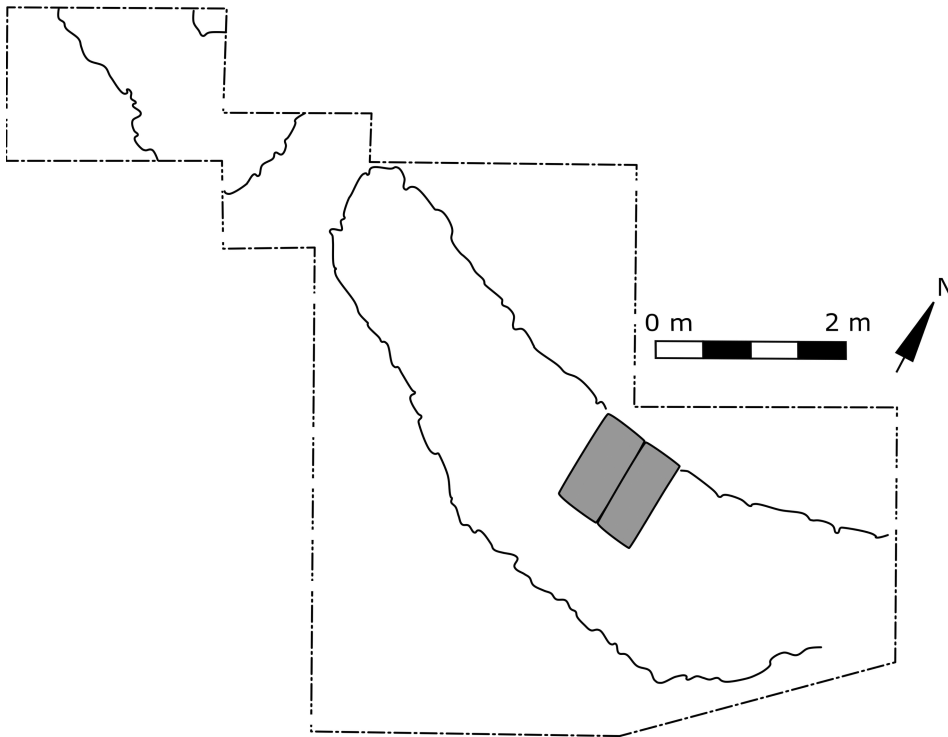
Technique: pier-and-rubble technique.

Function: retaining wall.

Date: phase IB (1st half of 8th cent. BCE).

A 10m long section of a wall, erected in the 1st half of the 8th cent. BCE, was uncovered in the western part of the Cabezo (hill) de San Pedro (where originally, another hill, the Cabezo del Cementerio Viejo, followed). It features one ashlar pier between sections of partly squared and partly

coursed rubble. Since it is adapted to the terrain, leans against the hill and has a rounded plan, it can be interpreted as a retaining wall; a gap of almost 1m width in its western part may have facilitated drainage. The width of the wall varies, being around 2m in the middle, where the only ashlar pier has been placed, but only around 1.3m at its known ends. Only the outer face of the pier was visible; it is preserved to a height of five courses. The lowermost and middle course has three headers, the second and fourth course probably has three stretchers (of which only one is visible) and the uppermost course only has two headers.



Plan 44. Huelva, Cabezo de San Pedro (**01-HU-01**) (redrawn after Rodríguez Muñoz 2004, fig. 2).

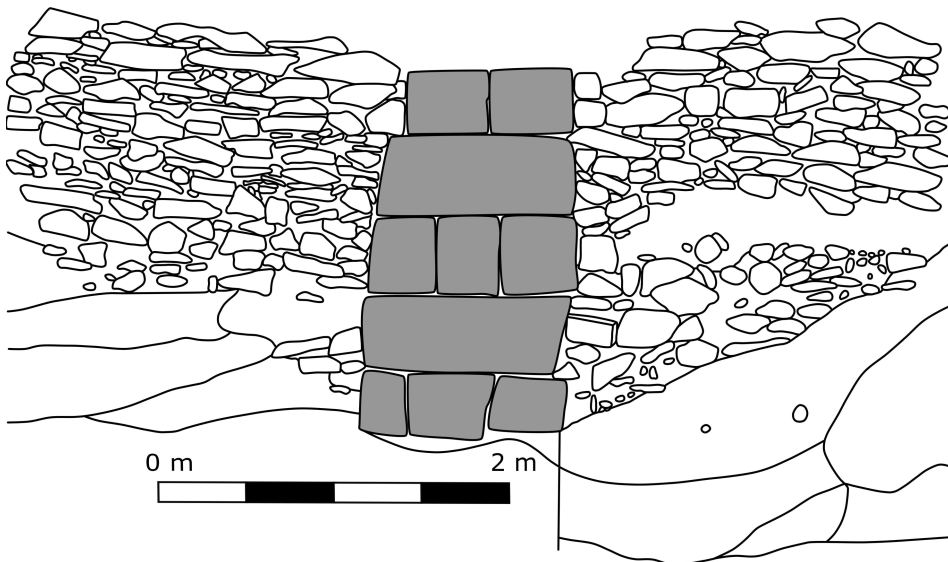


Fig. 97. Huelva, elevation of wall on Cabezo de San Pedro (**01-HU-01**) (redrawn after Mielke/Torres Ortiz 2012, fig. 3g).

It had no foundation. The length of the ashlar amounts to 1–1.20m, their width is consistently ca. 0.5m and their height reaches from 0.37 to 0.47m. Since only one pier is documented in a length of 10m, the wall very probably was not strengthened with ashlar at regular distances. The limestone ashlar were brought to Huelva from the area of Niebla, around 30km up the Rio Tinto.

Del Amo/Belén 1981, 59; Ruiz Mata 1981, esp. 184 f., 194, fig. 6, 21–23; 1984, 539 f.; Belén 1986, 274; Fernández Jurado 1986a, 214 (= Fernández Jurado 1986b, 214); Fernández Miranda 1986, 236, fig. 61; García Sanz 1988, 156–158, fig. 9; Fernández Jurado 1988, 343–345, fig. 6; 1988/1989, 81–85, 214 f., fig. 17–19, 39; Gras et al. 1989, 69; Fernández Jurado/García Sanz 1990, 70, fig. 3; Bonghi Jovino 1991, 187 f.; Fernández Jurado 1991, 170, fig. 1; Elayi 1992, 167 f.; Belén/Escacena 1993, 152, 155; Belén et al. 1993, 223–225; Belén 1994, 27 f.; Díes Cusí 1994, 290 f., fig. 178; Rufete Romico/García Sanz 1995, 12 f., 33 f.; Elayi 1996, 84–86; Belén et al. 2000, 1749; Blech 2001, 315, fig. 131; Fernández Jurado/García Sanz 2001, 162; Escacena Carrasco 2002, 86; Ruiz Mata 2002, 266–269, pl. 1; García Sanz 2003, 10, 12, fig. 2; Prados Martínez 2003, 45 f., pl. 12 (top left); Rodríguez Muñoz 2004, 54, fig. 2; Pittaccio 2004–2007, 44; Escacena Carrasco 2005, 199; Ciafaloni 2006, 146; González de Canales et al. 2006, 26; Fernández Jurado 2008, 46; Mielke/Torres Ortiz 2012, 269, fig. 3g; Camporeale 2014, 198, fig. 10; Peckham 2014, 279; González de Canales 2018, 67.



Fig. 98. Huelva, wall on Cabezo de San Pedro (01-HU-01) (after García Sanz 2003, fig. 2, adapted).

01-HU-02

Huelva, Cabezo del Molino de Viento

Technique: pier-and-rubble technique?

Function: retaining wall?

Date: unknown (8th cent. BCE?).

According to two footnotes of J. Fernández Jurado, walls corresponding in technique to the wall at the Cabezo de San Pedro have been noticed at Calle La Fuente 13–15 as well as on Plaza de San Pedro 10 in 1984 but could not be excavated. No published documentation for these observations exists. Fernández Jurado furthermore remembered having seen an ashlar similar to those used in the wall at Cabezo de San Pedro as a student in 1974. He concluded that this evidence belonged to similar retaining walls at the former Cabezo del Molino de Viento, which has meanwhile disappeared, but was located only about 100–200m south of the Cabezo de San Pedro. If this evidence indeed belonged to one or more retaining walls in the pier-and-rubble technique, it seems obvious (but can by no means be considered certain) that they were erected in the same period, that is in the 8th cent. BCE.

Fernández Jurado 1988, 344, note 16; 1988/1989, 267, n. 41; Elayi 1996, 86.

02-NI (plan 45, fig. 99–101)

Niebla, area next to the Puerta de Sevilla, Trench 8, Wall 5

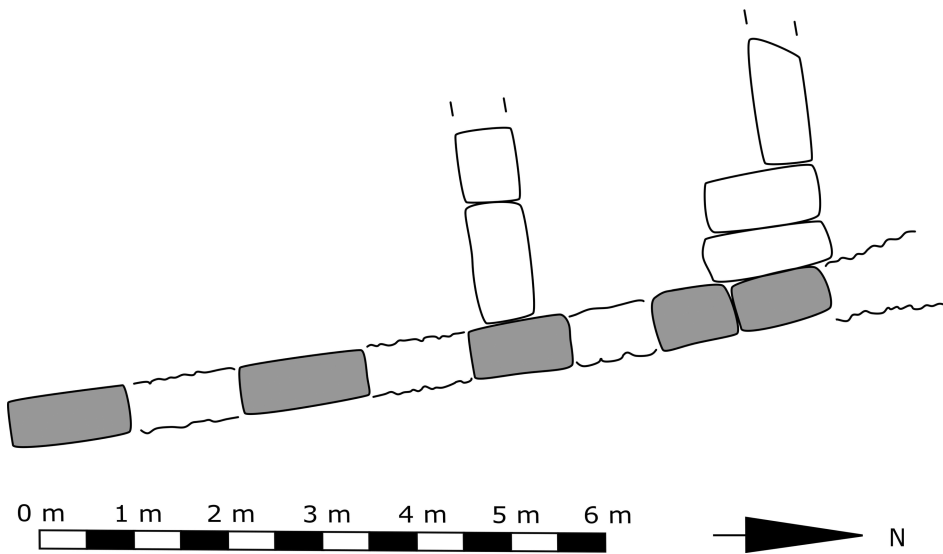
Technique: pier-and-rubble technique.

Function: unknown.

Date: phase V (mid 2nd cent. BCE).

The excavations next to the Puerta de Sevilla uncovered a nearly 10m long tract of Wall 5 in Trench 8; it was ca. 0.55m strong and the rising part of the wall is still 2.3m high. It included four ashlar piers between sections of small to medium-sized rubble. Two (or probably three) of the piers were built of five courses of one large stretcher each (although the lowermost ashlar is interpreted not as part of the rising wall, but part of its foundation), and another one was irregular (with one stretcher as a foundation, one course with only one header, two courses of one header and one stretcher each and a final course of two stretchers). The ashlars were carved from limestone and measured (up to) ca. 1.2 × 0.55 × 0.55m. The rubble was set without

mortar and partly coursed, irregular on the outer face of the wall, but more carefully laid (including some larger blocks roughly smoothed on their faces) and mortared on the inner face. At least four ashlars had dressed margins (one only on the outside and one only on the inside, one at least on the outside and one only along its upper edge on the outside). The wall rested on foundations which partly reused older walls. It was erected in layer V, in which chippings from the dressing of the ashlars were even found; this layer V was a heterogeneous fill, but radiocarbon dates from a tree trunk as well as the latest pieces of pottery suggest a date around the middle of the 2nd cent. BCE. The wall was reused in a Roman building destroyed during the later 1st cent. CE. The other walls of this Roman building seem to have included similar ashlars, which may have been reused from more ashlar piers. Some remains of plaster can be seen in one photograph on the outer face of the wall, but these probably belonged to the Roman phase.



Plan 45. Niebla, area next to Puerta de Sevilla, Trench 8, Wall 5 (02-NI) (redrawn after Belén/Escacena 1990, fig. 14).

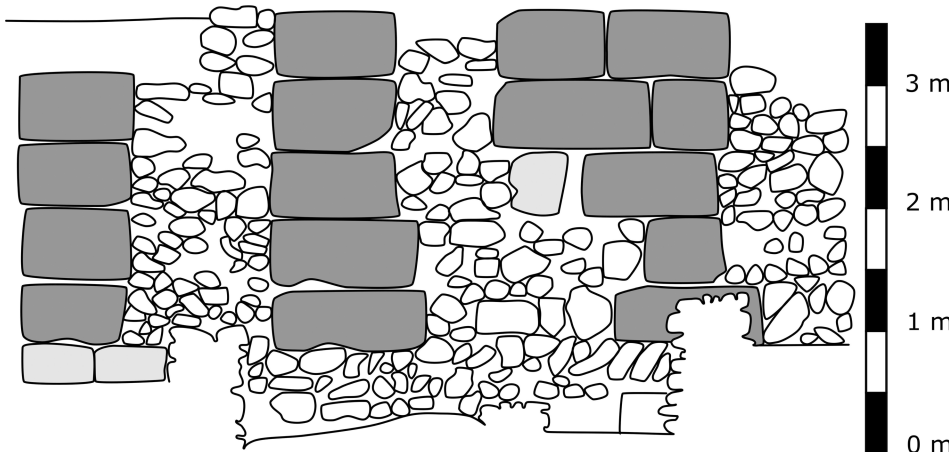


Fig. 99. Niebla, area next to Puerta de Sevilla, Trench 8, elevation of Wall 5 (02-NI), (redrawn after Belén/Escacena 1993, fig. 2).



Fig. 100. Niebla, area next to Puerta de Sevilla, Trench 8, Wall 5 (*02-NI*), (after Belén/Escacena 1990, fig. 19b, adapted).



Fig. 101. Niebla, area next to Puerta de Sevilla, Trench 8, Wall 5 (*02-NI*), (after Belén/Escacena 1990, fig. 22a, adapted).

03-GA-01

Gadir, San Sebastian island, Structures 1383 (and possibly 2029)

Technique: pier-and-rubble technique.

Function: religious?

Date: 7th–6th cent. BCE.

Recent excavations on the island of San Sebastian revealed a number of short stretches of badly preserved walls dated to the Earlier ‘Phoenician’ phase 1 of the 7th–6th cent. BCE. One of these walls, belonging to Building 1383, features remains of one ashlar pier composed of two stretchers above two headers (type B) next to remains of rubble walls. It seems that the ashlars were roughly squared and roughly smoothed and that the rubble was random. Another stretch of wall in another structure preserved a similar pier, but since no remains of adjacent rubble were preserved, it remains unclear whether this belonged to a second building erected in the pier-and-rubble technique. The finds indicate a religious function of the area.

Maya Torcelly et al. 2014, 165, fig. 6–8; 2015, fig. 2, 3; Bolder-Boos 2020, 116.

Belén 1986, 272, 274, pl. 1–3; Belén/Escacena 1990, esp. 199, 211, fig. 5, 6, 10, 14–16, 19, 21, 22, 24; 1993, esp. 142–148, 150, 155, fig. 2, pl. 1–3; Belén et al. 1993, 224 f.; 2000, 1749; Elayi 1996, 86; Campos Carrasco et al. 1998, 137, fig. 2; Blech 2001, 315; Prados Martínez 2003, 46; Mielke/Torres Ortiz 2012, 269.

03-GA-02 (plan 46, fig. 102)**Gadir, 'Casa del Obispo'**

Technique: pier-and-rubble technique.

Function: religious?

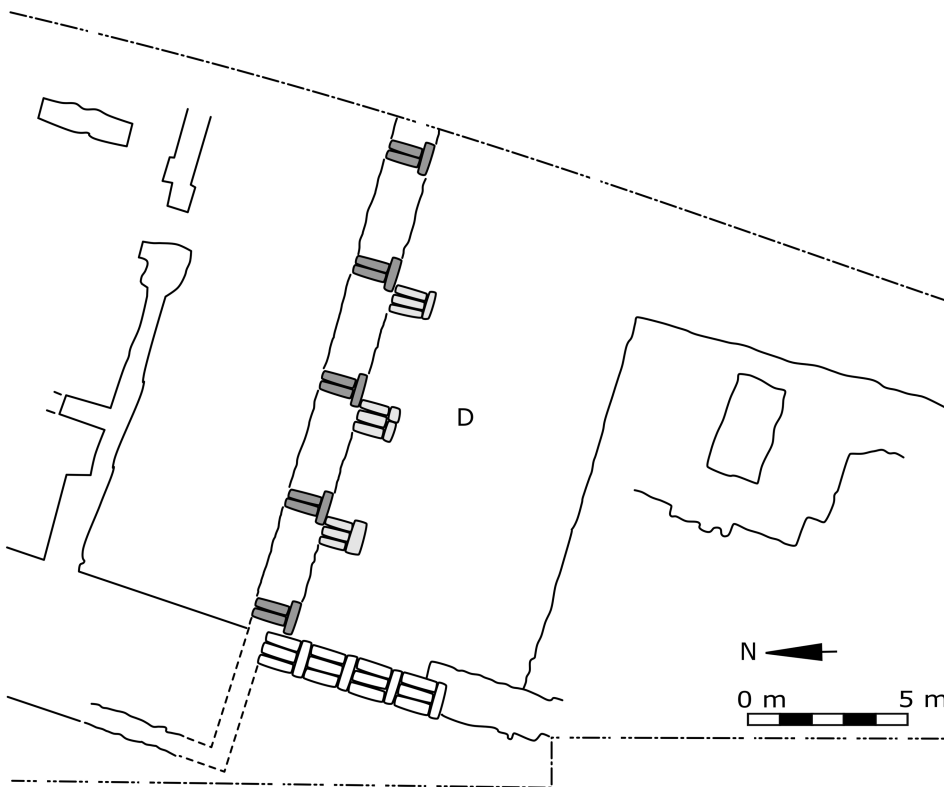
Date: phase II (4th–3rd cent. BCE).

Within the subterranean structures adjacent to a late 6th BCE funeral monument turning into a religious site, the long sustaining Wall g, erected in the 4th or rather 3rd cent. BCE, contained up to five ashlar piers of type C2, 2.25–3.8m apart. The wall was 1.4m wide and preserved to up to a length of 15.9m and in places up to a height of 2.5m; the ashlars measured 0.87–1 × 0.52 × 0.25–0.31m. The mortared rubble seems to have been coursed and partly squared. The wall was rebuilt during the Roman period (1st cent. CE) and reused as part of a cryptoporticus; in this rebuilding, the basic pier-and-rubble technique was preserved, but the piers were less systematically built with mortared ashlars. Three perpendicular walls likely connected to the first phase of wall g were almost completely dismantled in the Roman period and only preserve one pier of type G each.

Gener Basallote et al. 2014a, 141–143, fig. 3, 14, 17, 18; Gener Basallote et al. 2021, fig. 3.



Fig. 102. Gadir, 'Casa del Obispo' (03-GA-02), ashlar pier in Wall g (after Gener Basallote/Jurado Fresnadillo/ et al. 2014, fig. 17b, adapted).



Plan 46. Gadir, 'Casa del Obispo' (03-GA-02), period II, Wall g and adjacent structures (after Gener Basallote et al. 2014a, fig. 3).

04-DB**Castillo de Doña Blanca, 'Barrio Fenicio'**

Technique: pier-and-rubble technique.

Function: residential.

Date: 8th cent. BCE.

According to Ruiz Mata 2001, 263; Barrionuevo Contreras/Ruiz Mata 2004, 122; Ruiz Mata 2022a, 189, multiple walls of the 8th cent. BCE houses in the 'Barrio Fenicio' in the southeastern part of the settlement of Castillo de Doña Blanca included ashlar piers (not mentioned in most other reports, see e.g. Ruiz Mata 1984, 543 f.; 1986; 1987; 2002, 274–286). These authors state that most of them appertained to type B, but the only pier illustrated is of type A. According to the excavator, most blocks measured $0.52 \times 0.35 \times 0.17$ m (but the sizes of the roughly smoothed, but not entirely finely squared blocks visible in the photograph vary considerably). The walls are said to be mostly either 0.35 or 0.52m strong and have been plastered. No ashlar 'piers' are documented in the later phases of the 6th–3rd cent. BCE.

Ruiz Mata/Pérez 1995, 104; Elayi 1996, 86; Ruiz Mata 2001, 263, fig. 1 (top); Barrionuevo Contreras/Ruiz Mata 2004, 122; Ruiz Mata 2006, 483; Peckham 2014, 359 f.; Ruiz Mata 2022a, 189. Ruiz Mata 2022b appeared too late to be taken into consideration.

05-CA (plan 47, fig. 103)**Carmona, Plazuela del Higueral, Wall 50–53**

Technique: pier-and-rubble technique.

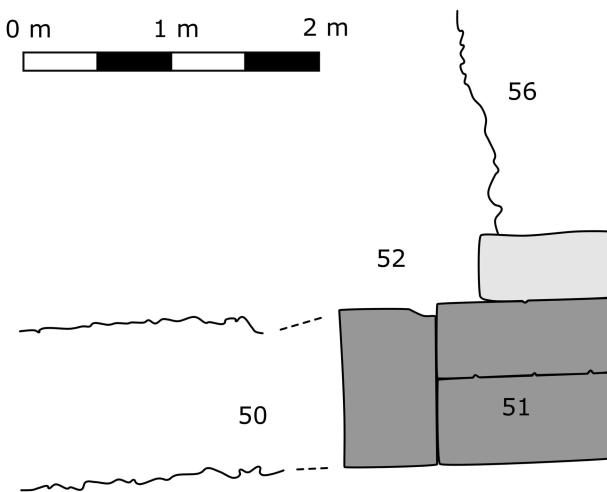
Function: unknown.

Date: 2nd half of 6th cent. BCE.

In a small trench of 4 × 4m, a 4m long section of a wall (contexts 50/51) consisting of an ashlar pier next to a section of rubble was uncovered. The wall was 1.1m wide and preserved up to a height of 2.3m (including a foundation of 0.50m) in the rubble section; the pier preserved only one course of ashlars on top of the foundation. The foundation (contexts 52/53) consisted of at least one large ashlar topped by one course of low slabs below parts of the pier and four courses of squared rubble next to the ashlar. The one course of the pier preserved had one header and two stretchers (type D?), although it is unclear whether it is entirely preserved. The blocks measured 1.06 × 0.64 × 0.4m, 1.38 × 0.56 × 0.4m and 1.12 × 0.6 × 0.4m and seem

to have been rather well-cut and well-smoothed. The mortared rubble was mostly coursed and partly squared, with rather larger stones at the two faces and rather smaller stones on the inside. The wall was interpreted as a fortification by the excavators, but this remains unclear; it can be dated to the 2nd half of the 6th cent. BCE, although it remains unclear how long it was in use. It was partly dismantled during the Roman period and robbed of many of its ashlars during the Medieval period. The adjoining Wall 56 was stratigraphically below Wall 50–53, but may have been used at the same time.

Cardenete 1988, 261, 263, photos 2, 3, plan 3; Belén/Escacena 1993, 152; Belén et al. 1993; Belén 1994, 27 f.; Belén et al. 2000, 1749; Blech 2001, 315; Escacena Carrasco 2002, 79; Prados Martínez 2003, 46, pl. 12 (top right); Escacena Carrasco 2005, 199; Mielke/Torres Ortiz 2012, 269; Peckham 2014, 356.



Plan 47. Carmona, Plazuela del Higueral, Wall 50–53 (05-CA) (redrawn after Belén et al. 1993, fig. 5).

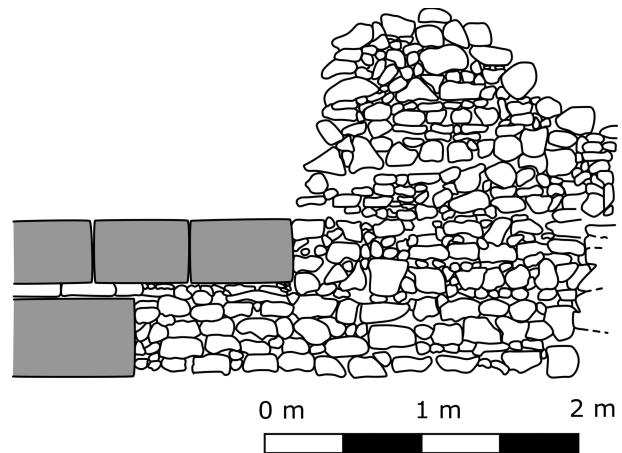


Fig. 103. Carmona, Plazuela del Higueral, elevation of Wall 50–53 (05-CA) (redrawn after Belén et al. 1993 Belén et al. 1993, fig. 6).

06-TA (plan 48, fig. 104–106)**Tarquinia, Edificio Beta**

Technique: partly modified pier-and-rubble technique?

Function: cult building?

Date: early 7th–1st half of 6th cent. BCE.

The area around Edificio Beta in the city area of Tarquinia evolved in three phases. The walls were rather badly preserved, erected from rubble and included ashlar piers in a few instances. In the **first phase** dating back to the early 7th cent. BCE, a small two-room structure was built. Its northern wall, Wall 29, included one pier of two stretcher-like ashlars above each other at the intersection with the short internal Wall 94, which seems to have had another pier of only one block at its end. The western end of Wall 29 further includes two ashlars placed side by side and covered by rubble, seemingly not belonging to a pier. The western wall of the building, Wall 285, has two piers at its northern end (next to a doorway) and at its southern end, the corner with Wall 43; in both cases, only a single ashlar was preserved. The southern wall, Wall 43, in turn, had four piers, of which only the two western ones were connected to each other by rubble, while the excavator states that the rubble sections connecting the other piers ‘got missing’ (Bonghi Jovino 1991, 177). All four piers are only preserved in one ashlar each; they are 0.8–1.6m distant from each other. Wall 10, belonging to another building opposite Edificio Beta, seems to have featured ashlars in one of its corners.

In the **second phase** dating back to the mid-7th cent. BCE, the small two-roomed building was included into a larger courtyard. The northeastern wall of the courtyard, Wall 264, has one pier of two roughly cubic blocks above each other (*fig. 104*); its northern corner may have included another pier. The southwestern wall of the courtyard, Wall 14, seems to have included four piers, the two northernmost of which were preserved only in a single stretcher-like block, while the two others had two headers below and a wide stretcher-like ashlar above (*fig. 105*). These two last piers seem to

belong already to the **third phase** of the 1st half of the 6th cent. BCE, in which another wall at the northern end of the courtyard is supposed to have featured four more piers, the ashlars of which have been robbed.

All of the walls are about 0.6m wide and partly based on earlier strata and partly on the living rock. They may have been plastered, but no remains of plaster was preserved. The excavator speculated whether wooden posts may have been placed above the piers. The ashlars were rather well-squared and only roughly smoothed, measuring 0.5–0.6m in width, mostly 0.8–0.9m in breadth and 0.4–0.5 m in height. The rubble was unmortared, partly coursed, but mostly random. All in all, the building is interpreted as cultic (‘tempio-altare’), but this interpretation is not entirely secure. Bonghi Jovino 1986, 98, fig. 67, 88–90; 1991, esp. 173–183, fig. 1–3, 6–9; Niemeyer/Docter 1993, 210; Bonghi Jovino 1997, 169 f., Beil. 13, pl. 50: 1; 144–146; 2000, esp. 90–92, fig. 1; Magness 2001, 81; Prayon 2001, 336–339; Leighton 2004, 72 f., fig. 31; Pittaccio 2004–2007, 44, 48, fig. 19; Cifaloni 2006, 145 f., 148 f., fig. 2; Bonghi Jovino 2008, 18, fig. 12; Cifani 2008, 237; Bonghi Jovino 2010a, 168, fig. 3, 7; 2010b, 10 f., fig. 3; Niemeyer et al. 2007, 189; MacIntosh Turfa 2012, 270; Camporeale 2014, 198, 200 f.; Potts 2015, 107, 132, pl. 43a, b; Bagnasco Gianni 2022, 148, 153, fig. 6,2; López-Ruiz 2022, 164; MacIntosh Turfa 2022, 32.

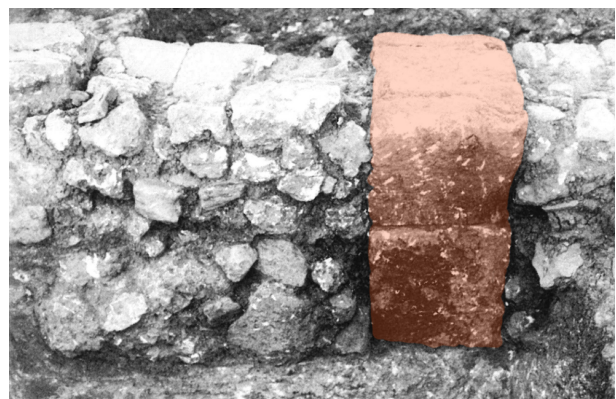


Fig. 104. Tarquinia, Edificio Beta (06-TA), detail of north wall (after Bonghi Jovino 1986, fig. 89, adapted).

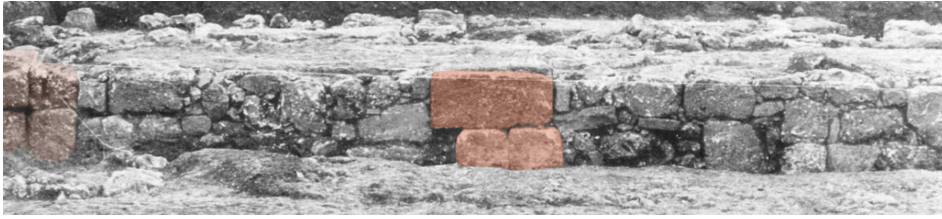
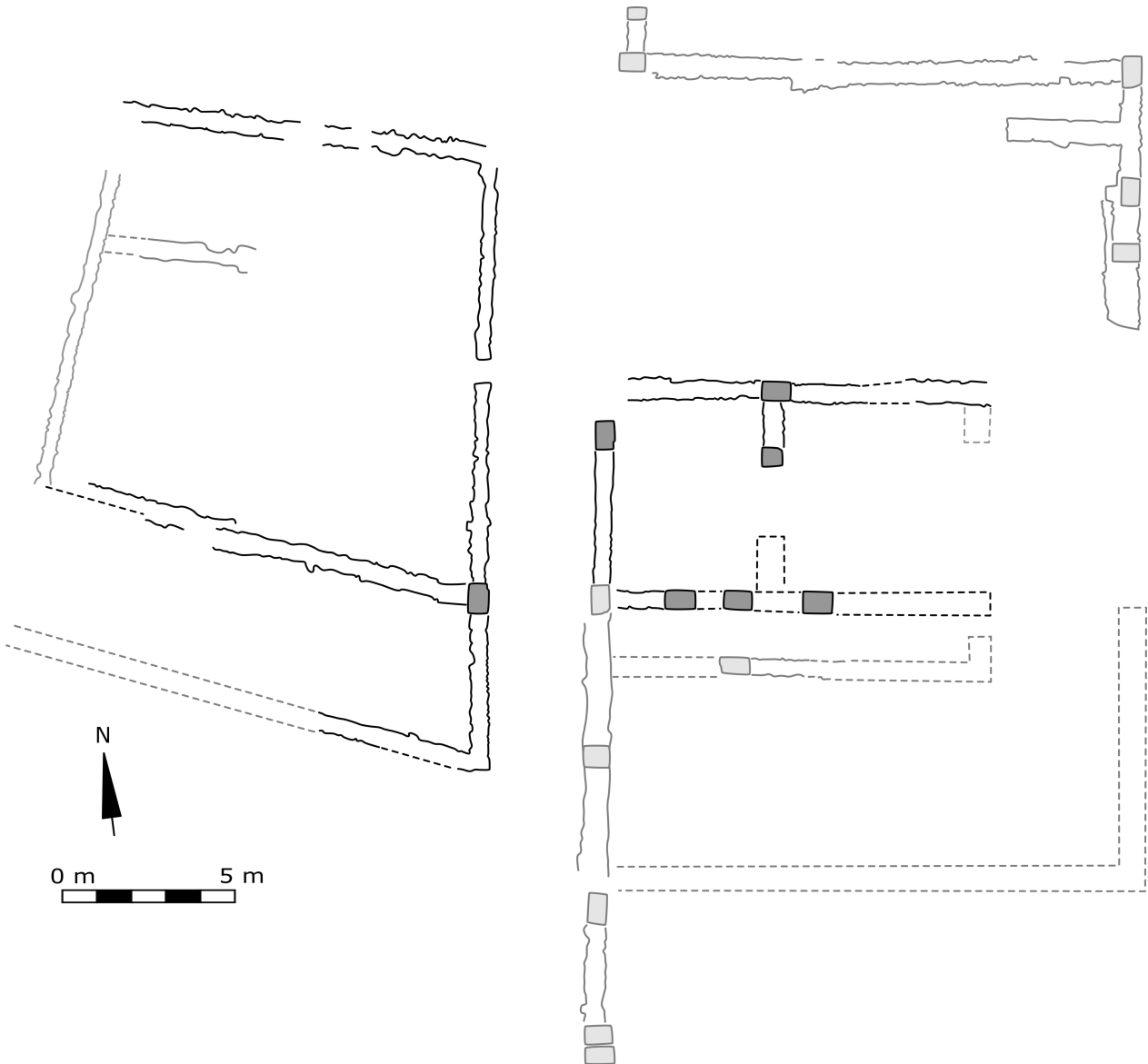


Fig. 105. Tarquinia, Edificio Beta (06-TA), Wall 14 A (after Bonghi Jovino 1997, pl. 50: 1, adapted).



Plan 48. Tarquinia, Edificio Beta (06-TA); dark grey = phase 1; light grey = phase 2 (redrawn after Bonghi Jovino 1986, fig. 67).

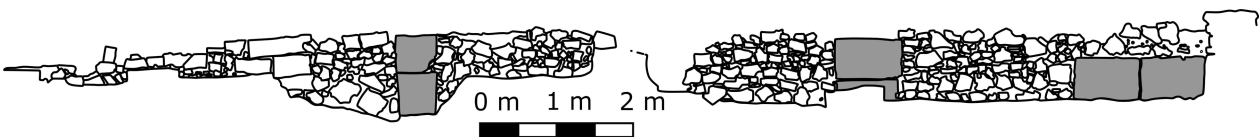


Fig. 106. Tarquinia, elevation of numerous walls of Edificio Beta (06-TA) (redrawn after Bonghi Jovino 1997, suppl. 13: 3, 4).

cat. no.	date (cent. BCE)	site	context	function	(roughly) isodomic	(very) diff. course heights	reused ashlar	max. ashlar size (ca. cm)	(roughly) uniform ashlar size	plastered	roughly cut ashlar	finely cut ashlar	roughly hewn	roughly smoothed	finely smoothed	mortared ashlar	mortared rubble	uncoursed random rubble	coursed random rubble	uncoursed squared rubble	coursed squared rubble	snecked rubble	uniform coursed rubble	wall width (m)	pier types (see fig. 2)	regularly placed	distances between piers (m) (bold for cases with 3+ piers)	
02-SU-01	2-1	Tell Sūkās	E J13 E	RE/IND	? ?	? ?	? ?	~50	X	/	(X) X	X	X	X	/	? ?	/	X	/	/	/	/	/	0.45-0.5	D (2), F/I (2)	? ?	3.3	
02-SU-02	2	Tell Sūkās	H 11 NW	RE	X X	X X	? ?	50	X	/	X X	X	X	/	/	? ?	/	X	/	/	/	/	/	0.5	D1, H (3), X	X	0.65-1.1	
02-SU-03	4	Tell Sūkās	L 8 SE	RE?	X /	X /	X /	100	X	/	X /	X	X	/	/	? ?	/	X	/	/	/	/	/	0.7	D1 (?), E	? ?	1.1	
02-SU-04	2-1	Tell Sūkās	L 11 SW	RE?	X /	X /	X /	50	X	/	X X	X	X	/	/	? ?	/	X	/	/	/	/	/	0.45-0.7	B1 (2), C2 (2?)	? ?	0.45-1.1	
03-AM	5-4	Amrūt	exc. 1954	?	/	X	? ?	? ?	/	/	X X	X	X	/	/	? ?	/	X	/	/	/	/	/	1.2	C2 (3+)	X	2.3	
04-TH	4	Tabbat el-Ḥammām	TT-1	?	? ?	? ?	? ?	? ?	? ?	/	X /	X	X	/	/	? ?	/	X	/	/	/	/	/	?	B1 (?), H, F/I (?)	? ?	?	
05-TK*	5-4	Tell Kazel	various locations	RE?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	?
06-MR	8	Tell Mīrhān	Area A/I-b/29-30 & c/30	?	? ?	? ?	? ?	60	? ?	X	/	X	X	/	/	? ?	/	X	/	/	/	/	/	0.6	B (1-3)	/	1.1	
07-BE-01	6-2	Berytos	city hall	?	X /	X /	? ?	40	X	X	X	X	/	/	/	? ?	/	X	/	/	/	/	/	0.4	D2 (3+), M (2+)	X	0.35-0.55	
07-BE-02*	4-1?	Berytos	Bey 002	?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	?
07-BE-03	3-1	Berytos	Bey 006	RE/COM	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	?
07-BE-04	6-4	Berytos	Bey 010	RE/IND/COM/ CU?	X /	X /	? ?	95 partly	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	X (X)	0.35-0.6	D1 (3), D2 (5), D (9+), H, J, K, M (1+), O	X	1-3.5	
07-BE-05*	4-1?	Berytos	Bey 045	?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	?
08-JI	5-1	Gīye	Area D	?	partly	? ?	? ?	60 partly	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	? ?	B2 (2+), X	? ?	1
09-BS	5-4	Bustān eš-Šeḥ	'Phoenician' retaining wall	RW	X /	X /	? ?	? ?	X	/	X /	X /	X /	X /	X /	X /	X /	X	X	X	X	X	X	X	? ?	D2 (6)	X	1
10-SI-01*	4	Sidon	College Site, 28, 1042/1043	?	/	(X)	? ?	45	/	/	X X	X	X	/	/	? ?	/	X	X	X	X	X	X	X	2	X?	? ?	?
10-SI-02*	9-8	Sidon	College Site, 28, 1112	?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	? ?	1.4	? ?	? ?	?
11-BU-01	8	Tell el-Burak	Structure I	RW	X /	X /	? ?	100	/	/	X X	X	X	/	/	? ?	/	X	X	X	X	X	X	X	2.8	X	/	?
11-BU-02	6	Tell el-Burak	House 1	RE	X X	X X	? ?	65	/	/	X /	X /	X /	X /	X /	X /	X /	X	X	X	X	X	X	X	0.5	X	/	/
11-BU-03	6	Tell el-Burak	House 2	RE	X /	(X)	50	(X)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0.5-0.6	B2 (4+)	X	0.55-1.25

cat. no.	date (cent. BCE)	site	context	function	(roughly) isodomic	(very) diff. course heights	reused ashlar	max. ashlar size (ca. cm)	(roughly) uniform ashlar size	plastered	roughly cut ashlar	finely cut ashlar	roughly hewn	roughly smoothed	finely smoothed	mortared ashlar	mortared rubble	uncoursed random rubble	coursed random rubble	uncoursed squared rubble	coursed squared rubble	snecked rubble	uniform coursed rubble	wall width (m)	pier types (see <i>fig. 2</i>)	regularly placed	distances between piers (m) (bold for cases with 3+ piers)	
12-SA-01	11-2	Sarepta	II X A8-B9	RE/IND	?	?	?	60	(X)	X	/	X	?	X	/	?	X	X	X	/	/	/	/	0.4-0.5	B (12?), D (?), F/I (?)	X	1.3-1.4	
12-SA-02	11-2	Sarepta	II X beyond A8-B9	RE/IND	X	X	?	?	/	/	/	X	?	X	X	?	X	X	/	/	/	/	/	B1 (2+), B2 (1+), D1 (2+), D2 (2+)	?	1-1.5		
12-SA-03	6-5	Sarepta	II Y Stratum B	RE/IND	(X)	/	X	50	/	/	/	X	?	X	X	?	X	X	/	/	/	/	/	0.5	B (8?), B1, D/J	X	0.9-1.1	
12-SA-03	9-7	Sarepta	II Y Stratum C	RE/IND	?	?	?	60	/	/	/	?	?	?	?	?	X	X	/	/	/	/	/	0.5 s.o.	/	0.5		
13-TY	9-8	Tyros	Bikai's deep sounding	RW	X	/	?	?	X	/	/	X	/	X	/	?	X	X	/	/	/	/	/	0.6 B2 (3)	X	<1		
14-AN	2	<i>Tēl Anafā</i>	LHSB	RE	X	X	?	80	partly	X	X	X	/	X	X	?	X	X	/	/	/	/	/	0.8	B (?), F, G (2), J, X (7+)	X	0.5-1	
15-OU	3-2?	<i>Umm el-'A-med</i>	back wall of portico	PO	X	/	/	75	mostly	/	X	X	/	X	X	?	?	?	?	?	?	?	?	0.6	D1 (2), H, N	X	0.6-0.9	
16-KE	4/3	<i>Tēl Qedes</i>	Hellenistic Administrative Building	RE/ADM	?	?	X	80?	?	X	?	?	?	?	?	?	?	?	?	?	?	?	?	0.8	B (≤6), D/H (?), F/I (?)	/	?	
17-AH	8/7-3	Achzib	city exc., esp. Area D	RE/COM	?	?	?	60	?	X	X	?	?	?	?	?	?	?	?	?	?	?	?	0.55	A/B (?), B (?), F/I (2?), K (?)	/	0.7-0.9	
18-KA-01	9	<i>el-Kabrī</i>	E3	FO	?	?	?	120	(X)	X	?	?	?	?	?	?	?	?	?	?	?	?	?	1.6	C (2+)	?	?	
18-KA-02*	7-6	<i>el-Kabrī</i>	new building (above MBA courtyard)	?	?	?	?	?	?	X	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	B?	/	?
19-NA*	5-4	<i>Tēl Nahāriyā</i>		?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
20-AK-01	5-4	Acco (<i>Tell el-Fūḥṭār</i>)	A	?	/	X	?	60	/	/	X	X	?	?	?	?	?	?	?	?	?	?	?	0.4-0.85	F/I (?), G (?), J (2?)	?	0.6	
20-AK-02	3	Acco	D	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
22-AH	4	<i>Tell Abū Ḥawām</i>	Stratum 2	RE/STO	X	/	X	50	X	/	?	X	X	/	/	/	/	/	/	/	/	/	/	0.7-1.0	B2 (27?)	X	2-3	
23-YO	5-4	<i>Yoqne'ām</i>	Area A Building 1558	?	?	?	?	65	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	0.6	?	?	?	
24-DO-01	5	Dor	A0	RE?	?	?	?	50	X	?	?	?	?	?	?	?	?	?	?	?	?	?	?	0.4-0.5	D (3)	?	?	
24-DO-02	5-1	Dor	A1	RE	X	/	?	50	X	/	X	X	/	X	X	?	?	?	?	?	?	?	?	0.45	B, D1 (9), H, J, M, CH	X	0.9-1.6	
24-DO-03	3-2	Dor	B	RE?	X	/	?	55	X	?	X	X	/	X	X	?	?	?	?	?	?	?	?	?	?	N (2)	?	1.1

cat. no.	date (cent. BCE)	site	context	function	(roughly) isodomic	(very) diff. course heights	reused ashlar	max. ashlar size (ca. cm)	(roughly) uniform ashlar size	plastered	roughly cut ashlar	finely cut ashlar	roughly hewn	roughly smoothed	finely smoothed	mortared ashlar	mortared rubble	uncoursed random rubble	coursed random rubble	uncoursed squared rubble	coursed squared rubble	snecked rubble	uniform coursed rubble	wall width (m)	pier types (see fig. 2)	regularly placed	distances between piers (m) (bold for cases with 3+ piers)	
24-DO-04	5-1	Dor	C0	RE	X	? ? ?	? ? ?	65 mostly	X	X	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	0.45	B (≤6), D2 (27), F/I (2+), H (8), I (2+), K (4), J (3), CH (3+), X (3)	X	1.3-1.8/0.6-1	
24-DO-05	5-4	Dor	C1	RE/FO	X	X X	X X	75 partly	/	/	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	0.4-0.8	B (?), D1 (5), E (3), F (?), H (?), L (6), M (?)	X	1.1-1.2	
24-DO-06	6-3	Dor	C2	RE	X	/	? ? ?	50 mostly	/	/	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	0.45	B, D1 (8), D2, G, J, X, CH	X	1.1-1.2	
24-DO-07	8/5?	Dor	D1	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	
24-DO-09	4-1	Dor	D1	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	
24-DO-10	4-3	Dor	D2	RE/STO	X	/	? ? ?	50	X	/	X	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	? ? ?	D2, H (3), N (3)	X	0.5-1
24-DO-11	8/6-3/2	Dor	D5	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?
24-DO-12	6?	Dor	E	?	X	/	? ? ?	50	/	/	X	/	X	/	X	? ? ?	? ? ?	/	/	/	/	/	/	0.75	X	? ? ?	? ? ?	
24-DO-13	5-2	Dor	E	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?
24-DO-14	4-2	Dor	F	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?
24-DO-15	4-2	Dor	G	?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?
25-ME-01	9-8	Megiddo	A IVA 1626	RW	(X)	/	? ? ?	120	X	/	X	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	1.5	C2 (3+)	X	4.5-9
25-ME-02	9	Megiddo	B IVB 1693	CW	X	/	? ? ?	100	X	/	X	/	X	/	X	? ? ?	? ? ?	/	/	X	X	X	X	/	1	A (2+), B (≤9), D	X	2.5-5
25-ME-03	9	Megiddo	C IVA 338	POD	X	X	X	130 partly	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	1	B2 (15+), K (?), X (5+)	X	1.4-2.8	
25-ME-04	9-8	Megiddo	C IVA 403	STA?	? ? ?	? ? ?	? ? ?	100 (X)	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	1	B (2)	/	/	/	
26-JE	9	Jezreel	casemate wall	FO	? ? ?	? ? ?	? ? ?	110	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	1.5	A, C (3), D (1+), X	/	/	
27-TM	4	<i>Tel Mavōrak</i>	casemate wall	FO	X	/	/	55 (X)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0.5	D1 (5), CH	X	0.8-1.1	
28-CA	3-2	Caesarea Maritima	north of Tower 1	?	X	/	? ? ?	60	X	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	0.9
29-MI*	5-4	<i>Tel Mikmo-ret</i>	Persian building	FO?	? ? ?	? ? ?	? ? ?	100	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	? ? ?	1.0-1.2	? ? ?	/	? ? ?	

cat. no.	date (cent. BCE)	site	context	function	(roughly) isodomic	(very) diff. course heights	reused ashlar	max. ashlar size (ca. cm)	(roughly) uniform ashlar size	plastered	roughly cut ashlar	finely cut ashlar	roughly hewn	roughly smoothed	finely smoothed	mortared ashlar	mortared rubble	uncoursed random rubble	coursed random rubble	uncoursed squared rubble	coursed squared rubble	snecked rubble	uniform coursed rubble	wall width (m)	pier types (see fig. 2)	regularly placed	distances between piers (m) (bold for cases with 3+ piers)	
30-KU	5-4	Tell Kūrdādi	Persian wall	?	X	/	/	50 (X)	X	/	/	/	/	X	/	?	/	X	X	X	X	/	/	0.75	X	X	1.5-2	
31-JA	5	Jafo	Area A level IB/LT-3a	RE/IND	X	/	/	60 partly	partly	?	X	X	X	X	/	?	/	X	X	X	X	/	0.5-0.85	X	X	1-2		
32-YA-01	5	Tēl Yāōz	C	RE	X	/	?	60	X	X	X	X	X	X	/	?	/	X	X	X	X	/	0.5-0.6	B2 (2), B (8)	X	0.7-1.1		
32-YA-02	6-4	Tēl Yāōz	D	RE	X	/	?	60	X	X	X	X	X	X	/	?	/	X	X	X	X	/	0.5-0.6	A (6+), B, D, D1	X	0.5-1		
33-YY-01*	6-4?	Yavnē Yām	A	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
33-YY-02*	6-4?	Yavnē Yām	B	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
34-AS*	4-2	Ashkelon	South Tell 38, 9/10	RE	?	?	X	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	
01-HU-01	8	Huelva	Cabezo de San Pedro	RW	X	/	?	120	/	X	X	X	X	X	/	/	/	X	X	X	X	/	/	2	X	/	/	
01-HU-02	?	Huelva	Cabezo del Molino de Viento	RW	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
02-NI	2	Niebla	Puerta de Se- villa, Trench 8, Wall 5	?	(X)	/	X	120	X	/	X	X	X	X	/	/	/	X	X	X	X	/	/	0.55	X (4)	?	/	
03-GA-01	7-6	Gadir	San Sebasti- an, structures 1383/2029	RE	?	/	?	?	X	?	X	?	?	?	?	?	?	?	?	?	?	?	?	0.5	B (1+)	?	?	
03-GA-02	4-3	Gadir	'Casa do Bispo'	RE	X	/	?	100	X	?	X	X	X	X	/	/	/	X	X	X	X	/	/	0.55	C2 (5?), G (3)	X	2.25-3.8	
04-DB	8	Castillo de Doña Blanca	'Barrio Feni- cio'	RE	/	X	?	65	/	X	X	X	X	X	/	/	/	X	X	X	X	/	/	0.35-0.5	B (?)	?	?	
05-CA	6	Carmona	Plazuela del Higueral, Wall 50-53	?	?	?	?	140	/	X	X	X	X	X	/	/	/	X	X	X	X	/	/	1.1	D (?)	?	/	
06-TA	7-6	Tarquīnia	Edificio Beta	CU	(X)	/	?	90	X	/	X	X	X	X	/	/	/	X	X	X	X	/	/	0.6	X	/	0.8-1.6	

Table 1. Contexts with pier-and-rubble (RE = residential; IND = industrial; COM = commercial; RW = retaining wall; PO = portico; CU = cultic; FO = fortification; STO = storage; ADM = administrative; CW = courtyard wall; POD = podium; STA = stables; X = attested; ? = not attested; (X) = unclear / = not attested; ? = probably attested).

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PIER-AND-RUBBLE?

Ashlars and rubble masonry were often used side by side in Levantine buildings of the Iron Age. This book distinguishes various such techniques and focuses on the popular pier-and-rubble technique. It deals with its prerequisites, its possible predecessors as well as its various structural advantages and traces its spread from its emergence at the turn of the first millennium BCE to the latest evidence, dated to its very end. An analysis of the ashlar piers' typology and other technical characteristics indicate that its use was not spread by specialised masons but possibly by word of mouth accompanying various forms of exchange. The technique's diffusion to the Iberian Peninsula, but not to the central Mediterranean, confirms that it should not be taken as a 'Phoenician' cultural or even ethnic marker. The pier-and-rubble technique is at best distantly related to the central and west Mediterranean technique called *a telaio*, three variants of which may be differentiated. The origin of those can only partly be traced to the 'Punic' area and likewise they are inadequate as cultural or ethnic markers; rather than that, the study of such building techniques highlights multi-directional links across the Mediterranean beyond the movement of mere objects and thus adds to our picture of interregional exchange. The individual occurrences of the pier-and-rubble technique are compiled in the book's richly illustrated catalogue.



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