Monumentality, Building Techniques, and Identity Construction in Roman Italy: The Remaking of Cosa, post-197 BCE

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Introduction

Although certainly not the grandest with its 13 ha., the Latin colony of Cosa (founded in 273 BCE) provides detailed archaeological evidence to study the tempo and dynamics of mass-construction projects in higher-order settlements of the Roman Republican period (cf. Dyson 2013; Fentress/Perkins 2016; for the bigger picture: Sewell 2010; 2016). A closer look at both the chronological sequence and process of construction of Cosa's public architecture reveals meaningful patterns that can help us characterize the cultural component of the technological choices underlying large-scale building programs in Roman colonial contexts.

In this study, then, the specific focus is on mortared-rubble architecture (for which the term *opus caementicium* or Roman concrete is used interchangeably; cf. Lancaster 2015: 21–23). As we see, at Cosa the technology was implemented for the renovation of the main civic symbols (namely the Comitium, the center of all political activity; and the so-called Capitolium, the largest temple at the site), most likely after the colonial resettlement of 197 BCE. Expanding the shelf of available techniques (i. e., costly limestone polygonal masonry; vernacular earthen architecture), the new building medium required significant logistical innovations, including water-supply (which was particularly problematic at a site lacking water sources; De Giorgi 2018: 6–10), and quarrying and transportation of reworked volcanic sands from the coastal plain. It also allowed, however, for the involvement of unskilled manpower in the actual construction process.

Thus, in what follows I locate Cosa's phenomenon at the particular nexus between monumentality, materiality, and collective action, linking technological change with the creation of a new communal identity, precisely at a time when a contingent of 1000 new colonists was reportedly sent to the colony. Questioning previous interpretations based on the idea that the technology was simply imported as part of a package from Rome, I argue for a more active role of the locals, concluding that early experiments with concrete construction, while still

relying on the local geology and economy, are brought about primarily by social and cultural needs.

Roman colonization, monumentality, and the origins of Roman concrete

Architectural features employing mortared masonry are known from several Mid-Republican colonies, most notably Ostia, Alba Fucens, and Cosa, and are commonly assigned to the earliest levels of the settlements (e. g., Giuliani 2006: 217–218). Using colonial foundation dates as fixed points, and combining them with ideas of progressive evolution of facing styles (from irregular to regular) and composition of the binder (from clay-based to lime-based), the spread of the building technique in Italy has been dated no later than the 3rd century BCE, though mostly on circumstantial grounds (for the typological approach see Tombrägel 2012: 39–102; on the development of mortars in Pompeii, see Peterse 1999; cf. Mogetta 2016, highlighting the methodological problems with the conventional dating framework). In previous studies, therefore, the variant seen at Cosa has been described as the precursor of standardized Roman concrete *(opus caementicium)*, reflecting an experimental phase for which there would be indirect evidence in the literary sources (e. g., Cato, *Agr.* 14.1–2: walls made *calce et caementis*; Vitruvius 2.8.1, *genus antiquum*; Blake 1947: 324–327; Lugli 1957, 1: 374; cf. Von Gerkan 1958). On the false assumption that Roman colonies were miniature copies of Rome in their institutional framework as well as in their physical aspect, the conclusion was that the technological innovation originated in or around the metropolis, and that it was exported from core to periphery (cf. Fentress 2000 with reference to Cosa; Stek/Pelgrom 2014 for a critique of the traditional model of Roman colonies; on the implications: Mogetta 2015: 2–7; Mogetta 2016, 43–44).

The interpretation of mortared-rubble architecture as a marker of Roman identity or influence rests also on the idea that Roman magistrates were directly involved in the urbanization programs affecting the colonies. There is evidence that this was probably the case from around the mid-2nd century BCE onwards. A fragmentary testimony in Livy (41.27-28) suggests that one of the Roman censors of 174 BCE, Q. Fulvius Flaccus, used allotted funds to carry out re-planning projects at the Roman colonies of Sinuessa, Pisaurum, and Potentia. Furthermore, an inscription referring to the resettlement of Aquileia in 169 BCE (*AE* 1996, Nr. 685) demonstrates that the *triumviri* (commission of three) sent from Rome were also responsible for physically configuring the urban landscape of colonies of Latin right (Sewell 2010: 84). Contemporary literary sources hint at an increasingly intensive use of contractors (known as *publicani* or *redemptores*) who carried out public construction works throughout Italy (Polybius 6.17.2-5;

see the discussion in Sewell 2010: 110–111; but Anderson [1997: 99–100] notes how Polybius may exaggerate the extent of censorial contracting, since the passage refers to the industry as it existed at the start of the Second Punic War). In this perspective, architects and skilled craftsmen coming from Rome would have been responsible for the introduction of Roman building types and building techniques in state-sponsored construction projects (Lugli 1957, 1: 445–446 for the class of concrete walls known as *opus incertum*; Torelli 1980: 153–154 for *opus reticulatum*). While there is no explicit reference of that sort for the 4th and 3rd centuries BCE, the expectation has nonetheless been that, at the very least, Roman masonry styles were transferred to Mid-Republican colonial sites like Cosa by the Roman colonists, who would have brought with them practices learned in their place of origin (Brown 1951: 109–110, emphasizing parallels with sites in Latium).

The distribution map of the earliest reliable examples of mortared masonry in central Italy (Figure 1) includes Cosa alongside other major urban sites where the archaeological evidence, however, points to a later date than previously thought (from the 2nd century BCE onwards; for a broad survey in Latium and Campania see Cifarelli 2013). Most notable in the sample are Pompeii, Cumae, and Teanum (Mogetta 2013: 264–281), to which we may add colonial Liternum (De Vincenzo 2018) and Puteoli (though with less confidence, due to limited stratigraphic excavations: Paternoster et al. 2007). Signature aspects of the techniques attested at some of these sites (e. g., the ashlar limestone framework at Pompeii; the use of poured concrete foundations at Teanum; the selection of head-to-fist size wall-facing tesserae at Puteoli) are entirely missing at Cosa. The lack of any standardized pattern emerging from this seems to suggests that the switch to mortar-and-rubble construction was not necessarily a centrally regulated phenomenon, but rather one betraying a great deal of local adaptation. For the same reason, the possibility that the same group of builders moved from site to site can be excluded.

Instead of characterizing the spread of the technology as a symptom of cultural diffusion in Roman Italy, I propose a different approach, using the Cosan material as a test-bed. While acknowledging the important role that private contractors hired by the colonists might have played in building Cosa, precisely because of the link between architectural development and colonial encounters at the site, my goal is to investigate what social identities and interpersonal relations could have been expressed and enacted within the arena of technological practice (which includes construction works), focusing on the cultural component (or technological style) of the innovation within the local context.

Figure 1: Map of Italy with main sites mentioned in the text (courtesy of Antiquity À-la carte; CC BY 4.0)

Roman building techniques and technological style

The literary evidence mentioned above actually provides a useful starting point for reorienting the discussion around issues of identity construction, because it also demonstrates how building methods could become caught up in contemporary social discourse. Cato the Elder, the source closer to the period under discussion, construed early Roman concrete as a discursive category primarily to express concerns about Roman identity and morals, and thus score political goals. In his *De Agricultura*, he singled out lime-based mortared rubble as the proper medium to build the foundations of Roman farms, alongside beaten earth for floors and dung plaster for coatings, contrasting his idealized view of traditional domestic architecture against the excesses seen in the *villae expolitae*, the "villas embellished to the most impressive degree" owned by his political rivals. In other rhetorical fragments, he in fact describes his own habitation, like his other personal effects, as utterly modest (*ORF*[4] 8.174, after 164 BCE?), denouncing greedy (public?) building as a form of political corruption (*ORF*[4] 8.133, ca. 183 BCE) (Nichols 2010; Nichols 2017: 83–129).

Of course, Cato's precepts are not to be taken at face value. His examples are at odds with archaeological realities, which seems normal considering that we are dealing with excerpts from works that were mainly literary in scope (Terrenato 2012). To be sure, known rural buildings in the region of Rome are either older,

larger and richer, or much smaller but more nicely-appointed than Cato's *villae* and none of them features rubble construction, ashlar masonry being the norm (Mogetta 2015: 23–24, Table 4). On the whole, however, texts like Cato's (and more extensively Vitruvius's *De Architectura*; Nichols 2017, especially pp. 42–82) suggest that construction methods and processes could be charged with social meaning. The main implication is that building technology itself can be described as a form of material culture. Thus, just as in other spheres of artifact production (pottery, metallurgy, textiles etc.), concentrating on the role of specific technological choices behind the introduction of mortared-rubble architecture at colonial sites across Roman Italy may reveal more complex components of social agency than Roman influence. During technical activities people are rarely constrained to a single operational chain, and opportunities and alternatives constantly arise, affecting the decision-making process. These choices are indeed capable of acquiring communicative potential, since technological gestures can be witnessed by others in the community, thus suggesting that technological practice and performance can help express and manipulate salient identities, and construct more than mere material objects (cf. Lechtman 1977 on the ability to identify cultural decisions and choices in the technologies behind object production; see Hoffman/Dobres 1999 for archaeological examples of how identities can be 'manufactured' through technological practice).

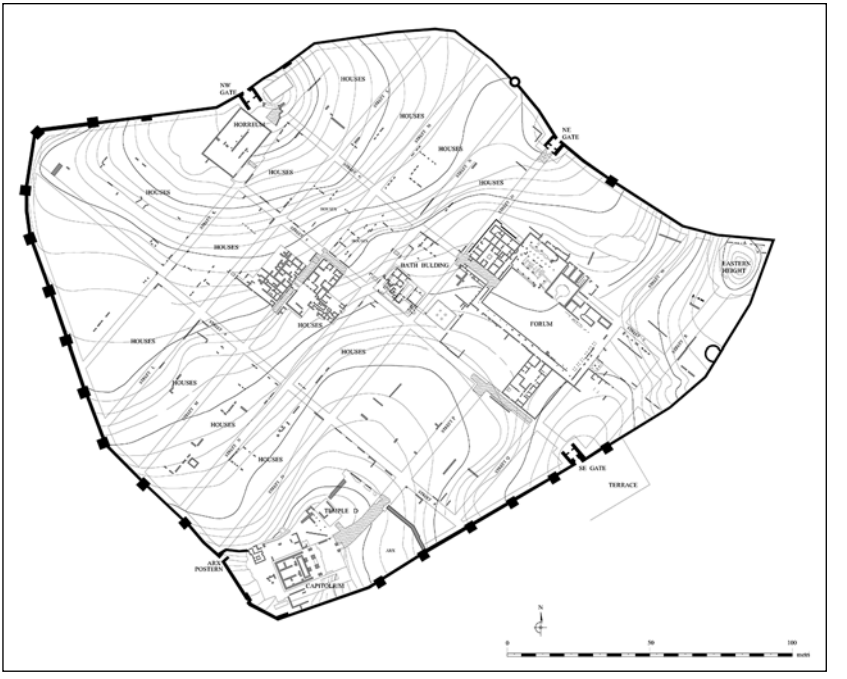
The relevance of Cosa for the study of early concrete architecture

The archaeological evidence from Cosa presents itself as an ideal testing ground for exploring the relationship between technological innovation, stylistic behavior, and the construction of social identity in the context of Roman Republican urbanism. Cosa is not only one of the most extensively researched Mid-Republican Latin colonies (with Alba Fucens, Fregellae, Paestum), but also one for which the publication record is relatively complete. This is why the site figures prominently in studies of early Roman architecture, making dealing with its legacy data almost inevitable (Figure 2).

The results of F. Brown's excavations in 1948–1954 and 1967–1972 have been disseminated through a series of monographs covering specific areas of the site primarily by building types: the fortifications (Brown 1951), the temples on the Arx (Brown et al. 1960), the port (McCann 1987), the Forum and its dependencies (Brown et al. 1993), and the houses (Bruno/Scott 1993). Each of these studies includes specific information on the relevant building methods. Adequate publication of the finds associated with these architectural remains, however, lagged generally behind, as it relied significantly on the final dissemination of Brown's stratigraphic analysis (the main publication for the dating of the Republican contexts is

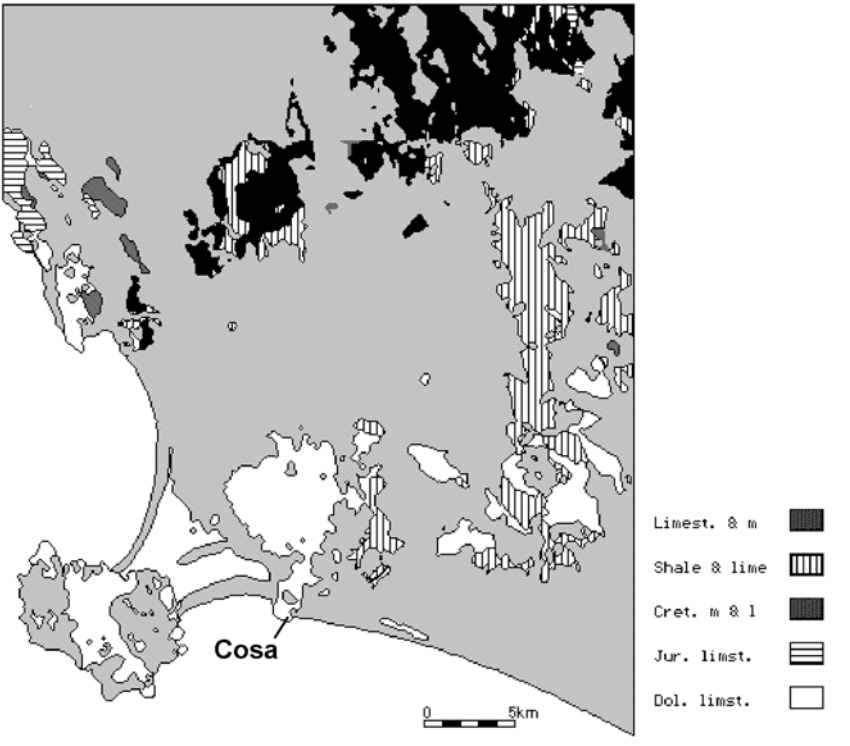
Scott 2008; for the coins Buttrey 1980). While the early works sketched the image of a fully developed Mid-Republican city, the results of more recent fieldwork projects carried out in 1991–1997 (Fentress et al. 2003) and from 2013 onwards (Scott et al. 2015) have seriously questioned the existence of a substantial settlement within the fortification circuit of the colony for most if not all of the 3rd century BCE (Fentress et al. 2003: 14–28; Sewell 2005; Sewell 2010: 25–33).

Figure 2: State plan of Cosa (De Giorgi 2018: 7, Figure 2; used by permission of the author)



Besides providing a critical mass of archaeological data, Cosa can also contribute significantly to our understanding of the relationship between early concrete architecture and local geology, especially because of the town's proximity to sources of both limestone and volcanic sands (i. e. the key ingredients for high-quality mortars). The spatial distribution of sites where the switch to mortar-and-rubble architecture has been dated with some confidence within the first half of the 2nd century BCE suggests a possible correlation in this sense, given that these are located at the interface between the limestone and volcanic regions of central Italy (think of Praeneste). The link between locally available resources and building techniques seems to have been a constant in the architectural history of these sites, since they also fall within the area of diffusion of the so-called polygonal masonry, a class of walls made of massive blocks of polygonal shape laid without mortar in a

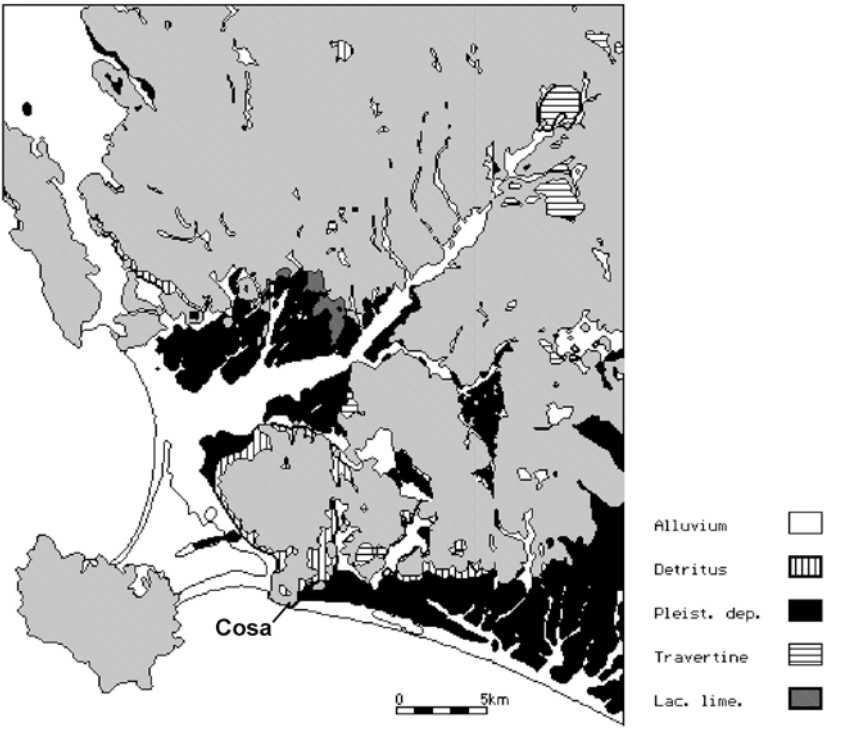
Figure 3: Geological deposits in the region of Cosa. Key: Limestone and marls; Cretaceous marls and limestone; Jurassic limestone; Dolomitic limestone (adapted from Perkins 1999: 6, Figure 1.1.3; used by permission of the author)



random pattern. Crosscutting cultural boundaries, polygonal masonry is almost exclusively found in areas where hard stones outcrop: marine limestones in the Apennine foothills of ancient Samnium, South Latium, the Sabinum, and parts of Umbria, and other sandstones and conglomerates in parts of coastal Etruria and North Etruria (cf. Helas 2016). At Cosa, polygonal masonry is the only form of monumental construction attested for the period pre-dating the urban renovations, as shown primarily by the fortifications (where it is found in combination with fills of dry rubble) and the cisterns located at the Northwestern Gate, the Northeastern Gate, and at the intersection of Streets 4 and K, and 5 and O (De Giorgi 2018: 9). Other structures securely dated to the initial phase of the colony of 273 BCE consist of rock-cut features (e. g., the so-called Auguraculum on the Arx; Brown et al. 1960: 11–13).

The innovation of mortared-rubble architecture at Cosa probably emerged as the result of the interplay between different regional traditions (thus Von Gerkan 1958: 151–152, interpreting mortared masonry at Cosa as an evolution of polygonal

Figure 4: Geological deposits in the region of Cosa. Key: Pleistocene deposits; Lacustrine limestone (adapted from Perkins 1999: 4, Figure 1.1.1; used by permission of the author)



masonry), the economy of construction (but see Torelli 1980: 156–157, comparing the skills required to finish individual elements in walls with *opus incertum* facings with the dressing of blocks in polygonal masonry at the building site), and the supply of locally available building materials.

The promontory on top of which the town sits is composed of a variety of grey Dolomitic limestone conventionally defined as *calcare cavernoso*, which in places is well layered, but elsewhere highly brecciated (Figure 3). Quarries of polygonal blocks have been reported near the harbor, just east of the promontory (where there are deposits of finer quality than those available from the hill outcrop; Gazda 1987: 87–88), though blocks for the fortification walls came from multiple quarry faces very close to the walls themselves. Smaller blocks and rubble could be obtained right at the building sites, particularly during preparation works (i. e., by regularizing the bedrock). Sandstone and clayey schists occur in association with the *calcare cavernoso*, outcropping in petrified dunes running parallel to the coast, about 1 km inland east of Cosa (Perkins 1999: 3–6. On the sourcing of the calcareous sandstone see Brown 1951: 59; Brown et al. 1960: 31, n.15).

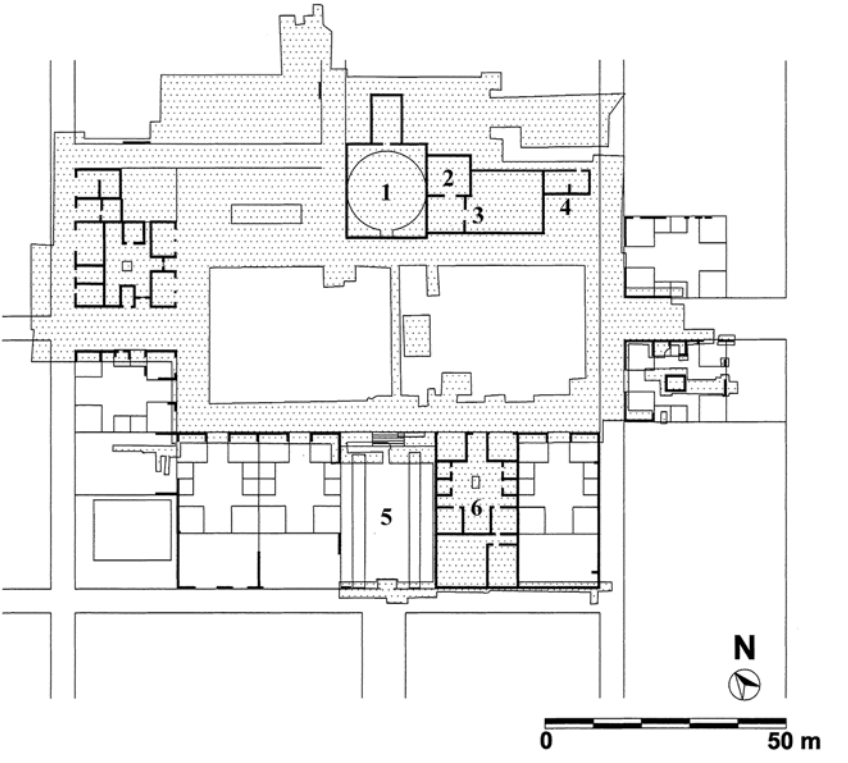
The main source of sediments on the hill is the *terre rosse*, a silty clay rich in ferrous oxides that results from the weathering of the local limestone. Pockets of this material fill depressions in the bedrock topography. Other important materials for building purposes came from the dune beach and offshore sands south and east of the promontory (Figure 4). These sands are rich in heavy minerals, which take up to half or more of their composition, and vary in color from light to dark gray depending on the percentage of the minerals (Bourgeois 1987: 50–53). They originated from the mountains 60–80 km to the north-east of Cosa, in the area of Lake Bolsena, which consisted of volcanic rocks and sediments, including tuffs and pozzolan (Marra/D'Ambrosio 2013). Scientific evidence has been reported to support the idea that there was long-distance trade of pyroclastic rocks from the Vulsini district in the Republican period. Cosa was located not far from the mouth of the Fiora river, which would have represented the main transportation route for the material, but the 4th–2nd century BCE date for the establishment of the trade (Marra/D'Ambrosio 2013: 1019) is questionable (it is based on material recovered from the Pisa shipwreck B, which has been assigned to the Augustan period).

The planning of the Forum ensemble of Cosa

The early development of mortared-rubble architecture at Cosa occurred in parallel with the emergence of civic infrastructure. There is a general consensus that the final aspect of the Forum of Cosa materialized only in a piecemeal fashion. The earliest activity would be represented by the digging of four open oblong cisterns, two on the NE side, parallel to the main square, two perpendicular to its SW side, and of a series of pits lining the SE half of the square. Construction of the free-standing structure of the Comitium, with its axial covered hall (identified as the Curia, or town council building) on the NE side, in the area between the two cisterns, would have soon followed. While the excavators assigned these buildings to the first phase of occupation of the colony (between 273–241 BCE, according to Brown et al. 1993: 26), Fentress/Perkins (2016: 381) recently revised the dating to the third quarter of the 3rd century BCE (between 240–220 BCE). The fixed point for this is based on the ceramic materials and coins contained in the fills that put out of use a neighboring structure, an enclosure with catchment area around the cistern SE of the Comitium, to be transformed into a sacred precinct (Templum Beta; Brown et al. 1993: 51–56). Another building on the NE side of the square has been assigned to the same sub-phase, and its vaulted basement identified with a Carcer (prison: Brown et al. 1993: 38–39). Significantly, the voting structures with annexed ritual spaces and jail are all located on one of the long sides of the open square. The progressive infilling and beautification of the remaining sides is more securely dated to the 2nd century BCE: first the construction of the so-called

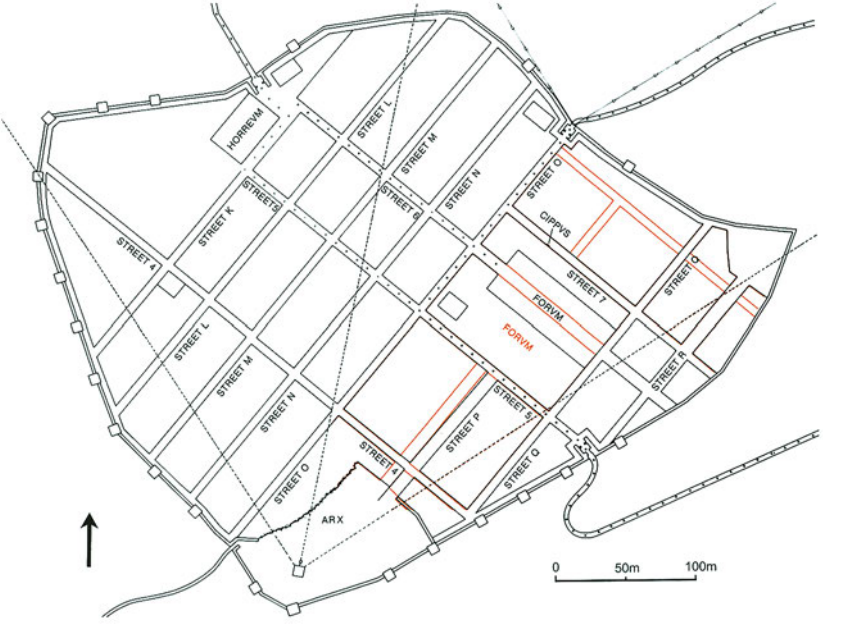
Atrium Buildings (four on the long SW side of the square, two on each of the short sides, best understood as élite *domus*; Sewell 2010: 137–165), and the Southwest Annex (an open-plan structure centered on the axis of the Comitium and Street P) (Brown et al. 1993: 57–106) (Figure 5); then the colonnaded triporticus and a monumental gateway (Brown et al. 1993: 107–138.); a small prostyle temple (Temple B, replacing Templum Beta: Brown et al. 1993: 142–153); and finally, a basilica on the N corner, built in the second half of the 2nd century BCE (Brown et al. 1993: 207–227) (cf. Figure 7).

Figure 5: Reconstruction of the Forum area around 180 BCE (after Fentress et al. 2003: 22, Figure 9; used by author's permission). Key: 1 = Comitium and Curia; 2 = Templum Beta; 3 = Forecourt; 4 = Carcer; 5 = Southwest Annex; 6 = House of Diana. The hatched area indicates the extent of excavations



The picture of gradual development has been challenged quite convincingly by Sewell, who has brought to our attention a series of anomalies in the planning of the excavated Forum: the fact that the open square has no streets along its edges, as is normally the case for contemporary Mid-Republican colonial layouts;

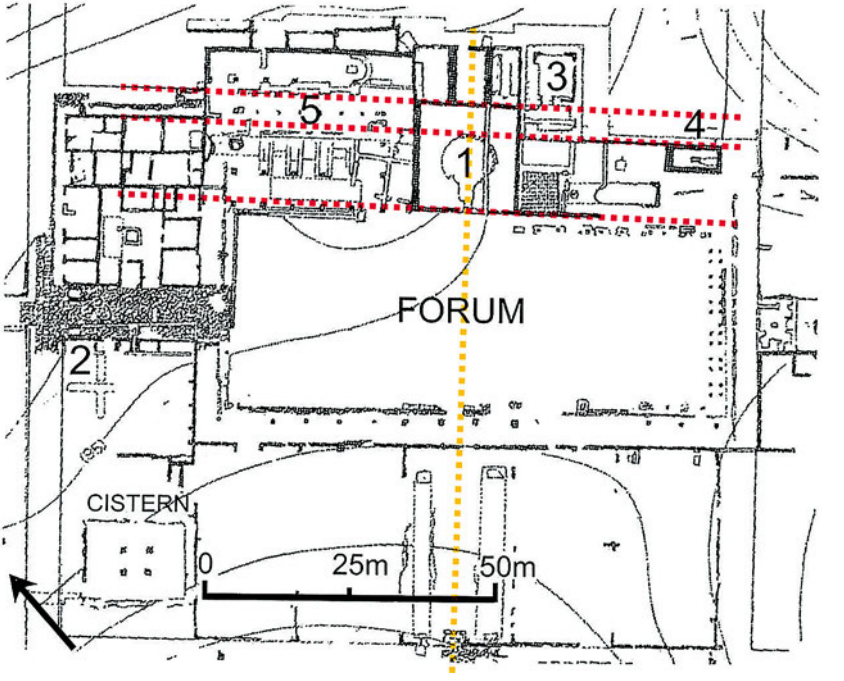
Figure 6: Composite plan showing the overlap of the 2nd-century BCE state (gray) on Sewell's ideal layout of Cosa in the 3rd century BCE (red) (adapted from Sewell 2010: 27 Figure 8, and 29, Figure 10). Note especially the shifting and reorientation of Street P from its reconstructed position in the original plan, which effected the trapezoidal, irregular shape of the city-block delimited by Streets P, Q and 5



the irregular shape of the city-blocks on its NW and SE sides; the positioning of the Comitium/Curia complex in a city-block that was not nearly wide enough, causing it to block Street 7 and encroach upon part of the adjoining plot (Sewell 2005; Sewell 2010: 27–32). Despite the lack of direct archaeological evidence, an attractive explanation to account for these irregularities is to consider the existing forum as a later insertion (Figure 6). Whether the original 3rd-century plan was ever completed remains debatable, because of the significant difference in height that exists between Streets 5 and 7 (2 m according to Sewell 2010: 29; up to 3 m according to Fentress/Perkins 2016: 380). A steep cut in the bedrock is still visible at the back of the House of Diana (one of the 2nd-century BCE *domus* facing onto the SE side of the square), i. e. where the SW half of the original piazza would have stood, meaning that part of its surface would have remained unfinished until the creation of the domestic structure.

The main implication is that none of the buildings lining the NE side of the excavated Forum can be assigned to the early phase of the colony of 273 BCE, with

Figure 7: Actual state of Cosa's Forum. Key: 1 = Comitium; 2 = Triple Arch (gateway); 3 = Temple B; 4 = Carcer; 5 = Basilica (from Sewell 2010: 28, Figure 9; used by permission of the author). Note the slightly skewed alignment of the buildings located on the north side of the Forum (red dashed line) and their relationship to the axis of Street P (yellow dashed line)



the possible exception of the Carcer, whose extent would seem to respect the width of the resulting narrow city-block delimited by the continuation of Street 6 and Street 7, north of the original Forum. It must be noted, however, that the Carcer, Templum Beta, and the back wall of the Comitium all share the same slightly skewed alignment with respect to the urban grid (Figure 7). The odd angle seems generated by the axis of Street P, which also stands out for having a different orientation to all other streets running from SW to NE (cf. Figure 6). Since Street P enters the redesigned Forum exactly at its center, Sewell considers it as part of the 2nd-century BCE redevelopment (incidentally, the final stretch of Street P explains both the siting of the cisterns and the function of the Southwest Annex as a monumental entrance). Assigning the Carcer to the later building phase, therefore, does not pose problems. Brown et al. (1993: 40) dated it to the period between the First and Second Punic Wars (241–220 BCE) primarily on account of the odd alignment of the wall running from the S corner of Temple B to the N corner of the Carcer, contrasting the random rubblework and rusticated quoins of the Carcer's super-

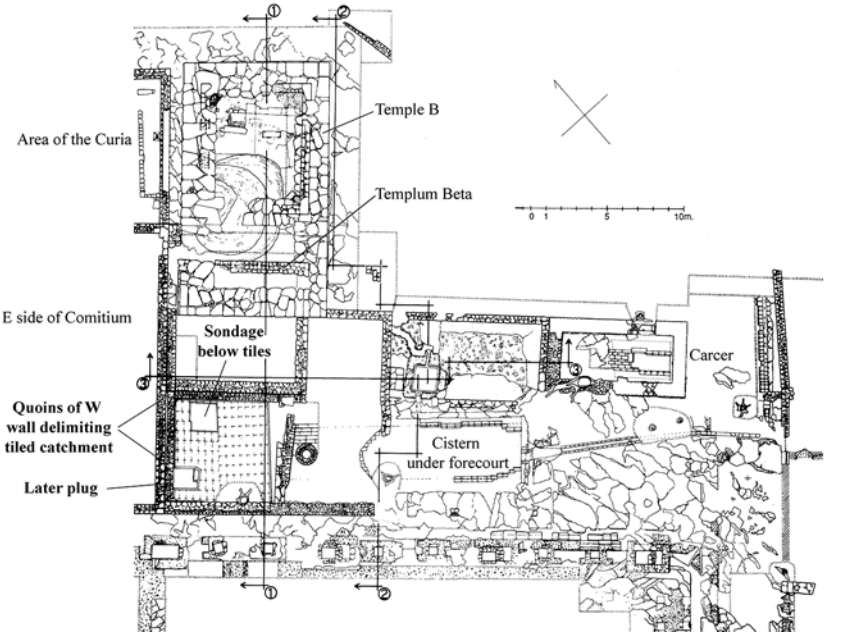
structure with the well-dressed and coursed facings of Temple B to confirm the earlier date of the former building (i. e., assuming that there was a progressive evolution of the facing style). Its unfaced concrete barrel vault, however, would have no parallels in the mid-3rd century BCE (Mogetta 2015: 8, Table 2).

Sewell's proposal agrees well with the general state of underdevelopment of Cosa in the 3rd century BCE, meaning that there would have been space available to relocate the square. No private buildings have been found to predate the 2nd century BCE (Fentress et al. 2003: 14; Fentress/Perkins 2016: 380).[1] Given its axial position, there is little doubt that the Comitium/Curia complex was the first element to be built. No datable material comes from the excavation of the deposits from the enclosure itself to support its 3rd-century BCE dating (Brown et al. 1993: 26. See also the discussion in Sewell 2005: 109–110). As already mentioned, indirect evidence comes from the construction sequence of the adjoining buildings to the E (Figure 8). In particular, the tile-floored catchment area adjacent to the SE corner of the Comitium has been taken to postdate the voting enclosure, because its NW wall partly abuts the circuit wall of the Comitium near its S corner (the short stretch in question, however, is clearly a later plug). What is certain is that the two structures coexisted for some time. The single fragment of Black Gloss from the construction level of the catchment area (Scott 2008: 115, Deposit TBa) can at best provide a *terminus post quem*, but should not be used as a *terminus ante quem* for the Comitium. The finds from the shallow layer of sediments deposited on top of the tile floor include coins from within the range 340–220 BCE (the majority of them from after the mid-3rd century BCE), all in a very worn state (implying that they circulated for a long time before entering the stratigraphy; Buttrey 1980, coins CF 2224, 2227-31, 2233-7; cf. Sewell 2005: 109–110). In addition to 3rd-century BCE types, the few diagnostic Black Gloss fragments from the same level also include a form uncommon at Cosa and dated elsewhere to the 2nd century BCE, suggesting that the assemblage consists mostly of residues (e. g., Scott 2008: 117, Deposit TBb, form Morel 1281, taking the smaller size of the Cosan example as evidence of an early experiment to confirm the last quarter/end of the 3rd-century BCE date originally suggested by Brown et al. [1993: 37–38] for the use period of the catchment). A date of 190 BCE has been proposed for the podium fills of Templum Beta, a structure built on top of the catchment area and which clearly abuts the Comitium, but the possibility of a later date cannot be ruled out.[2]

1 Casarotto et al. 2016 show that site density in the territory of Mid-Republican colonies is not compatible with the expected number of sites based on ancient demographic accounts. At Cosa, small areas with high site-density are found in the vicinity of the urban center, but the overall evidence suggests that a nucleated settlement strategy in villages farther away from the colony may have had an important role in early colonial societal organization.

2 Among the finds are also Campana A kylikes of the Anses en Oreille type, commonly dated to the second quarter of the 2nd century BCE (cf. Scott 2008: 134–135, Deposit TB, form Morel 4111). This

Figure 8: Detailed plan of the buildings located E of the Comitium (modified from Brown et al. 1993: 32, Plan IV)



In sum, the combined evidence of planning and stratigraphy seems to support the idea that the excavated Forum at Cosa was substantially redeveloped in the 2nd century BCE, which we know represented a time of renewal for the town. Livy (33.24.8-9) records that in 197 BCE a contingent of 1000 colonists was sent out to Cosa, an event that could have just as well resulted in the upheaval of the urban fabric (cf. Lackner 2008 for an overview of contemporary practice). Not by chance, both the paving of the streets and the first intense phase of house construction can also be dated to within the first half of the century (on the chronology of the street paving see Scott 2008: 109, Deposit F, whose *terminus ante quem* of 180 BCE should be taken as a *terminus post quem*; on the dating of the houses to 190 BCE and onwards see Scott 2008: 163–167, on the assumption that the Forum project took priority).

assemblage would provide the *terminus post quem* for Templum Beta, not the *terminus ante quem* for the Comitium (Scott notes that the pottery from the layers that seal Templum Beta is contaminated due to the continued maintenance of its monumental successor, Temple B, preventing a more precise dating of the actual use of the platform). Fentress et al. (2003: 30) place the construction of Temple B around the end of the second quarter of the 2nd century BCE.

The making of the Forum ensemble at Cosa

If we accept the new reconstruction, the series of building activities that produced the redevelopment and beautification of the Forum must be compressed in a shorter period of time than posited before. The notable irregularities in the spacing of the columns of the Forum portico as reconstructed by Brown, and the fact that the SE stretch of the colonnade encroaches upon Street Q speak for a project that was the result of successive interventions. Brown's date of 175 BCE for the NW gateway, which he assigns to either "before or right after construction of the portico" (Brown et al. 1993: 128) appears based primarily on comparanda known from literary sources for which we have no material correlate (i. e., the *ianos tris* built by Q. Fulvius Flaccus in the aforementioned passage by Livy). The same *opus incertum* technique of the gateway, which features fist- to head-sized facing blocks in a random pattern, is employed for the Basilica, dated to 150–140 BCE (Brown et al. 1993: 207–213; on typological grounds, however, Gros 2011: 240 prefers a date of ca. 120 BCE).

The burst of construction post-197 BCE may have provided the impetus for experimentation with, and implementation of, new building methods employing lime mortar. For all we know, the introduction of this building medium represents a clean break from previous architectural practice at the site. The town-walls, the only feature securely datable to the 3rd-century BCE occupation phase, do not employ mortared rubble in their original configuration, since they were built making exclusive use of massive polygonal masonry (Benvenuti 2002; Poggesi/Pallecchi 2012 report the use of lime mortar for the single round tower inserted in the north stretch of the circuit; according to Von Gerkan 1958b: 152, similar mortared-rubble additions on top of the projecting towers are to be understood as later restorations). The technological shift is even more significant because lime mortar is only found in public architecture. All the domestic buildings in Republican Cosa were in *pisé de terre*, i. e. rammed earth laid on dry-stone footings or directly onto the cut bedrock (as exemplified by the House of Diana; cf. Fentress et al. 2003: 19–21), a technique that might have been in use already in the 3rd century BCE (a possible candidate for a superstructure of this kind is the square building under the cella of the so-called Capitolium on the Arx, of which the rock-cut footings and possible architectural decoration survive; cf. Brown 1960: 11; Taylor 2002: 78). Whereas clay-based architecture (e. g., the first phase of the Curia; the water catchment E of the Comitium) or even polygonal masonry of smaller module (e. g., Temple B podium; later modifications of the Curia) can be found in combination with each other, all the components of the new Forum ensemble feature exclusively one variant of mortared-rubble architecture.

The building methods employed for the construction of the Comitium, i. e. the first monument in the sequence of development of the square, demonstrate which

specific technological choices were made by local builders to switch, thus providing important clues for interpreting the economic and social context of the innovation. A sounding on the NE side near the N corner showed that the walls of the enclosure are laid on a foundation consisting of a single course of unworked limestone boulders placed directly on the bedrock, and leveled with rammed earth. On the SW side was found a 0.35 m-deep socle of mortared-rubble masonry resting directly on the crests of the bedrock (Brown et al. 1993: 14). It is unlikely that the latter was a restoration, because it, too, was found leveled by a layer of rammed clay, so the creation of a uniform foundation does not seem to have been a primary concern (the loads were not very heavy, since the Comitium was unroofed). The main structural function of the enclosure walls was to respond to the lateral thrusts from the fills it retained.

The mortar used for both the SW foundation and the superstructure of the Comitium contains a high proportion of local volcanic sands, but the early development of the recipe has little to do with selective use in an airtight environment (unlike in Rome, where pozzolanic mortars were developed for use in foundations; cf. Mogetta 2015: 32). Because of their alteration from weathering, the volcanic rock inclusions in these sands have inferior pozzolanic properties in comparison with the pyroclastic-flow and pyroclastic-fall deposits of the Vulsini district from which they originate. In fact, hydraulic mortars attested at the site always include ground terracotta as a reactive agent, but are utilized primarily for revetments (Gazda 2008 discusses the practice of mixing ceramic fragments as aggregates with mortars of lime and local sands with relation to the superstructures of the port and fishery of Cosa, where imported pozzolan was selectively employed only for the submerged parts).

In the retaining walls of the Comitium, the medium is employed primarily for the bedding of brick-like slabs of the local calcareous sandstone, varying from 22 to 44 cm in length and 3.5 to 6.5 cm in thickness (at the corners are larger slabs or blocks of the same stone). These slabs are stacked in sub-horizontal courses on top of thick mortar beds of 2.5 to 3 cm, to form 60-cm-thick walls with uniform faces and a core of smaller limestone rubble and tile fragments (Figure 9) (Brown et al. 1993: 15). The use of lime mortar was clearly meant to facilitate the construction process: the walls were built up using stone elements that could be handled by individual workmen without the need of complex lifting devices, and whose relatively flat dimensions allowed even the unskilled to stagger them in sections without much supervision (the layers and joints could be regularized by adjusting the thickness of the mortar beds; only one leveling course has been identified across the four sides, 1.1 m from the reconstructed top of the precinct wall).

Figure 9: Cosa, Comitium Curia. Building C. SE Room. Level I. SW wall (Photo by American Academy in Rome, Photo Archive: AAR.COSA.1954.16; used by permission)

While bringing significant savings in labor costs due to ease of construction in comparison with ashlar masonry (further discussed below), the technology developed for the Comitium required other forms of investment for the large-scale production of the building medium. First, the procurement of lime for the mortar had to be organized *ex novo*, establishing a lime industry or trade network. Second, as part of the new building process, the quarrying and transportation of sands from the coastal dunes to the hilltop had to be arranged. Third, access to water supply from the storage system available on site needed to be regulated (there were no springs on the promontory so the water collected in the rock-cut cisterns had to be shared for construction purposes). The latter point explains the close spatial relationship between the Comitium and the annex at its SE corner: the water catchment area next to the rock-cut cistern was formally delimited to be probably used while the Comitium was under construction, only to be completely backfilled once the enclosure wall was completed. Brown et al. (1993: 37–38) describe the building technique of the catchment feature (crude brick walls; no *opus signinum* revetment; lack of any drainage) as being dictated by economy and haste, suggesting that durability was not a concern. Significantly, the SW and SE walls of the annex were rebuilt to form the forecourt of Templum Beta, and extended to resemble the façade of the Comitium (Figure 10).

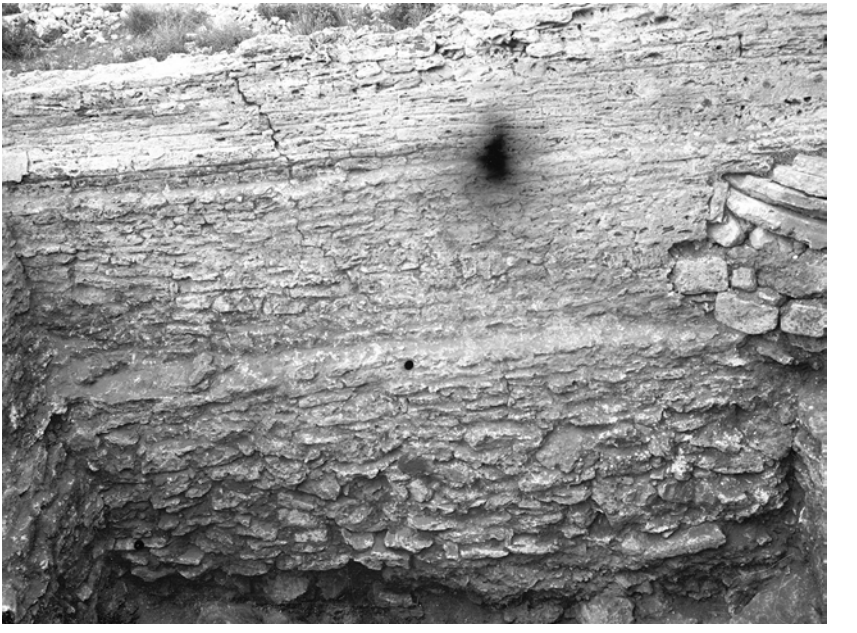
Figure 10: Cosa, Temple B. Forecourt. SW wall full stretch (Photo by American Academy in Rome, Photo Archive: AAR.COSA.1953.46; used by permission)

Discussion: Constructing civic identity at Republican Cosa

The type of construction just described for the Comitium is found at another major landmark at Cosa, the so-called Capitolium on the Arx. With the refoundation of the colony in the early 2nd century BCE, the citadel, too, became the focus of monumentalization, and was the object of a new phase of temple building, which has been taken to be roughly contemporary with the construction activities in the Forum (ca. second quarter of the 2nd century BCE; cf. Taylor 2002, presenting the current simplified chronology of the temples of the Arx based on the typology of their terracotta roof decorations and related stratigraphic evidence). The Capitolium stands out not only for its plan and size (at 23.2 x 31.7 m, it is the largest temple of Cosa and the only one with tripartite cella), but also for its siting: the temple dominates the height and the front of its podium is at the end point of Street P, which created a direct line of sight from the Comitium. Brown's original interpretation of it as a temple to the Capitoline triad (1980: 53–56) has been rightly challenged: Bispham (2006: 99–101) has pointed out that the evidence for it to be a Capitolium is negligible (in citizen colonies like Ostia, Tarracina, Minturnae, and Luna such a structure is located along the *decumanus* and near the Forum).

The very same idea of the ideological link between Capitolia and colonial status has been called into question (Quinn and Wilson 2013: 118–128, with reference to Cosa). However, it is likely that the cult activities relating to that temple had a prominent status in the colony's religious and cultural identity, especially if we consider that the first and only 3rd-century BCE temple on the Arx was intentionally demolished to make room for an entirely new building (Bispham 2006: 104.). Thus, we might suspect that the temple was dedicated to Cosa's tutelary deity (cf. Boos 2011: 27–28), which expands the argument for its civic function despite the rejection of Brown's identification.

Figure 11: Cosa, Capitolium. Cella N.1 W. Rear wall interior, excavated to bedrock (Photo by American Academy in Rome, Photo Archive: AAR.COSA.1949.27; used by permission)



The building process implemented for the main temple appears more complex than that of the Comitium, betraying an increased level of investment. The same type of mortared masonry featuring sandstone brick-shaped tesserae is used selectively for the foundations and walls of the cella and its projecting antae (Figure 11), but the mortar mix includes ground terracotta as an additive to impart greater pozzolanic properties (Brown et al. 1960: 50–53). Unlike in the Comitium, the technique is combined with high status *opus quadratum*, which is employed for the quoins of the antae (alternating headers and stretchers of brecciated lime-

stone), and for the podium socle. The latter feature was purely formal in function, i. e. a revetment with no structural purpose (except beyond the antae, where it served to retain the fills of the pronaos). It originally consisted of six courses of sandstone blocks, including plinth, base, die, and a crown molding. Only the latter element abutted the walls behind the podium, while the gap between the lower elements and the exterior of the cella, which evidently came first in the sequence of construction, was filled with packed rubble. Brown et al. (1960: 69–70, figs. 46–47) reconstruct the total height based on the traces of discoloration visible on the S side. The curved profile of the crown excludes the possibility that there was an ashlar revetment of the superstructure of the cella (for which see Brown et al. 1960: 71, Figure 48).

In the front part of the long sides of the temple, the socle was founded on the retaining walls that maintained the base level of the pronaos, which, like the column foundations, are made of unfinished limestone blocks laid up in clay (Brown et al. 1960: 59). In its final plan, the complex terminated with a forecourt whose walls were built with polygonal masonry associated with concrete cores, which betrays a later date (Brown et al. 1960: 75–80, Figure 56–57; Fentress [pers. comm.] proposes an Augustan date, whose cultural context would fit well with both the identitaire character of the facing style and its Archaizing flavor).

The mixed features of the Capitolium surely reflect the interplay of economy of construction, structural concerns, and issues of design and decoration. The masonry style of the cella was in all likelihood not visible (Brown suggests that the exterior walls were covered with plaster), so the specific choice has to be explained primarily in terms of construction process. Notably, this differs from the technique used for the only contemporary temple for which the superstructure survives, Temple D, whose cella is built with courses of roughly rectangular blocks whose height diminishes as one moves toward the top (Brown et al. 1960: 28–29). While the similarity between the precinct wall of the Comitium and the cella walls of the Capitolium may indicate a shorter time gap between the two monuments (thus indirectly confirming the later date of the Comitium; Brown et al. 1960: 102–103 proposed 150 BCE for the temple), the correlation with the main communal symbols of Cosa – the place where the assembly of all male citizens met, and the poliadic temple – may reveal some other clues as to the impetus for the technological shift.

One possibility is to consider the impact of the complex social dynamics set in motion with the arrival of the new colonists with the *adscriptio* of 197 BCE (Livy 33.24.8-9). The contingent, which corresponded to one-third of the original colony, probably included participants from Rome and other Roman areas as well as other indigenous groups who would have been given the opportunity to enlist (that colonies founded after the Second Punic War started to include allies has been explained by the suggestion that joining a colony had become undesirable

for Romans; cf. Bradley 2006: 171–177). Laffi (2017: 53–54) interprets Livy's specific reference to Cosa as evidence that the new colonists were recruited exclusively among Italian allies. Although colonies at this time were probably founded as hierarchical societies, with different classes of colonists receiving plots of different sizes, both at the urban and rural levels (for the idea that the residential areas of Cosa were allotted in accordance with the property class of the colonist see Sewell 2010: 121–122; 137–141), the long- term success of the enterprise was in part dependent also on the strengthening of inter-group bonds of solidarity and the creation of a shared communal identity, which must have been a concern in light of the demographic crisis of the 3rd-century BCE settlement.

In that respect, the way of doing things introduced for the construction of the Comitium and the Capitolium allowed for the active involvement of the main stakeholders of the colony, even if the colonists hired private contractors to execute the projects. The cooperation of previous inhabitants and/or rural settlers, who had better knowledge of the local environment, must have been a crucial prerequisite for the selection of sources of building materials, especially the volcanic sands and the stratified sandstone. Interestingly, according to Laffi (2017: 54), some of the newly enlisted colonists might just have been recruited from a preexisting group of *immixti* (resident aliens). On the other hand, the implementation of a building method based on the use of reasonably small, stackable elements and facing blocks may have represented a means of including larger pools of civic labor, drawing manpower from the new arrivals even if unskilled.

While production and transportation costs for the materials certainly played a role, for present purposes we can recall DeLaine (2001: 234–245, with Appendix A), who has calculated that tuff ashlar construction at Ostia (which was made with a softer stone than the limestone available at Cosa) is on average two to four times more labor intensive than any form of concrete; furthermore, the labor structure for most operations (e. g., shaping, fine finishing, and squaring of the blocks, dressing of edges) was four skilled to one unskilled laborer. Larger amounts of unskilled labor were of course required for hauling, lifting, and placing blocks (DeLaine's estimate provides a ratio of three skilled to four unskilled for every ton of blocks). While there are no contemporary textual sources for the direct participation of colonists in colonial public construction projects, it is fair to say that at Cosa as elsewhere large amounts of unskilled settlers were involved in the construction of ashlar monuments like the early 3rd-century BCE city walls (Bernard 2018: 108–114 discusses the role of *corvée* citizen labor for the 4th-century BCE fortifications of Rome). However, the introduction of concrete in the 2nd-century BCE probably lowered *both* overall costs and the ratio of skilled to unskilled builders within the workforce (for the laying of concrete wall faces and cores the generally accepted figure is one skilled to one unskilled laborer). In other words, the early form of *opus caementicium* at Cosa would offer broader opportunities than

ashlar masonry for unskilled colonial builders to be employed through the finishing stages of the construction process, including the physical raising of walls, while at the same time ensuring an efficient resource management.

Seen in this light, the building process devised for the main architectural components that were necessary for the functioning and self-governing of the town could have been conceptualized and understood as a form of public engagement that gave both the designers and the colonists an opportunity to materially shape the collective civic identity of the colony. Two pieces of evidence might help support the idea that municipal citizens involved themselves directly in public works. Varro (*Ling* 5.179) appears to imply that contributing *munera* formed part of civic identity, whereby he defines the citizens *(municipes)* as those who must jointly perform a *munus* (Bernard 2018: 110–111). The *Lex Ursonensis*, the Flavian copy of a colonial charter dating to the Caesarian period, contains explicit reference to *operae* for construction of *munitiones* (Crawford 1996, 1: 408, Nr. 25, Ch. 98), making it clear that some sort of labor was required from citizens for particular types of monuments (most notably fortifications and perhaps road infrastructure).

The innovative nature of both the building medium and the construction process developed for these communal projects emphasized the important relationship of the structures to Cosa's redefined status. The occurrence of the distinctive technique in monuments that were built in successive stages over the course of a quarter of a century demonstrates that the technological style was deliberately maintained. While restrictions of locally available resources, commercial expediency, the need for structural strength, and fashions in aesthetic appearance probably influenced the pattern, it seems that different variants of mortared architecture were specifically added to the repertoire for use in other structures that were not directly linked with the constitutive civic functions. This contributes to explain the apparently heterogeneous character of the building techniques at the site: from the random rubblework of the Carcer, to the polygonal masonry of smaller module in Temple B and Temple D on the Arx, to the *opus incertum* of the Basilica and the monumental gateway of the Forum. Another possible reason for this variation is that the contracts for these monuments were let out to different firms. In any case, the relationship between the masonry style of the Comitium and of the cella of the Capitolium and the manufacturing of Cosa's communal identity through technological practice could only be appreciated while construction of those monuments was still undergoing, given that the technique in question lacked emblemic value (in contrast with polygonal masonry and *opus quadratum* facings, which were always left visible). Therefore, the process of construction mattered the most, not its finished aspect.

Conclusion

By exploring the materiality of mortared rubble architecture at Cosa, the nexus between the emergence of monumentality and Roman colonization can be revealed in all its complexity, avoiding the traps of cultural diffusionism that have in the past affected the study of the origins of Roman concrete. The approach I advocate for pays greater attention to the local context, and therefore allows for an appreciation of the colonists as active agents that goes beyond impersonal mechanisms of technological transfer from core to periphery. Thus, I question essentialist views about the cultural meaning of Roman concrete architecture and its relationship with Roman identity and ingenuity. The early development of lime-based construction at Cosa is revealed to be mostly implicated with the web of political, social, and economic negotiations that influenced efforts to resuscitate a town that in the previous period of occupation had suffered substantial demographic decline.

This is not to say that broader explanatory frameworks should be dismissed altogether. The first half of the 2nd century BCE was indeed a phase of crucial developments in Roman architecture and urbanism (important building types like the Basilica and the Porticus first materialize in this period). In this sense, the projects that we see reflected in the monumentalization of Cosa were also a response to global trends and ideas about what it meant to be a city in contemporary Roman Italy. The potential for the development and diffusion of technology through *publicani* will also have to be confronted. Yet, archaeological evidence from other colonial sites shows that there was ample variability in the choice of how new towns were built (or rebuilt), suggesting that shared designs could be adapted to local circumstances or preference. The case of Fregellae, another Mid-Republican colony that was completely redeveloped not long after Cosa, is particularly instructive: despite the ready availability of both lime and pozzolan in the immediate surroundings, innovative building types could be crafted using traditional materials and techniques (e. g., fired bricks for vaulting in the baths: Tsiolis 2013; on contemporary houses see Battaglini/Diosono 2011). This suggests that environmental conditions alone were not sufficient to spark technological change. Thus, only the closer investigation of other 2nd-century BCE type-sites in their own social context will enable us to reach firmer conclusions about the processes of invention, innovation, and use of a technology that became inextricably linked with monumentality in Roman Imperial architecture (cf. Lancaster 2005; Van Oyen 2017; Stek 2013 discusses how material culture can be used to elucidate the cultural implications of Roman expansion in Republican Italy).

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