Professional Roles in Greek Construction Contracts

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Introduction

The classical Greek architect did not have quite the same function as the modern architect. The role was more akin to that of the medieval master builder. To some extent it was defined in contractual documents of the time. For example, they often referred to other documents that the architect would provide.

Inscribed on stone steles for public display and durability, many written construction contracts – syggraphai – survive, in whole or in part, for a range of projects. Table 1 lists 36 syggraphai, for 13 religious, 4 military and one civil project. The discrepancy arises because, for most large projects, multiple contracts were let in sequence as for Eleusis, e.g. for the foundations (IG II2 1671), then for the column fittings (IG II2 1675), and then for the capitals (IG II2 1680). Many are available online in Greek and English [1]. To avoid confusion the Greek term is used for these documents. Whilst they included contractual material (such as date, cost, delivery dates, payment regime, penalties and parties), they also included material now located outside the conditions of contract, such as construction quality (in the specification), quantities of items (in the bills of quantities), and location of items (on the floor plans). Written integrated documents of this kind continued to be used through to the medieval period in Europe [2].

Table 1: 36 surviving Greek syggraphai, in approximate chronological order

Project	Date BCE	Inscription
Wooden coffered ceiling, Erechtheum, Athens	409-8	Erechtheum VII
Repair of walls, Piraeus	394-3	IG II2 1657
Tripod plinths, Kynosarges, Athens	400-350	IG II2 1665
Temple of Apollo, Delphi	c.370	FD III 5 88
Stonework, Prostoon, Eleusis	356	IG II2 1666 A
Stonework, Prostoon, Eleusis	356	IG II2 1666 B
Middle wall, Prostoon, Eleusis	354-3	IG II2 1682
Naval tackle store, Zeia	347-6	IG II2 1668
Dowels, Eleusis	341-0	IG II2 1681
Repair of walls, Piraeus	337	IG II3 1 429
Foundations, Prostoon, Eleusis	350-300	IG II2 1671
Empolia and tenons, Prostoon, Eleusis	340-320	IG II2 1675
Stylobates, Prostoon, Eleusis	350-300	IG II2 1670
Capitals, Prostoon, Eleusis	350-300	IG II2 1680
Capitals, Prostoon, Eleusis	350-300	IG II2 1679
Drainage channel, Amphiaraos, Oropos	335-22	IG VII 4255
Swamp drainage, Ptechai	320-15	IG XII, 9 191
Portico, Taurinum, Delos	Before 315	IG II2 1678
Orthostats, Asklepion, Mytilene	330-300	IG VII XII 2 10

Project	Date BCE	Inscription
Long walls, Athens	307-6	IG II2 463
Tower & stair, Kyzikos	400-200	GIBM IV Supp 1005
Columns, Asklepion, Athens	c. 300	IG II2 1685
Temple of Apollo?, Delos	c.300	ID 503
Asklepion, Delos	297	ID 500
Paving, Temple of Apollo, Delos	297	ID 502
Steps, Eleusis	289-8	IG II2 1684
Portico, Mytilene	300-275	IG VII XII suppl. 14
Temple of Apollo?, Delos	300-266	ID 505
Temple of Apollo?, Delos	c.280	ID 504
Delos	277-6	ID 506
Temple of Herakles?, Thasos	3rd century	IG XII 8 266
Asklepion, Delos	c.250	ID 507
Delos	c.248	ID 507B
Delos	c.230	ID 508
Delos	c.230-20	ID 509
Inscriptions & flagstones, Temple of Zeus Basileos, Lebadeia	Before 220	IG VII 3073

The content of each syggraphai with respect to the various professional roles involved in the project – architect, contractor and guarantor – is summarised in Table 2 [3]. Eight mention all three. Seven mention none. While some of the inscriptions are complete or nearly so (notably IG II2 1668), many are fragmentary, with the start and/or end of the inscription often lost. Given that the client and the architect are usually identified at the start of the syggraphai, and the contractors and guarantors at the end, their omission in this table does not always mean that they were omitted originally. But in some cases, it can be said with confidence that they were. For example, though complete, IG II2 1668 did not include the names of contractors and guarantors, or any information concerning costs, penalties and the like. This then raises the question of what this inscription was for. It has been shown to contain enough information to recreate the building with some confidence – any ambiguity could have been resolved at the time by the architect [4]. One possibility is that this inscription was the celebrated monograph by Philo on the 'arsenal' at Piraeus referred to by Vitruvius – the text could have been transcribed to papyrus for circulation, as an epitome of such a description [5].

Architects

Of the syggraphai listed here, 18 mention the architect (architektōn), and four name him. Architects had multiple roles. The most important was the design of the building and the preparation of the syggraphai that described it for construction (and other) purposes, sometimes with assistance [6]. For the Athenian temple of Athena Nike, the inscription IG I3 35 (c.450 or 438 BCE) recorded that 'the sanctuary be provided with gates in whatever way Kallikrates may specify', that 'that a temple be built in whatever way Kallikrates may specify', and then (perhaps upon careful reflection of the free hand given to him) that 'three men be selected from the Council, and they shall make the syggraphai with Kallikrates [7]'.

IG II2 1668 acknowledged the authorship of the syggraphai in the first sentence: 'Syggraphai for a stone tackle-store for hanging tackle, by Euthydomos (son) of Deimeitrios from Melite and Philonos (son) of Exeikestidos from Eleusis'. Others were not so explicit. Though it named the architect, IG II2 1665 merely mentioned this authoring role: 'as the architect writes below'. IG II2 1685 had 'as written below pending that the architect gives', inferring that the inscription was not the complete description – more was to come. For the repair of the walls at Piraeus the authorship of the

specifications was open to anyone. IG II3 1 429 stated ‘that the architects [contracted to the city and anyone else who wishes shall bring forward] specifications, having drawn them up for each of the works’, and later ‘the architects contracted to the city and anyone else who wishes may [draft] specifications [and bring them forward] [8]’. Architects did not enjoy ‘protection of function’.

Table 2: Professional roles mentioned in 36 surviving Greek syggraphai

Inscription	**Architect**	**Contractor**	**Guarantor**
IG II2 1657	-	7 (named)	-
IG II2 1665	02 (named), 04	-	-
IG II2 1666A	07 (named), 23, 34, 48, 56, 75, 82, 90	-	-
IG II2 1666B	10, 24, 30, 35, 67	-	-
IG II2 1682	-	16 (named), 19 (named), 32 (named)	17 (named), 32 (named)
IG II2 1668	3 (named), 94, 96	94, 96	-
IG II2 1681	-	28 (named)	29 (named)
IG II3 1 429	5, 39	44 (named), 47, 54, 57, 60, 75, 97	34
IG II2 1671	-	52-54 (named)	-
IG II2 1675	18	22 (named)	23 (named)
IG II2 1670	16	11, 17, 21, 23 (named), 25 (named), 26 (named)	24 (named), 25 (named), 26 (named)
IG II2 1680	15	20 (named)	21 (named)
IG VII 4255	-	36 (named)	36 (named)
IG XII, 9 191	-	44 mentions (by name)	33, 40
IG II2 1678	02, 06, 11, 16 Over-architect: 08, 13	09, 10, 11, 12, 13, 17, 21, 25, 27 (named), 29 (named), 57	17, 20, 21, 22, 30-32 (named)
IG VII XII 2 10	-	1	-
GIBM IV Supp 1005	-	8 (named)	11 (named)
IG II2 1685	02	-	-
ID 503	-	-	17 mentions
ID 500	10, 22, 42, 44, 45, 47	-	A19, B14
ID 502	20	-	9, 25
IG II2 1684	25	26	26
ID 504	-	6, 9	8, 10, 12
ID 506	4	-	9
ID 507	24, 27, 34	16	21, 38
ID 507B	2 (named), 11	-	-
ID 508	15	-	7, 8
ID 509	-	21, 23, 43	-
IG VII 3073	53, 131, 160, 161 (sub-architect)	24 mentions	4, 25, 27, 28, 40, 47

Several syggraphai mention the need for the agreed contractual text to be inscribed and displayed (i.e. the text was agreed and written down, perhaps on papyrus or timber boards, before it was inscribed). IG XII, 9 191 is one example [9]. The inscribed steles were often erected so they could be seen from the construction site, [10] but this was not always the case. For example, IG XII, 9 191 required copies of the stele to be located at a couple of temples remote from the site, and if a stele described quarrying as well as assembly (as did IG II2 1666 A and B – inscribed on both sides of the same stele), then its building location will have been remote from the quarry. One stele describes its own inscription process in some detail. This is the first half of IG VII 3073, for the late unfinished temple of Zeus Basileos in Lebadeia (central Greece). It might be asked why such a detailed inscription was thought to be necessary since the process had been followed for centuries by this time. Perhaps the requisite skills had been lost during the wars between Rome and Macedonia, which ran from 214 to 148 BCE.

The inscriptions sometimes named the architects. IG II2 1668 has been noted above. IG II2 1665 named the architect as 'Architect, Xenophon (son) of Perithoide from Kynosarge'. IG II2 1666A, for the Prostoon at Eleusis, had 'Architect Philargos (son) of A[… from …] [11]'. Given that the names will have been known before the inscription was made (they probably authored it, as noted), and given their ongoing roles during the project, it is surprising that more did not name them. Knowing who you were going to be dealing with would have been important to the tenderers and knowing the identity of the author would have been important to the community for accountability (another reason that the syggraphai were displayed).

Referenced documents

As well as the syggraphai, architects also prepared other referenced documents, including those termed paradeigma, anagraphe and periteneian. To some extent, the nature of these can be determined from the context of their citation in the syggraphai. However, there is no real consensus on what they were. Architects also provided measurements (metra) and promised to provide other information during the contract (Table 3) [12].

Fourteen mentioned syggraphai, often a self-reference at the start of the document (presumably so it was clear to the readers what the nature of the document they were about to read was), but they also sometimes referred to others. For example, IG II2 1678, which dealt with columns, capitals and stylobates, stated: 'Finish the work as contracted for the fourth of silver just as for the contractor of the orthostats in the syggraphai written'.

Paradeigma were mentioned in five of the documents. IG II2 1675 had 'The latter, tenons, turn with a lathe, cylindrical to match the paradeigma'. IG II2 1668 stated: 'Make [the chests] to the paradeigma and place them at every column and centred in the space opposite', and as a general requirement: 'In this way everywhere shall work be carried out by the contractors conforming to the syggraphai and to the measurements and to the paradeigma as directed by the architect'. ID 504 stated: '… contractor Phaneas working to the syggraphai everywhere against the paradeigma, three flights of steps and a manger, for drachma three-hundred'. ID II2 1678 had 'And then contract for lead to the paradeigma around the capitals …', and 'And then to the paradeigma of the capital for Delos, the works contractor will complete'. ID II2 1685, for pilasters, had '… declare how against the paradeigma'.

Paradeigma seem to have been used for complex objects such as column capitals. It is thought that the Greeks used full-scale models of capitals. These models will have been incorporated into the works, [13] though one example of a purported paradeigma was not. This Corinthian capital for the Tholos of Polykleitos at Epidauros was an experimental piece produced as a part of the design process rather than a piece to be copied or replicated in construction, so does not qualify as a paradeigma at all [14]. However, it does support the idea that such objects were made by the architect himself, at least in some cases. In support of the idea that paradeigma were full-scale and incorporated into the works, one object

labelled in situ as a 'paradegma' survives. This 5 m section of tunnel was an example of acceptable construction or workmanship that was built into the works, for the tunnel of Eupalinos at Samos (mid-6th century BCE) [15].

Anagraphe were mentioned in 11 of the documents – roughly twice as often as paradeigma. IG II2 1680 had: 'And then the width [and the length], upper and lower, [to match the anagraphe], larger than (the) twelve'. IG II2 1670, stated: 'And show [the stylobates] having completed as contracted and the anagraphe …'. IG II3 1 429, for cutting blocks of stone, had: '… and against the anagraphe to which each is contracted …', and 'And provide for themselves and the stone cutters anagraphes and everything else …'. IG II2 1685, for walls, stated: '… against the anagraphe given by the architect'. The Delian contracts cited them as follows: ID 500 'and then for steles the syggraphai and anagraphe …; ID 508 '… anagraphe and syggraphai for the steles …'; and ID 509 'and anagraphe for the doors'. IG II2 1666A and IG II2 1666B mention the anagraphe ('given by the architect') eleven times, for quarrying (metopes, cornices x 2, capitals, gable blocks and roof tiles) and carving (cornices x 2, capitals, gable blocks and roof tiles).

Table 3: Architectural communications referred to in 36 surviving Greek syggraphai

Inscription	**Syggraphai**	**Paradeigma**	**Anagraphe**	**Periteneian**	**Metra**	**As directed**
IG II2 1665	2	-	-	-	-	-
IG II2 1666A	-	-	34, 48, 55, 82, 90	-	75	23
IG II2 1666B	-	-	4, 10, 17. 23, 30, 34	67	-	-
IG II2 1668	2	87, 95	-	-	21, 28, 95	94
IG II2 1681	27	-	-	-	-	-
IG II3 1 429	6, 40, 41, 46	-	53, 105	-	52, 74	55, 57, 61
IG II2 1671	-	-	-	1, 43	2, 48	-
IG II2 1675	-	15	-	-	-	-
IG II2 1670	-	-	23	17	-	-
IG II2 1680	-	-	13	-	4, 20	15
IG II2 1678	15	10, 11	-	-	32	6
IG II2 463	35	-	-	-	-	-
IG II2 1685	3.9, 5.9	5.5	5.6	-	2.9, 2.13, 5.4, 5.6	5.8
ID 503	30	-	-	-	-	-
ID 500	B7	-	B7	-	-	-
ID 502	6, 15	-	-	-	-	-
ID 505	-	-	-	-	-	-
ID 504	B7	B7	-	-	-	-
ID 507	23	-	-	-	-	-
ID 508	5, 12	-	12	-	-	-
ID 509	-	-	29	-	-	-
IG VII 3073	16, 18, 52, 88, 176	-	-	69, 187	23, 97, 101, 181	24, 69, 87, 124, 182

The topics in IG II2 1666 includes roof tiles, and interestingly three full-scale stone 'tile standards' survive from across the Greek diaspora – Messene, Assos and Athens [16]. These, then, may be examples of a type of anagraphe. They were full-scale models but could not be incorporated into the works. An example of another type might be the full-scale drawings for columns that were inscribed into the apergon (a protective stone skin) on the walls of the temple of Apollo at Didyma [17]. The syggraphai suggests that some anagraphe were provided by the architect, and some by the contractor, which fits in with this example of 'shop drawings'.

'Outlines' (periteneian) were mentioned in four syggraphai. IG II2 1666B stated for laying the corners, 'And level the tops [straight] and according to the periteneian given by the architect'. IG II2 1671 mentioned them twice: '… according to the periteneian for the course', and 'Then cut down to each course straight and flush according to the original periteneian'. IG II2 1670 stated: '… according to the periteneian provided'. IG VII 3073 had 'according to the periteneian provided', for trimming the steles, and 'using the original periteneian of the paving blocks', for the new paving blocks. In all cases this concerned the horizontal level – perhaps for new construction the periteneian was simply a stretched string, set to the required level, running around (peri-) the building. For alterations to an existing building, it would have been the original level.

Measurements (metra) are mentioned in nine of the documents, sometimes provided by the architect. IG II2 1666A stated for the installation of the plinths, 'Width then is from [the pilasters and] according to the measurement given by the architect'. IG II2 1680 had: '… cutting stone to the measurements provided'. IG II2 1685 stated: '… and as given in the measurements and the anagraphe'. Most, though, are given in the syggraphai themselves, or determined on site.

A type of document mentioned only in one syggraphai (IG II2 1684, for steps) is a syggegrammena [18]. A handful of small-scale stone models incorporating steps survive from the ancient world, so perhaps this refers to something of this kind [19]. Using a model will have helped convey their 3D geometry.

Architects also gave direction on site. Seven syggraphai include this term (keleyē). For the kanonides IG II2 1666A stated 'And clamp and do[wel and pour lead around] as directed by the architect'. IG II2 1680, on the transport of capitals to Eleusis, stated 'Then [unload all into the] sanctuary boundary as directed [(by) the architect]'. IG II2 1668 stated 'So that there may be fresh air in the tackle-store, when building the walls of the tackle-store leave gaps in the masonry at the joints or as directed by the architect'. IG II3 1 429 used the term in three consecutive sentences: '… and to the anagraphe, as directed for the contracted works. And carry to the work site the type as first directed for the contracted works. And demolish to the work every stone as directed for the contracted works.' IG II2 1678 had: 'And then for the empolia set in lead as directed by the architect'. IG II2 1685 stated, 'Then do as needed for the work and all as directed by the architect'.

IG VII 3073 had several examples, indicative of close supervision: 'Then if during the work any written measurement is to be lengthened or cut short, make it as directed' (twice), 'And then upon the existing steles place eleven coping stones, after trimming the steles, taking as much as directed, according to the periteneian provided', 'Then cleanse with nitron the steles and show the letters clean and washed out, until when directed', and '… polish with approved red-lead all to the standard, as often as directed, against the approved original stone standard in the sanctuary'.

The authors of the syggraphai were essentially acknowledging that certain key information was missing or possibly inaccurate, and would be provided or corrected later, presumably verbally (though today verbal instructions on site must be recorded in writing to carry any weight). The examples given here are qualitative and (mostly) not the sort of thing for which a model, drawing or specification would be appropriate.

Clients, contractors, guarantors and others

Client bodies provided project management for the works, engaging and paying the architects and the contractors. But they also sometimes provided tools and materials, such as metals. ID 502 had 'Then bronze for the work the city-state provides', and IG II2 1666B had: 'Lead, then, and iron for fastening stones the city-state provides, and complete hoisting-equipment.' Though supervision of the works was usually left to the architect, sometimes the client took on this role. The Lebadeia temple project was not completed (it seems to have ground to a halt several times), perhaps because of the wars mentioned earlier [20]. The main surviving inscription (IG II2 3073) suggests another reason – an obsession with close supervision and detail. The document included process specifications for the inscriptions and for stonework. The specification of processes is deprecated today and was not usual then [21]. Enforcement of process specifications requires close supervision. A competent contractor would not have welcomed or needed this and so may have been unwilling to tender. Or, having won the work, this close supervision may have stifled progress and led to disputes over delays, ultimately stopping the project. Or incompetency may have been the case, in which case the contractor may simply have been unable to execute the works competently, despite the instructions, and after disputes on quality, and consequent delays, the work was abandoned.

Nineteen syggraphai mention the contractors (misthōn) or workers (ergōnēs), and 12 named them. Where named, we can be sure that the syggraphai was a contract document, intended for construction. Contractors were often given rights relevant to the works, beyond their payment. IG XII, 9 191 gives several such rights. For example, the contractor was given tax immunity for the materials, was exempt from a 'deposit' to Eretria provided that items he produced in the drained swamp were sold at a reasonable price, was to be compensated for losses due to battle, and with his co-workers was immune from 'harm' during the contract. Contractors may also have had obligations above the normal business of construction. For example, an account (IG II2 1673) describes work done to build a cart to transport stone from the quarry at Penteleikon to the construction site at Eleusis (327-326 BCE) [22].

Guarantors or sureties (eggyos) are mentioned in nineteen syggraphai and named in eight. They were typically wealthy citizens (whereas contractors could be foreign) with a sense of civic responsibility, as this could be a risky business. IG II2 1678 stipulated that each guarantor had to be capable of meeting a debt of 1000 drachmas, with enough guarantors assembled to cover the total cost of the contract. IG VII 3073 required, where a part of the contract was resold due to non-performance for whatever reason, the original guarantors (and contractor) to remain liable until the contractor taking on the resold portion had in turn found sufficient guarantors. As mentioned, this project was never finished.

The community itself was brought into the agreement recorded in IG XII, 9 191, which stipulated oath-taking by the local citizenry and required their names to be inscribed, as over 300 were on faces B and C of the stele. This would have been because the contractor needed to be sure that he could use the drained swamp for the agreed 10 years, without challenge.

Conclusion

The study could be extended by considering syggraphai not listed here, such as those for Tegea, Epidauros, and other fragments for Lebadeia. It could also consider more fully the roles stated or implied in the syggraphai for clients, contractors and guarantors [23].

Nevertheless, the 36 Greek syggraphai examined here shed some light on the roles of architects in the construction of monumental Greek architecture. Architects wrote the syggraphai themselves. They provided, and perhaps made, full-scale models of stonework and other objects to be incorporated into the works (paradeigma). They provided reference standards and shop drawings (anagraphe) and set out the levels for foundations and the like (periteneian). They provided measurements (metra) for the use of the contractors and gave directions on site. On the other hand, though they enforced

quality on site using these various techniques, they did not administer the various construction contracts – this was done by the client bodies.

All these roles are found in construction projects today, but the architect only provides some of them, being supported now by the range of specialist disciplines that appeared after the Industrial Revolution [24].

References

[1] Many (but not all) of these inscriptions can be found online, at sites including the following: Greek transcriptions at Searchable Greek Inscriptions, https://inscriptions.packhum.org; English translations at Attic Inscriptions Online, www.atticinscriptions.com. For a general survey of Greek architectural inscriptions, see R.L. Scranton, 'Greek architectural inscriptions as documents', Harvard Library Bulletin 14/2, Spring 1960; 159-182.
[2] J. Gelder, 'Integrated. Dis-integrated. Coordinated. Re-integrated', Architectural Research Quarterly 16/3, 2012; 253-260.
[3] Client bodies such as epistatai and naopoioi are not listed as these were non-professional, elected, often specifically for the project, in which they could nevertheless be technically involved, as for IG VII 3073. R.K. Pitt, 'Just as it has been written: Inscribing building contracts at Lebadeia', in N. Papazarkadas, The epigraphy and history of Boeotia: New finds, new prospects, Leiden: Brill, 2014; 373-394. Syggraphai mentioning none of these parties are omitted from the table.
[4] Reconstructions can be found in the following: E. Fabricius, 'Die Skeuothek des Philon, das Zeughaus der Attischen Morine in zea', Hermes 17/4, 1882; 551-594; A. Choisy, L'arsenal du Pirée: d'après le devis original des travaux, Paris: Librairie de la Societe Anonyme de Publications Periodiques, 1883; V. Marstrand, Arsenalet i Piraeus og oldtidens byggeregler, Copenhagen: Egmont H. Petersens KGL, 1922; K. Jeppesen, Paradeigmata: Three mid-fourth century main works of Hellenic architecture reconsidered, Aarhus: Aarhus University Press, 1958; E. Lorenzen, The Arsenal at Piraeus, Copenhagen: Gads, 1964; W. Meyer-Christian, Das Arsenal des architekten Philon in Zea/Piräus, rekonstruktion, PhD Thesis: Universität Karlsruhe, 1983. Most also include translations. The footings for the building were finally found in 1988.
[5] Holloway suggested this equivalence in 1969: R.R. Holloway, 'Architect and engineer in Archaic Greece', Harvard Studies in Classical Philology 73, 1969; 281-290. Vitruvius, (transl. M. H. Morgan), The Ten Books on Architecture, Cambridge: Harvard University Press, 1914: Book VII, Introduction, 12. The building was destroyed by Sulla in 96 BCE. For a more recent example of such an epitome, see T. Donaldson, Handbook of specifications, Parts I & II, London: Lockwood & Co., 1859/60.
[6] Vitruvius described the role of the Roman architect in some detail, often citing Greek practices. Several anecdotes about the role of the architect can be found in Roman literature but, though Roman architects were often Greek, their relevance to practice in classical Greece is doubtful. Some are collected in A.N. Sherwood, M. Nikolic, J.W. Humphrey & J.P. Oleson, Greek and Roman technology: A sourcebook of translated Greek and Roman texts, London: Routledge, 2019.
[7] S. Lambert, J. Blok & R. Osborne (transl.), 'Decree about priestess and temple of Athena Nike', Attic Inscriptions Online, online at: www.atticinscriptions.com/inscription/Fornara/93 (accessed 25 May 2021). As well as this temple, Kallikrates was the architect of the Parthenon (with Iktinus), the circuit wall of the Acropolis, and one of the Long Walls protecting the route from Athens to Piraeus, all under Pericles (c.495-429 BCE), the Athenian statesman.
[8] S. Lambert (transl.) 'Law on repair of walls in the Piraeus, with appended specifications', Attic Inscriptions Online, online at: https://www.atticinscriptions.com/inscription/IGII31/429 (accessed 28 May 2021).
[9] For a translation and discussion, see J. Gelder, 'Ptechai and Oropos: Two ancient Greek drainage contracts compared', in J.W.P. Campbell et al (eds.) Water, doors and buildings: Studies in the history of construction, Cambridge: Construction History Society, 2019; 3-18.
[10] R.K. Pitt, 'Inscribing construction: The financing and administration of public building in Greek sanctuaries', in M.M. Miles (ed.) A companion to Greek architecture, Hoboken NJ: Wiley Blackwell, 2016; 194-205.

[11] Vitruvius named both the architects of the tackle-store and the Prostoon as 'Philo', which was incorrect and has led to some confusion (Book VII, Introduction, 12 & 17).
[12] Syggraphai mentioning none of these communications are omitted from the table.
[13] As suggested in J.J. Coulton, 'Greek architects and the transmission of design', in Actes du Colloque international organisé par le Centre national de la recherche scientifique et l'École française de Rome (Rome, 2-4 December 1980), 1983; 455-6. The preparation by a master carver of a paradigmatic stone capital (Corinthian), copied by the other carvers and then incorporated into the works, was the process followed for 1 St Pauls Churchyard, London, in 1986. The author was the site architect for the project.
[14] L. Haselberger, 'Architectural likenesses: models and plans of architecture in classical antiquity', Journal of Roman Archaeology 10, 1997; 90, fig 17.
[15] L. Haselberger, 'Architectural likenesses'; 90, figs 18a-b [Note 14].
[16] J.T. Clarke, F.H. Bacon & R. Koldewey, Investigations at Assos, Cambridge MA: Archaeological Institute of America, 1902; 71, fig.2; G.P. Stevens, 'A tile standard in the Agora of ancient Athens', Hesperia 19/3, 1949; 174-188; plate 82/1; P. Themelis, 'Hellenistic architectural terracottas from Messene', Hesperia Supplements 27, 1994, 141-169, 390-398; plate 48d.
[17] L. Haselberger, 'The construction plans for the Temple of Apollo at Didyma', Scientific American, December 1985; 114-122. Because the temple was unfinished, the apergon on the walls was never removed, hence the survival of the drawings (not plans but full-scale sections). Other examples of inscribed (in situ) full-scale drawings for Greek stonework include those for the temple of Aphaia at Aegina, the temple of Athena at Priene, and volutes for the Prytaneion at Ephesos.
[18] The term is not included in H.G. Liddell and R. Scott, Greek-English lexicon, Oxford: Clarendon Press, 1996.
[19] Stone small-scale models of steps from the Roman period include the plinth for the temple of Luna at Ostia (Museo d'Ostica Antica 189), a thermal bath at Taormina (Akademischen Kunstmuseums der Universität Bonn, inv. B 298), the adyton of temple A at Niha, Lebanon (Museo de Beirut), the Great Altar at Baalbek (Museo de Beirut), a water tank from Egypt (Petrie Museum UC14530), and altar steps from Egypt (Cairo 33.401).
[20] Pitt, Inscribing building contracts at Lebadeia, 2014 [Note 3].
[21] J. Gelder, 'Specifying construction processes', NBS Journal 01, November 2002; 3-4; J. Gelder, 'Process clarification', NBS Journal 02, May 2003; 3.
[22] A partial English translation is in A. Burford, The Greek temple builders at Epidauros, Liverpool: Liverpool University Press, 1969; Appendix IV. A full French translation is in G. Raepsaet, 'Transport de tambours de colonnes du Pentélique à Éleusis au IVe siècle avant notre ère', L'antiquité classique 53, 1984; 101-136. The construction of wagons for transporting stone was also described by Diodorus of Sicily (Library of history 4.80.5-6), and Vitruvius (De architectura, Book X 2.11-14). For more on the rights and obligations of Greek contractors see Table 1 in Burford (93-95).
[23] A broad study of this kind is P.H. Davis, 'The Delian building contracts', Bulletin de Correspondance Hellénique 61, 1937; 109-135.
[24] J. Gelder, 'Integrated. Dis-integrated. Coordinated. Re-integrated' [Note 2].