FUNDING OF PUBLIC BUILDINGS AND CALCULATION OF THE COSTS OF THE STONE MATERIALS. THE CASE OF THE FORUM OF SEGOBRIGA (CUENCA, SPAIN)

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Abstract
This paper presents an approach to the costs of the stone material, of workmen specialized in its treatment and of the actual building activity related to the Forum of Segobriga: an important architectural site which can be fully reconstructed thanks to the archaeological research where both the local limestone, from the nearby quarries, and much more precious stones, like Hispanic or imported marbles, were used. Based on the possibility to investigate how ancient patronage worked, this research provides a better knowledge of the financial resources of the provincial ruling classes, the way these resources were used by the patrons, the modes that conformed to the official architecture and the role of the imperial cult within the socio-political context the province. It is possible also for Segobriga to identitfy a mixed patronage, of local eminent citizens, among whom we can mention the *Calventii* to whom a large monument in the Forum was dedicated, or a *Proculus Spantanicus* to whom can be ascribed the Forum floor as we can deduce from the inscription over 16 m long, and with letters in bronze. This character, and possibly another one, boast the fact that he had it paved at his own expense (*forum sternendum d(e) s(ua) p(ecunia)...*). An important piece of information, this latter, as it offers the opportunity to reckon the cost of the slabs as they have all been preserved.

Keywords
Segobriga, marbles, *marmora*, local stone, costs, public buildings, Hispania.

Introduction

The Forum at Segobriga (modern Saelices, Cuenca) was already an existing monument in the year 15 BC. That space was shaped during the following years with the planning and the construction of a porticoed square, a basilica, a curia, some *tabernae* and an edifice with an exedra (Abascal *et al.* 2001b, 183-193; 2002, 123-161; 2004, 219-256; 2007, 385-397). For the making of the architectural elements such as columns and pilasters and for the square floor, the local limestone was used and was extracted from the so called quarry of the Diana's Temple whilst for the decoration were employed *marmora* coming from the Mediterranean quarries as well as coloured stones of Hispanic production. Local personages participated in funding the building of the Forum, among whom *[Proc]ulus Spantamicus,* who paid for the square floor (Abascal *et al.* 2001a, 117-130) (Fig. 1).

In this essay we show the reckoning of the costs of the local stone employed in the construction of the Forum in Segobriga, taking into account the cost of the material, of the transport and also of the installation.

Reconstruction of the costs and of the availability on the market of the marbles

Though very slowly, we have of late witnessed the birth of a research trend that concerns the costs of the materials and the workmanship necessary to craft them in Greek but mainly in Roman antiquity. The subject of the purchase power of the ancient currency was taken into account especially in the first decades of the past century and only recently has been reconsidered right regarding public edifices.

Besides the studies by Duncan Jones (1974) and by Jouffroy (1986) concerning Africa and Italy and that by Melchor Gil (1994) about Betica –which are limited to an analysis of the epigraphic information on public building activity without considering the employed materials- we ought now to mention the works by De Laine (1997) and by P. Barresi (2003) which have marked a turning point in this field. The former has proposed a method to reckon the expenditure necessary to build a large scale edifice such as the Caracalla Baths, a method that has put great attention on the relationship between the size of a wall structure, the time and the labour force necessary to build it as well as the precise quantification of the needed material. The latter has instead analyzed the public edifices in Asia Minor during the middle imperial age focusing on the relationship between the patrons –either traceable or known by means of epigraphs– with quantitative aspects linked with the works they funded for which the overall volume of the used marbles has been in turn figured out. Once the cost of the material was established on the basis of Diocletian's Edict of Prices expressed in values of the middle imperial age, he calculated the expenses for transport, the workmanship and the final installation of each architectural component so as to arrive in such a way at their final cost.

The accent put on the marble derives by the now well established awareness that it is not only the most expensive material but also the one entrusted with the message of the prestige and of the political –economical power of the patrons, generally the higher personages of the provincial cities but also, even if less frequently, by the Emperor and the imperial family.

Within this field of research, Barresi has been able to realize that the highest values were the ones for the shafts of coloured marbles from the imperial quarries

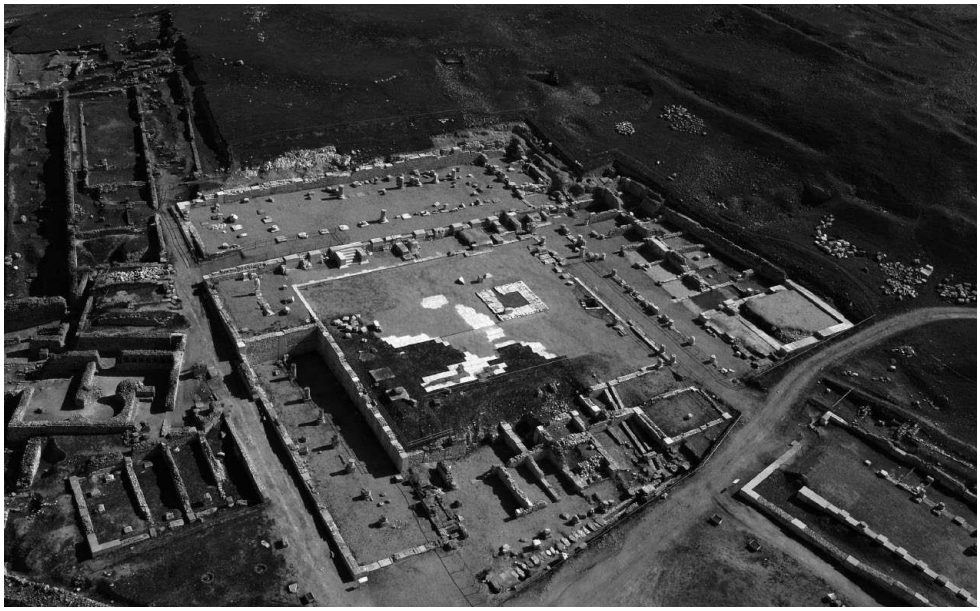

Fig. 1. Aerial view of the Forum of Segobriga from south east. Photo: Parque Arqueológico de Segobriga.

though this fact does not mean that the income from the sale of those materials went in full to the imperial administration as the contract system in force in the imperial quarries had to warrant some income for the contractors themselves. It is certain, though, that the large orders of marbles and shafts by the cities in Asia Minor and by their major exponents had to be somehow subjected to the approval of the Imperial house and often were obtained only by the clients' relationships with it.

Here we are interested in researching how many of these considerations can apply to the cases when the local stone was used. In this case other parameters should also be used such as the stucco lining, the used colours, and the higher or lower hardness of the stone which evidently modifies the workmanship costs.

We should also consider that the organization of the exploitation of the local quarries for the building needs of the cities nearby must have been simpler as the quarried stone (limestone, calcarenitis, sandstones) was used only for the buildings and not for the decoration. Also in this case, the quarrying and the first crafting –which took place in the quarries- of the blocks, as well as the transport, the finishing and the placing, did account for the overall costs.

The price of the local stones for the building

We can put forward a few hypotheses to give an estimate of the prices on the basis of receipts of edifice keepers contained in Egyptian papyri where the expenditure borne for columns and capitals is mentioned. For the Antonine age we have a case of nine columns with semi-worked capitals and finished bases for the agora of Heracleopolis which were paid 260 "silver" drachmas each, with a grand total of 2376 "silver" drachmas – equivalent to 61.6 denarii: a price that certainly included the transport, which was included in the purchase conditions, but probably also material and labour (in the condition when the materials were delivered)[1], whilst, instead, the instalment of the material was an extra cost. Another case concerns the temple of Artemis at Heracleopolis where in 117 AD 100 capitals were delivered at a cost of 180 drachmas (*SB*, XIV, 11598; Hagedorn 1993, 98) for their crafting at the quarries of Andikoronon, their transport via the Nile from the quarries to the harbour: therefore 1.8 drachma for each capital, equivalent to ca. 0.50 denarii. Within the hypothesis that the capitals are at least two or three feet high, we can surmise that such a figure was for the material: we can propose for the limestone supplied in both cases to the city by the Egyptian quarries, about 0.50 denarii (equivalent to two sestertii) for a roughed block 2/3 feet long, 2 feet ca. wide and high. The cost of a cubic foot of limestone can be approximately deemed as 1 sestertius (Mar and Pensabene 2010, 515), i.e. one fifth of the cost we have estimated for the Luni marble, but certainly in a much higher fraction if we add up the costs for transport, on account of the minor weight of the limestone and the lower costs of working it as it is easier to work.

Should this calculation be right, we would not mean, of course, that it must be *tout court* applied to the Spanish situation even though we provisionally use it for the estimate of the local stones utilized at Tarraco and Segobriga.

1. (*P.HIB* II 273+217; Lukaszewicz 1986, 106; Hagedorn 1993, 97-101; Barresi 2003, 159) who surmises that the columns were ca. 15 – 20 feet high, on account of their destination. About the quotation of these papyri see also Mattern 2000, 179, 180.

We here briefly remember that another Egyptian papyrus contains the inventory of the blocks and the capitals supplied by a Fileas, who evidently run workshops active near the quarries, for the reconstruction of the church of S. Filosseno at Oxyrhynchus (Papaconstantinou 2005, 183-192). Namely he supplied 5454 stones (λιθοι, meaning blocks) out of which 2136 were for the walls and 79 for the gates, as well as 120 capitals and 120 bases as he specifically states. It suggests a situation that is not so different from that of the warehouse of the blocks at El Mèdol, that is of a crafting blocks in series, and other architectural elements on the occasion of a main order such as might have been the one for the Provincial Forum at Tarraco.

B. Soler (Soler 2011) has presented an estimate for a local Spanish material, a more precious one, the red travertine from Cartagena, for which has been brought forward the hypothesis of a price equivalent to 20 Diocletian denarii for each cubic foot. It has been formulated on the basis that such a stone must have cost less than the cheapest marble such as the proconnesian, though, with an inter-provincial, and throughout the Mediterranean, distribution.

Moreover, to find out the equivalent of 20 Diocletian denarii in the Augustan age, we have established a proportional relation using the price of wheat: as in Nero's age one *modium* of wheat was paid between 8 and 10 HS (Pensabene 1981, 24; cf. Duncan-Jones 1974, 345, drawing from Plin. XVIII, 90 and IX, 67) and in Diocletian's Edict we find a cost of 100 denarius (though for a "*castrense modium*", of a larger size) we can formulate the equation:

2:100 = x:100

x = 800/100 = 8

Approximative estimate of the costs of the forum compound at Segobriga (cost of the material, transport and manpower)

We shall here mainly develop one of the mentioned aspects: the cost of the stone materials and of the workmanship specialized in working the local stone, with reference to an important architectural compound which archaeology can wholly reconstruct: the Forum of Segobriga for which was used the limestone of the so called quarry of Diana's Temple at Segobriga, therefore of a low cost, as well as much more expensive materials like the Spanish or imported, marbles.

A certain quantity of the stone needed for the building of the Forum must have been extracted from the clearings obtained in the rock of the hill so as to obtain a horizontal terrace of 4500 m^2. The rock emerges behind the hill wall of the basilica along the eastern side with a dimension of 0.75 m whilst the internal circulation level is situated at -4.08 m, for which was begun a clearing at 4 m. Moreover we realize that towards the north side of the basilica, the incline of the hill makes the rock appear unequal so that it was necessary to refill it to level the ground of the building. For the construction of the east half of the square and of the south portico it was necessary to cut the rock.

We shall not take into consideration the sculpted decorations accompanying the edifices of the Forum: the statues of the emperors and of their families, the gods' statues and above all those, in a very large number, dedicated to the members of the local élites, were realized in marble and occasionally also in bronze. We know that in the interior of the Forum basilica were placed in

Fig. 2. Discovery of the sculpted inside the Forum basilica in 2004. Photo: R. Cebrián.

all, seventeen columns: seven on each of the side *aedes* and three in the central nave[2]. Moreover, there is evidence that in the forum square and in the porticoes were placed seventeen pedestals for "*statua equestris"* and 26 for "*statua pedestris*" (Abascal and Cebrián 2004, 227-240) (Fig. 2).

This research, based on the possibility to enquire into the functioning of the patronage, can offer useful information for the study of the provincial ruling classes in relation with their modes to conform to the official architecture and with the role of the imperial cult in the socio-political body of the province. This is the reason why we have chosen Segobriga, with her Forum built in local stone and where marble was employed only for the statues or for some limited floor or wall lining.

The difficulty in such a research consists in the lack of documents, at least for the imperial age, regarding the costs of limestone and of other local stones used in the building activity.

In any case it is useful to attempt to reconstruct the expenses borne for the building of the compound especially if we consider the scarce information, even in Hispania, on the costs of the public buildings: a field where the history of the studies, mostly of an epigraphic character considered the orders, without comparing them with the materials used in the cases where it was possible to link a public edifice to the inscription celebrating the act of generosity.

It is also true that the inscriptions celebrating the sponsors of public edifices not always mention the figures destined to or actually spent for them. Also the Hispanic provinces, despite the epigraphic abundance relative to the patrons (Pensabene 1993, 205-206; Melchor Gil, 1994, 147ff. and 187ff.), present scarce information about the costs: we can quote the temple of Hercules at Oscua dated to the end of the 2nd - beginning of the 3rd century AD for which were spent 6000 sestertii (*AE*, 1974, 381; Curchin 1983, 228; Melchor Gil 1994, 148-149; Rodríguez Neila 1989, 161) including a statue, a figure that is in contrast to that of 200000 sestertii spent by the priestess *Baebia Crinita*, from Tourobriga (*CIL* II, 964; Curchin 1983, 228; Melchor Gil 1994, 148-149; Rodriguez Neila 1989, 161) for the temple of Apollo at Aruci (Bética) from which had to be taken out the "*vicesima hereditatium*" (5% of 200000 = 10000 HS); the same amount is destined to an *Aedicula* at Carthago Nova (250 silver librae equivalent to 200000 sestertii) (*CIL* II, 3424; Curchin 1983, 229; Mangas 1971, 137) as probably it was in marble and perhaps contained statues. At Jerica an Arch and three statues cost 40000 sestertii (*CIL* II, 3997; Rodriguez Neila 1989, 161), whilst a bridge at Oretum, donated by *P. Baebius Venustus* in honour of the *Domus Divina*, cost 80000 sestertii (*CIL* II 6339; Mangas 1971, 137; Rodriguez Neila 1989, 162) and for which it is difficult to think that marble was used. Also in Hispania sometimes when metals or marbles were employed, is mentioned the relevant material (at Canama *porticus lapideae marmoratae* (*CIL* II, 1674; see also 1075), at Gades *marmores in templo* (*CIL* II, 1724).

The case of Segobriga has been chosen as recent research carried out on the stones used in the Forum offer the opportunity to distinguish between on the one hand the local limestone from the Diana quarries with which the whole compound was built, including the columns, stuccoed and painted in red as well as the floors of the Forum and of the porticoes; and on the other hand the slabs, of the floor and wall linings, in stones of Hispanic import and from overseas which were used in some of the edifices and which, for the very opportuity of a limited usage, highlight the main architectural structure built with the local limestone. We ought at once to specify that the use of imported stones concern the floor and the wall decoration of the large Augustan building with a monumental staircase south-west of the Forum which was built with Hispanic marbles (broccatello from the Dertosa quarries, coloured limestone from the quarries at Espejón near Clunia and white marble from Almaden de la Plata (Sevilla) for the cornices of the higher section of the walls)[3] assembled with white and grey marbles imported from Italy (Luni)[4]. Besides, *opus sectile* with slabs in buixcarro and listels in bardiglio from Luni has been found in situ in the small temple added onto the east side of the forum square in the Flavian age[5], to which must belong a few fragments of Corinthian capitals of pilasters and of small cornices with straight cyma, and of lintels in Luni marble found afterwards in the vicinity (Cebrián 2004, 248) to which must be added the very numerous fragments of mainly local, but also imported, marbles found in the Forum area[6] and remains of wall lining in the north portico of the Forum, again with a prevalence of coloured Hispanic stones (Buixcarró from the quarries

2. The study of the sculptures found in the forum of Segobriga can be found in Noguera *et al. (*2008, 283-343).

3. On the use of marble from Almadén de la Plata in the Segobriga Forum, see Àlvarez *et al.* (2008, 101-120).

4. Cebrián 2004, 245-249: a rectangular edifice in the soutwest corner of the Forum with a floor dated to the Augustan age consisting of 16 rows of rectangular slabs 120x60 cm, of which remain the imprints.

5. The small temple along the east side of the Forum was built in the Flavian age within a programme of changes in the compound. In situ is preserved a floor *sectile* consisting of five rows of square slabs of 50.5 x 51 m., 2.5 cm thick in yellow limestone and fewer in pink Buixcarró together with listels in bardiglio for the border, cm 3.8/5.5, wide and wall bands in pink Buixcarró as well as of other bands whose impression is still visible (Cebrián 2004, 248).

6. In the Forum area 8124 fragments were collected, 75% of which are broccatello and Espejón, but are also attested fragments of cipollino, porphyry, rosso antico, pavonazzetto. It is still unsolved the problem of later re-occupations and of mediaeval limestone which may have created heaps of marble of different provenance (Cebrián 2004, 246).

7. From the quarries of *marmor Saetabitanum near* Xàtiva (Valencia), it started to be used in the Augustan age on account of an honorary column in this stone dedicated to Augustus at Ilici (CIL II, 3555; Cebrián 2008, 102; Cebrián in press).

Fig. 3. *Aedicula* built in the Flavian age at the east end of the Forum of Segobriga. Photo: J. M. Abascal.

of the district of Saetabis[7], in the white variety for the slabs: 60 % of the fragments) but also with an abundant use of the bardiglio from Luni (for the listels and for the slabs along the walls: 20.6% of the fragments)[8].

Such data have offered the opportunity to refer the north portico together with the small temple, to an alteration from the Flavian age to which we could date a strong increase in the use of the Luni marble. Though it is necessary to mention a few fragments of scalloped pilasters and their relative bases and Corinthian capitals in Luni marble, related to the lining of the pilasters of the south portico (Cebrián 2004, 248, Fig. 6), the general consideration of a homogeneous use of the local limestone from the Diana quarries for the architectural elevations with columns and pilasters as well as for the Forum floor and of the other buildings, is not modified[9]. However, in the estimate of their costs must be certainly added those of the linings in more precious stones and in stucco, but here we restrict ourselves to the calculation of the costs of the architectural artefacts only, in the local Diana limestone set in place during the main Augustan age when in 15 BC the city Forum had already been built (Fig. 3).

The concession of the privileged status of *municipium iuris Latini* to Segobriga was granted in a moment before that date and must be put in relation to Augustus' third voyage to Spain between the years 15-13 BC a time when many Hispanic cities obtained a juridical promotion to the level of *municipium*. In a late Roman passage in one of the *tabernae* of the south portico of the Forum, the lower corner of a pedestal of a statue was discovered in the year 2003 showing the name of one of the consuls of 15 BC and the formula *decre[to decurionum].* Therefore in that year the Forum of Segobriga was already standing and regularly functioned as the place for the decisions of the local *ordo* a fact meaning that the city already held the status of *municipium Latinum* (Alföldy *et al.* 2003a, 255-274; 2003b). In the Augustan age were built the Forum square with its porticoes, the grand Basilica (58.17 x 18.89 m), the Curia, a building with a rectangular plan of 18.50 x 12.95 m, an edifice with an exedra, very far toward in the north portico and the *tabernae* near the south portico. The original architectural project used for its construction stone from the quarry de Diana, not only for the walls but also for the shaft of columns, capitals and cornices.

Also for Segobriga it is possible to trace back, a mixed patronage of eminent local citizens out of whom we can mention the *Calventii* to whom a large monument in the Forum is dedicated, and a *Proculus Spantanicus* who commissioned the Forum floor financing the cost of 255.66 m^3 of local stone, as we gather from the inscription longer than 16 m with bronze lettering set onto it. Here this character and perhaps a second one, boast the fact that they have paved it at their own expense (*forum sternendum d(e) s(ua) p(ecunia)...)*, to which are added contributions from the administration of the province and from personages very close to the emperor as it is witnessed by the dedications to patrons of the city such as a governor of Hispania Citerior (*C. Calvisius Sabinus* governor between 1 BC and 9 AD) and Claudius' son's father in law (dedication of about 27 AD to *M. Licinius*

8. 1113 marble fragments were collected in the north cryptoporticus but almost certainly they came from the then overhanging porticoed wing of the Forum, with a prevalence of Buixcarró, Espejón, bardiglio from Luni; but there are also: jaspi from Cinta/broccatello and stones from the African and the Aegean imperial quarries but in a much smaller percentage (Àlvarez *et al.* 2008, 108-110).

9. Another modification in a room on the south side of the Forum is dated to the 3rd century when a floor in thick portasanta *marmor* was placed (Cebrián 2004, 248).

Crassus Frugi) or else Augustus' scribe or personal secretary (*M. Porcius M.f. Pup*.) an inscription dated to 15 BC when the Basilica had just been built and when the city had received the status of *municipium* (Fig. 4). The building of monuments in the city was strictly linked to the export of *lapis specularis*, as its status as the capital city of that mining district only could explain its great development (Abascal *et al.* 2006, 48-52). In his *Naturalis Historia* Pliny tells us that the area of production covered a space of 100000 feet around the city, a radium of 150 km with an extension of over 70000 km^2, which is key of the importance reached by Segobriga. This information regarding the large surface of her *territorium* must be searched in the administrative archives of Rome from which the exploitation of the quarries was controlled. From Pliny's quotation we can also infer that city was at the centre of the economic control and of the trading of those crystallised stones notwithstanding that other cities such the nearby Ercavica (Cañaveruelas, Cuenca) also controlled important minining compounds of *lapis specularis*. The situation of Segobriga in the road network favoured her export not only towards Hispania but also to all the other imperial provinces by means of the harbour of Carthago Nova.

Inside the city there were no difficulties for the social advancement of the families who held control of the quarries and of the various offices. To the senators who appeared as patrons in the Forum of Segobriga we ought to add the reality of other senatorial or equestrian orders. The presence of those characters in the city, in some cases of Segobrigean origin, is evidence that the urban planning and decorative programme which started before the age change, was not an accidental fact and that Segobriga was at the beginning of the Principate, a large urban and commercial centre. Moreover in the 3rd century AD, in the age of Septimius Severus, *Caius Iulius Silvanus Melanio*, an imperial official originary from Smyrne (Turkey), whom we know because of his presence in the mining district of Las Médulas, moved onto Segobriga to be in charge of the administrative control of the exploitation of the *lapis specularis*, giving evidence that the city was one of the rare imperial mineral districts in Hispania (Abascal and Alföldy 1998, 157-168) for which we have documentation (Fig. 5).

The Diana quarries

The quarries are placed at 1.5 mile southwest of the city and their landmark is a rupestrian shrine dedicated to Diana, linked to a *lucus* or sacred grove, of a pre-roman origin of it only a few inscriptions have remained on a rocky wall, reliefs on three registers and a well cut into the rock in the immediate vicinity of the Roman road (Alföldy 1985; Almagro Basch 1976; Almagro-Gorbea 1995; Almagro-Gorbea and Abascal 1999, 125-129; Abascal *et al.* 2003, 32). The quarries open onto the other side of the road, where are still preserved *loci* roughly squared from which the blocks for the public edifices of the city were caved. A few symbols such as a human head, a bucrany, a circle and other ones considered also of a pre-roman origin are grafted on one of these *loci*. A cross painted in red also appears therefore suggesting the Christianization of the area[10] (Fig. 6).

The digging fronts of the local stone used in the building of the Roman city were situated along both the sides of the road which linked Segobriga with the capital city of her province Carthago Nova, in the area known with the name of El Almudejo in a mountain environment.

Actually six fronts of digging can be recognized on the north side of the slope and two on the south side. On one of those stands the mountain shrine dedicate to the goddess Diana and an old digging front where is preserved in situ a column shaft – half extracted – with a diameter of 1.20 m (Fig. 7).

The largest sector covers a surface of 300 m^2, whilst the smallest does not reach 75 m^2. The Roman exploitation took place in the open in different sectors of work, independent and parallel to the road. The veins of extraction of the stone coincide with the natural fracture of the rocky mass lines on an inclination of 10 degrees. In the sector placed in front of the Templo de Diana and on the other side of the slope are six lines of extraction of the stone from which were caved blocks between 4 and 2 feet. In the last vein were found five square pieces in the rock which would correspond to caving blocks *circa* 4 feet high (1.24 m). We do not know the depth of such a front as it was filled in with earth for cultivation.

Adjacent to the road that front of the quarry presents at either side of the digging two raised platforms against the slope which could serve as loading piers for the caved stones. On one of those platforms there were three holes of a square section which might have been used for their movements.

The basilica of Segobriga

In the basilica at Segobriga (58.17 x 18.89 m), two superimposed orders from the Augustan age, Corinthian and Doric, dividing the internal area in three naives[11] have been reconstructed. In the middle of the shorter sides rise as well two overhead exedras with a distyle entrance. In this edifice we can count 12 columns 6.55 m high along the long sides and 4 along the short sides for the lower order, in the Corinthian order, totalling 28 columns subdivided into as many bases, capitals and shafts, scalloped and divided into drums. An equal number of columns, but with a shorter height and of an Ionian order, rise on the upper level which can be deemed 2.34 high m, on the basis of their capital height, 25 cm high and on its diametre. Again they consist of 28 shafts, both smooth and scalloped and as many bases and capitals.

10. Vázquez Hoyos 1999, 233-238; in the quarries are present grafted fallic figures and a bone which refer to cults of fertility.
11. The capitals of the basilica in the Forum have recently been studied by M. Trunk (2008, 13-34).

Fig. 4. Inscription in bronze lettering found in the Forum square of Segobriga. Photo: J. M. Abascal.

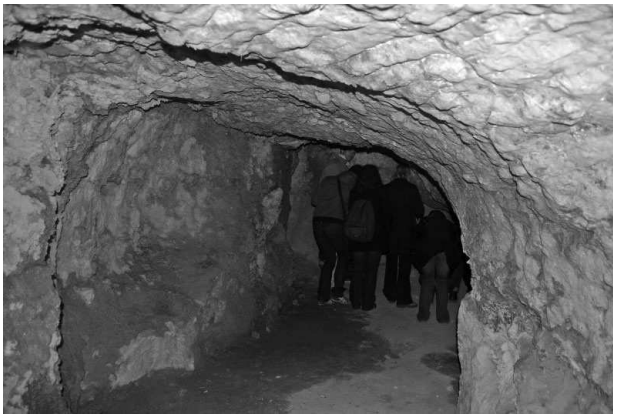

Fig. 5. Interior of one of the openings of the quarry of *lapis specularis,* south of Segobriga in the district of Osa de la Vega (Cuenca). Photo: R. Cebrián.

Fig. 7. Column shaft, half extracted, found in one of the fronts of the quarry of Diana. Photo: R. Cebrián.

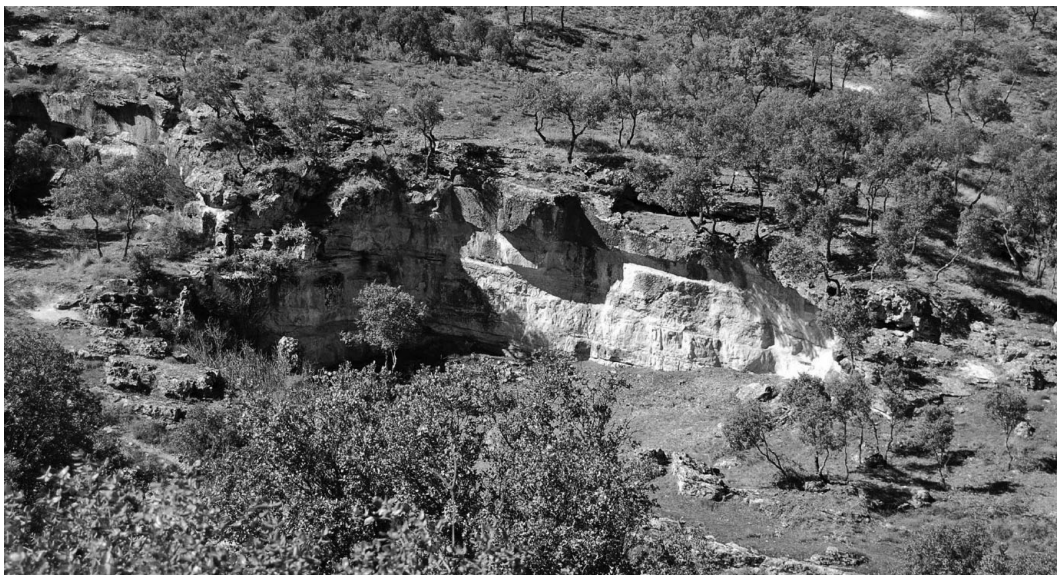

Fig. 6. Front of the quarry of limestone used in the building of the Forum of Segobriga. Photo: R. Cebrián.

Fig. 8. Corinthian capital from the basilica of Segobriga (inventory n.: 04-7943-1) (R. Cebrián).

Another four columns together with four semi-pilasters belonged, instead, to the exedras. Also in this case have been recognized large capitals belonging to pilasters but from the Flavian age and smaller corinthian capitals, still Flavian, which because of their position would agree with the internal decoration (Fig. 8).

Both the orders lack elements from the trabeation. The walls offer a thickness of 80 cm and consist of large pillars of blocks, from 0.9 to 1.6 m wide, set inside a mass of *opus caementicium concretum* m 3.5/4.58 wide, originally with a wooden structure and with a visible face in *opus certum* (Almagro-Gorbea and Abascal 1999, 95-96).

The façade of the building had been wholly built in *opus quadratum.* We have been able to state that approximately 1/3 of the overall surface of the walls was in blocks whilst the remaining 2/3 were in *opus caementicium*.

Costs of the material for the columns

We have been able to esteem a height of 6.55 m (with capitals of 0.70 m and the height of the shafts as of 5.50 m) for the columns of the first order. We can also suppose the height of the entablature as of 1.20m ca. Overall height 7.75 m.

With regard to the columns of the second order we only know the height of the ionian capitals, of 0.25 m, which present an upperscape diameter of 0.35 m. On the basis of these figures we can suppose a diameter for the lowerscape of 0.42 m, a shaft height of 3 m and a height for the base of 0.17 m. The trabeation in turn, would be of 0.55 m ca. with a grand total of 3.97 m.

From these data we can surmise a height of 11.72 m ca. for the walls of the basilica.

The volume of the shafts is equal to the volume of the drums.

– Columns of the first order

1 m^3 = 38.5 cubic feet (Barresi 2003, 166) or 38.2 cubic feet (Mar and Pensabene 2010, 511), and that 1 cubic foot of local calcareous stone = 1 HS (Mar and Pensabene 2010, 515).

Shafts 2.3 m^3 = pc 87.8 (x 1 HS = 87.8 HS). (Shaft height m 5.5, x square radius 0.13 square cm x 3.14) x28 columns = 2458.4 HS

Attic base: height m 0.28, plinth side m 1.14 x plinth side m 1.14 = 0.36 m^3 = pc 13.9 (x 1 HS = 13.9 HS). X28 columns = 389.2 HS

Corinthian capital: height m 0.70, lower diam. 0.68 x 0.68 = 0.32 m^3 = pc 12.3 (x 1 HS = 12.3 HS) x 28 columns = 344.4 HS

Total for each column including base and capital = 114 HS

Volume 28 columns = 83.44 m^3

Total 28 columns = 3192 HS

– Trabeation of the first order

Height m. 1.20. Its thickness cannot be over that of the *scamillus* of the capital = 0.76

The internal colonnade of the basilica measures 10 x 37.5 m

Long walls: 1.2x37.5x0.76x2 walls = 68.4 m^3 = pc 2612.8 (x 1HS = 2612.8 HS)

Short walls: 1.2 x 10 x 0.76 x 2 walls = 18.24 m^3 = pc 696.8 (x HS = 696.8 HS)

Total = cubic m 86.6 = pc 3309.6 = 3309.6 HS

– Columns of the second order

Shaft = M 0.21 $radius^2$ x 3.14 x m 3 height=0.41 m^3 = pc 15.6 (x1 HS = 15.6 HS). x28 columns = 436.8 HS

Attic base: height m 0.17, plinth side m 0.69 x 0.69 (ca) = 0.08 m^3 = pc 3.1 (x1 HS = 3.1 HS) x28 columns = 86.8 HS

Ionian capital: height m 0.25, lower diam. 0.35x0.35 = 0.03 m^3 = pc 1.2 (x1 HS = 1.2 HS) x28 columns = 33.6 HS

Total for each column including base and capital = 19.9 HS).

Volume 28 columns = 14.56 m^3

Total 28 columns = 557.2 HS

– Trabeation of the second floor

Height m 0.55. Its thickness cannot be over that of the scamillus of the capital, or should it be missing, the lower diameter of the capital = m 0.35

The internal colonnade of the basilica measures m 10 x 37.5

Long walls: 0.55x37.5x0.35x2 walls = 14.4 m^3 = pc 551.5 (x1 HS = 551.5 HS)

Short walls: 0.55x10x0.35x2 walls = 3.85 m^3 = pc 147 (x1 HS = 147 HS)

Volume = 18.25 m^3

Total = 698.5 HS

Total of first and second order m^3 = 202.85; pc = 7708.3

Overall cost for the stone = 7708.3 HS.

Cost of installation[12]

Total transport of the two orders: 0.85 x mile x m^3 (Diana quarries: 1 mile[13]) = 0.85x1x202.85 = 172.4 den = 689.55 HS

First order = 170.04 m^3 x0.85 x1 = 144.5 den. x4 = 578 HS

Second order = 32.81 m^3 x0.85 x1=27.88 den., x4 = 111.5 HS

Workmanship: roughing 10 hours (1 working day) x m^2 (Pegoretti 1869, vol 1, 429-430)

2.4 Ton. Specific weight (Pegoretti 1869, vol 1, 28)

Preparation of column carcass: [a (= 6.75)] * [2 + 0.50/x(= uppers cape diam. = 0.73)]

Preparation of carcass for capitals or bases: [a (=6.75)] * [1 + 0.25/x (= capital or base diam.) (Pegoretti 1869, vol. 1, 430)

Preparation of trabeation carcass: 10.17 hours/m^2 (Pegoretti 1869, vol. 1, 430)

Chiselling of shafts: 13.5 hours x m^2

Chiselling of Ionian capitals for a height of 0.25 m = 324 hours for each capital[14]

Chiselling of Corinthian capitals for a height of 0.75 m = 972.5 hours for each capital (Pegoretti 1869, vol. 1, 435-436).

Chiselling for trabeation (trusses 480 hours/m^2 + 9 hours/m^2 for each trabeation and 9 hours/m^2 for the frieze)[15]. To obtain an average estimate it is necessary to add up these figures and divide them by three in as much as the dimensional ratio between the different parts of the trabeation is in fact 1:1:1. That is 166 hours/m^2.

Chiselling of the bases: 11.25 hours/m^2 (Pegoretti 1869, vol 1, 433).

– First order: workmanship and installation

Worksmanship: The overall surface of the Shafts amounts to 0.73x3.14x5.5 = 12.6 m^2

Roughing 1 shafts = 10x12.6=126hours, that is 12.6 work days; so 6.3 den = 25.2HS x28 columns = 705.6HS

Roughing 1 capital = 10x(0.70x0.70x6) = 29.4 hours = 2.94 work days = 5.88 HS x 28 columns = 164.6 HS

Roughing 1 base = 10x[(1.14x,1.14x2 (surface) + (1.14x0.17 (height)x4(sides)] = 33.6 hours = 3.3 work days = 6.6 HS x 28 columns = 184.8 HS

Roughing of trabeation = 491.64 m^2 x 10 = 4916.4 hours = 491.64 work days = 983.2 HS

Preparation carcass of 1 shaft = 18.12 hours = 1.8 work days = 3.6 HS x 28 columns = 100.8 HS

Preparation carcass of 1 capital = 9.1 hours = 0.9 work days = 1.8 HS x 28 columns = 50.4 HS

Preparation carcass of 1 base = 8.2 hours = 0.82 work days = 1.6 HS x 28 columns = 44.8 HS

Preparation carcass of the entire trabeation = total side surface 491.64 x10.17 m^2 (Pegoretti 1869, vol. 1, 430) = 5000 hours = 500 work days = 1000 HS

Chiselling 1 corynthian: height 0.75 m = 972.5 hours each capital: 28 capitals = 27230 hours = 2723 work daysl[16] = 5446 HS

Chiselling 1 Shaft: 13.5 hours x12.6 m^2 = 170.1 hours = 17 work days = 34 HS x28 shafts = 952 HS

Chiselling 1 base: 11.25 x2.97 m^2 = 33.5 hours = 3.35 work days = 6.70 HS x28 bases = 187.6 HS

Chiselling trabeation: 166 hours/m^2 x491.64 m^2 s = 81612.2 hours = 8161.2 work days = 16322.4 HS

Total workmanship = 26142.2 HS

Installation:[17]: 0.20 (imbracatura) + 0.33 x m of distance + 0.2 x m of height (average m 5) + 0.1 (placement) + 1 (clamp) = 35.1 hours of labour x Tn.

Calculation of the tons (considering the specific weight of 2.4 Tn x m^3 as Pegoretti affirms for the conchiferous limestone):

1 base = 0.36 m^3 x28 columns = 10 m^3 x 2.4 Tn = 24 t

1 shaft = 2.3 m^3 x28 columns = 64.4 m^3 x 2.4 Tn = 154.56 t

1 capital = 0.32 m^3 x28 columns = 8.96 m^3 x 2.4 Tn = 21.5 t

Total trabeation = 86.6 m^3 x 2.4 Tn = 207.84 t

Calculation of the installation at: 35.1 hours of labour x t

Total tons: 407.9 t x35.1 =14317.29 / 10 =1431.7 x2 HS = 2863.5 HS

Total for installation = 2863.5 HS

Grand total for workmanship and installation and Transport = 29583.7 HS

– Second order: workmanship and installation

Workmanship: The total surface of the shafts amounts to 0.41x3.14x3 = 3.86 m^2

Roughing 1 shaft = 10x3.86 = 38.6 hours = 3.86 work days = 7.7 HS x28 columns = 216.2 HS

Roughing 1 capital = 10x(0.25x0.25x6sides) = 3.75hours = 0.37work days = 0.74 HS x28 columns = 20.7 HS

Roughing 1 base = 10x[(0.69x0.69x2 (surface)) + (0.69x0.17 (height) x4 (sides))] = 14.2 hours = 1.4 work days = 2.8 HS x 28 columns = 78.4HS

Roughing trabeation = [(10+10+37.5+37.5) x0.55 height x4 sides] + [0.55 height x0.35 thickness 2small sides x27 intercolumns] = 209+10.39 = 219.39 m^2 x10 hours = 2193.9 hours / 10 = 219.39 work days = 438.78 HS

12. DeLaine 1997, 210-21; Barresi 2003, 175, only valid for overland transport.

13. We have assimilated the Diana limestone to Pegoretti's "calcare conchilifero" (Pegoretti 1869, vol. 1, 430).

14. Pegoretti probably refers to a Ionian capital inspired to a classic model and not to a local model such as the one at Segobriga, therefore the ratio between height and lower diameter is higher. For the sake of convenience we have adopted Pegoretti's model which corresponds to a higher capital.

15. Pegoretti 1869, vol. 1, 433. We presume that the ratio between trabeation, frieze and cornice is 1:1:1, according to the ratio obtained in the temple of Diana in Mérida.

16. The number of work days looks very high only in appearance as we have to consider that it concerns the total number of the hours theoretically needed for one laborer: if we suppose the presence of ten stone cutters all employed in crafting the capitals, the work days would be reduced to 272.3 less, then, than a year of labour.

17. Pegoretti 1869, vol. 1, 246; Barresi 2003, 186, formula valid only for the calculation in working hours of the installation of stones of more than 1 tonne of weight.

Preparation of carcass of columns: 21.7 hours column = 2.17 work days x2 = 4.34HS x28 columns = 121.5HS

Preparation of carcass for capitals or bases: 11.5 hours column = 1.15 work days x2 = 2.3 HS x56 capitals and bases = 128.8 HS

Preparation carcass trabeation: 2231.2 hours total = 223.1 = 446.2 HS

Chiselling ionian capital for a height of 0.25 m = 108 hours each capital = 10.8 work days x2 = 21.6 HS x28 capitels = 604.8 HS.

Chiselling 1 shaft: 13.5x3.86 m^2 = 52.11 hours = 5.2 work days = 10.4 HS x28 columns = 291.2 HS

Chiselling 1 base: 1.42 m^2 x 11.25 = 16 hours = 1.6 work days = 3.2 HS x28 columns = 89.6 HS

Chiselling trabeation: 219.39 m^2 x 166 =36418.7 hours = 3641.8 work days = 7283.7 HS

Total workmanship: 9719.9 HS

Installation: 0.20 + 33 + 0.2 x m of average height (average 10 m) + 0.1 + 1 = 36.3 hours of labour x t

Calculation of the tons (considering the specific weight of 2.4 Tn x m^3 as Pegoretti affirms for the conchiferous limestone):

1 base = 0.08 m^3 x28 columns = 2.24 m^3 x 2.4 t = 5.37 t

1 shaft = 0.41 m^3 x28 columns = 11.48 m^3 x 2.4 t = 27.5 t

1 capital = 0.03 m^3 x28 columns = 0.84 m^3 x 2.4 = 2.01 t

Total trabeation = 18.25 m^3 x 2.4 t = 43.8 t

Calculation for installation: 36.3 hours of work x78.68 t =2856.1 hour = 285.6 work days x2 = 571.2 HS

Grand total of workmanship (9719.9 HS) and Installation (571.2 HS) and Transport (356.6 HS) = 10647.7 HS.

Grand Total of the First and the Second Order: 47743.58 HS

Cost of the limestone blocks of the walls

– Cost of the material

Walls: long side: 58.17x2x0.80x11.72 = 1090.8 m^3

Walls: short sides: 18.89x2x0.80x11.72 = 354.2 m^3

Total = 14.45 m^3 x38.2 = 55199 pc

Only 1/3 of the whole surface of the walls was made of blocks = 18399.6 pc

Grand total of the cost of the stone (x5 HS) = 91998 HS

– Cost of workmanship and installation

Pegoretti suggests a calculation made on the basis of the size of an ideal block to figure out the total surface needed to measure the labour necessary for the walls in the whole. To calculate the number of hours he suggested the following steps of workmanship (Pegoretti 1869, vol. 1, 429): sawing =10.8 x m^2; stone cutting 144 x m^2; preparation carcass =10.17 x m^2; chiselling=18 x m^2; edges 13.5 x m^2). We have been able to ascertain, however, that the ancient modes of workmanship in the quarry cannot allow us to use such a method: as a matter of fact the blocks came out of the quarry already roughed (rough preparation) and often already in the dimensions needed for the building. Consequently we have calculated, besides the roughing and semi-crafting phases which took place in the quarry, only the polishing up ("chiselling") which must be calculated only for the visible sides so as to obtain realistic figures. So that for the final polishing we can reckon the figure of 4 HS for square metre under the consideration that for each square metre were needed 18 hours of labour.

Therefore so to reckon the cost of the workmanship for the blocks of the basilica we have figured out the interior and the exterior surface of the walls, that is 2727 m^2 for the long sides (see above) and 885.5 m^2 for the short sides. Multiplying such a figure by 4 HS, that is the cost of the final polishing per square metre, we obtain an overall cost of 14450 HS for the polishing up which added to the cost of material (including also the roughing) gives a total of 32849.6 HS to which must be added the transport expense of 1637.66 for a cost:

Grand total of material, transport and workmanship costs: 34487.26 HS

The Forum square at Segobriga

The forum square has rectangular plan of 38.76 m from north to south and of 32.98 m from east to west. T his space was paved with large slabs of stone of local limestone for an extension of 1278.3 m^2.

The cost of the square paving which amounted to a cost of 9763.92 HS, was financed by a native citizen called *Spantamicus*, whose memory was left in a large inscription with bronze lettering placed on the square floor.

38.76x32.98x0.20 (slab thickness) = 255.66 m^3 of local stone

Total volume: 255.6 m^3 = pc 9763.92 = 9763.92 HS

The porticoes of the Forum at Segobriga

The topography of the hill on which stands Segobriga with steep natural slopes, forced to use a cryptoporticus to begin the construction of the north and the south porticoes of the forum square. The north cryptoporticus presents a rectangular plan measuring 35.54 x 9.86 m. Its walls consist of a mixed structure combining pilasters in *opus quadratum*, of variable with panels in *opus vittatum* forming a nucleus of *opus caementicium* and with the corners reinforced with rustication.

The cryptoporticus employed squared blocks of 84 x 84 cm, which were used to support the upper floor. To the latter belong most of the architectural elements recovered during the digging of the 90s of the past century, among which are present the column drums decorated with red rectangular, rhomboidal and round cartouches.

Adjacent to the monumental staircase of access to the Forum from the *kardo maximus* was placed another double portico along the west side of the compound of which is preserved only the base. From the 5th century AD houses were built on that space.

On the other hand the south portico at the same place of the square forum there was in precedence built an altar dedicated to Augustus between the years 2 and 14 AD which was placed at the east extremity of that portico. Its presence caused the placement of a good number of honorary pedestals among which the monument erected, in the Flavian age, in honour of the siblings *Calventia Titulla* and *C. Calventius Pudens*, members of one of the foremost families of the city.

Fig. 9. General view of the north Forum's cryptoporticus (R. Cebrián).

The north cryptoporticus

The walls of the cryptoporticus consist of a mixed structure which mixed pillars in opus quadratum of variable width with slabs in opus vittatum, forming a nucleus in opus caementicium. Those slabs measure under 3.50 x4.58 m in length (Fig. 9).

Long walls: 35.54x2x0.77x4.6 = 251.7 m^3

Short wall: 9.86x1x0.77x4.6 = 34.9 m^3

Gate wall: 4.12x1x0.77x4.6 = 14.6 m^3

Total volume: 301.2 m^3 = pc 11505.84 = 11505.84 HS

Cornices: 2.87x2

Square blocks of the north cryptoporticus: 0.84x0.84x7x4.6 = 22.7 m^3

Total volume: 22.7 m^3 = pc 866.32 = 866.32 HS

Total of the costs of the material of the north cryptoporticus: 12372.98 HS

The calculation of the transport of the limestone from the quarry de Diana, the labour and the installation amounts to 5232.13 HS.

Grand Total: 17605.11 HS

The north and the south porticoes

Long walls 50.80x1x0.77x5.60= 219 m^3

Short walls (we have not taken the gates into account) 11.58x4x0.77x5.60= 199.7 m^3

Total volume: 418.7 m^3 = pc 15994.34 = 15994.34 HS

Doric order (lower scape diam.:0.74 m, shaft height:5.60 m, capital height:0.42 m)

Total of the columns of the second gallery: 20

Second gallery, shafts of Doric order: 5.60x0.74x3.14 = 13.01 m^3 = pc 496.98 = 496.98 HS

496.98 HS x20 = 9939.6 HS

Doric capitals: 0.42x0.95x0.95 = 0.38 m^3 = pc 14.51 = 14.51 HS x20 = 290.2 HS

Total of the columns of the square: 34

Columns in the square, shafts of Doric order (lower scape: 0.60 m, shaft height: 4.50 m, capital height: 0.42 m)

Shafts of Doric order: 4.50x0.60x3.14 = 8.48 m^3 = pc 323.936 = 323.94 HS x34 = 11013.96 HS

Doric capitals: 0.42x0.95x0.95 = 0.38 m^3 = pc 14.51 = 14.51 HS x34 = 493.34 HS

Total cost of the material of the columns of the porticoes in the forum: 16477.10 HS

The curia

In the Augustan age, in the southwest corner of the Forum space and adjacent to one of the *tabernae* an edifice in a rectangular plan, 18.50 m long and 12.95 m wide was built with blocks of stones spretcher and header bond (1.30 m), of which only the lower rows have been saved from the expoliation which took place in the 5th century AD (Fig. 10).

The access to the edifice was realized from the south portico with a staircase 3.25 m long so that remained on an upper level with respect to the Forum square. Of the staircase three steps are preserved, the first of which is at the same level of the floor of the portico. The steps are 24 cm high.

At either side of the staircase there was a moulding belonging the podium of the edifice which was placed at a height of 92 cm on the floor level. It is still preserved only one of the moulded pieces which present one *cyma*. He moulding was cut in the upper section of the block and measures 14 cm.

Its construction was structured in two different modes. On one side a podium, 4.48 m wide gave access to an upper platform by means of a staircase with

Fig. 10. Aerial view of the Curia during the digging of the 2003 campaign. (J. M. Abascal).

seven steps situated in the central area. Of this second level only the bed of mortar has remained, the preparatory phase for the laying of the floor made with 16 rows of rectangular slabs of 120 x 60 cm in coloured stone from Clunia.

Dimensions: 18.50x12.80x8 m high
Long walls: 18.50x2x1.15x8 = 340.4 m^3
Short wall: 12.80x1x1.15x8 = 235.52 m^3
Total volume: 575.92 m^3 = pc 22000.14 = 22000.14 HS

Conclusions

The city of Segobriga bore the expenditure of 243464.40 HS for the building of the Forum in the Augustan age (Fig. 11).

Our attempt to retrace the costs of the stone materials of the forum compound at Segobriga offers the opportunity to highlight some interesting data, despite its largely hypothetical character. The relative highest figure regards the construction of the walls in blocks, at a cost of 176401 HS which is mainly due to the price of materials (120848 HS), whilst transport amounts only to 5459 HS and the installation to 36426 HS. It is surely a figure which can be borne by the finances of a Roman city of average importance but which is by itself more than half of the overall cost of the project. An indication that the imposing structure in blocks of the Forum represented by itself a noteworthy manifestation of urban prestige. The figures of transport and of installation -relatively modest- must not surprise as the proximity of the quarries offered the possibility to lower the costs and the installation of simple blocks would not have called for complex operations.

The higher economic incidence of the raw material obviously depends on the huge quantity of quarried limestone, necessary for the immense volume of the high walls of the Forum. The fact that the two orders of the basilica cost together 47743 HS, i.e. just a quarter of the cost of the walls in blocks of the Forum, is not a problem: the quantity of the used material is much smaller even though the quality of the requested craftsmanship is obviously higher. As a matter of fact here the ratio between material and the necessary labour is the opposite of that for the walls: the quarry limestone costs just 7757 HS as opposed to a transport cost of 689 HS but also to a workmanship cost of 35862 HS this latter also rising particularly in the crafting of the trabeation which is more richly decorated than other parts of the order. We have, then, a more precise image of a building yard for which the Roman city of Segobriga invested relatively high amounts of money with the purpose to underline the magnificence of the main public edifice of the city, an imposing one for both height and volume but also precious in its refined decoration.

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LOCAL STONE FOR WALLS	*length*	*wideness*	*thickness*	*highness*	*mc = pc*	*blocks 1/3 area pc*	*coste bloques x 1 HS*	*transport*	*workmanship*	*installation*
Basilica	58.17 x 2	18.89 x 2	0.80 m	11.72 m	1445 = 55199	18399.60	55199.00	1637.66	14450.00	6242.40
Forum square	38.76	32.98	0.20 m		255.6 = 9763.92	3254.64	9763.92	869.04	5113.20	1104.15
North crytoporticus	35.54 x 2	9.86 / 4.12	0.77 m	4.60 m	301.2 = 11505.84	3835.28	11505.84	341.36	3130.40	1301.15
North Porticus	50.8	11.58 x 2	0.77 m	7 m	318.86 = 12180.45	4060.15	12180.45	361.37	4141.76	1377.45
South Porticus	37.8	11.58 x 2	0.77 m	7 m	99.86 = 3814.87	1271.62	3814.87	113.18	3413.76	431.35
West Porticus	38.76		0.77 m	7 m	167.13 = 6384.48	2128.16	6384.48	189.42	2170.50	722.00
Curia	18.50 x 2	12.80 x 2	1.15 m	8.00 m	575.92 = 22000.14	7330	22000.14	1947.93	4006.40	2487.95
TOTAL MATERIAL COSTS							**120848.70**	**5459.96**	**36426.02**	**13666.45**
TOTAL										**176401. 13 HS**

BASILICA	*length*	*diam. imoscapo*	*dimensions*	*mc = pc*	*number*	*material cost HS*	transport	workmanship	*installation*
1st Columns	5.50 m	0.73 m		2.3 = 87.86	28	***2458.40***	***218.96***	*1758.40*	
1st Capitals	0.70 m		0.68 x 0.68 m	0.32 = 12.3	28	*344.40*	***30.44***	***5661.00***	
1st Basis	0.28 m		1.14 x 1.14 m	0.36 = 13.9	28	*389.20*	***34.24***	***417.20***	***Ist order***
1st trabeation	1.2 m		10 x 37.5 m	86.6 = 3309.6		*3309.60*	***294.44***	***18305.60***	***2863.50***
2nd Columns	3.00 m	0.21m		0.41 =15.6	28	*436.80*	***39.00***	*628.90*	
2nd Capitals	0.25 m		0.35 x 0.35	0.03 = 1.2	28	*33.60*	***2.84***	***689.90***	
2nd Basis	0.17 m		0.69 x 0.69	0.08 = 3.1	28	*86.80*	***7.61***	***232.40***	***IInd order***
2nd trabeaton	0.55 m			18.25 = 698.5		*698.50*	***62.05***	***8168.68***	***571.20***
1st-2nd order				202.85 = 7708.3					
TOTAL						**7757,3 HS**	**689.58 HS**	**35862 HS**	**3434.70 HS**
TOTAL COST 1st & 2nd ORDER									**47743.58 HS**

NORTH CRYPTOPORTICUS	*length*	*diam. imoscapo*	*dimensions*	*mc = pc*	*number*	*material cost HS*	transporte	installation
square blocks	4.60 m		0.84 x 0.84	3.24 = 123.76	7	866.32	77.11	382.11
Total						**866.32 HS**	**77.11 HS**	**382.11 HS**
TOTAL MATERIAL COST								**1325.54 HS**

FORUM PORTICOES	*length*	*diám. imoscapo*	*dimensions*	*mc = pc*	*number*	*material cost HS*	transporte	workmanship	intallation
1º Columns	4.50 m	0.60 m		1.27 = 48.58	34	1651.72	120.90	1476.96	1430.12
1º Capitals	0.42 m		0.95 x 0.95 m	0.38 = 14.51	34	493.34		3916.80	
2º Columns	5.60 m	0.74 m		2.3 = 87.86	10	4969.80	455.26	647.47	2255.94
2º Capitals	0.42 m		0.95 x 0.95 m	0.38 = 14.51	10	145.10		1152	
Total						**7114.86**	**1479.47 HS**	**7193.23**	**3686.06**
TOTAL MATERIAL COST									**17994.15 HS**

Fig. 11. Table with the calculation of the costs of the materials, the transport, labour and installation for the Forum of Segobriga.

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