The construction techniques and methods for organizing labor used for Bernini's colonnade in St. Peter's, Rome

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The diary of Pope Alexander VII Chigi (1657–1668) is full of references to the ongoing construction work on St. Peter's Colonnade (1657–1668), and he frequently complained that the work was «moving very slowly» and urged the people in charge to work more quickly. He clearly wanted to see the colonnade finished within the 60 months scheduled for its completion by the Congregazione della Fabbrica di San Pietro, for which Gian Lorenzo Bernini (1598–1680) was paid 60 scudi a month throughout the whole period of construction. Figure 1.

The five years allotted for building this impressive structure (which at the time was compared to ancient Roman buildings) was not overly optimistic, particularly if one considers that the work was originally supposed to be done by the Reverenda Fabbrica di San Pietro. The Fabbrica had been in charge of construction and maintenance in St. Peter's since the early 16th century. It was a very efficient organization, with such a highly skilled technical staff that it was able to finish building St. Peter's cupola in just 22 months, quite a technological feat for the late 16th century. Like many other organizations set up throughout Italy to promote religious architecture, during the 17th century the Fabbrica had an increasingly strong influence on Roman construction in general, in terms of artistic choices, management policies, and spreading architectural knowledge. This was also because the Fabbrica's architects, master builders and highly specialized workmen were quite mobile, meaning that they worked on other construction sites around Rome, spreading their technical knowledge in an osmotic fashion. St. Peter's Basilica and the whole area around it were one enormous building site, equipped with avant-garde technical knowledge in an osmotic fashion. St. Peter's Basilica and the whole area around it were one enormous building site, equipped with avant-garde technical knowledge in an osmotic fashion.

Figure 1
organization and technology, specialized in designing
construction machinery and in the synchronized
organization of labor.

The Vatican area also had plenty of resources. There were foundries for making building equipment, stocks of limestone; warehouses full of building materials and equipment, and ample space for working. The Vatican even had exclusive ownership of a river, the Aniene, including its riverbanks and the old Traspontina port, for shipping travertine to Rome from the quarries in Tivoli.

In spite of this supportive framework and the careful scheduling of work phases set up right after Bernini was given the job (July 31, 1656), it took twice as many years to complete this «great... Theatre» than had been planned.

It was a mistaken judgement, one of the few dark moments of the enterprise, and was the result of some unwise decisions made when work began.

Alexander VII was counting on this building project to give new life to Rome’s economy, which had become dramatically stagnant after pestilence broke out in June 1656. He therefore tenaciously opposed criticism to the project, which some considered unsuitably «grand and ornate» and repeatedly urged the people in charge of the work to procure everything that was needed for the building site. Figure 2.

To speed things up, the Pope also dealt personally with administrative issues connected with the project (giving audience to the magister stratorum Domenico Jacovacci, for example) and with its planning, organizational and economical aspects, conferring repeatedly with Bernini, with Mons. Luca Holstenio, Don Flavio Chigi and Father Virgilio Spada.5

His impatience was triggered by the knowledge that construction work began substantially after the decision to build the colonnade, a time lag clearly recorded in the memorandum drawn up (probably in August, 1656) by the Fabbrica foreman, Pietro Paolo Drei.6 According to Drei, it took fully three months to

Figure 2
The construction techniques and methods used for Bernini’s colonnade

lay in stores of tools and construction equipment. He clearly favored the initial decision to start working in an area where no demolition would be necessary, the northern section of the colonnade, towards Porta Angelica. He also suggested that, when calculating the work timing, it would be wise to bear in mind how long it would take to clear out the houses which would have to be torn down to make space for the southern section of the colonnade. These houses were all in the Stelletta and Arcipretato areas and expropriating them had cost just over 50,000 scudi, a very large sum. (By comparison, the Fountain of the Four Rivers in Piazza Navona cost «only» 30,000 scudi). The Fabbrica managed to recover some of the money by selling materials left over from the demolished buildings, either as partial payment to the master masons or else to third parties. This is what happened with the tufa stone taken from Raphael’s famous palace (which was knocked down in April, 1671) and the wood from Ferrabosco’s tower (demolished in 1660).7

Pietro Paolo Drei (an architect who had considerable experience in supervising building projects, since he had worked on the Fountain of the Four Rivers and Sant’Agnese in Agone) assumed that the construction site would be completely controlled by the Fabbrica, using exclusively Fabbrica workmen.

He therefore suggested that buying the freestone from the merchants, and compelling them by contract to provide a specific quantity of material each year, would give the best results. The quality of the travertine would also be specified in the contract. The blocks of stone would be transported from the quarries in a roughly cut state and then be worked on the construction site by crews of Fabbrica stone masons who, since work for them was scarce at that moment, were «idle» and «looking around for something to do». The finished pieces would then be lifted and put in place by the Fabbrica workmen, known as «sampietrini».

Alexander VII shared this view of how the work should be structured. He was initially against the contracting system, because he believed that «work done cheaply is always less well done».9 Bernini was also convinced that workmen paid on a daily basis produced better quality work and actually defended this theory in 1665, when discussing work management for his never realized Louvre project.

The project had to be «well built, otherwise his design would not be successful».9 On that occasion Louis XIV’s minister, Jean Baptiste Colbert, remarked that this method produced an uncertain output, so that construction could not follow a schedule «like it could with contract work», when workmen are not paid on a time basis but according to production.

But, returning to the colonnade, Drei’s concluding remark was that all these various aspects of the building site would have to be decided quickly, because «we must make the most of favorable seasons, and particularly of next autumn, because once it is over, the beginning of the year will be difficult and we will have lost an opportunity for employing many poor people».

It was a prophetic remark, since work began only a year later. This long and complex project had just begun, an enterprise, which was to transform the square (considered «outside of every rule in architecture»), into the Church’s tangible embrace of the faithful, Figure 3.

Although the project itself had still not been completely defined at that point (the final details were decided late in 1657), on May 28, 1657 the architect Marcantonio De Rossi notified the Fabbrica treasurer

Figure 3
that «the first boatload of travertine» had arrived.\textsuperscript{12}

The large ilex rulers used to measure the plan were paid for on July 13;\textsuperscript{13} while on July 23 Cardinal Barberini was asked to buy the equipment and materials needed to «start work on the portico» and Bernini was asked to increase the number of workmen (known as scocioni) employed in the travertine quarries.\textsuperscript{14}

By that date the system for organizing labor on the building site had already been outlined in the «Nota delle provvisioni che si devono fare per li Portici»,\textsuperscript{15} which reutilizes a method already used successfully on the Fountain of the Four Rivers a few years previously.\textsuperscript{16} This fountain was built in the years right before the 1650 Jubilee, a period when construction was going on throughout Rome at a hectic rate. The churches of St.John Lateran, Santi Luca e Martina, Sant’Ivo alla Sapienza and the Cornaro Chapel in Santa Maria della Vittoria were all being worked on in that period, along with Palazzo Pamphilj, the Basilica of St.Peter’s and other, more ordinary buildings.

The Nota provides guidelines for making sure that provisions of construction materials would be continuous, a crucial issue if the work schedule was to be respected. To save time, the Fabbrica representatives ordered that employees should go to the Tivoli quarries as soon as possible to choose the travertine blocks, then have them shipped to Rome, where they would be measured and cataloged. Finally, travertine blocks left over from other construction work, which were stored in Piazza Santa Marta (behind the Basilica), were to be moved out into the square, so that workmen could start finishing them, Figure 4.

The Fabbrica likewise decided to build shelters in front of St.Peter’s so that the stone masons could continue working in all weather conditions. This was a mediaeval tradition, which can also be seen in Renaissance and Baroque iconography.

The Fabbrica also established a monopoly on brick supplies, so that the bricks that had already been made could not be sold to any other construction site, since the estimated time for making all the bricks necessary for building the colonnade was four months. In any case, the brick kilns (which were all concentrated in the area behind Porta Cavalleggeri, near St.Peter’s) were mostly active in the summer months, when the heat speeded up the bricks’ drying process, before they were fired. Therefore, they could only start production in the spring of 1657, which further delayed the start of work on the colonnade. This had already happened in 1656.

A monopoly was also established for the tufa blocks (used for the walls and foundations), for the pozzolana and for all, and I stress all, of the lime produced in Rome and Tivoli during that space of time.

Incidentally, the lime was delivered as quicklime in clumps, and then slaked in a big pit dug in the square, near the façade, where it was «more convenient for the work». The method used to slake the lime involved transporting enormous amounts of water into that area of the construction site. For example, it took 1700 liters of water to hydrate 500 kilograms of quicklime, and this would produce just one cubic meter of lime putty.\textsuperscript{17} Apart from this notable amount of water, the building site also needed water to wet materials before using them, to mix mortar, plaster, pigments and sizing, to cut and polish stones and to grind down floors. The water was provided by a special connection to the Acqua Paola aqueduct.

The Nota ends with an order to procure the wooden planks (known as «piane») used for the floor systems of the provisional structures, and also to procure all of the implements needed by the workmen.\textsuperscript{18} The wood and implements were unusually easy to obtain,
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because in 1657 very few construction sites were open in Rome. An estimate of costs for contracting the travertine quarries was also drawn up in 1657. This «Nota della spesa» calculates what it would cost to hire a crew of men to quarry one thousand cartloads of travertine (about 335 cubic meters of stone). The estimate for six months’ work was around 1,100 scudi. This included all of the equipment (hoes, pickaxes, poles and sledgehammers of every size, ropes and pulleys, different cuts of wood for provisional structures, and a pump for removing water from the pits) and the wear and tear it would be subjected to, plus animals for transport, renting the quarry, trips to Rome and back to bring the necessary instruments, and living expenses. The estimate also points out that the cost could be reduced if the contractor decided to manage more than one crew of quarrymen, because in that case a lot of the equipment could be shared.

The best quality of travertine came from the Tivoli quarries, but merchants also delivered travertine blocks from Fiano and Monterotondo to St. Peter’s. These were considered of inferior quality and Bernini regularly protested about them in the payments. Figure 5.

Depending on the season, the travertine blocks were either brought to Rome on carts drawn by a team of buffaloes or shipped on boats pulled by a team of oxen, who plodded along the riverbanks of the Aniene and the Tiber. To facilitate the oxen’s passage, the Fabbrica had the banks of both rivers cleared of trees all the way up to the Tras pontina port. Prisoners were sometimes used to do this kind of maintenance (which was essential for the swift delivery of travertine supplies), serving part of their sentence with the work.

An enormous quantity of freestone was needed for the project, considering that it was used for the whole architectural order of the colonnade (base, column and entablature) «as well as the bases for the statues» and for the statues themselves, according to the lifesize model which Bernini had built on the square. Bernini regularly used these models for his work, «because objects don’t appear just as they are, but also in proportion with the objects next to them, and this relationship changes their appearance». He was openly imitating Michelangelo’s approach for the coping on Palazzo Farnese. Michelangelo «made a model, and then put it in place height-wise, where it looked so small that he decided to almost double it in size, producing the superb aphorism that distance is an enemy, against which one must fight in an open field».

In spite of the virtually synchronized way that the various phases of construction had been organized, a kind of impatience with the slowness of the work appears in the documents from the very beginning.
Alexander VII's diary entries start to have an imperious tone: «March 28 (1659), Friday, this evening we have ordered Luigi Bernini (Gian Lorenzo Bernini's brother and first assistant) to start work on the Borgia tower as soon as possible and to speed up work on the colonnade.»

With reason: on September 20, 1658, for example, «24 columns of the Vatican theater» had been raised. This meant that in slightly more than a fifth of the time allotted to build the colonnade, only one eighth of the Porta Angelica side had been completed (since the work was done in circular sections).

One of the system's flaws was providing a continuous supply of freestone. Because of this lack of material, two years after work had begun there was a surplus of stone masons («men and boys») and some of them risked being fired by the Fabbrica. The travertine was not delivered for various reasons: bad weather conditions in the spring of 1659, but also because contracts with the merchants had not been renewed. Therefore only small quantities of the stone arrived in Rome and were frequently sold to other building sites, such as Sant'Ivo alla Sapienza. As a result of this, workmen would spontaneously abandon the colonnade building site, looking for more permanent employment. In September 1659 as many as 20 workmen disappeared, and Alexander VII ordered that «the missing ones should immediately be sought out with the greatest care and sent to jail».

To overcome this stalemate, a new system was developed, whereby the crews of Fabbrica stone masons only worked on part of the travertine, while as of October 1658 some of the stone masons were given job contracts.

Another part of the travertine was to be worked and finished by the merchants themselves, who therefore had every interest in quarrying firmer, more compact blocks (to avoid having to pay for the expensive patching up of cracks in the stone), which were closer in size to their final shape (to save on transport).

The first contract was assigned to Andrea Appiani. The Congregazione della Fabbrica di San Pietro had decided this during a meeting held on May 25, 1659. Appiani was to make eighteen or twenty columns «of the second row (...) with all of the materials and work». The technical specifications listed in the contract are very detailed: the columns must be in Monterotondo travertine, the shaft must be composed of sections made out of a single block of stone, alternated by sections made up of two pieces. No more than two pieces could be used for each of the plinths, bases and capitals. The Fabbrica, on the other hand, committed itself to renting a covered working space on the square to Appiani, moving the rough stones and to transporting and installing the finished blocks.

The quantity of columns in the contract is oddly variable. Appiani had to produce either eighteen or twenty columns, and the uncertainty of this figure was related to the daily work system used by the Fabbrica stone masons. As mentioned, this system makes it is impossible for the work to follow a strict schedule. The contract therefore foresees the possibility that if less than twenty columns «with a diameter of six palmi, eight oncie and one fifth» (about 135 cm) should be needed for the second row, Appiani would be obliged to build some columns for the second row. In that case, since the columns of the third row have a bigger diameter, the work itself and the rustic stone would be paid more.

Other contracts were to follow. Appiani signed one (Nov.25, 1659) to dig the foundations. Bonifazio Perti signed a contract (Dec.16, 1659) for part of the entablature and Carlo Pervisani (Dec.22, 1659) for some pieces of the architrave. Figure 6.

Figure 6
Work seemed to progress more rapidly in this new structure. For example, the stone masons and bricklayers were very well synchronized, as can be seen in Benedetto Drei’s *Diario dei lavori dei Portici circolari*, written between September 4, 1659 and December 13, 1662.\(^5\)

Just to get an idea of what went on work-wise every day, on September 17, 1659 the workmen were used to

--- Position the last four segments of the shaft of the second column on the second row of the southern side of the colonnade towards Borgo;
--- move the scaffolding, consisting in wooden structures composed of vertical elements (called *candele*), with many joists on different levels and mounted on wheels, so they could be moved wherever needed (see table X in *I castelli e ponti di Mastro Nicola Zabaglia*, Roma 1743);
--- transport one of the many *antenne* (a device used for raising weights, similar to a modern crane) used on the building site beside the base of the third column in the third row in the middle towards Borgo. It was to be used to lift some columns which the stone masons had just finished. Moving the columns with the *antenna* was easy because it was not fixed in the ground but mounted on a thick board with logs underneath, which functioned like wheels (see table VII of Zabaglia 1743; the author sketches and describes the *antenne* used for the colonnade);
--- install on the base mentioned above four segments of the shaft, reaching the height of 13 palmi (about 2.90 meters; each segment weighs on average about 2 tons);
--- position the capitals of the two pilasters of the second row in the middle towards the Vatican Palace;
--- close the brick arch above the architrave of the entrance in axis with the obelisk;
--- position the base of the last pilaster of the third row from the Vatican Palace to the center of the colonnade;
--- install the plinth of the fourth column of the second row from the Vatican Palace to the center of the colonnade;
--- finishing the shaft of the second column of the second row of the northern side, towards Borgo, positioning 9 missing sections;
--- installing a piece of cornice above the entrance in the northern wing and the capitals on two pilasters;
--- positioning the plinth and base of the fourth column of the second row, from the Vatican Palace towards the middle of the colonnade;
--- installing two sections of the third column of the second row, from the Vatican Palace towards the middle of the colonnade;
--- assembling and bracing the *antenna*, which was about sixteen meters high and made of wooden beams connected by vertical clamps, with a transversal section called the *falcone*.\(^6\)

The *antenna* was connected to a pulley with a vertical spindle used to wind up the rope connected to the object that had to be lifted.

Work therefore continued at an impressive rate, and reading the diary one is amazed at how easily they shifted about the great construction machines and mobile scaffolding, which were far more versatile to use than fixed scaffolding, Figure 7. When it rained, and the bricklayers were therefore unable to work, they were sent to the stone masons’ shelters, where they picked up marble chips left over from working the travertine, which were then sent to the limekilns to be melted down. In spite of all this activity, between late 1660 and early 1661 (before the southern side of the colonnade was started) there was still some talk of how to speed up the work pace.

Father Virgilio Spada in particular suggested that the new wing’s foundations should be dug immediately, so that the finished columns could be installed, «otherwise it would be hard to distinguish between the mass of finished and unfinished things in the square».\(^7\) Alexander VII had quite a different opinion (so did Bernini) and wanted the Porta Angelica side of the colonnade to be completed before starting work on the other side. But Spada’s view was supported by the fact that it would take a long time to finish the Porta Angelica wing, «since it will be necessary (...) to secure the walls so that they don’t damage the stability of the palace nearby,
A contract was finally signed early in 1661 with four master masons, Simone Brogi, Gio Albino Augustoni, Giacomo Pelle and Piero Ostinì, who agreed to finish the first side of the colonnade and to build the new one, providing «all the materials».39

In this kind of agreement, the master builders are the legal contractors of the work, making a commitment both to do the work and to procure all the materials and equipment needed for the construction.40 Figure 8.

These master builders then rented the materials and equipment from the Reverenda Fabbrica di San Pietro. Many construction sites in Rome during the Renaissance and Baroque period did this, because small crews of workmen could not afford to buy and maintain scaffolding and machinery, ropes, hardware and cranes. The Fabbrica, as a result of the great

so we must consider that making this wing is like a slow fever and we must be patient, medicating it bit by bit».

During that period Spada was also busy contracting the masonry work, trying to save forty to fifty thousand scudi on the original estimate for the southern side of the colonnade.38

This proved to be quite difficult, because the master builders had strong financial reasons for not wanting to build the colonnade’s foundations and roofing. These were, in fact, the least profitable parts to build of any structure, and the hard work and poor pay they required were usually balanced by the more remunerative solid parts of the building, which of course don’t exist in a colonnade.

Figure 7
building activity in St. Peter's during the 16th century, owned a huge quantity of equipment, machinery and building materials, which were kept either in the numerous storerooms inside the Basilica or just nearby.

Equipment consigned to the workmen was recorded by the Fabbrica steward in the Libro delle Robe Prestate a list of which included details such as quantity, what state the equipment was in and its estimated value. This equipment was not really «borrowed»: the book actually lists the Fabbrica's sale of building materials (lime, pozzolana, wood and freestone) and renting tools and machinery (scaffolding, pulleys, hoists and antennae). When these objects were returned, another estimate of their value was made and written down in the book, noting wear and tear caused by use. To the cost of this wear and tear was added the full cost of equipment which could no longer be used. The master masons paid for renting the equipment and for buying materials, and the Fabbrica steward sent a note with the sum they owed to the Fabbrica accountant, which was then deducted from their earnings.41

On March 28 of that year (1661), Dreì recorded in his diary that «We have stopped directly employing the Fabbrica stone masons and started contracting the work».42 On this date, therefore, the Fabbrica completely changed their work system, to resolve problems which they could not resolve by managing the workmen directly.43 With the old system, the Congregazione della Fabbrica had to shoulder costs which included paying for eight crews of stone masons, each composed of six men, for the bricklayers, for horses to pull the carts and for the hoists, for the wear and tear of equipment and building machinery, for transporting the stone. And these costs in particular had become unbearably heavy, especially in proportion to how slowly the work progressed during the period when the «Fabbrica did everything by itself».

The Fabbrica was admitting to an operational crisis which, though it did not greatly affect the work's final quality, clearly revealed that, at least in terms of time and costs, the initial planning was a complete failure.

NOTES

1. Alexander VII's diary (Diary hereafter) is in the Vatican Apostolic Library (BV), cod. Chigi O IV 58, f. 19, col.

2. For the sections quoted here, see Morello 1991, 321–340.

3. According to Moroni Romano 1842, 253, «fabbrica» in ecclesiastical terms means «the revenue used for a church's upkeep, covering repairs and ornamentation as well as everything needed for religious ceremonies». For the Reverenda Fabbrica di San Pietro, which in the 16th century was still called the Collegio Fabrique Basilica, see Del Re 1969; Basso 1987; L. Rice 1997, 7–11; Jones 2000, 399–407 and F. Quinterio 1983, 361–378.

4. For opposition to the portico see BV, cod. Chigi H II 22, f. 97; for the epidemic, Gigli 1994, 2: 763; for the need to built a colonnade, see Diary, August 27, f. 21v, col. 2.

5. For how the building site was organized, see BV, cod. Chigi H II 22, f. 102–103.

6. BV, cod. Chigi H II 22, f. 102–103. The document is dated by Pesco 1988, 45. Dreì was the Fabbrica's steward from October 1, 1637 to October 30, 1638. He became the Fabbrica foreman on November 27 of that same year and kept the position until the day of his death on November 8, 1656, Archivio della Reverenda Fabbrica di San Pietro (AFSP), armadio 26, ripiano D, volume 272 and armadio 26, ripiano E, volume 305.


Usually all the materials salvaged from demolished buildings were either recycled or sold on request to other construction sites. The travertine dismantled from Bernini's bell-tower, for example, was sold to the building sites of the Campidoglio and Sant'Agnese in Agone (AFSP, armadio 26, ripiano E, vol 303).

8. Payments for the work are listed in the stone masons alphabetical account book from May 18, 1657 to October 31, 1659 (AFSP, armadio 16, ripiano A, volume 164).


10. Quoted from Chantelou (1665) 1946, 89.

11. For how the project was developed, see Brauer and Wittkower 1931, 64–102; Thoenes (1962) 1998, 11–47; Haus 1970, 7–16; Kitao 1974; Birindelli 1980; Borsi 1980, 64–96; Fagiolo 1982, 117–132; Rietbergen 1982,

12. On September 15 Leonardo Agostini wrote in a letter to Cardinal Leopoldo de’ Medici: «Although the foundations are being laid with the greatest speed, the final project has still not been decided» Florence State Archives, carteggio artisti 17, f.35. AFSP, armadio 55, ripiano G, volume 336/337.


15. AFSP, armadio 7, ripiano F, volume 466.


17. Manuale dell’Architetto 1962, 41.

18. A piana is a specific cut of timber (between 270 and 335 cm long, 10 and 20 cm wide and 6 cm thick.). Ischio is a variety of oak, Scavizzi 1983, 37–42.

19. Pietro Paolo Drei writes that this type of equipment «can be found easily, particularly right now, when many master builders are selling them, because with the present sacristy of construction sites, the equipment is a useless expense», BV, cod. Chigi H II 22, f. 102–103.

20. AFSP, armadio 7, ripiano F, volume 466. Travertine was also quarried seasonally, from October to April, to prevent the spread of malaria among the quarry workers, Scavizzi 1983, 43.

21. AFSP, armadio 38, ripiano D, volume 40. Contracts for the travertine were stipulated with Andrea Appiani, Pietro Naldini, Giò Francesco Ghetti, Carlo Pervisani, Bonifazio Perti, Pietro Grassi and Pietro Nerli (AFSP, armadio 7, ripiano F, volume 467). This volume also contains references to Bernini’s doubts about the various qualities of travertine used.

22. For the model see AFSP, armadio 42, ripiano E, volume 1.

23. Chantelou (1665) 1946, 83.


27. BV, cod. Chigi H II 22, f. 158.

28. For the travertine sold to other construction sites AFSP, Armadio 56, Volume 343.

29. AFSP, armadio 56, ripiano A, volume 343.

30. AFSP, armadio 26, ripiano E, volume 327.

31. BV, cod. Chigi H II 22, f. 159.

32. AFSP, armadio 7, ripiano F, volume 467. The accounts for Appiani’s work between 1658 and 1662 are in AFSP, armadio 42, ripiano E, volume 3.

33. AFSP, armadio 16, ripiano A, volume 168.

34. AFSP, armadio 7, ripiano F, volume 467.

35. Benedetto Drei, Pietro Paolo’s son, was assistant foreman of the Fabbrica from March 1, 1657 to July 13, 1675. The Diary provides abundant information about the timing of the work, AFSP, armadio 17, ripiano E, volume 29.

36. For a description of the antenna see Zabaglia 1743, tav. II; tav. VII.


38. The «Scrittura di monsignor Spada per l’apula con i muratori» (BV, cod. Vat. Lat. 7939, f. 311–313) is dated by Pesco 1988, 82. The «Scandaglio di tutta la spesa che va in fare il Portico dalla parte verso Cesis» is in BV, cod. Chigi H II 22, f. 201.

39. AFSP, armadio 16, ripiano A, volume 164; the masons started to work regularly on February 28, 1661. AFSP, armadio 27, ripiano A, volume 334; for the contract for the southern wing, see BV, cod. Chigi H II 22.

40. For a typical example of one of the many all-inclusive contracts «a tutta roba» see «Obbligodi Giuseppe Bucimazzi di Rocca di Mezzo per realizzare le fondazioni per i portici de San Pietro profondi 12 palmi con tutti i suoi ferramenti» (AFSP, armadio 7, rip. F, vol 466).

41. The list of «Munizioni (building materials and equipment) restituite alla R.da Fabbrica di San Pietro dalli capomastri muratori consegnati al Giacomo Baisinelli fattore» in 1666 (AFSP, armadio 12, ripiano E, volume 6) records the rented equipment and provides measurements of the scaffolding and antenna used on the construction site.

42. AFSP, armadio 17, ripiano E, volume 29.

43. «Ragione per qual causa la Reverenda Fabbrica di San Pietro ha dato il restante del lavoro dell portici di scalpellino alli 4 mercanti» «(Reasons for which the Reverenda Fabbrica di San Pietro has given the rest of the portico work to the 4 merchants»), AFSP, armadio 12, ripiano D, volume 3.

REFERENCE LIST


