

Present-day methods of representing architectural projects were for the most part already in use by the start of the sixteenth century. The masters of the Renaissance made use of the triad—plan, elevation and section—as well as various kinds of perspectives, with a degree of virtuosity and precision that has rarely been equaled since.<sup>1</sup> In spite of all the changes in style and technique, this continuity in the methods of design links the architecture of our time to that of the Renaissance; likewise, in ecclesiastical and secular building this tradition has never really come to an end. The study of architectural drawing now reveals that there had never been such continuity between antiquity and the Renaissance, that methods of architectural design had in fact been partially forgotten in the Middle Ages and were developed anew with Gothic architecture.<sup>2</sup>

This process was strictly tied to the general development of architecture. The greatest impetus came from two artistic circles: the High Gothic in northern France, and the Tuscan pre-Renaissance and early Renaissance starting with Giotto. If fairly simple design procedures were sufficient for the architects of Roman buildings, the Gothic style, completely centered on transparency, on structural logic and filigree ornamentation, required an increasingly masterly and precise project. The most beautiful example comes from the cathedrals, recorded by Villard de Honnecourt in about 1230 in his famous sketchbook covering various building sites (figs. 1–3).<sup>3</sup> He not only drew plans, but compared the elevations of the inner and outer wall of Reims Cathedral. No one had ever tried before to find the correspondence between the outer and the inner construction and to bring into close relations all the single elements of the body of the building by means of visual axes and cornices. The horizontal and vertical coordinates appear even more clearly in the few surviving projects of the early Gothic style, such as the superimpositions of Reims, where, in fact, it appears that these coordinates were used by the draftsman as his starting point (fig. 4).<sup>4</sup>

Everything could be represented through an orthogonal projection, but sections and elevations were sufficient for workshop projects and drawings of details. Difficulties arose only when draftsmen tried to represent buildings in three dimensions, as in the illustration of the choir of Reims Cathedral. Perspective techniques were not sufficiently developed for distinguishing at a glance the parts of the building which should have projected toward the observer and those which should have remained in the distance. And where the graphic techniques failed, the architects' creative energy must have reached its limits.

Only through this kind of formation and an improvement of the strictly graphic methods of design could the figure of an architect in the modern sense evolve during the first half of the thirteenth century, where projects to be transmitted to the builder-craftsmen existed independently of the finished building.<sup>5</sup> This growing autonomy of the architect-designer with respect to the craftsmen made it possible, at the end of the fourteenth century, for a painter such as Giotto (1266–1337) to become an eminent architect.<sup>6</sup>

It is significant that Gothic architecture and Gothic design techniques gained a footing only in Milan, the most northern city where northern European architects were always being called in for new tasks (fig. 5).<sup>7</sup> The first creative impetus developed in Tuscany since Florence was by tradition too strongly influenced by late antiquity (to be seen in Florence Baptistery or the church of S. Miniato) to adapt itself unconditionally to the new northern European style. Moreover, Giotto and his contemporaries succeeded, thanks to their new knowledge of the Gothic style, in rediscovering the pictorial space that had been lost at the end of antiquity, by means of a form of classification that was unimaginable before the Gothic style and with rapid strides led to Brunelleschi's central perspective.

These new abilities allowed painters to arrive at more accurate and penetrating images of the plasticity of a building and its inner spaces. In this way, they opened up the road for new kinds of architectural projects, while the *cantieri* in the north remained prisoners of their strictly orthogonal tradition.<sup>8</sup> In his projects for the campanile in Florence, Giotto himself must have gone beyond the strictly linear drawing of the elevation, and have used colors, chiaroscuro, and perhaps even some form of perspective similar to the project for the campanile in Siena of 1350, which followed on directly from the Florentine prototype in stylistic terms as well.<sup>9</sup> The graphic technique corresponded to the character of the project here as it had done with the Gothic style: instead of a filigree skeleton there was a stereometric body; in the place of

<sup>1</sup> W. Lotz, "Das Raumbild in der italienischen Architekturzeichnung der Renaissance," in *Mitteilungen des Kunsthistorischen Institutes in Florenz* 7 (1956): 193–226; English edition in J. S. Ackerman, H. A. Millon, W. Chandler Kirwin, eds., *Studies in Renaissance Architecture*, Cambridge (MA) and London 1977: 1–65; R. Schofield, "Leonardo's Milanese Architecture: Career, sources and graphic techniques," in *Accademia Leonardi Vinci* 4 (1991): 111–157.

<sup>2</sup> "Les batisseurs des cathédrales gothiques," ed. R. Recht, Strasbourg 1989: 227ff.; W. Müller, *Grundlagen gotischer Bautechnik*, Munich 1990: 21–34.

<sup>3</sup> H.R. Hahnloser, *Villard de Honnecourt*, Vienna 1935: 65ff., 162ff.

<sup>4</sup> D. Kimpel, R. Suckale, *Die gotische Architektur in Frankreich 1130–1270*, Munich 1985: 227ff.

<sup>5</sup> op. cit.

<sup>6</sup> D. Gioseffi, *Giotto architetto*, Milan 1963.

<sup>7</sup> J. White, *Art and Architecture in Italy 1250 to 1400*, Harmondsworth 1966: 336ff.; Schofield, op. cit.

<sup>8</sup> Müller 1990: 29–34.

<sup>9</sup> B. Degenhardt, A. Schmitt, *Corpus der italienischen Zeichnungen 1300–1450*, Berlin 1968ff., vol. I, cat. 38, 54; Schofield 1991: 128.

abstract lines, there was the precious materiality of a consistent surface. Probably these first illusionistic projects preceded even the first architectural models still unknown during the period of High French Gothic, which was then making its triumphal entry in Tuscany.<sup>10</sup> The architectural model must have evolved because of the same need for material and spatial clarity and could have even been the response of the master builders to the illusionism of the painter-architects.<sup>11</sup> Not only did the builder-craftsmen benefit from this new form of illustration, but it also laid the premises for the more active participation of patrons.

This new three-dimensional way of thinking soon spread beyond the Tuscan border. When Antonio di Vincenzo was commissioned to build S. Petronio in Bologna in 1389 he borrowed clearly from the filigree project for Milan Cathedral, whose section was consistent with the plan,<sup>12</sup> (fig. 5) but he also tried to give body to the abstract schema in the area of the base and the capital and in a detail of the external construction to be seen on the verso. However it is not surprising that he turned toward the more simple, more plastic and spacious forms of Florence Cathedral in the final project.

A similar interest in spatial clarity can be observed as early as 1310 in the area of the portal drawn on the elevations for Orvieto Cathedral.<sup>13</sup>

The *cantiere* of Florence Cathedral soon became the hub of research into new design techniques. There was such a confusion of projects and models there in about 1365 that it was decided to destroy all of them, except for the final project.<sup>14</sup> Generally the success of an architectural project was tied exclusively to its feasibility. After a building was completed the drawings of the final project were destroyed; as a result, today there is much written information about the Florence building site dating back to the fourteenth century, but not one drawing.

The drawing dated 1425 by Giovanni di Gherardo da Prato, Brunelleschi's rival and a learned humanist, certainly derives from this tradition—architecture at that time was the province both of scholars and of artists (fig. 6).<sup>15</sup> In order to represent the problem of the curve of the dome—which was first and foremost a structural problem—he used a strictly orthogonal section. He then added a plan, on a smaller scale, with its auxiliary geometrical lines and the whole area of the dome, together with the connecting section and perspective view introduced in the early Trecento. Only by utilizing perspectives and equally pictorial chiaroscuro did he succeed in demonstrating the problems of directing the illumination, which had in the meantime become an equally central component of architectural calculation.

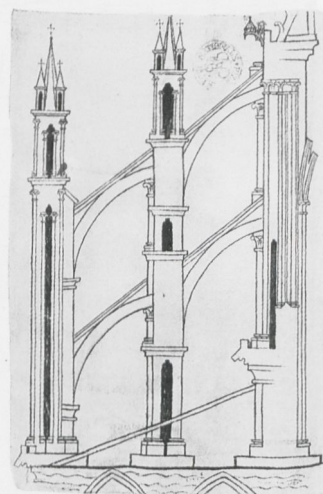
By the start of the fifteenth century, therefore, illusionistic design had not replaced but had been integrated with Gothic orthogonal sections; there was no reason to believe that Brunelleschi and his successors would have given up the orthogonal triad of plan, elevation and section.<sup>16</sup>

Like Giotto, Brunelleschi (1377–1446) had begun his career as a figurative artist interested in the perspective illustration of pictorial space before designing his first buildings.<sup>17</sup> He was the first to achieve a “correct” central perspective of Florence Baptistery and the Piazza della Signoria, and drew illusionistic architectural illustration toward more objective grounds. He brought architecture and painting continually closer, until pictorial space had an architectural structure and architecture became increasingly pictorial, conceived as a subject visible from a fixed viewpoint. This step inaugurated a new phase in architectural drawing. Brunelleschi too—as well as Leonardo—had to analyze the effect and the structural premises of his projects with the help of various plans, sections and perspectives.

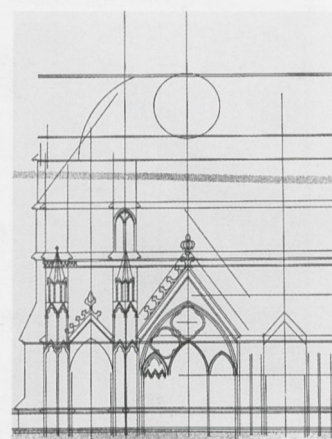
According to his biographer, Manetti, during his long sojourn in Rome Brunelleschi utilized new and more precise procedures of representation so as to study and reconstruct together with Donatello various kinds of buildings of antiquity, as well as the methods and techniques used by the ancients for the curvature of vaults, the Vitruvian orders, or musical proportions—pioneering achievements which his pupil Alberti was to take advantage of later on.<sup>18</sup> It is clear that Brunelleschi was proceeding from a classification similar to the one Alberti was to advise artists to use for investigating the human body in his treatise of 1435 on painting.

In the practice of architecture Brunelleschi appears not to have gone beyond strictly orthogonal projects and models, as suggested by the fact that before he departed for a long journey he simply left his master builder on the Loggia degli Innocenti building site an elevation drawn according to the scale and unit of measurement used in Florence at the time, the *braccio piccolo*.<sup>19</sup> In his ensuing projects and models he only prepared the plain body of the building, explaining details by word of mouth—as Manetti says—so that the workers very often had insufficient information. It is quite likely that later on he proceeded in the same way as Michelangelo did, and designed a detail only when the stage of construction made it necessary. There is no doubt that when doing this he used a combination of executive drawings, models of details, and molds because the stonemasons had not yet learnt to master the vocabulary of the ancients.

The strict orthogonality of Brunelleschi's detail projects distinguished them first and foremost from the architecture of Masaccio's *Trinity* (1401–28); that architecture is so stylistically akin



3. Villard de Honnecourt  
Elevation of Reims Cathedral



4. Reims Cathedral  
superimpositions and project

<sup>10</sup> see pp. 318–347.

<sup>11</sup> see pp. 18–73.

<sup>12</sup> Lotz 1956: 194, fig. 1.

<sup>13</sup> White 1966: 21ff.

<sup>14</sup> Schofield 1991: 120–131.

<sup>15</sup> H. Saalman, “Giovanni di Gherardo da Prato’s Design concerning the Cupola of Santa Maria del Fiore in Florence,” in *Journal of the Society of Architectural Historians* 18 (1959): 11–20.

<sup>16</sup> cf. Lotz 1956: 193ff.; P. Tigler, *Die Architekturtheorie des Filarete*, Berlin 1963: 141ff.

<sup>17</sup> A. Manetti, *Vita di Filippo di Ser Brunellesco*, ed. H. Saalman, Pennsylvania State University Press 1970: 43ff.

<sup>18</sup> op. cit.: 51ff.

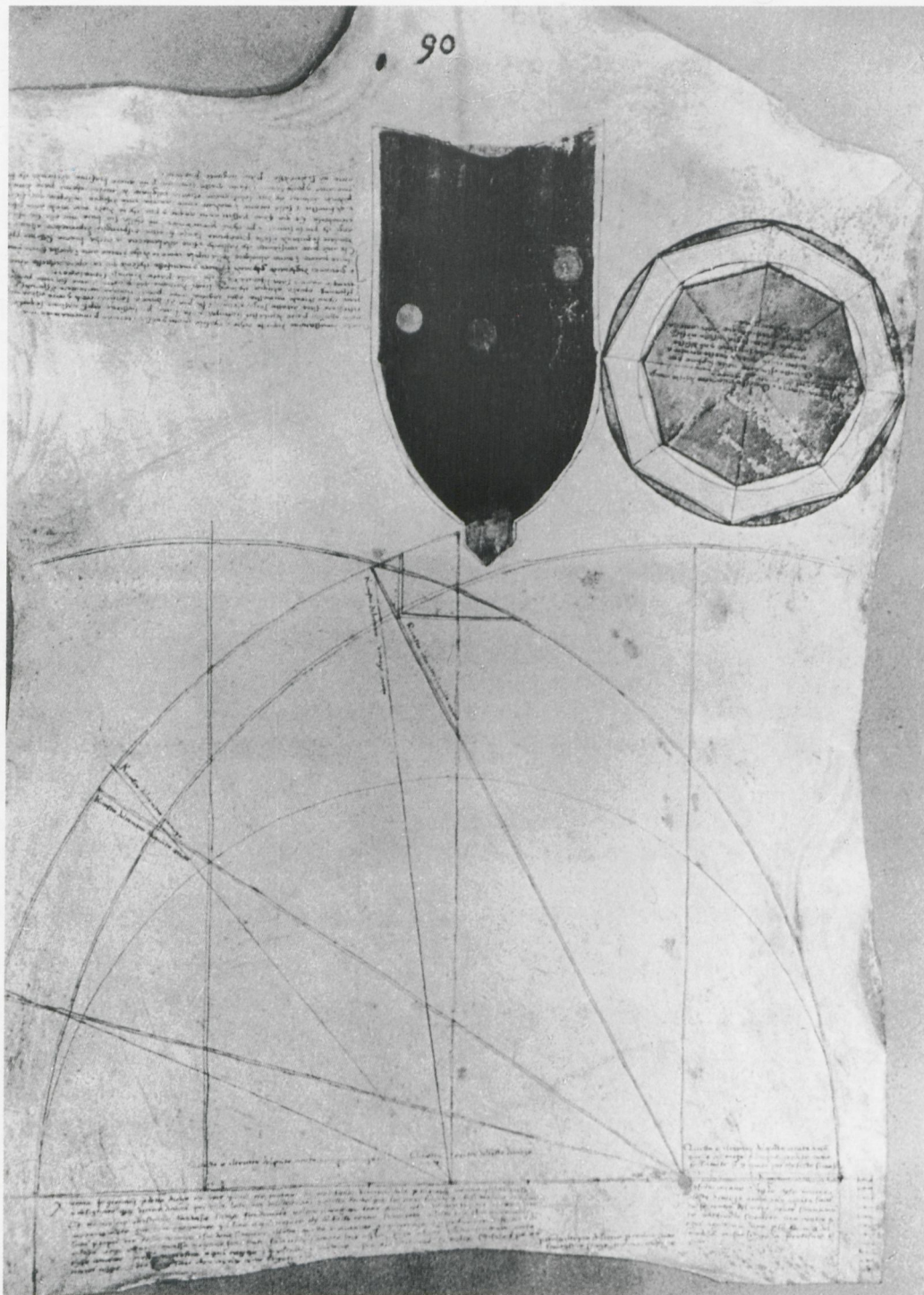
<sup>19</sup> op. cit.: 97.

Nota che l'ordine delle colonne sono tutte di una medesima altezza e larghezza e sono tutte di un solo pezzo di marmo  
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5. Antonio di Vincenzo, Surveys of Milan Cathedral  
 Bologna, Museo di S. Petronio, cartella 389, no. 1, Cat. no. 6



6. Giovanni di Gherardo Gherardi  
Project of the Illumination of  
the Dome of Florence  
Cathedral  
Florence, Archivio di Stato  
Cat. no. 263

to Brunelleschi's that it could well have been the work of the latter.<sup>20</sup> Ghiberti, who was much more active as a sculptor and, all in all, more closely tied to the tradition of the Trecento, is very different, for example, in his project—drawn likewise before 1428—for the Stephanus of Orsanmichele, where he stuck to the principle of the perspective elevation (fig. 7).<sup>21</sup>

In fact it was the painter-architects and sculptor-architects who developed new techniques of representation and established more direct links with the traditions of antiquity. It was no coincidence that Leon Battista Alberti dedicated his treatise on painting in about 1436 to his friend and teacher, Brunelleschi: it described the ancient orders of columns as inventions of painters.<sup>22</sup> If *firmitas* and *utilitas* were the concerns of real master builders, only the painter-architect and the sculptor-architect with their draftsmanship could meet Vitruvius' third prerequisite of *venustas*, beauty, and design the ornament.

The fundamental contrasts between Brunelleschi's and Alberti's buildings must not mask the fact that Alberti (1404–74) was probably the only contemporary to fully understand Brunelleschi's methods of representation and design and to develop them. In his *De re aedificatoria* he advised architects learning the trade to study and carefully analyze all the most important buildings, and to keep them in mind always as models: "*diligentissime spectabit, mandabit lineis, notabit numeris, volet se deducta esse modulis atque exemplaribus; conoscet repetet ordinem locos genera numerosque rerum singularum.*"<sup>23</sup>

<sup>20</sup> E. Battisti, *Filippo Brunelleschi*, Milan 1976: 106ff.

<sup>21</sup> B. Degenhardt, A. Schmitt 1968, vol. I: 293ff., cat. 192.

<sup>22</sup> L. B. Alberti, *On painting and on Sculpture*, ed. C. Grayson, London 1972: 60.

<sup>23</sup> L. B. Alberti, *L'architettura (De re aedificatoria)*, ed. P. Portoghesi, translated G. Orlandi, Milan 1966, IX, 10: 856ff.



7. Lorenzo Ghiberti  
Project for the Stephanus  
Niche at Orsanmichele, Florence  
Paris, Musée du Louvre  
Cabinet des Dessins, inv. 1231

8. Agostino di Duccio  
(after Leon Battista Alberti?)  
Rimini, S. Francesco  
Detail of the Temple  
of Minerva  
Ark of the Ancestors and  
Descendants



Alberti's new classification of antiquity prepared the way for a method of designing architecture that was no less fundamental. With almost polemical rigor, he made a distinction between the orthogonal design procedures which an architect was to follow, and the architectural perspective representation of the painter—certainly because it was increasingly tempting to take patrons by surprise with enticing views of a project.<sup>24</sup> A wooden model again offered the architect greater guarantees that a project would be carried out completely: "*non per scriptione modo et pictura, verum etiam modulis exemplariisque factis asserula*"<sup>25</sup>; only the model could supply the definitive information about site and arrangement, about the thickness of walls and vaults, or about the costs of the construction. Such an exact model however presupposed the triad plan, elevation and section which is why for Alberti the model and the drawings were not alternatives, but complements necessary for the elaboration of the complete project. In utterly separating the elaborated project from its realization, in giving greater importance to the *lineamenta*, or artistic design, Alberti completed the last passage in the process that had been developing since the Gothic style.

Thanks to his profound humanist education and his long sojourn in Rome, Alberti was able to carry the study of antiquity even further than Brunelleschi, and amply denied the difference between antique buildings and contemporary ones in his *De re aedificatoria*.<sup>26</sup> Since he began working as a painter and decorated his first buildings with excellent ornament, he must have

<sup>24</sup> op. cit., II, 1: 98ff.

<sup>25</sup> op. cit., II, 1: 96ff.

<sup>26</sup> R. Wittkower, *Architectural Principles in the Age of Humanism*, London 1949: 3ff.; C. L. Frommel, "Kirche und Tempel: Giuliano della Roveres Kathedrale Sant'Aurea in Ostia," in U. Cain, H. Gabelmann, D. Salzmann, eds., *Festschrift für Nikolaus Himmelmann*, Mainz 1989: 491.

been an able draftsman, even though the only drawing known as his so far offers merely a faint idea of his capabilities.<sup>27</sup> In this drawing he placed the various functions of an ancient *thermae* in a square area. It was first and foremost a theoretical exercise, and was perhaps even destined for publication and therefore had little to do with his final projects. He must have prepared later complex works such as S. Andrea in Mantua through careful orthogonal studies which then provided a basis for a model.<sup>28</sup> His "pictorial" drawings of antiquity could have appeared as the backgrounds to the two reliefs by Agostino di Duccio for Sigismondo and Isotta Malatesta's funerary chapels in 1454 (fig. 8).<sup>29</sup>

The seeds of Alberti's teaching germinated only after the turn of the century. However, even if we knew nothing about Brunelleschi's or Alberti's methods of representation, the effects they had are perceivable in the changes in Tuscan art from 1430 onward. The most direct offshoot can be found perhaps in the work of the Florentine sculptor Filarete (ca. 1400–69).<sup>30</sup> As early as 1433–45 Filarete reconstructed Roman monuments and imperial baldachins in the reliefs for the great bronze doors of S. Peter's with a classicizing splendor that cannot be found in either Donatello or Ghiberti, and which returned to the fore only in Alberti's Tempio Malatestiano.<sup>31</sup> Even though Filarete still had some difficulty in fully mastering pictorial space and perspective, his work already showed the influence of Alberti, who was in the service of the pope at that time.

Alberti's ideas are even more in evidence in Filarete's description of the ideal city of Sforzinda, which comprised his own real experiences as the architect of the Duke of Milan.<sup>32</sup> It is significant that Filarete praised most of all Alberti's "disegno, il quale è fondamento e via d'ogni arte che di mano si faccia, e questo lui intende ottimamente, e in geometria e d'altre scienze è intendentissimo" ("design, which is the basis and path to all manual art, and he is very expert at it, and in geometry and other sciences is excellent").<sup>33</sup> With the expression "disegno" Filarete intended the same concept as Alberti's *lineamenta*, meaning development of ideas and not its graphic expression: the graphic technique defined by Alberti with the word *pictura*. Filarete discussed this at another point where he distinguished between a drawing out of scale, "disegno in di grosso" (a rough sketch), and one based on a grid measured in *braccia*, a "disegno proporzionato" (proportioned drawing)<sup>34</sup>—as Alberti did himself in a letter to Lodovico Gonzaga in 1470.<sup>35</sup> He also sent a sketch of an idea for S. Andrea with this letter, adding: "Se ve piaserà daro modo de recarlo in proportione" ("if you like it I will have it drawn correctly in proportion"). From a scale plan Filarete then built a wooden model, the "disegno rilevato" (relief design). Filarete knew the designs for the Palazzo Medici and the Palazzo Rucellai and so also he could have been inspired by Brunelleschi's and Alberti's projects in the way he chose to represent the plan of the palace on fol. 66 recto.<sup>36</sup> In the majority of the remaining plans he included an elevation of the arcades in the medieval manner. While he still had occasional problems with perspective, he drew most walls to be built in perspective, or as a perspective elevation, enhanced with wash, to help his princely patron understand the strictly orthogonal sections. That he was familiar with elevations can be seen, for example, in his proposals for various types of windows.<sup>37</sup>

Alberti's influence, if not his way of representation, can be noted lastly in Filarete's reproductions of ancient kinds of buildings, such as the circus, amphitheater and theater, and of exceptional monuments such as the Colosseum, or of ancient themes such as the system of Castel Sant'Angelo, or the then little-used theater motif.<sup>38</sup>

Although a dilettante, Filarete's contemporary Ciriaco d'Ancona used similar methods of illustration in a virtually orthogonal drawing of the Parthenon, an elevation and perspective elevation of the Temple of Hadrian in Kyzicus; he likewise drew the Basilica of S. Sofia at Constantinople in a bird's-eye view and perspective section.<sup>39</sup> His view of Castel Sant'Angelo gives the impression that he might have discussed it with Filarete.<sup>40</sup>

Francesco di Giorgio (1439–1502)—a generation younger—began his career as a painter and sculptor and only in later life became one of the most sought-after architects and engineers in Italy.<sup>41</sup> He studied and made surveys of ancient monuments as far as Campania and was well-known as a translator of Vitruvius and author of treatises on architecture.<sup>42</sup> In spite of all his scholarship and range of knowledge, of the brilliance of his designs and architectural ingenuity, he did not live up to Alberti's expectations in his studies of antiquity (fig. 10). None of his surveys could have been transformed into a model that would have stood up to Alberti's criteria.<sup>43</sup> His reproduction of the Colosseum in plan, perspective section and view corresponds to a manner of representation already common before Alberti and it is, in its schematic simplicity, hardly more precise than Filarete's view drawn about thirty years previously (fig. 9).<sup>44</sup>

This limitation can be explained in terms of the backwardness of Siena, Francesco di Giorgio's native town, at the time, and does not occur in the almost contemporary drawings of Il Cronaca and Giuliano da Sangallo, who had absorbed the spirit of Brunelleschi and Alberti in Florence. Il Cronaca (ca. 1458–1508) had probably studied and drawn to scale the most important monuments in Rome and Florence as a youth.<sup>45</sup> According to Vasari, he worked in Antonio del

<sup>27</sup> H. Burns, "Un disegno architettonico di Alberti e la questione del rapporto fra Brunelleschi ed Alberti," in *Filippo Brunelleschi. La sua opera e il suo tempo. Proceedings of the International Congress Florence 1977*, Florence 1980: 105ff.; H. Günther, *Das Studium der antiken Architektur in den Zeichnungen der Hochrenaissance*, Tübingen 1988: 105.

<sup>28</sup> E. J. Johnson, "S. Andrea in Mantua," thesis, University of New York 1970.

<sup>29</sup> J. Poeschke, *Die Skulptur der Renaissance in Italien*, vol. I: *Donatello und seine Zeit*, Munich 1990: 133, pl. 181, with bibliography. Agostino never created another work with such a masterly use of perspective, and no other pictorial background in those decades came so close to the conception of triumphal architecture.

<sup>30</sup> W. Lotz 1956: 197ff; P. Tigler 1963.

<sup>31</sup> J. Poeschke 1990: 130ff., pl. 176, 177.

<sup>32</sup> P. Tigler 1963; *Antonio Averlino detto il Filarete, Trattato di architettura*, ed. A. M. Finoli, L. Grassi, Milan 1972.

<sup>33</sup> P. Tigler 1963: 146.

<sup>34</sup> P. Tigler 1963: 154ff.

<sup>35</sup> L. Fancelli, *Architetto epistolaro gonzaghesco*, ed. C. Vasic Vatovic, Florence 1979: 119ff.

<sup>36</sup> Filarete, *Trattato*: 227, 255, 695ff., pl. 42.

<sup>37</sup> Filarete, *Trattato*: 266, pl. 44.

<sup>38</sup> Filarete, *Trattato*: 247ff., 290ff., 33ff., pl. 41, 52, 65, 66.

<sup>39</sup> H. Günther 1988: 17ff.

<sup>40</sup> I would like to thank U. Nilgen, who is studying Filarete's doors, for mentioning this.

<sup>41</sup> H. Günther 1988: 29ff.; P. Fiore, M. Tafuri, eds., catalog of the exhibition (Siena 1993) "Francesco di Giorgio Martini, architetto," Milan 1993.

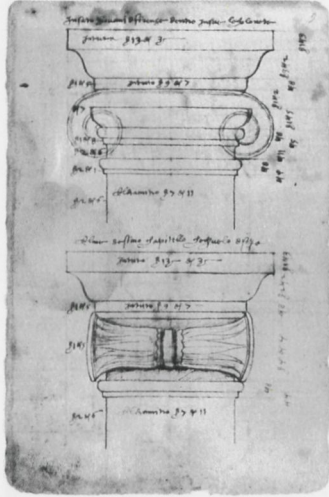
<sup>42</sup> H. Günther, loc. cit.; H. Burns, in ed. P. Fiore, M. Tafuri 1993: 330–357.

<sup>43</sup> P. Fiore, "Gli ordini nell'architettura di Francesco di Giorgio," in J. Guillaume, ed., *L'emploi des ordres dans l'architecture de la renaissance. Actes du colloque Tours 1966*, Paris 1992.

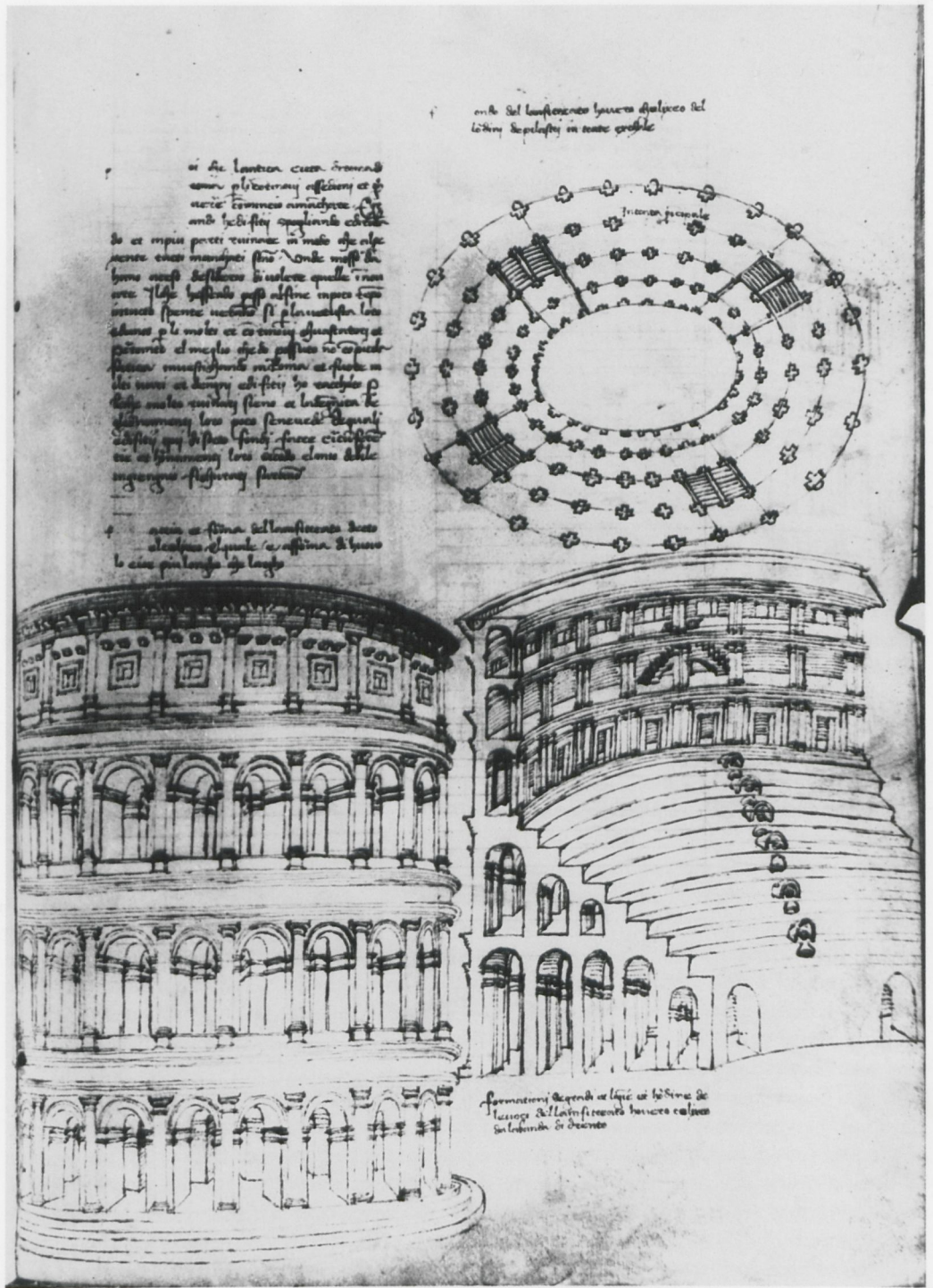
<sup>44</sup> H. Günther 1988, 33 fig. 22.

<sup>45</sup> op. cit.: 66–103, 331ff.

9. Francesco di Giorgio  
Plan, Perspective Section and  
View of the Colosseum, Rome  
Turin, Biblioteca Reale  
Codex Saluzziano 148, fol. 71r.



10. Il Cronaca  
Ionic Capital from Florence  
Baptistry  
Montreal, Canadian Center for  
Architecture  
Castellino Drawings, fol. 5r.



Pollaiuolo's workshop at the time and therefore he gained direct experience in the figurative arts as well. Later on, however, Il Cronaca worked exclusively as an architect and only used the orthogonal method of representation. Like Brunelleschi before him, his first drawings were schematic outlines, and his designs probably corresponded.<sup>46</sup> He measured bases, capitals and cornices with an accuracy worthy of Alberti, and reproduced, for example, capitals in plan, elevation and side view (fig. 10).<sup>47</sup> His most mature designs, in which he made use of pictorial media such as watercolor, precise concessions to perspective and the insertion of figurative ornament, compared well to the drawings of antiquity of Giuliano da Sangallo, with whom he had worked in 1493 on the sacristy of S. Spirito and had evidently also exchanged drawings of antiquity.<sup>48</sup> It is quite likely that he had also occasionally drawn perspective views. Giuliano da Sangallo (ca. 1445-1516) also started his professional life as a woodworker and sculptor. His figurative drawing was inspired first and foremost by Ghirlandaio (1449-94).<sup>49</sup> Figurative decoration of the kind he admired in the ancient triumphal arches in fact played an even greater role in his designs than in those of his contemporaries. Giuliano himself wrote that he had started his studies of antiquity in Rome in around 1465 when he might have met Alberti.<sup>50</sup> It seems however that he retouched his sketchbooks (kept in Siena and the Vatican) much later on so that the surviving images are at most partially corrected copies from these early studies.<sup>51</sup>

<sup>46</sup> op. cit.: ann. I, pl. 1-7.

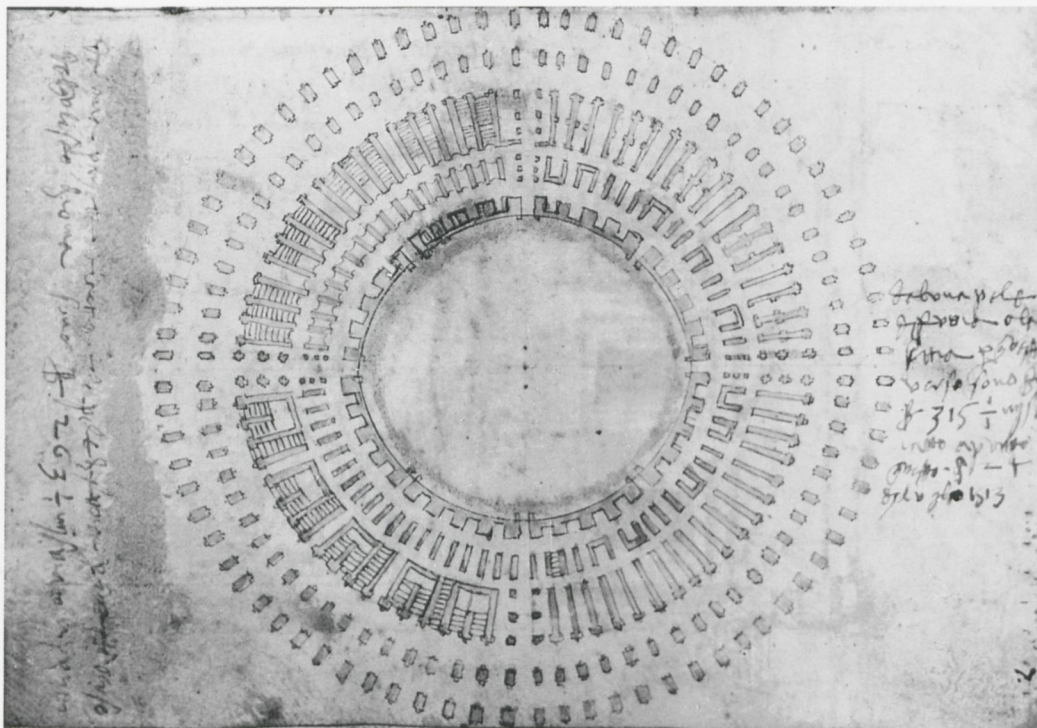
<sup>47</sup> op. cit.: ann. I, pl. 5a, 12a.

<sup>48</sup> op. cit.: pl. 8-11.

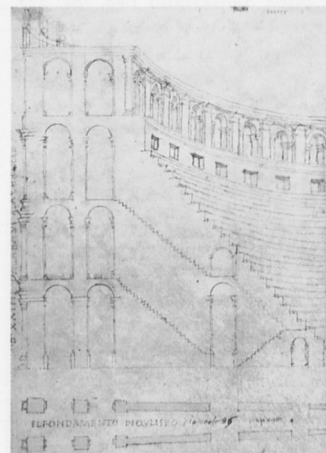
<sup>49</sup> S. Borsi, *Giuliano da Sangallo. I disegni di architettura e dell'antico*, Rome 1985; H. Günther 1988: 104-138.

<sup>50</sup> H. Günther 1988: 111.

<sup>51</sup> C. L. Frommel, in C. L. Frommel, N. Adams, eds., *The Architectural Drawings of Antonio da Sangallo the Younger and his Circle*, New York 1993: 7ff.



11. Giuliano da Sangallo  
Plan of the Colosseum, Rome  
Siena, Biblioteca Comunale  
Taccuino Senese IV 8, fol. 7r.



12. Giuliano da Sangallo  
Perspective Section of the  
Colosseum, Rome  
Siena, Biblioteca Comunale  
Taccuino Senese IV 8, fol. 5v.

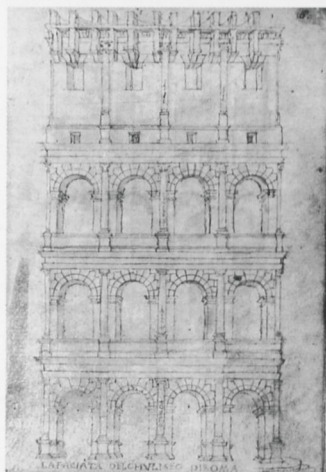
His first sketchbook, the *Taccuino Senese*, only contains drawings of the period before 1500 and its undatable projects and surveys perhaps correspond to his years in the service of Lorenzo il Magnifico (ca. 1483–92), and Cardinal Giuliano della Rovere (ca. 1494–97).<sup>52</sup> Sangallo was even more sparing with the pictorial devices of chiaroscuro and perspective in this sketchbook than in the one in the Vatican, where he approached the mature style of Il Cronaca.

Of the few buildings not belonging to antiquity included in his sketchbooks, such as his own more classicizing achievements, only the Cappella Piccolomini in Siena and the Torre degli Asinelli in Bologna were shown in perspective elevation; all the others were illustrated in plan only.<sup>53</sup> His favorite ancient monuments were those with rather flat facades, and only occasionally did he add a side view and a schematic plan. These reproductions may be more accurate from the archaeological point of view than the views of the ancient monuments painted by Botticelli or Perugino in the Cappella Sistina as from 1481, but they never achieve the same vividness and classicizing splendor.<sup>54</sup>

Only the Colosseum was given a full analysis in the *Taccuino Senese*. Giuliano drew it in plan, elevation, perspective section and perspective view.<sup>55</sup> While in the section, elevation and plan of the pier system he worked with much more precision than Francesco di Giorgio, on the plan he drew a nearly circular shape—a perhaps deliberate correction that is even more surprising considering that Alberti and Manetti had already discussed oval plans, and that both Filarete and Francesco di Giorgio had got much more closer to its real oval shape. As for the section, Giuliano offered such scant information that Alberti would never have given his approval. His studies of antiquity also suffered from his apparent lack of familiarity with Alberti's writings, and he must have doggedly worked out the vocabulary of the ancients, step by step.<sup>56</sup> Even in his last project, which can be attributed to the period after the death of Bramante, the Doric entablature seemed surprisingly out of date.<sup>57</sup>

The pages of the *Taccuino Senese* reveal little more of Giuliano's early design methods than that he had mastered the current techniques of orthogonal and perspective representation and that, all in all, he worked with less precision than he did later, in his old age. The projects he presented to his patrons must have been like the plan for S. Maria delle Carceri of about 1485 (fig. 14).<sup>58</sup> His sketches might have already been like those post-1503: quick and precise proposals for the solution of concrete architectural problems, such as Brunelleschi and Alberti must have done.<sup>59</sup>

A good understanding of the variety of perspective possibilities in such pre-1500 creative drawings can be obtained from the architectural drawings of Leonardo da Vinci (fig. 26).<sup>60</sup> During his years in Milan Leonardo studied only a few aspects of the Lombard tradition, and surprisingly little of Alberti's late works or his friend Bramante's early ones. He looked instead to Florentine prototypes—to the dome of the cathedral, the neighboring baptistery, and S. Maria degli Angeli—in a much more authoritative and creative way than Giuliano. As a typical Florentine, he cared more about the clear contours of the crystalline form than the expansion of the interior space, and preferred the organism expanding cell by cell, to the antique monumentality.



13. Giuliano da Sangallo  
Elevation of the Colosseum  
Rome  
Siena, Biblioteca Comunale  
Taccuino Senese IV 8, fol. 6r.

<sup>52</sup> R. Falb, *Il Taccuino di Giuliano da Sangallo*, Siena 1902; S. Borsi 1985: 250–314; H. Günther 1988: 112ff.; C. L. Frommel, in: C. L. Frommel, N. Adams 1993.

<sup>53</sup> R. Falb 1902: 38, 50, pl. 20, 44.

<sup>54</sup> H. Günther 1988: 37ff.

<sup>55</sup> C. L. Frommel, in C. L. Frommel, N. Adams 1993.

<sup>56</sup> H. Biermann, "Palast und Villa. Theorie und Praxis in Giuliano da Sangallo's Codex Barberini und im Taccuino Senese," in *Les Traités d'Architecture de la Renaissance. Actes du colloque Tours 1981*: 138; H. Günther, "Die Anfänge der modernen Dorica," in J. Guillaume, ed., *L'emploi des ordres dans l'architecture de la Renaissance: Actes du colloque Tours 1966*, Paris 1992: 103ff.

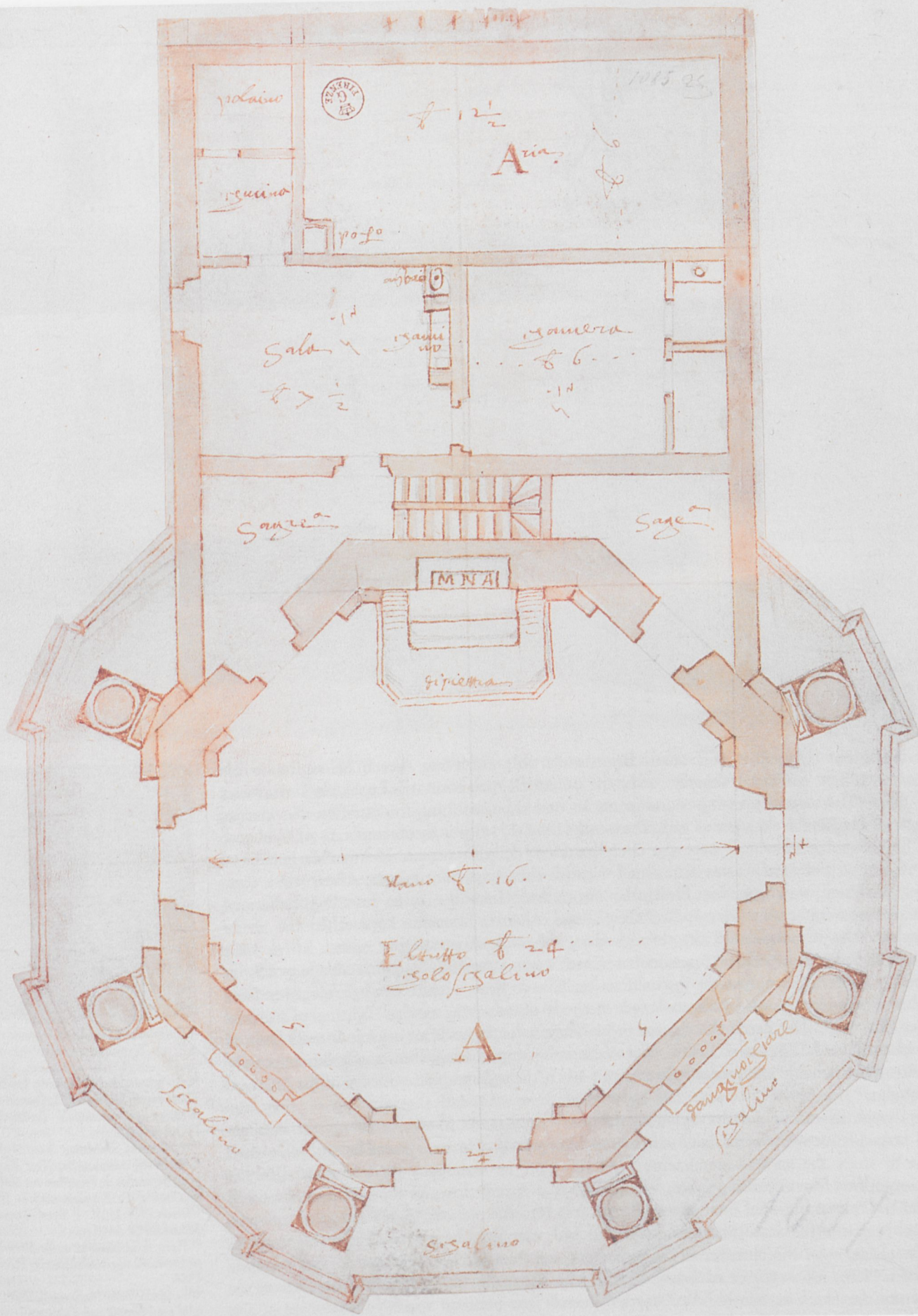
<sup>57</sup> S. Borsi 1985: 481–489.

<sup>58</sup> S. Borsi 1985: 417ff.

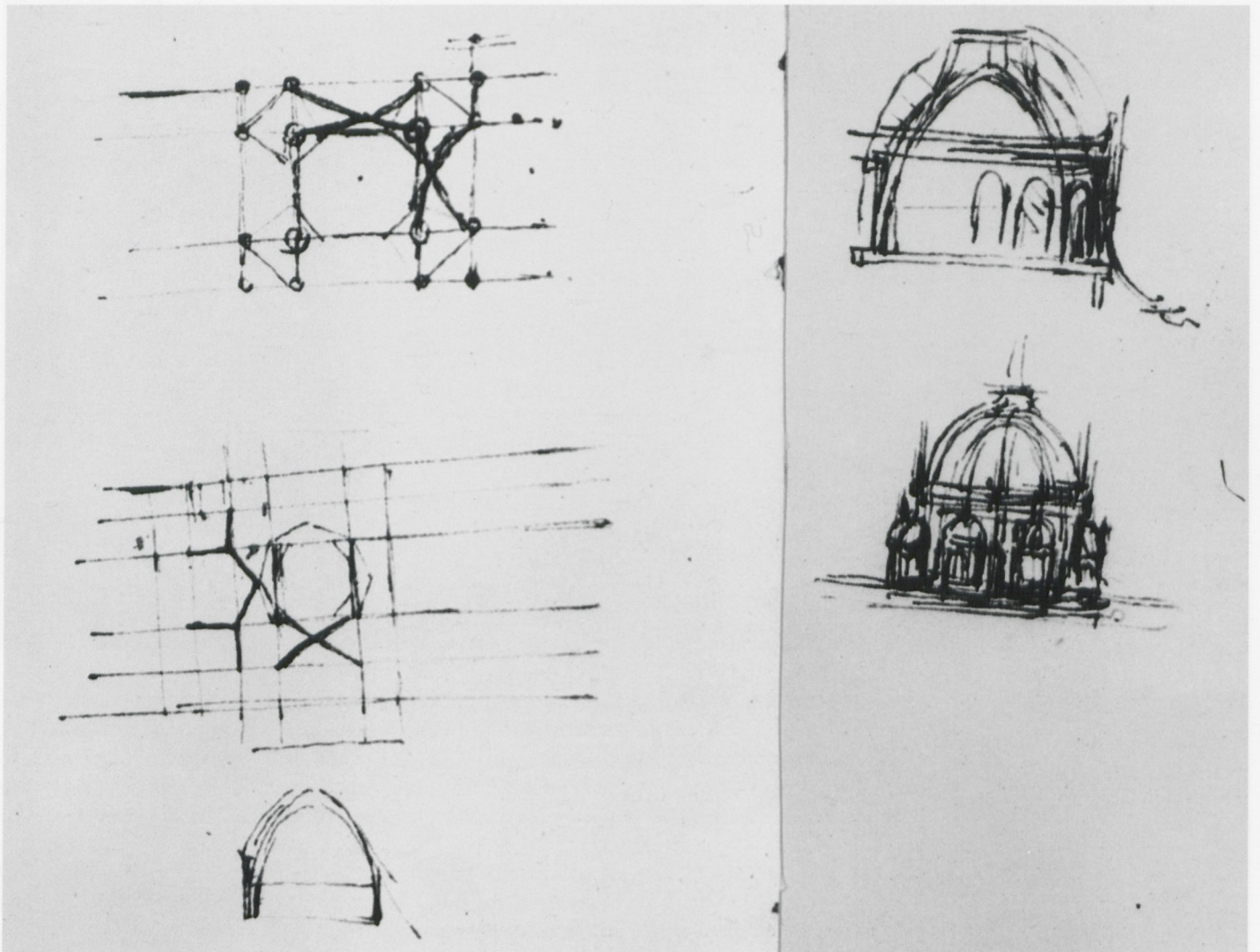
<sup>59</sup> S. Borsi 1985: 453ff.

<sup>60</sup> R. Schofield 1991: 131ff.





14. Anonymous  
 Plan of S. Maria delle  
 Carceri  
 Florence, Uffizi, Gabinetto  
 Disegni e Stampe  
 Uff. 1607Ar.



The impatient dynamism of Donato Bramante's only surviving sketch belonging to his years in Milan contrasts sharply with the scientific precision of Leonardo's drawings (fig. 16).<sup>61</sup> His way of pressing round in circles and circumscribing the question was characteristic of his Roman sketches as well. Bramante (1444–1514) was a contemporary of Giuliano, and his formative influences were the circles of Piero della Francesca, Melozzo da Forlì, and Mantegna; he therefore became acquainted with his most important master, Alberti, in a completely different way from his Florentine associates.<sup>62</sup> Like the three founding fathers of Renaissance architecture, Giotto, Brunelleschi and Alberti, Bramante approached the art of construction in a roundabout way through the perspective illustration of space. In ca. 1481 Piero della Francesca (perhaps Bramante's teacher) wrote a treatise, *De prospectiva pingendi*, inspired by Alberti, giving precise instructions on how to draw architectural perspectives from various viewpoints; he also indicated new methods of achieving natural lighting in pictorial spaces (fig. 17).<sup>63</sup> He placed the figures in his *Flagellation* in such an organic arrangement of the space as only Giovanni Bellini, the Venetian painter, knew how—offering important premises for Bramante's Prevedari engraving of 1481, the only graphic evidence of his Milanese beginnings.<sup>64</sup>

Even though Bramante was already about thirty-seven years old, the *aurea latinitas* of architectural language seemed not to have stimulated him greatly. He had probably not yet visited Rome to study the ancient monuments.<sup>65</sup> At this time he was much more interested in the representation of an expansive space, which is why he appealed to the viewer's imagination to extend the ruined fragment in all directions, to step into the picture, to join the groups of people and peep into the darkest corner of the quincunx. He might have learnt about this imaginative involvement of the observer in the pictorial space from his friend Leonardo, but certainly not from Piero, Mantegna or Melozzo. This is why Bramante was destined to translate to architecture the fruits of two hundred years' research into pictorial space.

Like Brunelleschi and Alberti, Bramante must have made a clear distinction during the almost twenty years he spent in Milan, between "pictorial" representation (as employed in the Prevedari engraving and his frescoes) and architectural projects based on the orthogonal triad of plan, elevation and section. This has in fact been corroborated by his sketch for the gallery in S. Maria presso S. Satiro,<sup>66</sup> and by the surprising correspondence between the inside and



<sup>61</sup> R. Schofield, "A Drawing for Santa Maria presso San Satiro," in *Journal of the Warburg and Courtauld Institutes* 39 (1976): 246–253.

<sup>62</sup> A. Bruschi, *Bramante*, Bari 1969; F. Graf Wolff Metternich, "Der Kupferstich Bernardos de Prevedari aus Mailand von 1481," in *Bramante und St. Peter*, Munich 1975: 111ff.; F. Borsi, *Bramante*, Milano 1989: 143ff.

<sup>63</sup> Piero della Francesca, *De prospectiva pingendi*, ed. G. Nicco Fasola, Florence 1984.

<sup>64</sup> F. Graf Wolff Metternich 1975: 98–178; see Ferino Pagden above.

<sup>65</sup> A. Bruschi, "Bramante," in *Dizionario Biografico degli Italiani*, vol. 13, Rome 1971: 712–725; F. Graf Wolff Metternich, "Bramante, Skizze eines Lebensbildes," in Wolff Metternich 1975: 179–221.

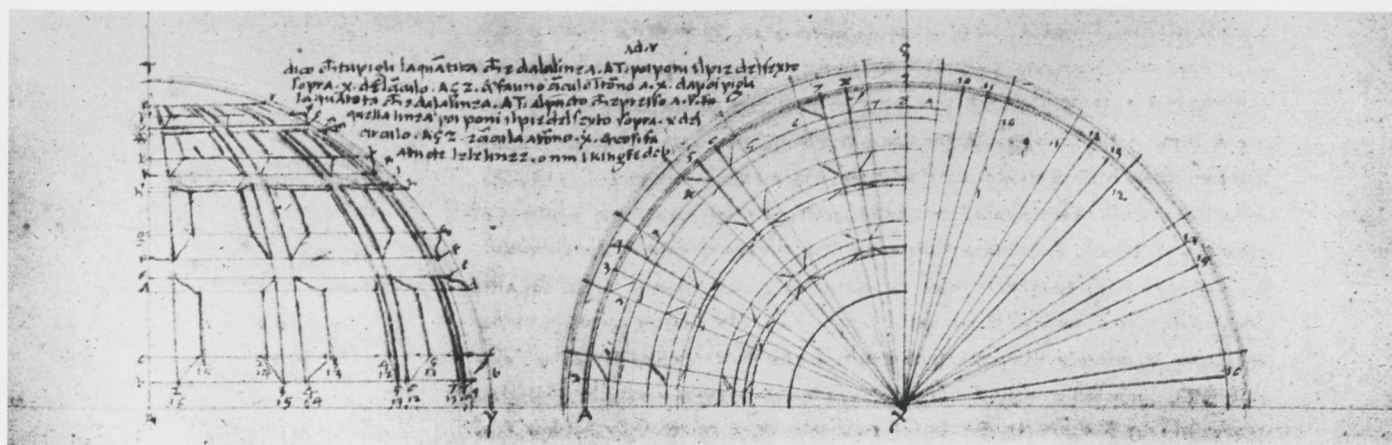
<sup>66</sup> see note 60.

opposite  
 15. Leonardo da Vinci  
 Sketches for Plan, Section and  
 Exterior of Drum  
 Milan Cathedral  
 (Milan, Codex Trivulziano  
 8v., 9r.)

16. Donato Bramante  
 Sketch for the Interior Gallery  
 of S. Maria presso S. Satiro  
 Milan  
 Milan, Archivio dell'Ente  
 Comunale di Assistenza  
 di Milano  
 chiese e altari

the outside of this church—a correspondence that is not found in any earlier building in the Italian Renaissance, and which was obviously influenced by the Gothic manner.<sup>67</sup> Even before his appointment as consultant to the Milan Cathedral site, and before becoming one of the architects of Pavia Cathedral, Bramante had had firsthand experience of the structural principles of Gothic construction. Moreover, since he always considered each building as an organic whole—more so than his contemporaries—he must have been particularly fascinated by the transparency of the load-bearing structure. While the domes of late antiquity, such as that of S. Lorenzo in Milan, which had inspired Bramante's conceptions of space,<sup>68</sup> revealed their splendor principally in the interior, the Gothic style drew closer links between interior and exterior, making the internal structure legible from the outside, and vice versa (figs. 2, 3). It took an architect of Bramante's ingeniousness to merge in a single style the extraordinary light-flooded spaciousness of the centrally planned buildings of late antiquity with the soaring skeletal transparency of Milan Cathedral and the imperial monumentality of Alberti's last works.

The only drawing that can give an idea of Bramante's methods of design when he was in Milan is the great facade project conserved in the Louvre, even though it appears to have been drafted by his pupil Cristoforo Solari toward 1505 (cat. no. 58). In an entirely Gothic interpretation, the giant order reflects the load-bearing structure of the three aisles, the arches mirror the



17. Piero della Francesca  
 Perspective View of a Dome  
 from De prospectiva pingendi  
 Parma, Biblioteca Palatina  
 no. 1576, fol. 77v.

vaults and the colonnades probably support extensive galleries. The traces of perspective in the round window and great cornice detract nothing from the orthogonal accuracy of this project—probably the earliest surviving detailed project of an elevation in the Renaissance. Likewise, the deep shading of the wall openings reveals his efforts to make it easier for his patron to understand the plain orthogonal drawing he presented.

Only a few drawings of his Roman years—from 1499 to 1514—have been left to posterity.<sup>69</sup> According to Vasari, once in Rome Bramante spent his time studying the ancient monuments which, like his friend Leonardo, he had so far ignored.<sup>70</sup> The speed with which he assimilated not only the ancient orders and the formal language of the past, but also the systems and types as well as the teachings of Vitruvius and Alberti, can be seen in his earliest projects for the Tempietto, the Palazzo Caprini, and the Belvedere Court.<sup>70a</sup> Just the calculation of the concentric Doric friezes of the Tempietto—four on the same round construction and perhaps another three in the surrounding circular courtyard—presuppose extraordinarily detailed calculations and precise methods of representation; it was, in short, the most elaborate method so far required in a Renaissance building.<sup>71</sup> In the division of the perimeter of the various circles into metopes and triglyphs Bramante must have made mathematical calculations in the same way that his pupil Antonio da Sangallo did for the entablature of the Palazzo Farnese,<sup>72</sup> probably calling in mathematicians to help. In any case, he must have studied the final project very carefully by means of the model.

The only surviving drawing of antiquity probably executed by Bramante himself, however, dates to as late as 1505 (cat. no. 281). At the time Bramante had just begun to take in hand the designing of St. Peter's, and was therefore forced to deepen his knowledge not only of the various kinds of antique buildings and the classical vocabulary but also of the early methods of construction. Using a scale of measurement of Roman *palmi* he sketched the Baths of Diocletian in sanguine—evidently on-site—and then added particular significant details in ink, marking their approximate measurements. Perhaps, as the first master post-antiquity, he understood the complex alternation of space and wall masses and did not hesitate to use the same means of expression shortly afterward in his great parchment plan for St. Peter's (cat. no. 282). The closed body of the building, with the arms of the cross projecting beyond it, together with the octagonal corner spaces and their dimensions, were themselves inspired by the Baths of Diocle-

<sup>67</sup> C. L. Frommel, "Il complesso di S. Maria presso S. Satiro e l'ordine architettonico del Bramante lombardo", in: "La scultura decorativa del Primo Rinascimento," *Atti del I convegno internazionale di studi di Pavia* 1980, Pavia 1983: 153ff.

<sup>68</sup> C. Thoenes, "S. Lorenzo a Milano, S. Pietro a Roma: ipotesi sul 'piano di pergamena'," in *Arte Lombarda* 86/87 (1988): 94-100.

<sup>69</sup> C. L. Frommel, in C. L. Frommel, N. Adams 1993: 8ff.

<sup>70</sup> G. Vasari, *Le vite...*, ed. G. Milanesi, vol. IV, Florence 1879: 154.

<sup>70a</sup> C. L. Frommel, "Living all'antica," in this catalog: 182-203.

<sup>71</sup> H. Günther, "Bramantes Hofprojekt um den Tempietto und seine Darstellung in Serlios drittem Buch," in *Studi Bramanteschi*, *Atti del congresso internazionale* 1970, Rome 1974: 483-501.

<sup>72</sup> C. L. Frommel, "Sangallo et Michel-Ange (1513-1550)," in A. Chastel, ed., *Le Palais Farnèse*, Rome 1981, vol. I, 1: 135, fig. 21.

tian. But Bramante was following fundamentally other formal principles when he made the building irradiate outward from the dome dominating the Greek cross. This is why he had already sketched on the verso of the sheet (Uff. 104A) a drawing preliminary to the parchment plan, showing the basilica surrounded with a huge concentric peristyle—close in form to the ancient bath complex—spreading out into exedrae and concluded with corner towers.

The surviving projects for St. Peter's covering the period 1505–09 (see construction history elsewhere in this catalog<sup>73</sup>) allow us for the first time to examine in detail the evolution of a given architectural project during the Renaissance. The first stage consisted undoubtedly of a freehand sketch; one such example is the sketch on Uff. 8A verso (cat. no. 280), which in this case gave the pope a preliminary idea of the architect's proposal. After agreeing on a quincunx system, on the site of Peter's tomb and the high altar, and on the reutilization of Nicholas V's choir, Bramante ordered his assistant to draw the first scale drawing, or "disegno proporzionato," to use Filarete's term. As he later did for his project for the Palazzo dei Tribunali, in the case of St. Peter's Antonio da Sangallo drew up a set of local conditioning factors, simplified building forms, accompanied by approximate dimensions. These measurements were deduced—following the method described by Filarete—from a simple square grid based on half the width of the central aisle of Nicholas V's choir, i.e., 20 *braccia*.<sup>73a</sup> The central quincuncial system took absolute priority in the elaboration, and at first there was no precise definition of the limits of the external construction or of the arrangement of the longitudinal body. Numerous intermediate projects that have been lost must have prepared the way for the next surviving project, which, since it was drawn using an unusually large scale on precious parchment and carefully watercolored, was executed to present the project to the pope (cat. no. 282).

If Bramante only drew half the (presumably) centrally planned building, he was simply applying the same method he had used on Uff. 3A recto and for the numerous other projects of that period (cat. nos. 280, 283, 288, 296), because the continuation of its form was so evident there was no need to go on. Even though a scale in Roman *palmi* may once have been inserted in the lower margin of the parchment (which is slightly torn all round), the approximate extension of the project is already discernible from the constant size of the dome arch. As in the plan of Uff. 3A recto the half width of the nave served now as a module for a grid of 60 × 60 *palmi*. Moreover, Bramante chose a scale of exactly 1:150 so that two and a half modules equaled one *palmo*. As with the two projects that followed closely (cat. nos. 283, 288), he was able to construct a measurement grid with squares 2-*minuti* wide (ca. 7.4 mm) based on the 60-*minuti* subdivision of the *palmo*; each 2-*minuti* represented five *palmi* in the project. Proceeding in this way, Bramante had likely already prepared a similar study in sanguine (before the parchment project), from which he could determine the individual measurements without difficulty. The auxiliary lines necessary for the more or less mechanical transcription could have been marked in sanguine and then erased. A final project ready for presentation to the pope, however, such as the one on Uff. 1A, presupposed detailed studies concerning the elevation, and in fact sketches of plans were combined with elevations on three of his later preparatory studies (cat. nos. 280, 283, 288).

The parchment plan can be distinguished from a real executive project by its "ideal" character. Bramante in fact studied its detailed elaboration only after he had convinced the pope of the project. He then reinforced the piers and the pier arches and verified every detail according to static, functional and esthetic criteria (cat. no. 283) before having the famous foundation medal coined (cat. no. 284).<sup>73b</sup> When, in spite of everything, the pope rejected his project, Bramante was forced to start all over again. Second thoughts about the pre-existing building, an even more radical reinforcement of the load-bearing structures and the elimination of the superfluous secondary spaces led him, step by step, toward the final project of April 1506. The surviving intermediate project drawings illustrate how, in this second phase, he still started his designs from sketches (cat. nos. 283, 287, 288), and how he elaborated their tiniest details by means of projects using grids for the measurement, while explaining the individual parts with the help of repeated sketches of elevations. No other project of Renaissance architecture has provided such an ample example of the gradual genesis of a complex organism such as the plan drawn in sanguine on Uff. 20A. Here Bramante kept the plan of the old basilica in front of him, and with it the identity of the venerable original building on which the pope was placing an ever-increasing emphasis. Bramante's superb skill as a draftsman allowed him to draw numerous phases, one upon the other, on a single sheet, with such methodical frugality as to make their distinction clearly possible today. At first he used a compass and straightedge and then drew freehand more and more often, using the grid as a guide and at times uniting here and there two of his 5-*palmi* squares with a mark.

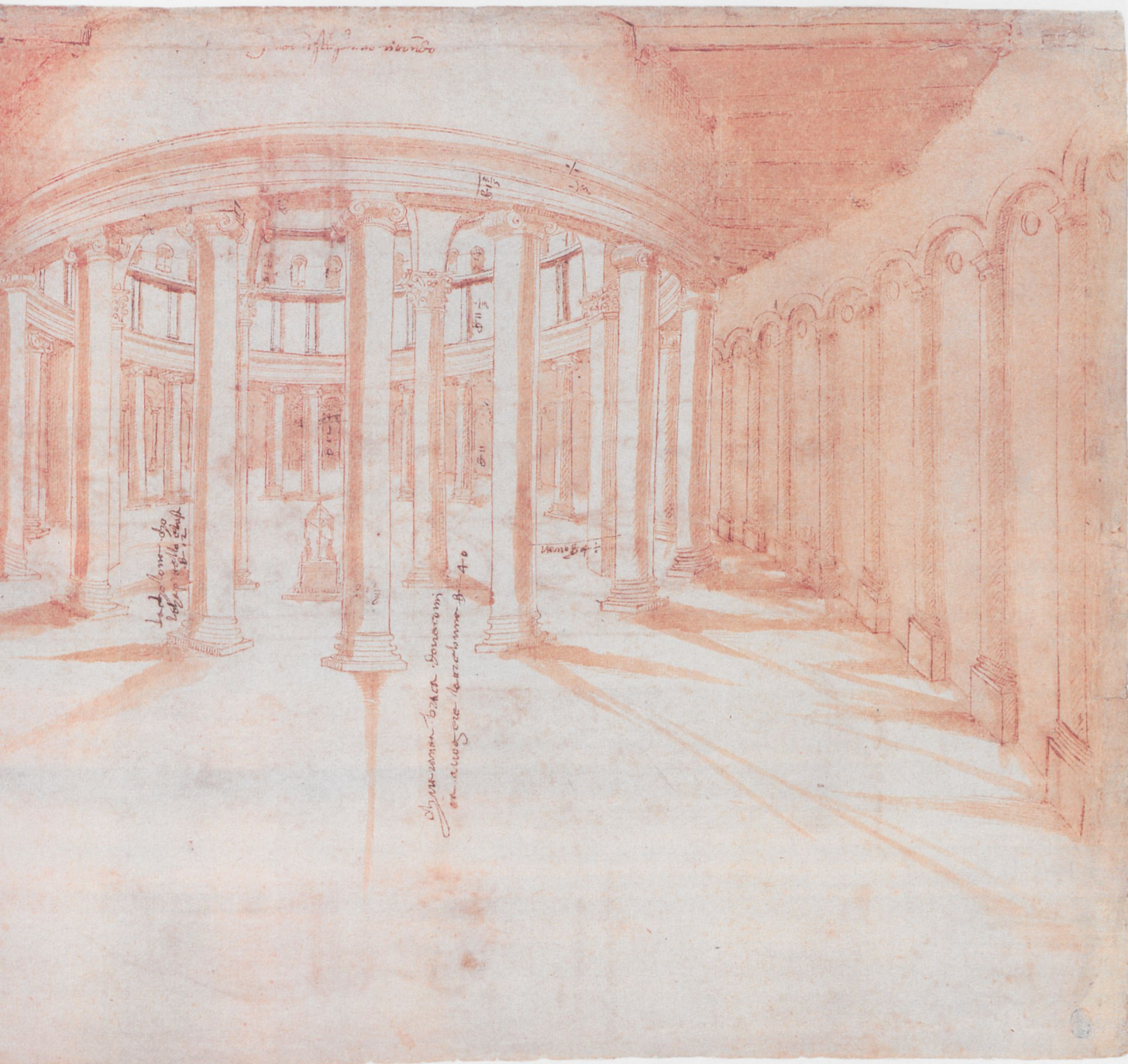
In a similar plan he must have then drafted the final executive project, and only afterward was he ready to prepare the exact elevations and the wooden model in the spring of 1506 (cat. nos. 293, 292). The model was however already outmoded the time work began on it. However,



<sup>73</sup> C. L. Frommel, "St. Peter's," in this catalog, pp. 398–423.

<sup>73a</sup> op. cit., fig. 2.

<sup>73b</sup> op. cit.



18 - Baldassarre Peruzzi  
Interior of S. Stefano  
Rotondo, Rome  
Florence, Uffizi  
Gabinetto Disegni e Stampe  
Sant. 161r.

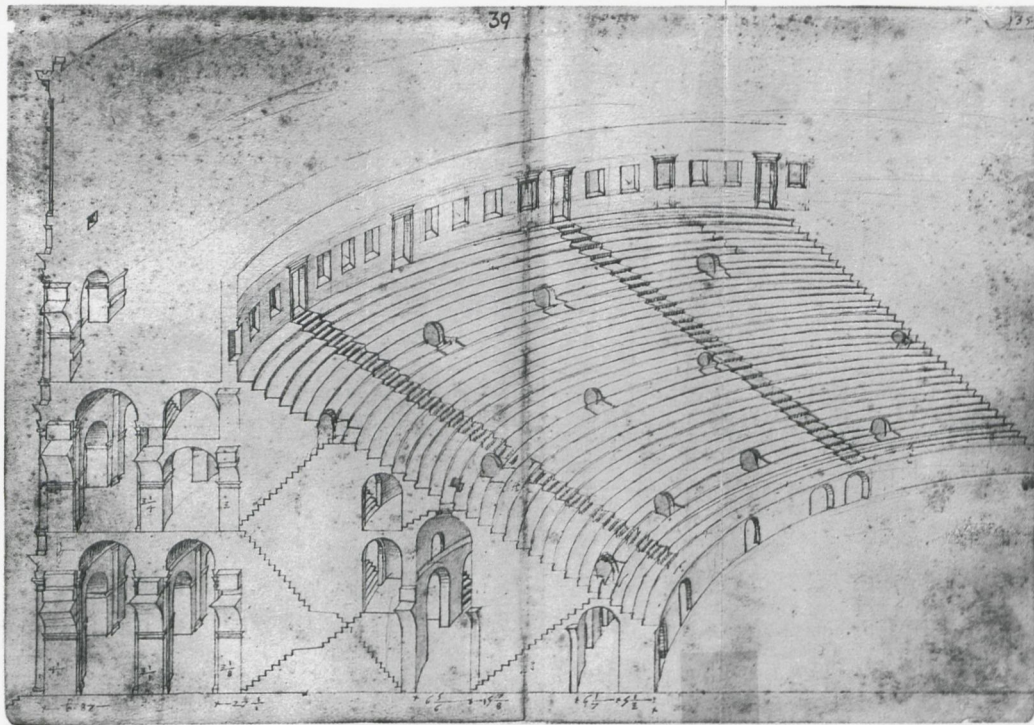
it was only after having finally settled the fundamental dimensions that the long and complicated process of elaborating the mostly orthogonal projects for the constructive details—from the capitals to the pendentives and centering—could go ahead (cat. nos. 295, 296, 297). This continual series of projects demonstrates how Bramante in the lengthy process from the simple ideal schema to the project for presentation to the patron and to the final executive project departed continually from the simple forms, from the precise module and the grid, and how the measurements were already complicated on the plan drawn in sanguine; and, lastly, how he reintroduced the original 60-palmi module only in the arcades.<sup>73c</sup> In his opinion the grid and model were first and foremost professional aids and not an end in themselves, and therefore all attempts to discover ideal proportions in the executive project similar to those of the early projects are destined to fail.

Neither the architect nor the patron denied the possibility of introducing alterations, even during the building process itself. Since the details were elaborated only when the building process reached a stage that made them necessary, the modifications of the forms also reflected the architect's own maturity—the most obvious example is perhaps the Cappella Medici of 1519 onward, in which Michelangelo even sacrificed the harmony of the form to the novelty of the detail.<sup>74</sup> This is why Bramante left the exact shape of the dome undecided right to the end, perhaps after reflecting on static problems as well.

After the death of Julius II, when the pier arches and the vault of the choir were already built, Leo X—like many of his successors—gave orders that the architects were to elaborate a new and larger project immediately. The basilica was to become bigger, more magnificent and more

<sup>73c</sup> C. L. Frommel, "St. Peter's," in this catalog, fig. 23.

<sup>74</sup> C. L. Frommel, "S. Eligio und die Kuppel der Cappella Medici," in *Akten des 21. Internationalen Kongresses für Kunstgeschichte Bonn 1964*, Berlin 1967, vol. 2: 53ff.



19. Bernardo della Volpaia  
 Perspective Section of the  
 Colosseum, Rome  
 London, Sir John Soane's  
 Museum  
 Codex Coner, fol. 39A

antique looking (cat. nos. 306, 307). This period of the design, which kept Bramante engaged for the rest of his life, was the time when he elaborated his monumental project for the dome that Serlio perhaps copied from the original (cat. no. 303). This project deserves particular attention for the way it was represented. It is the very first surviving project in which the plan is correlated directly with its complementary elevation and section, and in the same scale. This close linking of the orthogonal triad was probably established by Bramante himself, who had been particularly impressed by the structural transparency of the Gothic style, and who had already placed plan and section in a complementary relationship in his projects for the pendentives (cat. no. 296). When he drew the lantern in plan, he illustrated—as in the project for the Tempietto saved for posterity by Serlio—the radial relations between the parts bearing and discharging the load of the dome and lantern. This axial system, which also stems from Gothic architecture, is one of the fundamental differences from the Pantheon, the most important prototype for the dome of St. Peter's. Therefore, once again there is an intimate relationship between the project and its method of representation.

If Bramante's structural research led to the perfection of the orthogonal procedure of architectural design, the eminently visual quality of his buildings and the fundamental role played by light required right from the start projects drawn in one-point perspective with strong chiaroscuro, a technique of representation such as the one used in the Prevedari engraving (cat. no. 121). Bramante used this kind of central perspective not just for his project of the choir in his first Milanese building, the church of S. Maria presso S. Satiro, but also for his Roman buildings such as the Belvedere Court.<sup>75</sup> He conceived both of these buildings as a spatial and visual unit and overcame the conditioning factors of the site with pictorial devices. While in the Milanese church he added to the regular longitudinal body the scenographic make-believe of a choir arm denied to the clergy, in the Cortile della Pigna he carried out the shortening of the pilasters so imperceptibly that it was noticed only recently, thus weaving pictorial space and architecture in an as yet quite unknown form.

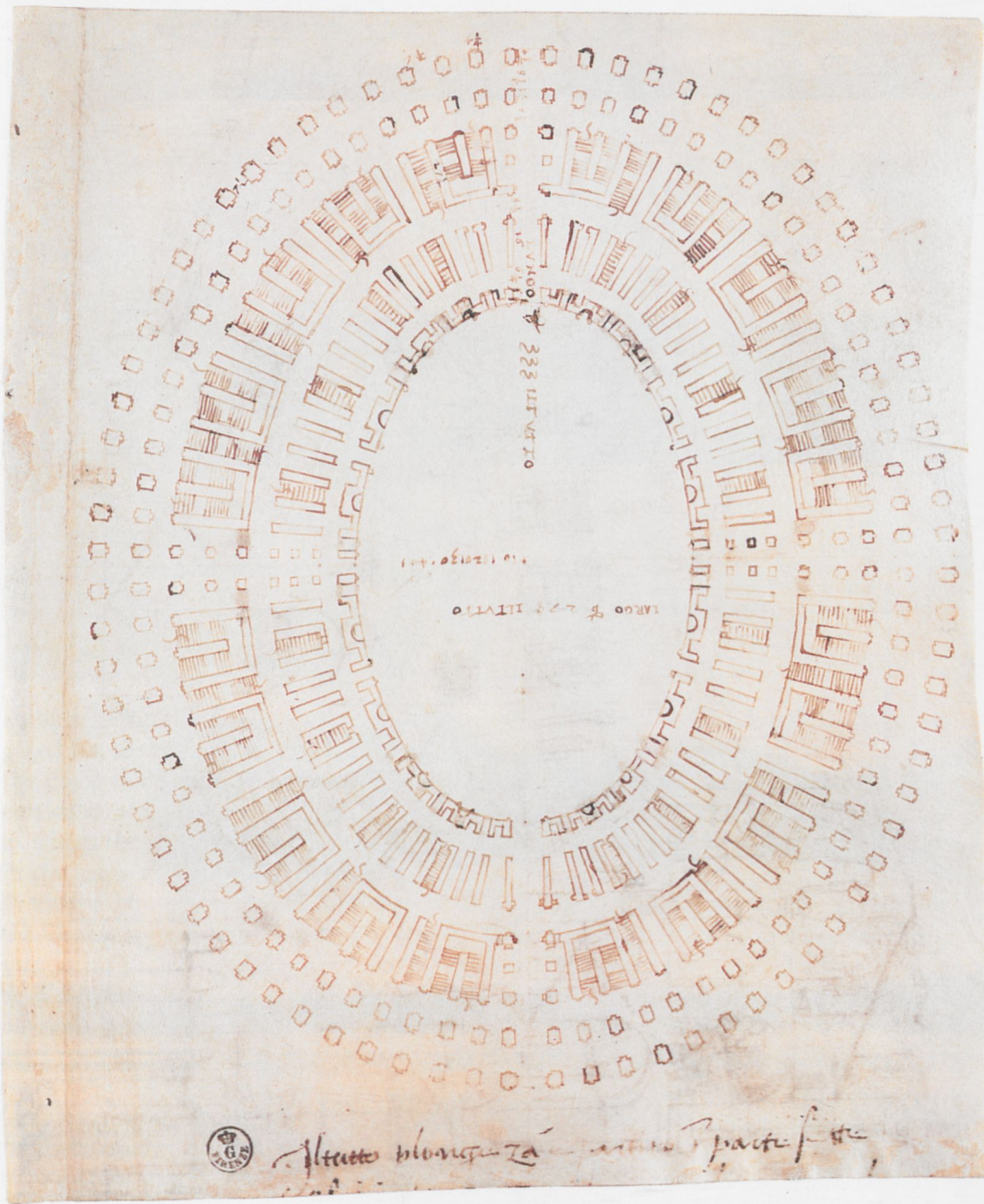
The spatial effect from an ideal position—in the case of the Belvedere Court from the pope's rooms in the Borgia apartment—was examined by Bramante however in other projects where he was not forced to introduce perspective devices such as the great plan drawn in sanguine for St. Peter's (cat. no. 288). In his sketches on the verso he drew the vault of the crossing and a coved vault from a low viewpoint and the drum and exterior construction from a high viewpoint. Similar changes in position can be noticed in his images for medals. He showed the exterior of St. Peter's rising up in a hierarchical manner, in a front view from a low viewpoint while the Belvedere Court, which was difficult to represent from the front, was illustrated in bird's-eye view from the side. In both cases Bramante deviated from the strict rules of central perspective for love of effect.

Like in the Prevedari engraving these perspective projects acquired their greatest illusionistic potential by a play of light. Bramante succeeded in illustrating the alternation of light areas and dark corners so typical of his Roman architectures, such as the last project he elaborated for St. Peter's or the two colonnades of the Tempietto, only by using chiaroscuro. The young Peruzzi could have been inspired by the project for the Tempietto or by the concentric court-

20. Raphael  
 Project for a Stage Design  
 Florence, Uffizi  
 Gabinetto Disegni e Stampe  
 Uff. 560Ar. and Uff. 242Ar.

<sup>75</sup> A. Bruschi 1969: 295ff.





21. Antonio da Sangallo the Younger  
Plan of the Colosseum, Rome  
Florence, Uffizi  
Gabinetto Disegni e Stampe  
Uff. 1555Ar.

yard when he designed the interior of S. Stefano Rotondo in about 1503-04 (fig. 18).<sup>76</sup> Whatever the case, this representation, with its unusually wide viewpoint and artistic distribution of light and darkness, is much more like the Prevedari engraving (cat. no. 121) or Bramante's sketches on the plan drawn in sanguine than either Giuliano da Sangallo's drawings or even those of Francesco di Giorgio. It would be difficult to imagine the perspective views of the so-called Pseudo-Sansovino master<sup>77</sup> (cat. nos. 293, 292) without Bramante's illusionistic projects or especially those conserved in the *Codex Coner* since their author, Bernardo della Volpaia, next to monuments of antiquity drew almost exclusively buildings by Bramante (fig. 19).<sup>78</sup>

The real heir, however, to the masterly methods of architectural design and representation was Raphael, whom the pope had summoned to Rome in 1508,<sup>79</sup> probably on Bramante's own suggestion. As early as 1509 Raphael adopted Bramante's new style and his illusionistic method of representation for the architecture in the background of the *School of Athens*. With an awareness of how he himself had developed, Bramante must have seen Raphael, in his steady progress from the pictorial spaces of the Stanze to his first building for Agostino Chigi, as his rightful heir. This is why he advised the pope to nominate Raphael as his successor instead of Antonio da Sangallo, his more technically expert assistant. The sketches in sanguine for the Chigi stables or the disorderly outlines of the square plan projects for the Chigi funerary chapel place Raphael much nearer his teacher's methods of architectural design than Sangallo. In 1514 Raphael also verified the spatial effects of his first projects for St. Peter's with the help of perspective drawings (cat. no. 309), in the same way as Bramante had done on the back of his plan in sanguine. Toward 1515 he borrowed not only the idea of groups of pilasters from the Belvedere Court but the same perspective devices for the Palazzo Jacopo da Brescia.<sup>80</sup> The shape of the dome and the whole method of representation of his second project for St. Peter's copied Bramante's project for the dome of five year's earlier (cat. no. 311). Lastly, Bramante's

<sup>76</sup> C. L. Frommel, "Peruzzis römische Anfänge von der 'Pseudo-Cronaca-Gruppe' zu Bramante," in *Römisches Jahrbuch der Bibliotheca Hertziana* 27/28 (1991-92): 173 fig. 36.

<sup>77</sup> C. L. Frommel, in C. L. Frommel, N. Adams 1993: 32.

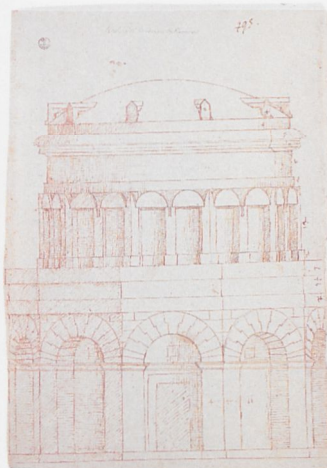
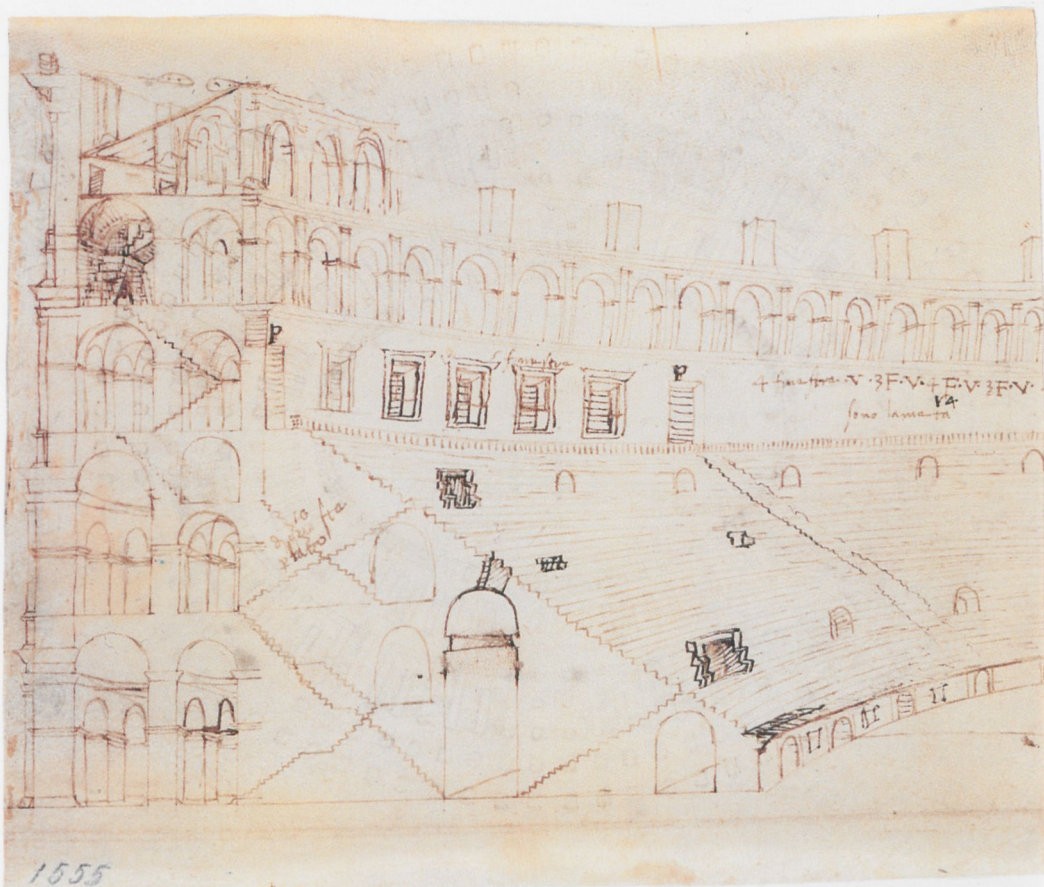
<sup>78</sup> op. cit.: 27.

<sup>79</sup> op. cit.: 29ff.

<sup>80</sup> C. L. Frommel, in C. L. Frommel, S. Ray, M. Tafuri, *Raffaello architetto*, Milan 1984: 157-162.



22. Antonio da Sangallo the Younger  
 Perspective Section of the  
 Colosseum, Rome  
 Florence, Uffizi  
 Gabinetto Disegni e Stampe  
 Uff. 1555Av.



23. Antonio da Sangallo the Younger  
 Survey of the Mausoleum  
 of Theodoric, Ravenna  
 Florence, Uffizi  
 Gabinetto Disegni e Stampe  
 Uff. 1563Ar.

artistically illuminated perspectives came to life in a project for theatrical scenery created by Raphael in his last years (fig. 20).<sup>81</sup>

It would however be too simple to consider Raphael as the heir of Bramante alone. Raphael had never worked in Milan, an experience which Bramante adhered to almost programmatically in one of his first sketches for St. Peter's (cat. no. 287). Skeletal structures such as Milan Cathedral and post-Constantinian interiors such as S. Lorenzo had less influence on Raphael than the Pantheon or the imperial baths, which he had learnt to comprehend under the watchful eye of Bramante.

Raphael's response to these monuments was the sweeping project for a complete reconstruction of ancient Rome, which he described precisely to his patron (presumed to be Leo X) in the *Memorandum*, a dedicatory letter of 1519–20. The procedures for the survey and representation proposed followed the methods introduced by Bramante, whether they were the orthogonal triad, the use of the compass or perspective views. The understanding of the monuments and the relative sources, the tendency toward a rigid scientific methodology increased at an even more surprising rate in the years immediately after the death of Bramante. Even though there are no proven links between the many known surveys of ancient monuments and Raphael's project to reconstruct imperial Rome, the drawings of his most advanced contemporaries from 1518 onward evince a concerted effort to achieve scientific accuracy and objectivity.<sup>82</sup>

Antonio da Sangallo (1485–1546) was Raphael's closest ally in this effort to arrive at a more extensive and deeper knowledge of antiquity.<sup>83</sup> Antonio was educated in the spirit of his uncle Giuliano. As early as 1504–05 he had made a much more accurate and analytic survey of the Colosseum, proving himself to be an authentic architect more interested in the three-dimensional structures than in the facades (figs. 21, 22). In about 1506–07 Giuliano moved into Bramante's circle and drew an orthogonal elevation of the Mausoleum of Theodoric, probably on the basis of a survey made by Bramante himself during the military campaign at Bologna in about 1506 (fig. 23). The pictorial shading in this elevation recalls Bramante's later project of the dome. As soon as Giuliano returned to Florence in the spring of 1509, Bramante summoned Antonio to work as his chief assistant, and when gout made drawing increasingly difficult, Antonio appears to have drafted Bramante's last projects following the master's instructions.

Even though Sangallo was proficient in the use of perspective and employed it in his sketches and occasional theatrical scenery, he concentrated much more than his contemporaries on a strictly orthogonal method of representation, both in his projects and in his drawings of antiquity. Since he proceeded from well-defined volumes rather than from the expansion of space, the greater part of his projects are based not on the neutral square grid but on incised axial coord-

<sup>81</sup> C. L. Frommel, in C. L. Frommel, S. Ray, M. Tafuri 1984: 225–228.

<sup>82</sup> C. L. Frommel, in C. L. Frommel, N. Adams 1993: 30–34.

<sup>83</sup> op. cit.: 10ff.



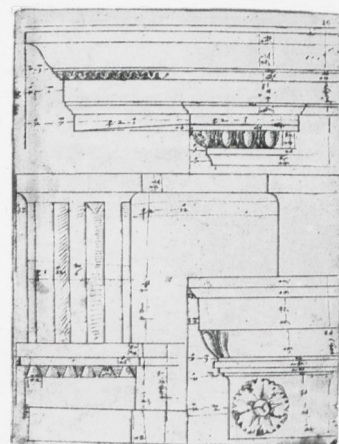
25. Baldassarre Peruzzi  
Project for the Completion  
of S. Petronio, Bologna  
Bologna, Museo di S. Petronio

dinates in the same way that Antonio da Pellegrino, his fellow townsman, had used them, and which were common practice from the time of the Reims superimpositions. This strictly orthogonal method corresponded to a continuity of all the horizontal and vertical components—as in his early works such as the Palazzo Farnese (1513 and later)—in such a consistent manner not even to be found in Bramante. In his second and completely independent survey of the Mausoleum of Theodoric in 1526, and in his later projects for St. Peter's (cat. nos. 347–372), he achieved a methodical accuracy that Bramante had never been capable of, and would never be bettered in the centuries to come.

Baldassarre Peruzzi (1481–1536) was quite the reverse. He worked alongside Antonio for many years on the St. Peter's building site, but he never denied his artistic origins.<sup>84</sup> His fanciful interpretations of ancient monuments and bird's-eye view presentations of his first designs were the fruit of Francesco di Giorgio's influence over him.<sup>85</sup> Only after considerable time did he arrive at a capacity to observe objectively more like Giuliano da Sangallo or Il Cronaca, and in the surprising view of the interior of S. Stefano Rotondo he could have imitated the superbly illuminated wide-angle perspectives of Bramante's Roman years (fig. 18). As from about 1506, more or less at the same time as Sangallo, he started adopting Bramante's orthogonal methods of representation and drew details of decaying ancient monuments with a precision and beauty never seen before (fig. 24).

He continued to use orthogonal drawings for the projects of his later years too. But it is hardly a coincidence that not one orthogonal triad can be found in all the vast legacy of his drawings, nor even a single complementary use of elevation and section. Similarly, symmetry, continual axes or cornices played a minor role in his later projects compared to Sangallo. For this reason he was among the few capable of designing extraordinary buildings like the Palazzo Massimo on uneven ground, assimilating ancient walls, and even taking advantage of the irregularities to achieve spectacular innovations and scenographic effects.

This highly scenographic relationship with architecture gained recognition in his projects for the presentation to the pope drawn in perspective, the only ones to continue Bramante's tradition of perspective projects. Surviving perspective projects, with masterly illumination, dating back to the first years of Leo X's papacy,<sup>86</sup> demonstrate how much Peruzzi owed to Bramante, his esteemed mentor. It is quite likely that he followed Bramante's example if he subjected his own more complex projects only partially to the rules of central perspective: like the Tuscan masters of the Trecento and Quattrocento or the draftsman of the Codex Coner, he foreshortened the lines leading to the background while representing every picture plane parallel to the first as an orthogonal elevation—a compromise which guaranteed a certain degree of objectiveness without diminishing the illusion. In his drawing of the project for S. Petronio of 1522–23 he



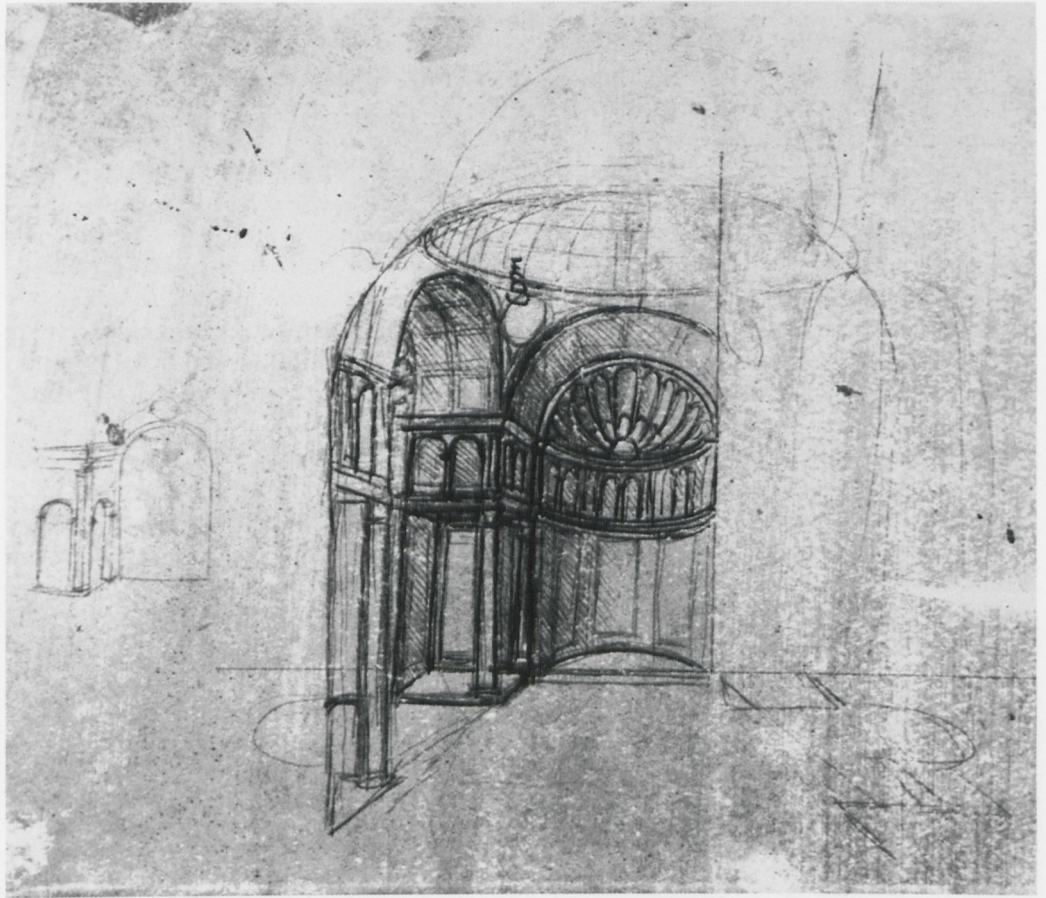
24. Baldassarre Peruzzi  
Survey of the Entablature of  
the Basilica Iulia, Rome  
Florence, Biblioteca Nazionale  
Codex Magliabechiano  
II.I.429, fol. 16r.

<sup>84</sup> H. W. Wurm, *Baldassarre Peruzzi. Architekturzeichnungen*, Tübingen 1984.

<sup>85</sup> C. L. Frommel 1991-92: 159ff.

<sup>86</sup> C. L. Frommel, "Baldassarre Peruzzi als Maler und Zeichner," in *Beibehalt des Römischen Jahrbuches für Kunstgeschichte* 11 (1967-68): 32ff., pl. 22c, d, 92c.

26. Leonardo da Vinci  
Project of a Church  
Windsor, Royal Library  
RL 12609v.



eliminated a large part of the outer wall in order to illustrate on an inner plane the orthogonal section through the longitudinal body and the area of the dome, and the view into the adjacent secondary spaces (fig. 25).<sup>87</sup> Even though it was not in scale, he represented the thickness of the wall and the vault in this way as well, as Alberti had said it should be for a good model; in the open area he even showed the foreshortened plan. By uniting plan, elevation, section and perspective view in a single drawing, he replaced the orthogonal triad and the complementary relation between elevation and section introduced from the time of Bramante's project for the dome, with a method of representation whose variety of information was much greater, though it was slightly less objective.

Early traces of this masterly procedure can be found in Leonardo's Milanese sketches, in which the front half of a building can be seen in a foreshortened plan and the back half in perspective section (fig. 26).<sup>88</sup> The same type of representation returned in the reconstructions of the Baths of Diocletian based clearly on surveys carried out by Bramante and Antonio da Sangallo in 1504–06, but the exaggerated bird's-eye view and elongated proportions seem to have more in common with Peruzzi's early drawings (fig. 27).<sup>89</sup> Peruzzi might therefore have learnt the technique during his first years in Rome working alongside Bramante. In his late project for St. Peter's he returned to the bird's-eye view to present the building from a slightly oblique position where the entrance portal can be seen only in the foreshortened plan, the front half of the interior is as high as the top of the niches and only the last half, at the back, illustrates the vault. Here too, all elements parallel to the picture plane were drawn in approximately orthogonal elevation (cat. no. 331). While the project for S. Petronio, with its low viewpoint, gave the observer an idea of the monumental spaciousness of the building, he seems to have cared more about the exemplary transparency of Bramante's quincunx system in the bird's-eye view of St. Peter's.

Any description, however brief, of early architectural drawing in Italy cannot leave out Michelangelo. From the time of his arrival in Rome and the commission for Julius II's mausoleum in the spring of 1505, he was intensely involved in architectural activities.<sup>90</sup> In the first two projects for the mausoleum of March 1505 (cat. nos. 278, 279) his classicizing approach was similar to Giuliano's. The volutes, pedestals and entablatures in the numerous surviving perspectives recall the style of Giuliano at that time.<sup>91</sup> Bramante's influence is already undeniable in the dominant *piano nobile* and its niche opening into space, and especially in themes such as the rhythmical arrangement of the orders (the *travata ritmica*) or the energetic use of projecting elements. Michelangelo adopted Bramante's strictly orthogonal method of representation, with its pictorial chiaroscuro, in the spring of 1513—perhaps even before Giuliano, and more or less at the same time as Raphael's and Antonio's first projects. In the projects for the

<sup>87</sup> H. W. Wurm 1984: 132.

<sup>88</sup> C. Pedretti, *Leonardo architetto*, Milan 1978: 23ff.

<sup>89</sup> A. Nesselrath, "Monumenta antiqua romana. Ein illustrierter Romtraktat des Quattrocento," in R. Harpath, H. Wrede, eds., *Antikenzeichnung und Antikenstudium in Renaissance und Frühbarock. Akten des internationalen Symposiums 8.-10. September 1986 Coburg, Mainz 1989*: 33ff.

<sup>90</sup> J. S. Ackerman, *The Architecture of Michelangelo*, London 1961; C. G. Argan, *Michelangelo architetto*, Milan 1990.

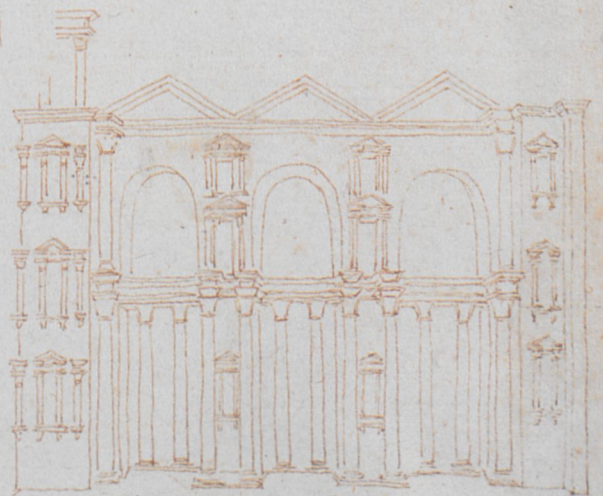
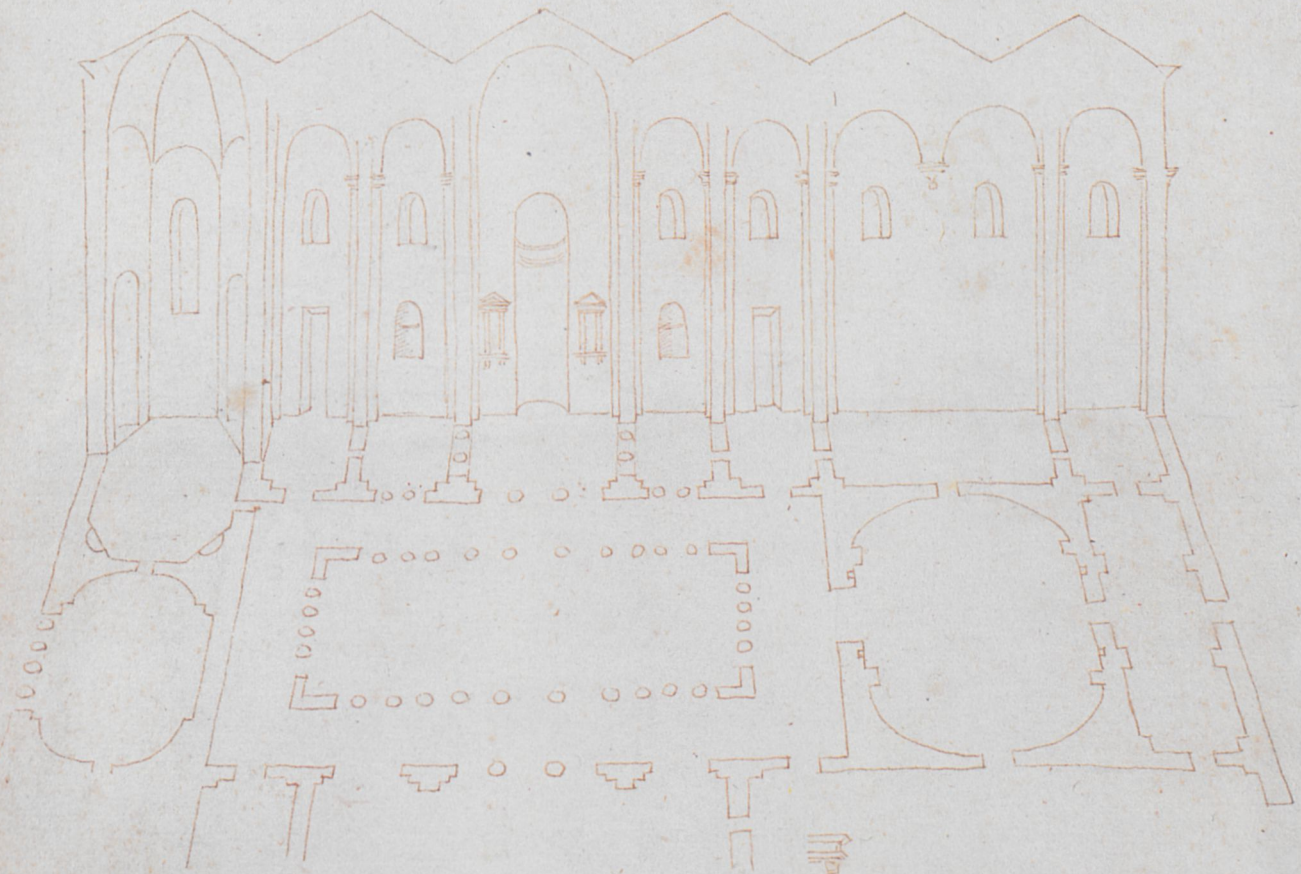
<sup>91</sup> S. Borsi 1985, figs. pp. 424, 469, 473, 477.

facade of S. Lorenzo he therefore treated the plan, elevation and section in no less a sovereign way than Raphael or Sangallo, and avoided concessions to perspective in an even more thoroughgoing manner (cat. nos. 223-235). Only in particularly voluminous structures, such as the staircase in the Biblioteca Laurenziana, did he illustrate the project by means of perspective sketches. In these early projects he took pains first of all to obtain a plastic relief and an accurate articulation of the detail, emphasizing their effects with the help of strongly contrasting wash. He modeled the elevation for S. Lorenzo, dating to the years 1516-17, in this way, bringing the light in directly from the south in a much more realistic and spatialistic way than Giuliano's slightly earlier rival projects. Moreover, since Raphael and Peruzzi were aiming at a similar richly contrasting form of model in their contemporary projects (figs. 20, 25) it is clear that Bramante was their common source of inspiration. Michelangelo maintained these methods of representation all his life, and in fact, the orthogonal section enhanced with highly imaginative shading was to make its way triumphantly throughout Europe in the centuries to come.<sup>92</sup>

The development of the new architectural drawing was condensed ultimately into a few stages that were decisive for architectural construction as well: the early Gothic style in France which had discovered or—more probably—re-discovered the orthogonal triad; Giotto's era, in which perspective elevations and models afforded substance, concreteness, spatiality, and chiaroscuro; and, lastly, the early Renaissance in Florence, during which Brunelleschi, Alberti and Leonardo probed all the perspective possibilities of representation. The experience of three centuries flowed together into the project of the new St. Peter's under Bramante, bringing a detailed method of design within reach for the first time whose roots went a long way back, but had hardly ever before been amalgamated with such consequence, complexity and precision. Bramante's followers perfected each of these methodological possibilities: in particular, Antonio da Sangallo the orthogonal procedure and Peruzzi, the perspective representation. The most illustrious designers of the years to come, from Vignola and Palladio to Borromini and Juvarra, inherited a highly developed patrimony which needed no fundamental improvement. In the same way in which every step forward in the development of graphic representation was linked to transformations in the history of architecture, so the retention of these methods of designing also implied a continuity of the architectural forms.

27. *Anonymous*  
Survey of the Baths of  
Diocletian, Rome  
*early 16th cent.*  
Florence, Uffizi  
*Gabinetto Disegni e Stampe*  
Uff. 1863Ar.

<sup>92</sup> W. Nordinger, in W. Nordinger, F. Zimmermann, eds., *Die Architekturzeichnung vom barocken Idealplan zur Axonometrie*, Munich 1986: 8ff.



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