

*Introduction.*  
*Antonio da Sangallo the Younger*  
*and the Practice of Architecture in the Renaissance*

Our knowledge of Renaissance architecture has increased and deepened so much during the last three decades that a reexamination of the more general issue of how architecture was practiced is now warranted.<sup>1</sup> The sheer quantity of Antonio's drawings and buildings, the latter often precisely documented,<sup>2</sup> requires a new discussion of three basic questions: How at that time did a talented individual become an architect; what was the nature of the design process; and by what process was a building erected? The architectural projects of the popes and their *nipote* in which Antonio participated afford far more detailed information on these issues than has previously been supposed.

Antonio was trained under unusually advantageous circumstances.<sup>3</sup> As the pupil and assistant of his uncles Giuliano and the elder Antonio da Sangallo, he could already observe in early youth the development—including the technical aspects of construction—of some of the most advanced architecture of his time, such as the Villa Medici in Poggio a Caiano, Santa Maria delle Carceri, the Palazzo Gondi, the sacristy of Santo Spirito, the Palazzo della Rovere in Savona, and the fortress of Poggio Imperiale. It is probable that he was already involved actively from the age of fourteen onward, as assistant to Antonio the Elder, in the planning and construction of the castle of Civita Castellana (1499ff.). He must have learned the rudiments of arithmetic, and probably of Latin, before this in Florence; these would later be indispensable for his complicated calculations of projects and studies from antiquity. Clearly, as the most talented nephew of the architects working for Lorenzo de' Medici, the Florentine Republic, Cardinal Giuliano della Rovere, and Alexander VI, he was not among those who had

risen from the ranks of common artisans. He went through the various stages of training with exceptional thoroughness, from a draftsman of ancient and contemporary monuments to a working carpenter and building supervisor to a creative architect. Scarcely any other architect in the Renaissance had such solid and continuous training.

From the time of the Gothic builders' lodges to the Quattrocento, most architects had begun as sculptors or stonemasons, who were much more closely involved in the creation of sacred buildings than were painters.<sup>4</sup> Even in the Quattrocento, only a very few architects—Alberti, Francesco del Borgo, and Fra Giocondo—came from humanism and theory. Beginning in the mid-Quattrocento, an increasing number of cabinetmakers and wood carvers—craftsmen such as Francione, the da Maiano brothers, the Sangallo brothers, Baccio Pontelli, Giovannino de' Dolci, the leading carpenter for Francesco del Borgo—rose to the rank of creative architect. Only for a brief period, from Bramante to Vignola and Lescot, was the field dominated by painter-architects, undoubtedly because structural technique mattered less than spatial imagination, grand designs with broad vistas, and the inclusion of both the figural arts.<sup>5</sup> Antonio's training in figural drawing, which may have been with Filippino Lippi, helped him in perspective and ornament but it was his primarily technical orientation that would make him so valuable to the more inventive painter-architects. Only Michelangelo managed in the course of his long life to unify all these abilities in one individual.

In general, the social structure of the time was far more permeable than it would become after the intro-

duction of academic studies. No formal obstacles hindered the rise of Sanmicheli and Palladio out of the ranks of artisans. Once they had acquired a reputation and fortune they built stately houses for themselves, or even palaces like Antonio, married into prominent families, and were courted by European princes.<sup>6</sup> While painters and sculptors received considerably higher prices for their work, it was possible for a business-minded architect to profit in numerous ways even during construction, from the building materials and craftsmen; as was true of prelates, the social status of artists in Rome depended primarily on their income.

The fact that in the high and late Renaissance only the most talented craftsmen could accede to the status of projecting architect, and that the most important sculptors and painters increasingly attracted the large architectural commissions, was undoubtedly also the result of growing intellectual demands. Brilliance in craftsmanship and training in a builders' lodge were increasingly insufficient. Knowledge of Vitruvius and Alberti, geometry, arithmetic, and the ancient monuments, as well as drawing ability, played an ever greater role. All this can best be seen in the projects of late Bramante, with which Antonio became familiar, at first passively but soon actively, and which overshadowed even the grandest projects of the older Sangalli.

Bramante's commission for the Cortile del Belvedere shortly after the election of Julius II must at once have turned his studies of antiquity in a specific direction (Fig. 1).<sup>7</sup> Suetonius had described the Palace of Nero and the Domus Transitoria; Pliny the Younger, and especially Vitruvius, provided information about possible prototypes such as the theater, exedra, xystos, and about the columnar orders and musical proportions; and Alberti's treatise helped to make Vitruvius's often obscure text more comprehensible. Bramante must also have studied all of the accessible ancient buildings that could serve as models for his project. For all this the impatient pope allowed him only a few weeks, since the ground floor of the east wing was completed during the first year of his pontificate. Architecture had become not only increasingly humanistic but increasingly a courtly art, in which an architect had to realize, and if necessary change, the sudden notions of his patron in the shortest possible time.

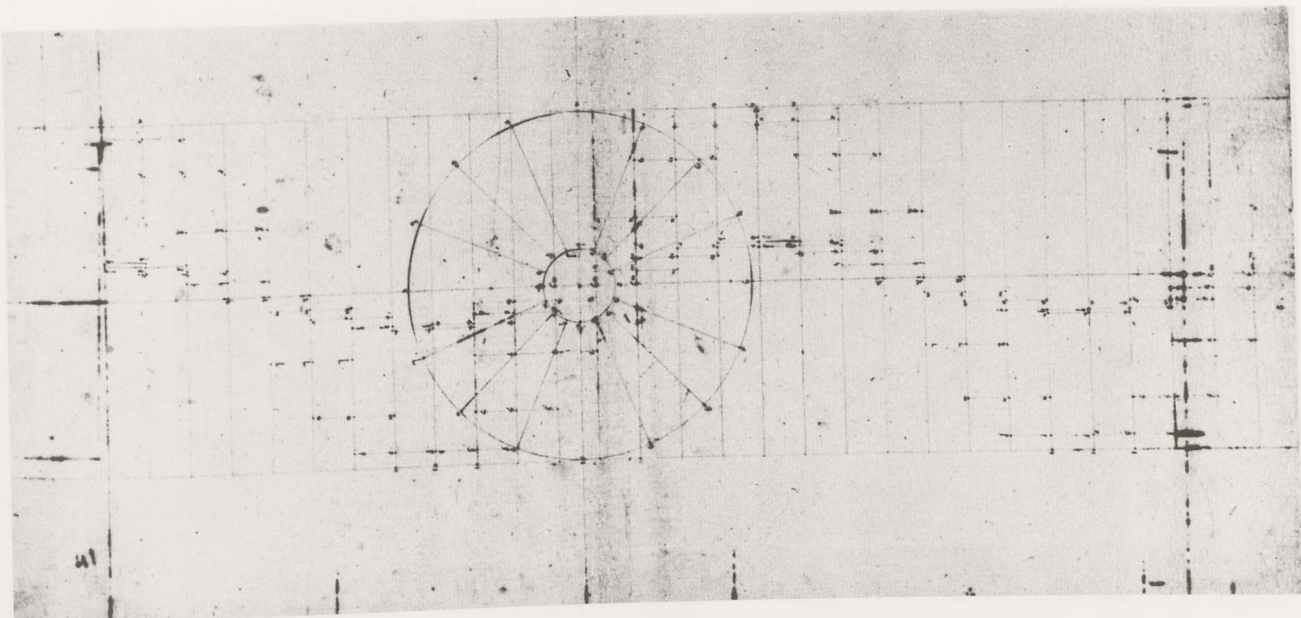
But studying rules, norms, and prototypes was far from the end of the matter. Bramante had to measure precisely the position and irregular angles of the old palace and the Quattrocento villa, which were to be connected by the new complex. He had to determine



1 Commemorative medal of the Cortile del Belvedere, 1503 (after Hill).

the exact dimensions and elevation of the land lying between them and develop his project from the results. Minor adjustments made it possible for him to give the symbolic length of 1,000 ancient feet, the same length as Nero's Domus Transitoria, and the total height of 70 feet. He then had to divide these measurements into individual bays which would take into account the ancient prototypes and functional requirements as well as his own ideas of classicizing architecture. This arithmetical problem was further complicated by the fact that detailed measurements for the artisans had to be in local *palmi*. Finally, in order to mediate between the levels of the palace and the villa, he made the uppermost of the three levels of his Via Giulia rise imperceptibly toward the north without letting it be apparent on the exterior structure. Similarly complicated calculations must have been demanded by the continuously more slender columns of the four Vitruvian orders of his famous spiral staircase.

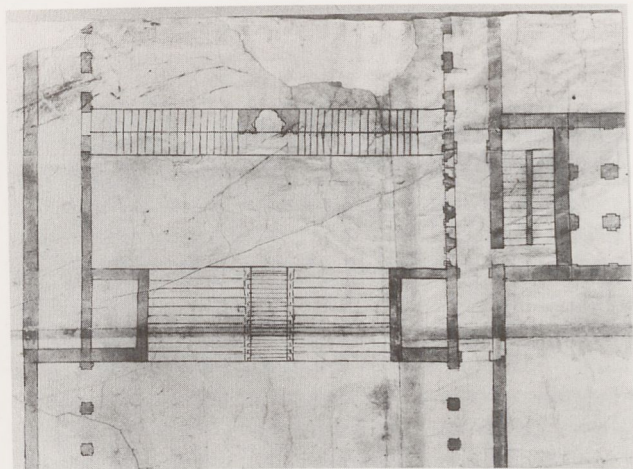
All these complex reflections, calculations, and inventions could be transmitted to the executant craftsmen only through plans of hitherto unknown precision. The plans for a spiral staircase without columns attributed to Fra Giocondo (ca. 1450–1515) give but a poor idea of this (Fig. 2).<sup>8</sup> What survives for the Cortile del Belvedere, besides the perspective image on the commemorative medal that Julius obviously had minted before the project matured, is a fragment of Bramante's somewhat later enlargement



2 Fra Giocondo(?). Study for a spiral staircase (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 4124A r.).

project (Fig. 3). Julius had commissioned him, in about 1506 to raise the courtyard by a story and to create a direct connection between his new apartment in the Stanze and the Belvedere, a task that not only endangered the already precarious statics of the complex but destroyed the project's artistic harmony. Such a plan, in a proportion of 1 to ca. 230-40, was intended primarily for the architect and his patron. Once construction was approved, it had to be translated by the shop into workable plans for the craftsmen. Vasari tells us of the existence of a model, which the visualization of a bold project of this kind undoubtedly demanded. Bernardino della Volpaia, who was in close contact with the Vatican builders' lodge, may have based his drawings in the Codex Coner on the constructed parts, but also on Bramante's plans and this model which then in its upper parts would have been unfinished. When Antonio said that his studies really began only in 1503 with the pontificate of Julius II and Bramante, it must have been because he viewed the designing and construction of the Cortile del Belvedere as a decisive stage in his development.<sup>9</sup>

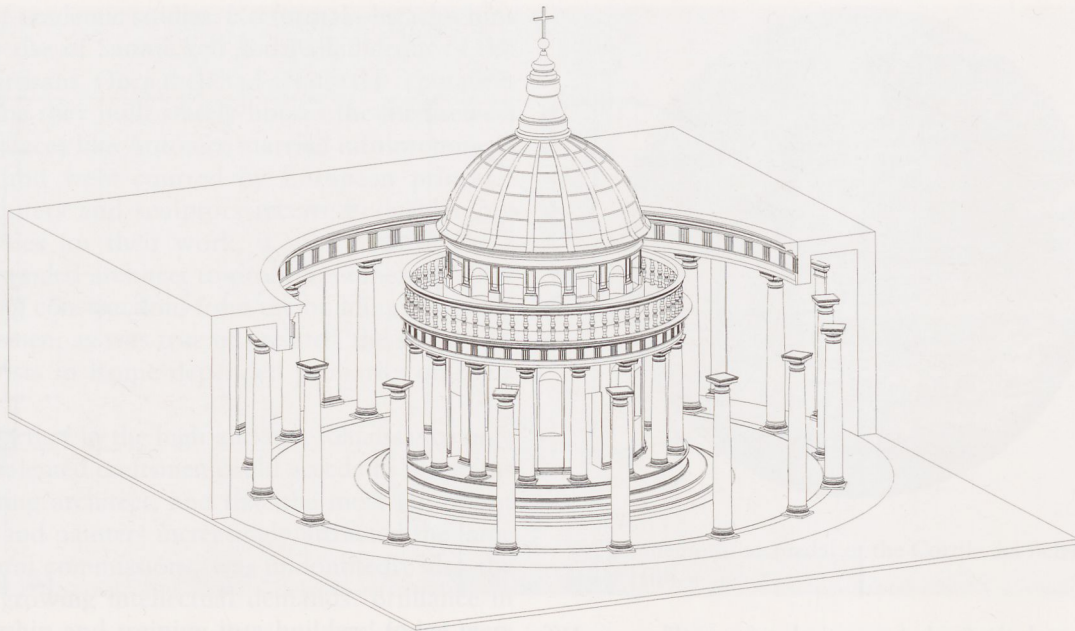
The Tempietto near San Pietro in Montorio, the first Roman project in which Bramante attempted to reconstruct Vitruvius's Doric entablature, had then been under construction for at least a year (Fig. 4).<sup>10</sup> There Bramante had made his calculations still more complicated by providing as many as six Doric entablatures with different moduli for the circular building and surrounding courtyard. If we go over the individ-



3 Bramante. Project for the enlargement of the Cortile del Belvedere, ca. 1506-07 (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 287A), detail.

ual steps of his calculations it becomes clear how difficult it was to reconcile Vitruvius's principle of the modulus and Alberti's principle of musical proportions with the current practice of starting with round measurements in *palmi romani*. In any case, the Tempietto shows that projects were becoming increasingly independent from their materialization in stone.

The process of designing the Tempietto and the Cortile del Belvedere can only be hypothesized, but



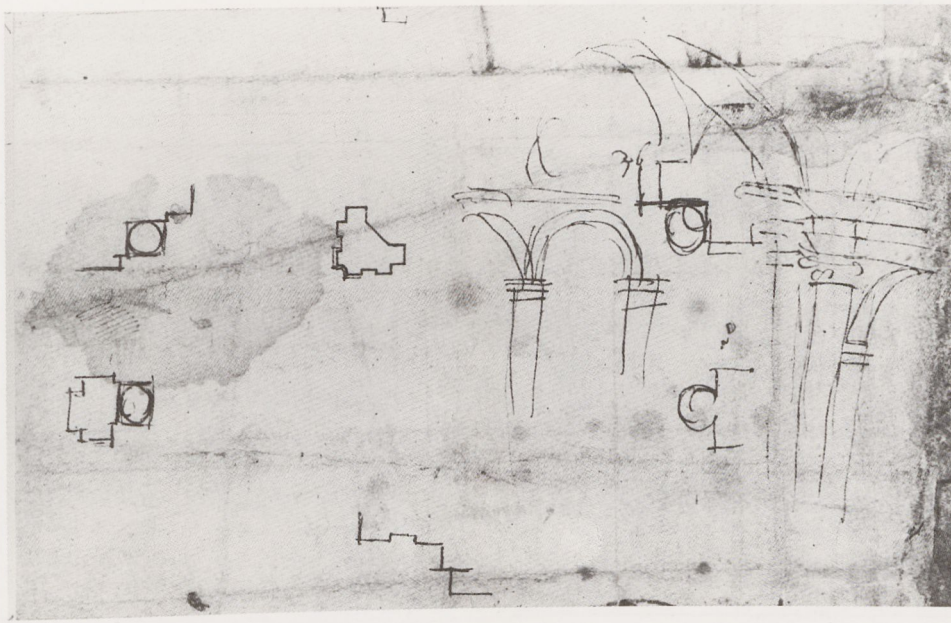
4 Hypothetical reconstruction of Bramante's project for the Tempietto (drawing: G. Diller).

there is concrete documentation for the planning of St. Peter's, which the pope initiated seventeen months at the latest after the Cortile.<sup>11</sup> The earliest stage is represented by a sketch on whose verso Bramante and his current assistant, Antonio di Pellegrino, search for a pier form which would allow the diameter of the dome to exceed Nicholas's project and the area of the dome to fit within the square of a quincunx (Fig. 5). Their intention was to append to this choir a nave modeled on that of the Basilica of Maxentius, with a length approximately equal to that of the old basilica but with a central aisle appreciably wider. The sketches of the plan and elevation complement each other, and neither is conceivable separately. Antonio di Pellegrino, no doubt following the ideas of Bramante, then drew on the recto a coherent centralized domed choir with an even more enlarged dome area and rounded measurements for the straight lines, leaving open, however, the connection to the nave and the precise contour of the exterior (Fig. 6). A complete schematic plan of the kind Antonio di Pellegrino would draw three years later on the back of an urbanistic sketch by Bramante for the Palazzo dei Tribunali could have been made only after such a still relatively unfinished design.

Soon afterward, Bramante apparently succeeded in convincing the pope to accept a centralized domed

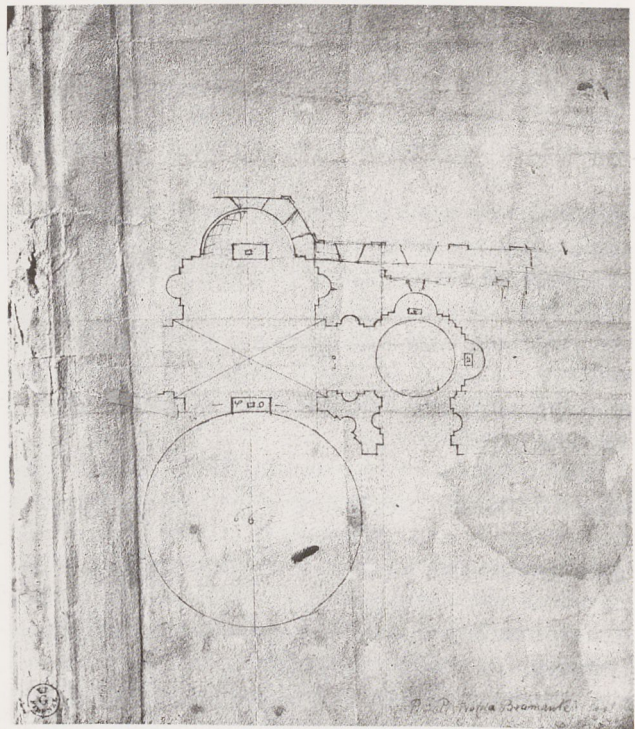
building, which he must have developed from the initial choir project in numerous, increasingly detailed and precise versions. It was probably Bramante himself who drew the first surviving presentation project on parchment. Because of its scale of precisely 1:150, it could easily be transferred to a model, although the final plans would have needed, of course, additional measurements. The parchment plan presupposed exact elevations, which can be approximately reconstructed and whose increasingly precise detailing necessarily led to changes in the much simpler original measurements.

Although the pope soon had a commemorative medal struck from a slightly reworked version on squared paper, he hesitated to begin construction. He asked Giuliano da Sangallo, who may have been involved in the planning from the start, and the prominent Veronese engineer Fra Giocondo to make critical counterproposals. Giuliano insisted, with good reasons, on a reinforcement of the supporting piers. Fra Giocondo wanted to return to a Latin cross and urged that greater consideration be given to the numerous functions of the old basilica. Obviously their arguments convinced the pope that a fundamental revision of Bramante's project was necessary. Then, perhaps while still in the presence of the pope, Bramante drew on the back of Giuliano's project—which he may have held against an "impannata," a

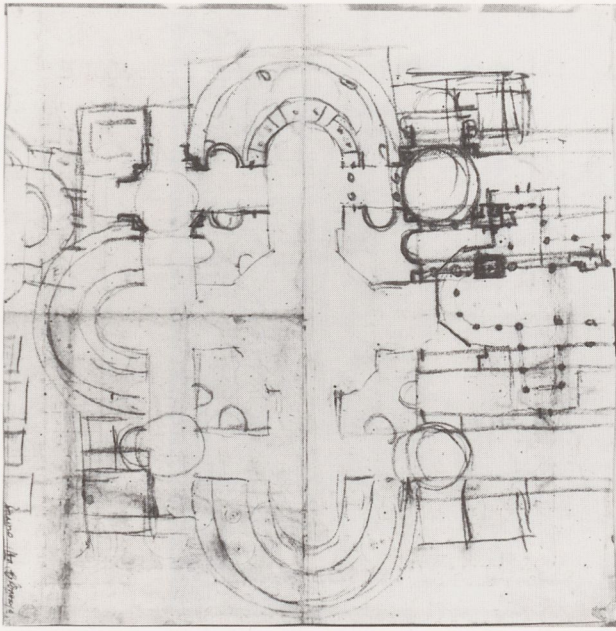


5 Bramante and Antonio di Pellegrino. Study for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 3A v.).

parchment window—a new proposal based on Giuliano's dome piers (Fig. 7). There he again combined a quincunx system with a nave, and added ambulatories to the three apses. He apparently tried to convince the pope to accept the latter by referring to two famous Milanese prototypes, whose plans he sketched at the edge—a unique testimony to the spontaneity possible in the thinking and planning of the time. After some further intermediate stages, he arrived at the large plan in red chalk, surely the most informative and important architectural drawing of the Renaissance (Fig. 8). Again he used paper with a 5-palmi grid, on which he first drew the old basilica and the choir of Pope Nicholas, and then repeated one version after another, especially in the area of the dome piers. He felt his way to the preparatory stage for the final project, until he finally abandoned even the transept ambulatories and the quincunx system and returned to the foundations of Nicholas's choir, following them still more precisely than he had in his earliest plans—in this case, too, undoubtedly in close consultation with the pope. Once again he demonstrated the spatial effect of both the individual parts and the entire structure by means of perspective sketches. When the pope had at last accepted a project of comparable completeness, Bramante had a wooden

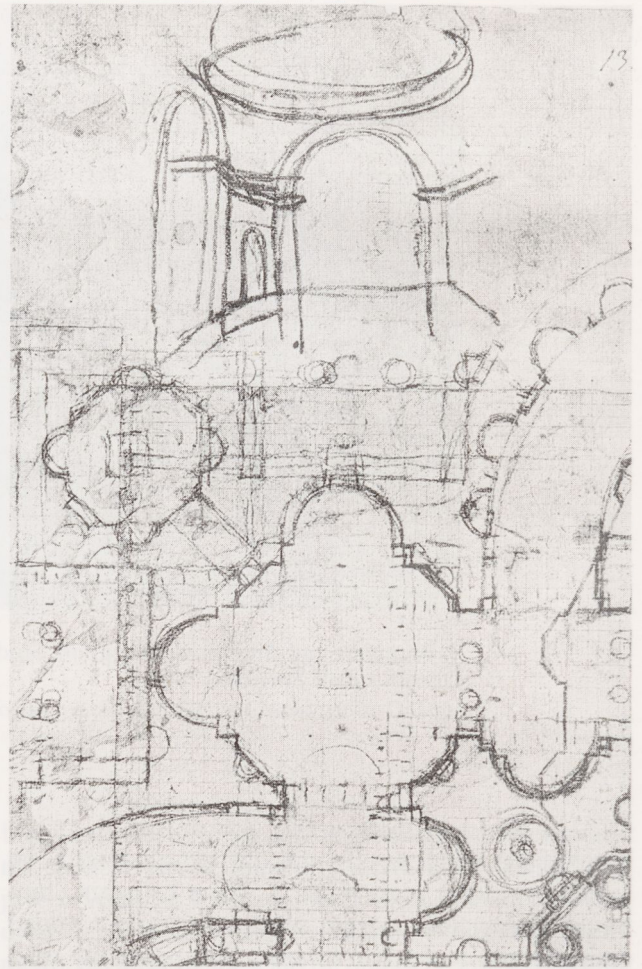


6 Antonio di Pellegrino for Bramante. Plan for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 3A r.).



7 Bramante. Plan for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 8A v.).

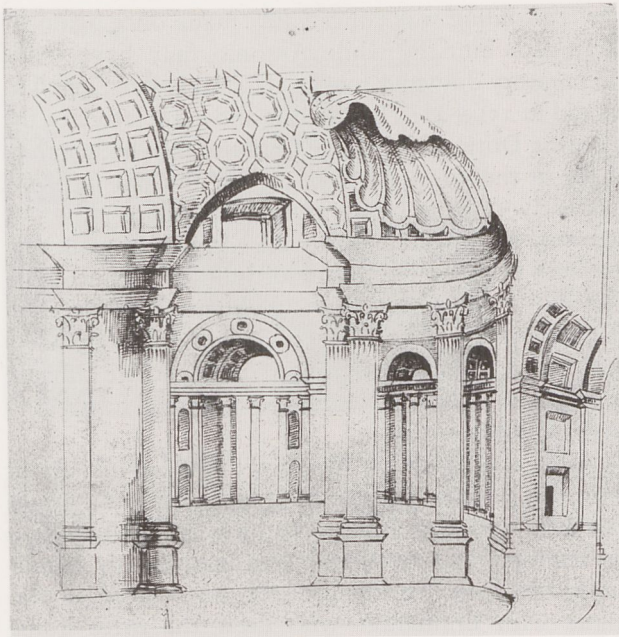
8 Bramante. Plan for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 20A), detail.



model made, probably with hinges so that it could be opened (Fig. 9). By the time construction began, however, parts of it were already obsolete. Bramante sometimes even went beyond the pope's agreement: While the pope was still thinking of completing the old benediction loggia of Pius II, Bramante was talking about destroying it and extending St. Peter's Square up to the new facade.

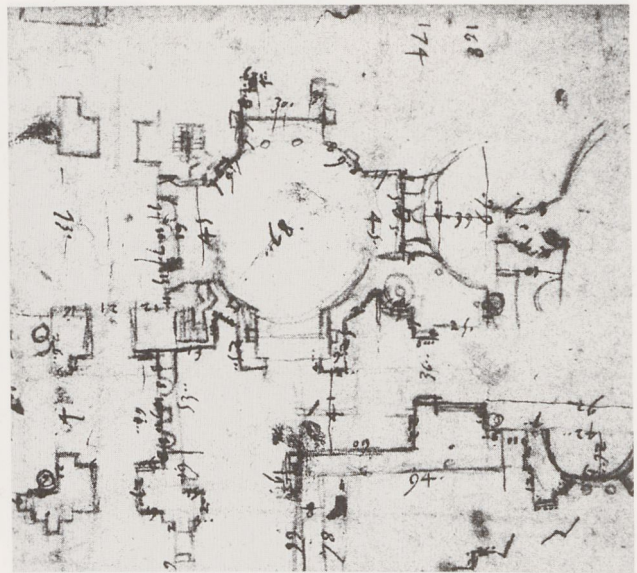
The initial phase of planning for St. Peter's thus allows us for the first time to follow the genesis of a project step by step, something that can be done in the Quattrocento only in the case of a few painters. What fundamentally distinguishes this genesis from that of a Gothic cathedral is the astonishing ease with which a change was made in the space of a few weeks, from a longitudinal building to a centralized building, and from the latter back to a longitudinal building with or without a quincunx and ambulatories. No longer was it merely a question to adapt well-established types to specific requirements and improve them. One could,

instead, look to the Pantheon or the Basilica of Maxentius, San Lorenzo or the cathedral in Milan, to a Venetian quincunx as well as the Cathedral of Florence. Buildings from ancient Greece as described by Vitruvius and from the Roman Republic and Empire, Byzantine and Gothic prototypes, were all equally accessible and thus an essential part of the history of European architecture. Architects were as far from the biases of dogmatic classicists as they were from the eclecticism of historicists; they knew that although vocabulary and individual spatial forms could be taken over from antiquity, it was much more difficult to use such different types as the temple, *thermae*, or theater. On the other hand, while the formal language of Byzantine and Gothic architecture was forsworn, their types, which derived from the ancient as well as the Christian tradition, could be relied on all the more. This necessarily led to a synthesis, for which—as the planning of 1505 demonstrates so well—an abundance of variants was available. Never



9 Anonymous, before 1520(?). Sketch of Bramante's wooden model for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 5A r.).

before had architects, as they now did, composed their projects from elements originating in different parts of Europe over a period of almost two thousand years. Familiar schemata and techniques had to be abandoned; one had to modify or enrich, to become acquainted not only with the forms and proportions of exemplary buildings but also with their construction. Bramante was familiar with the construction methods used in the cathedral of Milan, Giuliano with those of the dome of the cathedral in Florence, and Fra Giocondo with those of Byzantine Venice. But all three of them needed to study the disposition and construction of buildings from the Roman Empire such as the Pantheon and the *thermae*. While drawing the plan of Diocletian's *thermae*, Bramante could see how one and the same fragment of wall articulated four adjoining rooms and at the same time supported the vaulting (Fig. 10).<sup>12</sup> Experiences and discoveries of this kind demanded an immediate application, such as Bramante first attempted in the *Tempietto* and then proposed shortly afterward with even more virtuosity in the plan on parchment. In buildings such as the "Ninfeo" of Genazzano he was able with relatively inexpensive tufa, cast vaults, and stucco surfaces to create spatial effects surpassing anything in the architecture of the Quattrocento (Fig. 11). There, he used



10 Bramante(?) and Giuliano da Sangallo. Survey of the ground plan of the Baths of Diocletian (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 104A r.), detail.

three variations of the Tuscan order, which he had already employed in the spiral staircase of the Belvedere, together with the Doric, Ionic, and Corinthian orders. There he returned for the first time to Vitruvius's four orders, but allowed due freedom to "giudizio" in the proportions and details.<sup>13</sup> The exposed tufa masonry of the "Ninfeo" as we see it today shows, moreover, how quickly Bramante was able to teach his craftsmen this new way of building, which was inspired by the *thermae*. On the whole, he must have been uncommonly flexible and inventive in technical matters. Thus, about 1509, he covered the groined vault between the altar and the apse in Santa Maria del Popolo, which he himself had recently had built, with a pendentive dome of stuccoed wooden laths, in order to create as quickly as possible a surface for Pinturicchio's frescoes.<sup>14</sup>

In the construction of St. Peter's, which had been under way since April 1506, Bramante must also have experimented with new methods and techniques.<sup>15</sup> The general contract between the Camera Apostolica and the masons permitted the use of rubble only for walls at least 2.23 m thick, whereas thin walls and whatever covering might be necessary for tufa and cast parts apparently were to be of brick. Master Guelfo was paid especially well for the masonry of the



11 Genazzano, Ninfeo.

pendentives and transept arches, because he used brick even where he was not obliged to do so. From April 1506 until the death of Julius, hundreds of workers were active on the building site of St. Peter's under the direction of five experienced master masons. Other teams saw to the procurement of tufa, brick, lime, and sand. Carpenters completed the scaffolding, the building machinery, and the covering of the vault when that zone was reached. The logistics and organization were primarily in the hands of Bramante and his few assistants, among them Antonio beginning about 1509–10.

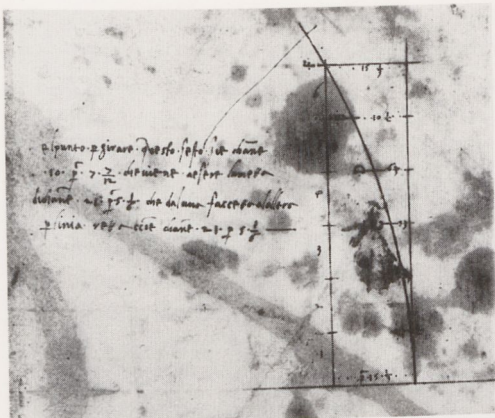
In August 1507, the first of a total of ten teams of stone masons began, probably near the building site, to finish the colossal Corinthian capitals of the interior order, with instructions to follow the prototypes in the vestibule of the Pantheon (see Fig. 21). They took their travertine from ancient monuments. Late in the summer of 1508 they began putting the capitals in place and started work on the entablature of the interior order. Bramante's drawings on a scale of ca. 1:5 for the front view and profile of the capitals were undoubtedly intended for wooden patterns to be used by the individual stone masons, such as are documented for the Villa Farnesina. Similar pattern drawings must have been made by Bramante for the entablature. Antonio and Antonio di Pellegrino, who was likewise a trained carpenter, had been working since January 1510 on the scaffolding of the dome arches and their coffers, casting of which began in 1511. The surviving drawing for

the scaffolding was conceivably made once again by Bramante himself, while Antonio may have made preparatory drawings for the classical coffers, much as he did in 1519–21. The capitals and entablature of the exterior Doric order—placed noticeably higher than those of the interior—were carved and put in place, evidently only in 1511–13, by six teams of stone masons. By far the most advanced final drawing that survives from the pontificate of Julius II was made by Antonio di Pellegrino and was intended for the pendentives of the dome (Fig. 12). It shows how precisely and efficiently the workshop of Bramante already understood how to represent such spherical forms both in plan and in elevation.

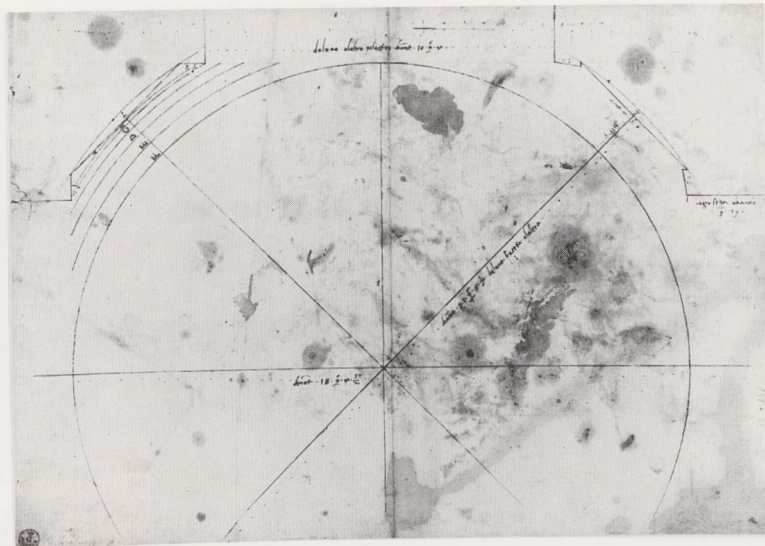
After the death of Antonio di Pellegrino about 1510–11, Antonio became Bramante's most important assistant and also appears to have served him as a draftsman, since Bramante was increasingly handicapped by gout.<sup>16</sup> It was probably he—indeed, in dialogue with Bramante—who drew the three dome studies inspired by the form and construction of the Pantheon, even if they are still far from the lavish project published by Serlio.<sup>17</sup> It was probably also Antonio who worked on the vault of the choir from 1510–11 on and supervised its casting. From the same years, 1510–13, we have some sketches by him and his cousin Giovanfrancesco for building machinery, as well as copies of designs for machinery by Francesco di Giorgio, which may have been of interest to the builders' lodge of St. Peter's.<sup>18</sup>

Julius had concentrated on the choir, the four dome piers, and the first piers of the nave, and had at least contemplated the vaulting of the dome, although it could hardly be undertaken without the supporting vaults of transept and nave. In any case, he proceeded no differently in St. Peter's than he had in the Cortile del Belvedere, the Palazzo dei Tribunali, and the Vatican loggias: he advanced work to the point where his successors would no longer be able to make fundamental changes, well aware no doubt that it would be easier for them to continue a project already begun than to begin a new one of comparable imperial monumentality.

Even so, when the young Leo X ascended the papal throne in the spring of 1513, he at first tried to outdo Julius. He not only resumed work at once on the loggias and the Cortile del Belvedere but commissioned Bramante, Giuliano da Sangallo, Fra Giocondo, and, after Bramante's death, Raphael to enlarge Bramante's final project significantly and make it more imposing.<sup>19</sup> This change in plans represents a process that occurred frequently from the Middle Ages on. In the



12 Antonio di Pellegrino for Bramante. Studies for the pendentives of the principal dome (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 124A r. and v.).

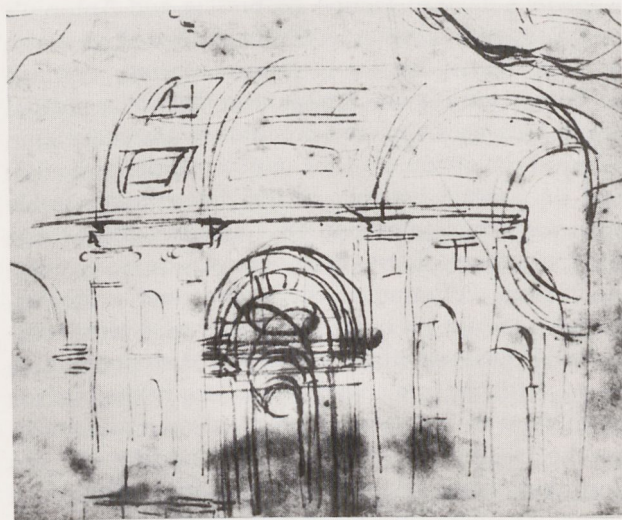


great cathedrals of the Gothic period, however, including those of Siena and Florence, there had been no hesitation in changing the system and even the scale, whereas for the Renaissance masters symmetry, harmony, and a seamless continuity were the top priority. Hence one of the main problems was to determine how much of the newly completed choir could be retained and how the new ambulatories and chapels could be incorporated organically into the system of the colossal exterior order. Since the interior orders were also fixed, the designing focused on the ground plan. But the sketch made by Raphael in the summer of 1514 shows that elevation and perspective drawings were also being used to test the relationship of the interior to the exterior structure and the spatial effects (Fig. 13). We can be certain that a great many other ground plan and elevation sketches by Bramante and Raphael from these years have been lost.

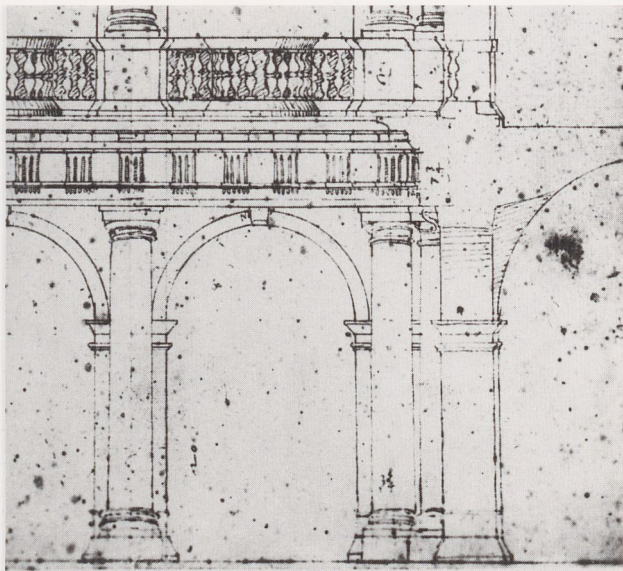
Antonio designed his first independent buildings during the last years of Bramante's life: the castello of Capodimonte, and the Palazzi Inghirami-Ricci, Baldassini, and Farnese.<sup>20</sup> Plans have survived for only the last two; like Raphael's slightly earlier plans for the Cappella Chigi, they demonstrate the high level that had been achieved in the methods of design around 1513–14.<sup>21</sup> Among Antonio's drawings for the Palazzo Farnese, the longitudinal section may possibly predate the beginning of construction, for it does not yet take into account the connection of the courtyard to the atrium (Fig. 14). The alternatives for the two upper stories of the courtyard may already be the result of a subsequent discussion with the client. The

orthogonal rendition with occasional perspective clarifications at the bases and capitals, the shading by means of crosshatching, the cursory indication of profiles, and the relatively rounded measures still largely follow Bramante's design procedures.

The extreme reliance on antiquity not only in the courtyard and atrium but also in the windows and portals is, once again, inconceivable without close consultation with the patron. Thus the humanist G. B. Varalli tells us that he prevailed upon Cardinal Farnese to construct the windows and doors "instar



13 Raphael. Sketch of ca. 1514 for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, 1973F), detail.



14 Antonio da Sangallo the Younger. Study for a section of the Palazzo Farnese (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 627A), detail.

illarum, que sunt Corae in Herculis templo.”<sup>22</sup> This may have been in fact the source of the volute windows on the ground floor.

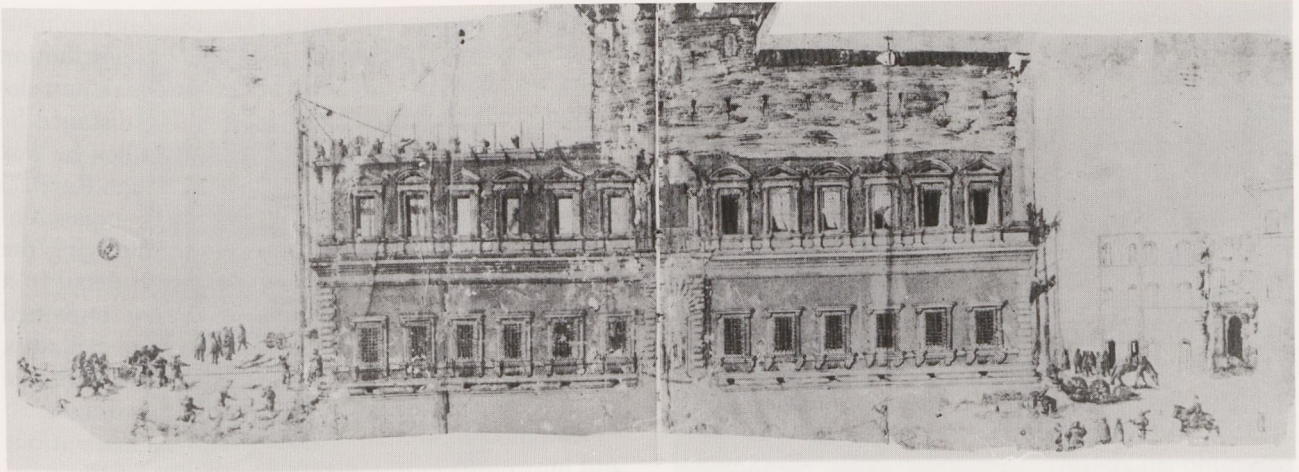
Antonio’s final project for the Doric order of the courtyard must have been drawn much more precisely than these early studies, more like his drawings of 1518–19 for St. Peter’s (see Fig. 17).<sup>23</sup> In fact, this Doric order is far more carefully detailed than those of Bramante for his Roman buildings, or that of Raphael’s Palazzo Jacopo da Brescia and Antonio’s own Palazzo Baldassini. A Bramantesque effect is also made by his studies for the entrance wing, in which he begins with a cross section giving the principal height measurements and proceeds to the connection between the atrium and the courtyard, the aediculas, and the central balcony of the *piano nobile*.<sup>24</sup> He notes the Vitruvian proportions and bases of the Doric and Corinthian orders, both of which he is considering for the columns of the atrium and aediculas, though he is not yet quite sure of Vitruvian terminology, and repeatedly illustrates details with perspective views. As Bramante already had done in the interior entablature of St. Peter’s, Antonio gives equal height to the architrave, frieze, and molding of the Corinthian order of the aediculas, without following Vitruvius’s prescriptions any more closely. The related ground plans must have been similar to those for the approximately contemporary Palazzo Baldassini—that

is, they are much more precise than Bramante’s plan of 1506 for the Belvedere (Fig. 3) or Giuliano’s projects of 1514 for St. Peter’s—and the facade project to that for the slightly later Farnese palace in Gradoli.<sup>25</sup>

This drawing and its inscription “proporzione della fazzata” show the value placed on satisfactory proportions, also for a palace facade. Its arrangement directly recalls that of the Palazzo Baldassini and follows certain norms characteristic for the early work of Antonio. The greater height given to the ground floor is due to its vaulting. The windows are highest in the flat-roofed *piano nobile*, but with their proportions of ca. 1:1.6 they are still squatter than those finally given to the Palazzo Farnese. Only the portal attains the proportion of 1:2 that was preferred, for instance, by Raphael and Peruzzi. The two intermediate moldings run directly under the window openings and thus considerably above the floor, undoubtedly because Antonio was trying for a rhythmical diminution in the height of the stories as they rose. Only in a second phase were details worked out for the rustication, windows, and moldings; in the finished palace they are, in fact, stylistically later. Such aesthetic conceptions changed with the architects. It was only after 1546, with Michelangelo, that the facade of the Palazzo Farnese in Rome received its harmonious proportion of ca. 1:2.<sup>26</sup>

Antonio is also the first to afford a precise look at the designing of a grand staircase; here, too, he must have followed a proven tradition.<sup>27</sup> In the detailed ground plan of the stairwell for Palazzo Farnese he draws the “hypotenuse” of the ascent of the stairs, which corresponds to the diagonal through the main flights. If this was the rule, the width and length of the flights would have been in direct proportion to their height; that is, narrow stairs would in principle have been made much steeper than broad, “representational” stairs.

In another drawing, which uses a 40-palmi high story as its point of departure and thus approaches the Palazzo Farnese, Antonio juxtaposes six types of staircases with different inclines, beginning with Vitruvius’s steep theater steps, with their 1:1.25 proportion of riser to tread, continuing with 1:2 (*dupla*), 1:3 (*tripla*), 1:4 (*quadrupla*), 1:5 (*quincupla*), and ending with a riding stair whose proportion of riser to tread is 1:6 (*sextripla*).<sup>28</sup> The 1514–15 staircase of the Palazzo Farnese has a proportion of 1:3.2, slightly exceeding the *tripla*.<sup>29</sup> The secondary stairs of the Palazzo Farnese, dating from 1540–46, correspond to the *dupla*, its new staircase of 1540 approaches the *quadrupla*,<sup>30</sup> and Bramante’s great Vatican riding stair



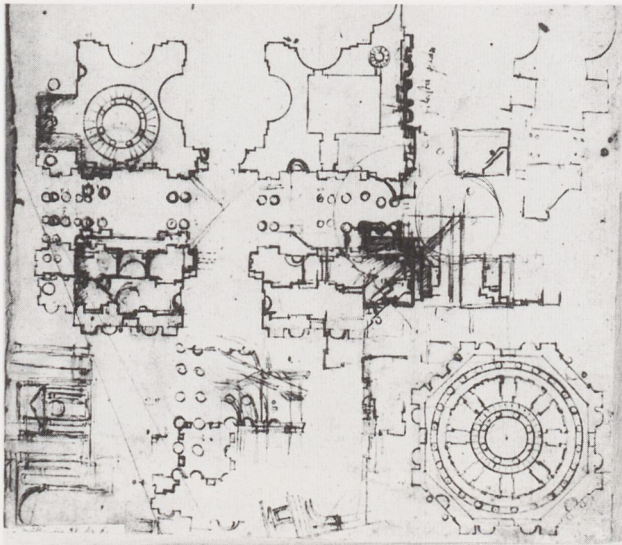
15 Italian draftsman, ca. 1525. View of the facade of the Palazzo Farnese (Naples, Biblioteca Nazionale, vol. XII, D, 1), detail.

the *sextripla*.<sup>31</sup> For reasons of spatial economy, the stairs of smaller Roman palaces usually fall between the *dupla* and the *tripla*.<sup>32</sup>

The construction of the Palazzo Farnese presented Antonio with the problem, by no means rare at the time, of incorporating as much of the existing Quattrocento building as possible into the new palace (Fig. 15). He further had to make certain that the cardinal, who remained in residence, would continue to have a comfortable apartment at his disposal. Such a juxtaposition of the old and the new can still be observed today, for example, in Palladio's Palazzo Thiene.<sup>33</sup> Antonio seems to have begun by extending the old building toward the left by the addition a utility area with a small courtyard and the shaft of the new stairwell, and only afterward used the old corner tower for the central atrium and made successive changes in the interior disposition of the old facade wing to the right. This, at least, is the only way to explain the disposition of the facade wing—unusual for Antonio—and its numerous irregularities.

The success of the Palazzo Farnese, especially its atrium and Doric courtyard order, must have contributed to Antonio's appointment in the fall of 1516 as Giuliano's successor and second architect in the builders' lodge of St. Peter's. With all the demands made on his time, Raphael was no doubt grateful for so professional a collaborator; yet the two masters arrived only gradually at a common plan.<sup>34</sup> Underlying Antonio's earliest projects is a critique of the projects of 1513–14. In them he enlarges and brightens the nave by additional domes, creates a lateral vestibule, and closes off the ambulatories of the

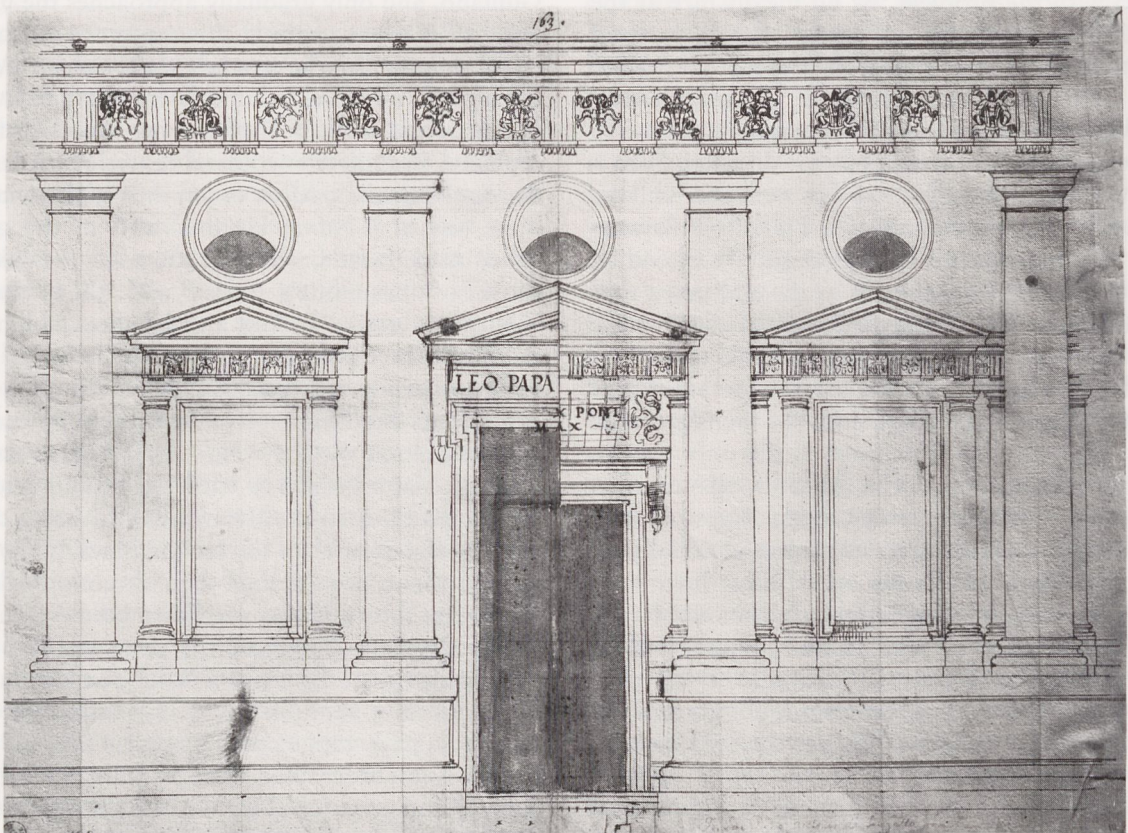
transept. Despite his new ideas, a more flexible rhythm, and a far more brilliant drawing technique, he is still encumbered initially by the archaic, ultimately additive compositional methods of his uncle Giuliano, and only gradually approaches the unifying spirit of Raphael, who in this respect is much closer to Bramante. In the studies that follow, Antonio attempts to integrate volumes more organically within his structure and to shorten the nave. At first he replaces Bramante's colossal exterior order with Raphael's small, 5-*palmi* order, then with an intermediate one of 9-*palmi*. He links this to the colossal order of the facade, whose shafts are even wider than those of Bramante's order and thus closer to Vitruvius's norm. To find a satisfactory solution for the facade he draws one version after another with a very fine pen as his teacher had once done with red chalk, and like him he visualizes them by means of rapid elevation sketches (Fig. 16). The final result led him to a plan in which he tried—as he had before and would continue to do afterwards—to bring the systems on the exterior of the building and on the facade into harmony, even though their execution still lay in the distant future. It may even have been Antonio who with such plans convinced the pope and Raphael of the superiority of the 9-*palmi* order over the much less monumental 5-*palmi* order. In any case, although he retained a nave with its own dome, he carried his plan for a 9-*palmi* order to completion with admirable consistency and precision (Fig. 17); and since the executed version is much closer to the Doric order in the courtyard of the Palazzo Farnese than to such contemporary works of Raphael's as the courtyard of the



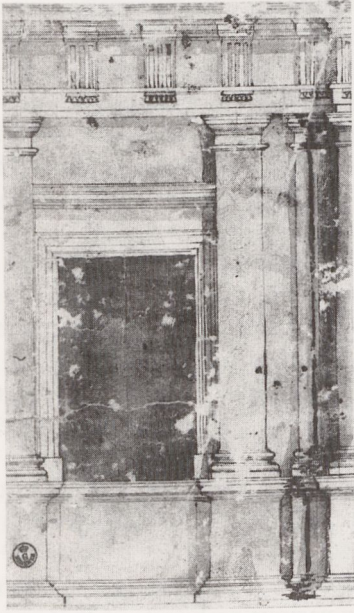
16 Antonio da Sangallo the Younger. Sketch for St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 37A), detail.

Palazzo Branconio dell'Aquila (Fig. 18), Antonio must at the very least have made a significant contribution to its articulation. His numerous ground plan and elevation studies illustrate the astonishing distance he traveled during this phase of planning, when he was in constant discussion with Raphael. Though Raphael surpassed him in his inventiveness, it was unquestionably Antonio who was responsible for bringing the methods of design and the elaboration of detail to a level previously unequalled—a level that remained obligatory for Peruzzi, Michelangelo, and Palladio, and that would also find expression before long in the greater precision with which antiquity was drawn.

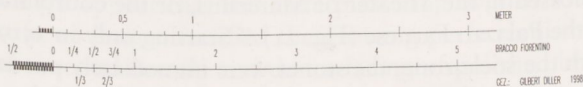
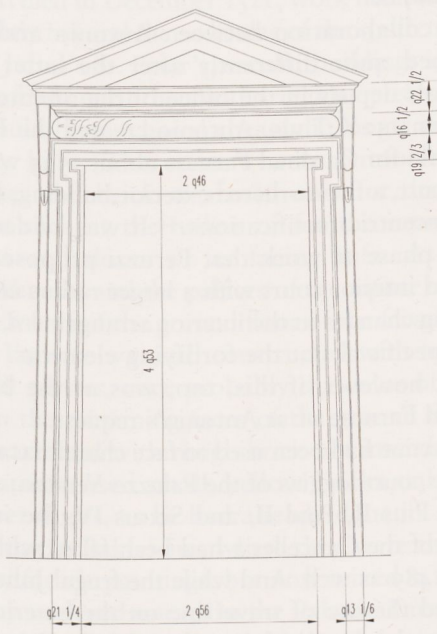
Antonio was probably also the most conscientious and informed of all in his understanding of Vitruvius and the norms of ancient architecture:<sup>35</sup> "Tenne continuo gli occhi nelle cose che fece, che non uscissero fuor de' termini et misure di Vitruvio; et continuamente infin che morì studiò quello."<sup>36</sup> Bramante in Rome was the first to take up Alberti's legacy, and



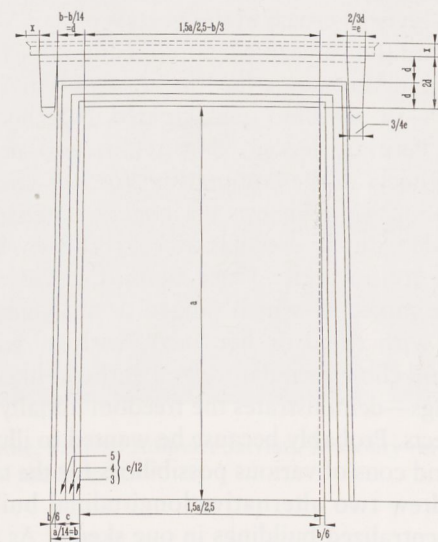
17 Antonio da Sangallo the Younger. Study of ca. 1519 for the ambulatories of St. Peter's (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 122A r.), detail.



18 Giulio Romano for Raphael. Study of ca. 1519 for the courtyard of the Palazzo Branconio dell'Aquila (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 1884A r.), detail.



especially since the Tempietto he had sought to reconstruct ancient building types and orders according to Vitruvius and his interpreters. In the courtyard of the Palazzo Farnese and the garden portal of Johannes Goritz, Bramante's pupil Antonio already went well beyond his teacher's portal of the Tempietto by looking to Vitruvius, Alberti, and ancient monuments even for the proportions and details (Figs. 19, 20). Rules and prototypes were becoming ever more binding, the margin for personal creativity ever more narrow.<sup>37</sup> In the following decades, Antonio concerned himself increasingly with the reconstruction of Vitruvius, particularly with his Ionic order, perhaps because Bramante had concentrated primarily on the Tuscan, Doric, and Corinthian orders.<sup>38</sup> Despite his philological precision, however, he never became a rigid dogmatist. The *porta ionica* described by Vitruvius seemed to him too squat, its frame too narrow, its volutes too short, and Virtruviu's ionic frieze so low



19 Redrawing of Giovanfrancesco da Sangallo's drawing of Antonio da Sangallo's portal of Johannes Goritz on U 989A r. (drawing: G. Diller).

20 Redrawing of Vitruvius's Porta Dorica (drawing: G. Diller).

that he could even dismiss it as “goffo.”<sup>39</sup> But he knew that Vitruvius’s text had been transmitted in a corrupt, unreliable form and questionably reconstructed, and that Vitruvius’s explanatory illustrations and the texts of other ancient authors which had once facilitated the understanding of Vitruvius were missing. With the help of humanistic friends, he undertook the study of surviving Vitruvius manuscripts, studied the relation of the ancient monuments to Vitruvian principles, and produced corresponding reconstruction drawings. In doing so he also relied upon his “giudizio,” which he had refined through the constant observation of ancient monuments and decades of experience. By repeatedly multiplying Vitruvius’s proportions and their measurements until no fractions remained and he had thousands of moduli to work with, he attained a precision and quality in his studies of Vitruvius that neither Vignola nor Palladio would surpass.<sup>40</sup> As the heir of Bramante, his two uncles, and Raphael, he must have felt himself responsible for the future of architecture. He looked for new norms that would join the splendor of antiquity with his own, in some respects divergent, sense of form, that would do justice to the traditions and functions of his time, and that would make it possible for future generations to continue building on the same level. Other masters, even Palladio, profited from the unique consistency of his systematic methods, but for the most part they gave far more latitude to artistic inspiration—whether Peruzzi in the portals of San Michele in Bosco and the Palazzo Massimo, Giulio in Mantua, Sanmicheli in Verona, or Jacopo Sansovino in Venice.

In 1518–19 Antonio participated together with Raphael, Peruzzi, Jacopo Sansovino, and possibly other architects in the competition for San Giovanni dei Fiorentini.<sup>41</sup> Now it was no longer a single patron who decided but a democratic jury chosen by the Florentine confraternity. Once again, the wide variation in the projects—which ranged from longitudinal buildings with three or five bays, with or without transept and choir ambulatory, to Pantheon-like circular buildings—demonstrates the freedom initially given the architects. Probably because he wanted to illustrate the pros and cons of various possibilities for the clients, Antonio drew two alternative longitudinal buildings and two centralized buildings in one sketch. As is still evident from the prints made by his pupil Labacco in 1552, he gave priority to the circular building with engaged columns, sketching only that alternative twice in elevation. The closeness of the drawing to other projects from the spring of 1519, such as the final project for St. Peter’s and the circular courtyard of the Villa

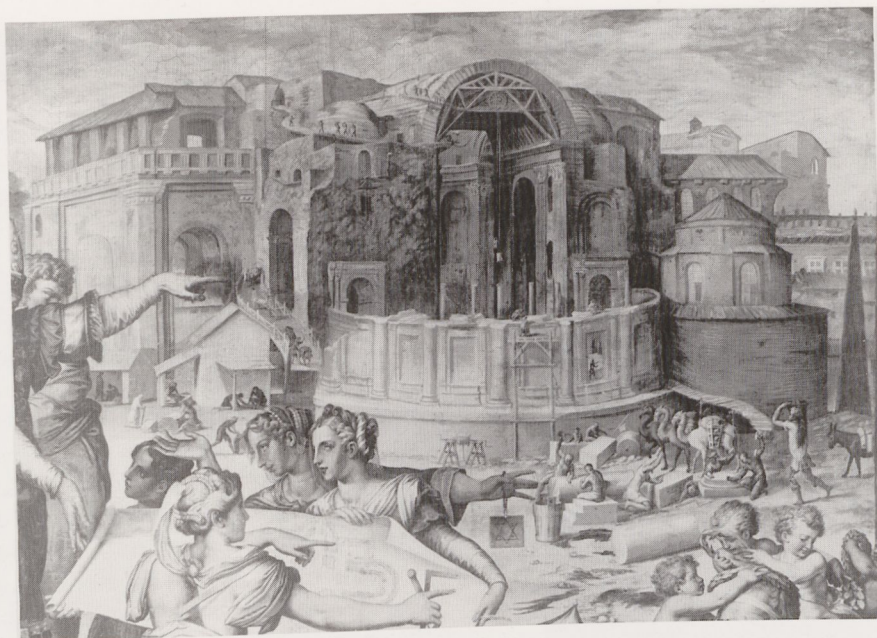
Madama, is unmistakable, but it also reveals Antonio’s creative limitations. In 1521, when Antonio succeeded Jacopo Sansovino, who had emerged as the triumphant winner in the competition but had failed in the construction of the project, he had to take Sansovino’s costly Tiber foundation into account. Thus he proposed a longitudinal building with a quincunx choir, though it, too, was not constructed.

The competition for the facade of San Lorenzo in Florence, which the pope finally assigned to Michelangelo, was less democratic. In his inventiveness and in the unprecedented care with which he searched for a convincing solution and made preparations for the final project, the wooden model, and the execution of the building, Michelangelo left the slightly earlier projects of Giuliano da Sangallo far behind, just as Antonio managed to do at the same time, though with more modest means, in his plans for St. Peter’s.<sup>42</sup>

How complex could be the apportionment of contributions by various architects at that time is demonstrated by the planning of the Villa Madama.<sup>43</sup> The two Medici cousins evidently first gave the commission to Raphael and only called in Antonio when the unsafe terrain posed technical problems. The latter revised the entire ground plan, but still had to leave the articulation of the elevation to Raphael and his pupil Giulio.

The collaboration between Antonio and Peruzzi developed quite differently after the latter became Antonio’s deputy in the office of the architect of St. Peter’s in 1520. Thus, Antonio created the Rocca of Caprarola for Cardinal Farnese about 1525 with a circular court, a five-cornered exterior building, bastions, and concentric fortifications.<sup>44</sup> It was evidently in a second phase of work that Peruzzi proposed a five-cornered interior court with a larger radius and corresponding changes in the interior arrangement, without being specific about the fortifying elements. It is not known, however, if this, too, was at the behest of Cardinal Farnese or at Antonio’s request.

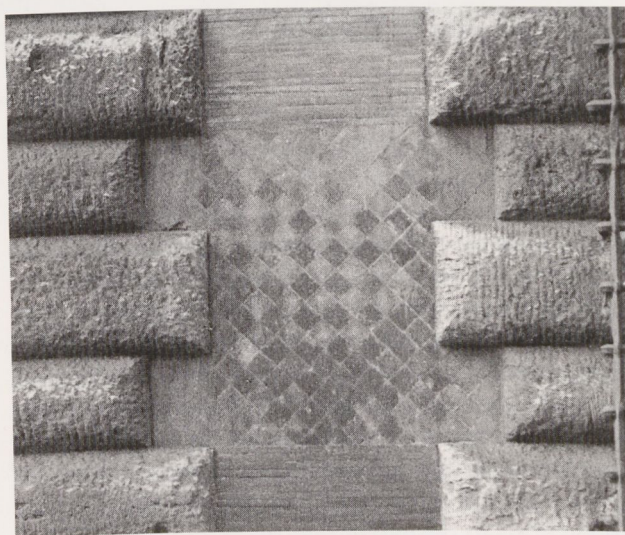
Travertine had been used to face church facades, and even the court loggias of the Palazzo Venezia, since the time of Pius II, Paul II, and Sixtus IV; the imposing facades of the Cancelleria had been faced with travertine in 1489 as well. And while the frugal Julius II had restricted the use of travertine on the exterior of St. Peter’s to the details of the colossal order, Leo insisted, probably from the beginning, on travertine, like the Colosseum, the Theater of Marcellus, or the courtyard of the Palazzo Farnese (Fig. 21).<sup>45</sup> Starting only in 1519 with the socle zone, the stones were immediately put in place, the stone masons winning out over the brick lay-



21 Giorgio Vasari. View of the south transept of St. Peter's, 1546 (Rome, Palazzo della Cancelleria), detail.

ers. However, the project soon proved so costly that when Leo died in December 1521, work had progressed only slightly beyond the aediculas of the south transept.

As in Julius's St. Peter's, secular buildings in Rome had been built until then with irregular pieces of tufa which could be purchased cheaply in Rome and were relatively light. The corners were reinforced with travertine, and brick was used only for decorative members such as the orders or for the insertion of windows and doors or as facing tufa. As in the Palazzo Venezia and the palaces of the *nipote* of Sixtus IV, the left half of the ground floor of the facade of the Palazzo Farnese was still constructed with tufa covered with plaster, once probably the color of travertine.<sup>46</sup> In the remaining faces of the ground floor the tufa was covered with rough brick not intended to be seen. Antonio used small, yellow bricks only at the two upper floors, as he had already done in 1513-14 in the Palazzo Baldassini, where they were then concealed by facade paintings, but now mixed in an arbitrary way with red ones. On the Palazzo Farnese and related palaces light *scialbo* may have tied together the heterogeneous parts of the facade. At any rate, it would appear that the mere plastering over of rough tufa no longer satisfied the growing perfectionism of the second decade and that a facing of polished brick was intended either to create a smooth surface for



22 Rome, Palazzo Adimari-Salviati. Masonry on the ground floor of the facade.

stuccoing or, less probably, a bicolored contrast between travertine and brick.<sup>47</sup>

Although shortly afterward Giulio even revived *opus reticulatum* on the facade of the Palazzo Adimari, no doubt for similar reasons,<sup>48</sup> such experiments had no sequel (Fig. 22). In the Villa Turini



23 Rome, Villa Madama. Masonry of the northeast facade.

Lante and the Palazzo Stati, he already returned to simple tufa masonry and brick for decorative members and blank panels. In the Palazzo Caprini, Bramante had demonstrated as early as 1501 how a magnificent travertine architecture could be simulated by the use of tufa, brick, and stucco.<sup>49</sup> This encouraged even economical clients to commission projects of high architecture and initiated a development that reached its climax with Raphael, Giulio, and Palladio, most brilliantly in Raphael's Palazzo Branconio dell'Aquila, begun in 1518, and on the exterior of the Villa Madama, which, however, was never completed.<sup>50</sup> There Raphael must have tried to reduce expensive brickwork—to the extent that the positioning and stabilization of the small tufa blocks would allow—by using the late antique method of alternating many layers of tufa with a few layers of brick (Fig. 23). Here, too, the important thing was to create as smooth a surface as possible for the planned stucco in *marmo finto* and straight edges for the pilasters and blank panels. On the moldings he inserted pieces of travertine to guide the plasterers in making exact profiles.

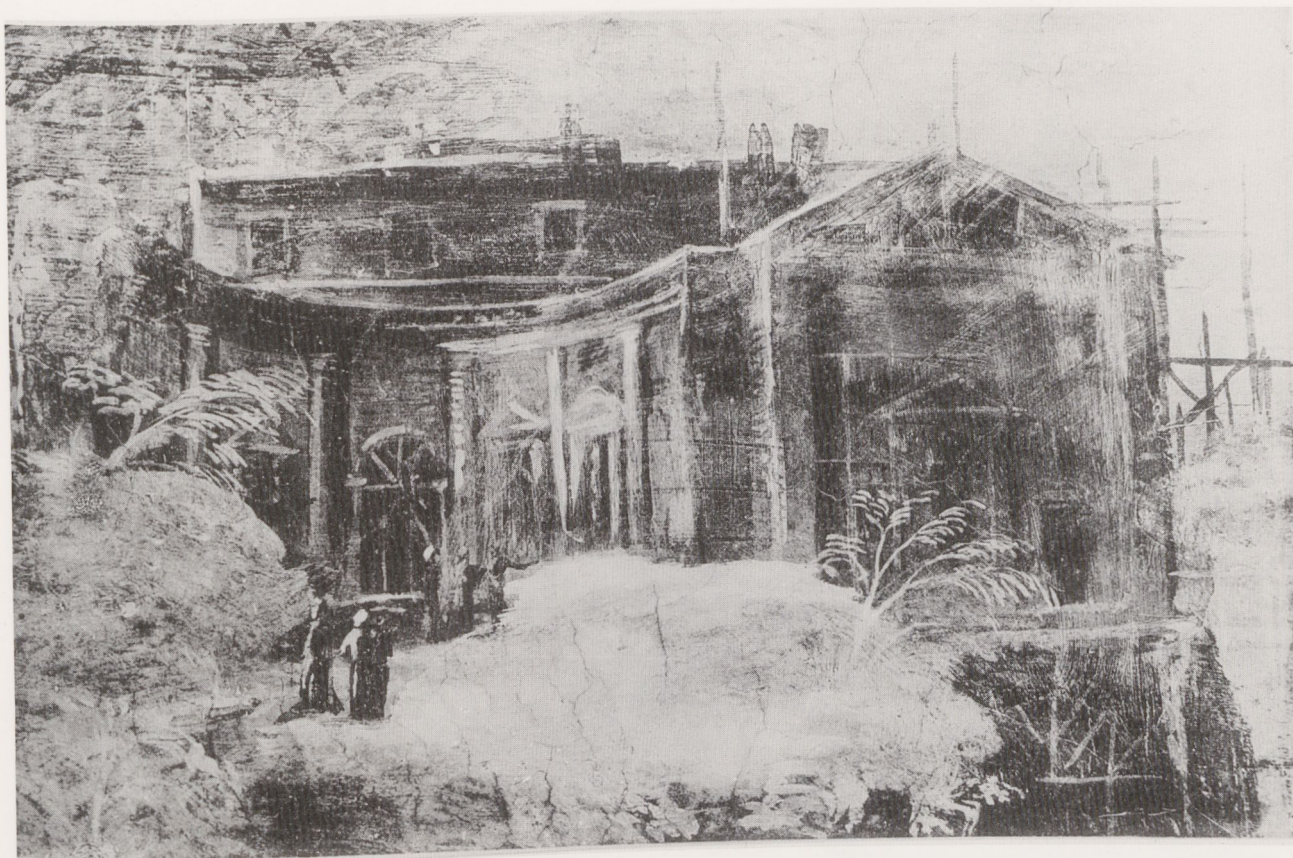
In the 1532 facade of the Palazzo Massimo, Peruzzi was able to imitate the travertine blocks of the ground

floor so deceptively in stucco on the upper stories that he was immediately emulated.<sup>51</sup> Antonio always insisted on genuine materials—not unlike Michelangelo, on whose facades ornament played a much greater role.

The Villa Madama, like Peruzzi's Villa Farnesina some thirteen years before, belongs among those rare buildings which for the most part allowed for free planning. While most churches were bound to preceding structures and most palaces and houses to a narrow network of streets and to old masonry, a villa *all'antica*, by its very nature, could develop freely. When the Villa Madama was planned, Raphael and his patrons evidently drew on a variety of prototypes: the terrace-form complex was inspired by the Villa Medici in Fiesole; such elements as the vestibulum, atrium, peristylum, hyppodromus, *dieta*, and *xystus* go back to descriptions of ancient houses, especially by Vitruvius and Pliny the Younger; and some of the spaces—the loggias, the triple-aisled vestibulum, and the chapel—are inspired by such contemporary interpretations of ancient buildings as the Tempietto, the "Ninfeo" in Genazzano, and the atrium of the Palazzo Farnese. For the body of the structure and the most important dimensions, the example was set by the most prominent palaces, such as the Palazzo Farnese, begun shortly before: not only is the floor area of the residential wing and the height of the facade block almost the same, but so is the clear width of the courtyard in Raphael's first project. The floor measurements of the residential rooms are likewise similar, and even the dimensions of Raphael's unexecuted domed hall would find an echo after 1540 in the *salone* of Antonio's papal project.<sup>52</sup> In other words, there were empirical standards for life in a courtly environment upon which planning could be based.

In Raphael's planning, whole numbers had symbolic importance, as they had for Bramante. Thus, the number 11—so significant in the life of Leo X—recurs in the most important measurements, from the width of the stairs and the clear dimensions of the courtyards to the total height and length.<sup>53</sup> Raphael also aimed from the outset for "musical" proportions—for instance, 1:3 in the facade block—whereas the more empirical Antonio used the window axes and the height of the stories as a starting point in his elevation, rather than the overall dimensions. As a result, the module number 11 noticeably lost its importance when he revised Raphael's ground plan.

Characteristically, Raphael's most important pupil, Giulio, was already treading a new path. Even though in the Villa Lante he likewise based the body of the building on whole ground-plan dimensions and basic



24 Giulio Romano. Battle of Constantine, detail with Villa Madama under construction (Vatican, Sala di Costantino).

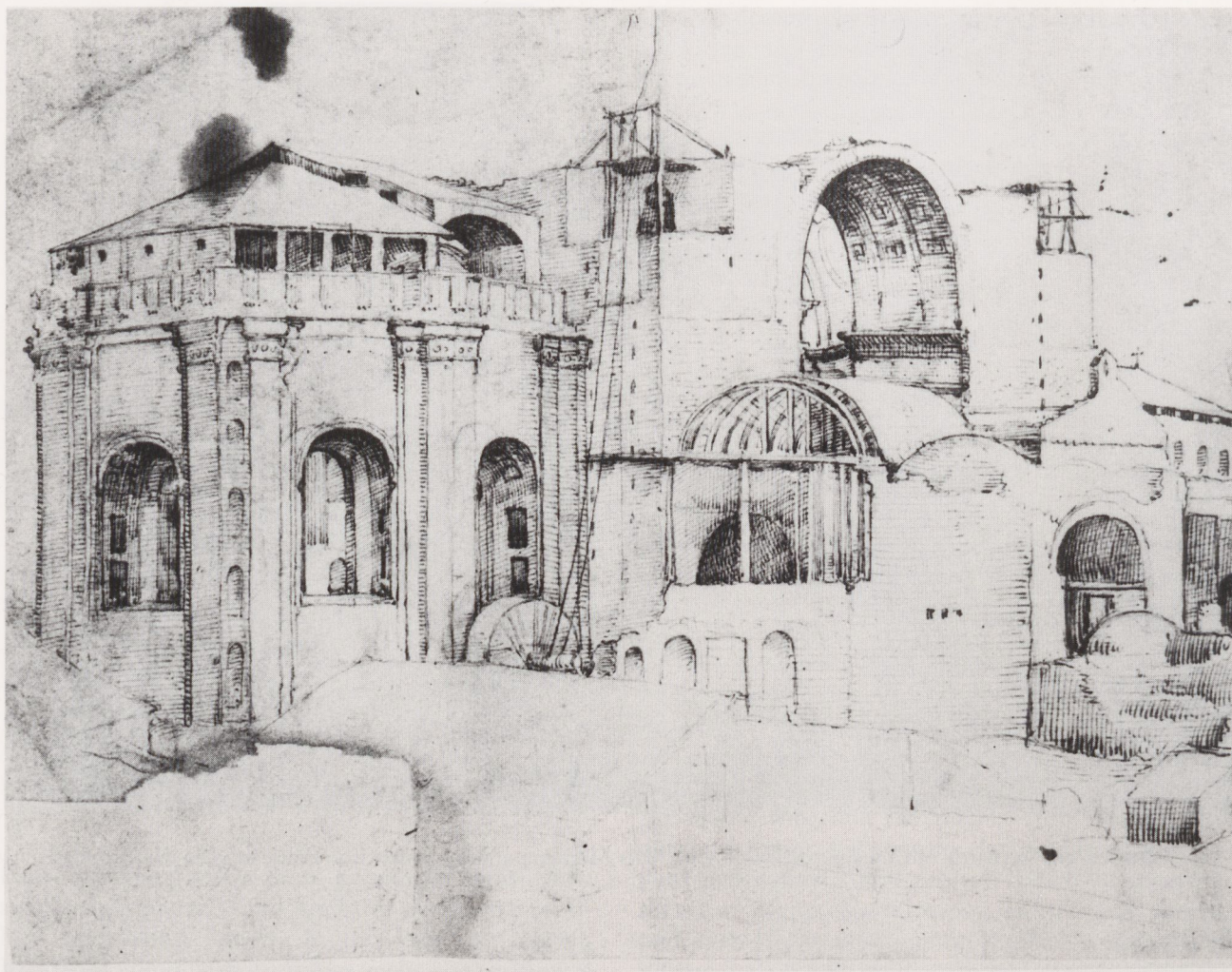
geometric shapes like the square and the cube,<sup>54</sup> he varied the widths of pilasters and bays during the complex design process in unprecedented ways, so that each of the four facades would correspond to the interior organism and still make a distinctive—in places even deliberately dissonant—effect. In doing so, he followed the same tendency to subjectivize that marks his interpretation of the orders and architectural ornament, and that seems to have especially impressed Michelangelo.

The Villa Madama is one of the many architectural commissions that never went beyond the first phases of construction (Fig. 24). From the start, the vast project was divided into several phases, beginning with a complete residence that could be occupied relatively quickly. Work came to a halt after Leo's death in December 1521, and the real patron, Giulio de' Medici, who became pope in 1523, had little interest in continuing it—not least because he gave increasing priority to religious buildings.

Perhaps with an eye to the political climate in Rome, Julius II had discontinued the Palace of Justice—begun

in 1508 at very great expense—after only a brief period of construction.<sup>55</sup> Several teams had apparently been working there in various places at once. The palaces of such wealthy merchants as Girolamo Pichi<sup>56</sup> and Angelo Ceci<sup>57</sup> and of the bishops Giannozzo Pandolfini<sup>58</sup> and Filippo Adimari also remained unfinished. The immensely rich camerlengo Cardinal Raffaele Riario, on the other hand, was able to complete the luxurious Cancelleria during his lifetime,<sup>59</sup> and Cardinal Farnese was raised to the papacy in time to bring his palace nearer to completion. Lesser patrons, such as Leo's personal physician, Jacopo da Brescia, and Raphael's friends Turini and Branconio were often wealthy and realistic enough to gain enjoyment of their *palazzetti* relatively quickly.<sup>60</sup> If shrewd speculators like Giuliano Leno or Giuliano Alberini generally began by building shops on the ground floor of centrally located palaces it was in order to finance the upper stories by renting out the shops.<sup>61</sup>

The surprisingly few sacred buildings commissioned during these decades fared no better. Most of

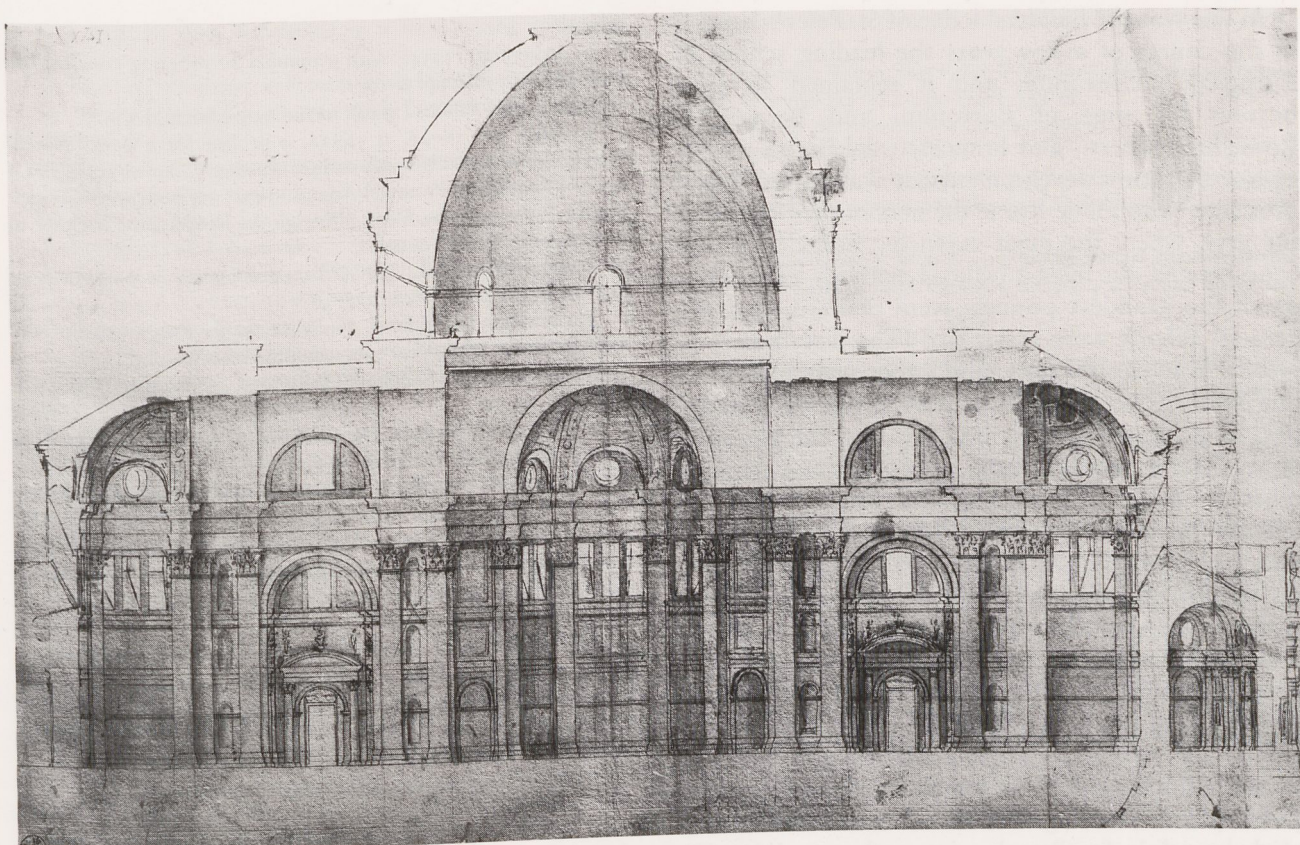


25 J. Scorel. St. Peter's from the southwest, 1524 (Biblioteca Vaticana, Disegni Ashby n. 329), detail.

them were centers for national or guild confraternities, which had only modest means at their disposal. Thus the national churches of the Spaniards,<sup>62</sup> the French,<sup>63</sup> the Florentines and the Siennese,<sup>64</sup> the guild churches of the goldsmiths,<sup>65</sup> bakers,<sup>66</sup> *mulattiere*, and *barcaroli*,<sup>67</sup> were completed only long after they were begun. Most of the other sacred buildings of these years, for example Santi Celso e Giuliano,<sup>68</sup> San Biagio,<sup>69</sup> and San Marcello,<sup>70</sup> shared the same fate; the churches of the Germans<sup>71</sup> and of the Ospedale di Santo Spirito<sup>72</sup> were exceptions in being completed relatively quickly.

How directly a course of planning was connected with the person of the patron and the architect is demonstrated by further events in the builders' lodge of St. Peter's.<sup>73</sup> It was probably only after Raphael's

death in April 1520 that Antonio dared to formulate his biting memorandum criticizing the projects of Bramante and Raphael. When Leo was willing to accept only a partial change, Antonio had a small wooden model made on a scale of 1:120 to show the results of the compromise: he could not convince the pope to abandon the ambulatories, but to accept the dome over the middle aisle and the shorter nave. Even though his new partner, the painter-architect Baldassarre Peruzzi, advocated a return to a pure centralized structure, Clement VII, too, seems to have wanted to retain this project. From 1523 on, work continued without any obvious change in plan; but now focus was on the transept, which was indispensable for the vaulting of the dome (Fig. 25). Only the catastrophic Sack of Rome compelled Clement to



26 Antonio da Sangallo the Younger. Study for St. Peter's, ca. 1538 (Florence, Uffizi, Gabinetto dei Disegni e delle Stampe, U 66A), detail.

make a further drastic reduction, though it seems not to have gone beyond some sketches by Antonio and Peruzzi.

Unlike the second Medici pope, whose priority had been to continue the projects of the first, the Farnese pope Paul III initiated a completely new plan at the end of 1534. Having recognized the problems inherent in Leo X's change in plan, he tried to move closer again to the projects of Julius II; indeed, not only to Bramante's final project, for which Antonio seems to have argued, but also to a pure centralized domed building—evidently a special preference of his—which Peruzzi advocated. The unhappy compromise agreed upon in 1538 led to the famous—or notorious—wooden model which Antonio prepared in a further phase of planning with unparalleled precision and a unique technical skill. He may have prepared in the apses, and probably also in the dome, that more rational rib construction which he had seen in the dome of Florence Cathedral and which was to be realized by

Michelangelo (Fig. 26). Antonio's intention was undoubtedly to use the drawings for the model as the basis for constructing the building itself.<sup>74</sup> Meanwhile, he continued to work on the vaulting of the transept, which was barely affected even by the most recent change in plans; hence when Michelangelo became the sole architect in charge of the builders' lodge in 1546, he was faced with the same dilemma as the planners of 1534–38.<sup>75</sup> Only he possessed the authority to convince Paul III to eliminate the ambulatories and return to a pure centralized building that was sculptural and compact even on the outside, though it meant leaving the connection to the papal palace unsolved. For the exterior articulation he looked to Bramante's colossal order and its rhythm but kept Leo's reference for richer travertine facing—far surpassing it, however, in his decoration of the niches and aediculas and in the beauty of his detail. The articulation of the wall reached a level never before achieved—climaxing a development that had been under way since about 1514.

In this way the builders' lodge of St. Peter's became in the course of a few years the leading school of European architecture, and it remained so even beyond the time of Borromini and Bernini. If Rossellini, Alberti, and Francesco del Borgo set the course of future developments, it was Julius II and Bramante who made Rome the uncontested center of the arts, where the most extensive knowledge was concentrated, the most advanced methods were developed, the grandest projects were realized, and the greatest talents were assembled. The last came primarily from central Italy, and either were related to one another, were friends, or were bound by regional ties. They expended their best ideas on the planning of St. Peter's, which in turn influenced most of their other projects. The increasingly intense dialogue between these masters, their ever deeper penetration into the secrets of architecture, their increasingly sure instinct for uniting the medieval heritage with the antiquity they so admired, and their constant competition with one another, which uniquely activated their powers—all these explain the powerful thrust given the architecture at that time. Although the Roman Empire may have been more innovative, and medieval sacred buildings may be more convincing to the religious eye, no building is more a work of "art" than Michelangelo's St. Peter's—art understood as the expression of the creative power and creative experience of an entire epoch. The builders' lodge of St. Peter's was the germ of all future developments. It is no accident that many of the principles and methods of design and construction worked out then have survived into our own century, and Antonio da Sangallo the Younger was probably its most perfect draftsman and constructor.

#### NOTES

1. Ackerman (1954), with a number of differing conclusions; Frommel (1973), I, pp. 6–10.
2. Frommel-Adams (1994), including bibliography.
3. Ibid., pp. 10–26. U 1642A, a project for a poorhouse in Florence, may possibly be his earliest drawing (Günther [1988], 114, fig. 7; Frommel, in Frommel-Adams [1994] 12; both with an attribution to Antonio the Elder, although the handwriting is closer to that of Antonio the Younger).
4. Spiro Kostof, ed., *The Architect: Chapters in the History of the Profession* (New York, 1977).
5. Christoph L. Frommel, "Sulla nascita del disegno architettonico," in Millon (1994) 101–20, including bibliography.
6. For Antonio's residential buildings, see Frommel (1973) II: 292–304, 315–21.
7. James S. Ackerman, *The Cortile del Belvedere* (Vatican City, 1954); Christoph L. Frommel (1998).
8. Per Gustaf Hamberg, "Vitruvius, Fra Giocondo and the City Plan of Naples," in *Acta Archeologica* 36 (1965) 119–22; Cesare De Seta, "La struttura urbana di Napoli tra utopia e realtà," in Millon (1994) 354f., who sees an urban scheme with the *tre decumani* of Naples represented on the sheet.
9. Frommel, in Frommel-Adams (1994) 11.
10. Bruschi (1969) 463–527; Christoph L. Frommel, "Genesi e ricostruzione del progetto bramantesco," in *Il Tempietto del Bramante*. Acts of the Student Conference, Rome, 1997, ed. Christoph L. Frommel, Felipe Garin, and Manfred Schuller (in press).
11. Bruschi (1996); Bruschi, in this volume.
12. Christoph L. Frommel, "Bramante e il disegno 104 A degli Uffizi," in *Il disegno di architettura*. Acts of the Congress, Milan, 1989, ed. Luciano Patetta (Milan, 1990) 161–68, including bibliography.
13. Christof Thoenes and Hubertus Günther, "Gli ordini architettonici: rinascita o invenzione I–II," in *Roma e l'antico nell'arte e nella cultura del Cinquecento*, ed. Marcello Fagiolo (Rome, 1985) 261–310.
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15. Frommel, in Bruschi (1996) 263–68.
16. Frommel-Adams (1994) 23–26.
17. Frommel, in Millon (1994) 611f.
18. Frommel-Adams (1994) 19, 40, 243f., 261, 266f.
19. Frommel, in Bruschi (1996) 268–76.
20. For Sangallo's *vita*, see Bruschi (1983); on Sangallo's first buildings, see Christoph L. Frommel, in Frommel (1986a).
21. Frommel (1973) II: 25, 118f.; Frommel (1981); Enzo Bentivoglio, in Frommel (1984a) 130f.; on Antonio's section U 627A for the Palazzo Farnese, see Christof Thoenes (1993), 567; Christoph L. Frommel, in Frommel-Schelbert (forthcoming).
22. Frommel (1981) 168 n. 218; on Sangallo's later survey U 1165A r. and v. of the Hercules temple in Cori and its volute portal, see Günther (1988) 194.
23. Frommel, in Frommel (1984a) 266–97; Arnaldo Bruschi, in this volume.
24. Frommel-Schelbert (forthcoming).
25. Frommel (1973) II: 122, pl. 166f.; Frommel-Schelbert (forthcoming).
26. Frommel (1981) 161f. The contract of 1524 with a stonecutter for the portal of the church of Cellere proves that drawings for details were made only when a building had reached the respective

level (F. Fagliari Zeni Bucchichio in a forthcoming article on Cellere).

27. Ibid. 141; Frommel, in Frommel-Schelbert (forthcoming).
28. Frommel (1973) I: 63, pl. 188d; Frommel, in Frommel-Schelbert (forthcoming).
29. Frommel, in Frommel-Schelbert (forthcoming).
30. Frommel (1981) 149-55.
31. Frommel (1997).
32. Frommel (1973) I: 60-66.
33. Frommel (1981) 127-49; Christoph L. Frommel, "Palazzo Farnese a Roma: L'architetto e il suo committente," in *Annali di Architettura* 7 (1995) 7-18.
34. Frommel, in Bruschi (1996) 271-76; Bruschi, in this volume.
35. Pagliara (1986) 4-85; Pagliara (1988) 181-206; Günther (1988) 256; Frommel (forthcoming).
36. Giorgio Vasari, *Le vite* (Florence, 1550) 866.
37. Frommel (forthcoming). Maurizio Ricci is preparing a study of the relationship between *regola* and *giudizio* in the architectural theory of the Renaissance.
38. Pagliara (1992) 137-56.
39. Pagliara (1986), p. 51 n. 24; see Sangallo's introduction to a planned commentary on Vitruvius, in Giovannoni (1959) 394f.; Günther (1988) 297 n. 205.
40. Pagliara (1988a) 169-74; Francesco Paolo Fiore, "Rilievo topografico e architettura a grande scala nei disegni di Antonio da Sangallo il Giovane per le fortificazioni di Roma al tempo di papa Paolo III," *ibid.*, 175-80.
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42. James S. Ackerman, *The Architecture of Michelangelo* (London, 1964) I: 11-20; II: 3-17.
43. Frommel, in Frommel (1984a) 311-56; Christoph L. Frommel, in *Giulio Romano* (Milan, 1989) 98-103, 290f.
44. Frommel, "Zum Bautypus des 'Palazzo in fortezza,'" in *Acts of the Conference Italienische Renaissancebaukunst an Schelde, Maas und Niederrhein* (in press).
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47. Pier Nicola Pagliara, "Murature laterizie a Roma alla fine del Quattrocento," in *Ricerche di storia dell'arte* 48 (1992) 43-54.
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