27 • Portraying the City in Early Modern Europe: Measurement, Representation, and Planning

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The Renaissance saw an explosion in the production of images of cities. One estimate puts at about thirty the number of city views with a geographically identifiable subject made before 1490.[1] A century later, the same category was so large that no one has counted the images from that period. The six volumes of the *Civitates orbis terrarum* that Georg Braun and Frans Hogenberg produced between 1572 and 1617 alone collected 546 images for publication.

The distinctive characteristic of these images is their specificity. Where medieval representations of cities were ideal and conventional, those of the Renaissance responded to a new demand for topographical information. In the course of the fifteenth and sixteenth centuries, the makers of the images of cities developed the techniques for recording and representing the distinctive spatial and material conditions of individual sites, and for the first time this kind of detail was fundamental to the authority of an image. Nature and architecture together—the city and the surrounding countryside—were the subjects of these images, the first popular form of the Ptolemaic chorography.

The new type of city view appeared in forms as various as the audiences for which they were intended. The most widely disseminated is the one represented by Braun and Hogenberg's atlas of cities.[2] Readers—whether merchants or scholars—used the book to expand their knowledge of the world, without, as Braun reminded them, the hardships of physical travel. The views were magnets for information, and the texts that Braun wrote for the obverse of the printed pages supplemented what the pictures could communicate. The *Civitates* depended on images contributed by its readers. The merchant Joris Hoefnagel sent the publishers ninety-one views of places he had seen. In his images, following a tradition that stretches back to the earliest topographical views, a traveler in the foreground marks his own presence at the site.[3]

Cities were the focus of geographical interest because they had become the capitals of political, cultural, and economic life in Europe and key fortresses in the system of military defense. As the capitals of territorial states, cities were also their most powerful symbol. Collections of city views decorated public places and carried messages of alliances and territorial possession. Representations of the cities of the Medici state, along with the views of Austria executed for the Palazzo della Signoria to welcome the arrival of Duke Francesco I and his bride Joanna of Austria in 1564, do both. The symbolic value of cities could also be marshaled as part of grand historical narratives. For example, in 1580–81, in the Sala delle Carte Geografiche in the Vatican, maps and views of cities were part of a representation of ecclesiastical history claiming the Italian peninsula as the site of pious deeds and the homeland of the Catholic religion.[4]

Individual images of cities, often produced and distributed in a multitude of copies by means of woodcut or engraving, inspired the most complex representational strategies. Whether they were instruments of propaganda sponsored by government or commercial ventures aimed at a more general public, the challenge of picturing the city included the need to characterize it. Humanist theory of the city supported this effort by equating the physical city with its residents. Leonardo Bruni, chancellor of the Florentine Republic from 1427 until his death in 1444, wrote that "Florentines are in such harmony with this very noble and outstanding city that it seems they could never have lived anywhere else. Nor could the city, so skillfully created, have had any other kind of inhabi-

Abbreviations used in this chapter include: BAV for the Biblioteca Apostolica Vaticana, Vatican City, and *Città d'Europa* for Cesare de Seta, ed., *Città d'Europa: Iconografia e vedutismo dal XV al XVIII secolo* (Naples: Electa Napoli, 1996).

1. Wolfgang Behringer, "La storia dei grandi Libri delle Città all'inizio dell'Europa moderna," in *Città d'Europa,* 148–57, esp. 155.

2. The history of city atlases begins in the fifteenth century with the illustration of chronicles of world history. Among the works of Braun and Hogenberg's predecessors, Johannes Stumpf's *Gemeiner loblicher Eydgnoschafft Stetten, Landen vnd Völckeren Chronick,* known as the Swiss Chronicle (Zurich, 1548), and Lodovico Guicciardini's *Descrittione di tutti i Paesi Bassi* (Antwerp: Gugliemus Silvius, 1567) stand out for the quality of their images. Sebastian Münster's *Cosmographia* (Basel: Henrich Pettri, 1544), especially in the revised editions published from 1550 forward, stands out for its range. See Behringer, "La storia dei grandi," 148–57.

3. Lucia Nuti, "The Mapped Views by Georg Hoefnagel: The Merchant's Eye, the Humanist's Eye," *Word and Image* 4 (1988): 545–70.

4. Juergen Schulz, "Maps as Metaphors: Mural Map Cycles of the Italian Renaissance," in *Art and Cartography: Six Historical Essays,* ed. David Woodward (Chicago: University of Chicago Press, 1987), 97–122.

tants." The equation works for individual buildings as well. The town hall "bespeaks by its very appearance the purposes for which it was constructed."[5] Of course, this is a classical idea, developed in Bruni's "Laudatio Florentinae urbis" of 1403–4 from Aelius Aristides, Quintilian, and the Byzantine scholar Manuel Chrysoloras.[6] The rhetorical tradition came into conflict with the new interest in topography when it applied geometric figures to the form of the city. Bruni mirrored Plato when he gave Florence the shape of a round shield and placed the town hall at its center. In its recourse to the hierarchies of geometry, the humanist's picture of the city was very similar to the symbolic representations of the Middle Ages. The strategies that Renaissance artists invented to give images of cities meaning without resorting to similar distortions of reality provided much of the tension in early urban cartography.

Closest in time and place to Bruni's "Laudatio" is the image of Florence (ca. 1485), by Francesco Rosselli, known through a sixteenth-century copy as "The View with a Chain." The view sets Florence into the topography of the Arno Valley and presents most of the city with locational and proportional values intact. The meaning of the image, though, is conveyed through physical distortions much like Bruni's. The city is represented in the guise of the New Jerusalem, with which it had been imaginatively identified since the late Middle Ages, geometrically centered on the swelling form of the dome of a cathedral that Florentines understood to reflect the design of Solomon's temple.

Rosselli inaugurated a modern tradition in the iconography of urban imagery when he titled the image "Fiorenza." In doing so he named the city using the toponym reserved in poetic practice to describe the city in times of peace and prosperity. Elsewhere in the image he used natural phenomena—leafing trees and an extreme northerly light source—to identify the season as summertime and the date as that of the summer solstice and the feast day of the city's patron, John the Baptist. All of these devices convey the same optimistic and celebratory tone; none disrupts the imitation of topography.[7]

Jacopo de' Barbari's magnificently descriptive bird's-eye view of 1500 Venice also uses its title to orient the viewer to its message. "Venetie" (at Venice) is the site where, at the top and bottom of the pictorial field, outsized figures of Mercury ("I Mercury shine favorably on this above all other emporia") and Poseidon ("I Neptune reside here, smoothing the waters at this port") celebrate the city as a commercial capital.[8] In the Renaissance, the representational elements of urban images moved to the perimeter of the composition. Benedit de Vassallieu dit Nicolay's perspective plan of 1609 Paris, to cite a northern European example, manipulates heraldic and allegorical devices to emphasize the city's role as the capital of the French nation. Relegating the city's arms to the bottom of the image, it positions those of the crown and the dedication to the king in the prominent upper left corner. A pictorial element, not the plan, makes the interpretive theme of the image explicit. Henri IV, on horseback, in armor and wearing the laurel wreath that marks his imperial rank, crushes his enemies and defends France and the city. Below the figure of the king, a quatrain paraphrases Augustus's *Res gestae*. The message is that, under Henry, "Paris is as Rome was under Augustus, the wonder of the world."[9]

Measuring the City: Italy and the Culture of Survey

Topography had not complicated the visual representation of cities before the Renaissance because the techniques to measure it were primitive and the ability to represent it graphically were nonexistent. Though a few schematic plans of cities are known from the Middle Ages, the detailed surveys of which we have records were transcribed in textual form. The documents that preserve the 1286 and 1294 surveys of the town hall and market squares at Bologna record the distances between a series of boundary stones that defended the open space belonging to the commune.[10] The line between these "termini" is nothing more than a dimension. The physical shape of the square or the street system could be known only by visiting the site.

A visual record of measured space was possible only in the Renaissance. The first, and formative, developments occurred in artistic and architectural circles in Italy, and from the beginning the new techniques were used to understand the city. Filippo Brunelleschi demonstrated his discovery of linear perspective in views of the town hall

5. Leonardo Bruni, *Panegyric to the City of Florence,* in *The Earthly Republic: Italian Humanists on Government and Society,* ed. and trans. Benjamin G. Kohl and Ronald G. Witt (Philadelphia: University of Pennsylvania Press, 1978), 135–78, esp. 136 and 141.

6. Christine Smith, *Architecture in the Culture of Early Humanism: Ethics, Aesthetics, and Eloquence, 1400–1470* (New York: Oxford University Press, 1992), 174–80.

7. David Friedman, "'Fiorenza': Geography and Representation in a Fifteenth Century City View," *Zeitschrift für Kunstgeschichte* 64 (2001): 56–77.

8. Juergen Schulz, "Jacopo de' Barbari's View of Venice: Map Making, City Views, and Moralized Geography before the Year 1500," *Art Bulletin* 60 (1978): 425–74, esp. 468 and 473, transcribing all the image's inscriptions, including "MERCVRIVS PRE CETERIS HVIC FAVSTE EMPORIIS ILLVSTRO" and "AEQVORA TVENS PORTV RESIDEO HIC NEPTVNVS."

9. Hilary Ballon, *The Paris of Henri IV: Architecture and Urbanism* (New York: Architectural History Foundation, 1991), 220–33, esp. 231.

10. Paola Foschi, "Il liber terminorum: Piazza Maggiore e piazza di Porta Ravegnana," in *Bologna e i suoi portici: Storia dell'origine e dello sviluppo,* ed. Francesca Bocchi (Bologna: Grafis Edizioni, 1995), 205–24.

and baptistry squares of the city of Florence (ca. 1420); Leon Battista Alberti presented the first system of geometric land survey in a pair of texts prepared around mid-century, and his test site was the city of Rome. His "Ludi rerum matematicarum" describes a primitive theodolite and defined the principles of triangulation that allowed the mapmaker to fix the position of monuments without direct measurement. The "Descriptio urbis Romae" gives an account of the map that survey had produced using a system of coordinates for transmitting the plan based on graduated scales on the circumference of the circle, his *horizonte,* and on the alidade he called a *radius*. The text records the data of the survey in a list that gives values of orientation and distance that together establish the position of each observed monument. None of the manuscripts of the "Descriptio" include an image, but the text is structured so that anyone who followed Alberti's directions for constructing the *horizonte* and *radius* could accurately reproduce the plan.[11]

The techniques of triangulation received wide circulation in the theoretical literature of the following century, beginning with their publication by Gemma Frisius in 1533. Cosimo Bartoli's *Del modo di misvrare le distantie . . .* of 1564 illustrates the method with a reconstruction of the survey of Florence and its immediate environs. Indirect measurement, called measurement "con la vista" in the literature, was facilitated by instruments that made observation easier and the translation of survey data into the graphic image more immediate.[12] The new techniques allowed mapmakers to fix the location of landmarks with reasonable precision, but this only partially resolved the problem of mapping the city. Triangulation could establish the spatial matrix of a plan, but it was of little value in the infinitely more complex job of defining the contour of the city's streets.

Raphael addressed this problem in his 1513–20 letter to Leo X describing the project to make a graphic reconstruction of ancient Rome. Raphael also used a theodolite—now improved by the addition of a magnetic compass to allow constant orientation—which he placed as near to the wall or street to be measured as the instrument allowed.[13] He determined the wall's orientation with the sighting vane that rotated around the center of the disk and measured its length. New sightings and measurements were taken at every point where the wall changed orientation.

Drawings from Raphael's circle demonstrate the application of the technique at the scale of the single building. The drawing (ca. 1519) defining the property of Giulio Alberini on the Via dei Banchi in Rome is inscribed with the orientation and length of each of the perimeter walls of the palace, then in the course of construction.[14] A line impressed in the sheet, not drawn in ink but marked at its ends S (for Settentrione, north) and M (for Mezzodi, south), further demonstrates the use of the compass and theodolite in preparing this true, if still limited, geometric survey. A sketch plan from the workshop of Antonio da Sangallo the Younger, dated to 1524–25, of streets near the Ponte Sant' Angelo in Rome, on which dimensions and orientations are inscribed, shows the first stages of the application of Raphael's technique to the plan of a larger urban complex.[15]

The overwhelming number of observations necessary to survey the infinitely irregular plan of a premodern city seems to have confounded any real attempt to make a complete map. Leonardo da Vinci's famous plan of Imola (1502) is a case in point (fig. 27.1). Because the city is inscribed in a circle whose circumference is divided into a compass of sixty-four units and inscriptions give the orientations of sightlines to neighboring towns, the plan is generally associated with Alberti's single-point mapping method. Though the city wall may have been surveyed following a system similar to the one described by Raphael and documented in Leonardo's notes about the defenses of Cesena and Urbino, preparatory sketches for the Imola street plan show no evidence of a geometric base.[16] Leonardo recorded only dimensions: the length of

11. Anthony Grafton, *Leon Battista Alberti: Master Builder of the Italian Renaissance* (New York: Hill and Wang, 2000), 241–48; Luigi Vagnetti, "La 'Descriptio urbis Romae': Uno scritto poco noto di Leon Battista Alberti (contributo alla storia del rilevamento architettonico e topografico)," *Quaderno* (Università a degli studi di Genova, Facoltà di architettura, Istituto di elementi di architettura e rilievo dei monumenti) 1 (1968): 25–79; idem, "Lo studio di Roma negli scritti Albertiani," including "Testo latino della *Descriptio urbis Romae,*" trans. G. Orlandi, in *Convegno internazionale indetto nel V centenario di Leon Battista Alberti* (Rome: Accademia Nazionale dei Lincei, 1974), 73–140; and Mario Carpo, "*Descriptio urbis Romæ: Ekfrasis* geografica e cultura visuale all'alba della rivoluzione tipografica," *Albertiana* 1 (1998): 121–42.

12. Daniela Stroffolino, "Tecniche e strumenti per 'misurare con la vista,'" in *"A volo d'uccello": Jacopo de' Barbari e le rappresentazioni di città nell'Europa del Rinascimento,* ed. Giandomenico Romanelli, Susanna Biadene, and Camillo Tonini, exhibition catalog (Venice: Arsenale Editrice, 1999), 39–51, and idem, *La città misurata: Tecniche e strumenti di rilevamento nei trattati a stampa del Cinquecento* (Rome: Salerno Editrice, 1999). The graphic notation of compass surveys for a plan of Florence of about 1546 by Antonio da Sangallo the Younger are preserved in the drawing cabinet of the Uffizi in Florence and published in Christoph Luitpold Frommel and Nicholas Adams, eds., *The Architectural Drawings of Antonio da Sangallo the Younger and His Circle,* vol. 1, *Fortifications, Machines, and Festival Architecture* (New York: The Architectural History Foundation, 1994), 128–30. Four sheets survive: U 771A, U 772A, U 773A, and U 774A.

13. Arnaldo Bruschi et al., eds., *Scritti Rinascimentali di architettura* (Milan: Il Polifilo, 1978), 459–84, esp. 478.

14. Florence, Uffizi 2137A. Published in Christoph Luitpold Frommel, Stefano Ray, and Manfredo Tafuri, eds., *Raffaello Architetto* (Milan: Electa Editrice, 1984), 181 (fig. 2.7.6).

15. Florence, Uffizi UA 1013. Published in Hubertus Günther, "Das Trivium vor Ponte S. Angelo: Ein Beitrag zur Urbanistik der Renaissance in Rom," *Römisches Jahrbuch für Kunstgeschichte* 21 (1984): 165–251, esp. 234–39.

16. Leonardo executed the surveys as military architect for Cesare Borgia. His notes record the lengths of segments of the city wall and

FIG. 27.1. IMOLA, LEONARDO DA VINCI, 1502. A modern survey has been laid over the sixteenth-century plan. The comparison shows that Leonardo did not always capture the shape of the plan, and that often when his survey differs from the plan on the ground, it has the apparent intention of improving the plan's formal composition. Leonardo executed the drawing in connection with a commission from Cesare Borgia to examine the papal fortresses of the Romagna. He inscribed it inside a circle whose perimeter is divided into eight winds, each with eight subdivisions. Inscriptions to the right and left of the circular plan give (inaccurately) bearing and distance to neighboring towns. See figure 36.16.
Base photograph courtesy of the Royal Collection © 2006, Her Majesty Queen Elizabeth II. Royal Library, Windsor (Cod. Atlantico 12284). Linework for overlay by Tim Morshead.

blocks, measured from the centers of intersecting streets. The sketches of the plan of the former Roman colony from his uniquely accomplished hand are remarkably accurate, but they do not include the compass bearings that would have measured the orientation of streets. Numerous differences separate the finished image and the sketches. Many of them, and particularly the curved course of the main street, appear to have been determined imaginatively, and they have the effect, and apparently the purpose, of giving the plan a greater organic coherence.

The uniquely high quality of the Imola plan may be best judged by comparing it with a plan of Pisa executed between 1474 and 1495 and preserved in a copy sometimes attributed to Giuliano da Sangallo (fig. 27.2).[17] The accuracy of this representation is very uneven. Some details, especially the citadels of the newly recaptured city, which were of special interest to Giuliano in his capacity as military architect of the Florentine forces, are well recorded, as are central components of the street system. At the same time, the plans of whole quarters are fanciful inventions, and the orientation of some main streets is wildly off. Clearly, these areas were not surveyed. The size and complexity of Pisa's medieval street system made the job of mapping the city infinitely more complex than Leonardo's task at Imola. The mapmaker compromised by focusing his attention on a limited number of central and strategic places. Throughout the city, the texture of the medieval blocks was brutally simplified and the width of streets exaggerated to articulate the plan and emphasize the transportation routes through the city.

The first plans presented to the public in printed form in the middle of the sixteenth century were based on surveys with very obvious limitations. Leonardo Bufalini's 1551 map of Rome displays a wealth of information (fig. 27.3). It names churches, palaces, streets, and squares in handsome woodcut capitals. It also offers individualized plans of the great monuments and a conventional grid of spaces for other, perhaps less accessible, large buildings. The most distinctive aspect of the plan is the conflation of ancient and modern structures into a timeless classical landscape. Thus, for example, the "Platea Capitolina" is bordered to the east not only by the medieval "temple" of San Maria d'Aracoeli, represented by a complete plan, but also by the names of the temples of Janus and Jupiter, of which no physical trace is recorded. Details like this re-

their orientations, both in lists and in sketches that constitute partial maps of sections of the wall. No control observations were taken across the town, and, in the case of the first survey of Urbino, errors of orientation made it impossible to close the polygonal circuit. See Nando De Toni, "I rilievi cartografici per Cesena ed Urbino nel Manoscritto 'L' dell'Istituto di Francia (15 Aprile 1965)," in *Leonardo da Vinci: Letture Vinciane I–XII (1960–1972)* (Florence: Giunti-Barbèra, 1974), 131–48, and Fausto Mancini, *Urbanistica rinascimentale a Imola da Girolamo Riario a Leonardo da Vinci (1474–1502),* 2 vols. (Imola: Grafiche Galeati, 1979). Mancini hypothesized that Leonardo's plan was based on an earlier survey done in 1472 by the military architect Danesio Maineri for Galeazzo Maria Sforza, Duke of Milan. The documents mention various "disegni" in the context of defense decisions and give no reason to believe that they surveyed anything inside the city wall. See Fausto Mancini, "Danesio Maineri, ingegnere ducale, e la sua opera alla rocca e alle mura di Imola sul finire della signoria manfrediani (1472–1473)," *Studi Romagnoli* 26 (1975): 163–210. The best treatment of the Imola plan as an artifact of the history of cartography is Mario Docci, "I rilievi di Leonardo da Vinci per la redazione della pianta di Imola," in *Saggi in onore di Guglielmo De Angelis d'Ossat,* ed. Sandro Benedetti and Gaetano Miarelli Mariani (Rome: Multigrafica Editrice, 1987), 181–86.

17. Florence, Uffizi 7950A. Published in Emilio Tolaini, *Forma Pisarum: Problemi e ricerche per una storia urbanistica della città di Pisa* (Pisa: Nistri-Lischi Editori, 1967), 72–95.

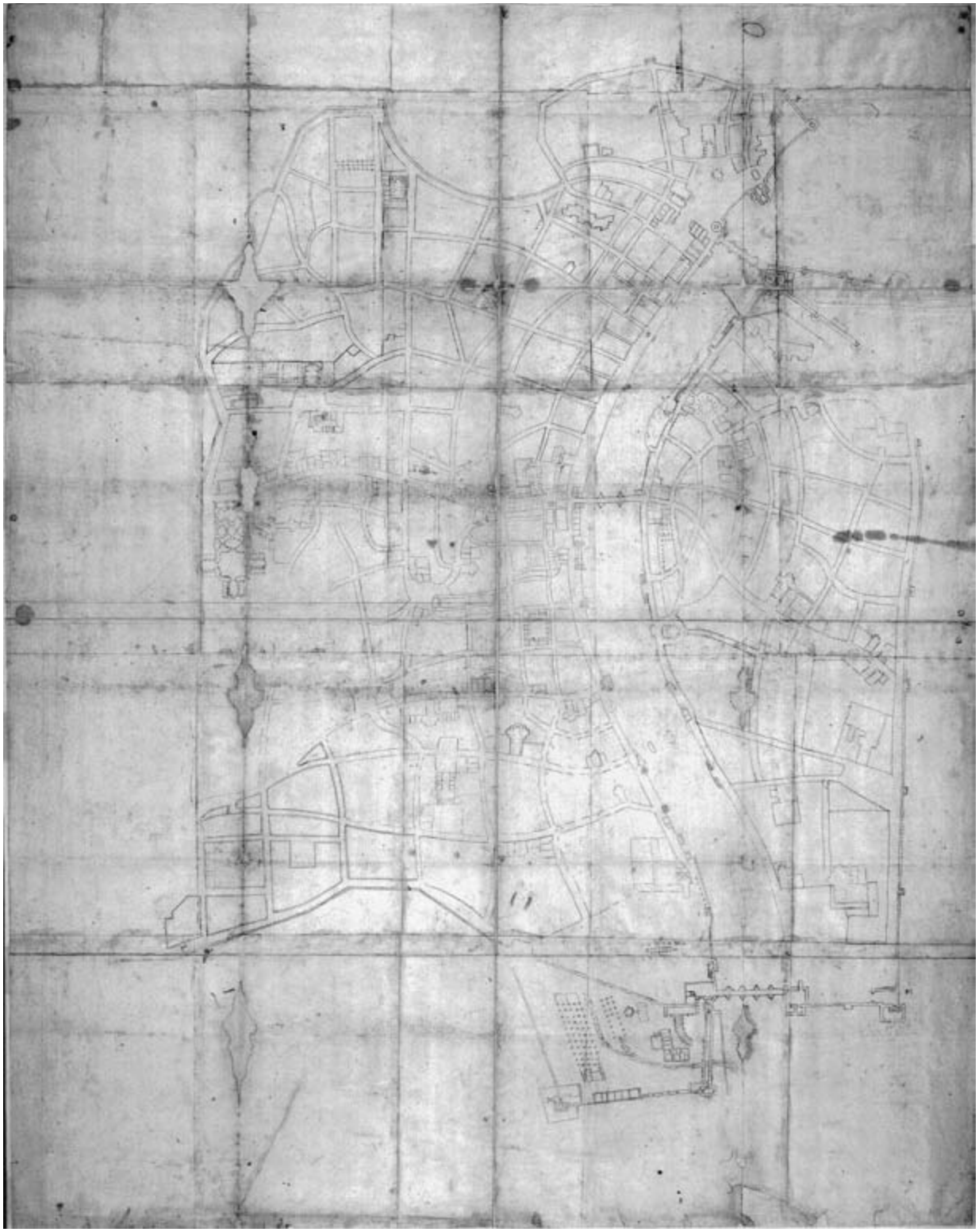


FIG. 27.2. PISA, ATTRIBUTED TO GIULIANO DA SANGALLO. The original of this plan belongs to the fifteenth century, while this copy seems to date to the first decade of the sixteenth century. The modifications to the original are identifiable by the traces of the transfer technique. Giuliano worked on the citadel built by the Florentines after the conquest of 1509, but the plan gives an incomplete picture of the total defensive situation in the city. The comprehensive street plan—however fanciful it is in some places—is unusual in a military map, as are the sketch plans of the city's monuments.
Photograph courtesy of the Galleria degli Uffizi, Florence (7950A).

FIG. 27.3. ROME, LEONARDO BUFALINI, 1551. Detail (the Capitoline hill and the streets below). The first ichnographic, or orthogonal, plan of Rome. It is reproduced in woodcut, divided into twelve blocks. The image combines elements of both the ancient and the modern city. It is preserved in three copies from the 1560 edition published by Antonio Trevisi, who had bought the blocks from Buffalini's widow and used his edition to announce his own project to straighten the bed of the Tiber. The plan was constructed from at least two separate and uncoordinated survey systems. A compass traverse measures the length and bearing of sections of the city wall. The positions of the monuments on the interior of the city seem to have been fixed by triangulation.
Size of the detail: ca. 36.5 × 35 cm. Photograph © BAV (St. Geogr.I.620 Riserva).

veal Bufalini's debt to antiquarians such as Bartolomeo Marliani, whose 1544 *Urbis Romae topographia* was the first to publish an orthogonal representation of the city.

The most meticulously surveyed element of the plan is the city wall. Every change of direction is reproduced, and the dimensions of each section recorded. The accurate description of the perimeter of the city, the traditional signature of its identity, was one of the most influential achievements of the plan. Bufalini's interest in the wall must have stemmed from the fact that he, like Leonardo, was a military engineer, one of the consultants who participated in the conference called by Paul III in 1534 to consider the refortification of Rome. It was this background that prepared him for the seven- to twenty-year campaign of survey that the project demanded.[18] But despite this level of dedication, the complex street plan of the city proved an overwhelming challenge. Each alley demanded the same effort as a similarly sized stretch of the city wall. It is not surprising that Bufalini took shortcuts. While his map established a new level of topographic accuracy for the often-represented Rome, the exact configuration of the streets remains approximate. The undulating street walls give a fluidity to the plan that later, more detailed, surveys reveal as conventional.

The working method that produced the surveys of sixteenth-century cities is only partly explained in the theoretical literature. Alberti and Bartoli described systems that allowed the surveyor to fix the position of a few prominent points. Augustin Hirschvogel recorded observations of thirteen monuments from six different station points as the basis of his plan of Vienna. Either direct measurement (his apparent system) or triangulation would have given him their relative positions.[19] Neither Hirschvogel nor the others, however, spoke of a method for tracing the course of the city's streets. We cannot assume that it was accomplished systematically. Mapmakers may have trusted entirely to their estimating skills or used the roughest kind of survey, much like that documented by Cristoforo Sorte in the field drawings he made in 1569 for a map of an area of the Italian Alps above Brescia and Bergamo.[20] When the image of a city was produced as part of a commercial enterprise, it is even less likely that much care could have been taken about the precise course of the streets. Stroffolino's computer analyses of Antonio Lafreri's perspective plans of Messina (1567), Milan (1573), and Genoa (1573) reveal the solution to the problem (fig. 27.4).[21] When the computer compared Lafreri's images to a foreshortened version of the eighteenth-century surveys Stroffolino used for her analysis, the locations of significant points (e.g., towers along the wall) coincided. When she asked it to do the same for streets, the divergences were significant. The evidence suggests that the paths of streets were interpolated between the fixed points established by the monuments.

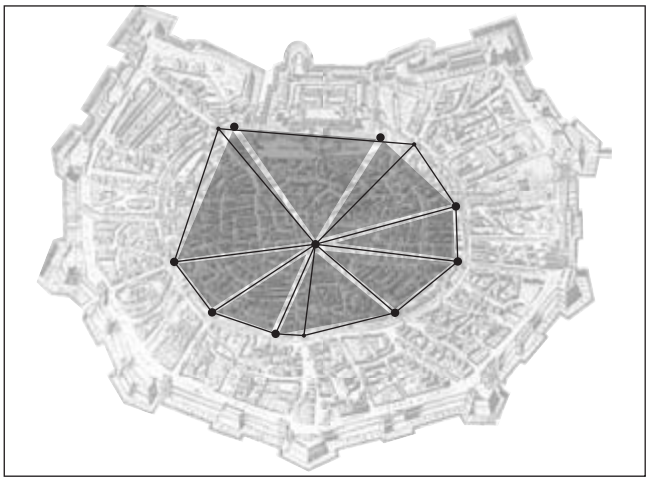
The difficulty of mapping streets must have contributed to the rarity of orthogonal plans in the sixteenth cen-

18. Leonardo Bufalini, *Roma al tempo di Giulio III: La pianta di Roma,* intro. Franz Ehrle (Rome: Danesi, 1911).

19. Albert Camesina, *Plan der Stadt Wien vom Jahre 1547, vermessen und erläutert durch Augustin Hirschvogel von Nürnberg* (Vienna: K. K. Hof- und Staatsdruckerei, 1863).

20. The road through the territory was broken into sections, and the orientation of each segment was surveyed with a compass and its length measured on the ground. Moving around the curve, the process was repeated for the next stretch of road. See Juergen Schulz, "New Maps and Landscape Drawings by Cristoforo Sorte," *Mitteilungen des Kunsthistorischen Institutes in Florenz* 20 (1976): 107–26. The segments here are relatively large; some city streets changed orientation every few yards. Sorte, of course, was not concerned with the perimeters of the roads or the building fronts of city streets.

21. Daniela Stroffolino, "L'immagine urbana nel XVI secolo: Gli Atlanti di Antoine Lafréry," in *Città d'Europa,* 183–202, and Stroffolino, *La città misurata,* 185–205.



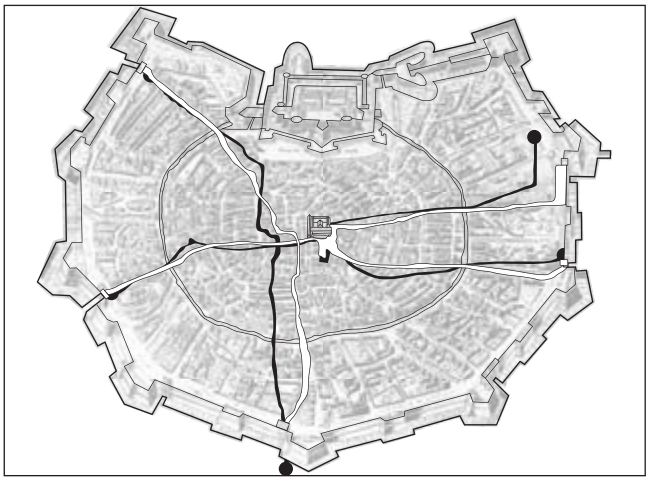


FIG. 27.4. ANALYTICAL DRAWINGS OF ANTONIO LAFRERI'S PLAN OF MILAN, 1573. These analyses compare Lafreri's perspective plan with an eighteenth-century orthogonal plan that has been foreshortened by Stroffolino to simulate the point of view taken by Lafreri. The upper image tracks the positions of gates on the city wall. These correspond except where the artist's desire to exaggerate the size of the fortress and to frame the structures at the center of the city imposed overriding compositional demands. The lower image illustrates the perspective plan's failure to track the course of the streets with the same accuracy.
Based on Daniela Stroffolino, "L'immagine urbana nel XVI secolo: Gli Atlanti di Antoine Lafréry," in *Città d'Europa,* 195.

tury.[22] The inaccuracy of the results certainly would have limited their practical use. The most common category of plans was one that was able to ignore the problem of surveying the streets almost entirely. They were the plans made for military purposes that focused exclusively on the defensive perimeter. The drawings of the defenses of the Sienese territory made by Baldassare Peruzzi as architect to the Republic are among the earliest surviving examples.[23] The drawings show the old defenses and Peruzzi's proposals for their modernization. The plan of the fortifications of Chiusi (1528–29), for example, shows no street plan but does give the location of some of the city's churches. The inclusion of these large buildings in the otherwise unarticulated space inside the walls suggests that their importance may have been more for the orientation of the surveyor and the gunners of attacking armies than for their value as monuments.

It was only a short step from the preservation of such drawings in the archives of committees concerned with the fortification of the state to the commissioning of atlases of the defensive perimeters of cities. Between 1546 and 1551, the military engineer Giovanni Battista Belluzzi prepared eighty-five surveys of the towns of Tuscany and its surrounding states for the Medici duke Cosimo I, a collection that, in the course of the century, was expanded

22. Though not exhaustive, a list of orthogonal city plans dating before 1600—in addition to the plans of Imola (figs. 27.1 and 36.16), Pisa (fig. 27.2), and Rome (fig. 27.3)—includes the following. For Vienna of 1547/52, see Siegmund Wellisch, "Die Wiener Stadtpläne zur Zeit der ersten Türkenbelagerung," *Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereines* 50 (1898): 537–65, and John A. Pinto, "Origins and Development of the Ichnographic City Plan," *Journal of the Society of Architectural Historians* 35 (1976): 35–50. For Guastalla of 1553 by Domenico Gianti (Parma, Archivio di Stato, Raccolta mappe e disegni, vol. 70, n. 76), see Nicola Soldini, "La costruzione di Guastalla," *Annali di Architettura* 4–5 (1992–93): 57–87. For Brescia of about 1556, see Franco Robecchi, "Il più antico ritratto di Brescia: Dettagliato come in fotografia riaffiora la città del Cinquecento," *AB* (*Atlante Bresciano*) 6 (1986): 76–81. For Piacenza before 1561, see Parma, Archivio de Stato, Piante e disegni, fol. 21, n. 2. For Milan of 1577–79, see G. Martelli, *La prima pianta geometrica di Milano* (Milan: Fininvest Communicazioni, 1994). For Cremona of 1583 by Antonio Campi, see Giacinta Jean, "Antonio Campi: Piante di palazzi cremonesi alla fine del Cinquecento," *Il Disegno di Architettura* 17 (1998): 21–26. For Ancona of 1583 by Jacomo Fontana, see Nicholas Adams, "The *Curriculum Vitae* of Jacomo Fontana, Architect and Chief Gunner," in *Architectural Studies in Memory of Richard Krautheimer,* ed. Cecil L. Striker (Mainz: Philipp von Zabern, 1996), 7–11, and Gianluigi Lerza, "Una proposta per il porto di Ancona: Il memoriale di Giacomo Fontana (1589)," *Storia Architettura* 5 (1982): 25–38. For Parma of 1589, see *Io Smeraldo Smeraldi ingegnero et perito della congregatione dei cavamenti . . .* (Parma: Comune di Parma, 1980), and Franco Miani Uluhogian, *Le immagini di una città: Parma, secoli XV–XIX: Dalla figurazione simbolica alla rappresentazione topografico* (Parma: La Nazionale, 1983). For Nürnberg of 1594 by Paul Pfinzing, see Ernst Gagel, *Pfinzing: Der Kartograph der Reischsstadt Nürnberg (1554–1599)* (Hersbruck: Im Selbstverlag der Altnürnberger Landschaft, 1957), no. 24. For Cartagena in the Indies of 1595 by Bautista Antonelli, see figure 41.19 in this volume and Richard L. Kagen, *Urban Images of the Hispanic World, 1493–1793* (New Haven: Yale University Press, 2000), 77. Extending the time frame by a few years adds more. For Milan of 1603 by Francesco Richini, see Ettore Verga, *Catalogo ragionato della Raccolta cartografica e Saggio storico sulla cartografia milanese* (Milan: Archivio storico, 1911), 41. For Ferrara of 1605 by Giovan Battista Aleotti, see Franco Farinelli, "Dallo spazio bianco allo spazio astratto: La logica cartografica," in *Paesaggio, immagine e realtà* (Milan: Electa, 1981), 199–207.

23. Simon Pepper and Nicholas Adams, *Firearms & Fortifications: Military Architecture and Siege Warfare in Sixteenth-Century Siena* (Chicago: University of Chicago Press, 1986), 179 (fig. 80).

through copies of plans of more distant sites.[24] A mid-century atlas of ninety fortified cities and towns in the Netherlands and Italy, perhaps after drawings by Francesco Paciotto, is a product of the all-consuming interest in military matters of the Savoy rulers. The collection was important enough that in 1567 Philip II sent a team composed of an engineer, a painter, and a surveyor to study and copy the drawings.[25]

Military maps, of course, were treated as closely guarded information and seen by only a few people. In fact, orthogonal plans of any sort were largely unknown to the public. The great popularity of the city as a subject of representation was almost exclusively satisfied by images committed to presenting their material as a visual picture. In his introduction to the *Civitates orbis terrarum,* Georg Braun cites Aristotle to assert the primacy of vision among the senses, and the views of the *Civitates* explicitly propose their subject to the eye of the viewer.[26] The Bolognese artist Floriano Dal Buono justified his pictorial view of that city (1636) with this inscription: "Making (this image) as a plan would have been futile and satisfied the imagination more than the eye. The image that captures the essence of a city is not, except for someone who wants to attack it with mines or build another just like it, its plan but one that represents it just as the eye sees it from a specific view point."[27]

Representing the City

As a practical matter, it was impossible to see a Renaissance city as a whole. However expansive the view from a bell tower or a hilltop at the edge of town, these vantage points were not sufficiently elevated to encompass the city and reveal its overall shape. Even if particular buildings, streets, and neighborhoods were familiar, closely observed sights, the entirety of the city remained an invisible and abstract entity. Yet the city's global form, a subject that could not be seen, was precisely the subject that urban cartographers sought to represent. Overcoming the limitations of perceptual experience, they depicted the city as a whole, as they imagined God might see it, from above.

The birth of the bird's-eye view as a pictorial genre is one of the great achievements of Renaissance visual culture. Its first appearance is dated to 1500, when Jacopo de' Barbari published his woodcut map of Venice, although his great aerial view was as much an outgrowth of the elevated views common in the fifteenth century as a new beginning to bird's-eye views.[28] Prior to Barbari, elevated views, such as "The View with a Chain" of Florence (ca. 1485), typically had assumed a lower vantage point and were staged as if seen from a hilltop. They implicitly positioned the viewer on the ground or not far above it, whereas Barbari's viewer takes flight to behold Venice from high in the sky. Lower, raking views privileged buildings in the foreground and concealed spatial relations, but this distortion was substantially corrected in the sky-high, nearly overhead aerial view, which served up the city as if on a platter. Barbari's view offers its audience a vision of the total shape of Venice, the course of her streets and canals, and the location of her landmark buildings. Unlike the idealizing views of the Middle Ages, which symbolically depicted the city as a unit, the bird's-eye view revealed a complex urban system of infill buildings, monuments, squares, roads, walls, and a variety of landscape features. Moreover, it gave a distinctive and memorable visual identity to something that previously had been unrecognizable and formless. So compelling was the bird's-eye view that it became the cartographic norm for the next two centuries, although the term was not adopted until the early eighteenth century, by which time the genre was no longer the dominant mode of urban representation.

24. Daniela Lamberini, "Funzione di disegni e rilievi delle fortificazioni nel Cinquecento," in *L'architettura militare veneta del Cinquecento,* ed. Sergio Polano (Milan: Electa, 1988), 48–61.

25. Turin, Biblioteca Nazionale, MS. q. II. 57 (old signature, Serie Atlas C N 5 [Bc. Atl. Sala XV]), cited in Charles van den Heuvel, *'Papiere Bolwercken': De introductie van de Italiaanse stede- en vestingbouw in de Nederlanden (1540–1609) en het gebruik van tekeningen* (Alphen aan den Rijn: Canaletto, 1991), 53–61. The unique collection of 260 manuscript plans of cities and towns of the Low Countries that Jacob van Deventer made for Phillip II around 1560 expands the information in these atlases with a systematically measured record of the streets and a conventional notation of the buildings, along with the survey of the city walls; see Boudewijn Bakker, "Amsterdam nell'immagine degli artisti e dei cartografi, 1550–1700," in *Città d'Europa,* 86–100. At the end of the century, a royal corps of engineers commissioned by the duke of Sully executed a survey of the realm of France that included plans of fortified places and sometimes a survey of the main streets inside the walls of cities. See David Buisseret, "Les ingénieurs du roi au temps de Henri IV," *Bulletin de la Section de Géographie* 77 (1964): 13–84.

26. Lucia Nuti, *Ritratti di città: Visione e memoria tra Medioevo e Settecento* (Venice: Marsilio, 1996), 38 n. 51 and 137 n. 15; Georg Braun and Frans Hogenberg, *Theatre des cites dv monde* (Brussels, 1574–1618), preface, unpaginated (vol. 1, fol. 4r): "Limited resources and potential danger, especially in these times, prevent most people from traveling to all parts of the world and visiting several cities. With this book we hope to free lovers of history from the peril, inconvenience, and cost of travel. By relying on the subtle sense of vision, which according to Aristotle surpasses all others, we offer the reader plans and views of cities diligently taken from life and skillfully rendered in illustrations that give a much clearer idea than one could obtain from some obscure source or words alone"; idem, *Beschreibung und Contrafactur der vornembster Stät der Welt, Cologne, 1572,* 6 vols. (1572; reprinted Stuttgart: Müller und Schindler, 1965), vol. 1, fol. 3r: "We offer representations of the form of cities and towns so that the reader can see into their alleys and streets and view their buildings and squares."

27. Giovanni Ricci, "Città murata e illusione olografica: Bologna e altri luoghi (secoli XVI–XVIII)," in *La città e le mura,* ed. Cesare De Seta and Jacques Le Goff (Rome: Editori Laterza, 1989), 265–90, quotation on 284.

28. Giandomenico Romanelli, Susanna Biadene, and Camillo Tonini, eds., *"A volo d'uccello": Jacopo de' Barbari e le rappresentazioni di città nell'Europa del Rinascimento,* exhibition catalog (Venice: Arsenale Editrice, 1999).

In an age of airborne travel, the bird's-eye view is easy to take for granted, but for the land-bound age of the Renaissance, it was a great imaginative leap. The bird's-eye view created a new pictorial subject: the city as a complete, self-contained, and internally organized entity. This conceptual and pictorial achievement, in turn, encouraged new ways of thinking about the city. The bird's-eye view made it possible to conceive of the city as a unified field, differentiated from the outlying countryside and organized internally by an interlocking network of streets. Renaissance and modern commentators alike praise the Renaissance city views for being lifelike, but this term is misleading because its claim naturalizes the mapmaker's core achievement, which was to make an impossible view seem credible and to convert a picture riddled with lies and artistic inventions into a respected form of knowledge. The claim of being lifelike pretends that the radically imaginative leap that puts the beholder in a celestial realm was subject to eyewitness confirmation, which was hardly the case. Admittedly the plethora of recognizable details about individual monuments could be tested against personal experience, but the overall shape and structure of the town, the revelation of which was the distinguishing feature of the bird's-eye view, was imperceptible. In this sense, the bird's-eye view, the overall look of the city, is informed by a fundamental degree of abstraction. The relevant Latin term, *ad vivos,* means both "from life," and "lifelike" and bridges an important conceptual divide between what is perceived and what is abstracted, but this ambiguity is lost in English translation.[29]

To achieve a holistic view of the city, it was necessary to develop a way of depicting space that could accommodate the plenitude of the city as well as visually organize it. What was needed was an all-encompassing, elastic vision, a way of representing space that could look around buildings, move in multiple directions, and see building facades as well as the contour of streets. To appreciate the achievement and appeal of the bird's-eye view as a form of spatial representation, it is useful to consider the alternative forms of representation available in the Renaissance.[30]

First and foremost was the system of linear perspective, which was one of the hallmarks of Renaissance visual culture. Linear perspective represented space as it would appear to an observer in a given spot. In constructing a perspectival space, the vantage point of the observer was mirrored in pictorial space by the vanishing point, the point at which sightlines converged. The organizing matrix of the visual pyramid and of converging sightlines imposed certain laws of representation on objects in perspectival space: three-dimensional forms were foreshortened, foreground objects obscured others farther back, and only one side of any material thing was seen, because the elements of the image were all viewed from one fixed position, namely, the vantage point. While linear perspective worked magically to create the illusion of a restricted space, such as a piazza, its constraints—its rules of representation—rendered it of little use in making city views. Linear perspective was inadequate to reveal the physical expanse of a city, to convey the spatial relations among a profusion of individual structures, and to permit an infinite number of focal points. Seeing a city from a single point of view would necessarily privilege buildings in the foreground and mask what lay beyond; it might capture part of a street, but not its dimensions and pathways. What could not be seen from the observation point remained invisible. Multipoint perspective, as it was developed in the sixteenth century by Viator and Jean Cousin, created wider visual angles, but it still hinged on a visual pyramid with a fixed vantage point. To map the plenitude of a city meant abandoning the premises of perspective: a fixed vantage point, a stationary observer, and a vanishing point.

One alternative to perspectival representation was the profile view, which northern artists favored in the sixteenth century. Beautifully illustrated by the drawings of Antoon van den Wijngaerde, the profile view reads like a scroll, with the viewpoint shifting constantly along a horizontal axis. It is clear why the profile view has been associated with navigation and seafaring cultures; the picture captures the panoramic view of a coastline from a moving ship.[31] But the profile view, limited as it is to what can be seen in the frontal plane, was unable to cope with buildings in the distance or clarify spatial relations in depth—simply put, to deal with the scope of the city. While benefiting from the heightened powers of vision associated with a mobile viewpoint, the profile view was trapped in a single spatial plane. It did not satisfy the Renaissance search for a holistic vision.

An interesting variant use of the horizontal format is illustrated by Erhard Reuwich's woodcut map of Jerusalem and the Levant, published in Bernard von Breydenbach's *Peregrinatio in Terram Sanctam* (1486). Unlike profile views, Reuwich's long (120 cm) foldout map is not restricted to a single spatial plane; indeed, it disregards scale

29. Lucia Nuti, "The Perspective Plan in the Sixteenth Century: The Invention of a Representational Language," *Art Bulletin* 76 (1994): 105–28, esp. 108, and idem, *Ritratti di città,* 133–43.

30. Svetlana Alpers, in *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983), 119–68, offers an illuminating discussion of the alternative modes of representation and differing notions of the pictorial project.

31. On the profile view, see Nuti, *Ritratti di città,* 69–99; idem, "Perspective Plan," 109–10; Richard L. Kagan, ed., *Spanish Cities of the Golden Age: The Views of Anton van den Wyngaerde* (Berkeley: University of California Press, 1989); and *Opkomst en bloei van het Noordnederlandse stadsgezicht in de 17de eeuw / The Dutch Cityscape in the 17th Century and Its Sources,* ed. Carry van Lakerveld (Amsterdam: Amsterdams Historisch Museum, 1977).

and spatial consistency to portray a symbolic worldview in which Jerusalem appears in a wide geographical context, with the Dome of the Rock disproportionately enlarged at the center of the composition. Reuwich's use of the elongated format aspired to a panoramic effect, but its symbolic distortion of geography failed to meet the Renaissance value of verisimilitude.

The Renaissance found a way to escape the constraints of perspective; the orthogonal plan, or true horizontal section, theoretically provided the perfect solution. At the same moment that Barbari's map of Venice introduced the bird's-eye view, Leonardo da Vinci produced the first Renaissance plan of a city, the drawing of Imola dated 1502 (discussed earlier and shown in fig. 27.1). The Imola plan shows what the plan format can do: it depicts the global form of the city, the course of streets, the location and geographic orientation of monuments and infill buildings, and the distances between sites. In a manner unlike both perspective and profile views, ground plans do not imply the presence of an observer, whether stationary or mobile. The plan adopts an infinite number of hypothetical viewpoints, each perpendicular to the earth's surface. Like a building plan, a plan of a city presents it as a flat image. True, a plan can allude to depth through shading and other graphic devices; Bufalini introduced cross-hatching in his plan map of Rome to suggest topographical relief. But a plan is basically uninterested in three-dimensional space and does not simulate optical experience. The plan rejected vantage point and the related notion of a fixed observer, liberating the image from the constraints of perspective. But the plan also required Renaissance cartographers to eschew the persuasive illusion of vision, an intolerable sacrifice because it did not advance their representational goal of depicting the three-dimensional form of the city.

Between plan and perspective, the bird's-eye view created a makeshift middle ground that was well suited to representing the city. The bird's-eye view escaped the spatial limitations of perspective but retained certain illusionistic attributes associated with the perspectival system. It presented the city in relief and highlighted three-dimensional space. The view implied the presence of an observing eye, although the observer has no determinate location in space. Whereas a plan denied the viewer's "illusion of looking," as Lotz put it, the bird's-eye view participated in the Albertian conceit of the picture as a window and the picture plane as a transparent surface through which we behold the subject.[32] The bird's-eye view retained certain conceits of perspective vision but disobeyed its representational rules in order to render a multifocal picture of the city. Where perspective targeted a focal point, the bird's-eye view was unfocused, all-encompassing, and unbounded, and where perspective located the observing eye in a fixed position, the aerial view implied a mobile eye and manifold observation points. Proposing another way of seeing into space, the bird's-eye view posed an alternative to the spatial system of perspective, although these two modes of representation shared a fundamental interest in appearance and in visual space.

The Renaissance interest in city views turned Claudius Ptolemy on his head. In his *Geography,* Ptolemy had dismissed chorography, or the representation of localities, which he mentioned only in passing, because it was a form of picture making, in contrast to geography's world mapping, which was based on the reliable foundation of mathematics.

As Berggren and Jones have written,

> Regional cartography [chorography] deals above all with the qualities rather than the quantities of the things that it sets down; it attends everywhere to likeness, and not so much to proportional placements. World cartography [geography], on the other hand, [deals] with the quantities more than the qualities, since it gives consideration to the proportionality of distances for all things, but to likeness only as far as the coarser outlines [of the features]. . . . [Chorography] has no need of mathematical method, but . . . [in geography] this element takes absolute precedence.[33]

What Ptolemy disparaged, however, Renaissance cartographers championed. Braun and Hogenberg commended the lifelike qualities of the city views published in the *Civitates* and praised the chorographer, who "describes each section of the world individually with its cities, villages, islands, rivers, lakes, mountains, springs, and so on, and tells its history, making everything so clear that the reader seems to be seeing the actual town or place before his eyes."[34] The success of the bird's-eye view in meeting the pictorial standard of *ad vivum,* or lifelike, representation is indisputable, but how bird's-eye views managed to be so persuasive has yet to be satisfactorily explained.

The persuasiveness of bird's-eye views and their topographical specificity is often linked to "scientific" advances, namely, the improved survey techniques and collection of more reliable topographical data discussed earlier. This explanation is consistent with the dominant narrative of cartographic history, which stresses progressive gains in accuracy and objectivity, and is powerful precisely because such gains were indeed made in the Renaissance. Nevertheless, the persuasiveness of bird's-eye

32. Wolfgang Lotz, "The Rendering of the Interior in Architectural Drawings of the Renaissance," in *Studies in Italian Renaissance Architecture* (Cambridge: MIT Press, 1981), 1–65, esp. 30.

33. J. L. Berggren and Alexander Jones, *Ptolemy's* Geography*: An Annotated Translation of the Theoretical Chapters* (Princeton: Princeton University Press, 2000), 58.

34. Cited in Alpers, *Art of Describing,* 156–57.

views did not ultimately derive from their mathematical, accurately measured components.

First, there is no evidence that bird's-eye views were actually based on surveyed plans, and, as we have seen, sixteenth-century survey techniques were capable of only a very approximate representation of urban street systems. The fact is that bird's-eye views are replete with inaccuracies, which nonetheless do not diminish the persuasiveness of the images. Moreover, Renaissance observers and map collectors were unable to assess the veracity of bird's-eye views; there was no objective standard or point of reference. There is no demonstrated correlation between mathematical accuracy and visual persuasiveness. The claim made here is that persuasiveness and the authority of the image were largely functions of pictorial technique and the force of visual conventions.

Although it is instructive to evaluate the accuracy of bird's-eye views, such inquiries do not explain how, despite flagrant ruptures and inconsistencies in their spatial structure, these images managed to establish an aura of knowledge and authority. Consider the painted view of Amsterdam commissioned by the city government in 1538 for presentation to the emperor Charles V, which the artist, Cornelis Anthonisz., developed in a woodcut version in 1544.[35] This image retains a persuasive immediacy despite its many elisions and inconsistencies. The angle of elevation shifts throughout the image, from profile and raking views of ships in the foreground to a nearly overhead view in other parts. The ground plane seems to tilt up to expose the built city, then folds back and flattens out among the fields. Monuments are represented on a larger scale than the infill, so they appear more prominent. Moreover, the pictorial structure is interrupted by the road that runs across the decorative frame (at left) and by the colossal figure of Neptune in a cloud bank that simultaneously overlaps the image and is detached from the space of the city. The relative orientation of individual elements is inconsistent, as is their orientation to the picture plane. In short, space fluctuates as if seen from different vantage points that imperceptibly slip and change. It might be thought that these internal inconsistencies and ruptures would jeopardize the credibility of the image, but, by virtue of what Hoffman called "the swift ease of vision," we fuse the elements into a unified image.[36] These inconsistencies are the result of the makeshift compromises entailed in the revision of the perspectival system in order to accommodate multiple vantage points and create a totalizing image of the city.

In order to understand the success of the bird's-eye view, it is necessary to return to Ptolemy's definition of chorography and recognize the pictorial essence of the chorographic project, not with Ptolemaic disdain, but rather with appreciation for the rhetoric of the image and the complex process by which city views attained an aura of authority. This chapter thus turns to the devices and pictorial elements through which bird's-eye views achieved the much-praised quality of being "lifelike" and asks how these images established their authority.[37] Given that the accuracy of a city view was not verifiable by the viewer, and given that resemblance was not a relevant criterion inasmuch as no one knew what the city as a whole looked like, mapmakers needed to deploy a variety of self-authorizing conceits to establish the authority of the image and to create a sense of actuality about an unseen subject.

The most common strategy was to celebrate the basis of the map in experience: in eyewitness observation, measuring, and recording. Sometimes the message was conveyed by depicting an artist in the act of drafting, as in "The View with a Chain" of Florence, or by placing a prominent observer in the foreground, as in Joris Hoefnagel's view of Cabecas (1565) from the *Civitates orbis terrarum*. These function as the choric figure in a painting to whom Alberti assigns the role of guiding the viewer's response; they establish that the maps were rendered in situ and based on the mapmaker's direct observation. In fact, these images were constructed in the studio with considerable manipulation of what could be seen from the nominal point of observation.[38] In short, the claim that an image was lifelike was part of a rhetorical strategy to authenticate the image.

Many of the maps in the *Civitates orbis terrarum* include figures in local dress as evidence of the mapmaker's familiarity with the place.[39] In compositional terms, the figures disrupt the spatial coherence of the image. Occupying a space apart from the city and discontinuous with it, they are seen not from an aerial perspective but from an altogether different point of view and at a different scale. The disjunction could be quite jarring, and the most persuasively illusionistic images found other ways of asserting their epistemological basis in observation, measurement, and experience. These ways included enframing texts that described the mapmaker's credentials and survey methods, including a profile portrait of the mapmaker in a decorative medallion, adding illustrations of surveying instruments, and providing a scale.

The making of a map was, in fact, a team effort. The collaboration involved one or more surveyors, usually name-

35. Antoine Everard d'Ailly, *Catalogus van Amsterdamsche plattegronden* (Amsterdam: Maart, 1934), and Bakker, "Amsterdam nell'immagine," 86–100.

36. Donald D. Hoffman, *Visual Intelligence: How We Create What We See* (New York: W. W. Norton, 1998), xi.

37. Adrian Johns, in *The Nature of the Book: Print and Knowledge in the Making* (Chicago: University of Chicago Press, 1998), shows how the link between the printed book and knowledge, once fragile and contested, was forged and solidified. We believe a similar set of questions need to be raised with regard to maps and city views in order to understand how these images acquired the aura of authority and knowledge with which they were eventually invested.

38. Friedman, "'Fiorenza': Geography and Representation," 67.

39. Nuti, "Mapped Views."

less, who collected data in the field. The survey data and other forms of information, including views of individual monuments and other maps, were combined in a single image by the draftsman. His drawing was then turned over to a printmaker, who cut the woodblocks or incised the copperplates, and they in turn were printed and sold by the publisher. Each step created an opening for error or distortion—an omission, errors in measurement, or incorrect transfer. Vesting responsibility for the map in the singular figure of the mapmaker thereby served to mask the margin of error in this multistep process and to associate the credibility of the image with one highly skilled person.

A very different authenticating strategy was embodied in the record of copyright. Granted by the state, the copyright was incorporated in the printed image, the formulaic legal language spelled out in typeface often too small to read. The copyright had a limited effect in preventing plagiarism; enforcement was limited, and ownership of the printing plates was a more practical protection. But the "privilege" played a valuable role in attaching the prestige and authority of the state to the image and certifying its value. The authority of the ruler was more explicitly invoked through portraits and coats of arms, of the king or a municipal governing body, that often decorated larger views. In short, the rhetoric of large and costly wall maps looked beyond the experience and knowledge of the mapmaker to the power of the state to establish the epistemological authority of the image.

All variety of signs of authority are deployed in Jacques Callot's etching of the siege of La Rochelle (1628–30), one of the finest wall maps of the age (fig. 27.5). A scale (at lower right) declares that the map was based on measurement and drawn to scale, which is not true. There is no consistent scale, no single point of view, no homogeneity in the rendering of space. Portraits of Louis XIII, who commissioned the map, and his brother Gaston d'Orléans, along with royal coats of arms, lend the crown's authority to the image. The enormous size of the map is another sign of its importance and reminds the viewer of the royal patronage that financed so costly a printing venture. The index of over one hundred locations and the use of Latin confer the authority of a text and invite a documentary reading of the image. The presence of the king, the enormous size of the image, its enframement with textual information and enlargements of important scenes, the plenitude of descriptive detail—all these devices establish the authority of Callot's image. However compelling the effect of eyewitness testimony, it is likely that Callot made the map without direct observation of the site. There is no evidence that he went to La Rochelle during the siege, and immediately afterward the walls of the city were razed, the troops disbanded, and the dike that had blockaded the harbor dismantled. Callot probably based his map on a process of artistic elaboration and refinement of written accounts and published images of the siege.[40]

Absent an objective standard of verisimilitude or any possibility of verification, the authority of a map was ultimately based on its fidelity to the pictorial tradition for the representation of a city rather than on the accuracy with which it registered the physical reality of the city itself. Maps of Venice, for example, attained a measure of credibility to the extent that they resembled Barbari's prototype of 1500. The technology of printing reinforced a conventional standard, because it delayed the integration of new information and had a conservative impact on cartographic images, which remained surprisingly stable.[41] The cost of preparing copperplates was not insignificant. Engraved plates were the capital equipment of a publisher and were sold, bequeathed, and safeguarded in the same way as other forms of valuable property. A printer could make small changes in a copperplate, but not revise the shape of a city, redimension it to incorporate new survey results, or constantly update it with architectural changes. Thus, once a map was made, it typically had a long afterlife. Printed maps were slow to register new cartographic knowledge. In the words of Lestringant, "Any given map was never established on entirely fresh ground, but always inherited from previous maps a not inconsiderable—even a preponderant—share of its information."[42] As a result, the aura of authority of a map, its "truth effect," operated independent of its degree of accuracy or facticity.

During the seventeenth century, the primacy of the bird's-eye view was gradually eroded. Mapmakers seemed to lose confidence in its omniscience, in the ability of the bird's-eye view to control the plenitude of detail it encompassed or cope with the burgeoning density of the early modern city. The problem can be seen in Pedro Teixeira Albernaz's bird's-eye view of Madrid (fig. 27.6). It was typical of a bird's-eye view to clearly represent the boundary between city and countryside, because the sense of enclosure and containment was central to urban identity. The boundaries of cities were rarely demarcated on the ground with the clarity they possessed on maps. In reality, there was usually a transitional zone between city and countryside, with buildings clustered outside city gates and flanking major roads. Such inconvenient facts were altered in bird's-eye views, and the outlying land was depicted in abbreviated form, so the density of detail in the urban fabric

40. Callot used this method in developing the map of the *Siège de Breda,* the one instance in which his working method is documented (see fig. 29.6 in this volume). See Simone Zurawski, "New Sources for Jacques Callot's *Map of the Siege of Breda,*" *Art Bulletin* 70 (1988): 621–39.

41. This subject is discussed in David Woodward, *Maps as Prints in the Italian Renaissance: Makers, Distributors & Consumers* (London: British Library, 1996).

42. Frank Lestringant, *Mapping the Renaissance World: The Geographical Imagination in the Age of Discovery,* trans. David Fausett (Berkeley: University of California Press, 1994), 112; originally published as *L'atelier du cosmographe, ou l'image du monde à la Renaissance* (Paris: Albin Michel, 1991).

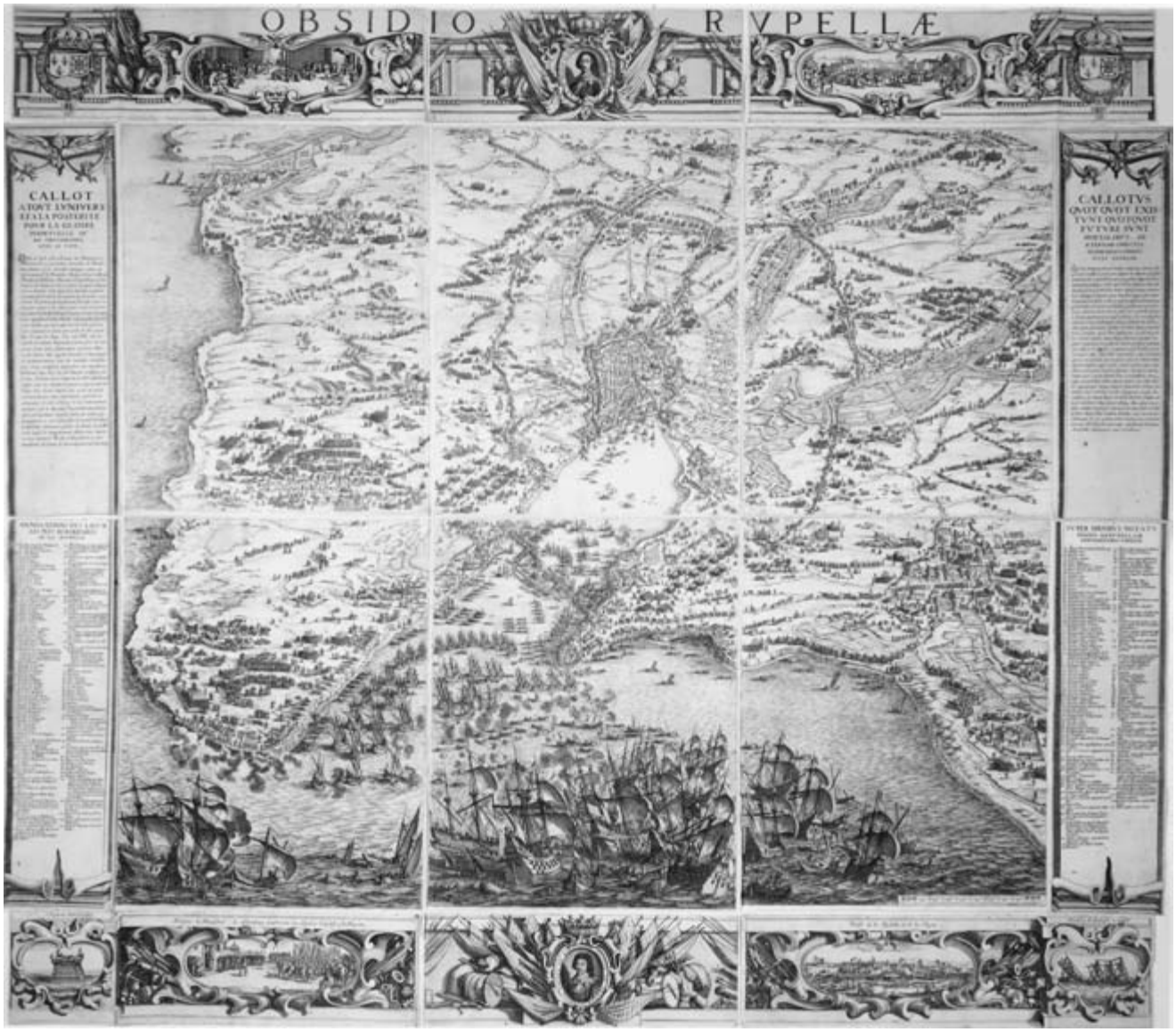


FIG. 27.5. SIEGE OF LA ROCHELLE (1628–30), JACQUES CALLOT. Callot's magnificent panoramic view was commissioned by Louis XIV to commemorate the royal defeat of the rebellious Huguenots who controlled the port city of La Rochelle. Specific military encounters and leaders are recorded in detail and keyed to extensive captions enframing the image, yet the image defies a narrative reading of the depicted events. The visual impact of the image derives from its specific but comprehensive picture of a vast landscape, an encompassing sea, a port, plains, and, at the center, a walled city. The monumental size of the etching is one of many signs of its royal patronage.
Size of the original: 113 × 132.5 cm (image); 148 × 168 cm (with border). Photograph © Board of Trustees, National Gallery of Art, Washington, D.C. (inv. nr. A 127988–127993, 59119–59124; 12 sheets total).

sharply contrasted with the relative blankness outside the city. This boundary line, which helped to establish the visual coherence of the city, was essential to the rhetoric of the image. In a failure of pictorial organization, Teixeira's Madrid has no particular shape or clear contour. The topography and parks at the city's edge have a very different impact on the composition than the city walls that traditionally occupied this position in the image of the city. Despite the visual pivot of the Plaza Mayor at the center of the view and the system of streets that radiate from it, the image hovers on the verge of formlessness. The rapid growth of the early modern city, the proliferation of buildings, and the erosion of boundaries threatened the pictorial unity of the bird's-eye view.

Mapmakers pursued two sorts of remedies to bolster the bird's-eye view and help it contend with the dynamic pace of urbanization in the seventeenth century. One was to supplement the view with alternate modes of repre-

FIG. 27.6. MADRID, PEDRO TEIXEIRA ALBERNAZ, 1656. In the manner of many maps of capital cities, this one presents Madrid as a seat of royal power through inscriptions, royal iconography, composition, and scale. The image is centered on the Plaza Mayor, the royal square, from which a trio of streets shown as thick white stripes lead to the Buen Retiro, the royal palace and gardens disproportionately enlarged on the right side. But the city lacks a coherent shape. This compositional weakness underscores a conventional feature of bird's-eye views, which aimed to create the illusion of a city as a coherent and bounded form.
Size of the original: 178 × 286 cm. Photograph courtesy of the BNF (Ge A 584).

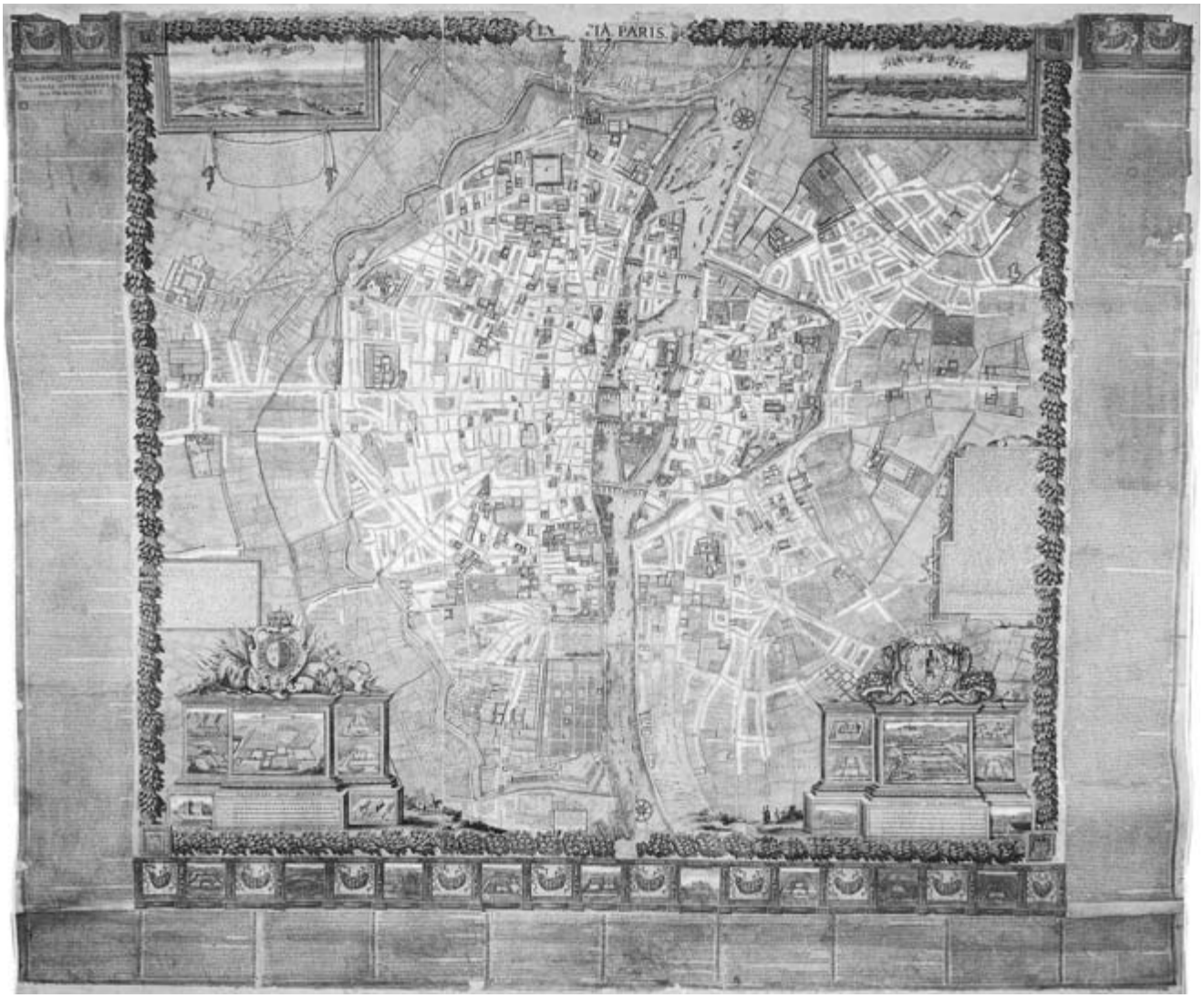


FIG. 27.7. PARIS, JACQUES GOMBOUST, 1652. Paris is presented as an artifact of royal power and the center of a network of royal buildings in and around the city. The Louvre and Tuileries gardens appear at the bottom center of the map, between two pedestals bearing royal arms and covered by views of royal châteaus. The map employs a variety of representational and graphic techniques to establish a clear visual hierarchy: monuments, gardens, and bridges are emphasized through perspective views; the white open spaces of streets, squares, and courtyards stand out in contrast to the shaded areas that signify infill fabric; and the linear pattern of outlying fields has a decorative effect.
Size of the original: 145 × 151 cm. Photograph courtesy of the BNF (Ge AA 573).

sentation as a way of revealing additional information about the city. Johannes de Ram and Coenraert Decker's map of Delft (1675–78) combines an aerial view, a profile view, a plan view, and views of buildings to offer multiple perspectives of even this relatively compact city (plate 20).[43] It also became common to surround the central image with views of individual monuments, including monuments located outside the city. Jacques Gomboust surrounded his map of Paris (1652) with vignettes illustrating the royal châteaus of the surrounding region (fig. 27.7). The composition highlighted the importance of the crown and acknowledged the connection of Paris to a larger geographical system. The idea of the city as a self-contained entity, the idea that underwrites the pictorial unity of the bird's-eye view, was no longer valid.

In another important change in the seventeenth century, the bird's-eye view underwent a rapprochement with the orthogonal plan. In order to manage the profusion of detail and to focus the eye on selective monuments, Gomboust suppressed infill buildings in his map of Paris. Most city blocks appear in plan, as flat, stippled shapes outlined by white streets. Wenceslaus Hollar adopted this technique when he mapped London after the Great Fire

43. Walter A. Liedtke, *Vermeer and the Delft School*, exhibition catalog (New York: Metropolitan Museum of Art, 2001), 507.

FIG. 27.8. LONDON, WENCESLAUS HOLLAR, 1666. Translating a historical event into an urban picture, Hollar's map illustrates the devastating impact of the Great Fire of 1666 on London, which appears as a white desert. The inset map at lower left situates the city in the metropolitan area, while the close-up highlights the destroyed churches and monuments in an otherwise blank field. The combination of aerial view, to depict the surviving buildings, and plan, to outline the empty streets, communicates at a glance the scope of the fire. The strong visual logic of the image makes the plan easy to decode and contributes to the legibility of this once esoteric form of cartographic representation.
Size of the original: 27 × 34.5 cm. Photograph courtesy of the Huntington Library, San Marino (RB 183917).

of 1666 (fig. 27.8). The blocks destroyed by fire are shown in plan, devoid of structures, while the surviving built-up portions of the city are seen from a bird's-eye view. Hollar took advantage of the plan to depict the ravaged sector of London. The fusion of view and plan is also artfully handled in Daniel Stalpaert's map of Amsterdam (ca. 1670). This map combines a profile view at the bottom of the image with an elevated view of the city center, where ships are seen from above, and then the pictorial space flattens out at the edges of the city to delineate the undeveloped blocks and fortifications in plan.

In stressing the abstract nature of the plan, historians have underestimated its potential as a form of rhetorical expression. There is no denying the greater pictorial appeal of the bird's-eye view and its invitation to visualization, which a plan does not offer. Nevertheless, plans are visual compositions also. The draftsman must make a variety of decisions, for example, about how shading and line weight are to be used; how the image is to be laid out on the page, orientated, and framed; what is to be in the center; and what, if any, buildings are to be delineated. These choices highlight certain aspects of a city and subordinate others. By manipulating the composition, the mapmaker can endow the plan with considerable visual interest and articulate its rhetorical content. This potential has been consistently underrated by historians who present the plan as a form of pure abstraction that bypasses the process of visual representation. Beyond reasserting the outdated oppositions of measurement and picture, the equation of the orthogonal plan with

mental abstraction presumes that an image can escape the process of graphic expression, pictorial representation, and imaginative interpretation that a plan necessarily undergoes.

Plans themselves refute this possibility. Certainly the decorative and iconographic features so common in bird's-eye views could be and were incorporated in orthogonal plans, for example Augustin Hirschvogel's map of Vienna (fig. 27.9). But setting those devices aside, the plan itself communicates visually. Hirschvogel eliminated all buildings except the cathedral, which is nearly at the center of the image, and the enclosing walls, which are shown in perspective, leaving no doubt about their importance in Vienna. The loose graphic treatment of the countryside, where only a river is indicated and the topography is otherwise indeterminate, serves to reinforce the specificity of the city plan and road system. The plan is contained in a circular frame, which visually overwhelms the irregular shape of the walls and harkens back to symbolic views of medieval cities.[44] At issue is not the limited visual appeal of these particular sixteenth-century plans, but rather the inevitable submission of the orthogonal plan to the process of representation and therefore its inherent susceptibility to formal and rhetorical manipulations. Without recognizing the rhetorical potential of the orthogonal plan, it is difficult to understand its development in this direction, beginning in the sixteenth century and continuing more boldly and creatively in the seventeenth, by the middle of which a hybrid image fusing plan and view came to prevail.

If the orthogonal plan was largely illegible in the sixteenth century, accessible only to a professional class of engineers and architects, how do we account for its emergence a century later as a public language of representation? Historians have stressed the new forms of measurement and rendering used by mapmakers, that is to say, aspects of map production, but they have largely ignored the issue of cartographic literacy, that is, how viewers acquired the visual skills to read new forms of representation.[45] New skills of visual literacy were required by map consumers in the seventeenth century in order to decode planimetric images that an earlier age had deemed illegible. It appears that the capacity to read orthogonal plans advanced during the seventeenth century, thanks largely to maps such as those by Gomboust, Hollar, and Stalpaert, where the parts in plan, however unfamiliar or austere the graphic language, nonetheless clearly communicated their meaning. The new visual skill may have been fostered initially by bird's-eye views of the sixteenth century, which, with their nearly overhead elevations, reveal the layout of streets almost as if depicted in plan. As Goodman has argued, seeing is not divorced from interpretation, and in these examples, seeing the plan in the context of the bird's-eye view clarifies the meaning of a new mode of representation.[46] These hybrid maps experimented with the pictorial and expressive potential of the plan and began the process of popularizing its once recondite language. Cartographic criticism has understood the triumph of the plan in the eighteenth century as that of the measured superseding the pictorial.[47] It might better be described as the moment when the plan was assimilated to vision and to the rhetoric of representation.

The plan had considerable prestige as a mode of representation because of its association with the expertise of engineers and architects, and with the erudition of Renaissance antiquarians. The identification of the plan with knowledge also may have contributed to its growing appeal during the seventeenth century, when the validity of perceptual experience was called into question. The microscope and telescope, the two quintessential inventions of the scientific revolution of the seventeenth century, changed the boundaries of the visible. They brought invisible forms into the realm of observation and made distant objects seem close at hand. Heedlessly altering scale and distance, these instruments implicitly called into question the reliability of human vision. Under these unstable conditions, with the horizons of visibility expanding and overthrowing the sovereignty of the human eye, the abstracted ground plan offered a reassuring and secure basis for representation. Because the plan did not correspond with visual experience, it may have appeared more reliable and better equipped to transmit information about the city. In search of constancy and an epistemological basis more stable than the shifting grounds of vision, mapmakers turned from the bird's-eye view to the plan in order to understand the city.

Planning the City: The Italian Evidence

The development of survey technology and the explosion of the popularity of the city view in the Renaissance did not coincide with a moment of great activity in the building of cities. However, the Renaissance was the period in

44. On Hirschvogel's plan, see David Landau and Peter W. Parshall, *The Renaissance Print, 1470–1550* (New Haven: Yale University Press, 1994), 239.

45. For an interesting discussion of this concept, see David Matless, "The Uses of Cartographic Literacy: Mapping, Survey and Citizenship in Twentieth-Century Britain," in *Mappings,* ed. Denis Cosgrove (London: Reaktion Books, 1999), 193–212.

46. Nelson Goodman, *Languages of Art: An Approach to a Theory of Symbols,* 2d ed. (Indianapolis: Hackett, 1976), 14.

47. See, for example, Nuti's formulation: "The rationalist culture of the eighteenth century finally succeeded in removing the Ptolemaic distinction and employing only one cartography, only one language. The representational system changed. Exactitude took over from lifelikeness in the expression of truth and there was a general move toward the expulsion of pictorial language from maps" (Nuti, "Perspective Plan," 120).

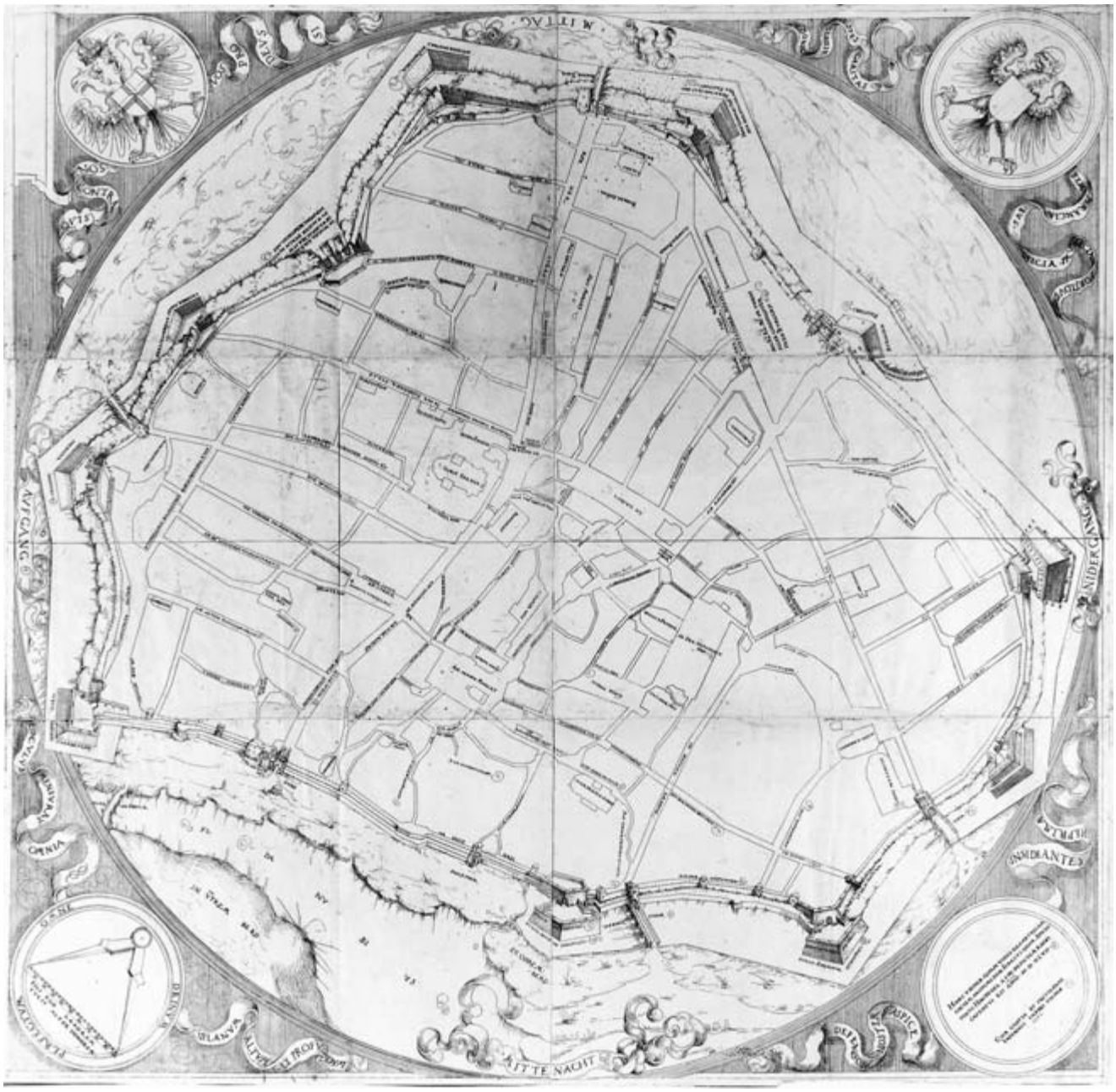


FIG. 27.9. PLAN OF VIENNA, AUGUSTIN HIRSCHVOGEL, 1552. An important early example of a printed city plan, this etching creates a striking visual effect by inscribing a circular image in a nearly square field and by contrasting the blank linear pattern of city blocks and streets with the dark ground of the frame. The composition draws an analogy between the frame, which encloses the map, and the bastions, shown in perspective, which encircle the city. The circular format with corner roundels links the plan of Vienna with religious symbolism, a theme echoed in the placement of the cathedral at the center of the composition.
Size of the original: ca. 84 × 85 cm. Photograph courtesy of the Albertina, Vienna (Schwarz S. 143 [p. 185f]).

which a comprehensive theory of their form first developed, and again, Italy led. Because of this theory's debt to the humanist tradition, it integrates urban planning principles with social and political models. Alberti's "De re aedificatoria" is the great formulation of these ideas. Alberti's treatment of architecture and the city is comprehensive, but it is not concrete. He offers no systematic description of an urban design and no illustration. Subsequent contributors to the literature of architectural and military theory, however, were quick to correct the omission, and it is in this context that the first consistently scaled plans of cities appear. From Filarete's illustrated

description of the imaginary city of Sforzinda (1460–62), through the treatise on architecture and engineering that Francesco di Giorgio produced in 1478–81 and revised in 1487–89, to the many treatises about military architecture of the sixteenth century, from Albrecht Dürer's *Etliche Underricht zu Befestigung der Stett, Schloss, und Flecken* of 1527 to Francesco de Marchi's *Della architettura militare,* written at midcentury and published in 1599, what all of the images in these texts—mostly plans but occasionally pictorial images—have in common is their abstract character. None of the published schemes concern themselves with those particularities of a site that would be revealed only by survey. These are generalized designs—ideal cities—unaffected by topography except as the conditions of a topological problem (e.g., a city divided by a river). The plans are laid out conventionally, with streets of even width and squares of regular geometric form. They have no need for the markers that tie plans to the real world, either the wind rose or the dimensional scale.

Before the end of the sixteenth century, the urban design projects of the Renaissance were, for the most part, concerned not with the expansion of cities or the foundation of towns but with the formation of monumental spaces as centers of community life and settings for great buildings. For none of these famous projects, from the rebuilding of the piazza of Pienza as the summer retreat of the papal curia by Pius II (1459–64) to the design of the Campidoglio in Rome by Michelangelo for Paul III beginning in 1537, do preparatory surveys of the site or design drawings of the urban scheme survive. Where detailed representations of urban situations do exist, they suggest that surveyed plans were not the foundation of design.

The drawing of a large Medici villa within the walls of Florence from around 1515 by Giuliano da Sangallo and his brother Antonio the Elder is the product of the most advanced practice of the period. Both men were well aware of the new survey techniques, and Giuliano is assigned the authorship of the plan of Pisa discussed earlier. The villa drawing consists of the design of the villa proper and a representation of the surrounding context of city streets, the town wall, and a neighboring convent.[48] But this is not a surveyed plan showing the relation of a proposed new building to the existing fabric of the city. A more accurate description would identify it as an architectural drawing willfully expanded into the urban surroundings, where it recasts the city after the rules of formal design. The east-west streets, residential streets that belonged to the 1490 development project, are represented accurately, because they, like the elements of the villa plan, are orthogonal. The older and more important north-south streets, the three streets that run from top to bottom in the drawing and intersect the city wall, are represented as the perpendicular elements of a grid system. In fact, they are neither parallel to one another, completely straight, nor do they have consistent width. Their regularity in the drawing is conventional. The absence of survey is further demonstrated by the city wall, which, despite the draftsman's repeated attempts, is not accurately oriented.

The survey became a regular part of the urban design process in the work of military architects. The concept of interdependent defense that was the foundation of gunpowder fortifications—where a cannon at one position defended adjacent walls and depended on other guns to cover the ground in their immediate area—meant that a spatially accurate representation of the whole defensive scheme was essential to planning. The cannon had made the design of a city's walls into a problem of geometry. When the military architect penetrated the city walls to lay out a street system for a treatise on fortification, it is not surprising that his schemes were as regular and efficient as the bastioned trace of the defensive perimeter. The plans for the 1539 project to modernize the town of Pratica, a feudal estate near Rome held by the Massimi family, offers a precocious example of the relationship between defense and urban design (fig. 27.10). The designer was Antonio da Sangallo the Younger, the nephew of Giuliano and Antonio the Elder. Antonio was the most accomplished designer of fortifications of the first half of the sixteenth century, as well as one of its most prominent architects, including among his projects the work at Saint Peter's Basilica in Rome, where he was chief architect from 1520 until his death in 1546. Drawings from his workshop document a practice that proceeds from site survey through preliminary design to formal project. They show how much more time went into the preparation of the fortification scheme than into the urban plan. The existing wall and castle were carefully surveyed using a system very much like the one that Leonardo had employed to record the defenses of Urbino and Cesena, but there is no record of the old town. The project shows why. An orthogonal grid overrides everything, rationalizing the site. Grids had subdivided land for millennia before the development of the survey. They were the first plans to be recorded in graphic form, because their conventional relationships (straight streets laid out either parallel or perpendicular to one another) were easily reproduced, requiring no geometric measurement at the site.[49] In the

48. Linda Pellecchia, "Designing the Via Laura Palace: Giuliano da Sangallo, the Medici, and Time," in *Lorenzo the Magnificent: Culture and Politics,* ed. Michael Mallett and Nicholas Mann (London: Warburg Institute, University of London, 1996), 37–63.

49. The few medieval images that reproduce the plan of a town with reasonable fidelity are all of orthogonal plans. They are not based on geometric surveys but simply reproduce the conventional relations among the elements of the town plan. The known plans are the 1306 notarial drawing of the Sienese new town of Talamone (see Francesca Ugolini, "La pianta del 1306 e l'impianto urbanistico di Talamone," *Storia della Città* 52 [1990]: 77–82) and the fourteenth-century drawings of the Dalmatian towns of Ston and Mali Ston (see Nicola Aricò, "Urbanizzare la frontiera: L'espansione dalmata di Ragusa e le fondazioni trecentesche di Ston e Mali Ston," *Storia della Città* 52 [1990]: 27–36).

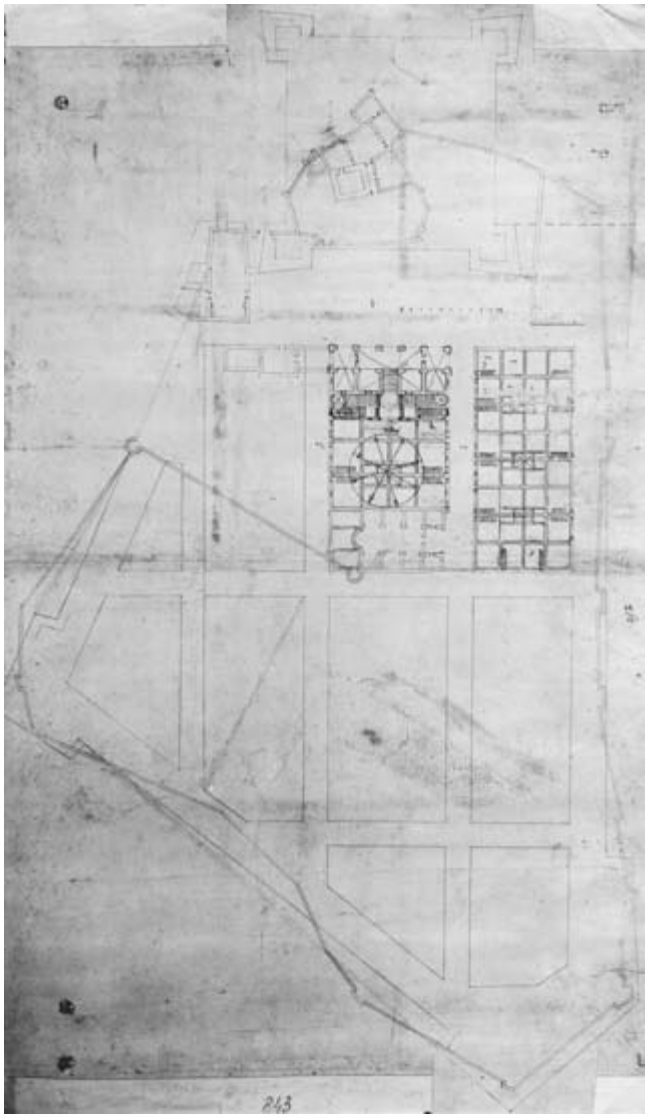


FIG. 27.10. PRATICA, A PROJECT FOR THE EXPANSION OF THE BORGO, ANTONIO DA SANGALLO THE YOUNGER, 1539. The borgo came into the possession of Luca Massimi with the division of his father's estate in 1539. Sangallo's project expanded the settlement and modernized its fortifications. The drawing records the position of older walls, the church, a tower, and some modest residential structures on the square. Sangallo's rationalized scheme, which includes ground floor plans of the residential buildings and the new church, is reflected in the layout of the modern borgo.
Photograph courtesy of the Galleria degli Uffizi, Florence (843A).

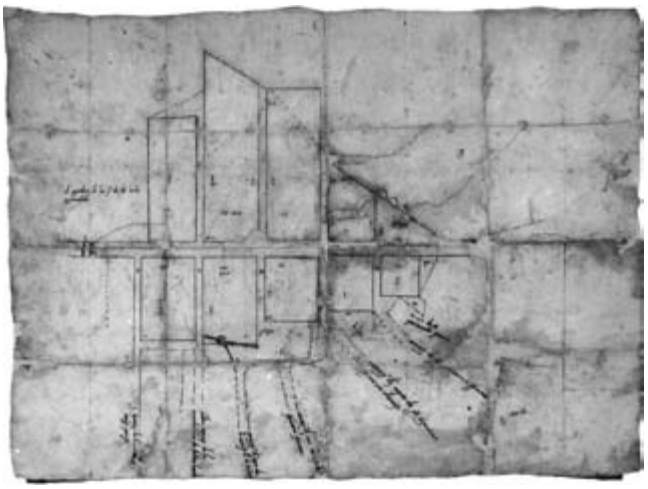


FIG. 27.11. GENOA, *MODELLO* FOR THE STRADA NUOVA DEVELOPMENT, 1551. The Strada Nuova project brought the heads of one faction of the Genoese nobility out of the fortified neighborhood enclaves where they had lived in the proximity of relatives and dependents to a residential area based on class rather than blood. It was developed with grand palaces in the new Renaissance style. The site was on the edge of the city, but the building lots were, by Genoese standards, both generous and regular. The *modello* is based on conventional orthogonal relationships. It is a survey in the medieval sense rather than the modern one.
Size of the original: 43.3 × 69 cm. Photograph courtesy of the Archivio Storico del Comune, Genoa (Filza n. 287, doc. 156).

Sangallo drawings, only orientation and a few fundamental dimensions were specific to Pratica.[50]

Evidence from Genoa illustrates the extent to which training in fortification design could influence the graphic documents prepared in connection with urban planning projects. The Strada Nuova was a residential development organized around a short stretch of broad, straight street that, for the first time in the crowded hillside city, created lots of a scale and regularity capable of accommodating palaces in the new classical style.[51] The original project was prepared by the city's *architetto di camera,* Bernardino Cantone. Bernardino was an able administrator of public projects and a surveyor who assessed the value of property but also laid out new streets and squares. The *modello* for the Strada Nuova project, referred to in documents from March 1551 forward, is a simple line drawing of the orthogonal planning scheme (fig. 27.11). It has an approximate but varying scale of 1:600 but contains no wind rose or dimensional scale. The measurements of the lots and the width of the streets are recorded by inscription. There is no serious attempt to record the irregular fabric of the adjacent medieval city. Where the grid ends, dotted lines suggest the continuation of streets. Despite the documented "measurement" of properties in preparation for laying out the new development, this drawing has neither the particularity nor the consistency of a surveyed plan.

50. Frommel and Adams, *Architectural Drawings,* 111–12, 151, and 173 (U 725A, U 838A, U 843A, and U 944A), and Paola Dell'Acqua and Marina Gentilucci, "Il progetto di Antonio da Sangallo il Giovane per il borgo di Pratica," in *Antonio da Sangallo il Giovane: La vita e l'opera,* ed. Gianfranco Spagnesi (Rome: Centro di Studi per la Storia dell'Architettura, 1986), 309–21.

51. Ennio Poleggi, *Strada Nuova: Una lottizzazione del Cinquecento a Genova* (Genoa: Sagep, 1972), 45–79.

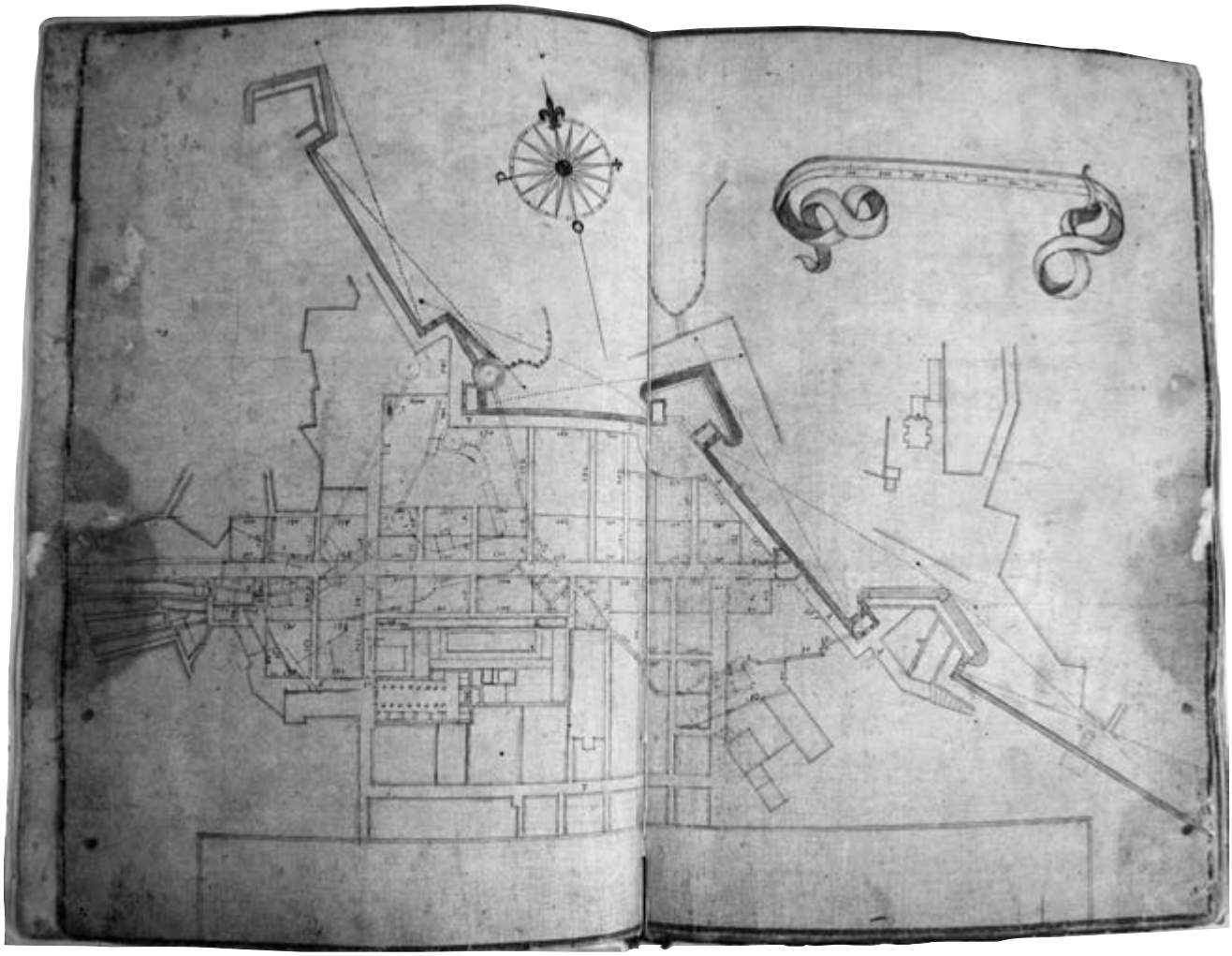


FIG. 27.12. GENOA, PROJECT SPONSORED BY PIETRO BATTISTA CATTANEO FOR THE EXTENSION OF THE STRADA NUOVA DEVELOPMENT, 1595. The connection of the development project with the modernization of the fortifications on the difficult hillside terrain of the city brought a new kind of professional to the urban planning process. His training in military architecture taught him survey skills that are evident in the compass rose and the dimension scale of this drawing. The form of the blocks and lots proposed here is still orthogonal, as it was—with the exception of very specialized radial plans used principally for urbanized fortresses—in all the urban projects proposed by military engineers in the sixteenth century. However, preexisting urban forms were measured by survey and their irregularities faithfully recorded in the drawing.
Pietro Battista Cattaneo, "Alcuni avertimenti et calcoli fatti intorno alla strada et nova habitatione nel luogo del Castelletto." Photograph courtesy of the Biblioteca Civica Berio, Genoa (Sezione di Conservazione, m.r.VIII.2.20).

A series of proposals for an extension of the Strada Nuova development submitted to the Genoese senate in the period between 1587 and 1595 offers a striking contrast to the 1551 *modello*. In exchange for rebuilding the section of the fourteenth-century wall that protected this part of the city, investors petitioned for the right to develop the land on the slope above the Strada Nuova. The drawings of the three projects submitted to the Padri del Comune present modern bastioned curtains and orthogonal development projects. The most elaborate of these is the 1595 proposal sponsored by the nobleman Pietro Battista Cattaneo (fig. 27.12). A wind rose and dimensional scale signal its systems of measure. The old walls and the new, the existing fabric and the proposed one, the bastions, and even the plan of the neighborhood's church were surveyed and recorded. Whoever designed the fortifications used the survey technology that came with that expertise to present his urban plan.

A military career also provided the training for the man responsible for the first surviving representation of an urban transformation project in the form of a full city plan.[52] Jacomo Fontana was an artillery specialist who had been employed by the papacy as chief gunner at the Castel Sant'

52. Adams, "The *Curriculum Vitae* of Jacomo Fontana," 7–11, and Lerza, "Una proposta per il porto di Ancona," 25–38.

FIG. 27.13. ANCONA, SURVEY PLAN, JACOMO FONTANA, 1585–90. One of a very limited number of orthogonal plans realized in the sixteenth century and the basis for two project presentation drawings. Fontana had made a model of the city in the 1560s when he served as gunner for the papal forces, and the survey on which the model was based may underlie this drawing as well as a perspective plan that he published in 1569.
Size of the original: 36.5 × 49.7 cm. Photograph © BAV (Vat. Lat. 13325, fol. 11v–12r).

FIG. 27.14. ANCONA, PROPOSAL FOR THE EXPANSION OF THE CITY, JACOMO FONTANA, 1585–90. The scheme integrates urban set pieces that Fontana might have seen in treatises of military architecture such as Pietro Cattaneo's *I quattro primi libri di architettura* (1554) with elements that respond directly to the specific conditions of the plan of medieval Ancona. Fontana's first concern seems to have been to provide the missing communication between the harbor and the inland gates.
Size of the original: 36.2 × 49.7 cm. Photograph © BAV (Vat. Lat. 13325, fol. 17v–18r).

Angelo and the city of Ancona. His proposals for the "Restauratione del Porto de Ancona Capo di Marca nel Mare Adriatico," produced during the papacy of Sixtus V (1585–90), are presented in three orthogonal plans. The first plan presents a survey of the city as it was (fig. 27.13); the other two offer Fontana's designs. The most ambitious of the designs proposes a new seawall to enclose the harbor and create a bastionated curtain toward the Adriatic (fig. 27.14). On the filled land inside the seawall, Fontana imagined an orthogonally ordered extension of the city divided into two sections. The northernmost was a set piece developed around a square basin accessible from the sea. The second section was more closely integrated into the existing fabric of the city. The informing element was a new street that would run on a straight line from a gate on the inland wall to a quay and promenade that would open the otherwise closed waterfront to the view of the sea. More than any other element of the design, the street benefited from Fontana's mapping skills. The base plan allowed him to calculate the course of the street through the old city and to display its impact on the existing urban fabric. The presentation plan shows where he proposed to truncate blocks and where he would fill in undeveloped areas to take advantage of what would have become the major route through the city.[53]

Formal acknowledgment of the value of surveyed plans for the management of urban design practice appears at the same time, in the late sixteenth century, in the dedications of some of the earliest surveyed images of cities. The most explicit is attached to the orthogonal plan of Parma executed between 1589 and 1592 by Smeraldo Smeraldi, the engineer and surveyor of the city office in charge of roads and canals. The plan may have had its origins in the desire of Alessandro Farnese, duke of Parma, to record the site where he wished to build a citadel, but by the time it received its dedication to Duke Ranuccio I in 1601, the text spoke not of military matters but of the city. Having foresworn a perspective presentation, Smeraldi asserts, the plan can give true measure. In it the duke "can see the proportions and relationships of the streets to one another and of any street to the body (of the city) as a whole." Smeraldi identifies the particular value of the plan when he adds, "If you want to bring the city to its full dignity you will clearly see the places that need to be improved."[54]

53. In the seventeenth century, the expansion and fortification of Dutch cities stimulated the production of a large number of urban design drawings. The expansion of Amsterdam that was approved by the city council in 1611 is illustrated in a plan of about 1620 preserved in the Gemeentearchief in Amsterdam. It shows the new system of fortifications (the first part of the project to be built) and the blocks and canals on the east side of the city where development began. Jan Pietersz. Dou's plan for the expansion and fortification of Leiden, also from 1611, was more closely followed in execution. This and the drawings for the expansion of other Dutch cities in the seventeenth century are the subject of Ed Taverne, *In't land van belofte: In de Nieue stadt. Ideaal en werkelijkheid van de stadsuitleg in de Republieck, 1580–1680* (Maarssen: Gary Schwartz, 1978).

54. *Io Smeraldo Smeraldi,* 95.

The second half of the sixteenth century saw the first systematic use of drawings as part of the legal record of the urban fabric. Beginning in the 1560s, under the pressure of an intensified property market, real estate records, especially those of the religious institutions that owned large amounts of the property in Italian cities, replaced the exclusively textual documents of the Middle Ages with inventories, called *libri di case,* that not only described properties and located them among abutting properties but also pictured them.[55] Public agencies charged with the maintenance of the physical structure of the city used the same pictorial devices to record changes on the larger, urban scale. In Rome, the Italian city in most dynamic transformation during the late sixteenth century and the seventeenth, the records of the Presidenza delle Strade and, in the seventeenth century, the chirographs produced by direct papal involvement in urban transformation projects document an increasingly sophisticated application of the survey. A drawing from the papacy of Sixtus V described a proposed demolition to enlarge the square in front of the church of Santa Maria della Consolazione behind the Campidoglio. The image has the same mixed format as the early graphic documents of ecclesiastical property. Most of the borders of the square are defined by property lines alone, and the structures on them are identified by name. Exceptionally, the building proposed for demolition is presented pictorially.[56] Like most surveys of this period, including a very ambitious one describing a project to enlarge the papal palace on the Quirinal and regularize the surrounding public spaces, attention to topographic irregularity is limited.[57] The rough approximation of existing conditions and the long straight lines of the proposed improvements give the plan an air of abstraction.

Seventy years later, a papal chirograph prepared by the surveyors of the Presidenza della Strada presented a much more precise and orderly picture of a similar project. The subject is the plan for a square in front of the Jesuit Collegio Romano in the old center of the city, promoted in 1659 by Pope Alexander VII (fig. 27.15). A dimensional scale and the detailed record of the irregularities of the site testify to the surveyed character of the drawing. Construction lines—including arcs that seem to record control measurements taken across the open space of the preexisting square—are traced in graphite; the finished image is reinforced in colored wash. The plan records the architecture of the Palazzo Salviati, which the pope forced the Jesuits to buy and demolish; it depicts the outline of the proposed "well proportioned" space that would afford the collegio building "the necessary view"; and, to the side of the plan, in register with the section of the building to which it relates, it even includes an orthogonal elevation of the facade of the structures to be demolished.[58] The sophistication of this plan reflects the frequency of the use of graphic documents by this date. In Alexander's chirograph, the papal decree is presented as an extended caption at the foot of the survey and explicitly depends on the image for the exposition of the project ("as shown in the plan drawn above").

By the mid-seventeenth century, surveyed project drawings described very complex situations. A 1656 scheme to connect the papal palace at the Quirinal with the northern entry to the city at the Piazza del Popolo would have extended the axis of the Via del Babuino / Via Due Macelli through a fully built-up section of the city. The survey that documents the aborted project gives not only the configuration of the block system that the new street would have had to penetrate but also the plan of all the houses to be acquired for the project.[59] Surveyed drawings allowed the pope, Alexander VII, and his architect, Gianlorenzo Bernini, to identify the properties needed for the Quirinal extension. They even facilitated the orientation of the new segment of the street. But the job could have been done without them. A sightline to the position of the proposed gate could have been established from a roof at the end of the Via Due Macelli and houses identified for demolition on the ground. Some process like this was responsible for the great urban clearing projects of the late Middle Ages, such as that for the Piazza Maggiore at Bologna or the Piazza della Signoria in Florence. The surveyed drawing of the Quirinal project facilitated the

55. Deborah Nelson Wilde, "Housing and Urban Development in Sixteenth Century Rome: The Properties of the Arciconfraterinta della Ss.ma Annunziata" (Ph.D. diss., New York University, 1989); Angela Marino, "I 'Libri delle case' di Roma: La città disegnata," in *Il disegno di architettura,* ed. Paolo Carpeggiani and Luciano Patetta (Milan: Guerini, 1989), 149–53; and Roberto Fregna and Salvatore Polito, "Fonti di archivio per una storia edilizia di Roma: I libri delle case dal '500 al '700, forma e esperienza della città," *Controspazio* 3, no. 9 (1971): 2–20. See also Paolo Portoghesi, *Roma del Rinascimento,* 2 vols. (Milan: Electa, 1971), 2:535–66 and 569–90. Giovanni Pinamoti, "aritmetico e geometra," produced a particularly detailed *libro delle* case for the church of San Pancrazio in Florence in 1585 using yet another set of graphic conventions. A three-dimensional image of the building, or set of buildings, was superimposed over the outline of the lot, defined by inscribed dimensions. Reproduced in Giovanni Fanelli, *Firenze, architettura e città* (Florence: Vallecchi, 1973), atlas volume, figs. 570–79.

56. Rome, Archivio di Stato, Disegni e piante, Coll. I, cart 80, n. 254, reproduced in Daniela Sinisi, "Lavori pubblici di acque e strade e congregazioni cardinalizie in epoca sistina e presistina," in *Il Campidoglio e Sisto V,* ed. Luigi Spezzaferro and Maria Elisa Tittoni (Rome: Edizioni Carte Segrete, 1991), 50–53, esp. 53 (fig. 27).

57. Accademia di San Luca, Collezione Mascerino, no. 2466, dated 1584–85. See Paolo Marconi, Angela Cipriani, and Enrico Valeriani, *I disegni di architettura dell'Archivio storico dell'Accademia di San Luca,* 2 vols. (Rome: Luca, 1974).

58. Rome, Archivio di Stato, Notai di Acque e Strade, vol. 86 (96), 1659, c. 738. Reproduced in Richard Krautheimer, *The Rome of Alexander VII, 1655–1667* (Princeton: Princeton University Press, 1985), 85 (fig. 64).

59. Vatican City, Biblioteca Apostolica Vaticana, Chig., P. VII 10, ff. 32v–33r. Reproduced in Krautheimer, *Rome of Alexander,* 94 (fig. 75).

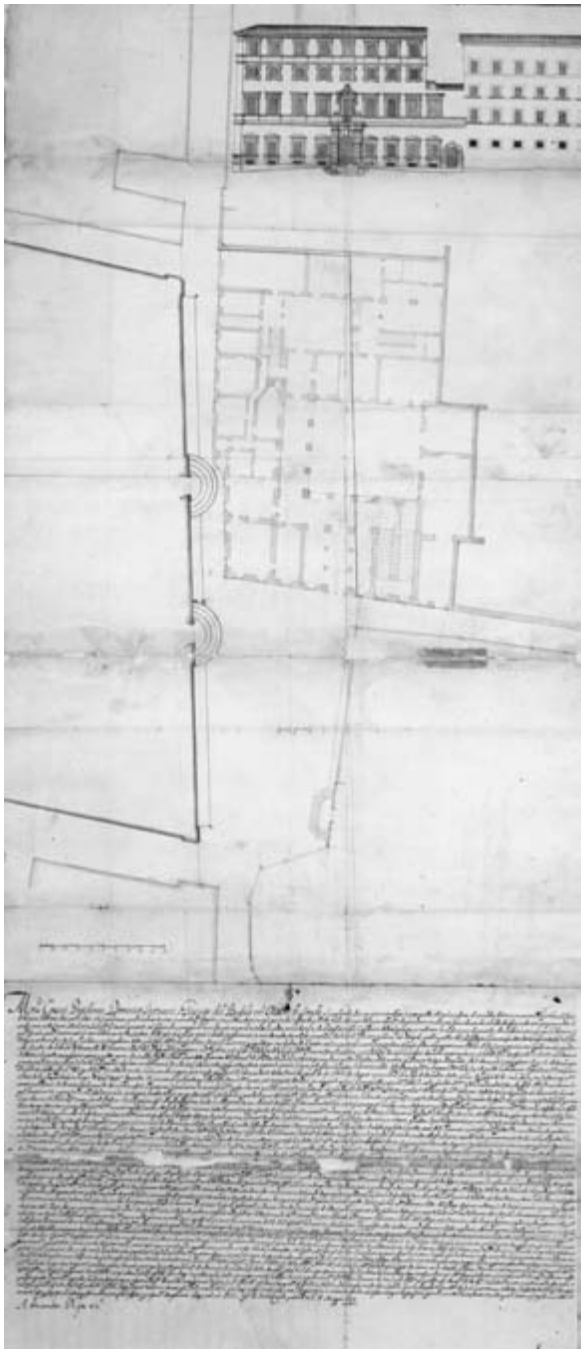


FIG. 27.15. ROME, PIAZZA COLLEGIO ROMANO, 1659. Finished drawing from a chirograph of Pope Alexander VII. The accompanying text—with ample reference to information contained only in the drawing—lays down the conditions for a project that included the destruction of an existing building (shown in plan and elevation) and the definition of an enlarged public space in front of the Collegio Romano. Drawings like this embodied authority over urban projects. Work on the project was delayed because the Maestri delle Strade, the agency in charge of the public space of the city, had failed to submit the official drawing of the final version of the design.
Photograph courtesy of the Archivio de Stato, Rome (Notai di Acque e Strade, vol. 86 [96], 1659, c. 738).

design process and rationalized the assessment of costs but did not create new forms.

In the same years, however, other survey drawings took on even this role. The drawings associated with the project that Alexander VII and his architect Pietro da Cortona began in the winter of 1656 for a square in front of the fifteenth-century church of Santa Maria della Pace in Rome are very much like the ones that might be prepared for an urban planning project today.[60] The issue that initially drove the design was concern about carriage access to the church. A drawing from the early summer of 1656 included the streets surrounding the church and the plan of an adjacent property that the administrators of the project proposed to demolish to create a parking area and a new route through the neighborhood (fig. 27.16). The drawing gave the shape of the piazza to be gained and the character of the buildings that would be lost, but it hardly seems essential for the conception of the project. The solution was a practical one, determined entirely by the position and shape of the houses to be sacrificed. But the drawing soon played a more dynamic role in solving the design problem. A note attached to the report records Cortona's statement that the pope had agreed to open up the right side of the intersection in front of the church as well as the left, "in order to give the new portico some breathing room on the alley side." What this meant is something we learn only from the drawing. A lightly drawn line that might have been laid down during a conversation between Cortona and the pope illustrates the idea: an irregular quadrangle vaguely reflecting the shape of the lot to be gained from the first demolitions was to be carved out of the property to the right of the intersection.

This first idea was more clearly defined in a later and more detailed plan (fig. 27.17). Here the irregular polygon of the square is given something like its final form, and the survey explains why. Now the structures on the right side of the square are seen to define its shape. Though buildings will have to be demolished, their internal structure determines the limits of the public space. The apse of the neighboring church of Santa Maria del Anima defines the northern limit of the square; a bearing wall of the house that will be partly destroyed for the square fixes its southern boundary. The left side of the square, where the planners had more flexibility because the church of Santa Maria della Pace owned the land, follows the form dictated by the conditions on the right. The design of the square would be almost unimaginable without the drawing and the survey on which it was based. The survey marked the position of the limiting structures

60. Hans Ost, "Studien zu Pietro da Cortonas Umbau von S. Maria della Pace," *Römisches Jahrbuch für Kunstgeschichte* 13 (1971): 231–85.

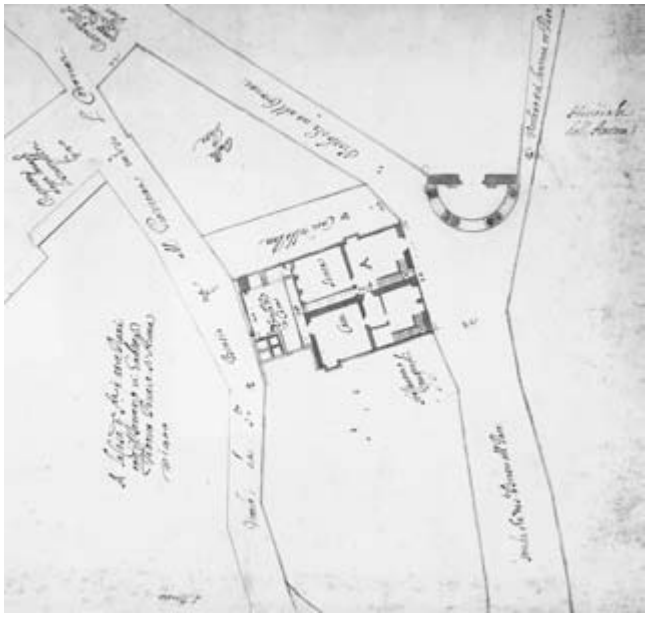


FIG. 27.16. ROME, THE NEIGHBORHOOD AROUND SANTA MARIA DELLA PACE, 1656. A drawing from the workshop of the architect of the project, Pietro da Cortona. The first plans were made to study the relationship of a porch proposed for the doorway of the fifteenth-century church to the existing public space. As problems of carriage access to the site became apparent, more far-reaching solutions were proposed. Subsequent surveys expanded outward into the neighborhood. This drawing records the shape and structure of buildings that would have been affected by a solution that called for the creation of a parking area on their site. The drawing was also used by the architect and the pope to sketch an alternate scheme. The pencil lines within the block to the right of the entrance to the church give the kernel of the idea that was ultimately put into practice (see fig. 27.17).
Size of the original: 41.8 × 45.6 cm. Photograph © BAV (Chig., P. VII 9, fol. 71).

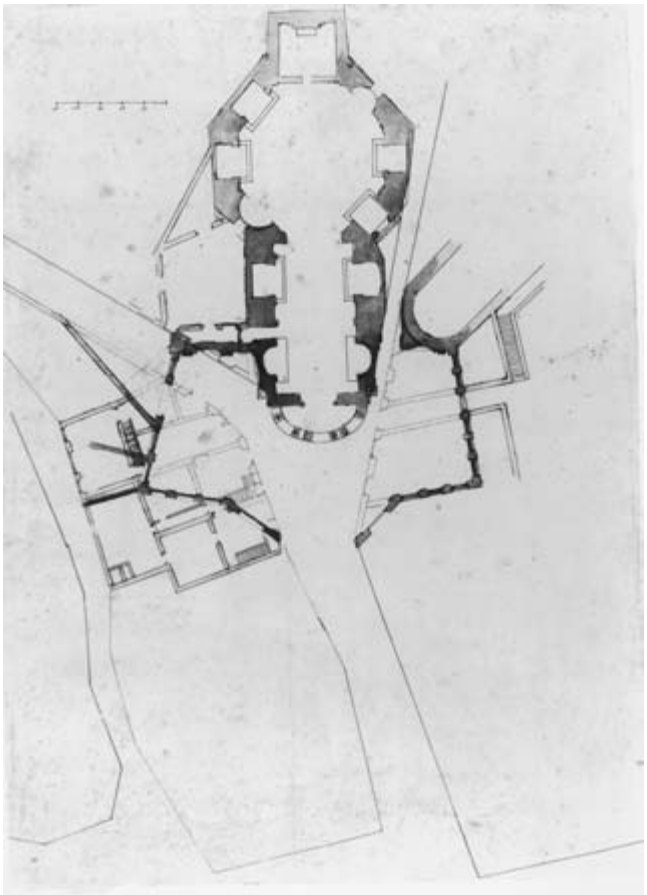


FIG. 27.17. ROME, PROJECT FOR THE SQUARE AT SANTA MARIA DELLA PACE, PIETRO DA CORTONA, 1656. The idea to expand the square to the right as well as the left of the church, first tentatively suggested in figure 27.16, is seen here in much more fully developed form. It is not likely that this beautiful drawing is the actual document where the shape of the square was worked out. The role of this sheet is more likely to have been to illustrate the practical logic behind the formal decision for the pope and his advisers. The buildings that bordered the right side of the square had to be taken from an owner not immediately involved in the project. The drawing shows that it was the structure of this building—and presumably the desire to limit damage to it—that suggested the very unusual shape of the public space.
Size of the original: 54.6 × 41.8 cm. Photograph © BAV (Chig., P. VII 9, fol. 74).

and allowed the designer to turn these conditions into a coherent form.

This drawing represents the point at which survey had transformed urban design. The orthogonal systems that had provided the only mental image of form for urban projects before the age of graphic notation and continued to dominate the projects of the military designers who first surveyed the city in preparation for intervening in it had given way to something new. Mid-seventeenth-century urban designers were not the first to turn topographic idiosyncrasies to artistic advantage, but they were the first to be able to see them on the drafting table. The scheme that Pietro da Cortona invented reflects the culture of the design studio in its complexity. It is not limited by conventional models easy to hold in the mind or to what could be imagined standing on a site. The surveyed plan of existing structures allowed the designer to know limits that could not be seen, and it was from these that he generated his design.