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Jena Patel March 25, 2015

A City Reborn: The Evolution of Seventeenth-Century Representations of the City of London after the Great Fire

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An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
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Abstract

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After the devastation of the Great Fire of London in 1666, city planners and authorities were presented with the unique opportunity of rebuilding London from the ground up. The Great Fire created the possibility for expansion, bringing the city out of the medieval era and for accommodating the influx of European immigrants. The disaster also catalyzed the process of renovating the city of London so that it could adopt the most up to date architectural designs and assume a more modern infrastructure. The late seventeenth-century not only witnessed a changing physical landscape, but the beginnings of an intellectual revolution, particularly with the increasing discourse between nations regarding both scientific and architectural discoveries. In my thesis I will examine how plans for the reconstruction of London evolved over the course of the seventeenth-century in tandem with the emergence of scientific thought with the rise of the Royal Society of London. My study will focus on three images. The first is *An Exact Survey of the Streets, Lanes and Churches Contained within the Ruins of the City of London First Described in Six Plates as surveyed by John Leake and engraved by Wenceslaus Hollar*. The second image is Sir Christopher Wren's 1666 Plan for the City of London, and the final image is *A Large and Accurate Map of the City of London* by John Ogilby and William Morgan, published in 1677. I will place these maps in the context of other illustrations of the city to show that when viewed in sequence, these maps demonstrate the representational shift from the bird's-eye perspective to the ichnographic view, as well as the emergence of innovative designs for the reconstruction of London with the rise of scientific thought and reason.

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I would like to thank Professor McPhee for all of her support and encouragement this past year. Her unrelenting positivity and reassurance has helped me create a project that I am proud to present. Thank you to Professor Rohrer and Professor Starnes for taking the time to read my thesis and serving as a part of my committee.

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Introduction

During the particularly dry autumn of 1666, Londoners were awakened by the smell of smoke and when they rose from their beds to look from their windows they saw the beginnings of "an infinite great fire".[1] The fire raged for three days consuming everything in its path. Founding member of the Royal Society of London, John Evelyn, described the dreadful and frightening scene in his diary:

> All the sky was of fiery aspect, like the top of a burning oven, and the light seen above forty miles round-about for many nights. God grant mine eyes may never behold the like who now saw above 10,000 houses all in one flame! The noise and the cracking and thunder of impetuous flames, the shrieking of women and children, the hurry of people, the fall of towers, houses, churches, was like a hideous storm…[2]

The Great Fire of London ravaged the city and left thousands of Londoners without shelter or possessions. The fire endured as the single most destructive disaster in the history of the city until World War II.

However, from the ashes and rubble, a group of intellectuals known as the Royal Society of London saw an opportunity to build a more modern and sophisticated metropolis grounded in scientific principle and contemporary architectural aesthetic. The Great Fire created the possibility for expansion, bringing the city out of the medieval era and accommodating the recent influx of European immigrants. The City of London not only witnessed a changing physical landscape, but the beginnings of an intellectual revolution, especially with the increasing discourse between nations regarding both scientific and architectural discoveries. The international exchange of information through travel and trade exposed English intellectuals to unconventional ideas, and inspired creativity and innovation.

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[1] Samuel Pepys, Robert Latham, and William Matthews, *The Diary of Samuel Pepys*, vol. 7 (London: Bell, 1970), 270.
[2] John Evelyn, *Diary and Correspondence of John Evelyn,* (London: Henry Colburn & Co., 1857), 10-11.

The seventeenth-century represented a pivotal moment in the history of the pursuit of scientific knowledge; English scholars and philosophers used the Royal Society of London as a platform to promote new systems for understanding the world. The Royal Society represented one of many recently established European organizations that emerged as a part of what is formally known as the scientific society movement. This period saw the foundation of two other prominent and influential scientific societies: the Academiè de Sciences in Paris and the Accademia de Cimento in Florence. Intellectuals across Europe dedicated themselves to exploring and understanding natural phenomena through observation and experimentation rather than ecclesiastical explanation. The inauguration of the Royal Society of London publically legitimized the study and exploration of the sciences, after years under the strict and confining jurisdiction of Oliver Cromwell. With the Restoration of Charles II to the throne, London entered a new era as their monarch endeavored to push England forward as a nation. British intellectuals saw the opportunity to form an official chartered organization dedicated to the investigation of the natural sciences for the enhancement of mankind.[3]

Prior to receiving its official charter, the Royal Society existed as an unsanctioned group of philosophers, architects, and scientists referred to as the "Invisible College."[4] Despite the risk involved, men of a variety of scientific disciplines gathered once a week at Gresham College after public lectures given by Sir Christopher Wren to share their theories, experiments, and findings. Gresham College, founded by Sir Thomas Gresham, was created to promote higher education and served as a center for the scientific network that ultimately gave rise to the Royal Society of London. The Royal Society's motto, "Nullis in Verba" or "Take Nobody's Word for

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[3] Henry George. Lyons, "The Invisible College, before 1660," in *The Royal Society, 1660-1940* (London: Cambridge University Press, 1944), 17.
[4] Henry Lyons, *The Royal Society 1660-1940: A History of Its Administration under Its Charters* (Cambridge: University Press, 1944), 1.

It" encapsulates the spirit of the organization, as its members questioned tradition and defied age-old axioms.

In his preamble to the charter for the Royal Society, founding member Sir Christopher Wren delineated the organization's undertakings and defined the benefits of scientific inquiry for the greater good of humanity:

> Wherefore our reason hath suggested to us, and our own experience in our travels in foreign kingdoms and states, hath abundantly confirmed that we prosecute effectually the Advancement of Natural Experimental Philosophy, especially those parts of it which concern the increase of commerce, by the addition of useful inventions tending to the ease, profit, or health of our subjects; which will best be accomplished by a company of ingenious and learned persons, well qualified for this sort of knowledge, to make it their principal care and study, and to be constituted a regular society for this purpose, endowed with all proper privileges and immunities.[5]

With help from the Society, science and mathematics began to permeate all schools of thought, including conventionally artistic fields such as cartography. Wren and his colleagues intended for the Royal Society's discoveries to benefit mankind and further promote the socioeconomic growth of the city as well as the nation, an ambition he realized in part through his ideas for reconstructing the city after the Great Fire.

Maps and city plans born out of the post-fire era reflect the growing influence of the Royal Society. In the twenty years following the Great Fire, depictions of London dramatically shifted their focus and fundamental purpose to better suit the needs of the growing scientific community. In my thesis I will argue that maps reflect both physical and ideological changes in the environments they represent. In the post-fire era recognition and appreciation for the sciences manifested itself in representations of London through both content and construction. My study will predominantly focus on three representations of the City of London. The first is *An Exact*

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[5] Christopher Wren, *Parentalia; Memoirs of the Family of the Wrens* (London: Gray's Inn, 1750), 197.

Survey of the Streets, Lanes and Churches Contained within the Ruins of the City of London by Wenceslaus Hollar. The second image is Sir Christopher Wren's 1666 Plan for the City of London, and the final image is *A Large and Accurate Map of the City of London* by John Ogilby and William Morgan, published in 1677. By placing these images in the context of other representations of the city, I will explore how the advent of scientific thought rapidly transformed cartographical practice and enhanced the ability of maps to project a specific impression of reality.

Chapter 1: A City Destroyed -The Exact Survey of London after the Great Fire

The Great Fire of London almost entirely and exclusively destroyed the City of London Corporation, England's chief financial center. The City of London Corporation existed as one third of the Greater London area alongside Westminster and Southwark. However unlike its counterparts, the City exercised a significant level of autonomy from the presiding monarchy.[6] Its position along the Thames allowed it to maintain a monopoly over the nation's ports and trade, and with the rise of conspicuous consumption and population growth, the City experienced a substantial boost in commerce and income.[7] As the country's primary economic enterprise, the City enjoyed a powerful and influential position; it existed as an individual entity with its own local governing body, the Court of Aldermen. In addition to economic and political autonomy, citizens residing within the City of London viewed themselves as more unified and refined than their counterparts in the suburbs.[8] The calamity of the Great Fire threatened to destroy all levels of the City's independence and individuality as economic, and political establishments stood in ruins. Londoners realized the "naked self interest" of their peers as each citizen sought to protect their own interests amidst the flames.[9] Furthermore, the destruction of homes, businesses, and urban infrastructure forced wealthy and influential merchants to move their work to adjacent boroughs, threatening to drive the City into an economic crisis.[10]

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[6] Joseph Monteyne, "The "Picture of Troy": Mapping the Trauma of London's Fire in 1666," in *The Printed Image in Early Modern London: Urban Space, Visual Representation, and Social Exchange* (Aldershot, England: Ashgate, 2007), 113.
[7] Peter Earle, "The Economy of London, 1660-1730," in *Urban Achievement in Early Modern Europe: Golden Ages in Antwerp, Amsterdam, and London*, by Patrick Karl O'Brien (Cambridge: Cambridge University Press, 2001), 82-83.
[8] Monteyne, "Picture of Troy", 123.
[9] Ibid.
[10] Ibid, 132.

The Great Fire rapidly spread with the strong autumn winds and despite efforts to stop the conflagration, it persisted for three days, obliterating everything in its path. In an effort to save valuables and personal belongings, citizens of London vacated their homes and fled the city to escape the growing blaze. Royal Society member Samuel Pepys recorded in his diary that he "saw the fire grow; and, as it grew darker, [it] appeared more and more, and in corners and upon steeples, and between churches and houses, as far as we could see up the hill of the City, in a most horrid malicious bloody flame, not like the fine flame of an ordinary fire."[11] The catastrophic inferno destroyed approximately 13,000 homes, key religious sites including St. Paul's Cathedral, and important economic institutions such as the Royal Exchange, Guildhall, the halls of the city livery companies, and chief administrative centers.[12] The City of London, as its citizens had known it, no longer existed.

In the chaos following the disaster, artists and cartographers rushed to visualize public establishments, boundaries, and roads in an attempt to preserve the City's identity amidst the confusion and tragedy.[13] His majesty Charles II identified the need for a practical and accurate map, to record the extent of the destruction and envision plans for rebuilding London.[14] Prior to the Great Fire, maps provided broad illustrations and picturesque representations of the city, but failed to supply the technical information necessary for measuring and planning anew. According to historian Phillipa Glanville, early "map-makers aimed at and achieved only an approximation of London in map form."[15] Contemporary taste preferred maps created in the

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[11] Samuel Pepys, Robert Latham, and William Matthews, *The Diary of Samuel Pepys*, vol. 7 (London: Bell, 1970), 271.
[12] Philippa Glanville, *London in Maps* (London: Connoisseur, 1972), 94.
[13] Monteyne, "Picture of Troy", 114.
[14] Simon Turner, "Hollar's Prospect and Maps of London," in *Printed Images in Early Modern Britain: Essays in Interpretation*, ed. Michael Hunter (Surrey: Ashgate, 2010), 154.
[15] Glanville, *London in Maps,* 23.

bird's-eye view, a perspective conceived at the expense of scientific accuracy and practicality. One particularly gifted artist, Wenceslaus Hollar, sought to create a map that accurately documented the damages wrought by the Great Fire. Hollar's *Exact Surveigh of the Streets, Lanes, and Churches Contained within the Ruins of the City of London* published in 1667 illustrates a crucial transition in cartographical practice from the popular bird's-eye view to the emerging, two-dimensional ichnographic plan promoted by the Royal Society of London (Figure 1). His map serves to memorialize the tragedy of the Great Fire by combining both representational modes, and ultimately provides a comprehensive plan view of the damages as a means of imagining a new and improved city.

Wenceslaus Hollar was born in Prague on July 13, 1607. As a young man, in order to begin his career as an artist and engraver, he left his home country never to return.[16] Hollar moved to Germany, where he worked for publisher Abraham Hogenberg, son of the renowned Franz Hogenberg, co-creator of the widely circulated city atlas, the *Civitates Orbis Terrarum*.[17] His position with Hogenberg allowed him to master the art of topography and sharpened his graphic skills. Hollar demonstrated his formidable talent and unmatched ability to create maps in bird's-eye perspective.[18] In the year 1638, Hollar left Germany for London where he distinguished himself from his peers and debuted his direct observational approach with an exceptionally detailed etching of Greenwich (Figure 2).[19] In the years surrounding the Great Fire of London, Hollar's cartographical services were in high demand as surveyors and city authorities needed new maps detailing the reshaped urban environment.

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[16] Gillian Tindall, *The Man Who Drew London: Wenceslaus Hollar in Reality and Imagination* (London: Chatto & Windus, 2002), 9.
[17] Turner, "Hollar's Prospect", 146
[18] Ibid.
[19] Tindall, *The Man Who Drew London,* 49-50.

Hollar's portfolio includes a variety of views of London that offer a visual narrative for the dramatically shifting urban topography.[20] In order to quickly publish and release his *Exact Surveigh* to the market, Hollar used work from his previously unfinished 1658 map of London and Westminster to render the extant areas of London in bird's-eye perspective.[21] A surviving impression of the 1658 plan from an unfinished plate illustrates the Lincoln Inn Fields in North London with an astonishing level of detail (Figure 3). In an etched sheet accompanying the incomplete plate Hollar explained that he intended to manufacture a map including "streets, lanes, alleys etc. proportionably measured" and with "buildings (especially of the principal houses, churches, courts, halls, etc.) as much resembling the likeness of them."[22] Hollar's combination of map and view in the image of London and Westminster, made in 1658, required a fresh survey of the city, however the gathered data became obsolete after the Great Fire. Despite facing major setbacks, Hollar endeavored to keep his project alive. In his new project Hollar strayed from conventional mapping practice to pursue a more scientifically accurate representation of the damage through the use of the ichnographic plan (Figure 9).

Hollar's *Exact Survey of the Ruins of London*, was highly anticipated by his peers in the Royal Society. On the 22nd of November 1666, Samuel Pepys expressed his enthusiasm for the map in his diary as he wrote:

> My Lord Bruckner did show me Hollar's new print of the City, with a pretty representation of that part which is burnt, very fine indeed; and tells me that he was yesterday sworn the King's servant, and that the King hath commanded him to go on with his great map of the City, which he was upon before the City was burned, like Gombaut of Paris, which I am glad of.[23]

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[20] Turner, "Hollar's Prospect", 146.
[21] Tindall, *The Man Who Drew London* , 171
[22] (As of March 6th, 2015 the British Museum has listed a portion of Hollar's 1658 map of London as a part of its online catalog with accompanying curatorial notes.)
[23] Pepys, *Diary of Samuel Pepys,* 378-379.

Pepys's fellow Society member, John Evelyn, also supported Hollar's ambitions to create an accurate ichnographic map of London. In a petition to the King, Evelyn attested to Hollar's unparalleled abilities as he wrote that he had "made numerous plans of places in Europe, monuments, ceremonies and to illustrate history, and a plan of London before the burning, which none can complete but himself."[24] In addition to offering their support, members of the Society directly participated in the map's construction. For example Richard Shortgrave, operator (i.e. technician) to the Society under the direct supervision of Robert Hooke, served as one of the surveyors on Hollar's *Exact Surveigh*.[25] The Royal Society encouraged cartographers to adopt an objective scientific approach to their observation of the city as a means of conveying quantifiable information through their representations. Hollar's *Exact Surveigh* is one of the last examples of a map created with the bird's-eye perspective as this type of view quickly became obsolete amidst the rise of ichnography and scientific values.

An Exact Surveigh of the Streets, Lanes, and Churches Contained within the Ruins of the City of London First Described in Six Plats, By John Leake contains an ichnographic representation of the area burned by the Fire, while the surviving regions are depicted in the bird's-eye perspective (Figure 1). The map originally consisted of six plates before being reduced to a single plate by Hollar. A copy of the six plate map has never been found. As stated in the subtitle, the map was commissioned "By the Order of the Lord Mayor Aldermen and the Common Council of the Said City" and is dedicated to the new Lord Mayor of London, William Turner (Figure 4).[26] The bottom left of the map contains publication details and indicates that Stationer Nathanial Brooke sold the map at Gresham College (Figure 5). The sale of this map at

[24] Tindall, *The Man Who Drew London,* 172.
[25] Turner, "Hollar's Prospect", 154.
[26] Ibid.

Gresham serves as a direct testament to its scientific value and appeal for Royal Society members. Immediately below the title of the map, Hollar has included a shield divided by a cross with a sword in the top left as the crest of the City Corporation of London (Figure 4). The *Exact Surveigh* also includes statistical information in the key relating to the Great Fire compiled by Jonas Moore and Ralph Greatorex (Figure 7):

> Burnt 373 acres
> 63 acres & 3 roads without the walls
> 89 churches, 13200 houses
> 11 parishes within the walls entire

The loss of churches and homes left the City of London uninhabitable, while the destruction of the livery companies and ports along the Thames entirely halted trade and industry.

Both the King and the Alderman recognized the urgency to rebuild in order to reestablish London as an internationally competitive trade center. Hollar's map offered a visualization of the city's underlying framework and basic infrastructure, and created a ground plan on which to imagine a new city. The fire destroyed existing map stocks, and prevented publishers from simply reprinting outdated plates.[27] The demand for new maps prompted cartographers to develop new surveying techniques aimed at increasing the precision and clarity of maps. Hollar's map is significant not only because of the meticulously detailed graphic illustration of the city, but also because of the accuracy of the surveying involved in its production. Six men of scientific and mathematical inclination completed the technical surveying behind Hollar's map, all of whom are acknowledged in the title. They include William Leybourn, author of the *Compleat Surveyor* published in 1653 and detailing the best surveying methods of the time, and Richard Shortgrave, previously mentioned as a member of the Royal Society. The other

[27] Glanville, *London in Maps,* 26.

surveyors on the project included John Leake, John Jennings, William Marr, and Thomas Streake.

In a market dominated by illustrative and decorative maps, Hollar and his team of surveyors aspired to scientifically advance the practice of urban cartography. Prior to the surge of cartographical projects occasioned by the Great Fire, London had a small market for maps. In addition to low demand, the public favored illustrative representations of the city because of their ability to provide a visual snapshot of the city's architecture and quotidian activities. Early maps of London provided a picturesque vantage point for the "armchair traveller" to experience the city as a whole, but failed to serve a practical function in terms of measurement and scale. Best known of these early maps is one made in the 1550s and included in Braun and Hogenberg's *Civitates Orbis Terrarum* (1572), which depicts medieval London in a pseudo-axonometric projection (Figure 8). The illustrative and expressive qualities of the *Civitates* map reflect the visually accepted style of urban cartography prior to the seventeenth-century. Like many other early maps, this widely distributed view of London continued to be published, even as late as 1660, with negligible modification.[28] These images continued to depict a small medieval city frozen in the sixteenth century.

Hollar maintains the fundamental illustrative and historical purpose of the early cartography by including an illustration of the Great Fire overtaking the City of London (Figure 6). The engraving, titled the "Prospect of this City as it appeared from the opposite Southwark side in the fire time," operates in tandem with the survey to memorialize the devastating effects of the Great Fire. In the far right side of the illustratation London Bridge appears untouched by the flames. Moving along the bank to the left of the image the viewer sees the billowing smoke

[28] Ibid, 78.

rising in the distance and waves of flames overtaking the foreground. Towards the center the once towering Gothic-style St. Paul's Cathedral appears engulfed in the blaze. Black smoke darkens the background before dissipating to reveal clear skies on the far left of the view. Despite being confined to a gray scale, Hollar successfully captures the full drama and tragedy of the catastrophe. In the weeks following the calamity, Samuel Pepys expressed the lasting impression of the fire as he wrote in his diary of feeling "much terrified in the nights now-a-days with dreams of fire, and falling down of houses."[29] Hollar captures this sentiment in his engraving while simultaneously establishing a cause and effect relationship between the vivid events of the Great Fire and the resulting widespread damage, ichnographically represented on the map.

Hollar's *Exact Surveigh* integrates the ichnographic view into a surviving bird's-eye framework to expose contemporary viewers to the new type of plan in a manner that avoids the complete violation of existing visual norms. Building elevations and facades appear along the periphery of the damage, clearly marking the extent of the destruction (Figure 9). Within the surroundings, roads and larger streets remain in scale and have varying widths and clear labels despite their being slightly obscured by the use of three-dimensional elements (Figure 10). Gardens and green spaces are indicated by small trees and bushes, most notably in the Moore Fields shown at the top of the map (Figure 4). Hollar maintains a high level of detail in his rendition of urban structures, particularly when illustrating religious, political, and economic establishments. Churches, accompanied by their small white churchyards, appear taller than the surrounding residential structures. For example, a side view of St. Andrew's at Holborne, can be seen with buttressing, a single towering steeple, and an empty rectangular yard (Figure 11).

[29] Pepys, *Diary of Samuel Pepys,* 287.

Similarly, Gresham College, located immediately adjacent to the damage, is depicted as a large square complex with an arcaded inner courtyard. (Figure 10). The extremely detailed view of the surviving parts of London contrasts sharply with the flat and dimensionless description of the damaged areas. This juxtaposition of cartographical styles emphasizes the exclusivity exuded by the City of London Corporation, and creates a clear demarcation of what exists inside and outside the borders of the City.

The *Exact Surveigh* compresses the burned city into a more easily conceptualized diagram reminiscent of a scientific illustration. Main sites are represented by their basic geometric ground plans, while the location of each livery company is signaled by its identifying crest (Figure 12). Each site has a number that refers back to a key located in the upper right corner. The systematic organization of the key into categories based on building type allows the viewer to identify locations with ease and prevents the map from becoming crowded with labels and names (Figure 7). Hollar has chosen to omit residential and private buildings, allowing for large open spaces and lengthy pauses between areas of interest. Pricked lines break up the entire plan into smaller fragments, and each fragment contains a large print letter ranging from A-ZZ; the letter corresponding to the name of a ward located in the key (Figure 13). Clearly labeled streets and lanes are drawn to scale, and the exclusion of elevations allows for an unimpeded view of the road system. Additionally, Hollar maintains an accurate representation of the burned city by seamlessly merging the ichnographic and bird's-eye views to precisely mark the edge of the destruction, as demonstrated by his drawing of the Wall of London. A thick black line represents the wall surrounding the majority of the damaged area, however when it reaches Cripplegate in the north it assumes a three-dimensional form (Figure 14). This precision reflects Hollar's steadfast determination to create a reliable image of the radically altered city. The

transition between the two modes not only establishes the scope of the damage, but also demarcates the boundary between the past and future of cartographical representations of London.

The dichotomy between the two representational modes alludes to the potential for architectural advancement with the reconstruction of the City of London. The three-dimensionally illustrated suburbs reveal the congested and cramped timber structures of Tudor London. Inversely, by recording firsthand observation in an ichnographic plan, Hollar provided a geometrically streamlined surface with which surveyors could redesign the once overcrowded city to form a more accessible metropolis. The demand for accuracy in Hollar's map did not originate from the singular purpose of planning a city, but also from a need to visualize existing private property lines and administrative boundaries. Hollar and his team used scientific empiricism to legitimize the veracity of the map's contents and to provide the information necessary to settle land disputes and galvanize the rebuilding process. Removing the third dimension and omitting domestic buildings eliminates the social body from the space and generates a homogenous plane that conveys the illusion of impartiality and candor.[30]

An Exact Surveigh of the Streets, Lanes, and Churches Contained within the Ruins of the City of London offered the most contemporary and accurate visualization of London at the time of its creation. The duality of the combination map appealed to both public taste and the more discerning perceptions of London's intellectual elite, particularly those men in the Royal Society. The simplified and geometrically defined ichnographic plan stands apart from its illustratively described setting; it was a technique never before used to represent London. Charles II perceived the vacant space as a visual reminder of the rare opportunity before him to realize royal building

[30] Monteyne, "Picture of Troy", 143.

agendas. The destruction of economic, social, and political infrastructure offered an opportunity to firmly reestablish monarchical influence over the City Corporation of London after years of independence. With this thought in mind, Charles II asked fellows of the Royal Society to devise plans for a new and modernized metropolis. Hollar's *Exact Surveigh* provided the information necessary to catalyze the construction of various potential city plans for London. In the next chapter, I will explore one particularly creative and ingenious plan, devised by Christopher Wren. His plan echoes the daring and enterprising spirit of the late seventeenth-century, inspired by the advent of scientific principles and experimentation.

Chapter 1 Images

Figure 1. Wenceslaus Hollar, *An Exact Surveigh of the Streets, Lanes, and Churches Contained within the Ruins of the City of London,* 1669. Engraving, 406 x 305 mm. Crace Collection of Maps of London, British Library.

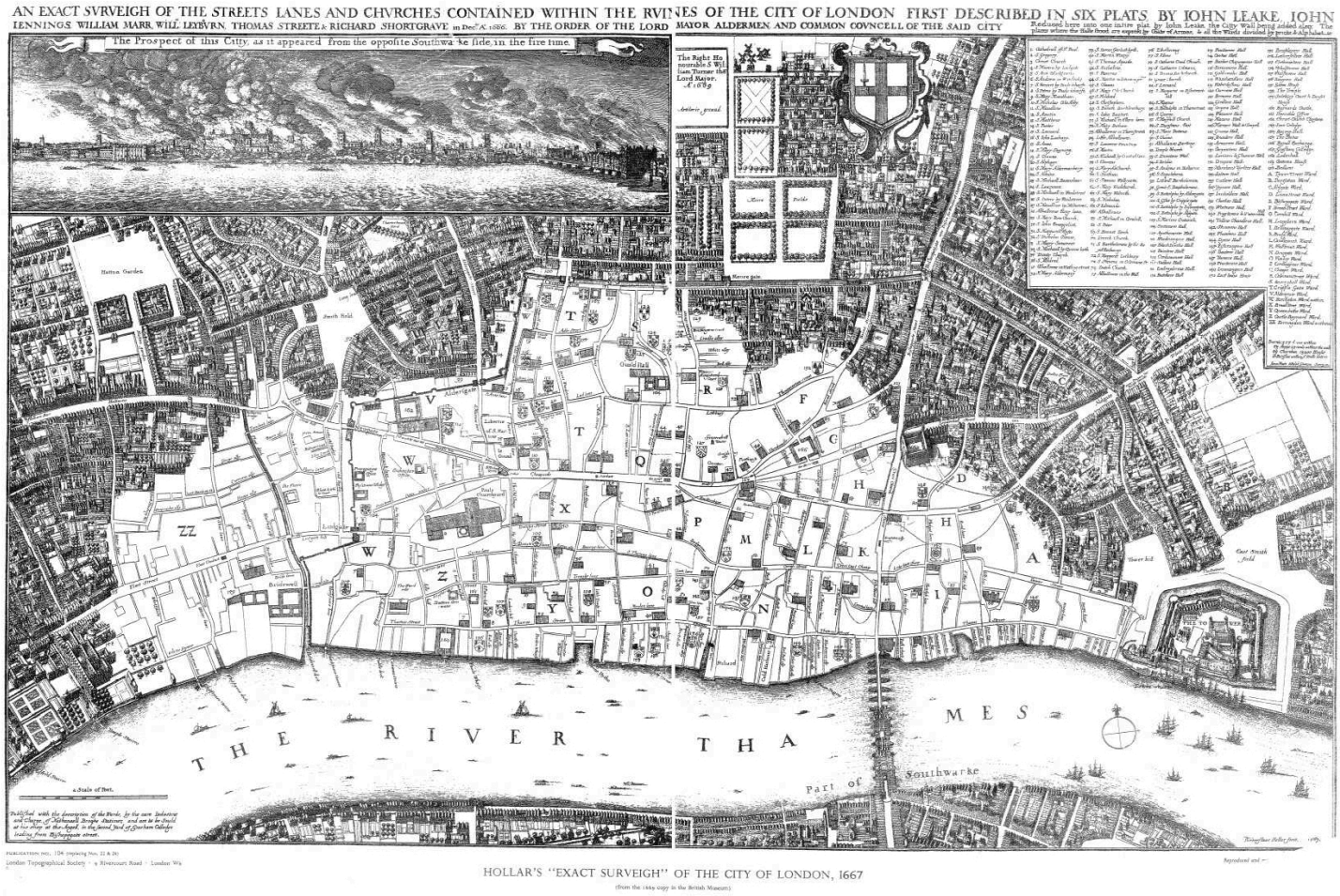


Figure 2. Wenceslaus Hollar, *Greenwich*, 1638. Etching, 15.2 x 83.5 cm. The Metropolitan Museum of Art.

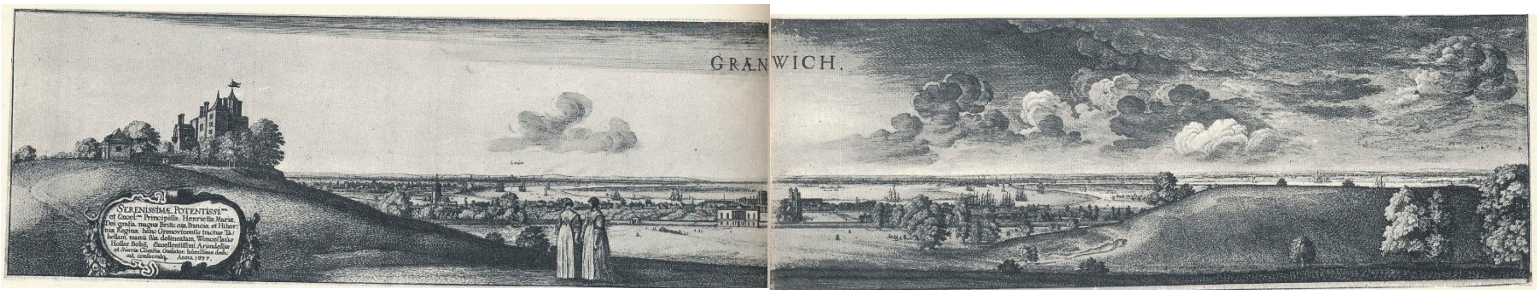


Figure 3. Wenceslaus Hollar, *Detail of Lincoln Inn Fields from Hollar's unfinished 1658 map of London and Westminster*, 1660-1666. Etching, 344 x 455 mm. The British Museum.

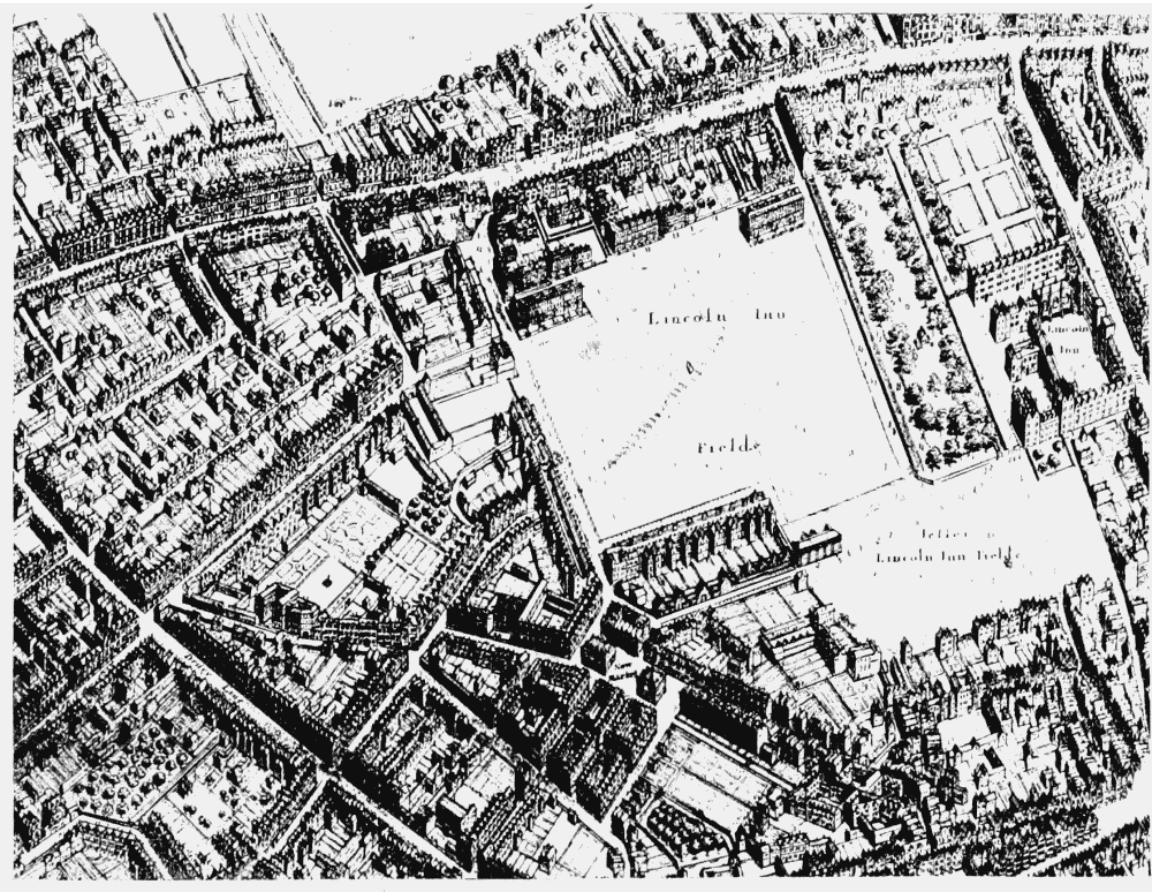


Figure 4. View of the Hollar's *Exact Surveigh* including the dedication to the Lord Mayor, the crest representing the City Corporation of London, and the Moore Fields.

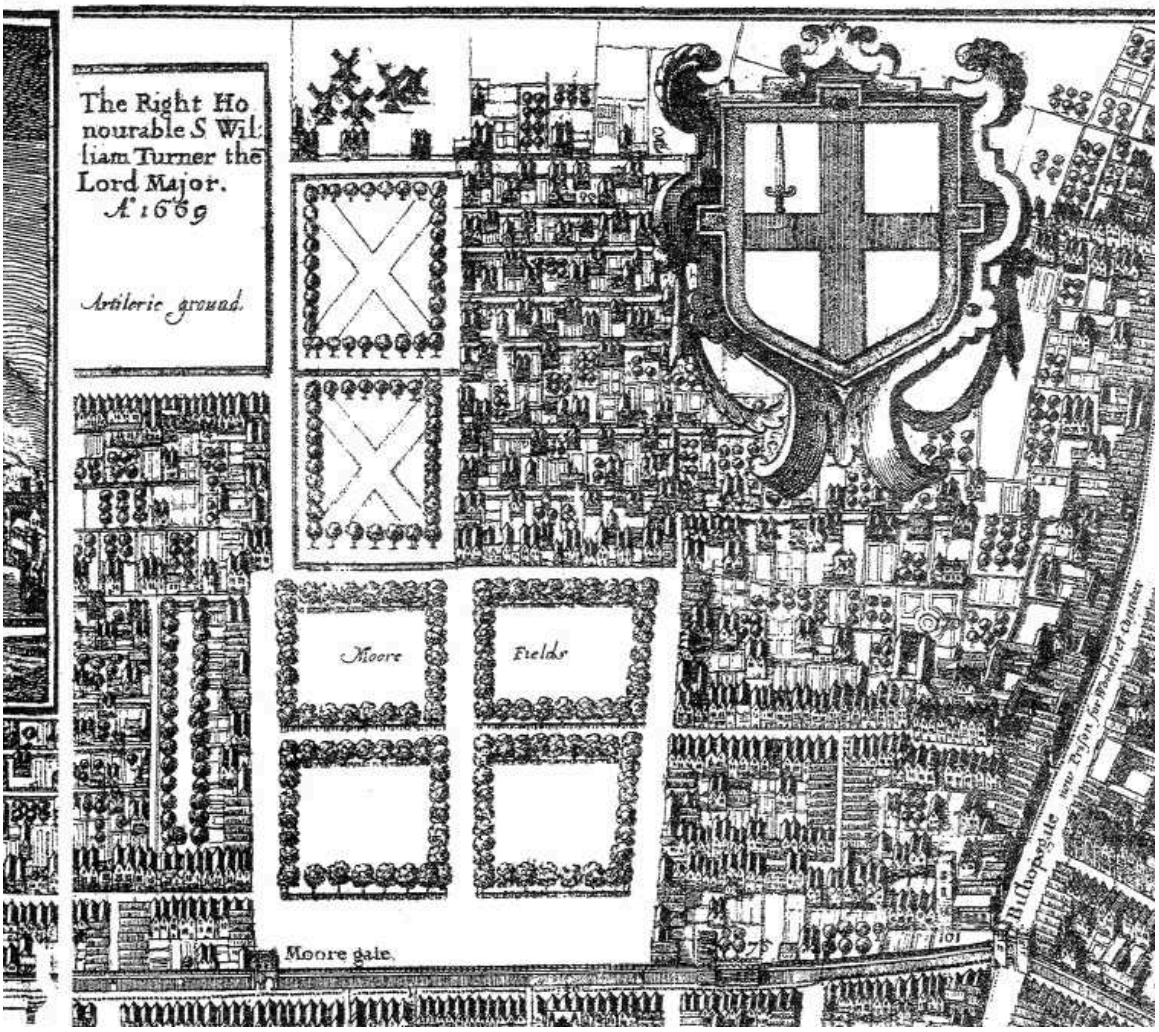


Figure 5. Inscription with publication details regarding the *Exact Surveigh*.

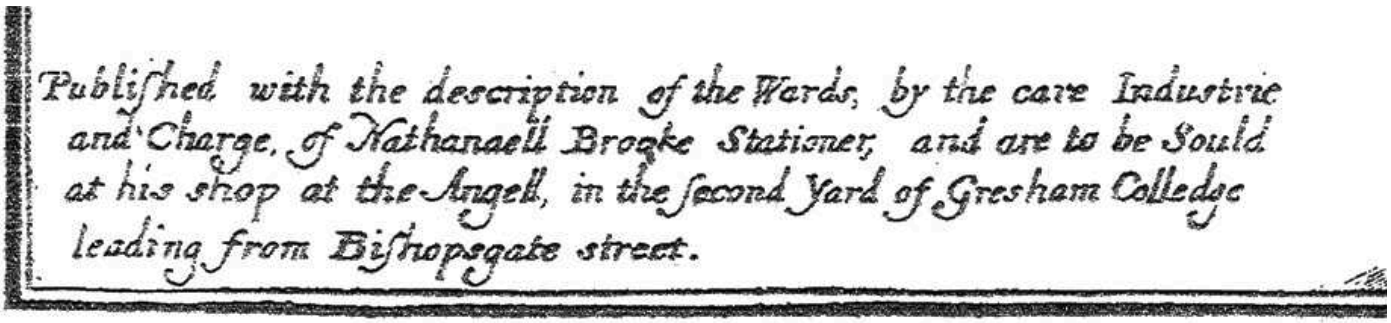

Published with the description of the Wards, by the care Industrie and Charge, of Nathanaell Brooke Stationer, and are to be Sould at his shop at the Angell, in the second Yard of Gresham Colledge leading from Bishopsgate street.

Figure 6. Hollar's Illustration of the Fire as it appeared on the *Exact Surveigh*.

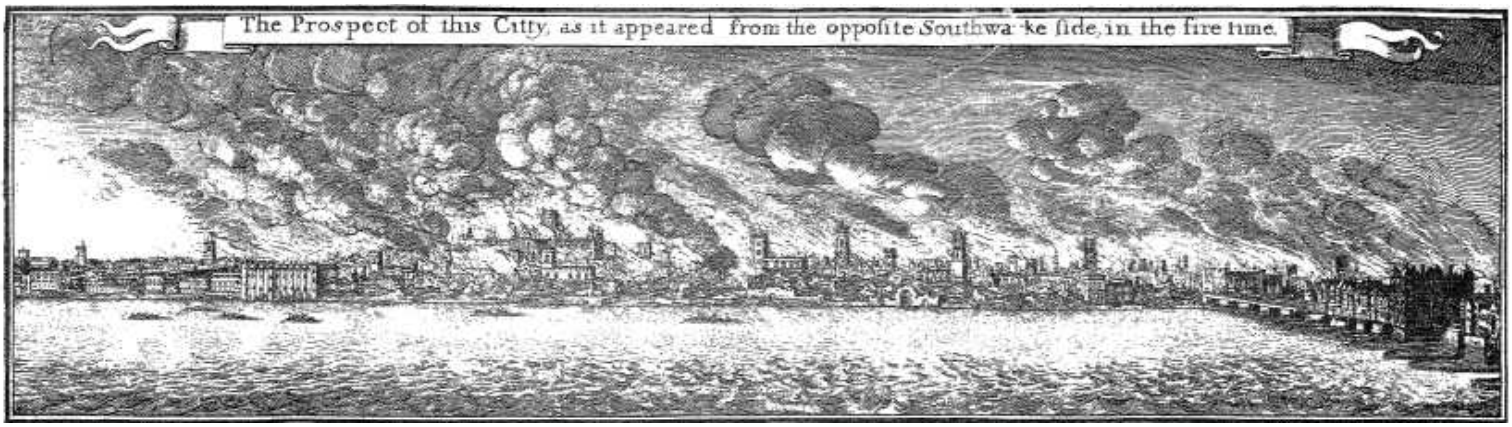


Figure 7. Number and letter key identifying important structures the map and a detail of the statistical information gathered by Jonas Moore and Ralph Greatorex regarding the City's losses on the *Exact Surveigh*.

Figure 8. Franz Hogenberg and Georg Braun, *Londinum Feracissimi Angliae Regni Metropolis*, 1572. Etching, 338 x 490 mm. The British Museum.

Figure 9. Boundary between the ichnographic view and the scenographic perspective occurs at the edges of the area destroyed by the Great Fire on the *Exact Surveigh*.

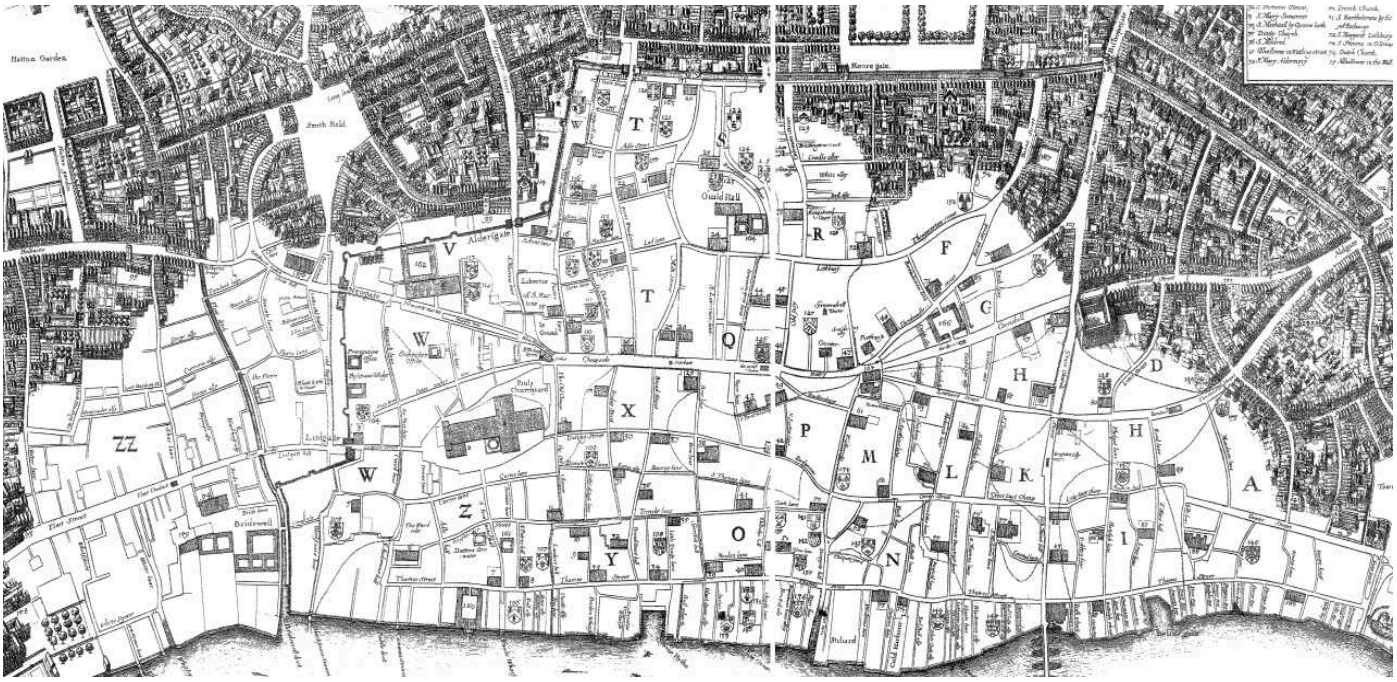


Figure 10. Labeling of streets as seen in this view of Broad Street and Bishopsgate Street. Gresham College is illustrated as number 167 in between the two thoroughfares on the *Exact Surveigh*.

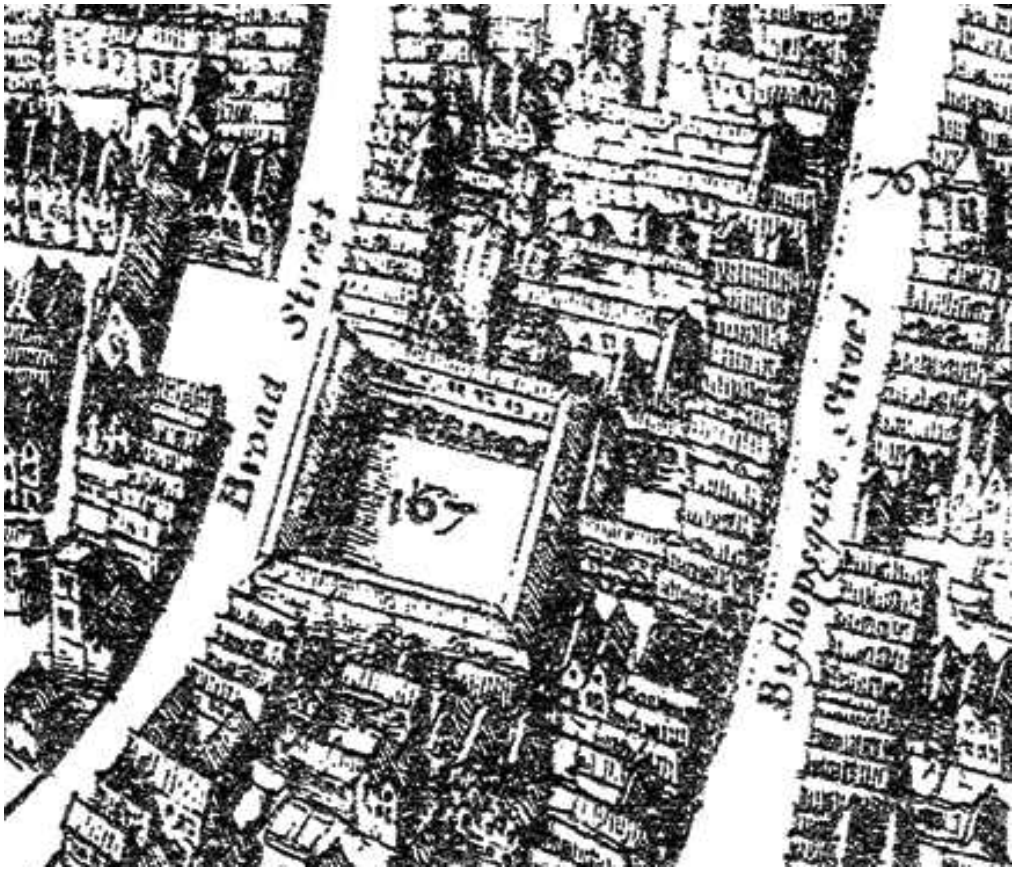


Figure 11. Side view of St. Andrew's at Holborne, demonstrating the high level of detail maintained by Hollar's engraving technique on the *Exact Surveigh*.

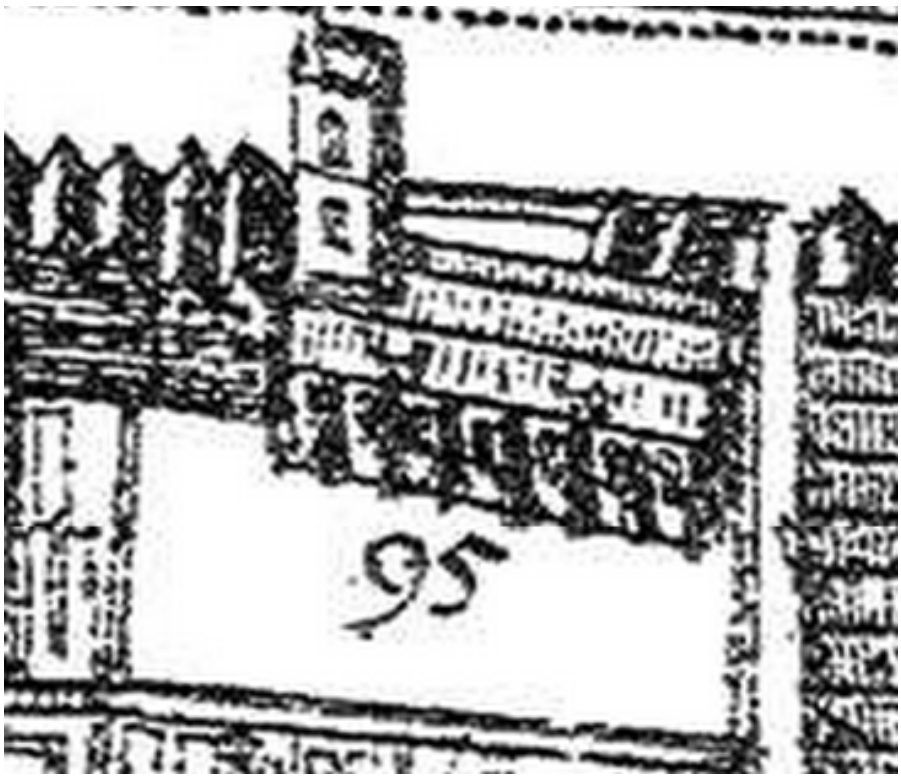


Figure 12. Physician's College, and Prerogative and Exchecker offices are examples of institutions represented by their basic geometric ground plans. Stationers Hall, one of the city's livery companies, is represented by its crest on the *Exact Surveigh*.

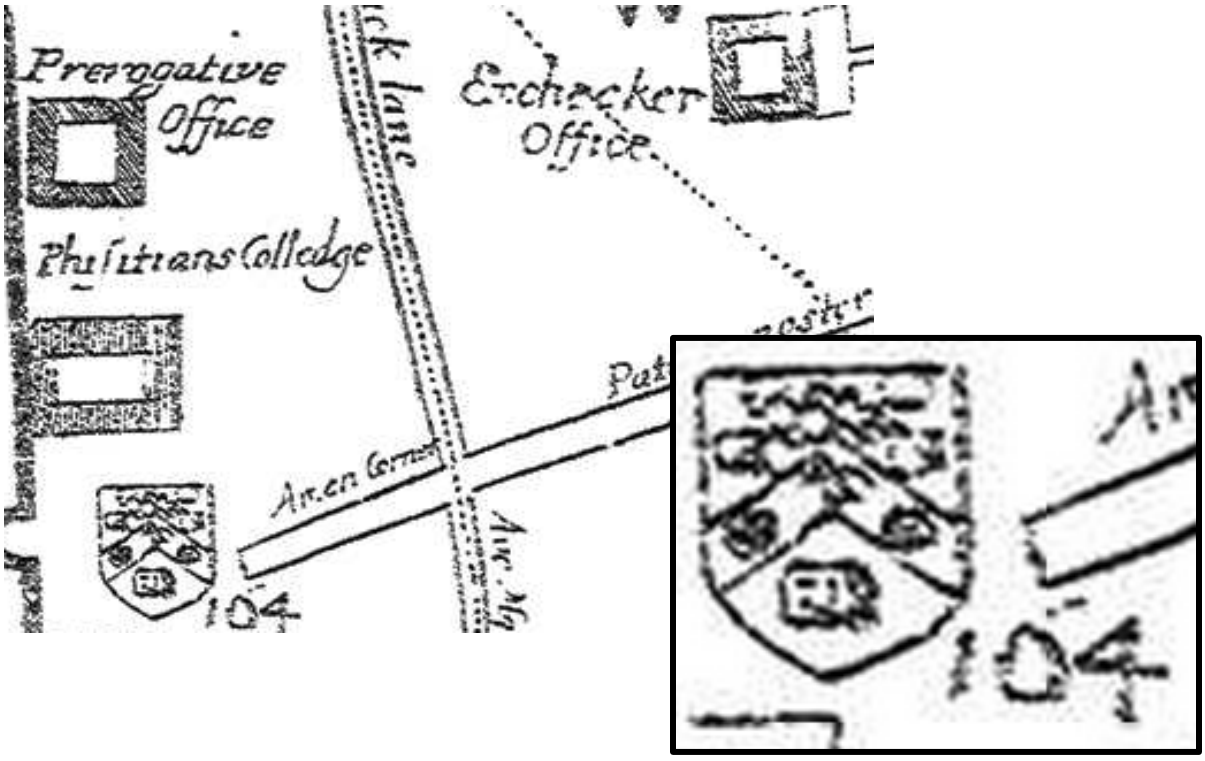


Figure 13. On the *Exact Surveigh* Hollar labels the Vintry Ward with the letter O. The arrow points to the pricked line marking the boundaries of the ward.

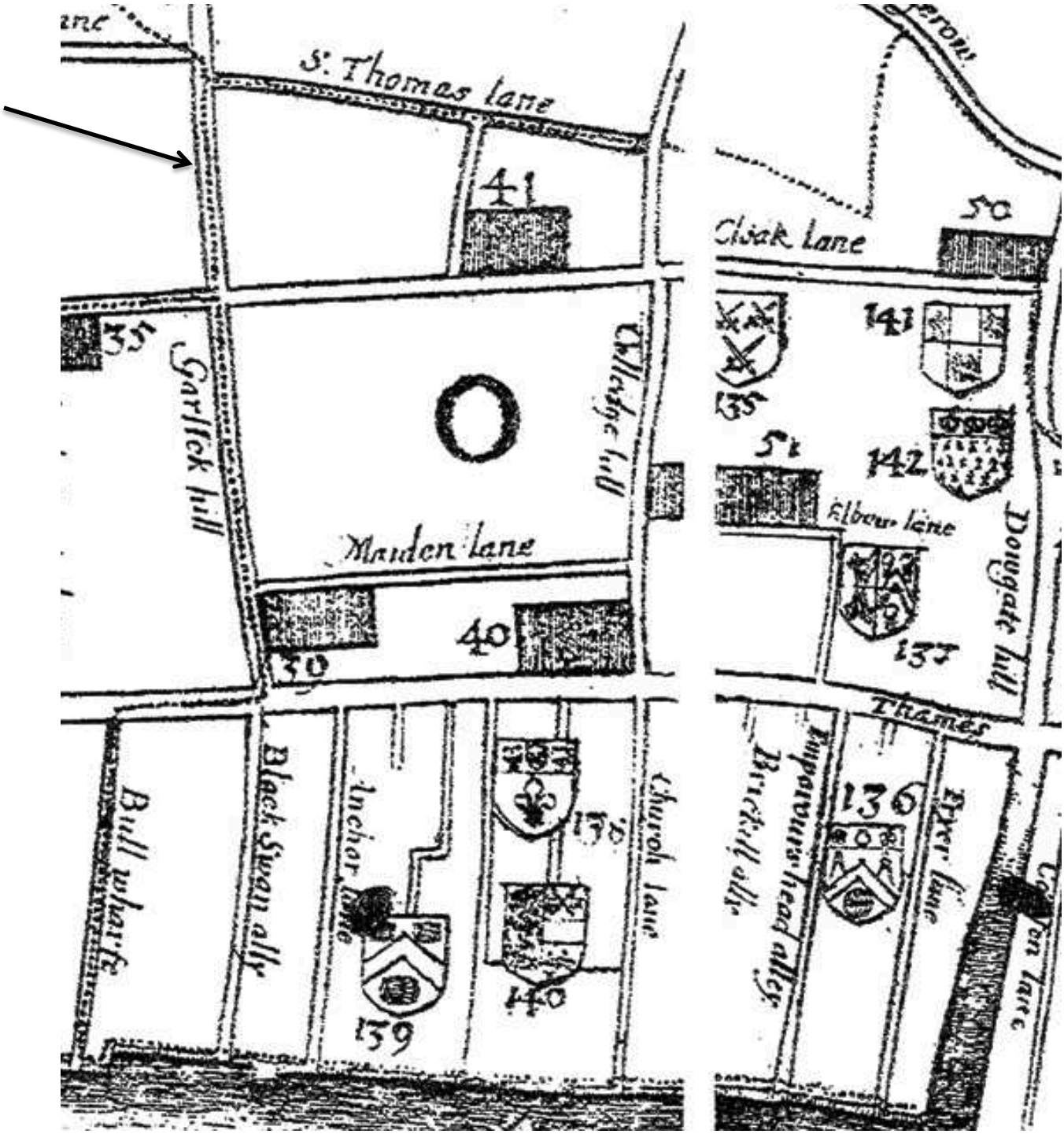
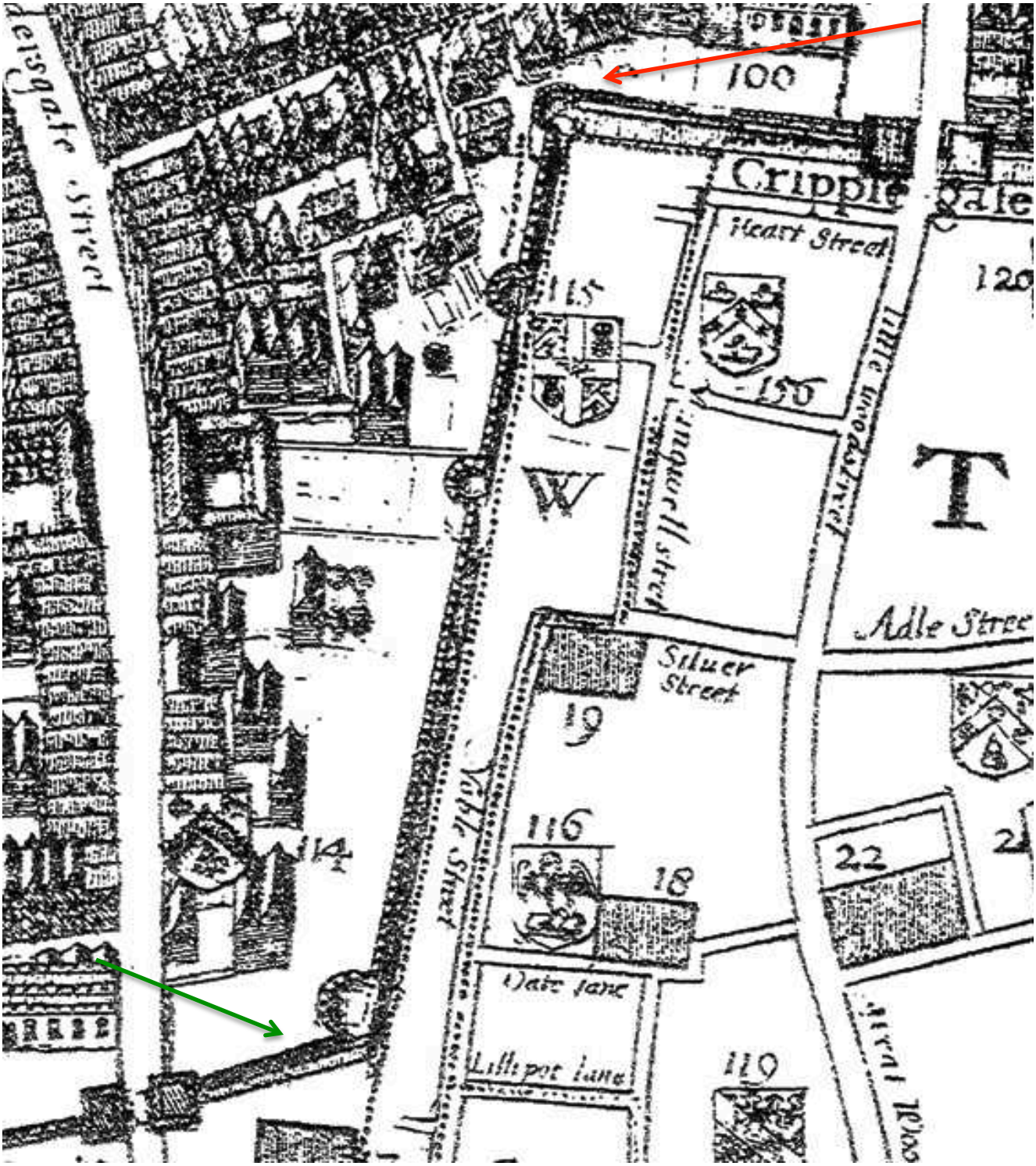


Figure 14. On the *Exact Surveigh*, the Wall of London is represented ichnographically (green) as it approaches Cripplegate where it assumes a three dimensional form (red) .



Chapter 2: Paper Schemes- Christopher Wren's 1666 Plan for London

In the days immediately following the Great Fire of London, Sir Christopher Wren formulated a plan for the reconstruction of London. He presented it to King Charles II on September 11, 1666, a mere six days after the end of the fire. Wren submitted his city plan for review alongside plans created by his fellow Royal Society members John Evelyn, Robert Hooke, and Valentine Knight. Like his colleagues Wren felt that the fire had placed "the opportunity in our hands of making this place the most convenient city for trade in the world."[31] Wren's 1666 plan for the City of London illustrates the integration of scientific thought with contemporary European city planning techniques to create a revolutionary scheme for the restoration of London as a means of reinforcing the city's role as a formidable international business center (Figure 1).

Wren's inexperience with town planning and architecture at the time allowed him to create novel solutions to urban infrastructure problems and draw inspiration from original sources to create a scheme free from antiquated planning conventions.[32] His ichnographic plan incorporates similar principles to those used by Domenico Fontana in his scheme for the reconstruction of sixteenth-century Rome under the reign of Sixtus V.[33] Additionally, he integrates elements of Andre Le Notre's geometrically inspired aesthetic as seen in the controlled

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[31] Lisa Jardine, *On a Grander Scale: The Outstanding Life of Sir Christopher Wren* (New York, NY: Harper Collins, 2002), 263.
[32] Elbert Peets, "Famous Town Planners: IV. The Plans for Rebuilding London in 1666," *The Town Planning Review* 14, no. 1 (May 01, 1930): 17, accessed January 06, 2015, JSTOR.
[33] Judi Loach, "Architecture and Urban Space in London," in *Urban Achievement in Early Modern Europe: Golden Ages in Antwerp, Amsterdam, and London*, by Patrick Karl. O'Brien (Cambridge: Cambridge University Press, 2001), 159-161.

French landscapes of Paris.[34] Wren's choice of representational mode emphasizes the linearity and geometric organization of his plan, and provides an uninterrupted logistical view of the city.

Wren's project proposed alterations to the city's infrastructure to adapt to changes in urban demographics, particularly after the Elizabethan and Stuart population explosion. His plan also served to enhance London's image as an imperial capital city in order to compete with growing European rivals.[35] Charles II asked the newly established Royal Society of London for ideas, offering its members the opportunity to influence the future of the urban landscape with their sophisticated knowledge of mathematics and geometry. The Great Fire provided the perfect moment to substantiate the value of scientific discourse and experimentation as Royal Society members, including Christopher Wren, utilized their expertise to advance London's commercial, political, and social endeavors.

Sir Christopher Wren was educated at Wadham College, Oxford where he received a BA and spent four years doing research as a Fellow of All Souls College.[36] During his time at the university, Wren explored the sciences as well as the works of ancient philosophers and authors, including Vitruvius, whose architectural treatise would inspire Wren's architectural designs.[37] Wren left Oxford to pursue his interests in math and science as a professor of astronomy at Gresham College in London.[38] During his inauguration speech, Wren emphasized the importance

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[34] Ibid, 155.
[35] Loach, "Architecture and Urban Space in London", 158.
[36] Kerry Downes, "Promise," in *The Architecture of Wren* (New York: Universe Books, 1982), 5.
[37] Margaret Dickens Whinney, "The Early Years," in *Wren* (London: Thames and Hudson, 1971), 8.
[38] John Summerson, "The Restoration: Hugh May; Dr. Christopher Wren," in *Architecture in Britain, 1530-1830* (Harmondsworth, Eng.: Penguin Books, 1970), 119.

of mathematics as a "universal truth" and further elaborated on the role of experimentation in understanding nature.[39]

> For natural philosophy having of late been order'd into a geometrical way of reasoning from ocular experiment, that it might prove a real science of nature, not an hypothesis of what nature might be, the perfection of telescopes and microscopes, by which our sense is so infinitely advanced, seems to be the only way to penetrate into the most hidden parts of nature, and to make the most of creation.[40]

Wren's words encapsulate his dedication to discovering the truth using direct observation, a practice that could be enhanced by the use of scientific tools and processes. At Gresham College, Wren upheld the values made clear in his speech as he hosted meetings with a group of the city's most prestigious intellects whose business it was to "discourse and consider of Philosophical Enquiries, and such as related thereunto as Physick, Anatomy, Geometry, Astronomy, Navigation, Staticks, Magnetics, Chymicks, Mechanicks, and Natural Experiments."[41]

Wren's talent in the arts began to permeate his exploration of the sciences and nature during the 1660's, as is demonstrated by a series of his detailed drawings of inventions and anatomies (Figure 2). His graphic skills were put to use after the Great Fire when Charles II issued the Rebuilding Act of 1667 urging for the "speedy restoration whereof and for the better regulation, uniformity and gracefulness of such new buildings as shall be erected, and to the end that great and outrageous fires may be reasonably prevented."[42] In his haste to be the first to present a plan to his majesty, Wren failed to pass his proposal through the Royal Society, a rather offensive and careless oversight in the eyes of Henry Oldenburg, secretary to the Society at the

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[39] Christopher Wren, *Parentalia; Memoirs of the Family of the Wrens* (London: Gray's Inn, 1750), 200.
[40] Ibid, 203.
[41] Henry George Lyons, "The Invisible College, before 1660," in *The Royal Society 1660-1940* (Cambridge: University Press, 1944), 9.
[42] "The 1667 Rebuilding Act," Museum of London, An Act for the Rebuilding of the City of London, accessed February 5, 2015, http://archive.museumoflondon.org.uk/Londons-Burning/Themes/1405/1408/Page1.htm.

time. According to Oldenburg, submitting the plan through the Royal Society "would have given the Society a name and made it popular, and availed not a little to silence those who aske continually, what have they done?"[43] As a result of its recent inception, the Royal Society was anxious to emphasize its importance to society-at-large, particularly through its contributions to city planning and architecture, two mathematically based disciplines of socioeconomic relevance. Although Wren deprived his peers of the opportunity to sanction his 1666 plan in any official capacity, his scheme remained ideologically consistent with the applied science promoted by the Royal Society. His overall design encompassed the social and economic needs of the city as he devised an underlying infrastructure built to support the lives of the middle class.

Prior to the Great Fire, London was an overpopulated medieval city expanding beyond its means as European refugees and immigrants poured into the country looking for work. Between 1500 and 1650 the city's population increased dramatically from sixty thousand to three hundred and fifty thousand inhabitants.[44] Due to limited space, citizens were forced to live in cramped and unsanitary conditions, ultimately leading to the spread of plague and disease.[45] This exponential growth in population resulted in traffic problems and congestion as the city failed to accommodate the large volume of people and materials. Apart from the inconveniences caused by the overpopulation of the city, the large influx of people forced citizens to build irregular and poorly constructed homes. The majority of London's urban landscape consisted of unstable wooden structures, essentially placing the city in imminent danger of fire damage. The monarchy

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[43] J. A. Bennett, "From Astronomy to Architecture," in *The Mathematical Science of Christopher Wren* (Cambridge: Cambridge University Press, 1982), 88.
[44] William C. Baer, "Planning for Growth and Growth Controls in Early Modern Northern Europe: Part 1: The Continental Experience, 1540-1610," *The Town Planning Review* 78, no. 2 (January 01, 2007): 259, accessed January 07, 2015, JSTOR.
[45] Ibid, 260.

and local government recognized the threat to the city and attempted to limit the growth of the population by enforcing a series of building prohibitions. During the early seventeenth-century King Charles I tried to further regulate construction by declaring brick and stone as the only suitable building materials.[46] Despite the importance of these preventative measures, the public ignored the royal building proclamations until it was too late. As stated in a biography of Sir Christopher Wren known as the *Parentalia*, written by his son Christopher Wren, city authorities reflected on their failure to prevent disasters:

> ...the successive calamities of Plague and Fire, gave all people occasion seriously to reflect on the causes of the increase of both to that excessive height; viz. Closeness of Buildings, and combustible Materials, and hence the Wishes for the necessary Amendment of both, by widening the Streets, and building with Stone and Brick, became universal.[47]

The Great Fire forced the Court of Aldermen and city planners to confront the issues that had beleaguered the City of London in order to build a safer and more efficient metropolis.

Wren created the final revised version of his plan for London as the sum of two sketches: a "survey plan" of London, documenting the fire damage, and a first version of the design for replanning the city (Figure 3 and Figure 4). In the "survey plan" of London, a thick black line marks the boundaries of the Wall of London, a dotted red line delineates the extent of the fire damage, and solid red lines illustrate the city's principal routes (Figure 3). This general outline of the city provided a base on which to formulate the plan for reconstructing London. Wren's first version of the plan deliberately omits the surrounding areas as the sketch is trimmed according to the boundary of the fire damage (Figure 4).[48] He pricked through the main body of the first version of the plan onto the larger "survey plan" to create the complete and final revised plan

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[46] Baer, "Planning for Growth", 266-271.
[47] Wren, *Parentalia*, 267.
[48] Anthony Geraghty, *The Architectural Drawings of Sir Christopher Wren: At All Souls College, Oxford: A Complete Catalogue* (Aldershot: Lund Humphries, 2007), 255.

(Figure 1). A scale of 434 feet to one inch is consistent throughout the three images, generating an organized narrative documenting Wren's underlying thought process for creating a scheme made to exist in harmony with the surviving portions of the city.

Wren's carefully crafted plan measures forty three by seventy one centimeters and is currently housed at All Souls College at Oxford University (Figure 1). Long boulevards and radiating plazas extend across a city organized in a structured grid pattern (Figure 6). Surviving streets are drawn with dotted lines, while a light yellow wash and dashed line distinguish the fire damaged portion of the city. Small crosses mark the city's important churches, and market sites contain a small symbol for mercury, the god of commerce (Figure 5).[49] Wren's simple, unencumbered ichnographic composition allows the originality and ingenuity of the town plan to captivate and intrigue the viewer. Wren creates his plan with a scientific and scalable approach, rather than traditionally illustrative methods, thus establishing the feasibility and exactitude of his scheme.

In his proposal, Wren focused on the introduction of ceremonial routes that joined London's major monuments, civic establishments, and the ancient city gates. Two of the three main thoroughfares, each designed to be ninety feet wide, originate at Ludgate in the west before dividing into separate roads at the city's religious focal point, St. Paul's Cathedral. By placing St. Paul's Cathedral at the angle between the city's two largest roads, Wren declares the structure to be a principal landmark (Figure 7). The first thoroughfare to the north of St. Paul's creates a linear route from the cathedral to London's primary economic establishment, the Royal Exchange. The second main arterial road runs parallel to the Thames, connecting two large

[49] Ibid, 256.

radiating piazzas located directly below the Exchange. A third major thoroughfare, farther north, begins at Newgate and serves as a path between Guildhall and the Royal Exchange (Figure 7).

The plan also includes a series of secondary highways with a width of sixty feet, followed by a variety of smaller lanes having a width of thirty feet. The rectangular pattern and multiple rondpoints prevents the awkward intersection of roads as all of the major thoroughfares and secondary streets transect each other at regular angles (Figure 8). The plan displays straight, wide roads and clear connections between the city's most important religious and commercial establishments intended to streamline movement throughout the city (Figure 7). Wren frequently incorporates open public spaces and organizes the disproportionate abundance of raw land into standardized rectangular building plots. He endeavors to create a contemporary and modern plan, integrating the Royal Society's interests in geometrical lucidity and rationalism, while simultaneously satisfying the growing needs of the city.

The gridiron plan and numerous piazzas open up the interior of the city, and allows light and air to circulate unobstructed by overhanging houses or small alleyways. The presence of companies and guilds had made London a center for industry, resulting in large amounts of pollution and soot, specifically from the burning of coal. To mitigate this issue, Wren proposed that "all churchyards, gardens, and unnecessary vacuities and all trades that use great fires, or yield noisome smells, be placed out of Town."[50] By removing coal burning enterprises from the city center and relocating them to the peripheries, Wren advocated for the cleanliness of the city and the overall health of its inhabitants.

Wren also provided opportunities to enhance London's commercial interests through organized trading establishments, and increased accessibility to ports located on the Thames. For

[50] Wren, *Parentalia,* 269.

example, he designs clear entrances to London Bridge and Custom House, both of which appear approachable from a number of secondary streets (Figure 10). The plan also includes an "open wharf on the bank of the Thames, to be spacious and convenient, without interruption; with some large Docks for Barges deep loaden" to provide lodging for the incoming trade ships.[51] Routes lead from the "open wharf" to the city's primary commercial institution, the Royal Exchange, where merchants bought and sold goods (Figure 11). In Hollar's *Exact Surveigh of London after the Fire*, the secluded and awkward location of the Exchange diminishes the institution's ability to function as a readily accessible trade establishment (Figure 9 and Figure 12). Wren pulls the Royal Exchange out of its isolated position, and subsequently places it in the midst of an open piazza. Wren assembles the city's principal administrative offices around the Exchange to create a convenient and accessible center for commerce (Figure 13). Through its organization and strategic placement at the center of all major thoroughfares, Wren makes it clear that the Royal Exchange is a fundamental urban structure.

The plan further supports the City's economic pursuits through the clear positioning of Guildhall, London's primary industrial hub. Wren sought to unite "the Halls of the twelve chief Companies, into one regular Square", creating an exclusive center for the city's key manufacturers and industries.[52] Two secondary streets constructed perpendicular to the river promote the export of British goods as they connect Guildhall directly to the Thames. The Royal Exchange and Guildhall served as the primary sources of income for the City of London, a function Wren accentuated through the close proximity of these two institutions (Figure 14). Wren's plan successfully integrates form and function as he aims to increase the city's wealth

[51] Ibid, 263.
[52] Ibid.

through the implementation of faster, more direct routes to allow for the efficient exchange of commodities at the river Thames, the lifeblood of the economy.

The plan for rebuilding London echoed the changing aesthetics of the seventeenth-century as Wren drew inspiration from modern Parisian landscape design, and the Baroque-inspired aesthetic used in the sixteenth-century reconstruction of Rome. One year prior to the creation of his 1666 plan, Wren left England for the first time to visit Paris, where he had the opportunity to visit recently completed gardens designed in the classical French manner. The gardens exemplified the use of geometry to organize an entire terrain, and incorporated multiple rondpoints to connect the major axes and hierarchize routes.[53] Wren clearly adopted these strategies on a larger scale, specifically with his implementation of radiating plazas for organizing horizontal and vertical thoroughfares.

Wren also borrowed techniques from Roman city planner, Domenico Fontana, who had successfully adapted to urban growth and expansion, while simultaneously reinforcing Rome's role as the center of the Christian world. Wren specifically admired Fontana's ability to incorporate dogma into the city fabric with the use of an organized network to connect monumental structures into a single circuit, thus offering a clear predetermined path designed to offer a conscious impression of the city.[54] Wren imitated this approach by connecting key economic, political, and religious sites to create ceremonial routes and impressive vistas meant to reinforce to London's reputation as an imperial trade city. However, despite the similarities in problems and basic city planning technique, Wren faced a unique and difficult challenge: he had to invent a plan that would gracefully join the parts of London that had escaped the fire. Intact

[53] Loach, "Architecture and Urban Space in London", 155-156.
[54] Ibid, 161.

roads and properties are not altered, but rather woven into the fabric of the plan to create one continuous framework for the new city (Figure 15).

Wren's lack of experience in city planning gave him the opportunity to act in the spirit of scientific experiment, free from allegiance to any one school of thought. Wren's unique geometrizing of the urban infrastructure successfully reorganizes the previously convoluted and congested streets of London with the palpable integration of straight lines, rectangular and standardized building plots, and hexagonal piazzas (Figure 1). The restructuring of the city's establishments and roads remedied London's most severe health problems and protected the city's vested commercial interests. As expressed in the *Parentalia* "the Fire of London, furnish'd the most perfect occasion that can ever happen in any city, to rebuild it with pomp and regularity: this, Wren foresaw and as we are told, offered a scheme for that purpose, which would have made it the Wonder of the World."[55] Wren's plan for City of London did not become a reality as a result of public opposition to the dramatic changes proposed by the scheme, the extraordinary cost, and prolonged timeline anticipated. Following the Great Fire of London, citizens became anxious to reclaim their properties. Londoners refused to yield their land to authorities so that it might be reorganized according to the overall plan. Apart from public resistance, the scheme also lacked financial viability as the City's primary commercial establishments and manufacturing guilds stood in ruins, making the city's coal tax its only source of income.[56]

Lastly, city authorities acknowledged the need for haste in rebuilding as many wealthy citizens began to leave the city to resettle in the surrounding boroughs. Despite the ingenuity of Wren's plan for creating an improved London, the social and economic consequences of

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[55] Wren, *Parentalia*, 270.
[56] Stephen Porter, "Preparations for Rebuilding," in *The Great Fire of London* (Phoenix Mill, Thrupp, Stroud, Gloucestershire: Sutton Pub., 1996), 112.

implementing the scheme proved too formidable to ignore. As lamented by Wren's son in the family history *Parentalia* "the opportunity, in a great degree, was lost, of making the new city the most magnificent, as well as commodious for Health and Trade of any upon Earth."[57] In an effort to prevent the evacuation of the city, authorities made the executive decision to build and improve on the existing ground plan. Approximately ten years after the Great Fire, cartographer and publisher John Ogilby mapped the City of London as it rose from the embers.

[57] Wren, *Parentalia,* 269.

Chapter 2 Images

Figure 1. Sir Christopher Wren, *Plan for the City of London,* 1666. Brown ink and yellow wash on paper, 434 x 714 mm. All Soul's College, Oxford.

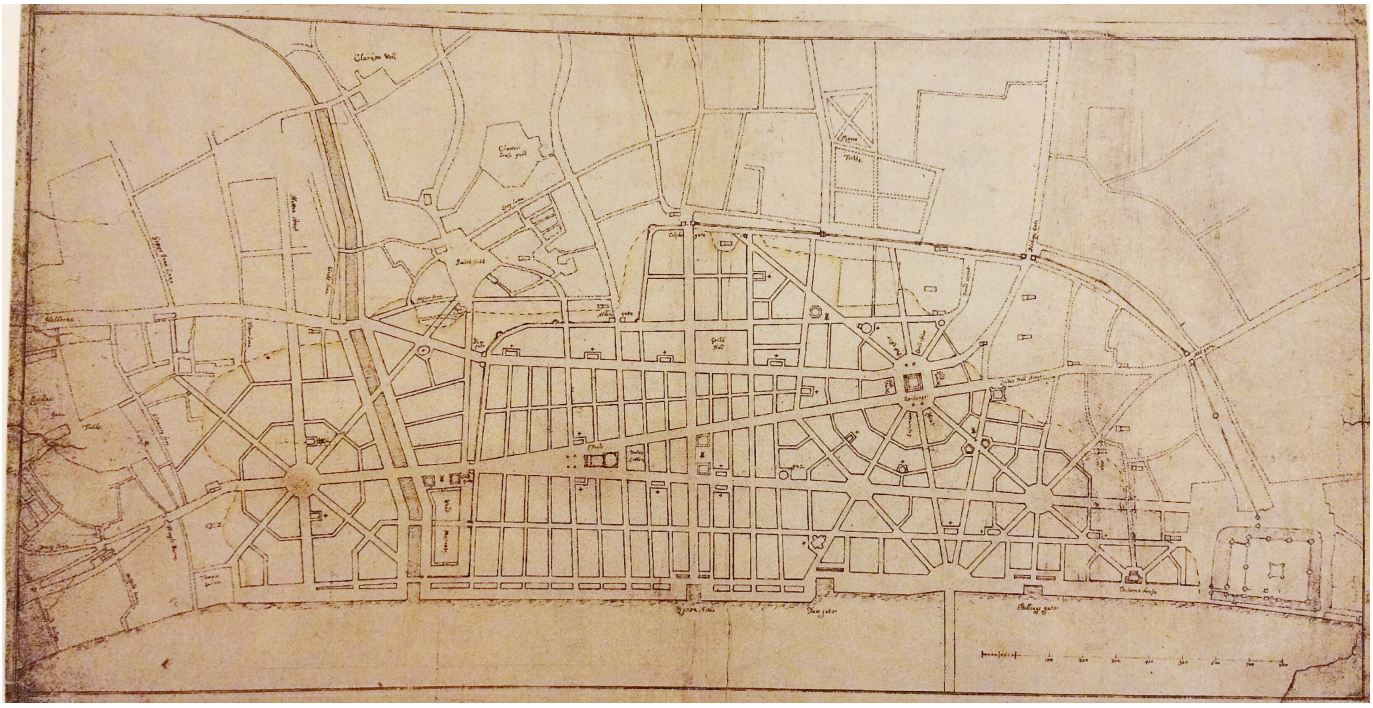


Figure 2. Top: Sir Christopher Wren, *Weather Clock,* 1663. Ink sketch. All Soul's College, Oxford.
Bottom: Sir Christopher Wren, *Clasped Hands,* 1650-1660. Pencil sketches, 201 x 315 mm. All Soul's College, Oxford.

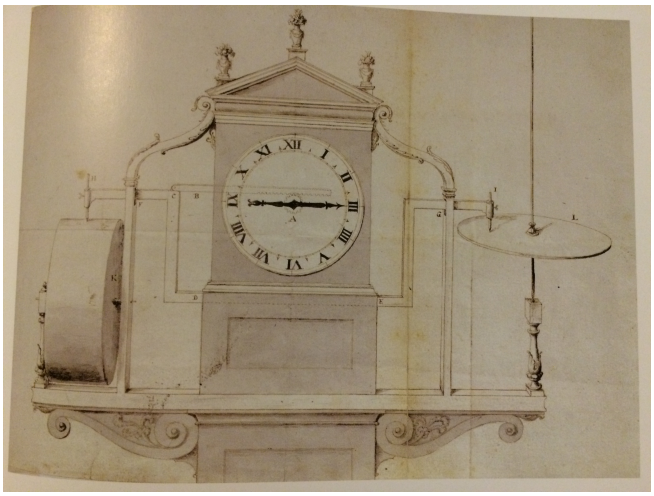


Figure 3. Sir Christopher Wren, *Survey Plan of London*,1666. Brown ink, red ink, and gray wash on paper, 458 x 578 mm. All Soul's College, Oxford.

Figure 4. Sir Christopher Wren, *Design for replanning the City of London: first version*, 1666. Brown ink on paper, 334 x 499 mm. All Soul's College, Oxford.

Figure 5. Wren labeling system used in his plan for rebuilding London. Black arrow pointing at dashed line representing extent of the fire damage. Blue arrow pointing at dotted line representing existing roads. Red boxes contain the symbol of mercury demarcating markets. Green boxes have small crosses delineating the location of churches.

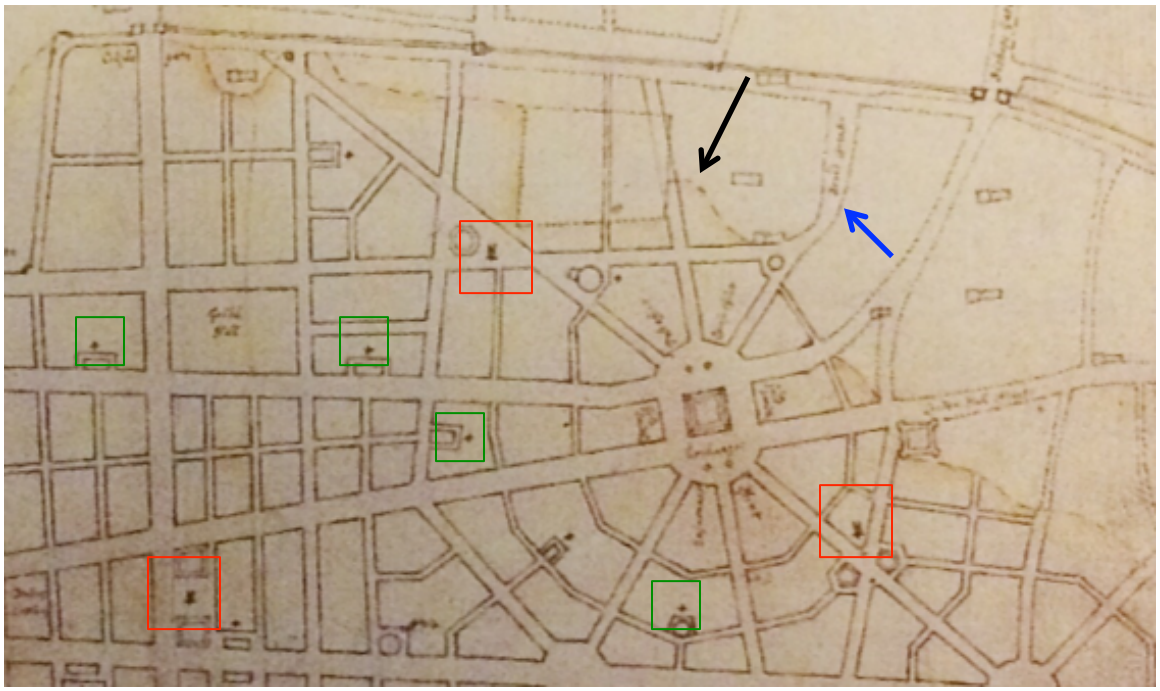


Figure 6. Long Boulevards and Radiating Plazas demarcated on Wren's Plan for the City of London.

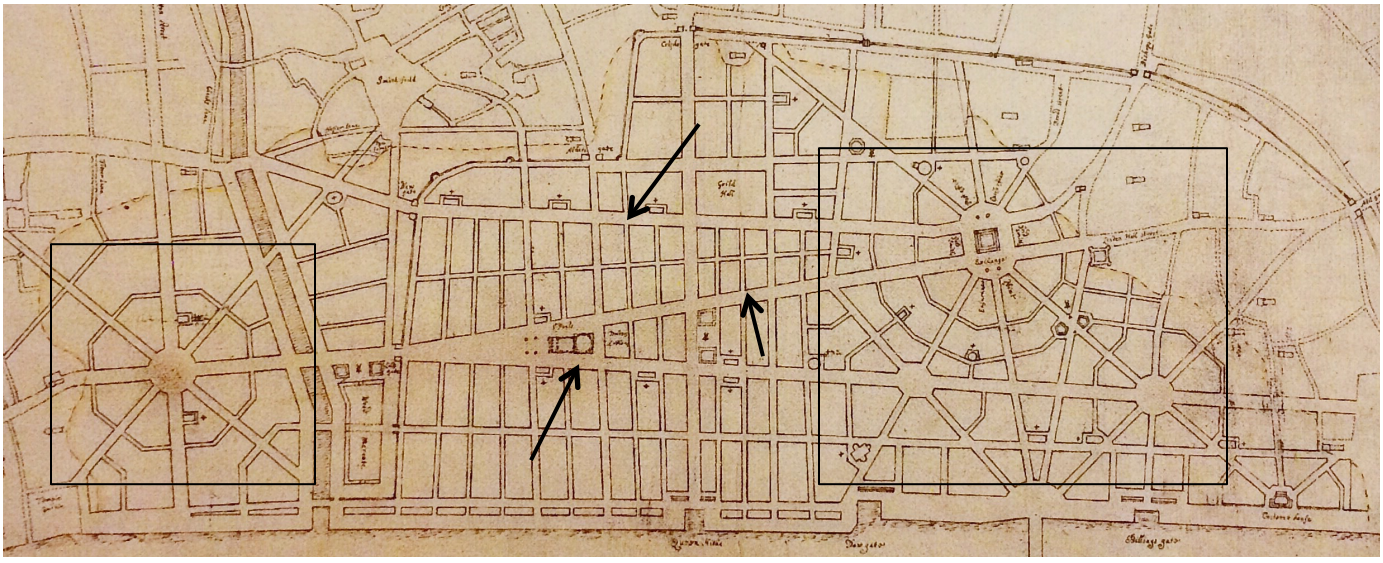


Figure 7. Three major roads connect the city's primary economic and religious establishments. Wren brings attention to St. Paul's through its central location at the intersection between two of the city's largest and busiest roads. Guildhall (red) is connected to the Royal Exchange (blue), and both structures possess direct access to St. Paul's (green).

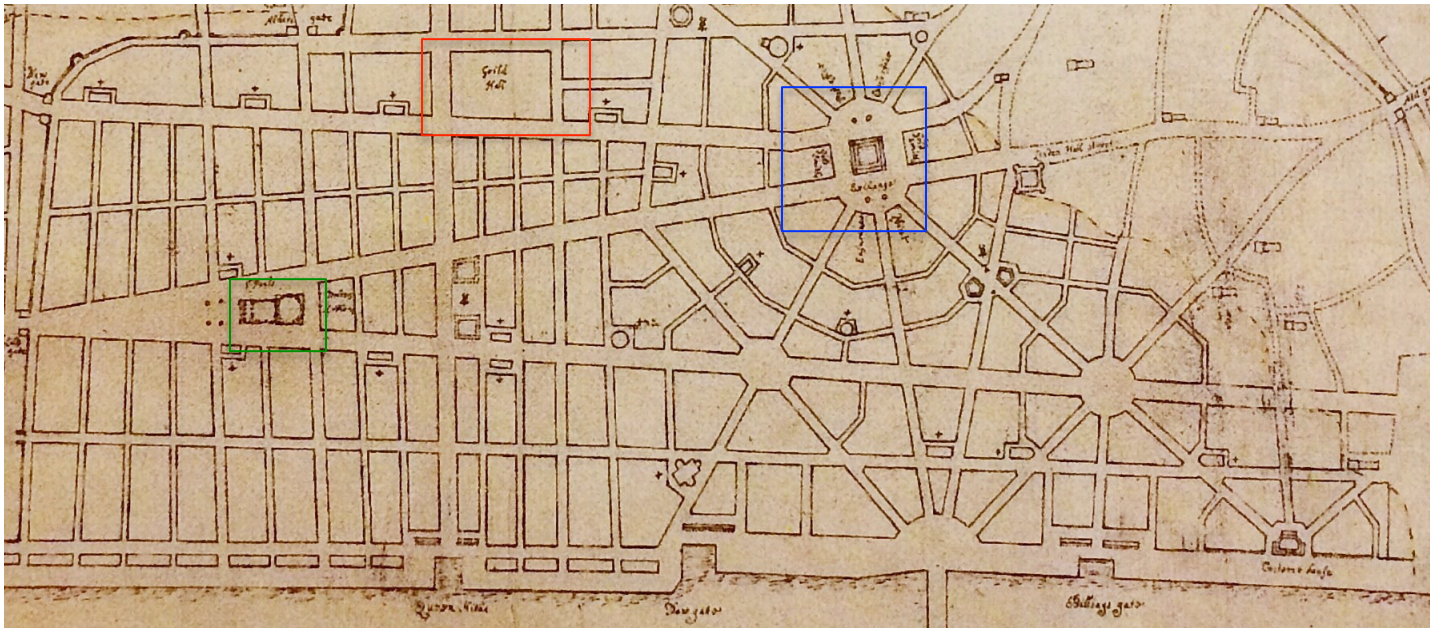


Figure 8. The intersections of roads in the gridiron layout resulting in right angles.

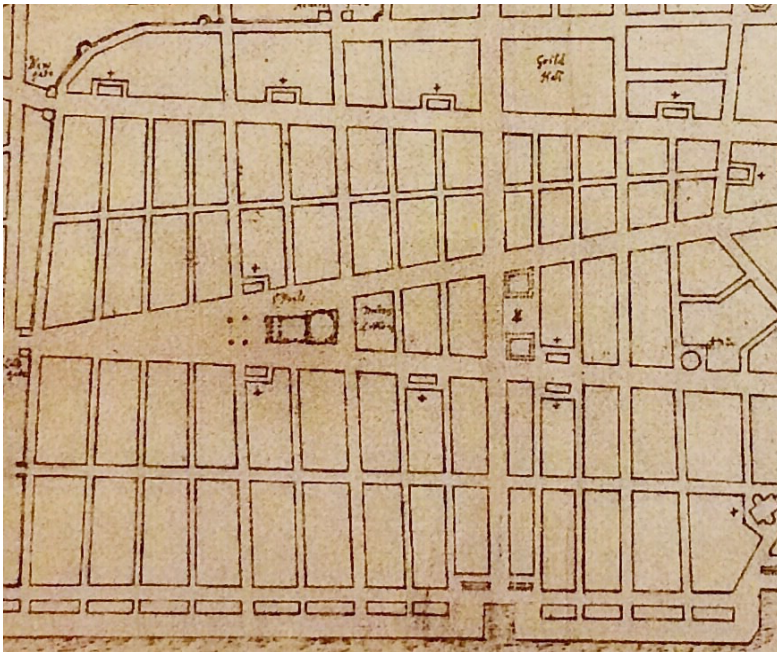


Figure 9. Detail of Hollar's Map of London illustrating the convoluted nature of the infrastructure, as the city's most important commercial and religious establishments do not link directly to one another. Guildhall shown in red, Royal Exchange in blue, and St. Paul's in green.

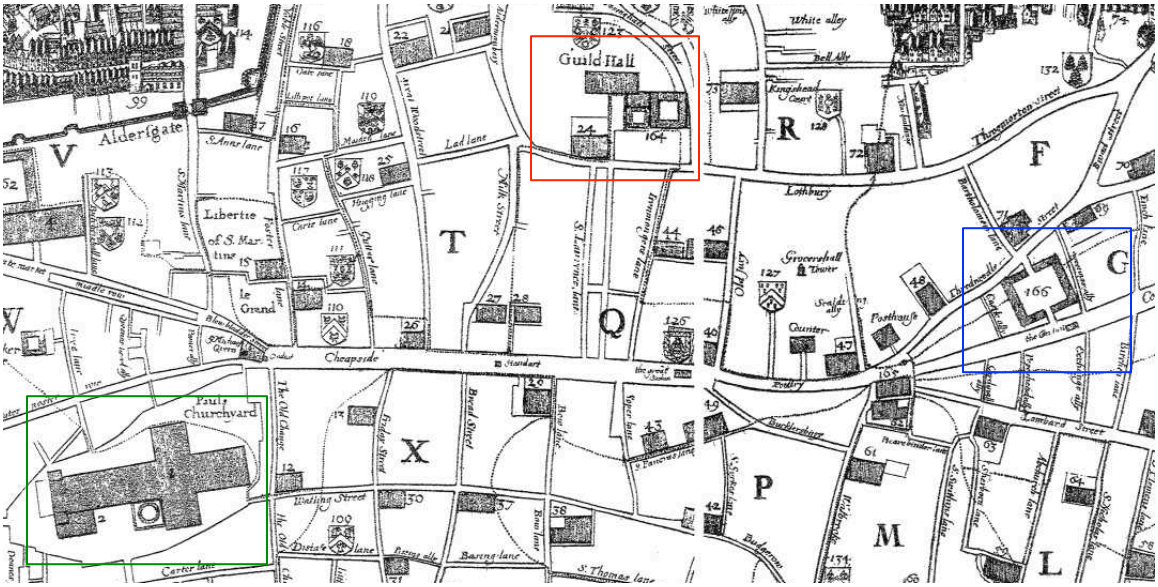


Figure 10. Entrances to London Bridge (red) and Custom House (blue) located on the Thames River on Wren's 1666 Plan for the City of London. A portion proposed key is marked by the green arrow.

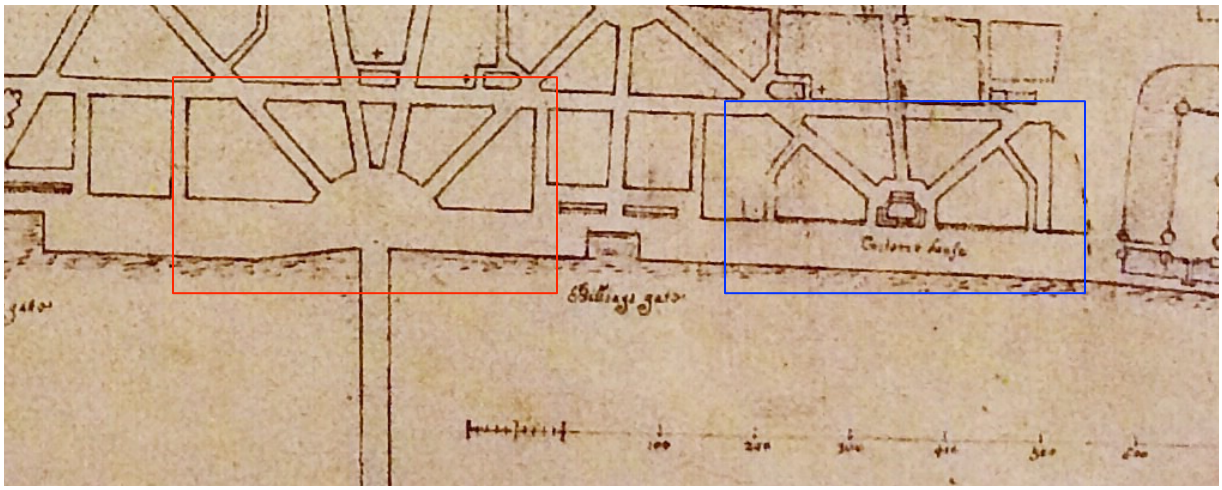


Figure 11. Routes (marked by the arrows) leading from the river ports to the Royal Exchange on Wren's 1666 Map of the City of London.

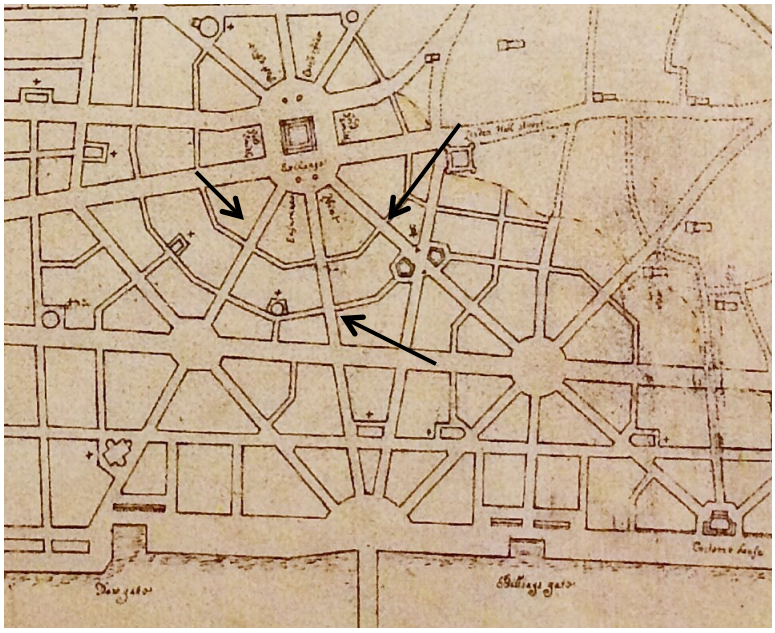


Figure 12. Excerpt of the Royal Exchange (blue) as it appears on Hollar's Map of London illustrating that there are no clear routes to the Thames.

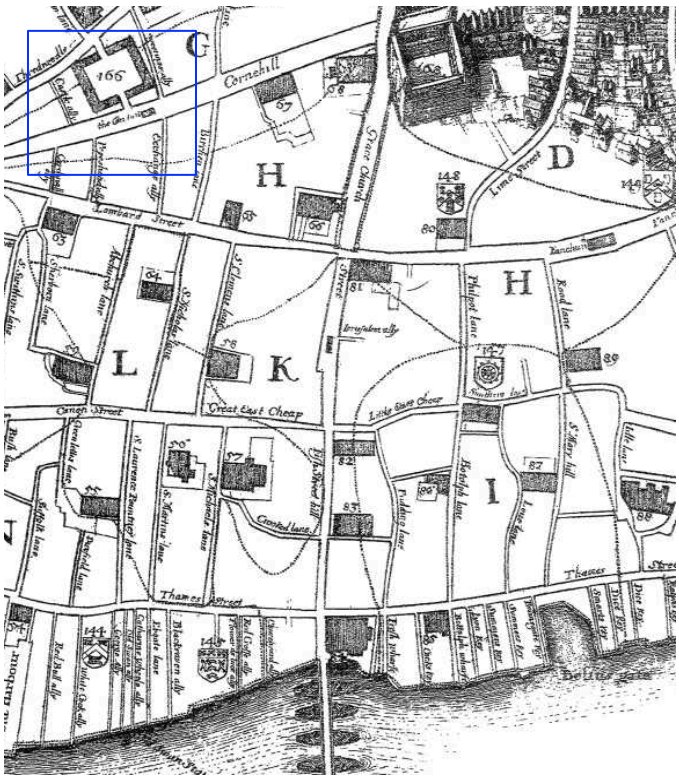


Figure 13. Organization of the Royal Exchange and the administrative offices of London on Wren's 1666 Map for the City of London.

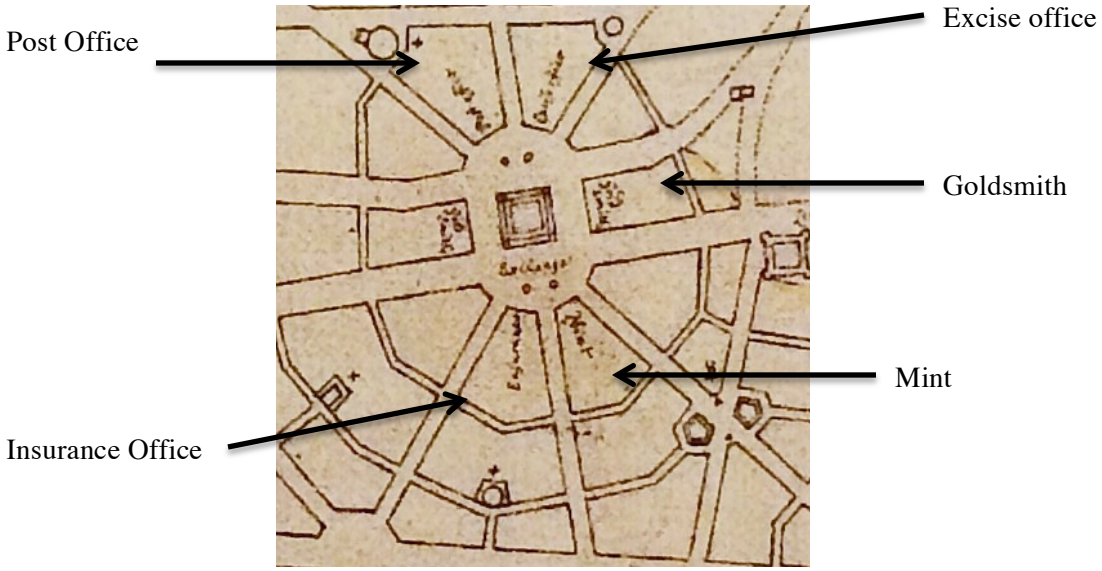


Figure 14. Routes connecting Guildhall (red) to the River Thames on Wren's 1666 Map for the City of London. Royal Exchange (blue) and Guildhall are joined by horizontal thoroughfare.

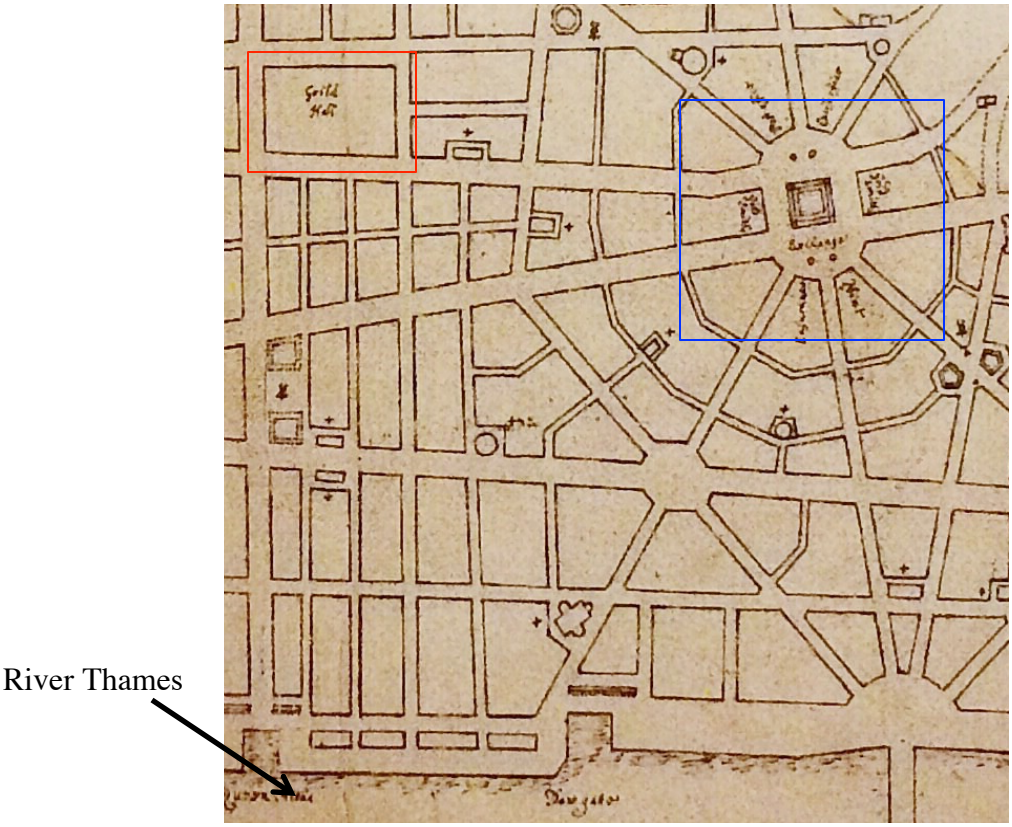
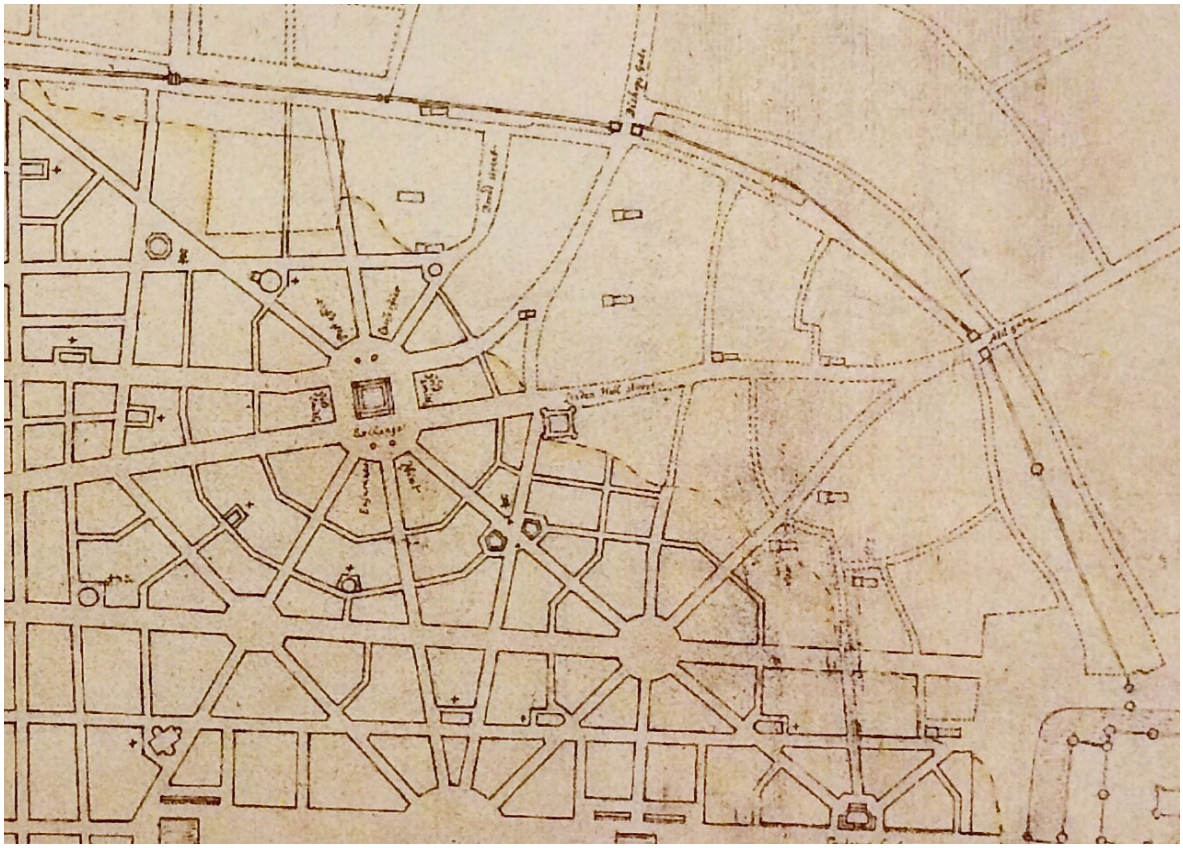


Figure 15. Existing roads (dotted lines) incorporated into Wren's 1666 plan for the rebuilding of London. A yellow tinted dotted line demarcates the border of the fire damage.



Chapter 3: Ten Years Later - A Large Scale Survey of the City of London

The Large and Accurate Map of the City of London, published by John Ogilby and William Morgan in 1677, illustrates a crucial moment in the history of the city (Figure 1). Ten years after the devastation of the Great Fire, city planners and authorities had rebuilt the city to better accommodate London's burgeoning trade business and increasing population. London no longer existed as a crowded medieval city constructed of timber, but rather implemented building regulations and codes to homogenize the city's architecture and underlying infrastructure. Late seventeenth-century London experienced dramatic changes to the city's physical landscape, particularly with the rise of the Royal Society and the advent of scientific empiricism as a methodical approach to city planning and architecture. Maps created in the years immediately following the Great Fire, including Hollar's *Exact Surveigh,* no longer accurately represented the City of London, thus prompting the manufacture of a new functional map.

The Large and Accurate Map of the City of London reflects the physical as well as ideological changes brought about during the late seventeenth-century as it illustrates important advances in the practice of cartography and urban development. Ogilby and Morgan departed from traditional mapping conventions as they utilized more scientifically accurate surveying methods and representational modes, as seen in their extensive use of the ichnographic plan. Furthermore, they included a systematic categorization of the map's contents in order to document the post-fire changes made to the urban landscape. The scientific accuracy and objectivity of the survey reinforces the notion that the map's contents represent the fundamental truth. The *Large and Accurate Map of the City of London* reveals the influence of the Royal Society in promoting scientific values through cartography, which served an important role in

establishing the City of London as a newly restored and formidable English and European politico-economic power.

Prior to Ogilby and Morgan's survey, a large scale map of the City of London had been created by Newcourt and Faithorne in 1658 (Figure 3). Although this particular map offered an extensive view of the city, it could not be used as a functional diagram to distinguish between street lines and boundaries. Instead, Newcourt and Faithorne's map offered a picturesque view of the city with streets lined by rows of identical little houses.[59] Despite its popularity, the bird's-eye view had many disadvantages— including the inability to accurately merge representations of building elevations with a clear description of roads and civil boundaries because of the conflicting horizontal and vertical planes. Additionally, most images drawn in this style maintained a single consistent scale throughout the entirety of the survey. This homogenous scale failed to quantitatively record the actual sizes of structures with respect to each other and their environment.[60] Although the pictorial style used in Newcourt and Faithorne's map is impractical for administrative purposes, it does show London prior to the changes brought about by the Restoration Period when it was overcrowded with buildings joined by narrow thoroughfares.

London's local governing body, the Court of Aldermen appointed Royal Society member and renowned scientist, Robert Hooke, to supervise the creation of a scientifically accurate map of the city. Due to the City's small budget, Hooke contracted entrepreneurial map maker John Ogilby to complete the project under his direct supervision. With ambitions to supply the market with current maps of both local and global landscapes, John Ogilby sought to print a series of

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[59] Peter Whitfield, "The Age of Elegance" in *London: A Life in Maps*, (London: British Library, 2006), 60.
[60] Ibid, 55.

volumes referred to as *The English Atlas*.[61] Ogilby, a Scotsman, had never formally been educated as a cartographer—in fact, he had been trained as a dancer![62] Following a serious injury, Ogilby's career shifted course as he established himself as a prominent publisher after gaining royal favor during the coronation of Charles II.[63] Unfortunately, the Great Fire destroyed most of Ogilby's assets, archives and studio space in Whitefriars, leaving him with a total of five pounds. Due to monetary constraints, Ogilby could not complete his atlas in its entirety, but he did manage to publish his Britannia volume, which included the *Large and Accurate Map of the City of London*.[64] Ogilby's survey of the city was published in 1677, and illustrates a remodeled and prospering city. Ogilby's step grandson and partner, William Morgan, published the final version of the map a year after his death in 1676.

Before the *Large and Accurate Map of the City of London,* a large scale plan of the city did not exist. As discussed in Chapter One, pictorial bird's-eye representations of the city were the norm until much later in the seventeenth-century when surveyors obtained the methods and technology necessary to apply ichnography to urban landscapes.[65] The need for ichnographic maps was particularly acute after the Great Fire as town planners like Christopher Wren and John Evelyn needed to gauge exact dimensions.[66] With help from the Royal Society and newly appointed city surveyor Robert Hooke, Ogilby and his assistants strove to make a mathematically accurate large scale map of the city of London, a feat never before accomplished by British mapmakers. According to his diary, Hooke regularly met with Ogilby at Garraway's Coffee

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[61] Taylor, "Robert Hooke", 529.
[62] Katherine S. Van Eerde, "Restoration: Royal Favor and Advancement," in *John Ogilby and the Taste of His times* (Kent: Dawson, 1976), 11.
[63] Ibid, 71.
[64] Ibid, 123.
[65] Ibid, 42.
[66] Glanville, "Topography", 79.

House, where he offered news of the most advanced surveying techniques and effective engraving methods.[69] Most importantly, Hooke applied his knowledge of geometry to devise a system with which to mathematically plot the city. Hooke split London into a series of interconnected polygons and divided the work of measuring each amongst a team of surveyors (Figure 4). Each polygon had sides and internal angles that could be measured and subsequently plotted using a scale ruler and projector.[70] The various geometric forms eventually came together like a puzzle to produce a cohesive image of the entire city. Hooke and his team resolved discrepancies in the larger image through rational debate and cooperative re-measurement of the area in question, rather than by accepting the individual surveyor's work based on his age or social status – a common practice prior to the introduction of a more objective scientific approach.[71]

Ogilby and Morgan understood the advantage of mapping in a single plane to provide greater clarity and precision. Ogilby's team of surveyors, including William Leybourn and Richard Shortgrave, began the map of the city with basic outlines of all the roads and major public establishments. However, when Hooke introduced surveyor Gregory King to the project, King proposed the idea of plotting each individual house and garden to create an even more holistic and comprehensive survey.[72] Ogilby's appointed surveyors used the most contemporary surveying techniques to collect data for the map as recorded in William Leybourn's *Compleat Surveyor*. He describes the use of chains and rods to measure distances, and the English semicircle to measure angles:

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[69] Taylor, "Robert Hooke", 532.
[70] Michael Cooper, *Robert Hooke and the English Renaissance,* (Wilshire, England: Gracewing, 2005), 178.
[71] Ibid.
[72] Taylor, "Robert Hooke", 532

> This is the best and most accurate way that I can prescribe for the plotting of Cities or Towns, and it is the way which I myself use in my Survey of the City of London, as it is not re edified; wherein I take notice of all remarkable things therein. For, besides the High-Streets, and Streets of note, I take notice of, and Plot all by-streets and Lanes, all Courts and Allies, all Churches and Churchyards, and the temples, all inns of court, all college, the Guildhall, and all eminent Hall of Corporation, all Marketplaces and Market houses. This task is now under my hands, and I hope with God's assistance in a few months to compleat it.[73]

Having previously assisted in creating Hollar's *Exact Surveigh*, Leybourn understood how to accurately measure angles and distances, and translate his observations onto a two-dimensional survey.[74] King, Shortgrave, and Leybourn constructed the *Large and Accurate Map* by compiling raw data as opposed to relying on previously recorded information.[75] Gathering mathematically correct measurements provided unbiased information on which to design the *Large and Accurate Map of the City of London*, thus contributing to its apparent authenticity.

Due to Ogilby's limited funds, he was forced to seek public and private endorsement to complete the *Large and Accurate Map*. With the help of Robert Hooke, Ogilby procured substantial funding from subscription fees placed by wealthy merchants, and more significantly, he obtained financial support from the Court of Aldermen.[76] In the decades following the Great Fire, the Court supervised the reconstruction efforts and controlled both the finances and laws of the City of London. The court consisted of twenty-five Aldermen, each one an elected official

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[73] William Leybourn, "CHAP. IX. Of the Mensuration and Plotting of Roads, High-ways, Streets, Lanes, &c. And of the Taking of the Ground-plot of Cities, Towns, or Hamlets," in *The Compleat Surveyor*, 5th ed. (London, 1722), accessed October 19, 2014, The Making of the Modern World.

[74] Ralph Hyde, ed., *The A to Z of Restoration London* (London: London Topographical Society, 1992), vii.

[75] Philippa Glanville, "The Topography of Seventeenth-century London: A Review of Maps," *Urban History* 7 (May 1980): 80.

[76] Taylor, "Robert Hooke", 533.

representing his respective ward within a collective governing body.[77] The Aldermen chose to spend valuable capital to fund Ogilby's *Large and Accurate Map* because they required a thorough and systematic map documenting post-fire changes to urban infrastructure for use as an administrative aid. The official survey of the city reestablished boundaries between city wards and defined the specific jurisdiction of each Alderman.[78] Precise definitions for these boundaries was necessary in order to prevent territory disputes, and particularly during election times.

The emphasis placed on creating a scientifically accurate map not only lies in the assembly of the map, but in the representation of the contents themselves. The *Large and Accurate Map of the City of London* measures eight by five feet, and consists of twenty sheets printed from engraved copper plates (Figure 1). The full subtitle of the map reads, "Ichnographically describing all the Streets, Lanes, Alleys, Courts, Yards, Churches, Halls and Houses, & Actually surveyed and delineated by John Ogilby Esq, his majesties cosmographer." At the bottom of the map, a compass indicates the orientation of the survey, and an engraved pair of dividers rests above an inscription displaying the map's scale of one hundred feet to one inch (Figure 1a). The large dimensions and scale of the map provide an exclusive, detailed view, and perpetuate the reputation of the City of London as an epicenter for wealth and modernity. The survey explicitly depicts the area of London destroyed by the fire, and is completed entirely in the ichnographic plan—with the exception of a few smaller illustrative elements. The exclusion of building elevations and figures within the map combined with the predominantly ichnographic

[77] Hyde, *A to Z*, v.
[78] Taylor, "Robert Hooke", 529.

plan excludes human figures and signs of urban life, therefore removing obvious political and social bias to create the illusion of a completely objective image of the city.[82]

Although the map is ichnographically constructed, pictorial representations appear on the map. Small trees fill the Moore Fields, Lower Walks, and the areas surrounding Gray's Inn (Figure 5a). Additionally boats and cargo ships sail down the River Thames and crowd at the docks and wharves of the northern bank, suggesting the return of international commerce to the city (Figure 5b). At the top of the map, the New Artillery Gardens are portrayed with small men forming battalions and pitching tents in the background (Figure 5c). The use of illustration does not interfere with the scientific integrity of the map, but rather bridges the visual gap between the bird's-eye perspective and ichnographic plan for the average seventeenth-century viewer. The assimilation of three dimensional visual elements allowed cartographers to acclimate their audience to ichnographic maps, while simultaneously promoting the superiority of new scientific representations of the city.

While the majority of the *Large and Accurate Map of London* appears rather stoic, Ogilby selectively includes ornamentation in the map's peripheries. The upper left and right corners of the survey hold emblems and accompanying dedications (Figure 1). In the upper left corner the dedication reads "To the right and honorably lord major Court of Aldermen and Sheriffs of the honorable city of London. This most accurate survey made by John Ogilby esquire and William Morgan, is dedicated and presented by your honors most humble servant William Morgan his Majesty's Cosmographer." Above the inscription there is the coat of arms for the City of London Corporation. A knight's helmet stands above the coat of arms and two

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[82] J. B. Harley and Paul Laxton, "Maps, Knowledge, and Power," in *The New Nature of Maps: Essays in the History of Cartography* (Baltimore, MD: Johns Hopkins University Press, 2001), 98.

winged dragons stand on either side with the motto “Domine Dirige Nos” meaning “O Lord Direct Us” inscribed below (Figure 6a). On the top right of the map a second cartouche holds a similar shield and knight, but in this instance, the shield is divided into two sections. The top half of the shield contains two Sheldrake birds and the bottom half holds one (Figure 6b). This coat of arms represents the Sheldon family and refers to the Lord Mayor, Joseph Sheldon who presided over the Court of Aldermen at the time of the map’s completion.[83] Both cartouches allude to the Court of Aldermen's financial support for the map as well as their crucial role in rebuilding the City of London. However, the small size and inconspicuous placement of the decorative cartouches prevents them from affecting the virtue of the map, and maintains an overall image of the city that appears unencumbered by flagrant political imagery or prejudice.

Ogilby and Morgan’s *Large and Accurate Map* participates in a more subtle political dialogue through its integration of administrative boundaries between governing wards and church parishes. The twenty-five wards under the jurisdiction of the Aldermen have boundaries marked by distinct dotted lines and each is labeled with a letter of the alphabet that corresponds to a key in the accompanying description of the map (Figure 7). The map distinguishes between the numerous buildings depicted on the map with the use of shading, numerical classifications, and categorical labeling. Specific typographies correspond to particular elements. For example, a thin curvsive typeface is used for the names of sizeable fields and gardens, while a thicker Roman font demarcates main roads and important markets (Figure 8 and Figure 13). Explicitly labeled structures include the Inns of Court, colleges, city churches, markets, and important trade establishments, including the Royal Exchange and Guildhall. As suggested by Robert Hooke, a

[83] David I. Bower, "Further Light on Ogilby and Morgan's Map of London (1676)," *Imago Mundi: The International Journal for the History of Cartography* 65, no. 2 (June 10, 2013): 284, doi:10.1080/03085694.2013.784590.

gray scale is used to discriminate between different building types—for example, private domestic residences appear light gray, while public establishments appear much darker (Figure 9). The methodical demarcation of the boundaries between wards as well as public and private property lines reinforces their legitimate, indisputable, and permanent existence. The omission of illustrative elements results in a map that appears to represent an accurate image of reality.

Apart from including the names of various churches and royal works on the map, Ogilby and Morgan also labeled important academic institutions. For example, Gresham College, the center for scientific dialogue and education, appears clearly named and demarcated on the map (Figure 10). Prominent members of the Royal Society, including Robert Hooke and Christopher Wren, regularly taught and met at Gresham College.[84] Gresham College had been the gathering place for the "Invisible College" and the Royal Society. After the Great Fire, the organization moved their meetings to the Arundel House, which appears on the map along the river Thames (Figure 11).[85] Incorporating these structures emphasizes the importance of "geographie" and science in not only creating this particular map, but also in resurrecting the city after the Great Fire. Both establishments suggest the prominence of the Society as an academic body and its role in establishing London as an epicenter for intellectual discourse and discovery.

The most obvious structure on the map is St. Paul's Cathedral, which points east in line with the map's compass (Figure 12). The cathedral's floor plan can be observed, although its actual architecture cannot. Herein lies the true ingenuity of the *Large and Accurate Map* as Ogilby and Morgan were able to illustrate what appears to be a finished structure when in actuality the cathedral would not be completed for several years. By excluding the vertical plane,

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[84] Lisa Jardine, "Architect of London's Renewal," in *The Curious Life of Robert Hooke: The Man Who Measured London* (New York: HarperCollins, 2004), 140-142.
[85] Lyons, *The Royal Society,* 8.

the ichnographic plan does not reveal the extent of ongoing construction, but rather illustrates the City as a completed urban landscape. The Court of Alderman wanted to illustrate the City of London as a flourishing trade center to surrounding European powers and more importantly to English merchants. Following the fire, many wealthy merchants and tradesmen left the City of London to relocate their businesses to more stable communities, and with their departure, the city experienced significant economic losses.[86] With the illusion of a completely renovated city, the Court hoped to encourage English citizens to return.

Markets and liveries are prominently featured on the survey as Ogilby and Morgan documented improvements made to the City of London after the fire. At Leaden Hall Market for example, there are a series of different shops selling a variety of items, including fish, leather, flesh (meats), and herbs (Figure 13a). Before the fire, Newgate Market had served as the city's principal meat supplier and had consisted of various smaller provisions markets along Newgate Street. In an effort to clear main thoroughfares and create a steady flow of traffic, the market was reestablished as a square with a central market house (Figure 13b).[87] The systematic representation of these markets serves as an example of how the new "scientific cartography" attempted to provide an administrative record of post-fire alterations to the city's infrastructure.

In addition to markets, Ogilby and Morgan incorporate important commercial and trade establishments, including Custom House and the Royal Exchange — both of which functioned as principal gathering places for the business merchants and brokers. The Royal Exchange, located towards the middle of the map, thrived as the financial center for England's booming international trade. Founder of the Royal Exchange, Sir Thomas Gresham, also established Gresham College with funds from his family's trade business, thus illustrating the promotion of

[86] Baker, *Rebuilding the City,* 9.
[87] Ibid, 162.

the sciences through contributions made by London's upper classes.[88] In Ogilby's map, Gresham College appears a few inches to the northeast of the Royal Exchange, further alluding to the connection between urban wealth and scientific advancement (Figure 14). Ogilby and Morgan continue to perpetuate the impression of the city's economic success by illustrating Custom House as a busy hub for international commerce, and by including small illustrations of large ships crowding around the adjacent shore (Figure 15). The Court of Aldermen may have hoped that by illustrating the viability of these particular trading establishments, European merchants would return to London and contribute capital to the city's ongoing reconstruction efforts and scientific pursuits.

The creation of the *Large and Accurate Map of the City of London* marks an important transition in both urban development and the intellectual pursuits of seventeenth-century London. From the flames of the Great Fire a new and prospering metropolis emerged as showcased by the ichnographic representation of the city. Ogilby and Morgan utilized scientific cartography to create an objective final product for both city authorities and the general public. The technical manufacture and systematic representation of the map's contents implies an inherent accuracy and reinforces the apparently irrefutable nature of the post fire changes as determined by the monarchy and local government. The ichnographic plan redefined the types of information that could be visually communicated, and eventually became the norm. Cartographers would soon abandon the bird's-eye perspective to pursue a more standardized and methodical approach to mapping cities. *The Large and Accurate Map* acts as a clear example of this representational shift and demonstrates how the science behind the ichnographic plan could substantiate and strengthen the economic and political claims of a City and a Nation.

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[88] Ibid, 82-85.

Chapter 3 Images

Figure 1. John Ogilby and William Morgan, *A Large and Accurate Map of the City of London,* 1677. Etching and Engraving, 1420 x 4005 mm. Crace Collection of Maps of London, The British Library.

a.

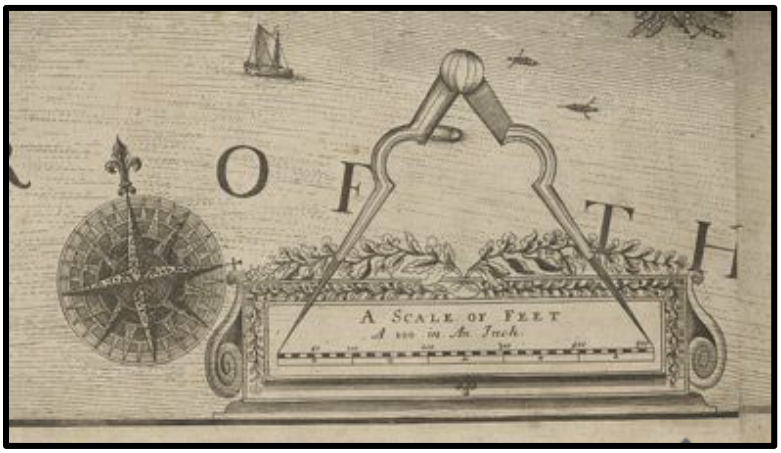


Figure 2. Wenceslaus Hollar, *An Exact Surveigh of the Streets, Lanes, and Churches Contained within the Ruins of the City of London,* 1669. Engraving, 406 x 305 mm. Crace Collection of Maps of London, British Library.

Figure 3. William Faithorne and Richard Newcourt, Excerpt from *London*, 1658. Engraving, 926 x 1545 mm. The British Museum.

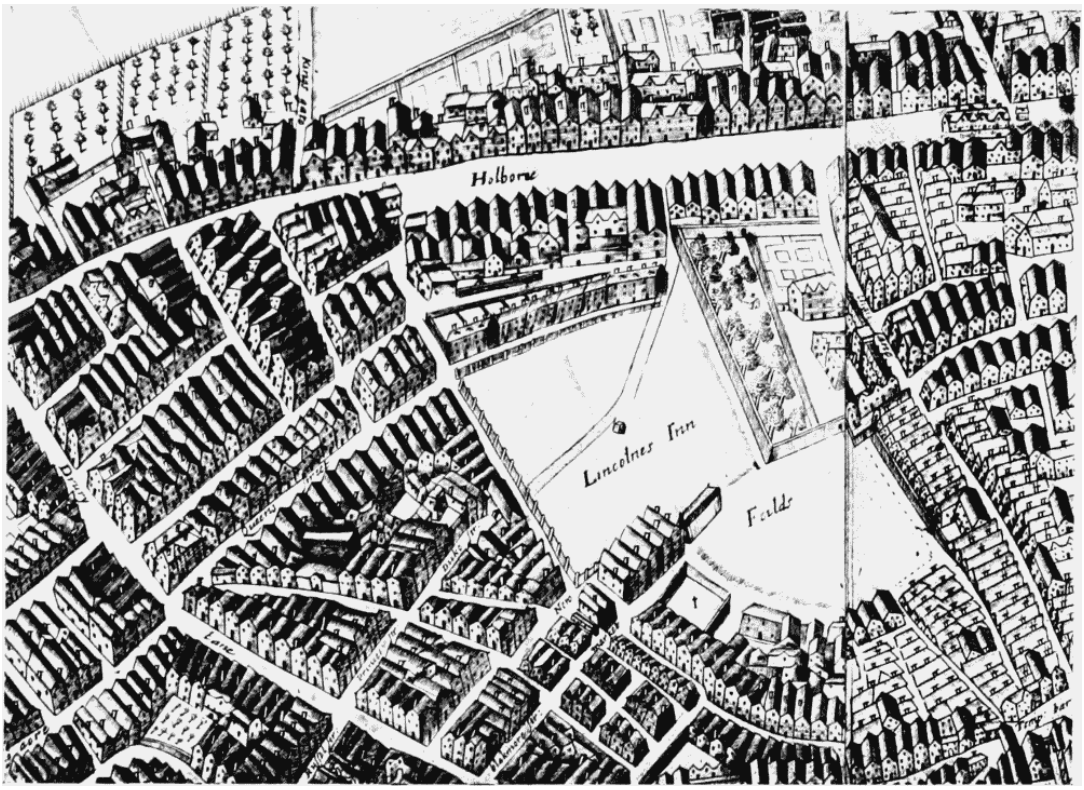


Figure 4. John Holwell, *Robert Hooke's Polygonal Layout of Survey Lines*, 1678. Excerpt from *A Sure Guide to the Practical Surveyor in Two Parts* housed at University College London.

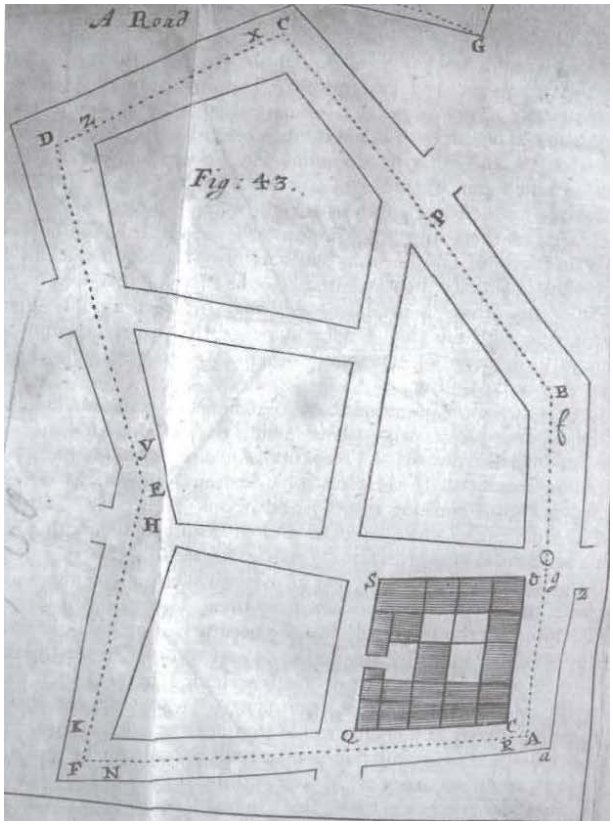
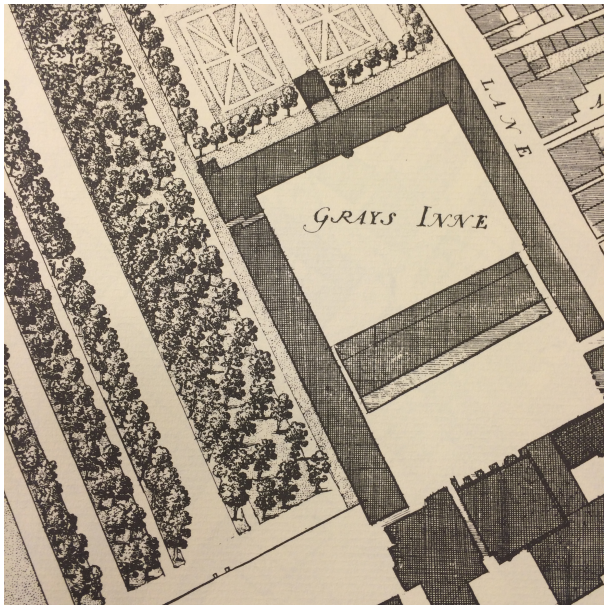
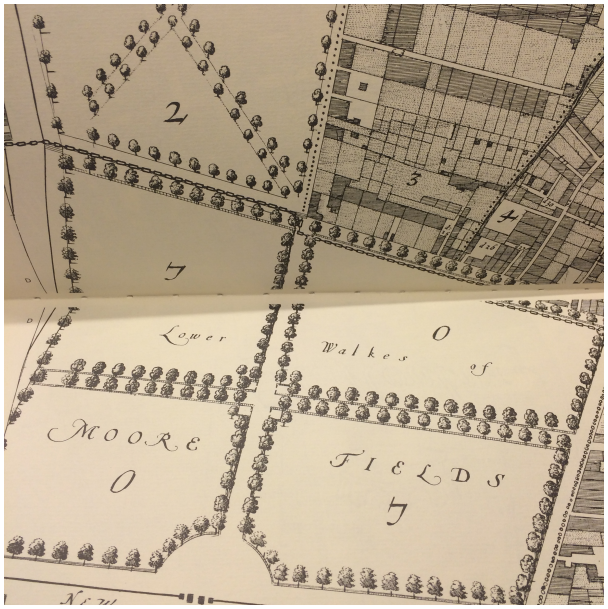


Figure 5. Pictorial representations: (a) trees in Moore Fields, and the areas surrounding Gray's Inn, (b) boats on the river Thames, (c) New Artillery Garden.

a.





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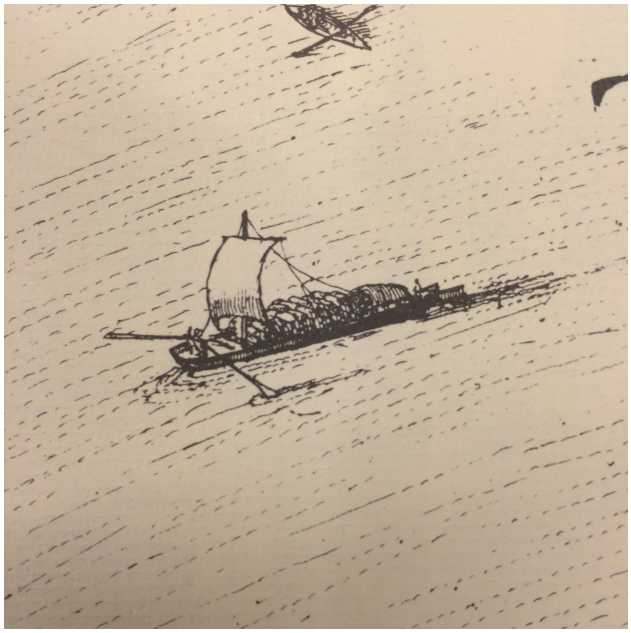


c.

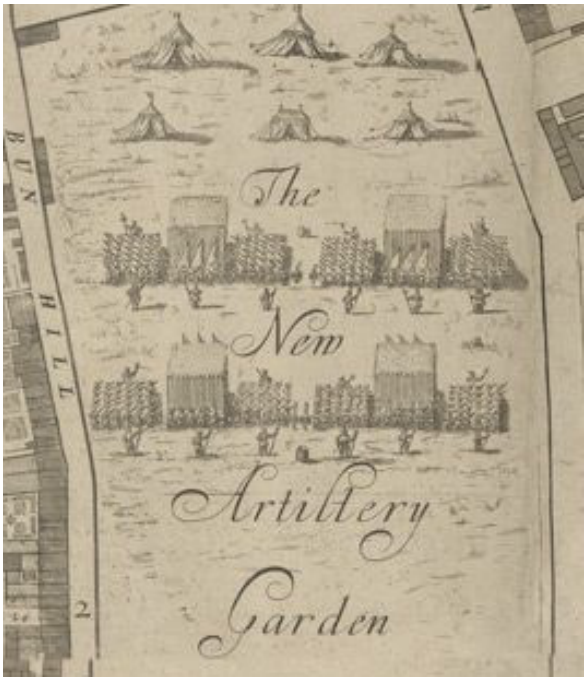


Figure 6. Cartouches with Coats of Arms: (a) Coat of Arms for Corporation of the City of London, (b) Coat of Arms for Sheldon Family

a.

b.

Figure 7. Ward boundaries marked by dotted lines and the corresponding lettering system.

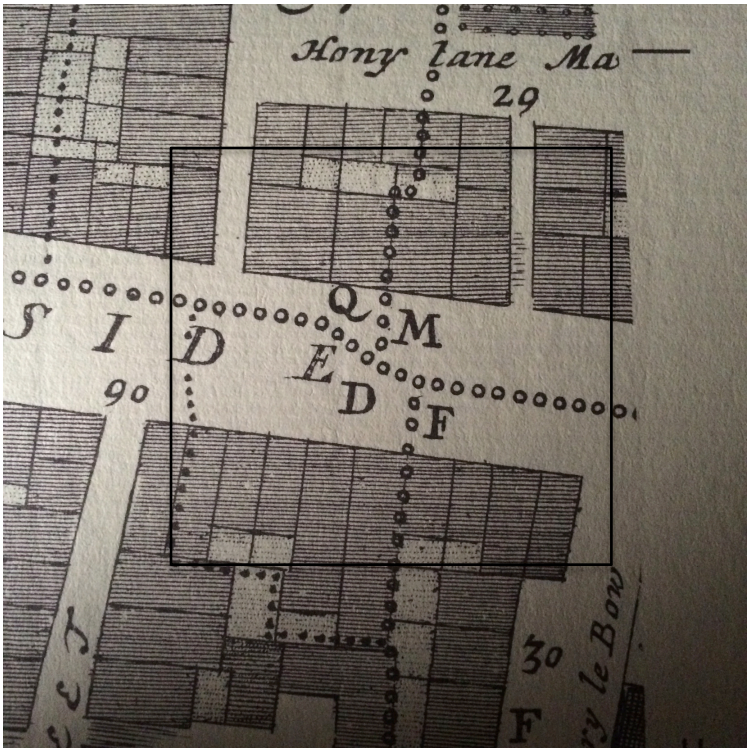


Figure 8. Use of different typographies to identify distinct parts of the map.

Figure 9. St. Sepulchers represents a darkly shaded public establishment. The surrounding light gray plots represent private property.

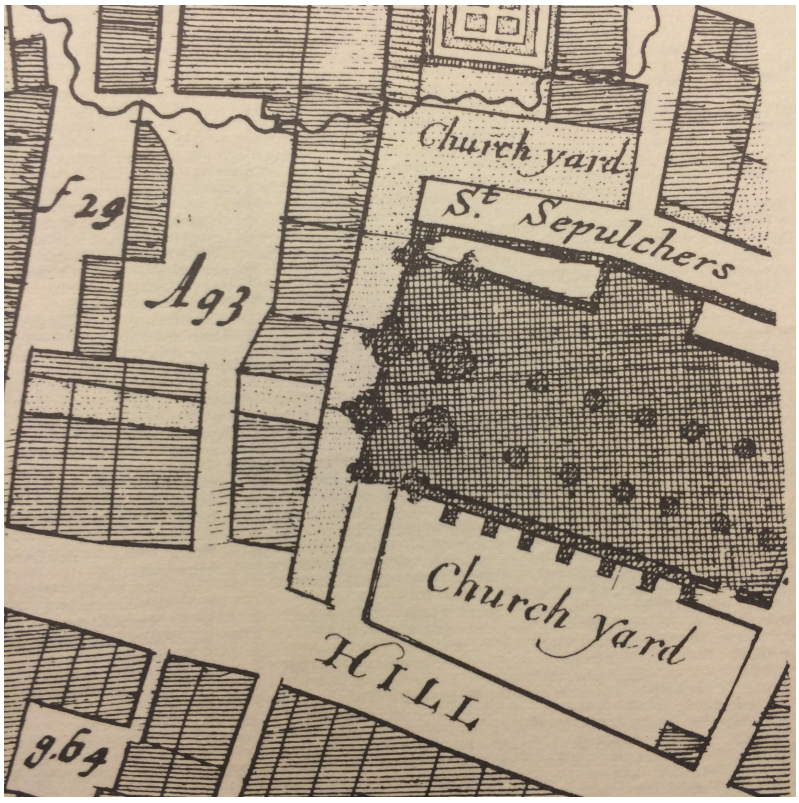


Figure 10. Gresham College

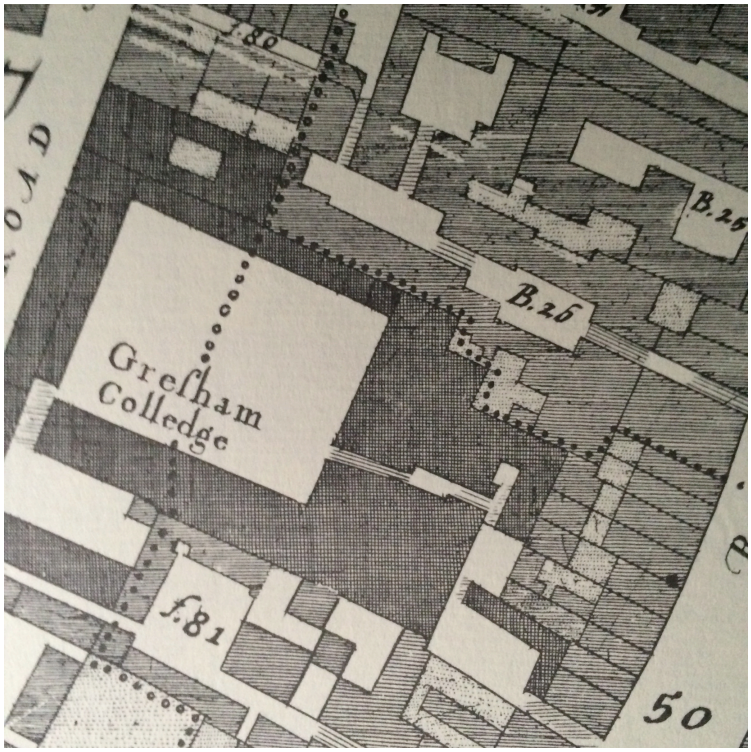


Figure 11. Arundel House

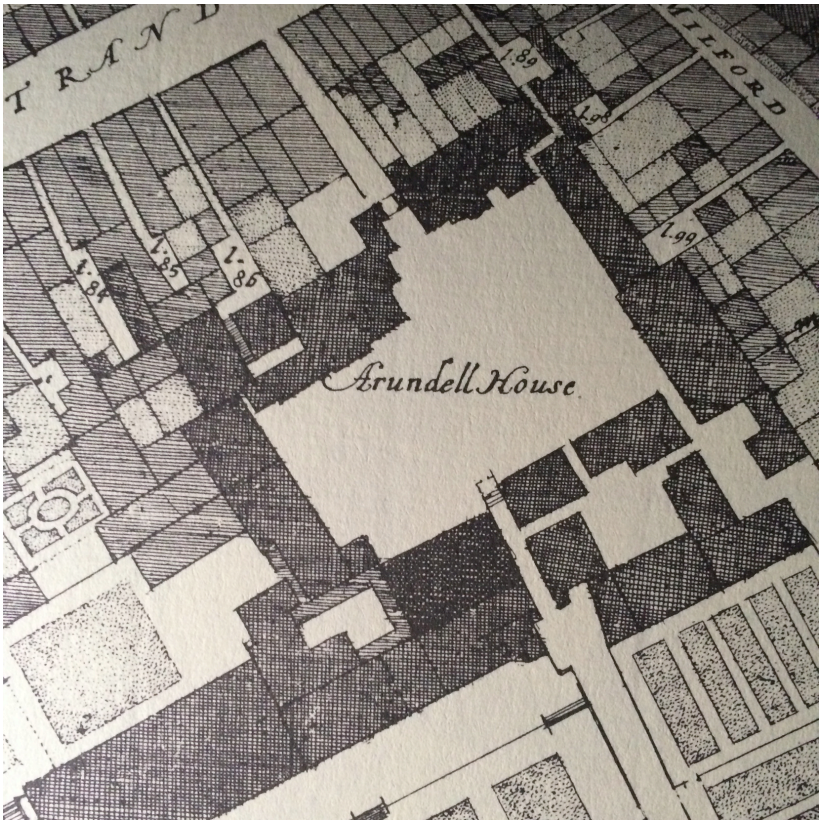


Figure 12. St. Paul's Cathedral

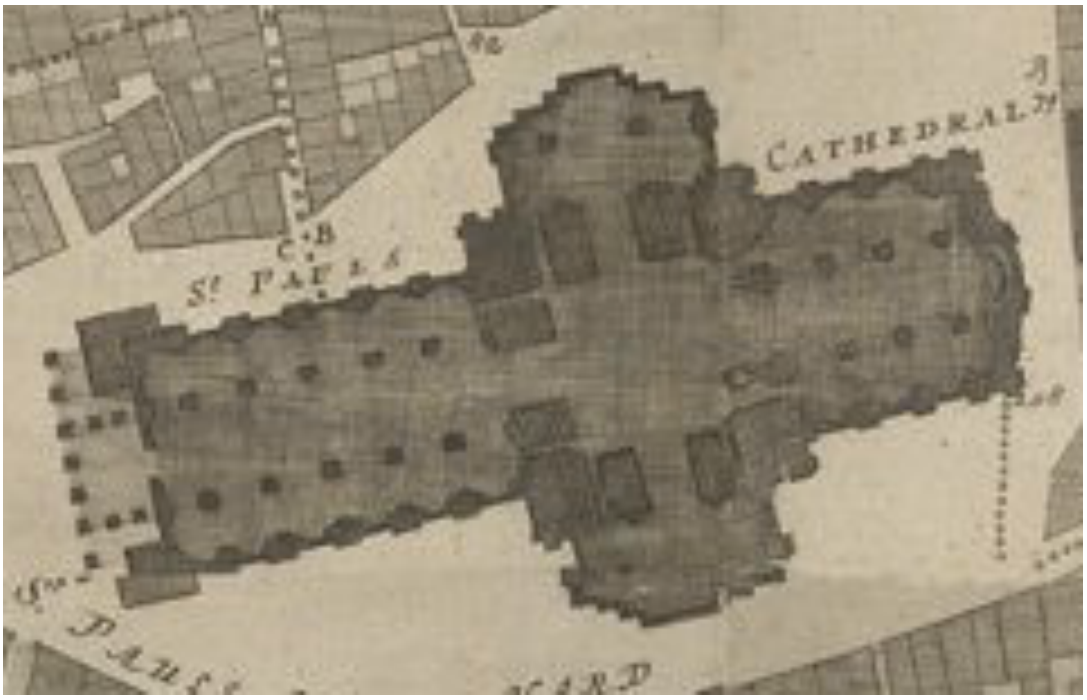
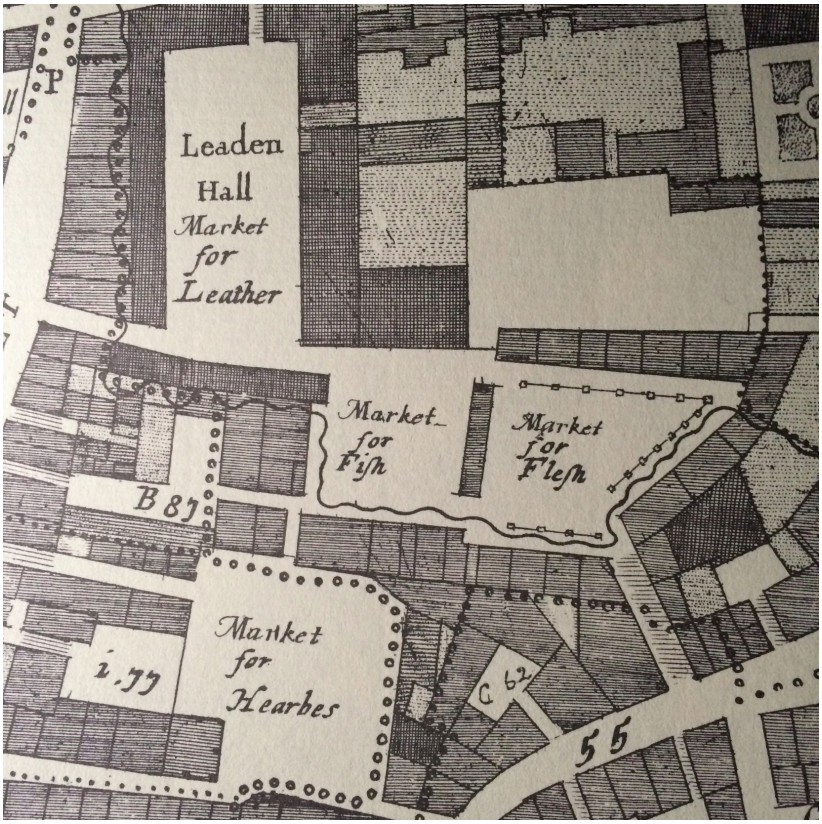


Figure 13. (a) Leaden Hall Market and (b) Newgate Market

a.



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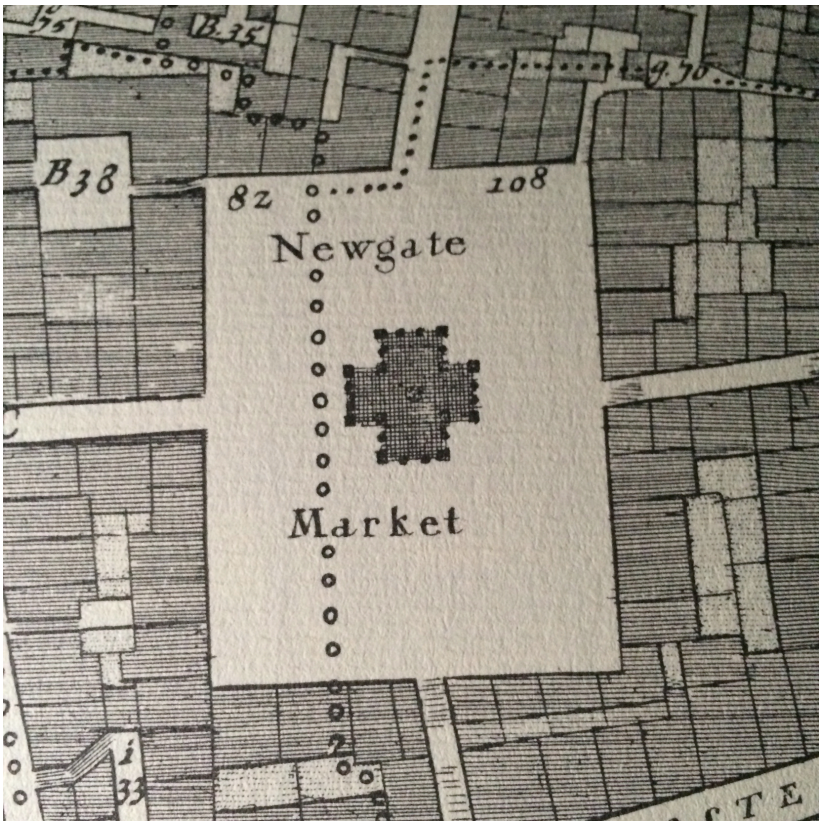


Figure 14. Close detail of Royal Exchange and Royal Exchange in relation to Gresham College.

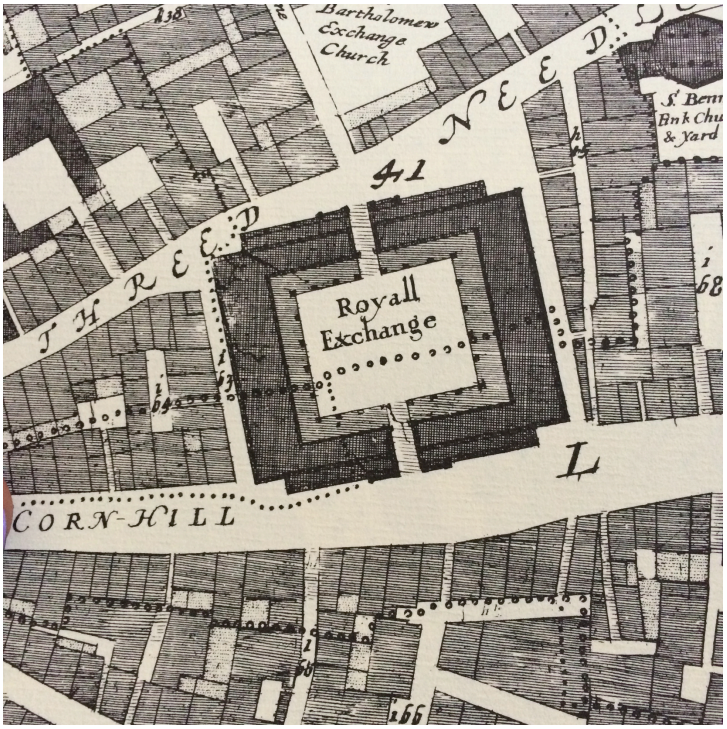
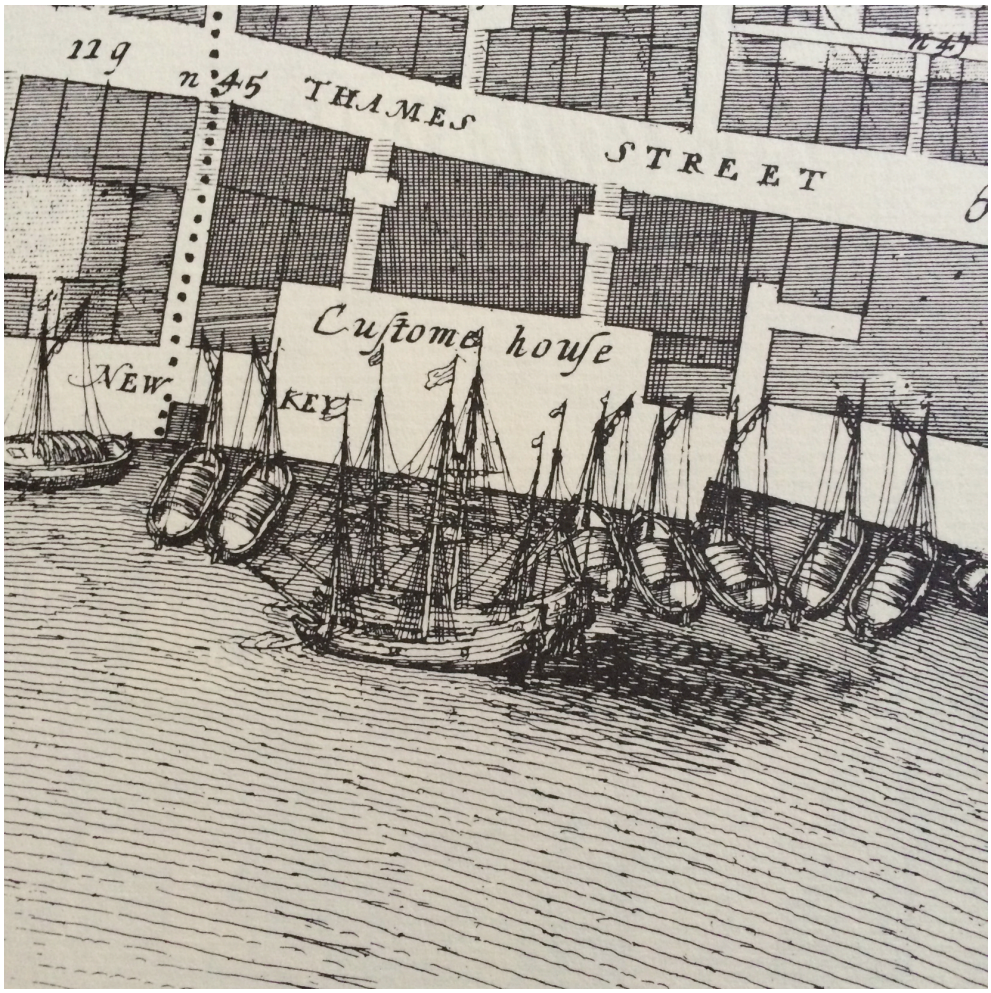


Figure 15. Custom House with surrounding pictorial representations of cargo ships.



Conclusion

The seventeenth-century representations of London examined in this study visually demonstrate the gradual integration of science into the traditionally artistic field of cartography resulting in an entirely new kind of image. When considered in sequence, these images recount a larger narrative describing the assimilation of scientific thought and approach into both academia and society at large. Cartographers gradually changed the lens through which Londoners viewed their City; the ichnographic plan forced them to discern new types of information about their immediate environment including distance, scale, and structural plans. The removal of human figures and indicators of social life added to the progressive desocialization of maps during the post-fire era and contributed to the apparent authenticity and legitimacy of projected images of reality.

Of all of the images studied, the *Exact Surveigh* is the most effective example of a map constructed in the old tradition with its meticulously detailed representations of the standing city. Although, the integration of plan view into the center of the survey alludes to the future of mapping practice, Hollar does not forfeit his commitment to refining the accuracy of the bird's-eye view. The juxtaposition of a three-dimensional view against the flat plan offers the most obvious comparison between the two perspectives. The use of a more geometrically defined representational mode indicates the invocation of science and mathematics with regards to the reconstruction of the City. Hollar's map exists at the edge of a new scientific era as it not only represents a fundamental shift in cartography, but also a transformation in the local urban landscape.

Wren's 1666 plan for the City of London captures the reformist spirit of the late seventeenth-century as the Royal Society used the Great Fire as an opportunity to disseminate

their ideas and build their ideals into the foundation of the new metropolis. Wren's plan simultaneously demonstrates the growth of international collaboration and exchange as he borrows ideas from his European predecessors in Rome and Paris to create a revolutionary scheme for London. Although British authorities did not use the 1666 plan, town planner and architect Pierre Charles L'Enfant recognized the ingenuity of Wren's scheme and borrowed the grid plan and rondpoints for his own 1791 plan for Washington D.C.

Both Hollar's *Exact Surveigh* and Wren's 1666 plan demonstrate the gradual integration of a scientific aesthetic that becomes blatantly obvious in the *Large and Accurate Map of the City of London*. Ogilby and Morgan do not hesitate to push the boundaries of established cartographical convention to create an entirely repurposed representation of their City. After the *Large and Accurate Map*, cartographical representations of London no longer utilized the once popular bird's-eye view, but rather improved upon the ichnographic with the advent of more technologically advanced surveying tools. Post-fire maps and city plans tangibly illustrate the growth of empiricism and rational thought with the rising influence of Royal Society of London. The seventeenth-century marked the beginning of a new advanced age as the scientific approach offered new systems for categorizing information.

The Great Fire ignited the process of understanding the world from a direct and individual perspective. The same cultivation and inculcation of scientific ideology that occurred in the City of London eventually transpired throughout Europe and the world, and has shaped the very way in which we ourselves perceive the physical environment. Modern day maps are not constructed with an illustrative perspective, but rather assume an ichnographic view based on scientifically grounded sources of information such as satellite feeds or photographs, which offer direct images of reality. The Royal Society may have initially struggled to promote their

principles of experimentation and direct observation, but their tenets have transcended time and become the very core of how modern day society understands the world. They awakened a new era of enlightenment during which people embraced and lived by the Society's fundamental adage: "Nullis in Verba" (Take Nobody's Word for It).

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