Sunlight and Gaslight:
Mapping Light in Mid-Nineteenth Century New York City

By Rachel Eu

Senior Thesis
Department of History, Barnard College
Advisor: Gergely Baics
April 2019

TABLE OF CONTENTS

INTRODUCTION: *A Lone Gas Lamp*……**1**

CHAPTER 1: *The Sunlit City: Spatial Patterns of Light and Ideologies of Darkness in Manhattan's Urban Landscape*……**7**

CHAPTER 2: *The Gaslight City: Light, Security and Morality in Nocturnal New York*……**40**

CONCLUSION: *In the Shadows of the City*……**62**

BIBLIOGRAPHY:……**67**

INTRODUCTION:
A Lone Gas Lamp

> "We are standing at midnight in the center of Five Points. Over our heads is a large gas lamp, which throws a strong light for some distance around, over the scene where once complete darkness furnished almost absolute security and escape to the pursued thief and felon...the large lamp is kept constantly lighted, and a policeman stands ever sentinel to see that it is not extinguished. The existence of this single lamp has greatly improved the character of the whole location and increased the safety of going through the Points at night. Those, however, whose purposes are honest, had better walk a mile around the spot on their way home, than cross through it."[1]

A lone gas lamp stands in the center of the Five Points, illuminating what many Americans considered to be the "heart of urban darkness."[2] As George Foster introduces readers to the underbelly of Manhattan in his book *New York By Gaslight,* he reveals a great dichotomy within the mid-nineteenth century city—the dichotomy between light and darkness. In the case of the Five Points darkness is evident, for it is midnight and only a single lamp can be found in these streets. But the Five Points is proverbially dark as well; the crime, prostitution, and poverty these streets are known for engulfs it in a rhetoric of darkness, regardless of the time of day. The lone gas lamp, which "throws a strong light for some distance around," stands in sharp contrast to the otherwise dark street, implying improved security and symbolizing virtue and modernity. Foster reveals that the symbolic value of the lamp is so great that a policeman was stationed under the lamp to "see that it is not extinguished." However, the lamp's ability to tame the night is imperfect, as those "whose purposes are honest, had better walk a mile around the [Five Points] on their way home, than cross through it." Still, the symbolic value of the light endures; while the brightness of the streetlamp cannot alleviate the proverbial darkness of the

[1] George G Foster, *New York by Gaslight: With Here and There a Streak of Sunshine* (New York: Dewitt & Davenport, 1850), 53.
[2] Ibid., 52.

neighborhood, the lamp still stands as a marker of purity and progress in the otherwise dark night.

George Foster was only one of a half dozen or so prominent authors who wrote of Manhattan in the mid-nineteenth century "in the lines of light and gloom."[3] Indeed, discourse surrounding light and darkness in the city proliferated during the mid-nineteenth century amongst contemporary writers and journalists who produced works such as *Sunshine and Shadow in New York, New York by Sunlight and Gaslight,* and Foster's infamous *New York by Gaslight.*[4] As the titles suggest, these works grappled with "gaslight" and "sunshine and shadow," assessing activities in Manhattan under gaslights and during daylight hours. Though these works offered fictional, journalistic and often satirical accounts of life in the mid-century metropolis, they produced depictions of the city along lines of light, darkness and shadows. As these works proliferated during the mid-century, they established a geography of light and darkness in Manhattan, with certain spaces coming to hold reputations for light, while other spaces were cast in darkness and shadows.

Writers and journalists were not the only figures participating in conversations of light in the mid-century. Rather, physicians, public health reformers, and government officials were also drawn to these discussions. However, in contrast to writers and journalists, who discussed light as a metric of character, physicians and health inspectors discussed patterns of light in the city through the lens of public health and sanitary reform. By the mid-nineteenth century, New York City was approaching crisis. As the city's population skyrocketed from sixty thousand people in

[3] Matthew Hale Smith, *Sunshine and Shadow in New York (*Hartford: J.B. Burr, 1868), 706.
[4] Ibid., 1; James D McCabe, *New York by Sunlight and Gaslight: A Work Descriptive of the Great American Metropolis* (New York: Edgewood Publishing Company, 1882), 33; Foster, *New York by Gaslight,* 1.

1800 to half a million by 1850, the dramatic increase in residents overwhelmed Manhattan.[5] As density and overcrowding consumed poor neighborhoods such as the Five Points and the Lower East Side, public health deteriorated rapidly.[6] The city's annual death rate doubled between 1810 and 1856, reaching a peak in 1849 and 1853.[7]

Amongst colonial New Yorkers, disease had been regarded as the providence of God. Particularly in times of epidemic, vice and sin seemed to predispose disease, and illness was thus viewed as the manifestation of God's punishment.[8] However, during the nineteenth century, new theories of disease prevailed; doctors moved away from a providential explanation for public health and illness, and towards a social theory of prevention.[9] In particular, the miasmatic theory of disease came into vogue, which pinpointed the persistent filth and stench of the streets as the principal etiology of disease. As the miasmatic theory became the principal explanation for sickness during the nineteenth century, light and air were seen as essential to the health of the city's inhabitants. Even before doctors identified atmospheric sources of disease, common law defined light and fresh air as essential features of a house.[10] But in the new era of the miasmatic theory, access to light and air was suddenly paramount. However, access to light and air came with a price tag; light and air could not be easily assured in all households, but with sufficient funds these features could be purchased or leased.[11] Thus, patterns of light and darkness

---

[5] Elizabeth Blackmar, "Accountability for Public Health: Regulating the Housing Market in Nineteenth-Century New York City," in David Rosner ed., *Hives of Sickness: Public Health and Epidemics in New York City* (Rutgers UP, 1995), 42.
[6] Christine Stansell, *City of Women: Sex and Class in New York, 1789-1860* (Urbana: University of Illinois Press, 1987), 199.
[7] Ibid.
[8] Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago, IL: Univ. of Chicago Press, 1962), 15.
[9] Blackmar, "Accountability for Public Health," 44.
[10] Ibid., 45.
[11] Ibid., 48.

transpired within the surveys and writings of medical professionals, with a discourse of darkness emerging primarily in response to the living conditions of the working poor.

By the mid-nineteenth century, a combination of public health surveys, journalist investigations and literary works consolidated to produce a geography of light and darkness in the city, in which light was often correlated with affluence and darkness with poverty. While some of these sanitary and literary investigations of the city were bred out of sympathy and intended to mobilize reform, these investigations also shaped interpretations of social relations that in effect naturalized class divisions as a permanent feature of the city's landscape.[12] As journalists and public health reformers alike presented the city as irrevocably divided into "sunshine and shadow," the surveys and writings drew a grim picture, with physical darkness being read as a sign of moral darkness and light holding connotations of virtue and morality.[13]

A fashionable topic during the mid-nineteenth century, the matter of light in the city once again came into vogue during the late twentieth century, as scholars like Wolfgang Schivelbusch, Mark Bouman, Joachim Schlör and Peter Baldwin took on various facets of the nocturnal city. Wolfgang Schivelbusch's *Disenchanted Night* chronicles the development of artificial light in the nineteenth century. As Schivelbusch traces the technological development of light, he analyzes the symbolic meaning of domestic light and argues that gas lighting, in particular, had a profound psychological impact as the technology marked the centralization of a most vital provision—light. Mark Bouman, in a pair of articles, argues that gas lights were the "best nocturnal police," as they conquered darkness, preserved security and deterred crime.[14] Joachim

[12] Blackmar, "Accountability for Public Health" 58.
[13] Ibid.
[14] Mark J Bouman, "The "Good Lamp Is the Best Police" Metaphor and Ideologies of the Nineteenth-Century Urban Landscape," *American Studies* 32, no. 2 (1991): 66.

Schlör's *Nights in the Big City* describes Paris, Berlin and London, and how perceptions and relationships with the night changed in these cities throughout the nineteenth and early twentieth centuries. Schlör argues that there were two incarnations of the urban night that fell on opposite ends of a spectrum—the nocturnal city as a place of danger and the nocturnal city as a place of celebration—which created a fundamental dynamic in the nighttime city that defined metropolitan modernity.[15] Peter Baldwin's *In the Watches of the Night,* the most recent work amongst these authors, depicts the changing experience of the urban night in U.S. cities between 1820 and 1930. Baldwin shows that while artificial light transformed the night, many social patterns of the preindustrial night remained, surviving as a "potent influence on human life."[16] Notably, all of these authors focus on the issue of light in the nocturnal setting. And while these works help set the stage for a discussion of light in the city, they fall short in addressing one key dimension: patterns of light and dark during daylight hours.

Scholarly literature to date explores light in the urban setting through qualitative means. This thesis employs new methods to explore the topic of light in the city. While this thesis draws on literary, investigative and journalistic descriptions from the mid-nineteenth century to explore connotations between light and poverty, light and morality, and light and vice, its main approach is to bring geographic information systems (GIS) analysis to reconstruct the spatial patterns of light in New York City. The use of GIS to map light in the city allows for going beyond descriptive and narrative discussions of light, and consequently challenge perceived patterns of light and darkness in Manhattan.

---

[15] Joachim Schlör, *Nights in the Big City: Paris, Berlin, London 1840-1930* (London: Reaktion Books, 2016), 11.
[16] Peter C Baldwin, *In the Watches of the Night: Life in the Nocturnal City, 1820-1930* (Chicago: University of Chicago Press, 2015), 203.

As the day is divided between daytime and night, this thesis is organized into two chapters to reflect this division. Chapter one explores the distribution of natural light in the daylight city, using GIS to map street widths and building density as facets of the built environment that influence patterns of light and shadows. This chapter argues that the conditions of the built environment in mid-nineteenth century Manhattan caused darkness to congregate in areas of poverty, provoking discourse on the impact of darkness on physical and moral health, and revealing that access to natural light was a luxury rather than a given. Chapter two explores patterns of light in the nocturnal city, using GIS to map streets with gas lights. This chapter shows that while the city emphasized the importance of installing gas lamps under the pretense of improving nighttime security, in fact the city did not prioritize the installation of gas lights in the most crime-ridden segments of the city. The geography of gas lights therefore questions established views: while gas lights could be found in areas of wealth and were more sparsely found in working-class areas, gas lights primarily followed patterns of commerce, highlighting the city's prioritization of protecting private property over personal safety.

Together, the two chapters reconstruct the spatial geography of light in the city, paying particular attention to the corresponding social geography of light and darkness. In doing so, a regular theme emerges: while light—both natural and artificial—held associations of affluence, virtue and morality, darkness often represented immorality and vice. But patterns of light in the city were complex and nebulous. By using GIS, this thesis demonstrates that the spatial geography of light and the moral landscape of Manhattan did not clearly align. Consequently, in Manhattan, the social geography was fixed, sunlight was evasive, darkness was widespread and shadows were ever changing.

CHAPTER 1:

The Sunlit City: Spatial Patterns of Light and Ideologies of Darkness in Manhattan's Urban Landscape

In Manhattan, the built environment shapes the contours of light and shadows. As the sun rises, and the city comes to life, the width of streets, the height of buildings, and the density of structures bend light, producing complex patterns of light and darkness throughout the urban landscape. However, the morphology of the Manhattan landscape varies widely. Streets range from broad thoroughfares to narrow and crooked alleyways, from sparsely built stretches of land to densely packed ones. Consequently, during daylight hours, sunlight does not touch all streets evenly, as the built environment allows light to filter into some thoroughfares while leaving other spaces cast in shadows.

The Manhattan built environment underwent significant changes during the nineteenth century, which had a profound impact on patterns of light in the city. Before the Manhattan grid captured the streets of the city into a codified, orthogonal system, Manhattan grew sporadically.[17] As a colonial city, Manhattan clustered at the southern tip of the island, a tight knot of short streets, some dating back to the time of the Dutch settlement of New Amsterdam.[18] These streets were shaped by local conditions and lacked comprehensive order. Streets had been weakly regulated by colonial authorities, with private inland streets being opened at the discretion of property owners. However, by 1800, the Common Council, the governing body of the city, began to take control. Streets were increasingly recognized as a public responsibility, and the Common Council established regimes to keep the streets clear, approve new openings, and assess property owners to pay for their upkeep.[19]

---

[17] Hilary Ballon, *The Greatest Grid: The Master Plan of Manhattan 1811-2011* (New York: Museum of the City of New York, 2012), 17.
[18] Ibid.
[19] Ibid.

In 1807, the New York State Legislature took steps to strategize a comprehensive street system in Manhattan when they appointed three commissioners to design a plan for the future growth and development of the city.[20] The plan put forth by the commissioners, known as the Commissioners' Plan of 1811, proposed a distinctly orthogonal grid system. Consisting of perpendicular streets and avenues that outlined rectangular blocks, the proposed plan was orderly and repetitive. As noted by some commentators, the grid seemed to represent the democratic qualities of the Republic, due to its anti-hierarchical nature and uniform patterns of land division and street settlement.[21] Most importantly, however, the Commissioners' Plan of 1811 established set dimensions for the streets; on the grid, north-south avenues were to measure 100 feet wide, and east-west cross-streets were to measure 60 feet wide. Additionally, fifteen major east-west thoroughfares were to punctuate the grid at intervals, also measuring 100 feet wide.[22] The grid street system produced elongated, rectangular blocks, whose dimensions averaged 200 feet in their north-south length, and anywhere between 610 to 920 feet along their east-west length.[23] Consequently, in contrast to the natural and unplanned nature of streets in the southern part of the city, the newly gridded region of Manhattan created an unprecedented urban order that prioritized uniformity within the metropolis, and set a standard for the quantity of space and light that was to exist within the streets.

Between 1833 and 1862, the physical size of Manhattan increased by over 2,000 acres.[24] And though Manhattan's northern limit did not exceed 59th Street until after the Civil War, by the 1830s the city had broken out of the confines of Lower Manhattan and into the realm of the

---

[20] Ballon, *The Greatest Grid*, 17.
[21] Ibid., 27.
[22] Ibid., 33.
[23] Gergely Baics and Leah Meisterlin, "The Grid as Algorithm for Land Use: A Reappraisal of the 1811 Manhattan Grid," *Planning Perspectives*, November 13, 2017, 4.
[24] Jason M. Barr, *Building the Skyline: The Birth and Growth of Manhattan's Skyscrapers* (New York: Oxford University Press, 2018), 24.

sparsely populated grid. As Manhattan stretched longitudinally, the density of the built environment varied immensely. Consequently, the concentration of buildings across the Manhattan landscape played a vital role in establishing patterns of light and dark in the city. While Manhattan experienced significant horizontal growth during the first half of the nineteenth century, this horizontal expansion was not accompanied by any remarkable vertical growth. At the mid-century, few of New York's structures rose higher than seven stories, with the upper limit averaging around five of six. Rather, ship masts and church spires defined the city skyline, as these features towered over shops, warehouses and dwellings.[25] While Manhattan would not see great variety in building heights until the turn of the twentieth century, the height of buildings still played a role in casting shadows in the city streets.

As street widths, building heights and density of the built environment came together in various ways, light and shadows in the city bent and shifted so that sunlight filled one street while casting another in shadows. This chapter will examine the spatial patterns of light in Manhattan by comparing the distribution of street widths in the 'pre-grid' and 'post-grid' realms of the city in order to explore the implications of wide city streets in relation to light. This chapter will then examine the distribution of narrow streets in the Manhattan urban landscape in conjunction with density of buildings, in order to explore the parts of the city most likely to be bathed in constant shadows. A three-dimensional rendering of the Fourth Ward will be used to explore light in one of Manhattan's densest and poorest neighborhoods. Finally, this chapter will examine light in the streets as an imperfect indicator of the moral landscape of the city. As demonstrated in this chapter, the conditions of the built environment caused darkness and poverty to congregate in the tenements of the Lower East Side, provoking discourse on the

[25] Mona Domosh, *Invented Cities: The Creation of Landscape in Nineteenth-century New York and Boston* (New Haven: Yale University Press, 1998), 69.

impact of darkness on physical and moral health, and revealing that access to natural light was a luxury rather than a given. However, contrary to popular beliefs of the time, the spatial geography of light and the moral geography of the city did not completely align. Consequently, in the Manhattan urban landscape, the moral geography of the city was rooted in perceptions of light which did not always align with the reality.

Light and Street Widths in the 'Pre-Grid' and 'Post-Grid' City

The Manhattan street system played a pivotal role in establishing patterns of light and dark in the streets. By the mid-nineteenth century, Manhattan had yet to grow into its street plan; though the Commissioners' Plan of 1811 had prescribed a new grid street system that would regulate patterns of growth in the northern reaches of the island, the city hardly stretched past 42nd street in 1850. Consequently, at the mid-century Manhattan was comprised of two morphologically distinct halves— the 'pre-grid' to the south of Houston and the 'post-grid' to the north—which were roughly equal in extent.[26] When considering access to light, the width of Manhattan streets were of particular significance. Wide streets equated to more open space between buildings, which in turn suggests improved access to light and air, two of the most valuable commodities in the mid-century city. Additionally, wide streets allowed for greater ease in the circulation of people and goods throughout the city.[27] Given the morphology of the Manhattan landscape, street widths in the city were highly variable. Figure 1.1, which depicts 1852-54 Manhattan graduated street widths, reveals the morphological split between the 'pre-grid' and 'post-grid' sections of the city. In this map, the width of the street correlates to the width of the line, with the thickest lines representing the widest streets. As seen in Figure 1.1, the

[26] Baics and Meisterlin, "The Grid as Algorithm for Land Use," 3.
[27] Ballon, *The Greatest Grid*, 17.

widest streets in the city are found north of Houston Street, and the narrowest streets in the southern tip of the island and in the Lower East Side. Consequently, if wider streets correlate to more light, Figure 1.1 reveals that the streets in the 'post-grid' parts of the city were privileged with better access to light that their southern 'pre-grid' counterparts.

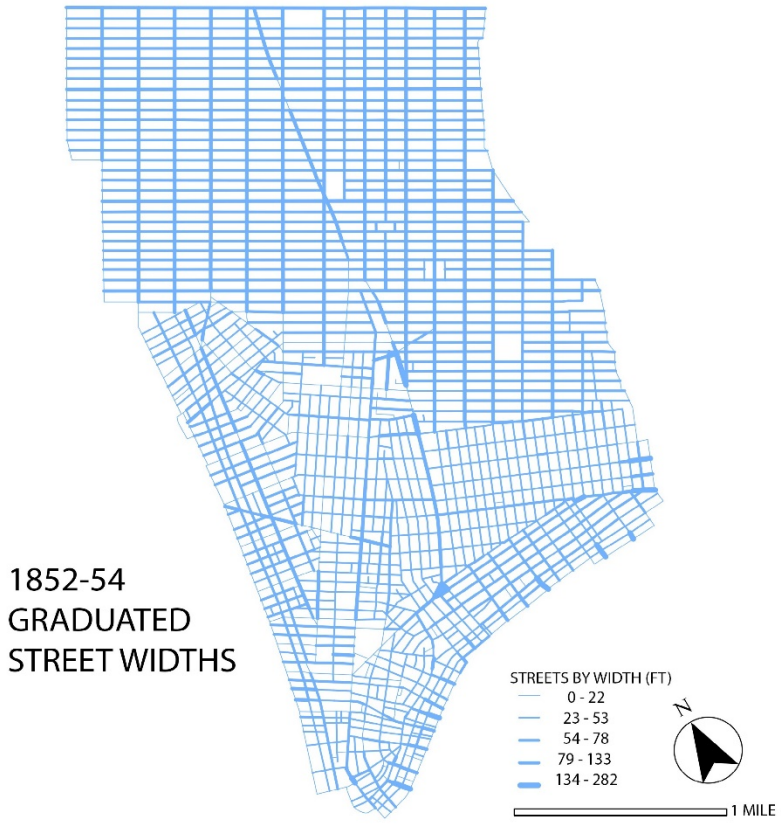

FIGURE 1.1[28]

The Manhattan grid is known for its monotony. As James McCabe describes in his book, *New York by Sunlight and Gaslight,* the grid was characterized by its "regular" formation of streets, which played an important role in establishing patterns of light and dark in the city: "above Canal Street the streets... are broad and straight, crossing each other at right angles, and are laid off at regular intervals." In contrast to the 'post-grid' portion of the city, McCabe

[28] The street width data used to create Figure 1.1 was assembled by Gergely Baics and Leah Meisterlin for their article, "The Grid as Algorithm for Land Use." Using the 1852-54 Perris Fire Insurance Atlas, Baics and Meisterlin manually obtained data on street widths per segment from the atlas's plates to create a dataset detailing the dimensions of streets throughout the Manhattan street network south of 42nd street. This data was brought into geographic information systems to create a shapefile. This shapefile containing street widths per segment was then manipulated for the purpose of this thesis to display graduated street widths. Gergely Baics, and Leah Meisterlin, Manhattan Street Width Shapefile, 2017, Columbia University; Baics and Meisterlin, "The Grid as Algorithm for Land Use."

describes Lower Manhattan as "a dense mass of houses, with narrow and often crooked streets."[29] As revealed by McCabe, the "broad" nature of the streets suggests ample access to sunlight within the gridded portion of the city. In contrast, the "dense mass of houses" and "narrow and often crooked streets" of Lower Manhattan's built environment suggests that this space within the city was compressed and thus comparably dark. Figure 1.2 further enforces the unequal distribution of light within the Manhattan streetscape, particularly between the 'pre-grid' and 'post-grid' realms of the city. In Figure 1.2, streets are categorized by width; streets that are wider than 60 feet are in red, streets that are equal to 60 feet are in orange, and streets that are narrower than 60 feet are in pink. On the grid, north-south avenues measure 100 feet wide, and east-west cross streets measure 60 feet wide. Additionally, by 1852 four major cross-streets punctuated the grid at 14th, 23rd, 34th, and

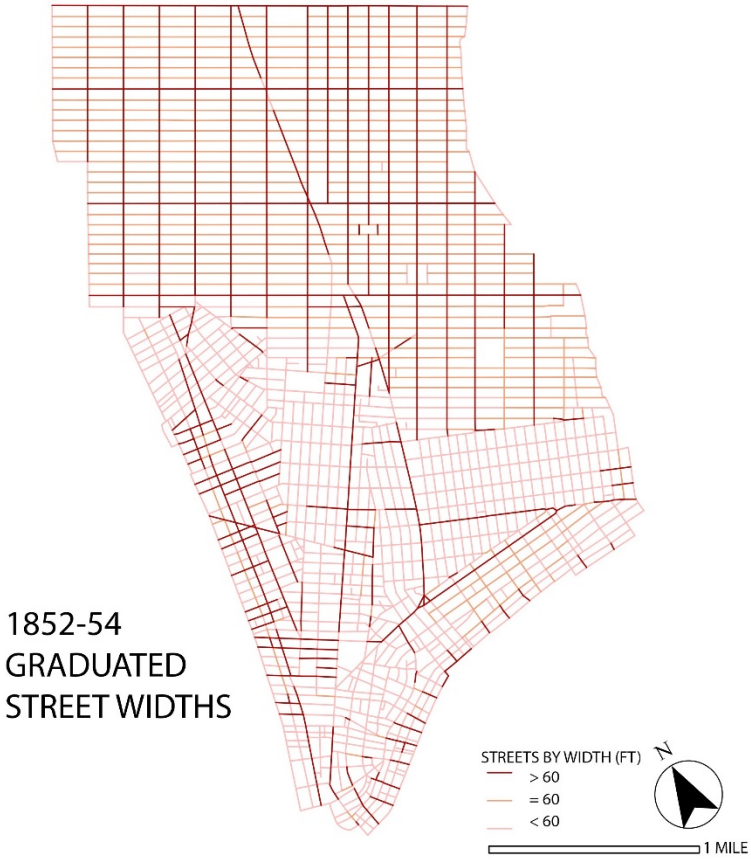

FIGURE 1.2[30]

[29] McCabe, *New York by Sunlight and Gaslight*, 35.

[30] Figure 1.2 was constructed in GIS using Baics and Meisterlin's street width shapefile. To create Figure 1.2, the shapefile was manipulated so that the streets were sorted into one of three categories: streets that are equal to 60 feet wide, streets that are less than 60 feet wide, and streets that are greater than 60 feet wide. Baics and Meisterlin, Manhattan Street Width Shapefile.

42nd Streets, each measuring 100 feet wide.[31] Figure 1.2 reveals the consistent, homogenous nature of the streets in the 'post-grid' realm of the city; north of 14th Street, the width of the avenues and the cross streets are codified and consistent, with avenues and major east-west thoroughfares measuring over 60 feet wide, and cross-streets measuring 60 feet wide. In contrast, Lower Manhattan is dominated by streets measuring less than 60 feet wide. Additionally, there is no clear spatial pattern explaining the distribution of streets measuring greater than 60 feet wide within the 'pre-grid' city. Consequently, Figure 1.2 further visualizes the dominance of light within the Manhattan grid, particularly along avenues and major cross streets, in contrast to the uneven and variable nature of light within the streets of the 'pre-grid' urban landscape.

Though Figures 1.1 and 1.2 suggest improved access to light in the northern, gridded portion of the city, these maps reveal some nuance to this binary division between northern and southern streets. Both maps reveal that streets along the waterfront were distinctly wide, particularly along the East Side of the island in Lower Manhattan. The crux of nineteenth-century Gotham, the ports demanded easy access between the waterfront and the rest of the city, and the notably wide streets along the waterfront reflect this.[32] Moreover, Broadway and the Bowery stood out as distinctly wide thoroughfares in the city's southern half, along with a number of major commercial streets such as Grand, Division and Chatham. Once again, however, the breadth of these streets is to be expected, as their substantial width contributed to their position as prominent thoroughfares and major arteries within the city. Thus, while wide streets were incorporated into the Manhattan grid at regular intervals, wide streets in the southern portion of the city were infrequent and could only be found in locations where circumstance required it.

---

[31] Baics and Meisterlin, "The Grid as Algorithm for Land Use," 4.
[32] Ballon, *The Greatest Grid*, 4.

Street Widths and Building Density: Patterns of Light in Manhattan's Built Environment

The width of the street and the density and height of the built environment are the main factors that determined the quantity of sunlight within a select street. As McCabe describes in *New York by Sunlight and Gaslight*, the narrow nature of the streets in the 'pre-grid' city, coupled with the intensity of construction and the height of the surrounding buildings resulted in streets full of shadows. For instance, "Pine street...is a narrow thoroughfare, but between Nassau Street and Broadway is lined with noble structures occupied by banks and corporate institutions. These buildings are so tall that the street is always in shadow."[33] While patterns of light and shadows change over the course of a day, McCabe reveals that some spaces, such as Pine Street, never saw direct sunlight and remained in almost perpetual darkness. And, streets that were constantly in shadows impacted the feel of the city, as McCabe describes of Nassau Street: "Nassau street...is one of the narrowest streets in the city, and is built up with lofty houses, which shut out the sunlight and give it a dark and gloomy appearance."[34] Like Pine Street, Nassau was constantly bathed in shadows. Similar to the "banks and corporate institutions" that lined Pine Street, Nassau boasted "lofty houses" along its length which "shut out the sunlight." Thus McCabe reveals that narrow streets and tall buildings resulted in a "dark and gloomy appearance," suggesting that the darkness endowed the streets with a somber quality; as sunlight escaped the reaches of these streets, they became dreary, desolate and uninviting.

[33] McCabe, *New York by Sunlight and Gaslight*, 278.
[34] Ibid., 277.

In Manhattan, darkness congregates in specific regions of the urban landscape. Figure 1.3 reveals the intrinsic inequalities of the Manhattan street system when displaying the density of streets that are equal to or less than 60 feet wide; this map reveals the parts of the city where the concentration of narrow streets was particularly high in 1850. Figure 1.3 makes plain the high density of narrow streets in the Lower East Side. Since its conception, the Manhattan grid had been hailed as the manifestation of democratization within the urban landscape; by homogenizing the street network, the Commissioners' Plan of 1811 appeared to embody the nation's egalitarian values, as the plan produced an anti-hierarchical street system and promoted uniform patterns of land division and street settlement.[36] However, Figure 1.3 reveals that while the grid itself was perhaps egalitarian, the Manhattan urban landscape as a whole possessed great inequalities when considering access

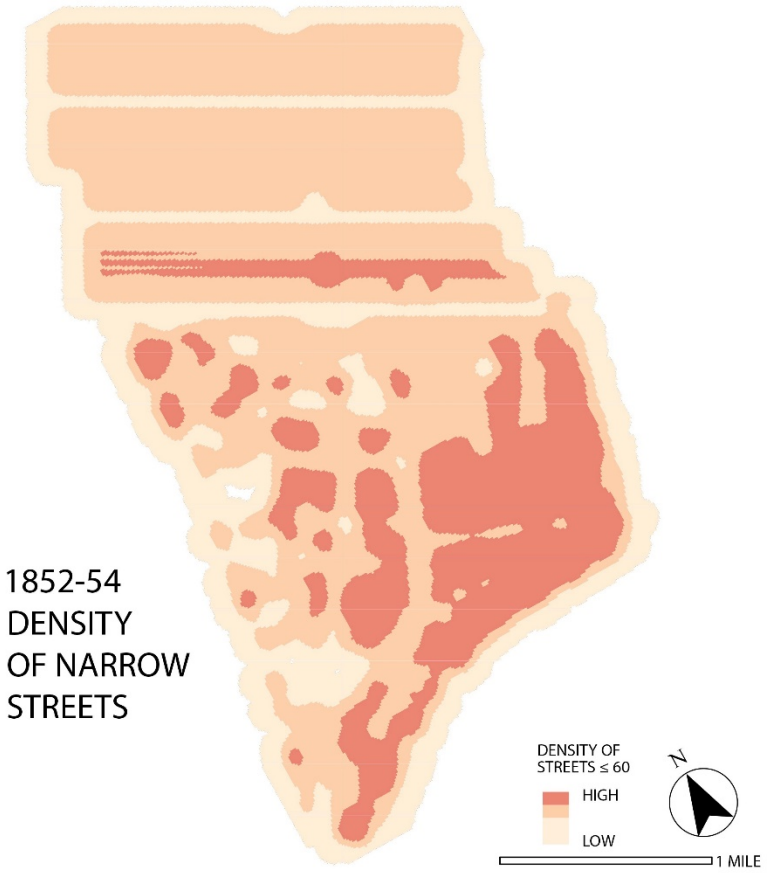

FIGURE 1.3[35]

[35] Figure 1.3 displays the kernel density of narrow streets in Manhattan. Kernel density is a density analysis function in GIS which calculates the magnitude-per-unit area of a feature throughout a defined geographic area. The kernel function in kernel density analysis creates a smoothed density raster for each input feature. Figure 1.3 was created using Baics and Meisterlin's street width shapefile as the input feature for kernel density analysis. This shapefile was manipulated so that only street segments that measure less than or equal to 60 feet were included. Baics and Meisterlin, Manhattan Street Width Shapefile.

[36] Barr, *Building the Skyline*, 44.

to light; narrow streets and the accompanying darkness congregated in the Lower East Side, while a regular pattern of wide, broad streets projected light from the northern reaches of the city.

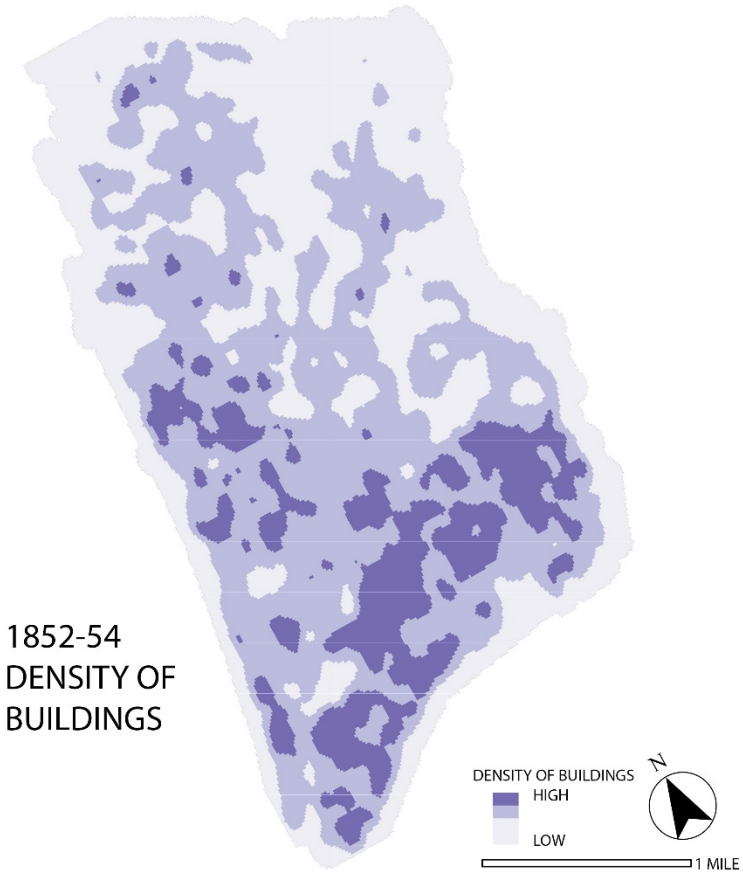

FIGURE 1.4[37]

In addition to having the highest concentration of narrow streets in Manhattan, the Lower East Side was also one of the most densely built regions of the city. Though building heights certainly played a role in establishing shadows in the streets of Manhattan, at the mid-century most buildings did not exceed six stories high.[38] However, the density of the built environment varied widely throughout the urban landscape; by 1850, middle and upper-class New Yorkers had largely fled to the northern fringes of the city, settling in the less densely developed and uncrowded areas around Washington Square Park, Gramercy Park, St. Mark's Place, and southern Fifth Avenue. In contrast, the low eastern wards of the city were largely working class and drew the thousands

[37] The data for this figure derives from the 1852-54 Perris Fire Insurance Atlases. These maps, georeferenced through crowdsourcing and digitized by the New York Public Library Map Division, provide building-footprint level information on land use in the city south of 42nd Street. Kernel density of the building footprints was calculated using this shapefile to produce Figure 1.4. New York Public Library, Perris Buildings Shapefile, 2015, NYPL Map Warper, http://maps.nypl.org/warper/.

[38] Domosh, *Invented Cities*, 69.

of immigrants that poured into the city starting in the middle of the nineteenth century.[39] In these areas, population density skyrocketed, and the built environment intensified. Thus, by examining the location of narrow streets in conjunction with the density of the built environment in Manhattan, the parts of the city where shadows were most prevalent can be revealed. Figure 1.4 displays the density of buildings in Manhattan in 1852-54. This map reveals that at the mid-century, the highest concentration of buildings in Manhattan could be found on the low, eastern side of the island. As some of the oldest parts of the city, Lower Manhattan on the east side was a known commercial district, and thus the high density of buildings in this area is unsurprising. However, areas such as the Five Points and the Lower East Side were largely residential segments of the city, and predominantly housed the working poor. Consequently, the density of the built environment in these parts reflects residential crowding and the demand for cheap housing in Manhattan at the mid-century.

When examining Figure 1.3 in tandem with Figure 1.4, these two maps notably mirror one another, particularly along the east side of Manhattan. Thus, the area of the city with the highest density of narrow streets conflates with the area that contained the highest density of buildings. Consequently, Figures 1.3 and 1.4 suggest that lower eastern wards of the city were subject to a disproportionate proclivity for darkness and shadows. These findings are most significant, however, when the social geography of the city is taken into account. By the mid-nineteenth century, Manhattan contained extremes of wealth and poverty. Social inequality within the city manifested spatially, with the wealthiest New Yorker's anchoring in the sparsely populated northern reaches of the city, and the poorest groups congregating in the tenements of the Lower East Side. Consequently, the geography of light and darkness in the city correlates

[39] Barr, *Building the Skyline*, 26.

with the spatial patterns of wealth and poverty; the low eastern wards of Manhattan not only contained the highest concentration of buildings and the greatest number of narrow streets, but this area also housed the city's poorest inhabitants, revealing a correlation between poverty and darkness, and conversely affluence and light.

Darkness, Poverty, and Crowding in Manhattan's Fourth Ward

The tenement houses of New York's Lower East Side were perhaps the most notorious feature of the nineteenth century Manhattan landscape. Manhattan underwent massive population growth during the nineteenth century, fueled by a combination of economic prosperity and immigration. To accommodate the influx of residents and businesses, Manhattan expanded at an unprecedented pace which transformed the city's significantly rural landscape into a densely urbanized one.[40] European immigrants flooded the city, many fleeing the catastrophe of the Potato Famine, only to find hardship and misery awaiting them in the "land of promise." From sixty thousand people in 1800 to half a million by 1850, the dramatic increase in residents overwhelmed the city.[41] As New York's population skyrocketed, the housing market struggled to absorb the influx of newcomers seeking low-cost housing. Thus newcomers flooded into the tenements of the Lower East Side, crowding into small quarters.[42] By the mid-century, the low eastern wards of Manhattan made up the oldest, densest and poorest parts of the city, and were characterized by tenement housing, poor sanitary conditions and general overcrowding.[43]

As the city's population swelled and tenements became the dominant form of working-class housing, the sanitary conditions of the city became increasingly a topic of concern.

---

[40] Gergely Baics, and Leah Meisterlin, "Zoning Before Zoning: Land Use and Density in Mid-Nineteenth-Century New York City," *Annals of the American Association of Geographers* 106, no. 5 (2016): 1154.
[41] Blackmar, "Accountability for Public Health," 42.
[42] Barr, *Building the Skyline*, 35.
[43] Baics and Meisterlin, "Zoning Before Zoning," 1166-1167.

Between 1845 and 1854, the citywide mortality rate reached its all-time high— 40 deaths per 1,000 city residents. Moreover, the gap between death rates in middle-class and working-class neighborhoods widened dramatically.[44] Consequently, many public health reformers turned their attention to tenement housing as the locus of disease and depravity in Manhattan. In 1865, the Citizen's Association of New York conducted a systematic survey on the sanitary conditions in the city. In this report, the Fourth Sanitary Inspection District, which comprised all of Manhattan's Fourth Ward, was revealed to be amongst the most densely populated, troublesome districts in the city.[45] To accompany his report, inspector Ezra Pulling produced a detailed map of the Fourth Sanitary District, complete with statistics on building types, number of residents per building, and most significantly for this study, building heights in number of stories. This data will be used to examine the impact of the vertical city on patterns of light and shadows in Manhattan's Fourth Ward.

Despite the city's "southern exposure towards the ocean" which "insured sunlight and sea breezes," the tenements ensured that much of Manhattan's population lived in almost perpetual darkness.[46] Figures 1.5, 1.6 and 1.7 display a three-dimensional rendering of a few blocks from Manhattan's Fourth Ward. Bounded by Roosevelt, Madison, Oliver, and Cherry Streets, these blocks contain structures that are primarily tenement buildings, although a number of single-family private dwellings, commercial buildings and stables can be found throughout these streets. Within these blocks, buildings range from one to seven stories high. The most populated tenement building within these blocks, 43 Oliver Street, housed 83 people across 20 domiciles.[47]

---

[44] Blackmar, "Accountability for Public Health," 56.
[45] *Report of the Council of Hygiene and Public Health of the Citizens Association of New York upon the Sanitary Conditions of the City*, (New York: D. Appleton and Company, 1865), 43.
[46] Stephan Smith, "The City That Was," February 24, 2018, Accessed December 14, 2018, http://www.gutenberg.org/ebooks/56633?msg=welcome_stranger#IV.
[47] Lionel Pincus and Princess Firyal Map Division, The New York Public Library, "Sanitary and Social Chart of the Fourth Ward of the City of New York, to accompany a report of the 4th Sanitary Inspection District, made to the

Of the 181 tenement buildings in Figure 1.5, 1.6 and 1.7, 15 are located in rear lots, thus representing some of the worst living conditions within the city.

Natural light, in principle, is not static but rather a fluid phenomenon that constantly changes throughout the course of a day; thus, within the streets patterns of light and dark are fluid and constantly shifting, as a bright and sunlit street can suddenly become bathed in shadows as morning turns to afternoon and afternoon turns to evening. Figures 1.5, 1.6 and 1.7 display patterns of light and shadows in a section of Manhattan's Fourth Ward on September 21, 1850, at three different times of day: 9 o'clock am, 12 o'clock pm, and 3 o'clock pm. September 21st was selected, as the date falls halfway between the solstices, the times of the year when the sun reaches its highest and lowest points in the sky. Additionally, September 21st is around the autumnal equinox, meaning that the sun rises due east and sets due west.[48] The angle of the sun in the sky is a principal factor in determining shadows; the higher the sun in the sky, the less shadow a structure will cast.[49] Consequently, the shadows cast in the winter are drastically different in angle and length than the shadows cast in the summer, and some parts of the city receive different quantities of light between winter and summer.[50] Thus, the autumnal equinox was selected as the preferred date for this study, as the date serves as a medial point between the

Council of Hygiene of the Citizens' Association by E.R. Pulling, M.D. assisted by F.J. Randall" New York Public Library Digital Collections, Accessed March 6, 2019, http://digitalcollections.nypl.org/items/fc8b9560-f3a1-0130-679f-58d385a7b928.

[48] "Autumnal Equinox and Other Sky Events: What You Need to Know," National Geographic, September 20, 2017, accessed April 07, 2019, https://news.nationalgeographic.com/2016/09/autumn-equinox-explained-start-fall-spring-sun-earth-science/.

[49] Ibid.

[50] Quoctrung Bui and Jeremy White, "Mapping the Shadows of New York City: Every Building, Every Block," The New York Times, December 21, 2016, accessed April 07, 2019, https://www.nytimes.com/interactive/2016/12/21/upshot/Mapping-the-Shadows-of-New-York-City.html.

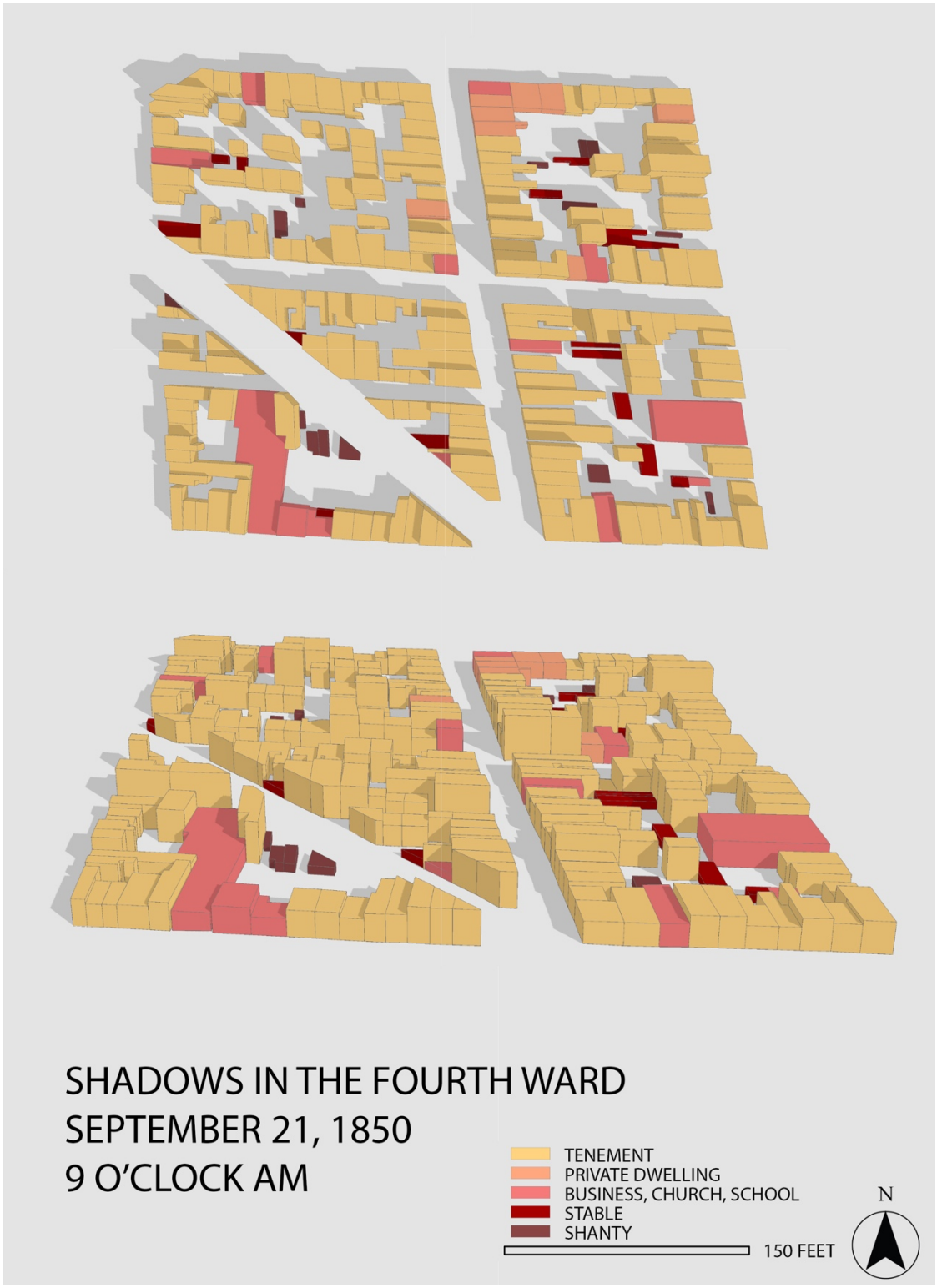
SHADOWS IN THE FOURTH WARD
SEPTEMBER 21, 1850
9 O'CLOCK AM
TENEMENT
PRIVATE DWELLING
BUSINESS, CHURCH, SCHOOL
STABLE
SHANTY
150 FEET
N

FIGURE 1.5[51]

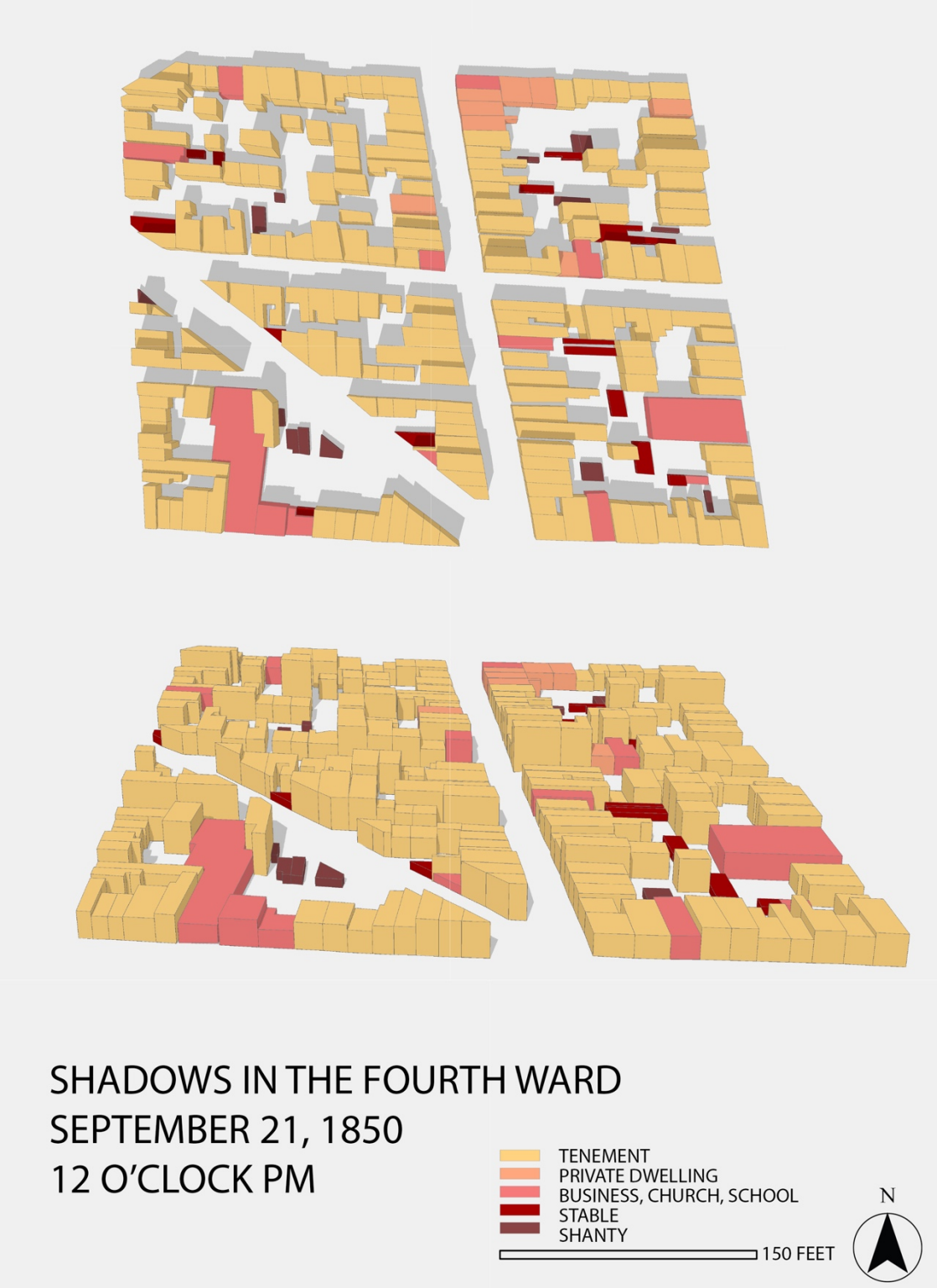
SHADOWS IN THE FOURTH WARD
SEPTEMBER 21, 1850
12 O'CLOCK PM
TENEMENT
PRIVATE DWELLING
BUSINESS, CHURCH, SCHOOL
STABLE
SHANTY
150 FEET
N

FIGURE 1.6[52]

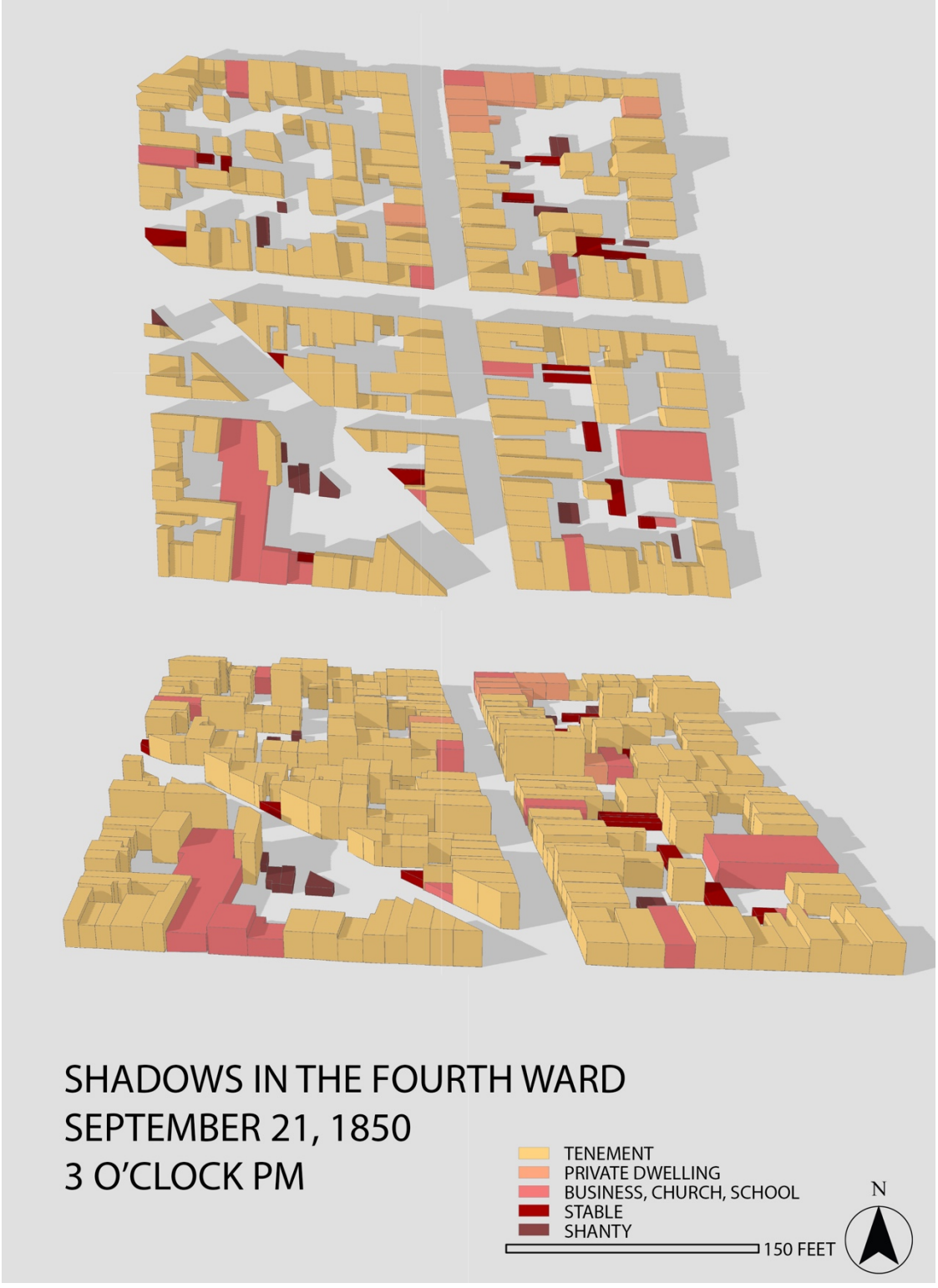
SHADOWS IN THE FOURTH WARD
SEPTEMBER 21, 1850
3 O'CLOCK PM
TENEMENT
PRIVATE DWELLING
BUSINESS, CHURCH, SCHOOL
STABLE
SHANTY
150 FEET
N

FIGURE 1.7[53]

summer and winter solstices, the two extremes when it comes to light and shadows

There are innumerable factors that play into the creation of shadows within the built environment, and thus exact patterns of light and shadows in any given area is hard to determine. However, Figures 1.5, 1.6 and 1.7 reveal that some parts of the Fourth Ward were bright and sunlit, while other parts were in near constant shadow. Figures 1.5, 1.6 and 1.7 display the natural movement of shadows throughout the course of a day; in these figures, shadows constantly shift from west to east as the sun traveled across the sky from east to west. Consequently, at 9 o'clock am, the eastern faces of buildings are cast in shadows. At 12 o'clock pm, shadows are oriented due north, and consequently the northern face of buildings are in shadows. By 3 o'clock pm, shadows have shifted to the west, and thus the western face of the buildings are shaded. Additionally, based on the angle of the sun and Manhattan's position in the northern hemisphere, shadows in the city are cast to the north; in other words, the north side of all buildings remain cast in shadows, regardless of the time of day. In contrast, the south facing side of buildings tend to remain largely free of shadows.

Additionally, Figures 1.5, 1.6 and 1.7 display the benefits of wide streets; Chambers Street, the wide street running through these blocks, possesses considerably fewer shadows than

---

[51] Figures 1.5, 1.6 and 1.7 were created using the *Sanitary and Social Chart of the Fourth Ward of the City of New York.* This map was created in 1864 by city inspector E.R. Pulling, to accompany his report of the Fourth Sanitary Inspection District to the Council of Hygiene of the Citizens' Association. This map was georeferenced through crowdsourcing at the NYPL. This map notably contains information on building heights for most structures, making a three-dimensional rendering of the map possible using GIS. Lionel Pincus and Princess Firyal Map Division, The New York Public Library, "Sanitary and Social Chart of the Fourth Ward of the City of New York, to accompany a report of the 4th Sanitary Inspection District, made to the Council of Hygiene of the Citizens' Association by E.R. Pulling, M.D. assisted by F.J. Randall." New York Public Library Digital Collections, Accessed March 6, 2019, http://digitalcollections.nypl.org/items/fc8b9560-f3a1-0130-679f-58d385a7b928.
Shadows for Figures 1.6, 1.7 and 1.8 were created using the illumination function in ArcGIS Pro. The altitude and azimuth of the sun on September 21st, 1850 at 9 am, 12 pm and 3 pm was calculated using the "Sun or Moon Altitude/Azimuth Table," created by the United States Naval Observatory Astronomical Applications Department. Sun or Moon Altitude/Azimuth Table, Accessed April 14, 2019, https://aa.usno.navy.mil/data/docs/AltAz.php.
[52] See Figure 1.5.
[53] See Figure 1.5.

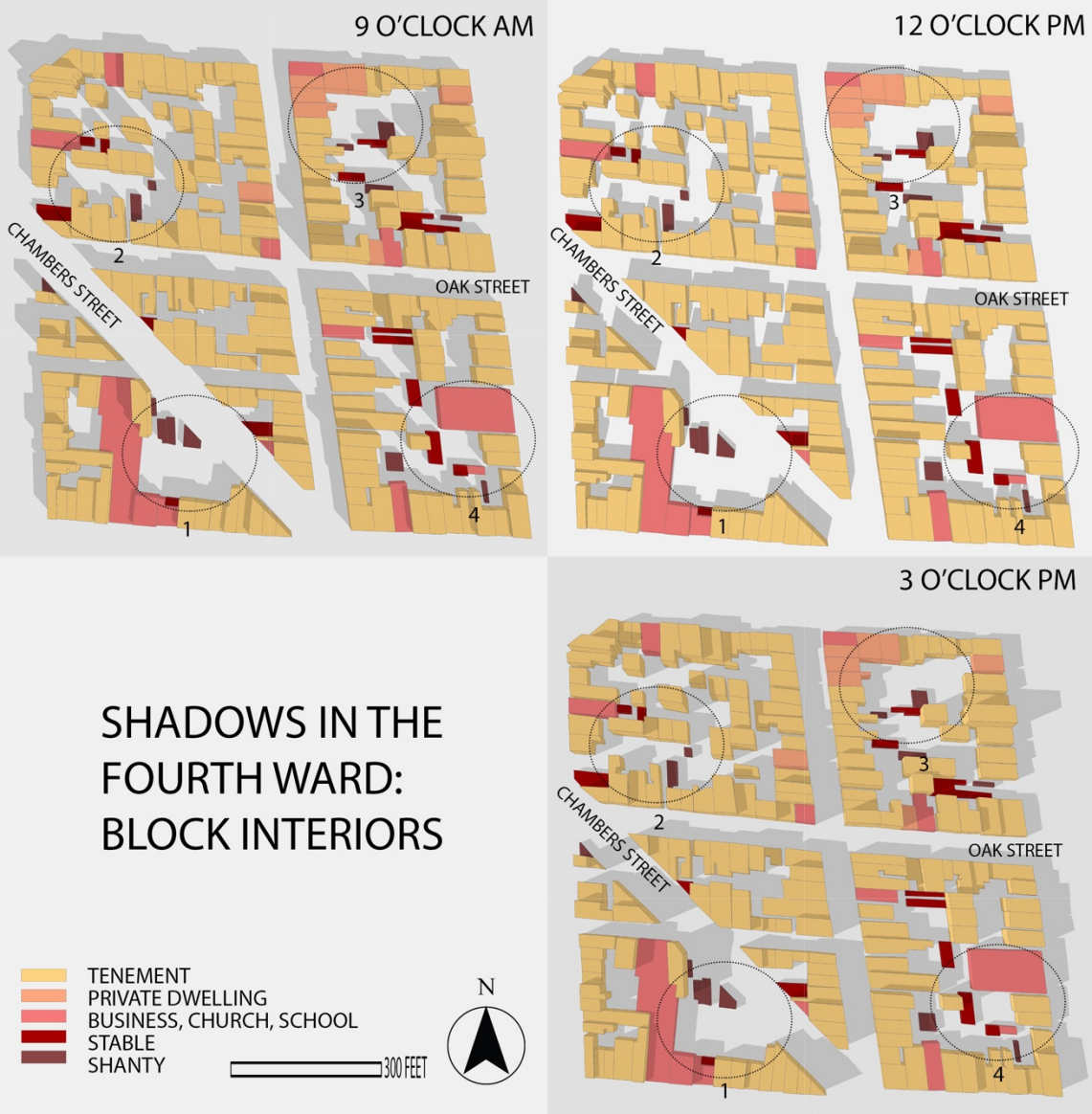

FIGURE 1.8[54]

Oak Street, the narrow street to the north. Throughout Figures 1.5, 1.6 and 1.7, Oak Street is in near constant shadows. And while Chambers Street is also shaded, particularly in the afternoon, the wide street and open lot on the south side of the block allowed for more light in this street. Additionally, Chambers Street runs through these blocks at an angle. Consequently, as the buildings along the street cast shadows to the north, the orientation of the street offsets the

[54] See Figure 1.5.

shadows, making for an overall less shaded street.

The interiors of blocks in Manhattan's Fourth Ward, which include courtyards and alleyways, were noted places of darkness and shadows. Inspector Ezra Pulling described an interior courtyard in his report: "Through a narrow alley, we enter a small courtyard which the lofty buildings in front and rear keep in almost perpetual shade. Entering it from the street on a sunny day the atmosphere seems like that of a well."[55] Despite Pulling's description that the courtyard was in "almost perpetual shade," Figures 1.5, 1.6 and 1.7 reveal that not all interior block spaces were constantly shaded. In fact, there were a number of courtyards that were void of shadows throughout the course of the day. Figure 1.8 highlights four interior block spaces that remained relatively free of shadows throughout Figures 1.5, 1.6 and 1.7. The reason why these spaces remained unshaded is a multitude. However, it appears that in all four areas, either the surrounding buildings were low, or there was a significant north-south gap between buildings which created space for sunlight.

Though Figure 1.8 reveals the nuances to patterns of light and shadows in Manhattan's Fourth Ward, Figures 1.5, 1.6 and 1.7 reveal that the contours of the built environment made darkness in the Fourth Ward unavoidable, and in some cases a near-permanent condition; though there were spots of light amongst the shadows, the density of the built environment and the residential crowding in this area meant that many residents of the Fourth Ward lived in almost perpetual darkness. As darkness pervaded the Fourth Ward, the inequalities of the Manhattan urban landscape become abundantly clear. As seen in Figures 1.3 and 1.4, the low eastern wards of the city were the most densely built and had the highest concentration of narrow streets. As these conditions combined, the result was streets full of shadows, as seen in Figure 1.5, 1.6 and

---

[55] *Report of the Council of Hygiene and Public Health of the Citizens Association of New York upon the Sanitary Conditions of the City*, 48.

1.7. Consequently, the conditions of the built environment created a spatial pattern of darkness, such that darkness became correlated with the most poverty-ridden, destitute and often foreign-born segment of the population.

The conflation of class and darkness in Manhattan is of particular significance when considering the implications and connotations darkness holds. By the mid-nineteenth century, tenements were known to be, "dark, unventilated, uninhabitable structures" that threatened the health of Manhattan's poor working class.[56] As density and overcrowding consumed neighborhoods such as Five Points and the Lower East Side, public health deteriorated rapidly. Poverty meant that amenities such as running water were limited, as these services meant higher rents which were generally beyond the means of the working poor.[57] However, reformers were particularly worried about the lack of fresh air and sunlight that the tenements afforded. At a time when the miasmatic theory of disease prevailed, "the poisonous air, the darkness, and the damp" nature of tenement apartments were hailed as the ultimate sanitary evil.[58] By the mid-century, the crowded, dark and unventilated living conditions within the tenements were defined as the locus of the public health crisis in the city.[59] However, darkness was not only considered a threat to physical health but to moral health as well. Consequently, discourse surrounding darkness in the tenements is infiltrated with rhetoric of morality. For instance, the 1866 Citizens' Association report describes the impairment of both physical and moral health within the tenements: "the physical and moral degradation, the blight of these miserable abodes, where decay reigns supreme over habitation and inhabitant alike, may be plainly traced to much of the

[56] Smith, "The City That Was," 1.
[57] Barr, *Building the Skyline*, 35.
[58] *Report of the Council of Hygiene and Public Health of the Citizens Association of New York upon the Sanitary Conditions of the City*, 49.
[59] Baics and Meisterlin, "Zoning Before Zoning," 1167.

immorality and crime which prevail among us."[60]As described in the Citizens' Association report, darkness was not only seen as a concern for physical health but also the root of the "immorality and crime" that prevailed in the low eastern wards of Manhattan. Thus as spatial patterns of light and darkness consolidated within the built environment, sites of darkness became firmly attached to notions of vice, while light came to embody virtue and morality. And as darkness became associated with immorality and vice, these qualities became attached to the inhabitants of the darkest spaces within the urban landscape—the poor, often foreign-born groups that populated the low eastern wards of the city.

Light, Air, and Space: The Unequal Distribution of Parks in the City

In response to crowding, destitution and deteriorating health conditions in the city, the creation of parks in Manhattan became one of the perceived solutions amongst public health advocates, real estate developers, and city officials. As living conditions became more crowded and the built environment denser, parks, as blocks of undeveloped land, promised access to light and air for all who resided in the vicinity. Prior to 1825, only a handful of parks could be found in Manhattan. Some of these spaces, such as Washington Square Park, were former burial grounds and consequently had yet to be developed. But with land values on the rise during the early nineteenth century, almost every square inch of downtown real estate was dedicated to development.[61] The Commissioners of the 1811 Plan articulated the belief of many when they stated that in terms of access to light and air, "those large arms of the sea which embrace

[60] *Report of the Council of Hygiene and Public Health of the Citizens Association of New York upon the Sanitary Conditions of the City*, 64.
[61] Catherine McNeur, *Taming Manhattan: Environmental Battles in the Antebellum City* (Cambridge, MA: Harvard University Press, 2014), 46.

Manhattan Island, render its situation in regard to health and pleasure…peculiarly felicitous."[62] Consequently, adequate park space within the city was initially not prioritized. The Commissioners believed public space was intended more for the circulation of air than for beauty or recreation, and given Manhattan's placement between two large rivers, New York was privileged with prestigious access to light and air.[63] However, by 1830, New Yorkers' understanding of the role of parks began to change. Advocates for green space believed that parks could make for a healthier city, create elite spaces and drive up real estate prices.[65] However, new parks did not serve all New Yorkers equally. Rather, as Figure 1.9 shows, parks

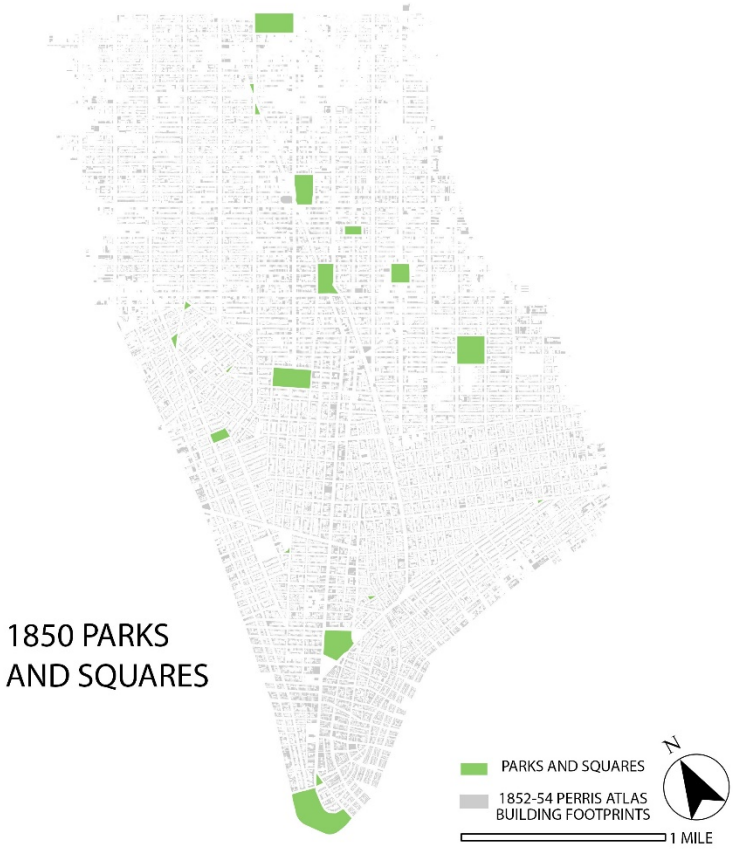

FIGURE 1.9[64]

[62] Gouv. Morris, Simeon DeWitt, and John Rutherfurd, *Remarks of the Commissioners, March 22, 1811* (Albany: New York State, 1811), 1, as quoted in Hilary Ballon, *The Greatest Grid: The Master Plan of Manhattan 1811-2011* (New York, Museum of the City of New York, 2012), 40.
[63] McNeur, *Taming Manhattan,* 51.
[64] Figure 1.9 was created using Jason Barr's shapefile of Manhattan parks in 1900. Barr's shapefile was adapted to represent parks in Manhattan in 1850. Information on early parks in Manhattan was found through the NYC Parks website, which provided a list of parks that were created prior to 1850. The georeferenced plates from the 1852-54 Perris Atlas were used to trace parks that did not appear in Barr's shapefile. Jason Barr, Manhattan Parks 1900. Shapefile; "The Earliest New York City Parks," Earliest Parks: NYC Parks, Accessed April 08, 2019, https://www.nycgovparks.org/about/history/earliest-parks.
[65] McNeur, *Taming Manhattan,* 51.

existed almost exclusively in wealthy neighborhoods and in new uptown housing developments designed to attract wealthy purchasers.[66] The way in which the city financed the creation of parks played an important role in determining where parks were created. While aldermen had the legal right to initiate their own projects, in practice the Common Council waited for the petitions of private individuals, preferably landowners in the area affected by the improvement, before they took action in the creation of parks.[67] The Common Council, with support from a number of citizens, would determine what properties would benefit from the addition of a park. They would then determine how much money to assess landowners, based on the estimated price of improvement and the cost of whatever property might be purchased. Public improvements were therefore funded locally, by the landowners who were most likely to see a rise in property value and desirability of their holdings.[68]

Parks are undeniably bright spots within the Manhattan urban landscape; as areas that are largely undeveloped, parks offer air, opens space and sunlight, and allow for the surrounding buildings to enjoy access to large quantities of light and air. However, the funding of parks through the method of special assessment made for the unequal distribution of green space throughout the city.[69] Private citizens had the right to initiate public works projects, which inevitably meant that wealthy areas were favored with more parks. Neighborhoods where speculators hoped to increase real estate prices often found the government eager to develop parks. However, there was little incentive for landlords in poor neighborhoods to push for expensive improvements like parks and squares, especially if they had little chance in recouping the cost of the assessments from rents. Consequently, the location of green space in the urban

[66] McNeur, *Taming Manhattan,* 51.
[67] Ibid., 79.
[68] Ibid.
[69] Ibid.*,* 81.

landscape became an expression of social and political inequality.[70] As a result, as seen in Figure 1.9, the majority of parks and squares in Manhattan in 1850 were located north of Houston street, providing open space and light to the wealthy, while the dense and poor regions within the city remained in comparative darkness.

Light, Darkness and Manhattan's Moral Landscape

Manhattan's built environment rendered patterns of light and darkness palpable within the city. And as darkness congregated in the densest and poorest parts of the city, the implications of darkness became extrapolated so that darkness and vice became interchangeable. However, the relationship between darkness and morality, light and virtue, is complex and multifaceted. At the mid-century, the Lower East Side was certainly not without its share of urban vice. James McCabe describes the perilous job of a policeman in these parts of the city, revealing the propensity for crime: "He must patrol streets that are known to be dangerous, narrow alleys, without a light along thief course, where a well delivered blow from a slung shot, a skillfully aimed thrust from a knife, or a bullet from a revolver would make an end of him before he could summon help."[71] Yet despite the Lower East Side's reputation for darkness and vice, the relationship between light and immorality in Manhattan, and particularly the notion of light as a marker of virtue, is in need of further exploration.

Broadway is an intriguing case when exploring the relationship between light and morality. In the mid-nineteenth century, Broadway, in contrast to its dark and narrow adjacent streets, carried the reputation for being a bright, sunny and elegant thoroughfare. The reputation of Broadway as a fashionable and sunny corridor is noted by James McCabe when he writes of

[70] McNeur, *Taming Manhattan,* 81.
[71] McCabe, *New York by Sunlight and Gaslight*, 381.

Broadway as emblematic of the city's prospects, and as the apex of what Manhattan has to offer: "Over all pours the bright radiance of the sunlight, which seems to shine more beautifully here than elsewhere, and on all sides are evidences of the wealth and prosperity of the great city."[72] Saturated in the "bright radiance of the sunlight" Broadway was the pinnacle of prosperity in Manhattan's built environment. As the primary axis of the city, Broadway had long been associated with the fashionable and elite.[73] Promenading was a distinctive use of the street that characterized upper-class participation in public space. Journalist and author George Foster describes the intricate rules that governed the ritual of the promenade in his book *New York in Slices:* "To see Broadway in its glory…you must wait till six o'clock, P.M. Then, if you take your stand in the door of a shop on the 'fashionable side,' you will see New York's possible in the way of beautiful women, scrupulously-dressed dandies and pretty children."[74] Foster's reference to the "fashionable side" of Broadway asserts the social geography of the built environment. Within this geography, Broadway was associated with affluence, elegance and sophistication, consequently endowing the thoroughfare with a positive reputation.

However, promenade culture along Broadway did not last. Broadway's aristocratic status was complicated by the spatial transformation of the city during the 1830s and 1840s. As the city expanded dramatically, due to the sizable expansion of commerce following the completion of the Erie Canal, the city broke out of its compact core and expanded north into the less developed upper Manhattan.[75] Due to its centrality, Broadway evolved from a fashionable commercial corridor to a crucial and often congested thoroughfare for goods and passengers in and out of the

---

[72] McCabe, *New York by Sunlight and Gaslight*, 137.
[73] Nick Yablon, ""A Curious Epitome of the Life of the City": New York, Broadway, and the Evolution of the Longitudinal View," *Journal of Urban History* 44, no. 5 (2016): 953-84. Accessed October 10, 2018.
[74] George G Foster, *New York in Slices: By an Experienced Carver: Being the Original Slices Published in the N. Y. Tribune* (New York: W. H. Graham, 1849), 9.
[75] Yablon, "A Curious Epitome of the Life of the City," 957.

city.[76] Despite the more utilitarian use of the thoroughfare, Charles Dickens nonetheless praised Broadway as an elegant avenue in his 1842 travelogue, *American Notes:* "Was there ever such a sunny street as this Broadway! The pavement stones are polished with the tread of feet until they shine again; the red bricks of the houses might be yet in the dry, hot kilns; and the roofs of those omnibuses look as though, if water were poured on them, they would hiss and smoke, and smell like half-quenched fires."[77] Dickens notes Broadway's role as a transportation thoroughfare and he further alludes to the streets heavy use as "the pavement stones are polished with the tread of feet until they shine." However, most important is Dickens' "sunny" description of Broadway, which paints the thoroughfare in a positive light; despite being a congested commercial corridor, the prominent

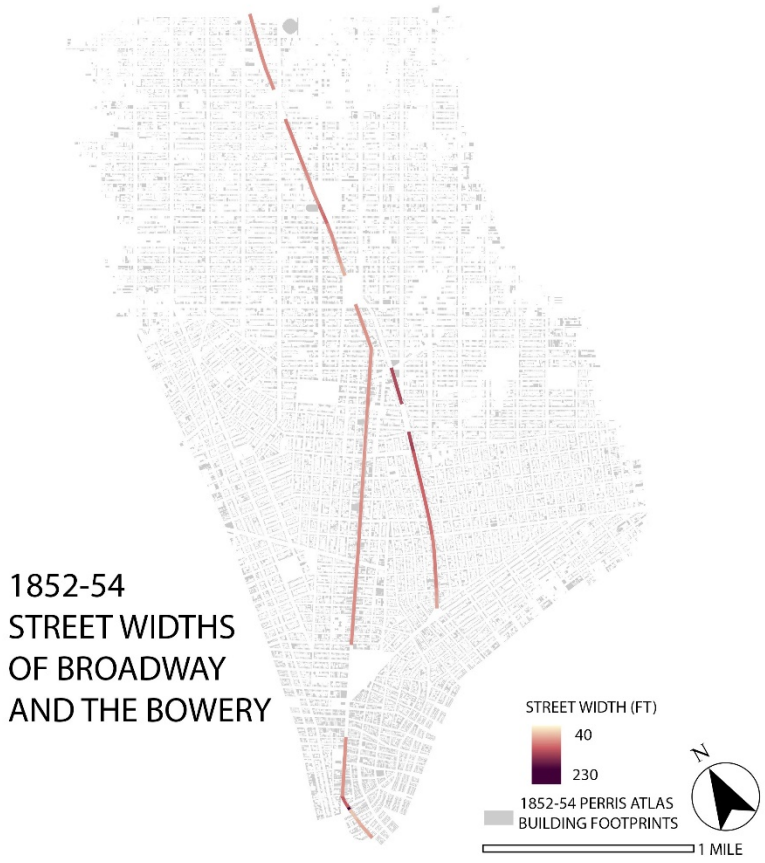

FIGURE 1.10[78]

[76] Yablon, "A Curious Epitome of the Life of the City," 957.
[77] Charles Dickens, *American Notes for General Circulation* (New York: D Appleton and Company, 1868), 36.
[78] Figure 1.10 was created using Baics and Meisterlin's street width shapefile. Using this shapefile, Broadway and Bowery were isolated and manipulated in GIS so that the color of the line represents the width of the street. Baics and Meisterlin, Manhattan Street Width Shapefile.

street retains its reputation as a laudable and respectable space within the city. In other words, Broadway remains full of sunlight.

Moreover, despite Broadway's reputation for sunlight and prosperity, the thoroughfare was not a notably prominent street in terms of width. In fact, Broadway was considerably narrower than the Bowery, its plebeian counterpart, suggesting that Broadway's notoriety had little to do with its actual capacity for light in the built environment. Figure 1.10 displays Broadway and the Bowery in tandem, with each street segment categorized by width. As revealed by Figure 1.10, Broadway's narrowest segment was 40 feet wide, while the Bowery's was 65 feet wide. And though Broadway's maximum width was 230 feet in comparison to the Bowery's 150 feet, Broadway's mean width was 82 feet while the Bowery's was 109 feet. Thus Broadway's reputation for "bright radiance" and "sunlight" had little to do with its size and scale, and far more to do with its fashionable reputation. Consequently, the case of Broadway reveals that the relationship between light and virtue was subjective; as Broadway changed from a sophisticated promenade to a congested commercial corridor, the thoroughfare maintained its favorable reputation as a sunlit and flourishing axis within the city.

While Broadway maintained a positive reputation, despite undergoing significant transformation from a fashionable corridor to a utilitarian one, the Bowery never achieved status beyond its reputation as a hub for Manhattan's working class; despite the Bowery's considerable width and thus access to light and air, these factors proved insufficient to overthrow the Bowery's seedy reputation. Consequently, the case of the Bowery, like Broadway, reveals that at times the realities of the built environment have little bearing on the social geography of the city. Running parallel to Broadway, the Bowery was the heart of the butchers' district and was lined

with workshops and manufacturers, saloons and dance halls.[79] Charles Dickens describes the Bowery in comparison to Broadway in his *American Notes*: "the stores are poorer here; the passengers less gay. Clothes ready-made, and meat ready-cooked, are to be bought in these parts; and the lively whirl of carriages is exchanged for the deep rumble of carts and wagons."[80] Unlike in his description of Broadway, Dickens notably does not describe Bowery in terms of sunlight. Rather, Dickens appeals to auditory senses when he describes the "deep rumble of carts and wagons," revealing the street's working-class status.

Amongst authors and journalists during the decades before the Civil War, the Bowery was seen as the embodiment of working-class culture and a well-known site of illicit activity; the thoroughfare housed dance halls, oyster saloons and the infamous Bowery Theater, which filled on Saturday nights with working women and laborers, looking to fraternize.[81] As James McCabe describes, the Bowery was associated with vice: "concert saloons are among the worst features of the social evil. They flourish along certain parts of...the Bowery, and are simply so many places where the devil's work is done."[82] Additionally, the Bowery was the birthplace of the 'Bowery Boys,' a metropolitan type that was a "revivified version of the working-class dandy and the Irish "Jackeen." As the embodiment of working-class youth culture, Bowery Boys associated with working-class 'Bowery Gals,' and solidified the Bowery's reputation as the site of mingling and amusement.[83]

In examining the relationship between light and morality, Broadway and the Bowery serve as intriguing examples. Broadway, like the Bowery, was not without its share of perverse

[79] Baldwin, *In the Watches of the Night*, *89.*
[80] Dickens, *American Notes*, 37.
[81] Baldwin, *In the Watches of the Night*, *89.*
[82] McCabe, *New York by Sunlight and Gaslight,* 489.
[83] Stansell, *City of Women,* 90-92.

activity; the thoroughfare housed a multitude of theaters, brothels, saloons, and streetwalkers. However, Broadway maintained its sunny reputation, despite its marginal width and utilitarian uses. In contrast, despite the Bowery's breadth and capacity within the built environment, the street was not known as a space of sunlight; instead, the thoroughfare's reputation as a working-class district prevailed, and the Bowery was solely described in terms of its nighttime attractions, plebeian population and prowess for production and labor.

As seen in the case of Broadway and the Bowery, by the mid-nineteenth century perceptions of light consolidated so that certain spaces within Manhattan held associations for light or darkness, creating the moral geography of the city. And within the moral landscape of Manhattan, the Five Points could not shake its reputation for darkness, regardless of the time of day. As Matthew Hale Smith describes a walk around Five Points in his book *Sunshine and Shadow in New York*, he notes the presence of children in the streets: "with the early light of morning they are driven from their vile homes to pick rags and cinders, collect bones, and steal…they are familiar with every form of wickedness and crime."[84] As Smith reveals, in the Five Points "early light of morning" does not eradicate vice. Rather the presence of sunlight aids immoral activities by facilitating movement within the street. Thus Smith reveals that the issue of light within the tenement districts is complex; despite the presence of light in the streets, Five Points cannot shake its reputation for "wickedness and crime," and no amount of sunlight can alleviate the darkness.

While the Five Points held a reputation for immorality, by the mid-nineteenth century darkness and vice were most frequently discussed in relation to the tenements, which could be found in abundance in the Five Points and the Lower East Side. In particular, within the

[84] Smith, *Sunshine and Shadow in New York*, 208.

Manhattan tenements, cellar apartments were notoriously "dark, damp and dreary abodes...seldom penetrated by a ray of sunlight, or enlivened by a breath of fresh air."[85] A rhetoric of darkness prevails throughout literary accounts of cellars in the city, both in terms of the physical space and also in terms of the people who frequented them. Solon Robinson's 1854 bestseller *Hot Corn* provides a fictional account of life in Manhattan's impoverished Five Points neighborhood, and contributes a vivid description of the horrors of cellar living: "The first *home* we entered was a cellar room twelve by twenty feet, quite below the surface...at every step the water oozed up through the boards we trod upon...On one side two windows with places for three panes of glass to each, gave all the light and ventilation afforded to the four families who occupied the room."[86] Darkness pervades Robinson's description of the cellar apartment. Cramped and crowded, Robinson describes the room as dark and poorly ventilated, as "two windows" provide "all the light and ventilation afforded." Additionally, the crowding within this cellar apartment reveals the breakdown of pure domestic living; within the single cellar, Robinson reveals the mixing of four nuclear families, as most of the cellar's inhabitants are not related. John Griscom, a physician and city inspector, warned against the dangers of crowing in his 1842 report on the tenements of New York City. Griscom's report warned that residential crowing compromised domestic norms, and multiple families living in close proximity not only endangered physical health but also produced "an indifference to the common decencies of life, and a disregard of the sacred obligations of moral propriety."[87] Consequently, in the cellar apartment described by Robinson, the moral geography of the city coincides with the geography of light, as the cellar serves as a site of physical darkness and immorality.

---

[85] Smith, "The City That Was," 72.
[86] Solon Robinson, *Hot Corn: Life Scenes in New York Illustrated: Including the Story of Little Katy, Madalina, the Rag-pickers Daughter, Wild Maggie, &c (*New York: DeWitt and Davenport, 1854), 311.
[87] Blackmar, "Accountability for Public Health," 54.

While darkness concentrated in the tenements of the Lower East Side, not all living spaces within the city were associated with such immorality and decay. James McCabe describes a "Fifth Avenue mansion" in his book, which stands in stark contrast to the tenements of the Lower East Side. However, patterns of light and dark are complex within this space, proving that light and affluence are not absolute. In this mansion, "windows are draped with curtains the cost of which would provide an average family with a home in other cities, and which shut out the bright daylight and give to the apartments a soft, luxurious glow; costly chandeliers shed a flood of warm light through the elegantly furnished rooms."[88] McCabe suggests in his depiction of this home that for the affluent, light is a choice. The "curtains" which "shut out the bright daylight" suggest that sunlight could fill this space if allowed, reinforcing the relationship between sunlight and affluence. However, within this space "costly chandeliers shed a flood of warm light," revealing that light, for the wealthiest of New Yorkers, is something to be curated; in this space, light is a luxury. Consequently, while darkness lingers in the slums of Manhattan's built environment, light is planned and controlled in other spaces, sculpted to customized perfection.

Conclusion

In the Manhattan urban landscape, social inequalities manifested spatially, resulting in the separation between the rich and the poor and creating sharp contrasts, as seen in the division between the cellar apartment and the Fifth Avenue mansion. And within the divided city, unequal access to light was a central feature of the mid-century metropolis. Three major factors of the built environment—street width, building height and density of buildings—largely determined access to light in the city. And as building density and narrow streets conflated in the urban landscape, light in the city was revealed to be a valuable commodity which the demands of

[88] McCabe, *New York by Sunlight and Gaslight*, 137.

the mid-century metropolis put out of reach of the masses. While conditions of the built environment made darkness unavoidable in areas like the Five Points and the Lower East Side, the moral geography of the city locked these areas into a schema of darkness and decay. However, the moral landscape and the geography of light in Manhattan did not completely align, as Broadway upheld its status as a sunny street despite its marginal width and utilitarian uses. Consequently, perceptions of light and darkness did not always fit the reality, and the moral geography of the city was widely based on assumptions and reputations as opposed to realities. Yet patterns of light in the city were fluid and ever-changing. And as the sun went down and the night engulfed the streets in a veil of darkness, gaslights illuminated a new urban order of light and dark in the dynamic mid-century metropolis.

CHAPTER 2

The Gaslight City: Light, Security and Morality in Nocturnal New York

For the first quarter of the nineteenth century, nightfall plunged the streets of New York City into nearly complete darkness. Though oil lamps were scattered throughout Manhattan's built environment casting compact spheres of light within the city streets, these lamps were few and weak.[89] As one New Yorker described, early street lamps merely "exhibit[ed] the somnified gloom of a sepulchral taper."[90] The expense of lighting materials limited the use of candle and oil lamps in the domestic sphere; in preindustrial America, poor households saved money by burning as little light as possible, while wealthier homes splurged to burn beeswax candles or whale-oil lamps. Due to their high cost, most early street lamps were sparsely lit and often were extinguished after midnight or on moonlit nights.[91] Consequently, the streets became "dark as grave-vaults," ensnaring the nocturnal city in a veil of darkness.[92]

Gas light technology revolutionized Manhattan's system of public lighting and established a new urban geography of light and dark within the metropolis.[93] The prospect of lighting New York City streets with gas first entered the conversations of the Common Council in 1823, when the pioneering New York Gas Light Co. was granted a charter that stipulated exclusive privileges to install gas mains in Lower Manhattan south of Grand Street through the year 1853.[94] In 1830, the Common Council granted privileges to the competing Manhattan Gas Light Co. to lay gas pipes in the city north of Grand Street.[95] Gas lights were first introduced into the Manhattan streetscape in 1826, when 120 lamps were installed on Broadway from Battery to

---

[89] Baldwin, *In the Watches of the Night*, 10.
[90] Marshall B Davidson, *Early American Lighting* (New York: Metropolitan Museum of Art), 32.
[91] Baldwin, *In the Watches of the Night*, 10.
[92] George Lippard, *New York: Its Upper and Lower Million* (Cincinnati: E. Mendenhall, 1854), 137.
[93] Ibid., 16.
[94] *Minutes of the Common Council of the City of New York,* vol. 13 (NY: City of New York, 1823-1824), 60.
[95] *Minutes of the Common Council of the City of New York,* vol. 19 (NY: City of New York, 1830-1831), 2.

Grand Street.[96] Over the course of the following decades, gas lights were gradually approved by city authorities and installed by the contracted companies in high traffic commercial corridors and other select streets within the city. By the mid-century, gas mains were laid across 285 streets, illuminating over 5,000 gas lamps within the city (Figure 2.1).[97]

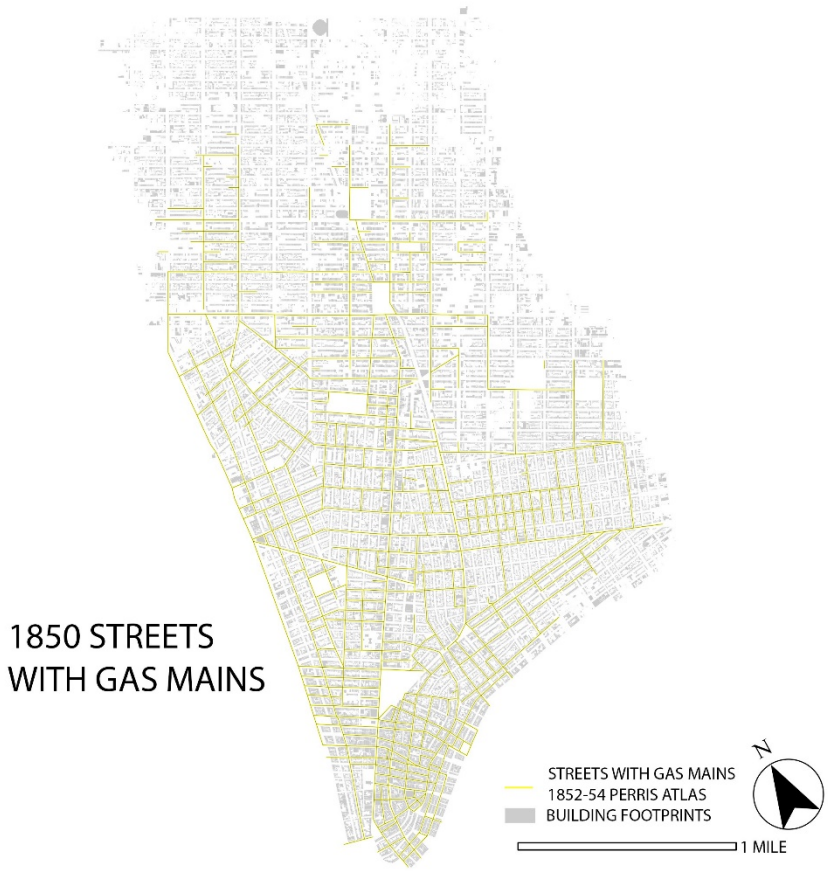

FIGURE 2.1[98]

The origin of gas lights can be traced back to early nineteenth century English factories. Gas lights in the industrial setting were invaluable in their ability to prolong the number of

[96] *Minutes of the Common Council of the City of New York,* vol. 15 (NY: City of New York, 1825-1826), 664-666.
[97] *Documents of the Board of Aldermen*, vol. 16 (NY: City of New York, 1849-1850), 12.
[98] The location of gas lights in Manhattan has been largely unknown. Consequently, this study relied on a number of primary source documents to gather information on the location and placement of gas lights in the city. Ultimately, a comprehensive list of streets where gas mains had been installed by the Manhattan Gas Light Co. and the New York Gas Light Co. was found in the Documents of the Board of Alderman and the Proceedings of the Board of Assistant Alderman. Using data compiled from these sources, a dataset was assembled for this study containing a comprehensive list of streets where gas lights were installed by the year 1850 and the intersections delineating the beginning and end of where gas lights were installed on certain streets. GIS was then used to map these streets where gas mains had been installed. Charles Roome, *Document No. 7*, Vol. 32, Part 1 (New York: Board of Assistant Aldermen, May-Sept. 1848), 95-102; Herman W Childs, *Document No. 52*, Vol. 17, Part 2 (New York: Board of Aldermen, 1850), 792-96; Herman W Childs, *Document No. 6,* Vol. 18, Part 1 (New York: Board of Aldermen, 1851) 183-194.

productive hours in the workday.[99] However, gas lights were easily transferable outside the industrial sphere. In 1816, London became the first city to introduce gas lamps as a form of public street lighting.[100] Baltimore followed shortly thereafter, becoming the first American city to adopt gas light technology in 1817 when a number of streets in the city center were lit with gas.[101] Early gas lamps introduced into the city were a novelty. The most notable feature of gas lights was their dazzling brightness. Gas lights were said to be between six to sixteen times brighter than a candle flame and three times brighter than the best oil lamp.[102] Gas' higher temperature of combustion allowed carbon particles that make up the flame to become white hot, compared to a reddish orange glow in the flames of the oil lamp and candle, making gas lights distinctly brighter than any other source of light known during the nineteenth century.[103] Consequently, gas lights were described as "dazzlingly white," "bright as day," and like an "artificial sun," in comparison to the "weak reddish glow" of traditional candle and oil lights.[104]

In addition to their brightness, gas lamps were notably uniform in the light they produced. While the light produced by candles, was "never the same for two moments in succession," gas lights burned evenly, providing a steady and uninterrupted source of illumination.[105] Writing about the newly gas-lit streets in comparison to oil lit ones, one Baltimore newspaper recounted:

> The light is certainly more beautiful than any which has yet been produced, or of which we have any knowledge...There is no comparison between the light of the one and the other—the first brilliant and beautiful, illuminating for a considerable distance, while the latter affords but a faint glimmer, only rendering darkness more visible.[106]

---

[99] Wolfgang Schivelbusch, *Disenchanted Night* (CA: University of California Press, 1995), 18.
[100] Joachim Schlör, *Nights in the Big City: Paris, Berlin, London 1840-1930* (London: Reaktion Books, 2016), 32.
[101] Baldwin, *In the Watches of the Night*, 16.
[102] Ibid., 16.
[103] Schivelbusch, *Disenchanted Night*, 42.
[104] Ibid., 40.
[105] Schivelbusch, *Disenchanted Night*, 43.
[106] Dobbin, Murphy, and Bose, eds., "Gas Lights," *The American and Commercial Daily Advisor* (Baltimore), January 9, 1823.

Consequently, against the dark backdrop of unlit city streets, gas light stood as a symbol of true modernity. As New York City imitated Baltimore less than a decade later by first illuminating with gas its principal thoroughfare, the new "brilliant and beautiful" system of illumination shed light on the city's rapid growth and development, indicating Gotham's forthcoming status as a "great city...the highest result of human civilization."[107]

Since their inception as a method of illuminating the city streets, gas lights were justified in Manhattan by the city council as a means of reducing crime by "exposing offenders" and preserving peace; in other words, gas lamps, it was believed, had the ability to tame the unruly night.[108] However, the installation of gas lights into the streets was piecemeal. And while the city emphasized the importance of installing gas lamps under the pretense of improving nighttime security, the spatial patterns of gas light installation demonstrate that the city did not prioritize policing and pedestrian protection. Moreover, patterns of gas light installation within the city streets did not solely correspond to affluent residential areas. Instead, gas lights followed patterns of commerce, as streets with a heavy commercial presence predominantly drew the improved lighting technology, illuminating the city's profit-based agenda as Manhattan reached its mid-century moment and moved into the second half of the nineteenth century. Nevertheless, the implications of improved public lighting permeated the urban psyche. And while early patterns of gas light installation proved to promote commerce over citizen safety, gas lights maintained a powerful symbolic identity as a fixture in the night that policed activity by enhancing visibility.

This chapter will examine the spatial patterns of gas light installation in mid-century Manhattan by looking at the relationship between population density, as an indicator of wealth, and streets with gas lamps to explore the connection between light, affluence and security. This

---

[107] Foster, *New York in Slices*, 3.
[108] *Documents of the Board of Aldermen*, vol. 1 (NY: City of New York, 1834-1835), 602.

chapter will use urban land use data to examine the relationship between gas lights and commerce. Finally, this chapter will investigate the implications of light and explore the powerful symbolic identity of gas lights as a marker of virtue, purity and safety within Manhattan, a metropolis of light and shadows.

Affluence, Security and Manhattan's Illuminated Streets

As gas lights were introduced into the city streets, they seemed to transform the urban landscape after dark; the brightness of gas lights obliterated the opaque night, indicating their ability to offer surveillance and security within the dark streets.[109] And indeed, from the very beginning gas lights were seen as an extension of Manhattan's primitive police force and a critical participant in nocturnal law enforcement. Gas lights began to appear in the city streets 20 years before Manhattan established its first modern police force in 1845. Prior to 1845, constables served as figures of authority within the streets. And though meant to preserve law and order, this early police force was hardly effective.[110] Constables had very little supervision. They patrolled assigned neighborhoods, often alone. Most carried a "billy club" or a thick wooden nightstick for protection, though few used them. Constables were expected to make arrests if they witnessed a crime, yet their potency in the streets primarily derived from their presence as opposed to their actions.[111] Additionally, streets with high crime rates were often avoided, as patrolman feared becoming victims of a crime themselves.[112] As gas lighting technology slowly spread throughout the city, gas lights came to symbolize reform within the streets, and city government affirmed the necessity of installing gas lights as a means of

[109] Bouman, "The 'Good Lamp Is the Best Police,'" 66.
[110] Bruce Chadwick, *Law & Disorder: The Chaotic Birth of the NYPD* (New York: Thomas Dunne Books, St. Martin's Press, 2017), 5.
[111] Ibid., 11.
[112] Ibid.

protection, security and control. As stated by the Board of Aldermen, the lawmaking body of the city, it was believed that "if the streets were better lightened, it would operate directly to the diminution of crime, by exposing offenders to the detection."[113] The Board of Assistant Aldermen furthered this conviction when they stated that "comfort and convenience, and the preservation of the peace in the night requires that it should be done."[114] Consequently, to the city council and other optimistic observers, the new systems of urban lighting served as a beacon of hope; if policing could not tame the unruly night, then perhaps gas lights could.

By the time Manhattan approached the mid-century mark, over 5,000 gas lamps could be found illuminating streets throughout the city.[115] And though introduced into the Manhattan cityscape under the pretense of maintaining security and preserving the peace after dark, early patterns of gas light installation within the city reveal an alternate truth. While gas lights could be found in neighborhoods of considerable wealth and affluence, gas lights predominantly clustered in the heavily commercial districts of the city. In addition, gas lights were notably absent in the city's poorest sectors and the most notoriously crime-ridden ones. Consequently, the placement of early gas lights in the city did not prioritize pedestrian protection but rather operated in synergy with the city's economic agenda by illuminating commercial properties and thoroughfares as opposed to residential ones.

In order to explore the spatial patterns of light and security in mid-century Manhattan, streets with gas lamps can be examined in relation to population density. In nineteenth-century Manhattan, population density was a fairly accurate representation of wealth in the city; because only upper-class New Yorkers could afford freestanding single-family homes on good sized lots,

---

[113] *Documents of the Board of Aldermen*, vol. 1, 602.
[114] *Journal and Documents of the Board of Assistants, of the City of New York*, vol. 15 (NY: City of New York, 1839-1840), 666.
[115] *Documents of the Board of Aldermen*, vol. 16, 12.

low population density correlated with wealthier groups.[116] Thus by looking at streets with gas lamps in relation to population density, the relationship between gas lamps and affluence can be explored. Figure 2.2 depicts population density in Manhattan by block for the year 1855. The population density map indicates that the Lower East Side of Manhattan had the highest number of people per acre. As Manhattan's population swelled during the 1830s, the housing market struggled to keep up with the demand for quality affordable housing. Additionally, new construction catered to the upper half of the housing market and was largely concentrated in elite residential zones of the newly gridded upper Manhattan. By the mid-century, those who could afford to leave fled the densely choked lower wards of the city, clustering in newly built uptown

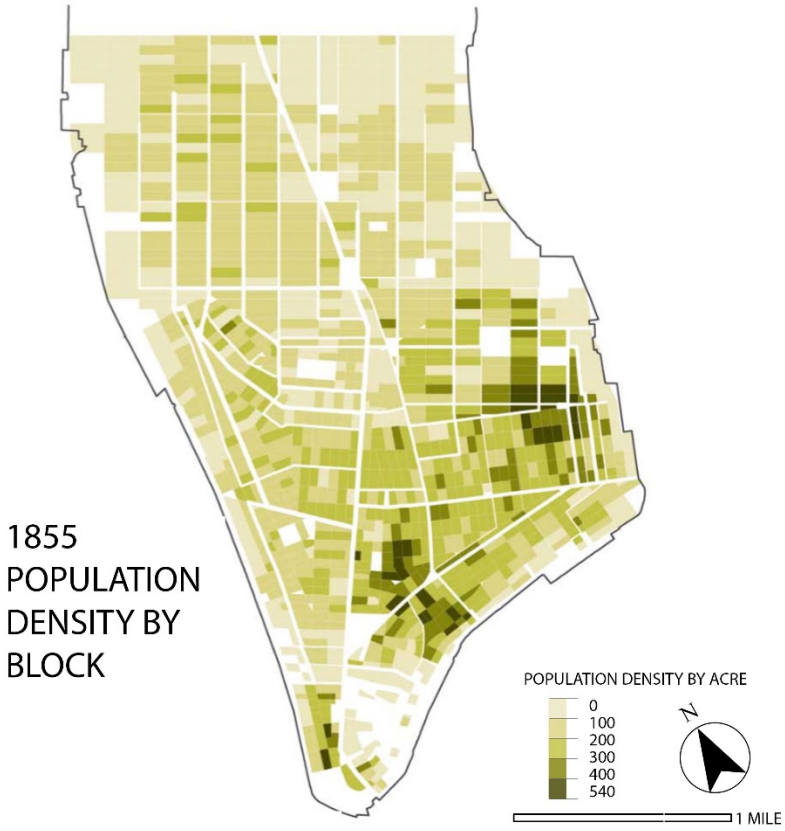

FIGURE 2.2[117]

[116] Baics and Meisterlin, "Zoning Before Zoning," 1167.

[117] Figure 2.2 comes from Gergely Baics and Leah Meisterlin's article "Zoning Before Zoning." This map estimates population density by block. Population density by block was calculated by taking the residential building area per block from the Perris Atlas building footprints, and multiplying residential building area per block as a proportion of a wards total residential building area by population per ward from the 1855 census. Gergely Baics and Leah Meisterlin, "Zoning Before Zoning: Land Use and Density in Mid-Nineteenth-Century New York City," *Annals of the American Association of Geographers* 106, no. 5 (2016).

residential enclaves. Those who could not afford the new construction packed into existing structures, where houses were cut up by landlords into one or two room apartments, forcing families to crowd into small quarters.[118] Thus, in a pattern evident on the population density map, affluence gravitated to the least dense and far removed uptown enclaves, while poverty became concentrated in the densest and centrally located lower eastern tenement districts.

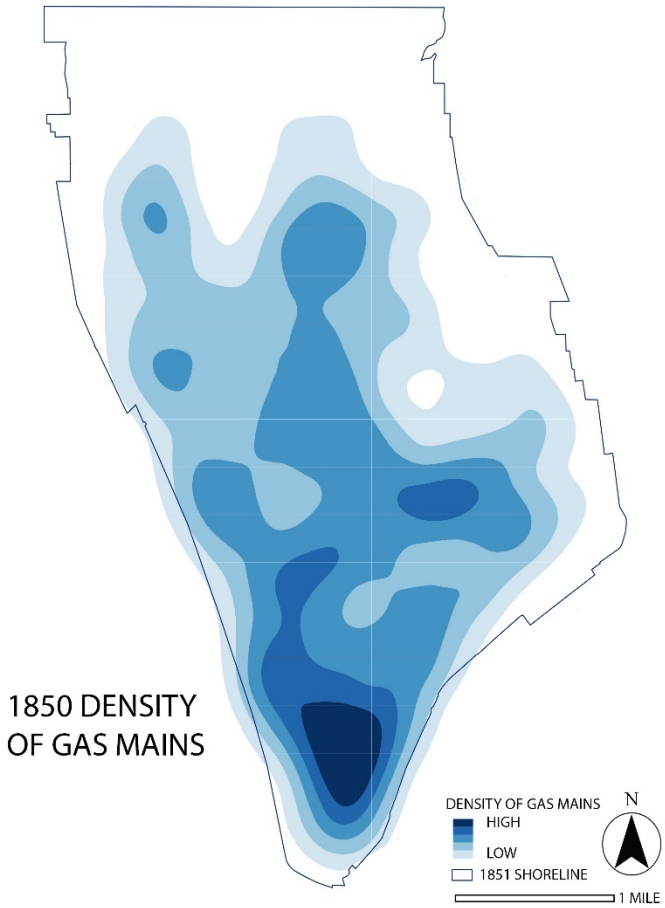

FIGURE 2.3[119]

The comparison of the spatial patterns of population density to streets with gas lamps shows a curious relationship between population density and access to improved lighting technology. Figure 2.3 displays the density of streets where gas mains were installed by 1850. When comparing Figure 2.2 and Figure 2.3, there is an inverse relationship between the two maps; the Fourth Ward and the Lower East Side of Manhattan, some of the densest parts of the city, appear to be the darkest. Additionally, the areas north of 14th Street and south of Chambers

[118] Sam Bass Warner, and Andrew H. Whittemore, *American Urban Form: A Representative History* (Cambridge: MIT Press, 2012), 77.
[119] Figure 2.3 displays kernel density of streets with gas mains. This map was created using the gas light shapefile. See Figure 2.1.

Street, regions of low population density, contain notably high concentrations of gas mains. In particular, as seen in Figure 2.3, the low-density areas around Washington Square Park, Gramercy Park, and southern Fifth Avenue, all notable affluent enclaves, contain a relatively high concentration of illuminated streets. Thus, population density as an indicator of wealth in relation to streets with gas lamps reveals a positive correlation between affluence and access to light.

Due to the positive correlation between affluence and gas lights in Manhattan, the spatial patterns of gas light installation in the city suggests that the Common Council, in part, fulfilled their objective to bring "comfort and convenience," and enhanced nighttime security on behalf of the wealthier classes. However, the inverse relationship between population density and density of gas mains in the city reveals that the Common Council failed to address the second goal of improved street lighting; though the Common Council stated "the diminution of crime" was one of their expectations for the improved lighting technology, light was not installed in the city's most notorious and crime-ridden segment—Five Points—or in the densely packed, vice-filled Lower East Side. Consequently, despite the assertions of Manhattan's legislative body, gas lights did not alleviate darkness in the most desolate parts of the city.

While Figure 2.3 reveals a strong correlation between gas lights and affluence, the region of the city with an unparalleled concentration of gas mains is Lower Manhattan, a notable commercial and business district. Consequently, Figure 2.3 reveals an additional truth about the spatial pattern of gas light installation; though gas mains could be found in the city's wealthiest areas and were notably absent in the densest and poorest neighborhoods, gas mains were particularly abundant in commercial thoroughfares, indicating a powerful relationship between light and commerce.

Gas Lights, Commerce, and the New Urban Order

Gas lights, unlike their oil and candlelight predecessors, were systemized in a vast urban web; as gas mains were installed into New York City streets, the network of mains seemed to encompass the entirety of the urban fabric, reigning in the city until few streets were left in complete darkness. Commercial streets seemed to be a logical place to first install gas lamps, as improved lighting extended the number of profitable hours in the day, thus stimulating commerce. Additionally, commercial streets tended to be heavily traveled, which would further make them prime locations to install early gas lighting. Urban land use data allows the relationship between light and commerce to be further explored. Figure 2.4 displays streets with gas lamps in conjunction with land use data; on this map, all buildings were categorized on their designated land use. Buildings highlighted in blue

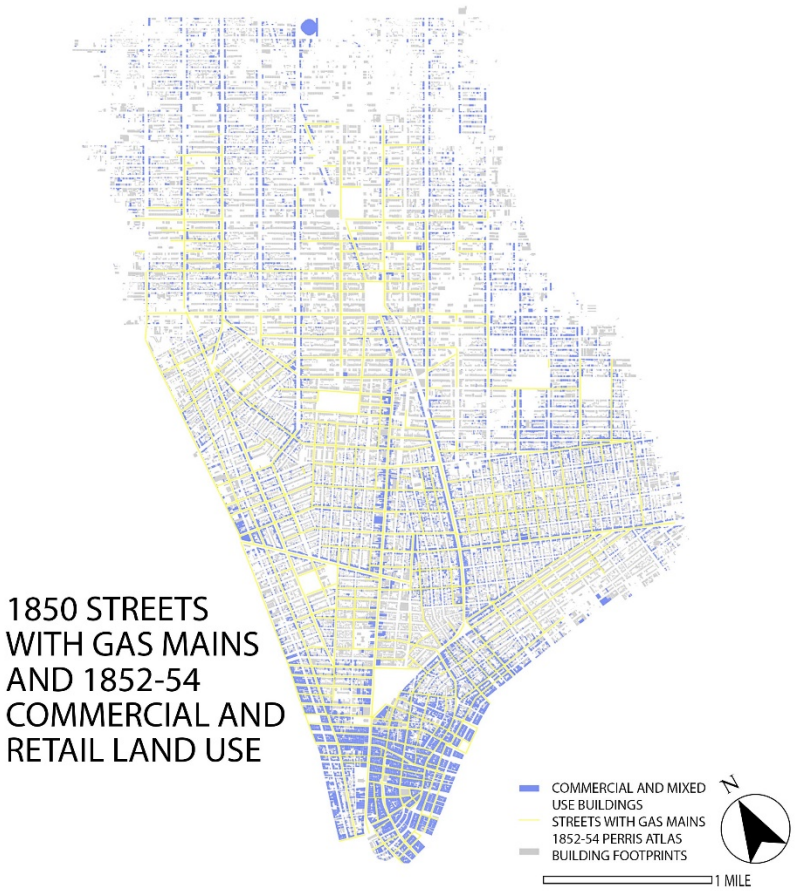

FIGURE 2.4[120]

[120] A shapefile of the digitized building footprints from William Perris' 1852-54 *Maps of the City of New York*, compiled by librarians from the New York Public Library, was used as the principal data source on land use patterns in mid-nineteenth century Manhattan. The Perris Atlas building footprints shapefile contains information on land use; each building is categorized as residential, commercial, industrial, educational, worship, or mixed use. Using GIS, the buildings categorized as commercial or mixed use (commercial and residential) were selected, in order to display commercial land use patterns in mid-century Manhattan. New York Public Library, Perris Buildings Shapefile, 2015, NYPL Map Warper, http://maps.nypl.org/warper/.

indicate that they were commercial or mixed-use (commercial and residential) in 1852-54, and buildings highlighted in grey were non-commercial (industrial, residential, educational, worship). In total, there were 61,687 buildings in Manhattan in 1850. Of these 61,687 buildings, 27% of these buildings were commercial in nature. While Figure 2.3 reveals a high concentration of streets with gas mains in the commercial and business district of Lower Manhattan, a cursory glance at Figure 2.4 suggests that gas mains were mostly located in predominantly commercial areas, indicating a positive correlation between artificial light and commercial land use.

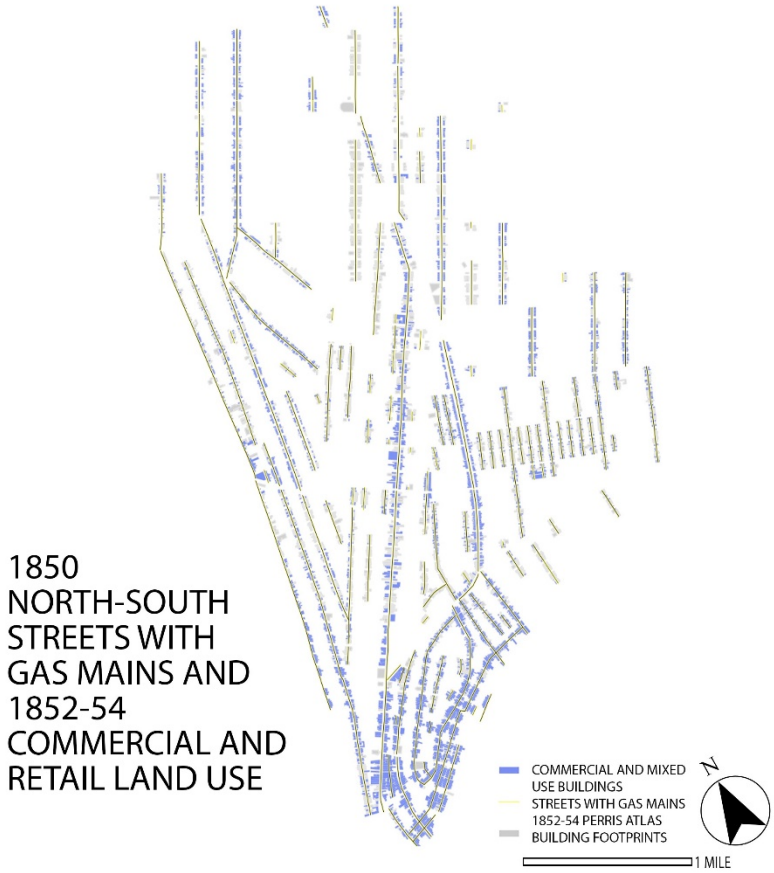

FIGURE 2.5[121]

To further explore the relationship between streets with gas lights and commercial thoroughfares, the gas light data was divided based on the geographic orientation of the streets that received light. Figure 2.5 displays streets with gas mains that run north to south, and their corresponding land use data. Figure 2.6 displays streets with gas mains that run east to west, and

[121] Figure 2.5 was created using the Perris Atlas building footprints shapefile (See Figure 2.4) and the gas light shapefile (See Figure 2.1). Streets with gas lights that possessed a north-south orientation were selected. Buildings facing these north-south gas lit streets were isolated from the Perris Atlas building footprints. These street facing buildings were then categorized by land use, with commercial and mixed-use buildings highlighted in blue.

their corresponding land use data. During the mid-nineteenth century, the commercial geography of Manhattan north of Houston street profoundly shifted, as retailers moved to north-south avenues from smaller crosstown streets.[123] Not all avenues attracted street commerce. In particular, avenues towards the center of the island, such as Fifth, Madison, Fourth, Irving Place, and Lexington Avenues, lacked virtually any business activity.[124] However, as urban development codified into the regularized street system of the Manhattan grid, Third and Eighth Avenues became some of the busiest commercial thoroughfares. Intersections along avenues running north to south occurred three to four times more frequently than on streets running east to west due to the formation of the Manhattan grid. Consequently, once the population of Manhattan began to move north, avenues ensured retailers access to several times more

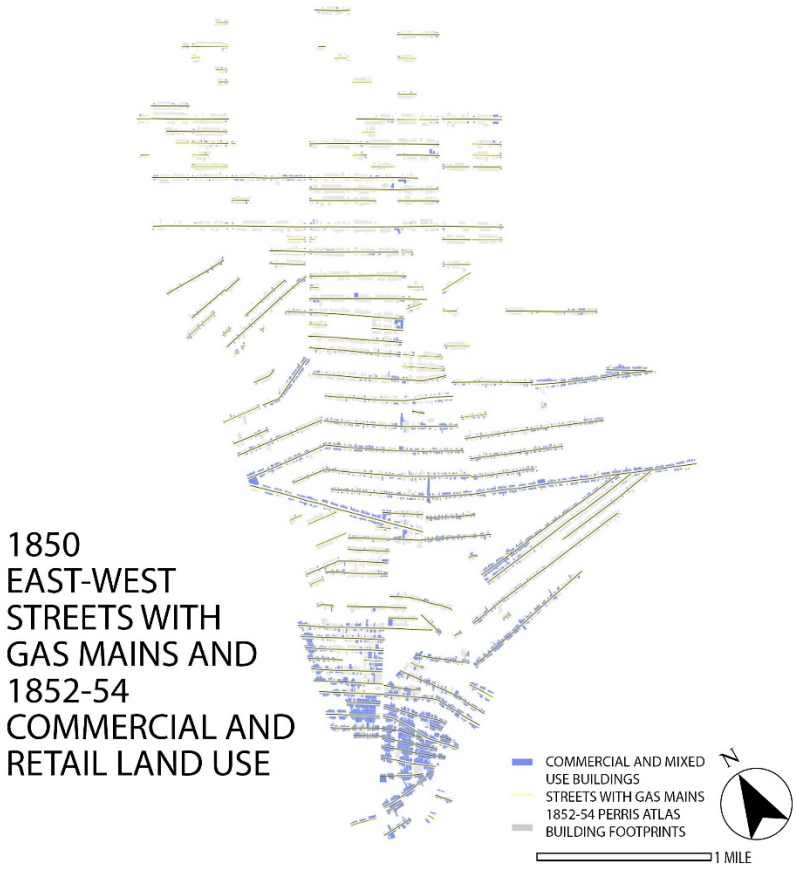

FIGURE 2.5[122]

[122] Figure 2.6 was created using the Perris Atlas building footprints shapefile (See Figure 2.4) and the gas light shapefile (See Figure 2.1). Streets with gas lights that possessed east-west orientation were selected. Buildings facing these east-west gas lit streets were isolated from the Perris Atlas building footprints. These street facing buildings were then categorized by land use, with commercial and mixed-use buildings highlighted in blue.
[123] Baics, and Meisterlin, "Zoning Before Zoning," 1163.
[124] Ibid., 1164.

customers than if they were located on crosstown streets.[125] Additionally, the greater width of avenues allowed for a higher volume of pedestrians and street traffic, securing north-south avenues with an additional advantage as commercial thoroughfares.[126] Figures 2.5 and 2.6 reveal this profound shift in retail geography; while commerce stretched along the entirety of north-south oriented thoroughfares as seen in Figure 2.5, Figure 2.6 reveals that on east-west oriented cross streets, commerce was notably lacking north of Bleecker Street.

Examining the geographic orientation of streets with gas mains in conjunction with urban land use data reveals the enduring relationship between commerce and gas lit streets. As seen in Figure 2.5, 131 gas mains were installed in streets running north to south. As seen in Figure 2.6, 154 gas mains were installed in streets running east to west. A greater number of streets in Manhattan run east to west, and thus a higher number of streets with gas lights running east to west is logical. However, Figure 2.5 reveals that the number of north-south oriented streets which receive gas lights is significant and relatively close to the number of east-west oriented streets, indicating that gas lights were prioritized in north-south corridors. Additionally, along the north-south oriented corridors, 57% of the buildings facing streets with gas mains were commercial. Along east-west oriented corridors, 37% of the buildings facing streets with gas mains were commercial. Moreover, of all the commercial buildings in Manhattan during 1852-54, 35% of these buildings were on north-south oriented gas lit streets, and 27% of these buildings were on east-west oriented gas lit streets. Consequently, over 60% of the commercial buildings in New York faced gas lit streets by 1850. In contrast, only 36% of residential buildings and 17% of industrial buildings faced gas lit streets, illuminating Manhattan's profit-based agenda as gas lights were predominantly found along commercial thoroughfares.

---

[125] Baics, and Meisterlin, "Zoning Before Zoning," 1164.
[126] Ibid.

By the mid-nineteenth century, New York possessed a consolidated central business district that was almost entirely composed of commercial buildings. Within this central business district were a number of specialized zones.[127] Financial services clustered along Wall Street and administrative services around City Hall. A dry goods and shopping district consolidated to the north along Broadway, while wholesale provisioning could be found near Washington and Fulton Markets and warehouses clustered in the south along the East River.[128] Gas lights could be found in all these areas. Consequently, as spatial patterns of commerce and retail conflated with the location of gas lights in mid-century Manhattan, the economic agenda of the city is revealed; while the Common Council promised gas lights to enhance citizen safety, gas lights instead offered their protection to properties within the city's centralized business district. From warehouses to dry good stores to the fashionable shops along Broadway, gas lights illuminated streets that housed businesses across the commercial spectrum. Thus the spatial placement of gas lights in Manhattan illuminates the city's prioritization of profit producing resources, the lifeblood of the metropolis and consequently first priority within the gaslight city.

The effects of gas lighting on the commercial sphere were remarkable. Not only did gas lights offer protection to high-value commercial properties, but they also facilitated extended purchasing hours, illuminated shops and their products, and consequently advertised where to buy, sell and invest.[129] As leisure activities commercialized over the course of the nineteenth century, shopping became a form of recreation for the upper class.[130] Consequently, gas lights were novel, luxurious and "elegant street ornaments," that boosted commercial traffic by

[127] Baics and Meisterlin, "The Grid as Algorithm for Land Use," 8.
[128] Ibid.
[129] Mark J Bouman, "Luxury and Control," *Journal of Urban History* 14, no. 1 (1987): 13.
[130] Ibid., 11.

drawing people to the city center.[131] The effects of gas lighting, then, proved to be contradictory to their initial agenda to tame the nocturnal streets; while perhaps gas lights aided in the reduction of crime and offered protection to nighttime shoppers, gas lights also facilitated freedom of movement in the nocturnal urban landscape, thus liberating the city from the constraints of the night by enhancing one's ability to move through the streets after dark.

Light, Morality and the Urban Psyche

Despite the liberating effects of gas lighting within the nighttime metropolis, gas lights maintained a powerful symbolic reputation in mid-century Manhattan as objects of surveillance and thus a means of social control. Though public gas lights were largely absent from the most notorious and crime-ridden parts of the city, the theoretical notion that light could tame the streets prevailed and thus the abstract relationship between policing, surveillance and light were consolidated and fortified. Additionally, contrasts in lighting allowed observers to map a new urban geography of wealth and poverty, virtue and vice, safety and danger. Consequently, gas lights in the nineteenth century urban landscape changed not only physical patterns of light and dark in the city but altered perceptions, reshaping the moral geography within the metropolis.

Though gas lights were not installed in the most crime-ridden segments of the city, light and policing were nearly synonymous during the nineteenth century.[132] As gas lights were introduced into the Manhattan urban landscape, Lamp and Watch districts in the city spread in tandem, revealing the partnership between the two municipal divisions and the analogous function of light and policing on the streets.[133] Moreover, while light was considered essential to policing the city streets, the symbolic significance of gas lamps can be seen when examining a

[131] Mark J Bouman, "Luxury and Control," 14.
[132] Bouman, "The 'Good Lamp Is the Best Police,'" 73.
[133] *Documents of the Board of Aldermen*, Vol. 7 (NY: City of New York, 1840-1841), 222.

particular illicit nocturnal pastime—lantern smashing. The breaking of public lamps was not a nineteenth-century phenomena specific to gas lights; the practice of lantern smashing can be traced back to the seventeenth and eighteenth centuries when night watchmen on patrol, lanterns in hand, were known subjects of countless pranks which included attempts by mischief seekers to break the watchmen's lantern. The motives behind lantern smashing stem from the symbolic repute artificial light attracted; by destroying public street lights, the surrounding areas were plunged into darkness, disrupting the authority light represented. The darkness that prevailed after the lights went out suggested disorder and freedom in the city streets, in comparison to the control and surveillance that systems of artificial light implied. Thus, attacks on street lights were small acts of rebellion against the order light embodied.[134]

Blackouts are another instance where the symbolic value of gas lights can be examined. In the afternoon of August 30th, 1848, a fire broke out at the New York Gas Company's works in Lower Manhattan, resulting in the first great blackout in American history.[135] Fueled by barrels of rosin, storage pits of waste tar, and the burning gasometers, the flames from this fire reportedly rose 100 feet in the air and quickly spread to surrounding buildings. Due to the fire, the New York Gas Company shut off its main gas pipe to the storage reservoir on Church Street. Consequently, by evening gas lights in Lower Manhattan could not be lit, and the city was left in darkness.[136] Though the interruption in gas services was brief, the *New York Herald* cast the blackout as a catastrophe and a threat to public safety:

> A dismal gloom pervaded every quarter, where the gas has long been the light to the pedestrian's pathway...Never before, since the introduction of that great agent of light, has the city been subject to such a scene. The calamity will doubtless be hailed with joy

[134] Schivelbusch, *Disenchanted Night*, 98.
[135] Peter C Baldwin, "In the Heart of Darkness," *Journal of Urban History* 30, no. 5 (July 5, 2004): 756.
[136] Ibid., 756.

> by those who prowl about the city to rob their fellow men; for never before has such an opportunity to practice their villainy been afforded them.[137]

By 1848, gas lights were an established feature of the nocturnal landscape. Thus, as the city fell into darkness on the evening of August 30th, the lack of light suggested disorder in the streets. For those who believed that lamps served as the best police, a sudden lack of light in Lower Manhattan offered prime opportunity for "those who prowl about the city to rob their fellow men." The blackout of 1848 in Manhattan was short-lived, and the production at the gasworks supplying Lower Manhattan continued the following day.[138] But as New York was plunged into uniform darkness, returning the city to levels of darkness widely known only a few decades before, the brief disruption suggested upheaval in the modern city and solidified the reputation of gas lights as essential to maintaining order within the urban landscape.

By the mid-nineteenth century, the symbolism of light, coupled with the unequal distribution of gas lights in the Manhattan landscape, fortified connotations between darkness, poverty and disordered urban life, while light came to hold opposite implications of wealth, virtue and safety. The dramatic contrast between dark and illuminated spaces in the nocturnal city drew the attention of contemporary writers and journalists, who produced a plethora of literary works during the mid-nineteenth century that reiterated the dichotomous geography of light and darkness in Manhattan. Within these literary works, the Five Points was known as one of the darkest spots within the urban landscape, regardless of day or night. George Foster perpetuated the Five Point's reputation for darkness and vice when he describes an oyster saloon: "the population forming the principal class of their customers burrow in their secret holes and dens all day, and only venture out at night….They are the obscene night-birds who flit and howl

---

[137] Baldwin, "In the Heart of Darkness,"
[138] Ibid.

and hoot by night, and whose crimes and abominations make them shun the light of day."[139] As leading late-night drinking spots, oyster saloons were amongst the best known nighttime establishments of the nineteenth century. As Foster describes a Five Points oyster saloon, he bestows the customers with distinctively animalistic qualities, suggesting that these people are subhuman. As Foster dehumanizes the oyster saloon customers, critiquing their obscene behavior, he enforces the relationship between darkness and vice, light and virtue; as the thieves and burglars, prostitutes and "low gamblers" who populate the oyster saloon only emerge after dark, their behavior becomes associated solely with the nocturnal sphere of the Manhattan landscape.[140] Additionally, as these people "shun the light of day," Foster suggests that light is the antidote that puts an end to nighttime barbarism.

In mid-century Manhattan, light was thought, perhaps over optimistically, to be the best antidote to nocturnal barbarism as light could unveil the happenings of the streets during nighttime hours. Consequently, light was thought to be effective in policing simple yet undesirable behaviors. For example, Dr. Woods Hutchinson argued that light put a stop to unsanitary practices such as throwing garbage and waste into the streets under the cover of darkness.[141]Additionally, improved street lighting was thought to diminish more explicit illicit nighttime activities such as prostitution, thievery and violence, by making these activities visible. However, while improved visibility due to gas lighting allowed for improved surveillance, light also offered freedom of movement and perhaps even enhanced illicit activity on the now navigable nighttime streets.[142] As described by William Sanger in his 1858 study of prostitution in New York City, the practice "no longer confines itself to secrecy and darkness…but boldly

[139] Foster, *New York by Gaslight,* 55.
[140] Ibid., 55.
[141] Bouman, "Luxury and Control," 13.
[142] Schlör, *Nights in the Big City*, 190.

strikes through our most thronged and elegant thoroughfares."[143] As Sanger discusses the transformation of prostitution from a transaction confined to the "bawdy house of the poor" to an enterprise infiltrating cosmopolitan and sophisticated public spaces like Broadway, Sanger shows that light did not guarantee purity. Rather, it appears that illuminated Broadway, now easily navigable after dark, allowed prostitution to become urbane, as the trade became increasingly public in business districts and established itself as a fixture of metropolitan life.

Sanger reveals the complexities of the spatial geography of light and the moral landscape of the city; though gas lights were widely presented as the anecdote to the plight of darkness, the moral geography of the city and the geography of light did not clearly align. George Foster's *New York by Gaslight* provides additional accounts of degeneracy at night under Manhattan's illuminated streets, which complicates the notion that gas lights were the "best nocturnal police."[144] As Foster describes Broadway at night, he reveals the complex role of gas lamps in the city streets: "one by one the late shops close their shutters...With the exception of the dim and distant public lamps the street is now dark….Here and there a lamp-post is embellished with a human swine who leans, a statue of drunkenness, against it for support."[145] Foster reveals that to an extent, gas lights have done their job, as they illuminate the depravity of the "human swine who leans, a statue of drunkenness." However, as Foster makes clear, "the dim and distant public lamps" of Broadway have not expelled vice from the street. Rather than force purity within the nocturnal urban landscape, gas lights appear to have certified Manhattan's reputation as a playground of nighttime activity by drawing nighttime activity to the illuminated streets.

---

[143] Stansell, *City of Women*, 173.
[144] Bouman, "The 'Good Lamp Is the Best Police,'" 66.
[145] Foster, *New York by Gaslight*, 75.

Not only did illuminated streets make Manhattan navigable after dark, but gas lights were used by businesses as a tool to draw customers to their late-night establishments. Consequently, gas lights stimulated nighttime activity, by allowing spaces like restaurants and saloons to become brightly lit. James McCabe describes Sixth Avenue as a space that underwent a significant transformation once the sun set:

> When the darkness settles down over the city, and the lamps flare out along the street, and the broad rays of light stream brightly into the open air from the stores, restaurants, and saloons. Sixth Avenue undergoes a transformation. All day it has been crowded with the best of New York's people, intent upon honest business. Now the crowd is almost as great, but it is of a different character. The larger, and better class stores are closed; only the smaller retail shops, the drug stores, the saloons, restaurants, and tobacconists remain open, but these are numerous enough to give a brilliant coloring to the street with their bright lights and elaborately-decorated windows.[146]

As McCabe describes, darkness converted Sixth Avenue from a street of the "best of New York's people," to an entirely new sort of space within the city. As night fell, both the character of the people on the street and the makeup of the stores and businesses along Sixth Avenue changed, as the "larger, and better class stores" closed, and late-night establishments like saloons and restaurants opened. As McCabe reveals, light played a critical role in New York City nightlife. Rather than simply line the street, lights "stream brightly into the open air from the stores, restaurants, and saloons," signaling to customers which establishments are open for business, and thus prolonging the number of profitable hours in the day. Moreover, lights in stores and businesses lining Sixth Avenue "give a brilliant coloring to the street with their bright lights and elaborately-decorated windows," and were thus used as a strategy of enticement to attract customers.[147] Consequently, McCabe reveals that gas lights transformed the nocturnal world of

---

[146] McCabe, *New York by Sunlight and Gaslight,* 252.
[147] William Leach, *Land of Desire: Merchants, Power, and the Rise of a New American Culture* (New York: Vintage Books, 2001), 40.

the city by infusing nighttime establishments with a host of tools to draw customers in, making late night saloons and restaurants all the more appealing.

Conclusion

As the night waned and early morning approached, McCabe reveals that the city underwent a final transformation; as dawn approached and gaslights were extinguished, "there is a brief period of silence and darkness...and with the dawning day all signs of sin and vice have disappeared. Sixth Avenue puts on its respectable dress, and until sunset devotes itself to legitimate and reputable business."[148] As McCabe describes Sixth Avenue, he reveals the distinct dichotomy between day and night in Manhattan; during daylight hours the city was "legitimate and reputable," while darkness and night transforms Manhattan into a place of "sin and vice." Consequently, the moral landscape of the city is perpetuated. However, within the binary division between day and night, virtue and vice, the moral geography of the city and the geography of light is full of nuance. Nocturnal New York is described almost entirely along the lines of immorality, for all activity in the streets after dark is assumed criminal, unchaste or perverse. However, the spatial patterns of gas lights and the moral geography of the city did not align, as nocturnal activity was drawn to illuminated streets. McCabe suggests that the "dawning day" did away with vice and sin in the city. However, as Chapter 1 reveals, this was far from the case. Consequently, the moral landscape of the city and the geography of light were separate entities, as the presence of light did not always indicate purity and respectability.

Though gas lights did not correlate with virtue just as daylight did not expel sin from the streets, gas light technology transformed the world after dark, as gas lamps liberated the streets from the oppressive veil of darkness, and paved the way for Manhattan to establish itself as a city

[148] McCabe, *New York by Sunlight and Gaslight,* 256.

of lights, and a brilliant spectacle after dark. Though introduced into the Manhattan urban landscape under the pretense of reducing crime and improving nighttime safety, gas lights were predominantly found in affluent neighborhoods and along commercial thoroughfares. Thus the spatial patterns of gas light installation indicate that gas lights offered their protection to high-value commercial properties within the city's centralized business district, and did little to alleviate the oppressive veil of darkness in the poorest and crime-ridden segments of the city. Moreover, the addition of gas lights to the city streets had a number of unexpected consequences; by liberating the city from the constraints of darkness, gas lights facilitated the increase of nocturnal activity in the streets. Consequently, as the sun went down in the city, the streets no longer succumbed to the darkness, and instead the nocturnal world of Manhattan shone bright into the night, a city of lights, and a brilliant spectacle in the surrounding darkness.[149]

[149] R.E.B Crompton, "Artificial Lighting in Relation to Health," *Journal of the Society of Telegraph-Engineers and Electricians*, (July 4, 188), 1.

CONCLUSION

In the Shadows of the City

"Great cities must ever be the centers of light and darkness; the repositories of piety and wickedness…holding within themselves the highest talent for good and evil."[150]

In the mid-nineteenth century, Manhattan was, as Matthew Hale Smith describes, a city of contrasts, and a repository of "piety and wickedness," "good and evil," and "light and darkness." As the social conditions of the city relegated the working poor to the densest, most intensely built parts of the urban landscape, natural light was fleeting and hard to come by. Similarly, gas light companies bypassed impoverished neighborhoods in favor of wealthy and commercial areas, out of fear that they could not recoup their investments.[151] As access to light in the city became a defining feature between the rich and the poor, discussions of darkness and light as a measure of immorality and virtue proliferated. Consequently, areas such as the Lower East Side and the Five Points were widely discussed in terms of darkness and immorality, as the conditions of the city subjected these areas to disproportionate darkness and shadows. However, the spatial geography of light and the moral landscape of the city did not entirely align. Light was often presented as the anecdote to darkness and as an indicator of virtue and safety, yet the presence of light did not guarantee purity of the streets. Thus patterns of light and darkness in the city aligned with the social geography of expectations, and the metaphor of light reflected impressions as opposed to actualities.

Contemporaries and scholars have long explored the geography of light and darkness in the city, as both nineteenth-century writers like George Foster and present-day scholars like Peter Baldwin discussed light in spatial terms in their work. However, mapping methodology brings a

---

[150] Smith, *Sunshine and Shadow in New York,* 709.
[151] Baldwin, "In the Heart of Darkness," 752.

new framework to the study of light in the historical city. This new methodological approach allows for explorations of light to go beyond narrative descriptions and provides the tools to separate perceptions of light from realities, ultimately allowing for the moral geography of the city to be explored and challenged.

The case of Broadway and the Bowery is perhaps the best example to illustrate the benefits of the approach. As discussed in Chapter 1, Broadway carried the reputation for being a bright, sunny and elegant thoroughfare, in contrast to the Bowery which was known for its nighttime attractions, working-class population, and a plethora of workshops and manufacturers. Literary works from the mid-century, such as Charles Dickens *American Notes,* notably discussed Broadway along the lines of sunlight: "Was there ever such a sunny street as this Broadway!"[152] In contrast, the Bowery was known for its "deep rumble of carts and wagons," signifying the thoroughfare's working-class status.[153] However, despite Broadway's reputation for sunlight in contrast to the Bowery's gloomy reputation, GIS mapping of street widths revealed that the Bowery was notably wider than Broadway, suggesting that the Bowery was in fact sunnier than its more fashionable counterpart. Thus GIS allows for perceptions of light and darkness to be challenged; using this method proves that some descriptions of light and darkness are rooted in perceptions rather than actualities, and consequently, the moral geography of the city and the spatial geography of light are not necessarily aligned.

In the mid-nineteenth century, light in Manhattan had been largely unregulated. However, by the turn of the twentieth century, light became recognized as a resource the city could protect and preserve. The city took its first legislative steps to protect access to light and air with the passage of the Tenement Act of 1901. This Act banned construction of the dark, poorly

[152] Dickens, *American Notes*, 36.
[153] Ibid., 37.

ventilated structures that characterized the Manhattan landscape during the mid-nineteenth century. The law required that new tenement buildings include outward facing windows in every room, outlawing the "dark rooms" which had been hailed as the ultimate sanitary evil.[154] While unequal access to light in the city would prevail, the Tenement Act of 1901 marked a turning point at which access to light was increasingly understood to be something the city could regulate, protect and control.

While tenements had dominated the Manhattan landscape throughout the second half of the nineteenth century, the urban landscape underwent significant changes during the late nineteenth century as new forms of construction began to transform the built environment. Most significantly, the rise of new technological developments in steel, construction and engineering allowed for the city to experience its first remarkable vertical growth.[155] Throughout the nineteenth century, few buildings exceeded six stories high. But in 1889, New York's first skyscraper, the Tower Building, opened on Lower Broadway measuring a novel 11 stories.[156] The Tower Building marked an important moment in the New York urban landscape; for the first time, the city's skyline was in flux, foreshadowing Manhattan's forthcoming status as the world's greatest vertical city.[157]

As building heights became increasingly variable in the city, the question of shadows in the streets grew as a topic of concern.[158] New York passed its first comprehensive zoning ordinance in 1916, which marked the city's first attempt at light preservation in public spaces. The 1916 Zoning Ordinance regulated heights by creating the setback rule; under the new

---

[154] Robert DeForest, and Lawrence Veiller, eds, *The Tenement House Problem*, Vol. 1. (New York: MacMillan Company, 1903), 6.
[155] Bui and White, "Mapping the Shadows of New York City."
[156] Barr, *Building the Skyline*, 144.
[157] Ibid., 343.
[158] Bui and White, "Mapping the Shadows of New York City."

regulations, buildings in strictly residential areas could only rise as high as the streets in front of them were wide. The ordinance also created zones ranging from "1 ¼" to "2 ½." In Lower Manhattan's "2 ½" zone, buildings could rise without setback two and a half times the width of the street that they fronted.[159] Thus as buildings grew taller, the resolution mandated that they had to be continuously set back from the street, producing a distinct style of "wedding-cake" skyscrapers.[160]

While the Zoning Ordinance of 1916 was meant to moderate excessive construction of immense skyscrapers that technological advancements had made possible, it proved relatively ineffective. Between 1920 and 1932, 150 skyscrapers of 295 feet or taller were added to the Manhattan skyline.[161] Ultimately, in 1961 the city implemented a new zoning code which overhauled the old ordinance in favor of a floor-area ratio model. Under the new regulations, there were no limits to the height of buildings, but the new rules regulated bulk by establishing maximum floor area ratios (FARs), which placed caps on building volume.[162] Thus buildings could possess any dimensions that its lot size permitted, so long as it was proportional to the set FAR ratio of its zoning district. And like the 1916 ordinance, the new zoning code altered the form of buildings, as new construction tended to produce tall, narrow structures with open plazas at the base.[163]

As skyscrapers became a definitive feature of New York City during the twentieth century, the zoning laws of 1916 and 1961 suggest that the matter of light in Manhattan remained pressing amongst urban planners and city authorities. New construction concurrently

---

[159] David W Dunlap, "Zoning Arrived 100 Years Ago. It Changed New York City Forever," The New York Times, December 21, 2017, Accessed April 10, 2019, https://www.nytimes.com/2016/07/26/nyregion/new-yorks-first-zoning-resolution-which-brought-order-to-a-chaotic-building-boom-turns-100.html.
[160] Bui and White, "Mapping the Shadows of New York City."
[161] Barr, *Building the Skyline*, 167.
[162] Ibid.,169.
[163] Bui and White, "Mapping the Shadows of New York City."

redefined the skyline and the concept of density in the city. And as zoning codes were implemented in response to the changing form of the city, light emerged as the principal resource that was prioritized and protected. In the present day, patterns of light impact everything from the flow of foot traffic to rents and real estate prices throughout the city, suggesting that in the modern metropolis, sunlight remains the ultimate commodity.[164] By night, Manhattan is known for its bright lights, its nightlife, and its wide array of nocturnal activity. Thus patterns of light and darkness are entwined within the fabric of the metropolis, and sunlight and shadows continue to shape the rhythm of the city.

[164] Bui and White, "Mapping the Shadows of New York City."

BIBLIOGRAPHY

MAPPING SOURCES:

Baics, Gergely, and Leah Meisterlin. Manhattan Street Width Shapefile. 2017. Columbia University.

Barr, Jason. Manhattan Parks 1900. Shapefile. 2016.

Childs, Herman W. *Document No. 6.* Vol. 18. Part 1. New York: Board of Aldermen, 1851. 183-194.

Childs, Herman W. *Document No. 52*. Vol. 17. Part 2. New York: Board of Aldermen, 1850. 792-96.

Lionel Pincus and Princess Firyal Map Division, The New York Public Library. "Sanitary and Social Chart of the Fourth Ward of the City of New York, to accompany a report of the 4th Sanitary Inspection District, made to the Council of Hygiene of the Citizens' Association by E.R. Pulling, M.D. assisted by F.J. Randall" New York Public Library Digital Collections. Accessed March 6, 2019. http://digitalcollections.nypl.org/items/fc8b9560-f3a1-0130-679f-58d385a7b928

New York Public Library. Perris Buildings Shapefile. 2015. NYPL Map Warper. http://maps.nypl.org/warper/

Perris, William. *Maps of the City of New York: Surveyed Under Directions of Insurance Companies of Said City.* New York: Perris & Browne, 1852–54. New York Public Library, Lionel Pincus and Princess Firyal Map Division. NYPL Map Warper. http://maps.nypl.org/warper

Roome, Charles. *Document No. 7*. Vol. 32. Part 1. New York: Board of Assistant Aldermen, May-Sept. 1848. 95-102.

Sun or Moon Altitude/Azimuth Table. Accessed April 14, 2019. https://aa.usno.navy.mil/data/docs/AltAz.php.

"The Earliest New York City Parks." Earliest Parks: NYC Parks. Accessed April 08, 2019. https://www.nycgovparks.org/about/history/earliest-parks.

PRIMARY SOURCES

Crompton, R.E.B. "Artificial Lighting in Relation to Health." *Journal of the Society Of Telegraph-Engineers and Electricians*, July 4, 1881.

DeForest, Robert, and Lawrence Veiller, eds. *The Tenement House Problem*. Vol. 1. New York, NY: MacMillan Company, 1903.

Dickens, Charles. *American Notes for General Circulation*. New York: D Appleton and Company, 1868.

Dobbin, Murphy, and Bose, eds. "Gas Lights." *The American and Commercial Daily Advisor* (Baltimore), January 9, 1823.

Documents of the Board of Aldermen. Vol. 1. City of New York, 1834-35. Accessed February 1, 2018. https://catalog.hathitrust.org/Record/008421031.

Documents of the Board of Aldermen. Vol. 6. City of New York, 1839-40. Accessed February 1, 2018. https://catalog.hathitrust.org/Record/008421031.

Documents of the Board of Aldermen. Vol. 7. City of New York, 1840-41. Accessed February 1, 2018. https://catalog.hathitrust.org/Record/008421031.

Documents of the Board of Aldermen. Vol. 16. City of New York, 1849-50. Accessed February 1, 2018. https://catalog.hathitrust.org/Record/008421031.

Foster, George G. *New York in Slices: By an Experienced Carver: Being the Original Slices Published in the N. Y. Tribune*. New York: W. H. Graham, 1849.

Foster, George G. *New York by Gaslight: With Here and There a Streak of Sunshine*. New York: Dewitt & Davenport, 1850.

Journal and Documents of the Board of Assistants. Vol. 15. City of New York, 1835-42. Accessed December 20, 2018. https://catalog.hathitrust.org/Record/012307197.

Lippard, George. *New York: Its Upper and Lower Million*. Cincinnati: E. Mendenhall, 1854.

McCabe, James D. *New York by Sunlight and Gaslight: A Work Descriptive of the Great American Metropolis*. New York: Edgewood Publishing Company, 1882.

Minutes of the Common Council of the City of New York, 1784-1831. Vol. 13-19. City of New York, 1823-31. Accessed December 20, 2018. https://catalog.hathitrust.org/Record/001150706.

Report of the Council of Hygiene and Public Health of the Citizens Association of New York upon the Sanitary Conditions of the City. New York, NY: D. Appleton and Company, 1865.

Smith, Matthew Hale. *Sunshine and Shadow in New York.* Hartford: J.B. Burr, 1868.

SECONDARY SOURCES

"Autumnal Equinox and Other Sky Events: What You Need to Know." National Geographic. September 20, 2017. Accessed April 07, 2019. https://news.nationalgeographic.com/2016/09/autumn-equinox-explained-start-fall-spring-sun-earth-science/.

Baics, Gergely, and Leah Meisterlin. "The Grid as Algorithm for Land Use: A Reappraisal of the 1811 Manhattan Grid." *Planning Perspectives*, November 13, 2017, 1-24. doi:10.1080/02665433.2017.1397537.

Baics, Gergely, and Leah Meisterlin. "Zoning Before Zoning: Land Use and Density in Mid-Nineteenth-Century New York City." *Annals of the American Association of Geographers* 106, no. 5 (2016): 1152-175. doi:10.1080/24694452.2016.1177442.

Ballon, Hilary. *The Greatest Grid: The Master Plan of Manhattan 1811-2011*. New York, NY: Museum of the City of New York, 2012.

Barr, Jason M. *Building the Skyline: The Birth and Growth of Manhattan's Skyscrapers*. New York: Oxford University Press, 2018.

Baldwin, Peter C. *In the Watches of the Night: Life in the Nocturnal City, 1820-1930*. Chicago: University of Chicago Press, 2015.

Baldwin, Peter C. "In the Heart of Darkness." *Journal of Urban History* 30, no. 5 (July 5, 2004): 749-68. doi:10.1177/0096144204265194.

Blackmar, Elizabeth. "Accountability for Public Health: Regulating the Housing Market in Nineteenth-Century New York City," in David Rosner ed., *Hives of Sickness: Public Health and Epidemics in New York City,* Rutgers UP, 1995.

Bouman, Mark J. "Luxury and Control." *Journal of Urban History* 14, no. 1 (1987): 7-37. doi:10.1177/009614428701400102.

Bouman, Mark J. "The "Good Lamp Is the Best Police" Metaphor and Ideologies of the Nineteenth-Century Urban Landscape." *American Studies* 32, no. 2 (1991): 63-78. http://www.jstor.org/stable/40643595.

Bui, Quoctrung, and Jeremy White. "Mapping the Shadows of New York City: Every Building, Every Block." The New York Times. December 21, 2016. Accessed April 07, 2019. https://www.nytimes.com/interactive/2016/12/21/upshot/Mapping-the-Shadows-of-New-York-City.html.

Chadwick, Bruce. *Law & Disorder: The Chaotic Birth of the NYPD*. New York: Thomas Dunne

Books, St. Martin's Press, 2017.

Davidson, Marshall B. *Early American Lighting*. New York, NY: Metropolitan Museum of Art.

Domosh, Mona. *Invented Cities: The Creation of Landscape in Nineteenth-century New York and Boston*. New Haven: Yale University Press, 1998.

Dunlap, David W. "Zoning Arrived 100 Years Ago. It Changed New York City Forever." The New York Times. December 21, 2017. Accessed April 10, 2019. https://www.nytimes.com/2016/07/26/nyregion/new-yorks-first-zoning-resolution-which-brought-order-to-a-chaotic-building-boom-turns-100.html.

Leach, William. *Land of Desire: Merchants, Power, and the Rise of a New American Culture*. New York: Vintage Books, 2001.

McNeur, Catherine. *Taming Manhattan: Environmental Battles in the Antebellum City.* Cambridge: Harvard University Press, 2014.

Rosenberg, Charles E. *The Cholera Years: The United States in 1832, 1849, and 1866*. Chicago, IL: Univ. of Chicago Press, 1962.

Schivelbusch, Wolfgang. *Disenchanted Night*. CA: University of California Press, 1995.

Schlör, Joachim. *Nights in the Big City: Paris, Berlin, London 1840-1930*. London: Reaktion Books, 2016.

Stansell, Christine. *City of Women: Sex and Class in New York, 1789-1860*. Urbana: University of Illinois Press, 1987.

Warner, Sam Bass, and Andrew H. Whittemore. *American Urban Form: A Representative History*. Cambridge, MA: MIT Press, 2012.