NEW URBAN MANUFACTURING

NEO-INDUSTRIAL DESIGN IN LOUISVILLE, KENTUCKY

by
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Bachelor of Arts in Political Science
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Submitted to the Department of Urban Studies and Planning
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ABSTRACT

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American manufacturing is experiencing a modest renaissance. U.S. firms are choosing to re-shore manufacturing jobs not out of their sense of patriotism, but because it makes good business sense. The costs of transportation and overseas labor are increasing, opening the door for domestic production. Political leaders are embracing the prospects for skilled, living wage jobs; President Obama has made manufacturing one of the central tenets of his economic recovery plan. This has important implications for cities, which stand to benefit from new investment and increased employment opportunities. However, important questions linger for planners: where will manufacturing jobs materialize within the urban fabric? Are factories even viable within the core cities of industrial regions, where there is the greatest need? If so, what physical planning strategies should those cities be pursuing in order to retain, attract, and increase the number of manufacturing jobs within their borders?

This research begins with a history of urban production, from the Industrial Revolution through the present day. Emerging trends are assessed and synthesized into a new model for urban industrial development. That model is tested with a detailed examination of Louisville, Kentucky, a place that embodies the renewed efforts to re-industrialize cities with a manufacturing past. Urban manufacturing typologies are presented that describe the urban forms in Louisville at large, and within the Park Hill industrial corridor in particular. A unified set of design principles is presented and matched to the urban manufacturing typologies, focusing on verticality, mixed uses, transparency, sustainability, connectivity, and adaptability. Finally, the thesis concludes with an assessment of the most pressing challenges and opportunities facing the implementation of the Neo-Industrial City model.

Thesis Supervisor: Eran Ben-Joseph
Title: Department Head / Professor of Landscape Architecture and Urban Planning

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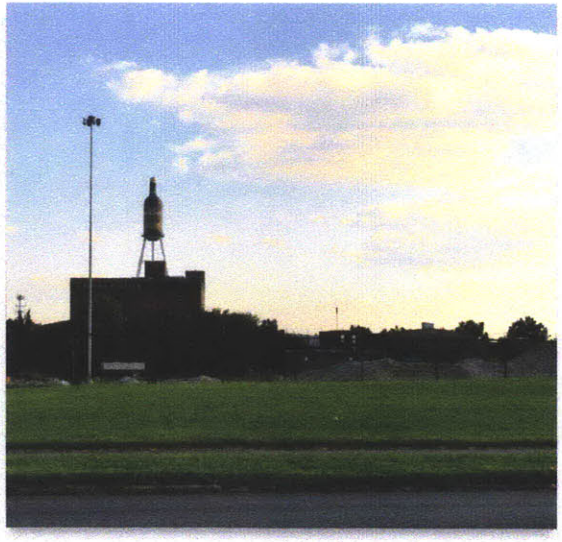

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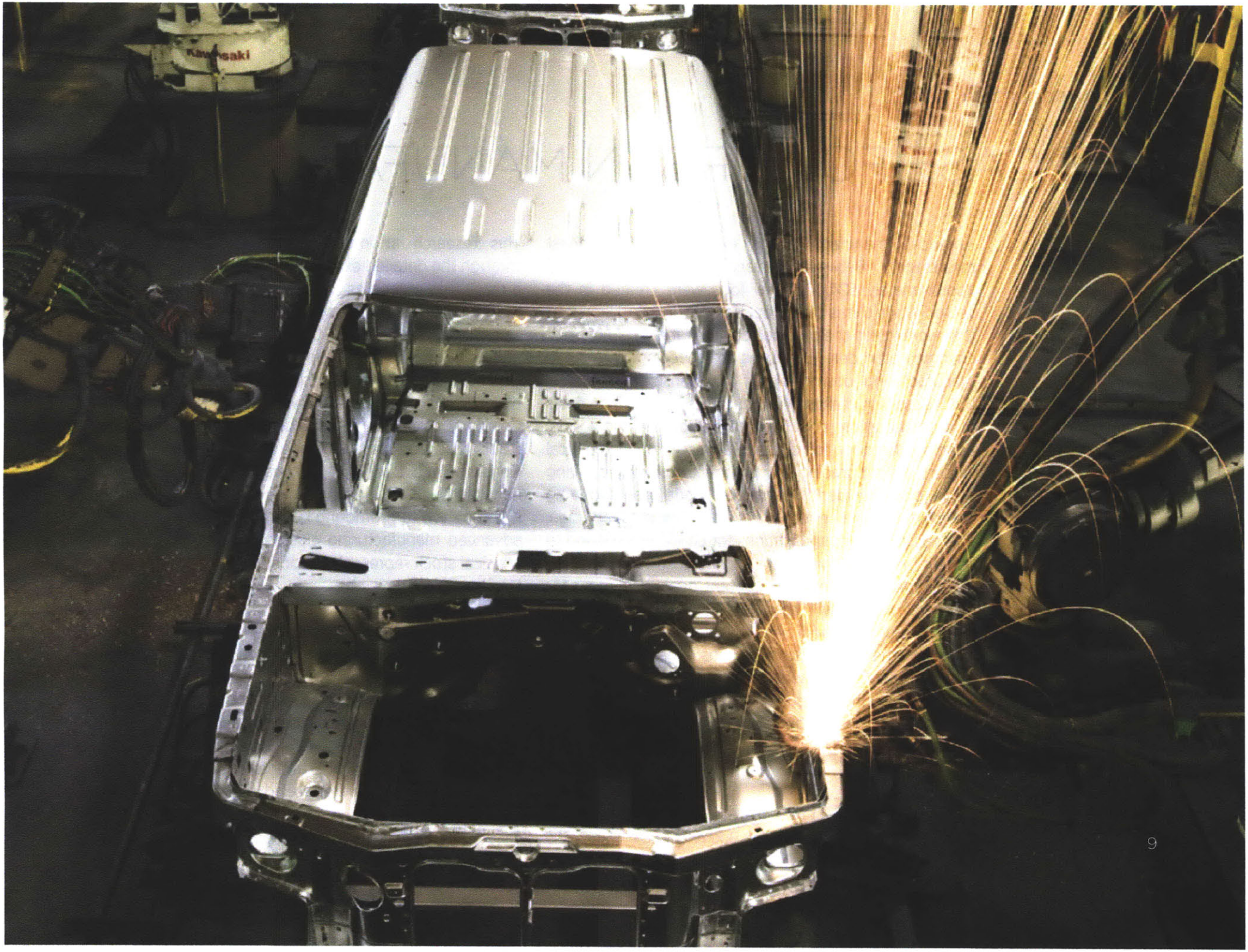

THE CASE FOR URBAN MANUFACTURING

American manufacturing is experiencing a modest renaissance. Between January 2010 and March 2013, approximately 524,000 new jobs were created in the sector. While this is only a fraction of the 5.8 million jobs that were lost in the previous decade,[1] it is a reflection of changing attitudes. U.S. firms are choosing to re-shore manufacturing jobs not out of their sense of patriotism, but because it makes good business sense. The costs of transportation and overseas labor are increasing, opening the door for domestic production.[2] Political leaders are embracing the prospects for skilled, living wage jobs; President Obama has made manufacturing one of the central tenets of his economic recovery plan. This has important implications for cities, which stand to benefit from new investment and increased employment opportunities. However, important questions linger for planners: where will manufacturing jobs materialize within the urban fabric? Are factories even viable within the core cities of industrial regions, where there is the greatest need? If so, what physical planning strategies should those cities be pursuing in order to retain, attract, and increase the number of manufacturing jobs within their borders?

This research attempts to answer these questions through the detailed examination of Louisville, Kentucky, a place that embodies the renewed efforts to re-industrialize core cities with a manufacturing past. According to the Brookings Institute, Louisville is one of the nation's five fastest cities in recovery, having restored 80% of jobs lost during the recession; manufacturing jobs in particular have increased 9% year-over-year. Ford Motor Company invested over $1 billion to modernize two plants that produce the Escape sport utility vehicle, and General Electric re-shored operations to its Appliance Park campus.[3] The economic development community is committed to promoting Louisville as the center of an advanced manufacturing cluster, but the city's limited physical stock represents an obstacle for attracting new business – and new jobs.

Herein lies the challenge for physical planning and urban design practitioners. Prevailing notions of post-industrialism have led to an extensive phase out of urban industrial land, through various instances of attrition and obsolescence. In many instances, vacant or underutilized factories and warehouses were converted to non-industrial uses such as loft apartments and artists' studios. In other cases, they were leveled entirely to make way

1 U.S. Bureau of Labor Statistics

2 Fishman, "The Insourcing Boom."

3 Rogers, "Louisville's Economic Comeback."

for new residential and commercial districts. The industrial space that remains is typically irregular and often contaminated. And to top it all off, the underlying land is still expensive relative to suburban and rural sites.

The question of what to do with legacy urban industrial land is a wicked problem, and the planning profession has barely begun to engage it. Economic development professionals are largely focusing on workforce development and access to financial capital; however, these efforts are often at the regional level. Physical planners and urban designers are by and large missing from the conversation altogether. Scott Page of Interface Studios, one of the only planning firms with an industrial land practice, affirms that "there's almost no serious discussion of the design implications of urban industrial land."[4]

Left to its own devices, legacy urban industrial land will not be redeveloped in a manner that supports manufacturing jobs; the near-term remediation costs and long-term competition from competing land uses are significant disincentives. So why should planners even care about urban manufacturing if it so difficult to implement? Fundamentally it matters for job creation in cities lacking economic opportunity. When manufacturers started moving their operations from city to suburb in order to reduce costs, they separated factories from the city workforce, creating what the late economist John Kain termed a "spatial mismatch." Commuting costs for the working class increased, which negatively impacted access.[5] In his seminal 1987 book *The Truly Disadvantaged*, sociologist William Julius Wilson reported that the exodus of manufacturing jobs from Northern cities was especially detrimental for black men.[6] Bringing manufacturing jobs back to the core city could mitigate the harmful effects of industrial sprawl.

Urban manufacturing offers a chance to place living wage jobs where people live – something that has been overlooked by smart growth advocates who have concentrated on employment in the "post-industrial" economy.[7] There are measurable environmental benefits associated with shortening commutes, as well as reducing delivery distances among firms. Proximity can also bolster the strength of economic clusters, due to the positive effects of knowledge spillover and a robust labor market . Manufacturing also has a multiplier that far exceeds the multiplier for service jobs;[8] for every job gained or lost, 2-3 supporting jobs are similarly affected.[9]

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4 Page, interview

5 Kain, *Essays on Urban Spatial Structure.*

6 Wilson, *The Truly Disadvantaged*

7 Leigh and Hoelzel, "Smart Growth's Blind Side."

8 National Council for Urban Economic Development, United States Economic Development Administration, and United States Dept. of Commerce, *Urban Manufacturing--Dilemma or Opportunity?*

9 Nash-Hoff, "American Manufacturing Has Declined More Than Most Experts Have Thought."

The promotion of urban manufacturing is also good fiscal policy; cities can generate additional revenue by enabling industrial land to be used efficiently. A study conducted by the Initiative for a Competitive City showed that industrial land was a net positive proposition for the city of St. Paul, Minnesota. While gross property tax revenues are higher for residential uses, they are negated by the cost burden of additional services; this is not the case for industrial uses [insert citation]. Manufacturing is also an excellent use for brownfield redevelopment, as the level of remediation is less extensive than for other uses.

Finally, there is a visceral quality about urban manufacturing that is essential to placemaking and civic pride in industrial core cities. It is about connecting to the means of production, tapping into a city's creative and constructive spirit. This is precisely why Louisville takes such great pride in having returned the Louisville Slugger factory to its home in the West Main District and why German car manufacturers are luring customers to assembly plant-showroom hybrids in Dresden and Munich. Cities built on industry are celebrating their past, present, and future as centers of production.

RE-SHORING'S BLIND SPOT

The importance of reviving America's manufacturing sector has been discussed for decades. In their 1987 book, Manufacturing Matters: The Myth of the Post-Industrial Economy, Stephen Cohen and John Zysman make the case that the wholesale movement towards post-industrialism is a shortsighted, as it will produce a one-dimensional service-based economy that will lose its ability to innovate. Their argument is at the core of today's re-shoring movement:

> *A flight offshore for cheap labor will not provide a winning long-term strategy; after a few rounds of product and process innovation it will just compound the problem. A strategy of trying to hold onto the high-value-added activities while subcontracting production to foreign producers who have a manufacturing edge defines the fast track to disaster. Over time American firms will not be able to control what they cannot produce. The only viable strategy for American firms is to combine advanced technology with high-skilled labor and innovative management to create high-wage, high-productivity, flexible production capabilities.*[10]

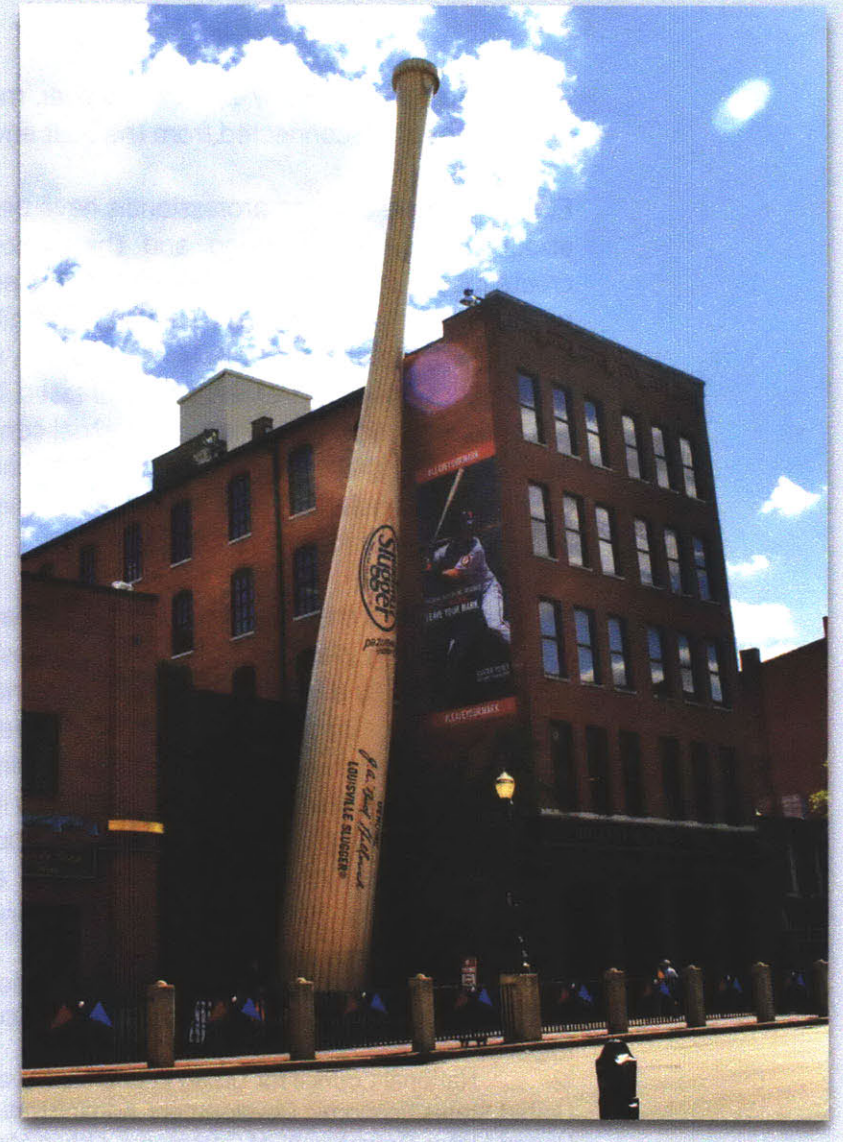
The call for a manufacturing-led innovation economy was renewed in 2010, when United States President Barack Obama declared his commitment to domestic manufacturing in his second State of the Union address. He appointed Ron Bloom, a prominent figure in organized labor, as his senior counselor for manufacturing policy, and he asked then-MIT President Susan Hockfield to lead a research commission. As this thesis is being written, MIT's Production in the Innovation Economy (PIE) initiative has released its first book on the topic, with

10 Cohen, *Manufacturing Matters*.

LOUISVILLE SLUGGER FACTORY & MUSEUM

Since 1884, Louisville Slugger has sold more than 100,000,000 baseball bats, making it the most prolific bat manufacturer in the history of the game. Each year, tens of thousands of baseball fans visit the Louisville Slugger Museum & Factory on "Museum Row" in Louisville's West Main District, seeking to experience a piece of Americana that is intrinsically connected with Kentucky's largest city. But this facility has only been open since 1996 – for several decades, the iconic bats were produced in suburban Indiana, following a shift in production from central cities to suburban greenfields that pervaded in the latter half of the 20th century.[1]

The Hillerich & Bradsby Co., which owns the Louisville Slugger brand, was lured back to the central city as part of a placemaking strategy that reinvigorated downtown Louisville. The return of baseball bat production to Louisville portends a reversal in the movement of select manufacturing firms that produce everything from food products to automobiles. In contrast to the long-held belief that industrial real estate is relegated to suburban and exurban locales, this thesis will demonstrate how manufacturers of value-added and location-sensitive products are seeking urban sites for production.[2]



1 "Louisville Slugger - The Slugger Story."
2 Ibid.

another to follow in early 2014.[11] However, most of this work has been disconnected from the built environment.

Economic development professionals have been writing about urban manufacturing and the opportunity to create jobs in industrial core cities, including an oft-cited policy forum organized by the National Council for Urban Economic Development in 1994. The forum, which also published a collection of essays, addressed barriers to the reuse and redevelopment of industrial contaminated properties, the shortcomings of enterprise zones, failures of land use regulation, and architectural challenges in adaptive reuse of industrial facilities. [12]

Despite the fact that nearly two decades have passed since that forum, planners have few resources to turn to when it comes to designing for manufacturing in industrial core cities. By and large, industrial developers are content to focus on suburban locales for business parks, data centers, and distribution facilities, which is reflected in practitioners' guidebooks. Recent publications from the National Association of Industrial and Office Properties do not even discuss heavy manufacturing facilities.[13] Similarly, the Urban Land Institute's Business Park and Industrial Development Handbook has almost no discussion of urban developments.[14]

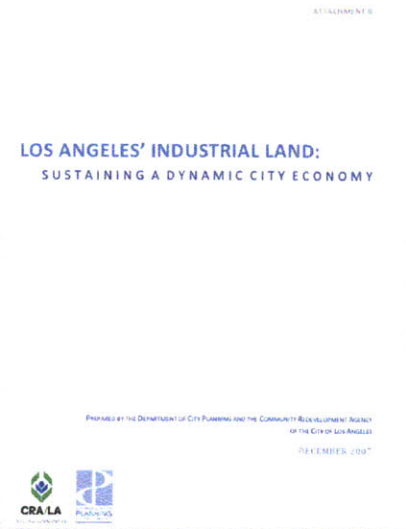
The missing element in all of this is an actionable strategy that physical planners and urban designers can employ in order to support the development of urban manufacturing. This thesis, while not attempting to be the definitive work on the subject, will provide a unified set of design principles to fill this gap in the practitioner's toolkit.

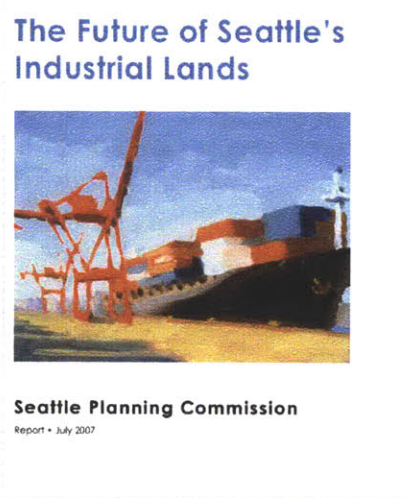
11 MIT Taskforce on Innovation and Production, A Preview of the MIT Production in the Innovation Economy Report.

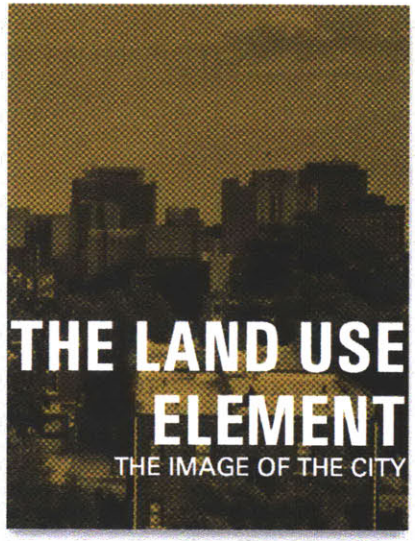
12 National Council for Urban Economic Development, United States Economic Development Administration, and United States Department of Commerce, *Urban Manufacturing--Dilemma or Opportunity?*

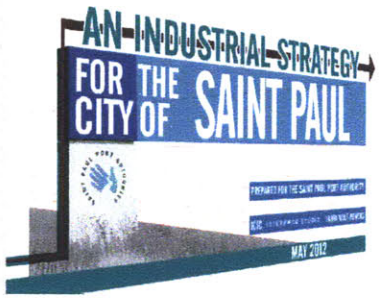
13 National Association of Industrial and Office Properties, Exceptional Industrial Projects.

14 *Business Park and Industrial Development Handbook.*









Industrial land plans, while relatively uncommon, have been conducted in several major cities over the past ten years, including Los Angeles, Seattle, Philadelphia, Detroit, and St. Paul.

ORGANIZATION AND METHODS

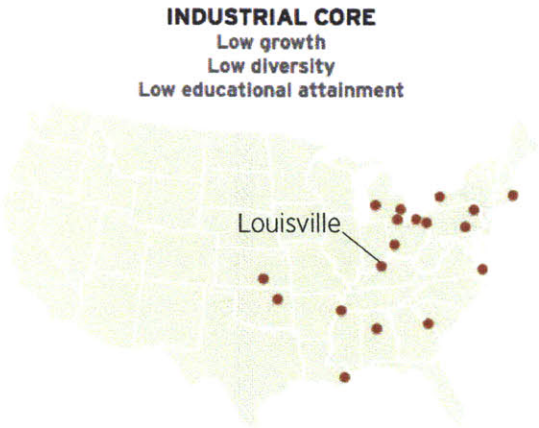
This thesis is a study on the potential for design and physical planning strategies to attract, retain, and grow urban manufacturing activity in the United States. By focusing on the embedded test case of the Park Hill Corridor in Louisville, Kentucky, I apply a pragmatic framework to address discrete opportunities and challenges in the built environment. Spatial analysis, key stakeholder interviews, and direct site observations are the primary methods employed, nested within a study of the historic patterns of industrial development. The lessons learned from the focused analysis are then extracted and re-evaluated for their applicability to other American cities.

Although manufacturing activity has the potential to occur in many different kinds of cities, some are better positioned than others. For example, the high land costs and lack of available land in big cities such as New York will likely prevent manufacturing from taking root on a large scale. One useful framework for considering the potential for manufacturing is the metropolitan area categorizations developed by the Brookings Institution.[1] Eschewing the traditional lens of regional generalizations, the new categories drew similarities among cities with similar demographic opportunities and/or challenges. Seven categories are differentiated by population growth, diversity, and educational attainment; suffice it to say that the largest cities and/or the ones with service-based economies are not particularly relevant to this thesis.

Industrial Cores, of which Louisville is a part, are in some ways the most geographically disadvantaged of Brookings' metropolitan types. These 18 metro areas are largely older industrial centers of the Northeast, Midwest, and Southeast. Their populations are slower growing, less diverse, and less educated than national averages, and significantly older than the large metropolitan average. These metro areas lost population in the aggregate in the 2000s. This category aptly describes the universe of cities that could stand to benefit the most from a resurgence in manufacturing activity. Much of the infrastructure needed to support new industry is already in place, and stagnant or shrinking populations are correlated with lower land values, which can allow industrial land uses to be viable within the urban core. Finally, workforce development can have a significant impact by provide pathways for upward mobility among less educated populations.

Among the industrial core cities, Louisville stands out. Despite its demographic challenges, Louisville was

1 The Brookings Institution Metropolitan Policy Program, State of Metropolitan America.



The Brookings Institution's *State of Metropolitan America (2009)* grouped the nation's largest metro areas into seven categories based on demographic characteristics.

resilient during the recession – in 2013, Brookings named Louisville as one of the nation's top five fastest recovering cities.[2] This is likely due to a relatively well-diversified economy that includes low tech, mid tech, and high tech industries. Since the metropolitan area is already showing resilient qualities, Louisville could exhibit qualities that would be transferable to other core industrial cores such as Cleveland, Memphis, Tulsa, and Providence.

As for the organization of the following chapters, Chapter 2 will establish the context for the current state of industrial land in America, giving a brief history of urban production from the Industrial Revolution through present day. It will also expand upon contemporary thinking about the role of manufacturing in the innovation economy, including placemaking strategies for cluster-based economic development. Chapter 3 will introduce Louisville and a series of spatial analyses, in the process identifying a set of manufacturing typologies that are most relevant in the infill context. Chapter 4 will include a more fine-grained analysis of existing conditions in Park Hill, Louisville's legacy industrial district that has been targeted for redevelopment. This chapter will also present a unified set of design guidelines and show how they might be applied in Louisville, while Chapter 5 will consider the obstacles and opportunities confronting the neo-industrial framework.

The successful re-industrialization of cities like Louisville will not be an easy process. The infrastructural and space requirements of 21st century production are not aligned with 20th century industrial districts. The low initial cost and ease of construction on suburban and rural greenfield sites undermines the competitiveness of urban sites, which are scattered and heterogeneous. However, these are surmountable problems. Some production facilities may never come back to core cities, particularly the ones that are most land-intensive. However, it is incumbent for urban planners to make these cities viable for manufacturing, for the benefit of job creation, economic sustainability, and pride of place.

2 Rogers, "Louisville's Economic Comeback."

TWO | CONTEXT


MADE IN AMERICA
MADE IN AMERICA
SOMETHIN' ELSE
every gift a work of art
Handmade American Crafts
CLOSED

THE URBAN HISTORY OF PRODUCTION

The relationship between the city and industry has long been one of necessity. The industrial revolution spurred large-scale urbanization, as new technologies enabled the adoption of water wheels, coal-fired steam power, and intercity railways. Factories located near transportation and power sources, and workers followed suit. Long hours and limited financial means restricted workers' living options to cramped quarters adjacent to factories. The rapid inundation of newly urbanized workers overwhelmed cities, resulting in exceptionally poor living conditions. The societal reaction was dramatic, and the side effects of the industrial revolution continue to affect the image of industry to this day.

The immediate pressures of overcrowding and lack of sanitation infrastructure led to the outbreak of diseases such as cholera, which led to the emergence of the modern profession of public health. Prevailing wisdom was that the epidemics were caused by the spread of germs, exacerbated by the lack of access to air and sunlight. This era produced the notion that industry ought to be separated from the places that people lived. Whereas industrialization and urbanization had once been thought of as one and the same, the idea that the two ought to be separated began to take root. The theory of use zoning emerged as early as 1876[1] and would catalyze the modern practice of urban planning.

THE GARDEN CITY

The most influential thinker on the subject was Sir Ebenezer Howard, whose 1902 book, *Garden Cities of To-Morrow*, remains as one of the most important texts in planning. Howard touched upon radical ideas of societal reorganization, including common land ownership, reflecting the discourse of the time.[2] But the concept that took root was the marriage of town and country. Howard wished to extract the benefits of both, to allow access to nature while enjoying the charms of a town dweller's lifestyle. Garden Cities would be self-sufficient, with residences, jobs, services, and a local food supply. Industry was carefully separated so as not to cause the ills experienced in sickly industrial cities.[3]

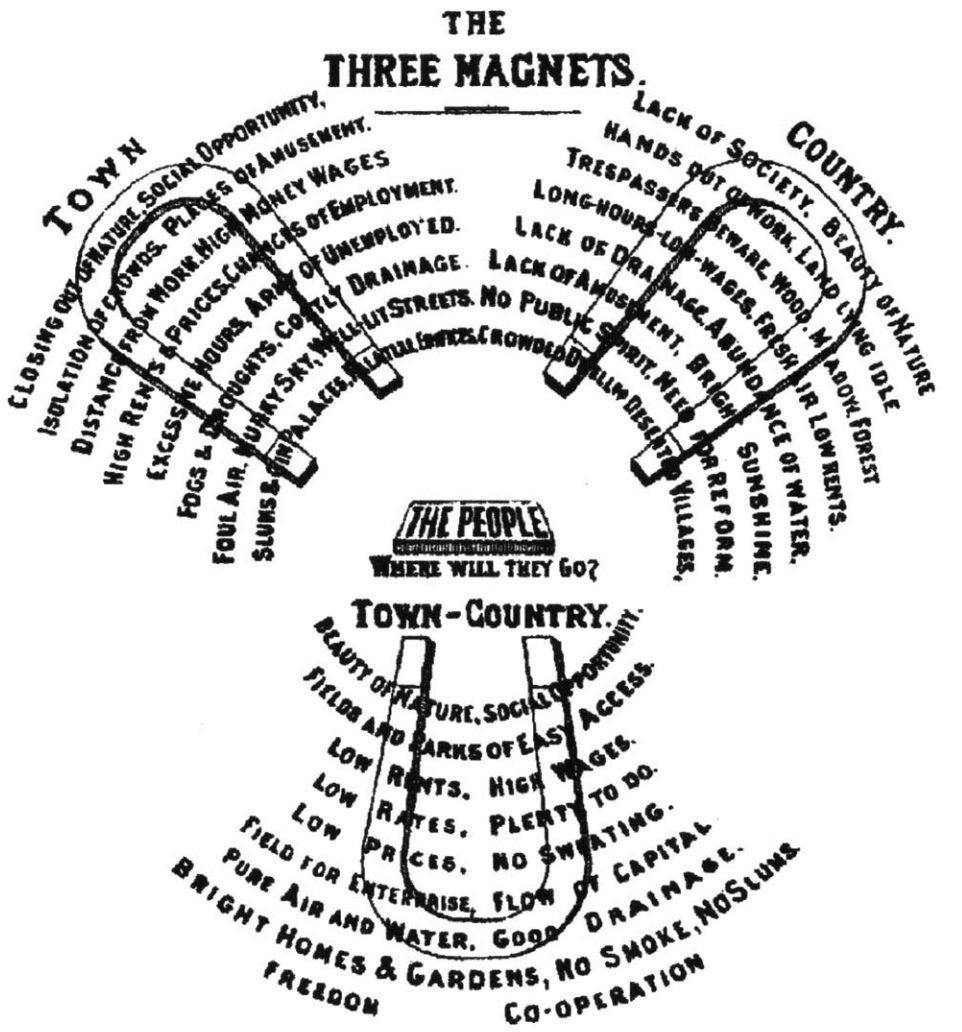
Howard's idea that industry should be quarantined from the city took hold, becoming codified as governments isolated industry to separate districts. This idea is deeply ingrained to this day, as industrial "parks" are typically

1 Kim and Ben-Joseph, "Manufacturing and the City."
2 Forsyth, "Planned Communities and New Towns."
3 Simons, "From New Town to Eco Town."

separated from residential neighborhoods. Over time, isolated industrial buildings lost their architectural lexicon. They became flat, windowless, uninspired rectangles surrounded by asphalt. The perception of industry as a polluter that should be quarantined was self-reinforcing, as this out-of-sight, out-of-mind mentality stunted advancements in architecture and urban design.

Environmentalism has changed that perception, albeit slightly. Rachel Carson's 1962 book, *Silent Spring*, shed light on the negative environmental impacts of the pesticide DDT. The public could no longer turn its back on industry. The United States established its national Environmental Protection Agency in 1970, banned the use of DDT in 1972, and enacted the Clean Water Act in 1977. The American environmental movement represented a sea change in the relationship between industry and society, as concerns about environmental protection put an end to unbridled pollution.

In more recent memory, private companies have taken the initiative to address their relationship with the environment. In 1999, inspired to establish a new paradigm, the Ford Motor Company hired architect William McDonough to redesign its River Rouge Complex, which had been manufacturing trucks in Dearborn since 1928. A renowned sustainability thinker, McDonough created a bold vision for the industrial park, which includes extensive green infrastructure to treat rainwater, reduce cooling load, improve air quality and provide



Ebenezer Howard's Garden City merged the benefits of town and country.

fauna habitat. The complex showcases its green design with a new visitor center.

While the River Rouge Complex makes important strides, its urban form is largely the same as it was before. The environmental impact has been reduced on site, but employees still have the same commutes as they did before. The land around the factory buildings is vegetated, but the site's overall use mix and density are substantially unchanged. While the relationship between industry and the natural environment has improved, the complex is still at the edge of the city.

Industry and the city have not always been such separate entities. During the early portions of the industrial revolution, new industrial cities sprung up throughout England. They were largely based on the availability of power resources – namely, water mills. Industry also benefited from cities' labor pools, transportation hubs, and entrepreneurs.[4] Cities were the logical centers of production, and industrial cities quickly outgrew their older counterparts.[5]

Rapid population growth, driven by rural to urban migration, would lead to infrastructural deficiencies as cities simply could not keep up. When the basics of shelter, water, and waste disposal could not be met, it was widely believed that cities could not handle such density. Further exacerbating matters was the pollution from coal that accompanied the switch from water-based to steam-based energy. These factors gave rise to the Garden City tradition, whereby industry would be de-concentrated. Ebenezer Howard believed that by balancing town and country, the environmental ills of industrial cities could be alleviated.

Howard still intended for industry to exist within city limits, as it was a necessary part of the Garden City economy. It would, however, be sited around the city limits, so as to contain its perceived impacts. By creating an industrial zone around the periphery of the Garden City, even clean energy was enabled:

> *The smoke fiend is kept well within bounds in Garden City; for all machinery is driven by electric energy, with the result that the cost of electricity for lighting and other purposes is greatly reduced.*[6]

Howard's Garden City ideal also maximized the utility of urban transportation systems. The industrial area was envisaged as being organized around the outside of the city in order to take advantage of rail transport:

> *On the outer ring of the town are factories, warehouses, dairies, markets, coal yards, timber yards, etc., all fronting on the circle railway, which*

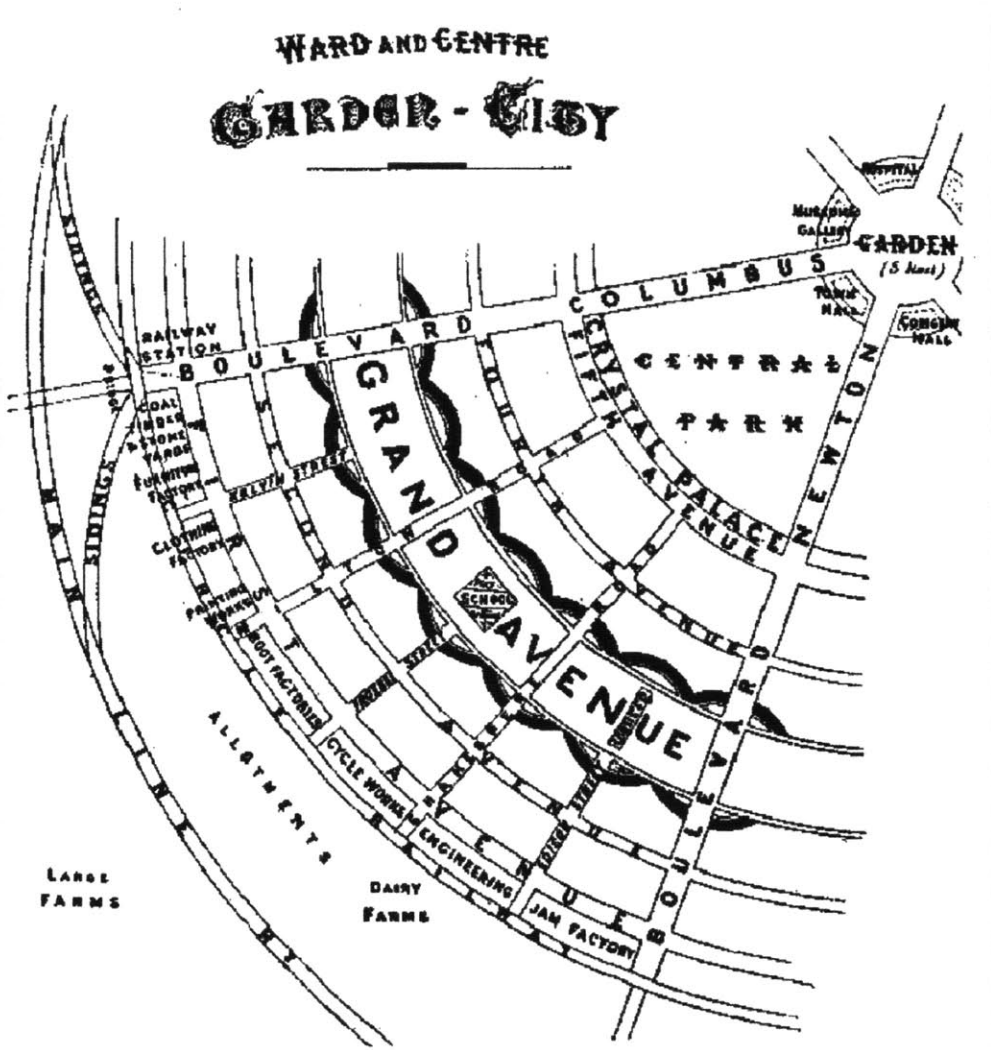
4 Rappaport, "Vertical Urban Factory."

5 Hoselitz, "The City, The Factory, and Economic Growth."

6 Howard, *Garden Cities of To-Morrow.*

encompasses the whole town, and which has sidings connecting it with a main line of railway which passes through the estate. This arrangement enables goods to be loaded direct into trucks from the warehouses and workshops, and so sent by railway to distant markets, or to be taken direct from the trucks into the warehouses or factories; thus not only effecting a very great saving in regard to packing and cartage, and reducing to a minimum loss from breakage, but also, by reducing the traffic on the roads of the town, lessening to a very marked extent the cost of their maintenance.[7]

The simple logic of organizing industry around rail, within easy reach of the city center, was adopted in new towns throughout England. The first generations of those new towns were designed around a variety of transportation modes. Industry, while separated from residential areas, was still accessible by bicycle.[8] While relegated to its own district, industry was still within reasonable proximity of the city, as the availability of a local workforce necessitated this location. Of course, Ebenezer Howard never imagined the rapid uptake of the automobile in the decades that followed.



In the Garden City, industry was located at the periphery, serviced by rail.

7 Ibid.

8 Simons, "From New Town to Eco Town."

NEW TOWNS / COMPANY TOWNS

One of the great experiments in urban design, the company town provides a comprehensive model for the integration of industry, housing, and amenities. Built by or around a single employer, company towns have enjoyed differing levels of success, which is often tied to the fortunes of founding firm. The most successful ones evolved over time, building upon their statuses as industrial centers to attract and retain a diversity of employers. The company town is important for discussion because contemporary small cities often find themselves in the position of wooing large employers to serve as economic anchors, but it is potentially a very limiting redevelopment strategy.

The first company towns emerged in the eighteenth century as a way to house new factory workers for rapidly expanding industries; they were often developed by a single employer. These included Lowell, New Hampshire (textiles), Pullman, Illinois (railroad cars), Essen, Germany (iron works), and Saltaire, England (wool). Although not without problems – these cities also hosted some infamous labor strikes – company towns have proven to be good places to live. Writing about Manchester, New Hampshire, Tamara Hareven and Randolph Langenbach contend:

> *Contrary to the prevailing popular idea that large factories and the urban environment cause individual anomie and social fragmentation, most of these people had a highly developed sense of place and formed tightly knit societies around their kin and ethnic associations.*[9]

Note that company towns – and new towns in general – are different from planned communities, in that they are specifically planned to include local jobs, not just residences. In Pullman, the company provided housing, markets, a library, churches, and entertainment for their 6,000 employees and their dependents, but they also required residence as condition of employment.[10] Note how different this is from the New Urbanist movement in the United States; although communities are planned with town centers, transit access, and third places, most employment is assumed to be fulfilled outside those communities.

Planning a residential community within an existing metropolitan area is simple when compared to creating a new town. The sheer number of stakeholders, regulatory hurdles, and financial resources required can be overwhelming. The task of building a town from scratch is Herculean; where do you begin? As Ann Forsyth writes:

> *In terms of building a new town, the classic problem is that a great deal of infrastructure needs to be in place before people arrive but until enough people arrive, there is not a revenue stream to pay for it...*

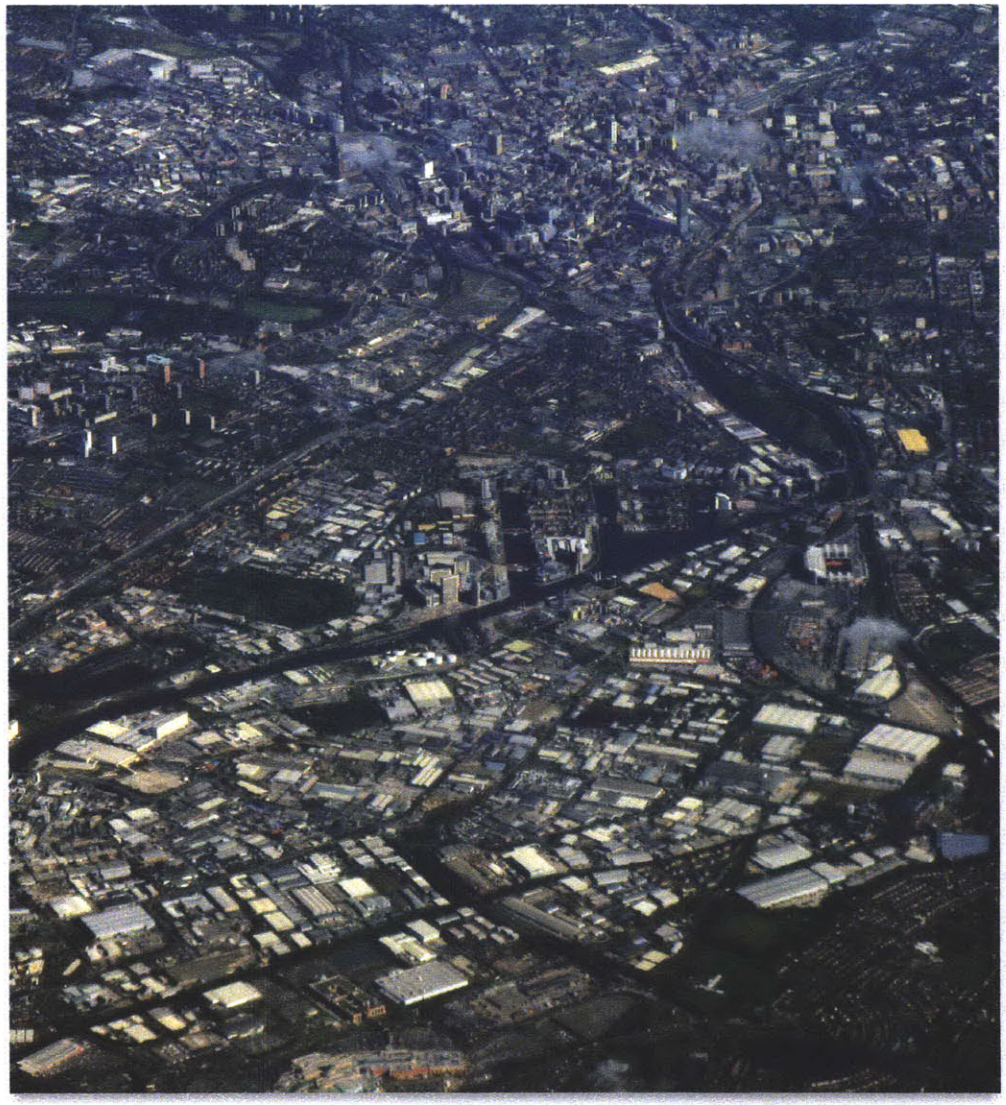
9 Hareven and Langenbach, *Amoskeag*.
10 Kim and Ben-Joseph, "Manufacturing and the City."

Company towns have jobs in place early but often lack a variety of options; other new towns need to attract industries. Without significant government intervention, and even with it, this can take years. These have design implications because the new town needs to be designed to function when under construction as well as when fully built – a difficult challenge.[11]

New towns only exist in a few places around the world, due in no small part to the challenges delineated herewith. Given the choice, industries will usually take the easiest path when selecting locations for their production facilities. Barring exceptional circumstances, that path typically doesn't include a company town. Whether it includes a city whatsoever is the more pertinent question.

INDUSTRIAL PARKS

The world's first planned industrial estate was established in Manchester, England, in 1896 when Trafford Park Estates, Ltd. purchased a 1,200-acre country estate adjoining the docks of the Manchester Ship Channel (the estate had been the ancestral home of the Trafford family). The ship channel, which provided access for ocean vessels to reach Manchester, allowed the city's port to flourish 54 miles inland, closer to the heart of England's industrial region. Trafford Park Estates was



Trafford Park Estates in the foreground; Manchester appears in the distance.

11 Forsyth, "Planned Communities and New Towns."

dominated by heavy manufacturing and remained the world's largest planned industrial estate until the 1950s.[12]

In the United States, the first industrial districts were constructed in Chicago shortly after the turn of the century. The Central Manufacturing/Original East District was developed by the Union Stock Yard and Transit Company in order to attract additional freight for the company's rail line. In this case, transportation not only enabled industrial development, but its representatives actively pursued it. The 260-acre tract was built in 1902, and featured buildings with a uniform height of four stories to facilitate the gravity-fed production which was prevalent at the time. Each building was served with its own rail siding, and power and steam were provided from a district generating plant. Streetscape features such as landscaping, planting strips, and ornamental lighting were incorporated into the design. A navigable portion of the Chicago River flowed into the middle of the district, although it is unclear whether barge transportation was incorporated into the district.[13]

The management of the Central Manufacturing District opened its second industrial district in 1916, the Pershing Road District. Although adjacent to the Original East District, it was much smaller at 80 acres, but it continued the innovations that began in its neighboring district. In addition to a centralized heat, light, and power, the Pershing Road District also had a central sprinkler system, a centrally located freight station for less-than-carload shipments, and standardized structural design (minimum six stories and basement, high-speed elevators, standardized building systems). It even had underground traffic and utility systems to provide fast, safe transportation and utility service. In terms of its relationship to the city, the Pershing Road District had a mile of frontage along a highway; on the other side of the highway was McKinley Park which served as a green buffer and a comfortably scaled "front yard" for the rows of six-story buildings along the edge.[14]

These railroad-sponsored districts were the precursor to modern industrial parks, which became increasingly prevalent after World War II. Examples from this era include the New England Industrial Center in Needham, Massachusetts (1949) and Stanford Industrial Park in Palo Alto, California (1951). Industrial parks changed even more dramatically in the 1970s and 1980s, in correspondence with the shift from heavy manufacturing to service, information, and technology-based industries.

Today's business parks have evolved to include more flexible facilities, greater tenant services and employee amenities, and a higher degree of public/private development agreements, controls, and fees. The locational concerns of the early industrial parks, which centered on

12 Urban Land Institute, Business and Industrial Park Development Handbook.

13 Ibid.

14 Ibid.

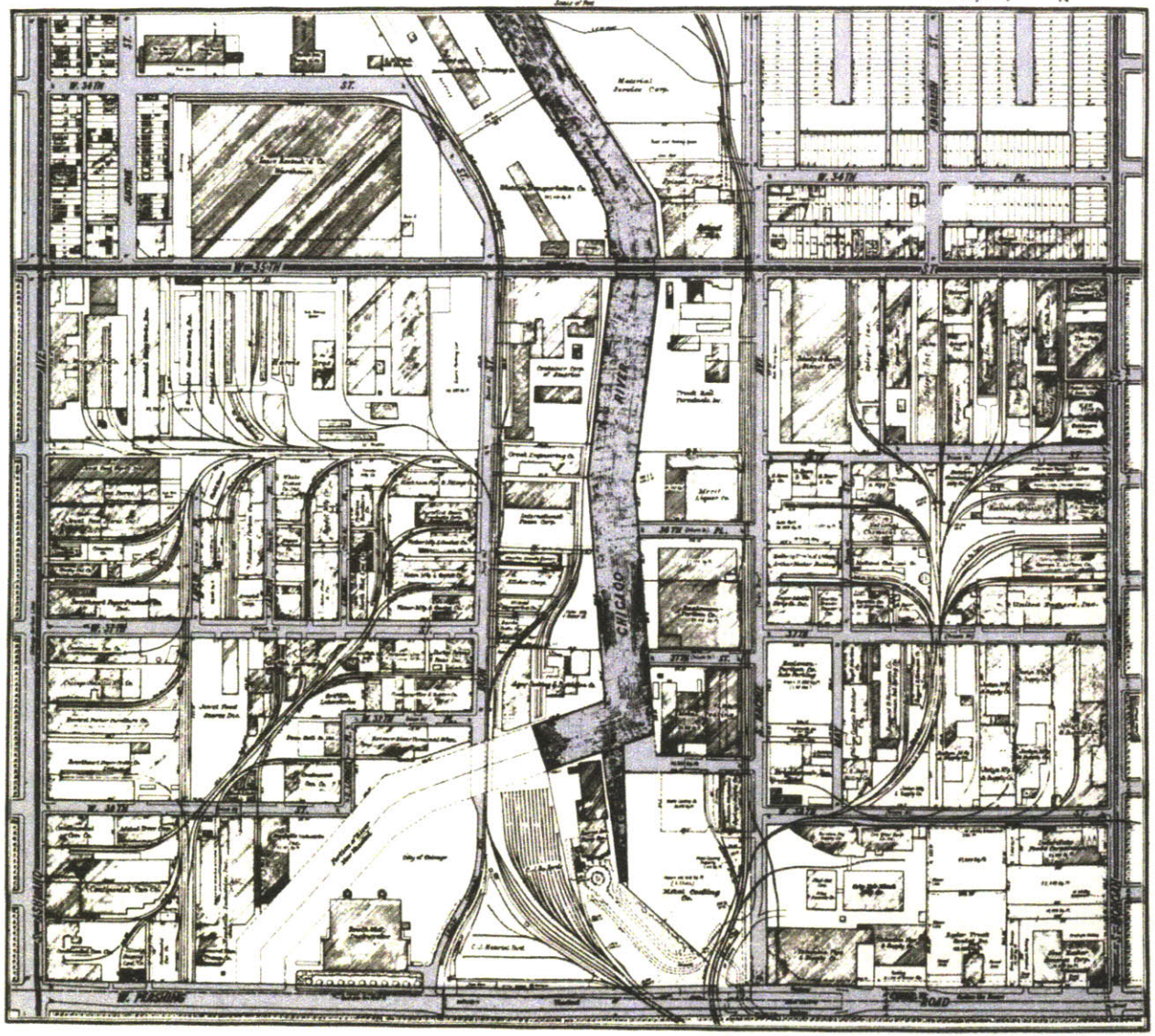
CENTRAL MANUFACTURING DISTRICT

C. M. D. Studios — William Wood Prince and James F. Donovan

Telephones
Randolph 6-2252

Offices
1307 First National Bank Bldg. Chicago

N



proximity to railroads, ports, and raw materials, have been supplanted by access to high-quality housing, shopping, cultural amenities, and educational facilities.[15]

DROSSCAPE

In 1930, Frank Lloyd Wright was re-imagining industry's relationship with the civilized world. His Broadacre City ideal was predicated on the motor car and the potential dispersion of jobs. "Wright felt the city and the industrial civilization that produced it must perish," wrote urban sociologist Leonard Reissman. "They were the consequences of diseased values, and to achieve health, new values had to be established in a new environment."[16] Broadacre City was the antithesis of the industrial city, representing the strongest reaction yet to its perceived ills. Although Wright's agrarian vision was not realized on a broad scale, it represented a societal shift in attitudes towards the role of industry in society.

World War II had a tremendous impact upon the location of industrial production, as a rapid increase in industrial demand and vertical integration led to the development of immense production facilities that could no longer be located within existing urban fabrics. Although large factories were able to achieve certain economies of scale, they gave rise to a now-familiar physical form: single-story, windowless, sealed off from the world.[17] The big box form would continue to be reinforced through advances in air conditioning – the importance of natural ventilation diminished – and automobile infrastructure.

The construction of highways in the mid-twentieth century dealt a huge blow to urban industry. Rail transport lost its competitive edge, as proximity to shipping hubs was much less of a concern to industries that could rely upon trucks. Factories were also no longer dependent upon a local labor force, as employees could commute over longer distances. The rise of standardized container shipping and digital supply chains would further reinforce the supremacy of trucking over rail shipping.[18]

These large-scale changes resulted in outward sprawl, leaving behind the remnants of urban industry in a wasted landscape – a phenomena that MIT professor Alan Berger has coined *drosscape*.[19] Berger writes:

> *[De-industrialized sites] await some form of reclamation prior to reprogramming and reuse... Adaptively reusing this waste landscape figures to be one of the twenty-first century's great infrastructural design challenges as these sites are potentially transformable into new productive uses such as permanent open landscapes or infill developments.*

15 Ibid.
16 Don, "Frank Lloyd Wright's Utopian Dystopia."
17 Rappaport, "Vertical Urban Factory."
18 Ibid.
19 Berger, Drosscape.

The rapid exodus of traditional industry from cities has been a boondoggle for urban economic development for a generation. But as the next section describes, there is a renewed interest in reversing the trend of de-industrialization and bringing manufacturing back.

RECONCILING THE POSTINDUSTRIAL CITY

> *To call a city "industrial" in the present period... is to associate it with a set of negative images: declining economic base, pollution, a city on the downward slide (Jakle and Wilson 1992)... Constructing a new, more positive picture includes the marketing of a new image, constructing a new environment, and reorienting a city's relationship with its physical environment.*[20]

A great deal has been written about postindustrial cities, that is, cities that have experienced decline following the export of manufacturing labor. Much of the discourse is centered around a postindustrial economy, whether it is focused on a service-based economy or a new creative class. This is typified by the so-called New Century Cities, a typology that has been explored at length by MIT researchers.[21] There is also an emergent movement for small urban manufacturing, as represented through "Made In" initiatives.[22] But postindustrial nations are beginning to re-embrace domestic production on a larger scale. The economic drivers of offshore production, such as lower labor costs, are eroding as wages rise in developing economies. Concerns over intellectual property protection and rising energy costs are also contributing factor. Cities are being presented with an opportunity for revitalization and job creation, but it would require progressive thought to break away from the physical status quo of big boxes in the hinterlands.

The desire to re-brand struggling cities as postindustrial is understandable, if troubling. Although it shows that cities are adapting to new circumstances, it evokes a perception of jumping ship. Remaining industry is devalued, as the message being broadcast is that manufacturing is an activity of the past, and it's only a matter of time for the firms that are still standing. This sentiment is particularly acute in the United States, where manufacturers are concerned that the country may be losing its industrial knowledge – the ability to develop and produce new products. This is widely expected to have the long-term impact of undermining the national economy.[23]

Both President Barack Obama and his main challenger Mitt Romney have promised to bring manufacturing back during the 2012 campaign. Through a series of

20 Short et al., "Reconstructing the Image of an Industrial City," 208.

21 Joroff, Frenchman, and Rojas, "New Century City Developments: Creating Extraordinary Value."

22 Mistry and Byron, "The Federal Role in Supporting Urban Manufacturing."

23 Ibid.

tax breaks, loans, trade enforcement, and targeted investments, manufacturing is being discussed as a growth sector for the first time in recent memory. This is supported by employment data, which showed an uptick in manufacturing in 2010, the first such increase in 13 years.[24] Economists disagree over the number of manufacturing jobs that could be created, and the types of jobs will surely be different than the ones that existed in the heyday of America's unions.[25] Nevertheless, the renewed interest in manufacturing has not attracted the same attention from urbanists. Perhaps it is because cities have forgotten how to make places for making things.

Following the decline of rail in the United States during the automobile era, many railways were abandoned. Having been unused for decades, community activists saw an opportunity to utilize the public rights of way for a better purpose, creating hundreds of rail-to-trail projects. The recreational routes, while popular, are also problematic now that rail is starting to be re-embraced by a country looking for alternatives to the private automobile. Once rail has been removed, it is quite difficult to reinstate.

There is concern that a similar phenomenon could happen with industrial facilities. In postindustrial cities, many former industrial spaces have been adapted for other uses, such as loft apartments. While this is generally good for urbanism, it can be of long-term concern for cities that wish to re-establish an industrial core. If enough infrastructures have been removed, it can be difficult to return to a previous use. Postindustrial cities would do well to consider future adaptability when pursuing strategies for industrial reuse.

One example is the reclamation of military industrial sites in New York City, namely the Brooklyn Army Terminal and the Brooklyn Navy Yard. Unlike the manufacturing spaces throughout the rest of the city, which have largely been converted to residential and commercial uses, these two sites have remained largely the same since World War II. The reason being that they were under control of the national military, which was not subject to market pressures to convert its industrial spaces. However, after many decades, the military turned these properties over to the City of New York, which has been aggressively seeking to attract new industries. A city built upon the financial services industry, New York has felt the effects of a global downturn and is particularly cognizant of the need to diversify its economic base.

The revival of former industrial spaces is one way for cities to begin approaching the re-introduction of industry, but many of those spaces have disappeared long ago, or have been altered such that they are no longer useful. So it remains a relatively limited strategy, one that must be complemented by entirely new organizing concepts. Moving forward, there are a few directions for cities that wish to revive manufacturing. In a sense, they can *look*

24 Hagerty, "U.S. Factories Buck Decline."
25 Goldfarb, "Can Obama Save Manufacturing?".

back to previously constructed urban industrial spaces, *look up* to the creation of new space through verticality, and *look forward* to a new typology of industrial park that is based upon environmental sustainability.

VERTICAL URBAN FACTORY

A 2011 exhibition at the Skyscraper Museum in New York City represented a thought exercise in a form that could be better suited for the city: the vertical urban factory. If one of the reasons that industry moved to the country was the search for more space, then perhaps urban designers could look in a different direction to accommodate industry within dense urban factories: upwards not outwards.

This is a concept that was explored in the early 20th century, as vertical integration began to occur in both the conceptual and physical realms.[26] Automated conveyors and/or gravity-fed chutes were used to facilitate production flows within stacked facilities. Ironically, car manufacturers were among the first to implement the vertical factory, with notable examples including Ford's Highland Park Factory in Detroit, and the Fiat Lingotto Factory in Turin. The latter is particularly well known for having installed included a test track on the roof of the factory.

Similar verticality was also achieved in multi-tenant industrial buildings. Typically the tenants were from similar or related industries, so as to benefit from aggregated access to employees and customers. Smaller operations also benefited from sharing common areas and services. This is a practice that continues to occur to this day in New York's Garment District, which houses a multitude of designers, fabricators, distributors, and retailers. Another example is the Starrett Lehigh Building, an ambitious industrial building on Manhattan's West Side, covering 2.3 million square feet, with elevators large enough to accommodate all but the largest delivery trucks.

Manufacturing firms, and policymakers who would like to support them, are once again realizing the benefits of vertical integration. If that can occur in cities, then vertical urban factories could become important components of urban revitalization strategies. Furthermore, the potential environmental benefits are quite large, especially as production moves towards just-in-time manufacturing and cradle-to-grave recycling processes.[27]

Nina Rappaport, curator of the Vertical Urban Factory exhibit, identified three types of contemporary manufacturing spaces in cities. The first is *The Spectacle*, an iconic piece of design that is described in the next section. The second is *The Flexible*, which changes easily in order to accommodate new technology and changes in economic conditions. The example she gives is American

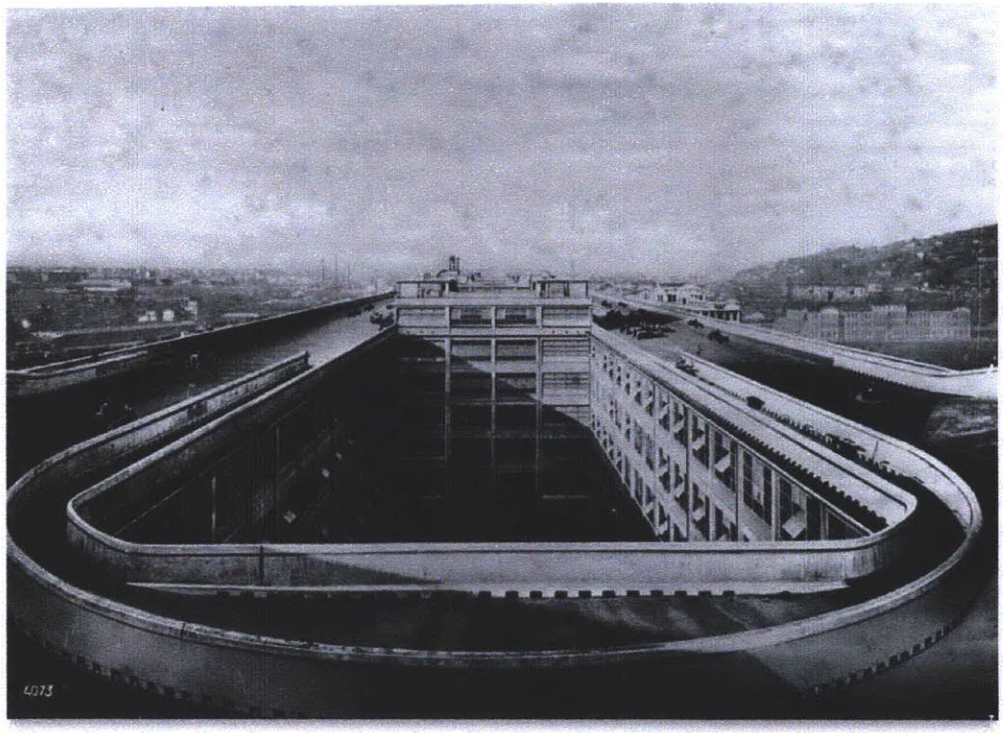
26 Rappaport, "Vertical Urban Factory."

27 Ibid.

Apparel's production facility in Downtown Los Angeles. Finally, Rappaport points out *The Sustainable*, which can serve multiple functions and integrates green building principles. She gives the example of the Brooklyn Navy Yard, the former military site that now houses a number of startup industries.

The three types are non-exclusive, as one could easily show how the Brooklyn Navy Yard is also flexible and the American Apparel is a spectacle, even if it's not that dramatic. The greater point is that these are the principles that will make urban manufacturing spaces competitive in the future. The clustering of firms in like industries works to their benefit, especially when they are along the same vertical supply chain. This is where cities can add value, by connecting designers with fabricators. Designers, who tend to live in cities, are empowered these days by rapid prototyping technologies such as computer numerical control (CNC) machines and three-dimensional printers. By having ready access to large-scale producers, they are able to better design efficient, effective products.

Finally, the vertical urban factory offers a platform for a new industrial paradigm that moves beyond mitigating harmful impacts and towards symbiosis with the natural environment. Trends in industrial management, including lean manufacturing, cradle-to-cradle recycling, and just-in-time production, are significantly reducing material and energy waste. Proximity to clients, customers, suppliers, and service providers can reduce transportation costs significantly. Proximity also enables



The Fiat Lingotto Factory in Turin typified the vertically integrated manufacturing process. Raw materials would be delivered on the ground floor, and fully assembled cars were driven on the rooftop test track.

urban metabolism; for instance, it creates opportunities for the reuse of waste outputs such as heat. Given proper management, a balanced urban metabolism provides industries significant economic benefits, as well.

SPECTACLE FACTORIES

The iconic *Die Gläserne Manufaktur*, or Transparent Factory, began operations in 2001 to the rave reviews of architectural critics. Jonathan Glancey of the Guardian called it "an industrial revelation. A revolution even."[28] Producing the company's luxury Phaeton sedan, both the factory and the product line were conceived of simultaneously with the explicit aim of communicating the process of automobile construction. It is a stunning facility with polished hardwood floors, minimalist aesthetics, and a 100% glass envelope – hence the name. The assembly line has been completely re-imagined, as robotic arms on overhead tracks guide the cars silently from station to station as smaller, droid-like machines move parts and tools to the appropriate worker; they are guided by a computerized management system that controls under-floor conduction loops. The workers themselves are dressed in white jumpsuits, disappearing into this unique form of industrial-interior design. Customers get to observe the auto plant in action, and even participate in the final assembly of their made-to-order vehicles.

Even the factory's parts are delivered in an innovative manner. Utilizing Dresden's passenger tram rails, the factory receives shipments via bright blue "CarGoTrams." This was a strategy devised to avoid the use of trucks on city streets. It is one of the most essential components of a new paradigm in urban industrial operations. Modernist ideas of separating manufacturing from the residential city give way to a new, harmonious coexistence.

That is not to say this is a perfect model. *Die Gläserne Manufaktur* does not host the primary sector of the economy, whereby raw materials are extracted and processed; only the final assembly stages take place in the Dresden facility. Trams may relieve the streets of truck traffic, but the factory is producing luxury cars that can only add congestion to urban environments. Nevertheless, this is manufacturing activity that would happen somewhere, so why not in an urban environment? It is an architectural icon that adds to Dresden's cache as an up-and-coming metropolis. It has been embraced by the city, and both Volkswagen and Dresden are reaping the benefits.

ECO-INDUSTRIAL PARKS

In direct opposition to twentieth century conceptions of industry, eco-industrial parks embrace industry's potential for environmental sustainability, though the concept is still in its infancy. Kalundborg Eco-Industrial Park in Denmark is considered among scholars to be the only mature eco-industrial park, and it evolved over a

28 Glancey, "Dream Factory."

period of 25 years.[29] Numerous public and private entities have seized upon the branding opportunity, including a plethora of developments in East Asia. The scale can be immense: Suzhou Industrial Park in China, a collaborative effort with the Singaporean government, is an eco-industrial new town development with a planned residential population of 1.2 million. The Delhi-Mumbai Industrial Corridor will span some 700 miles, linking twenty-four industrial zones/areas. Although cleaner and greener technologies are being deployed, developing symbiotic relationships to minimize waste will take substantial time and effort if it is to be achieved. Nevertheless, even the commitment to branding suggests a changing attitude toward urban industry.

CLUSTER-BASED DEVELOPMENT

In 1994, Michael Porter proposed a new model for economic development. Presenting the existing, flawed models of inner city development, Porter made the case that cities could no longer rely upon cheap labor, low cost real estate, and basic infrastructure to provide a competitive advantage. They would need to rely instead upon their human capital; clusters of economic activity were the source of cities' competitive advantage, and only the firms that continued to innovate would be successful in the long run. Porter is not without controversy – his emphasis on business development critiques social

Die Gläserne Manufaktur in Dresden is the foremost example of a spectacle factory.

29 Chertow, "The Eco-Industrial Park Model Reconsidered."

programs such as income assistance, housing subsidies, and food stamps.[30] Nevertheless, the idea of promoting the development of clusters has been quite influential.

In June 2013, General Electric also entered into an agreement with the University of Kentucky to collaborate on research projects that could lead to new inventions related to home appliances. Notably, the agreement sets forth conditions for shared intellectual property, streamlining the working relationships between GE scientists and University students and researchers. Collaborations such as these are fundamental to strong economic clusters, as private companies stand to benefit from the human and intellectual capital of universities, while students have a chance to contributed to research with immediate, real-world applications.

CURRENT LAND USE CONDITIONS

In 2013, Minjee Kim and Eran Ben-Joseph investigated the efficacy of land use planning in fostering manufacturing activities in urbanized areas. Their exploratory survey of U.S. cities' practices revealed that the location choice and morphology of manufacturing facilities continue to be affected by social forces and theoretical planning principles. Their general findings were that cities and their planning officials recognized the importance of urban manufacturing activity, but zoning regulations often discouraged such activities from occurring within their cores, producing a conflict between policy and ideals. Kim and Ben-Joseph acknowledge the efforts to integrate manufacturing activity in cities such as Philadelphia and Chicago, but note that the approaches are ad-hoc remedies to existing zoning regulations, rather than large-scale overhauls. The authors recommend that new, hybridized land use policies may be required, although they do not go so far as to describe exactly what those policies might look like.

The survey authors identify three major models for urban manufacturing: (1) Center-city manufacturing, which involves the reclamation or enhancement of manufacturing facilities in dense urban cores; (2) Urban edge manufacturing, which takes advantage of labor pool proximity, and; (3) suburban/rural manufacturing, where agglomerations of manufacturing firms are bound together through extensive subcontracting and networking relationships. All three of these forms are found within Louisville and are described in detail in the following chapter.

Of the 74 survey respondents, all of them allow manufacturing activities within their borders, and only a small portion (10%) went so far as to discourage those activities. Cities reported various approaches to encouraging manufacturing uses, including more flexible zoning ordinances, financial incentives, and workforce development. Respondents noted that manufacturing uses

30 Michael E. Porter, *The Competitive Advantage of the Inner City.*

were typically permitted outside of core urban areas. Interestingly, 80% of respondents considered their current zoning ordinances sufficient for future manufacturing needs, but that those locations were in urban edges or suburban industrial parks. Additionally, 79% of respondents noted that manufacturing uses were allowed to be mixed with other land uses. This suggests that the codes themselves may not need much revision. Indeed, survey respondents reported high land prices (37%) and lack of available land (32%) as being the greatest obstacles to urban manufacturing.

The survey does not ask respondents to go into greater detail about the kind of land that is being sought, but it can be assumed that large-scale greenfield sites are few in number and high in price. However, brownfields may offer at least a partial solution to the land availability problem. With adequate government intervention, the cost of the land can be reduced to the point that it is viable for development for manufacturing uses. The challenge is to figure out what exactly those uses are in the context of today's cities. The next section introduces a normative framework that is referenced throughout the remainder of this thesis.

DEFINING NEO-INDUSTRIALISM

If underlying macroeconomic factors allow manufacturing to return to the United States in a significant way, then planners have an opportunity to fundamentally rethink the way that production is incorporated into the urban fabric. Certainly some facilities will continue to be built in suburban and rural locations, as vertical integration and horizontal expansion are unavoidable for the largest manufacturers. But for small and mid-sized firms, there is a potential to capture the multiplier effect of industrial development within cities, which have the land, labor, and capital to support such activity. Urban manufacturing has the potential to create local jobs, improve the image of the city, and provide opportunities for social mobility and participation in the manufacturing process. Perhaps not every city can have its own Die Gläserne Manufaktur, but every city can take certain steps towards improving the relationship between industry and the city. Breaking away from the decades-old legacies of separated uses and disengaged manufacturers will require a new model of urban design.

This thesis proposes such a model. The Neo-Industrial City will be driven by cluster-based development that aggregates the production activities of related industries. Firms compete on quality and innovation, rather than shortsighted cost cutting. Having a better-diversified economy, with greater social mobility across all education levels, the Neo-Industrial City also emerges from the trappings of past industrial cities. A flexible and human-scaled urban form enables infill development, with manufacturing located in the center-city, the urban edge, and points in between. Environmental compatibility is renewed as eco-industrialism takes root. The Neo-Industrial City is robust and resilient, as manufacturing is reintroduced into the urban fabric and celebrated by the community. It represents a fundamental shift in attitudes from the industrial cities of the past, as represented in the table on the opposite page.

Having examined the historical patterns of industrial development and emerging trends, the next chapter will investigate how they have impacted and are continuing to impact the physical form of the Park Hill neighborhood in Louisville, Kentucky. Based on this analysis, a unified set of design principles is presented in Chapter 4, as a method of understanding how these influencing factors can best shape the Neo-Industrial City. The principles, and the model they represent, are an attempt at identifying the most important potential contributions of physical planning to urban manufacturing at large.

	INDUSTRIAL	*NEO-INDUSTRIAL*
Competitive Advantage	Low Cost	Rapid Innovation
Organization of Firms	Anchor-Based	Cluster-Based
Relationship with Environment	Exploitative	Symbiotic
Labor Mobility	Driven by Tenure	Driven by Education
Production Scale	Large and Inexpensive	Flexible and Dynamic
Urban Form	Utilitarian	Human-Oriented
Relationship with Community	Minimize Interaction	Celebrate Production

THREE | LOUISVILLE

An 1878 birds eye perspective illustration of Louisville, Kentucky shows how the city's industrial base developed on and around the Ohio River

BIRDS EYE VIEW OF

LOUISVILLE

KENTUCKY, 1876.

CHURCHES

1. First Church, Presbyterian.
2. Second " "
3. College St. Church, Presbyterian.
4. Walnut St. " "
5. Chestnut St. " "
6. Broadway Tabernacle, " "
7. Broadway Church, Methodist.
8. Walnut St. " "
9. Chestnut St. " "
10. St. Paul's Church, Episcopal.
11. St. John's " "
12. Christ " "
13. Church of Christ, Episcopal.
14. Calvary Church, " "
15. Walnut St. Church, Baptist.
16. Broadway Church, " "
17. Preston St. " "
18. First African " "
19. York St. African Church, Baptist.
20. Cathedral of the Assumption.
21. St. Patrick's Church, Roman Catholic.
22. St. John's Church, " "
23. St. Bonifacius Church, German.
24. Church of the Immac. Con., German.
25. St. Martin's Church, German.
26. St. Louis Bertrand Church, German.
27. Chapel of the Ursuline Sisters, German.
28. Church of the Messiah, German.
29. Madison St. Church, " "
30. St. Peter's Church, " "
31. St. Michael's Church, Roman Catholic.
32. St. Andrew's, Episcopal.

PUBLIC BUILDINGS, ETC.

33. Court House.
34. City Hall.
35. City Hospital.
36. Custom House and Post Office.
37. Industrial Exposition Building.
38. Public Library of Kentucky.
39. Medical College—University of Louisville.
40. Male High School.
41. Female " "
42. Third Ward School.
43. Fourth " "
44. Fifth " "
45. Seventh " "
46. Eighth " "
47. Ninth " "
48. Tenth " "
49. Masonic Widows' and Orphans' Home.
50. House of Refuge.
51. Nashville Depot.
52. Fourteenth Street, Depot.
53. Short Line Depot.
54. Narrow Guage Depot.

THE NEO-INDUSTRIAL PROTOTYPE

Louisville, Kentucky is an ideal city for studying the potential for urban manufacturing. This chapter explains why the city has already been successful at retaining more manufacturing jobs than most, beginning with a general background before delving into spatial analyses. The Park Hill neighborhood is then studied in greater detail, setting the stage for the design principles presented in Chapter 4.

BACKGROUND

Located on the Ohio River, which also forms the Kentucky's northern border with Indiana, Louisville was built for industry and trade. Automobiles, appliances, rubber, Freon, cigarettes, and distilled spirits are among the most prolific products to roll off the conveyor belts. Located in the nation's interior with excellent transportation infrastructure, the city historically attracted manufacturing employers with wages that were lower there than in larger, denser cities on the coasts. Louisville was not immune to the pitfalls of outsourcing, but it also did not experience the same dramatic reduction in jobs as experienced in many Rust Belt cities.

Today, Louisville is actively engaged in trying to attract manufacturers. Mayor Greg Fischer attracted national media attention in November 2011 when he overcame a prominent college basketball rivalry and partnered with Lexington Mayor Jim Gray to create the Bluegrass Economic Advancement Movement. Also known as BEAM, the initiative seeks to grow the region's economy through advanced manufacturing.[1] The Brookings Institution has already provided $750,000 worth of research to develop an economic development plan.[2] Major employers including Ford and General Electric have re-shored production in revamped Louisville facilities (and Toyota is doing the same in Lexington, which is approximately 75 miles to the east of Louisville).

One of Louisville's best assets is the centrality of its location in the eastern United States.[3] Louisville is within a two-hour flying distance of three-quarters of cities in the continental United States and within a one-day drive of 60 percent of them.[4] The strong rail, road, and water connectivity, in addition to a Louisville International Airport, have also made Louisville a strong player in manufacturing and distribution since the 1800s.

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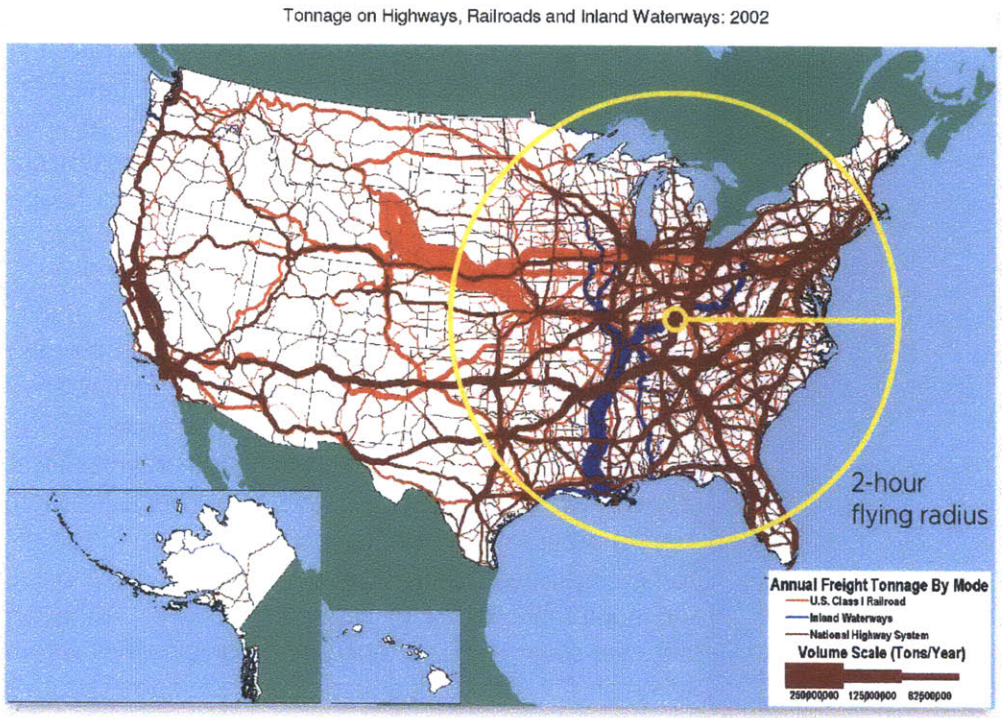
1 Rogers, "Louisville's Economic Comeback."
2 Musgrave, "Group Plans to Have Economic Plan for Lexington and Louisville by October."
3 Sullivan, "The One Map That Explains Louisville's Economy."
4 Economics Research Associates, "Park Hill Industrial Corridor Revitalization - Market Analysis."

In 1999, United Parcel Service invested $1 billion into an existing sort facility near Louisville International Airport, re-branding the facility as Worldport. After another billion-dollar expansion in 2006, the facility now stands at 5.2 million square feet, handles 416,000 packages per hour, and turns over 130 aircraft daily. Worldport is currently the largest fully automated package handling facility in the world,[5] in addition to being the largest employer in Louisville with some 20,000 people on the payroll.[6] Modest co-location has occurred in Louisville for distributors who wanted easy access to this shipping amenity. For example, Café Press, a printing company that produces custom apparel and housewares, counts fast delivery as essential to its business. Other companies include Best Buy Geek Squad, Great Northern Manufacturing, and Ann Taylor.

The 1999 investment in Worldport coincided with the establishment of a nationally recognized joint education-workforce-economic development initiative called Metropolitan College (despite its name, it is not an academic institution). The program began as the key part of an effort to keep UPS from relocating the logistics hub; the company had been having difficulties with inconsistent staffing for its third shift. Metropolitan College employs students to work part-time at UPS, in addition to providing full tuition reimbursement at area colleges that



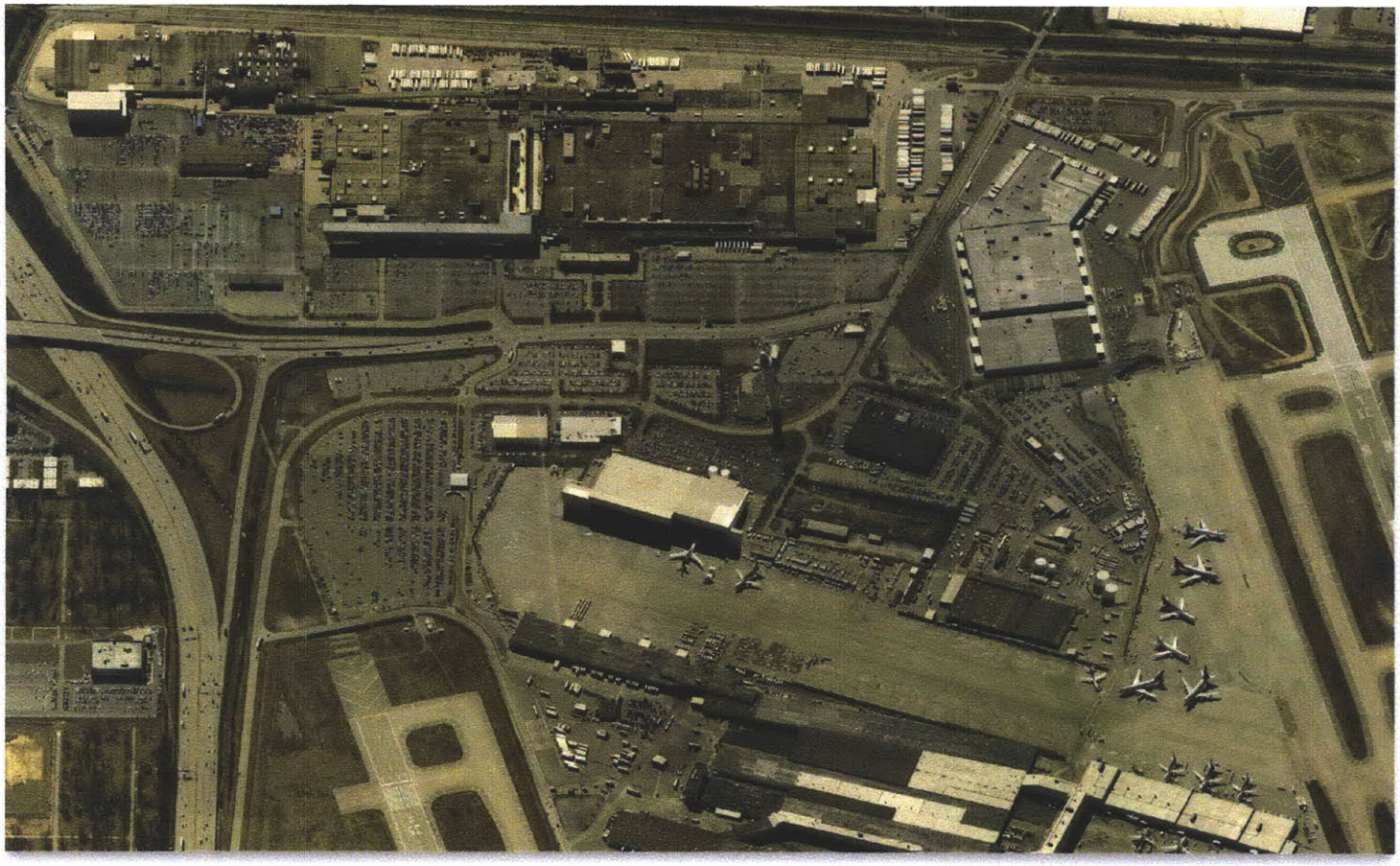
Being near the center of the eastern United States gives Louisville a locational advantage in the logistics industry by tapping into the national rail, water, highway, and air networks.

5 UPS Airlines Public Relations, "UPS Worldport Facts."
6 Economics Research Associates, "Park Hill Industrial Corridor Revitalization - Market Analysis."

is partially funded by UPS. Since the program's inception in 1998, more than 13,000 students have participated in the program and the annual turnover rate of new hires at UPS Worldport has decreased from 100% to 20%. Metropolitan College has also partnered with healthcare provider Community Alternatives Kentucky and health insurer Humana.[7]

Louisville is also an innovator in the realm of public administration. In 2003, the City of Louisville merged with Jefferson County to form a single administrative unit called Louisville Metro. The merger allowed local government to become more efficient and provide better services, with an annual cost savings of over $3 million. Among other improvements, a one-stop shop for development was created and extending tax relief on property and equipment to all of Jefferson County. Although there are some small, independent municipalities within Jefferson County's borders, the common administrative boundary makes it a convenient and relevant unit of analysis; the spatial analyses presented later in the chapter demonstrate the Louisville Metro borders. Both Louisville and Louisville Metro are used interchangeably from this point forward.

7 Metropolitan College, "About Us."



UPS Worldport is Louisville's largest private employer, and it dwarfs the passenger portion of Louisville International Airport (not shown). The Ford Motor Company's Louisville Assembly Plant is on an adjacent parcel, and can be seen along the top third of this aerial photograph.

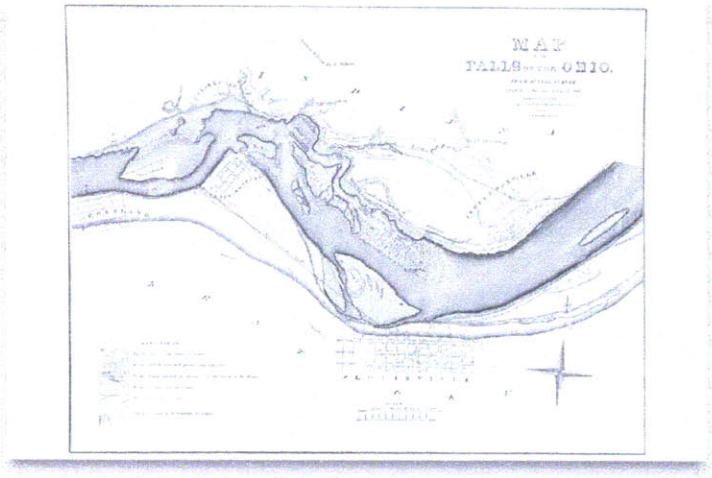
THE EVOLUTION OF CITY FORM

As the previous section elucidated, Louisville is ripe for the continued development of urban manufacturing, propelled by its existing industrial base, geographic advantages, and political will. This section will show how Louisville also has a significant amounts of industrial land, although that land is not a blank slate. The historical patterns of development have created differing forms. This section seeks to understand that history through the reading of historic maps (from 1819, 1864, 1930, and 1940) and presents four typologies that each require a different approach from a planning perspective. These are examined in further detail in the Manufacturing Typologies section.

Louisville followed the typical pattern of growth for an industrial city, essentially starting from its port on the Ohio River and expanding outwards. Industrial activity generally followed this pattern as well, which in many cases left behind a drosscape as abandoned buildings and land stood fallow. Recently there have been efforts at revitalizing the historic downtown; there are many precedents to follow in this case. However, there are also industrial areas outside of the downtown that have yet to be redeveloped, perhaps because there simply aren't good models to follow.

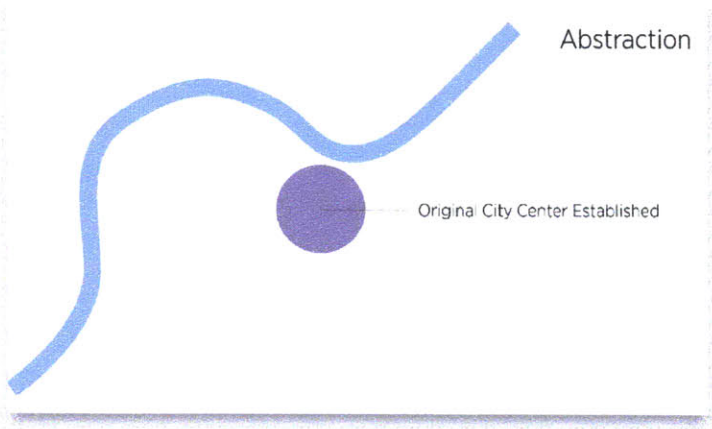
1819: ESTABLISHMENT

The City of Louisville is established along the Falls of the Ohio River; the river provides the primary mode of transportation and power, and manufacturers locate as close to the resource as possible. This desire to be proximate to the river also enables vertical density to be viable, as buildings rise multiple stories in order to reduce horizontal distance. The original settlement is now the city's downtown/central business district. Some of Louisville's earliest industrial buildings have been preserved and adapted for non-industrial use.



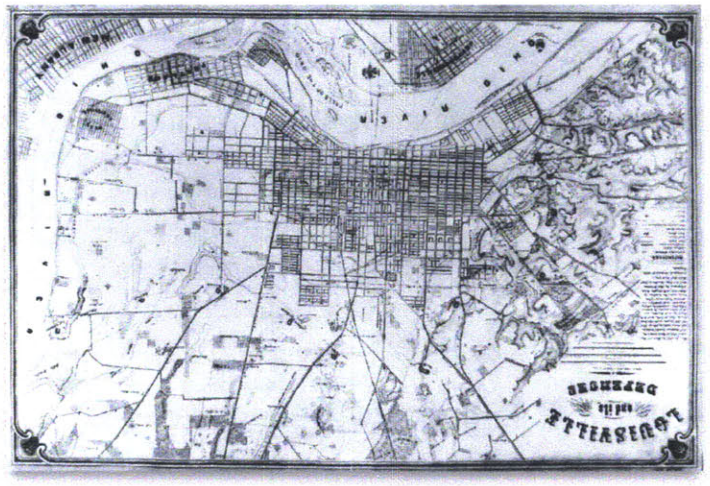
Manufacturing Typologies

Louisville's downtown is a typical Center City district, as it is home to several employment clusters including healthcare. There is some opportunity to re-introduce manufacturing activity in a manner that is least disruptive to the non-industrial uses that are dominant.



1864: GROWTH

Louisville grows outward, and new rail connections start to create irregular intersections with the city's rectilinear street grid. A second city center is established in the Portland neighborhood to the west, although much of the low lying land to the west of the original downtown has yet to be developed. To the south, industry starts to take root in the Park Hill neighborhood, as proximity to the Ohio River is of diminishing importance.

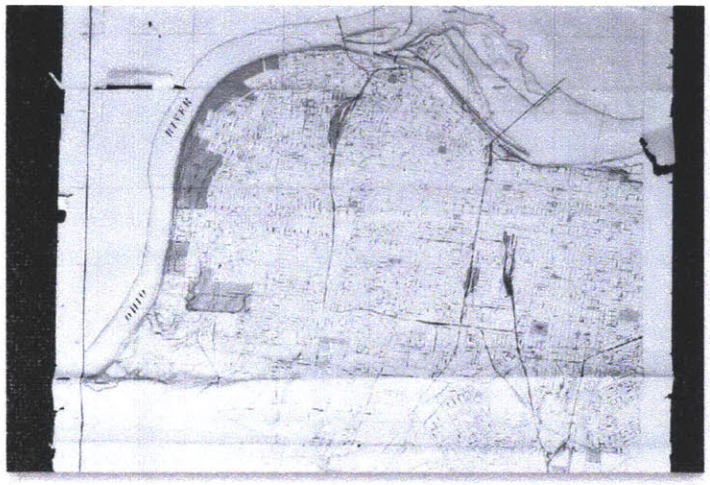


Manufacturing Typologies

The Center City, which has expanded to a second area, is joined by new development at the Urban Edge, enabled by the new mode of freight transportation represented by the railroad. It might seem that there is room for horizontal expansion, but as Louisville continues to grow, the pressures from competing land uses limit its extent.

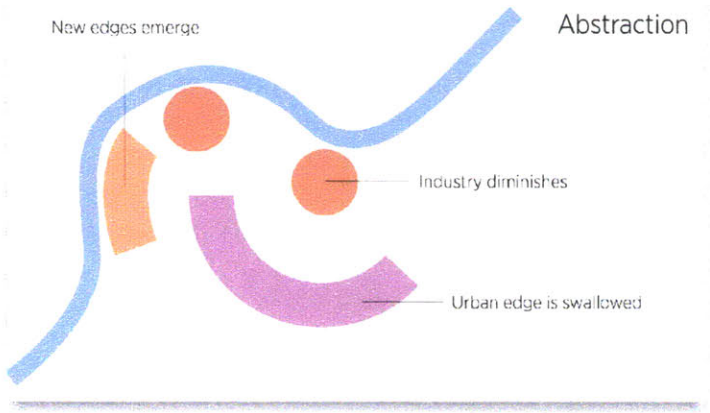
1930: TRANSFORMATION

This detailed map shows that the street grid is expanding in all directions, filling in land that had previously been agricultural. Rail yards are clearly visible in the Portland and Park Hill neighborhoods, which are now becoming surrounded by the expanding city. The banks of the Ohio River to the west of downtown are also developed for industrial uses.



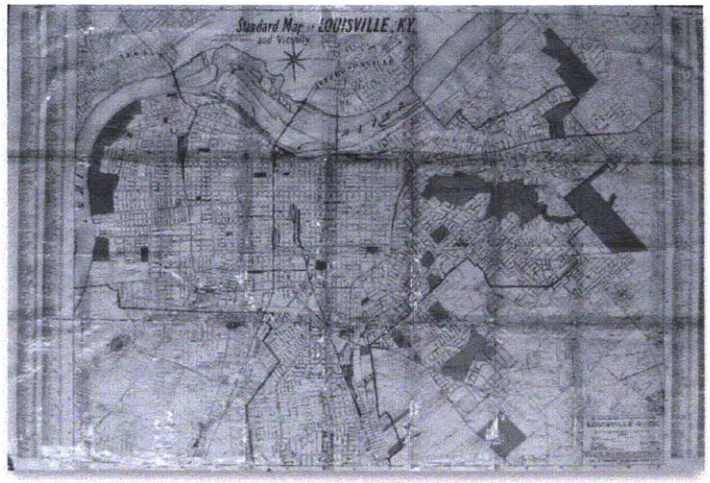
Manufacturing Typologies

The Center City contracts as manufacturing activity begins its large-scale shift to Urban Edge locations. The Urban Edge continues to expand at inland locations (off map), in addition to development at a new location along the Ohio River. The Urban Edge is not permanent, though, as the expanding city swallows the former edge, creating a new condition. I call this the Legacy Edge.



1940: EXPANSION

Louisville's boundaries have continued spread inland as the city accommodates an expanding population. A Frederick Law Olmstead-designed park system can be seen towards connecting the city to the surrounding country. By this time, the horizontal expansion accompanying World War II production demands is in full swing, as wartime manufacturing activity moves to the hinterlands. The rapid expansion quickly leads to decline in the existing industrial districts.



Manufacturing Typologies

There are actually four distinct typologies that emerge from Louisville's historic patterns of industrial development. In addition to the Center City, Urban Edge, and Legacy Edge, there is also the Suburban form that emerges with the adoption of industrial parks after 1940 (not pictured).

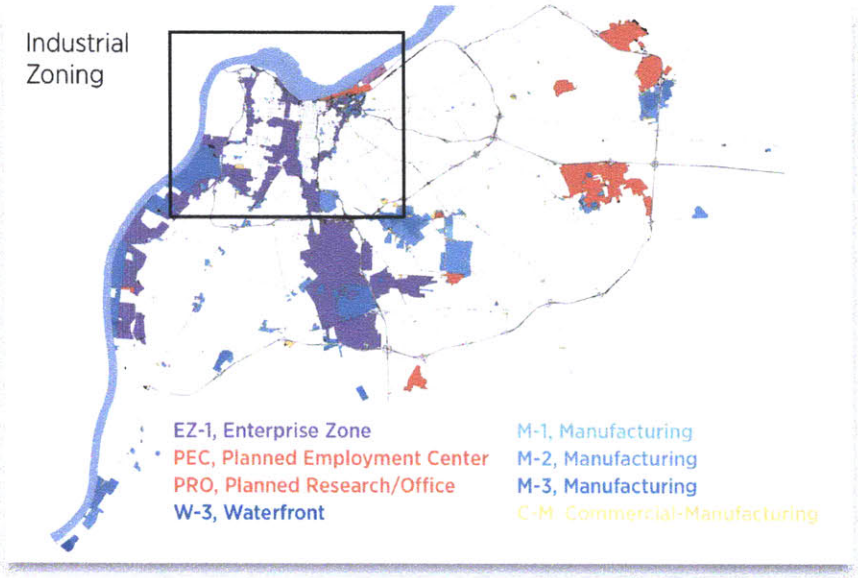
PRESENT DAY

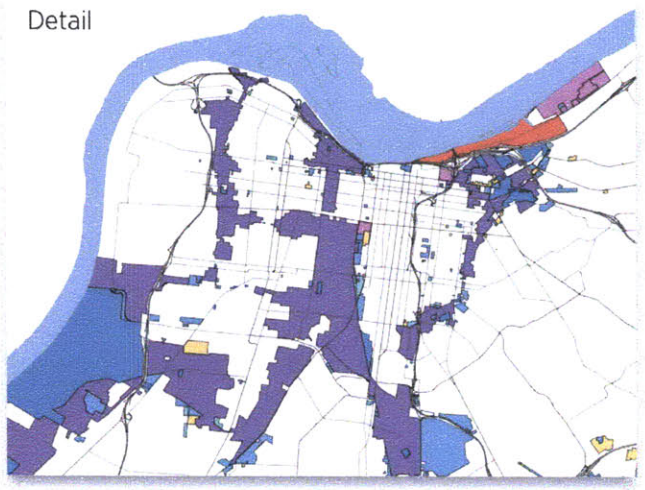
The map on the left illustrates the areas within Jefferson County that are currently zoned for industrial uses. What is immediately apparent is that the boundaries have expanded a great deal, with roughly four times the land area as compared to Louisville's 1940 borders. Approximately 12% of the land, or 29,000 acres, is zoned for manufacturing. Additionally, the zoning categories show some correspondence with the four manufacturing typologies.

The Suburban typology tends to correspond with the specialized zoning categories of PEC (Planned Employment Center) or PRO (Planned Research/Office), categories which are aimed at landscaped office or industrial parks with low maximums for FAR (1.0) and lot coverage (50%). Manufacturing uses are limited to less intensive uses.

Urban Edge typologies, including the areas along the city's western boundary, fall under the EZ (Enterprise Zone) category in addition to the M (Manufacturing) and W (Waterfront) categories. These allow for more intensive uses and high maximum FARs (5.0 for EZ-1).

The Legacy Edge and Center-City typologies, located within the detailed area map, have more of a patchwork of zoning categories, although the flexibly written EZ category gives planners a wide berth in terms of allowable land uses and densities.





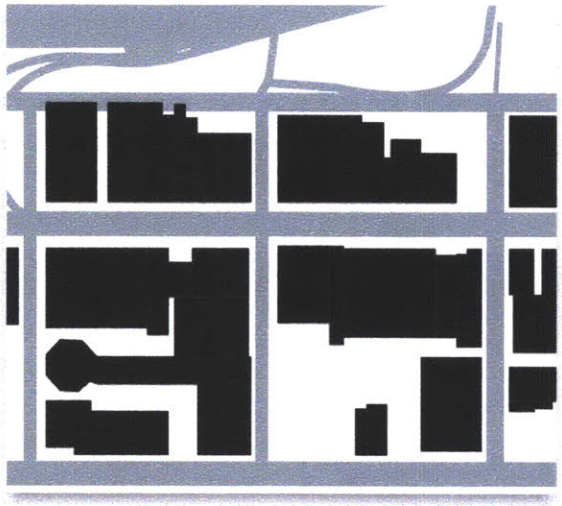
MANUFACTURING TYPOLOGIES

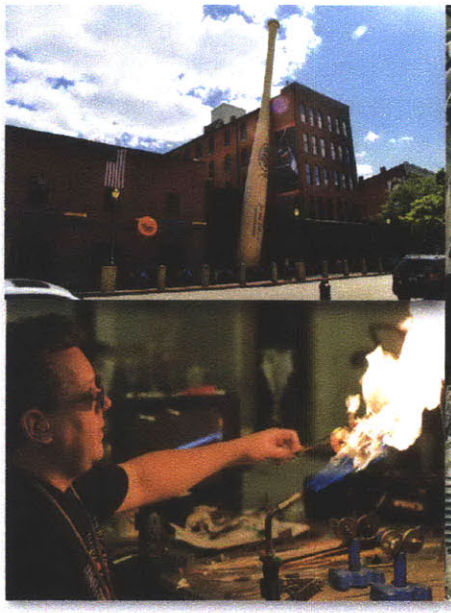
The city-scale patterns of industrial development revealed the locations of four manufacturing typologies, which are analyzed in greater detail in this section. Three of these typologies - Center-City, Urban Edge, and Suburban/Rural Manufacturing - were identified by Kim and Ben-Joseph, and will be briefly described as they apply to particular sites in Louisville. The fourth typology of Legacy Edge Manufacturing is a hybrid condition that may be of greatest interest to the planning profession, as it exerts some of the least understood and most intractable challenges within the urban fabric. In Louisville, this is exemplified by the Park Hill neighborhood.

Note that this thesis focuses on the urban scale. One of the challenges inherent in attempting to plan for manufacturing uses is that factories and facilities can take on a wide variety of forms depending on their intended use. Unlike other product types, including residential and commercial buildings, purpose-built manufacturing buildings can be quite idiosyncratic when it comes to architectural design. Developers and Louisville Metro officials confirm that it is difficult to pursue speculative development for manufacturing because the needs of each tenant are highly specialized. Future theses in planning and allied disciplines could make a meaningful contribution by exploring how building products could be developed in such a way that they could be more readily adapted for a wider variety of tenants, thereby preventing some of the challenges associated with vacancy, disuse, and obsolescence.

However, there are insights to be gained at the urban scale, as cities like Louisville can tailor their approach to physical planning depending upon the physical conditions of the different manufacturing typologies within their borders.

Zoning	EZ-1, M
FAR	4.0+
Lot Coverage	70-90%
Industrial Uses	Artisanal
Access	Multi-modal



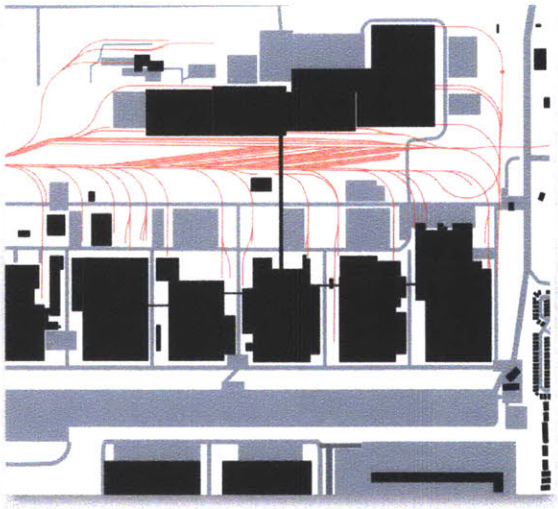


CENTER-CITY MANUFACTURING

This typology is commonly seen in dense urban environments that also used to be the city's dominant economic base. In Louisville, this typology is exemplified in the downtown area, where consumer-oriented production has taken root in mixed use districts. Given the age of the buildings and the production processes they were originally constructed to serve, this typology is best suited for small urban manufacturing. Transportation access is excellent for the workforce but can be a challenge for shipping and receiving, and mixing uses is a relatively straightforward endeavor.

Downtown Louisville has undergone a transformation over the past decade, and manufacturing has been an integral part of the placemaking strategy. Two key developments exhibit the prototypical characteristics of Center-City Manufacturing. The Louisville Slugger Factory and Museum, which produces baseball bats, draws hundreds of tourists on a daily basis (see inset in Chapter 1). The multi-tenant Glassworks building, the first warehouse conversion in Louisville, is a highly successful home for creative industries and special events; it includes a glassblowing studio on the ground floor. Both buildings are reclaimed manufacturing facilities in the urban core, exhibiting potent symbolism and play a key part in revitalizing the downtown economy.

Zoning	EZ-1
FAR	<0.5
Lot Coverage	20%
Industrial Uses	Advanced
Access	Highway, Rail

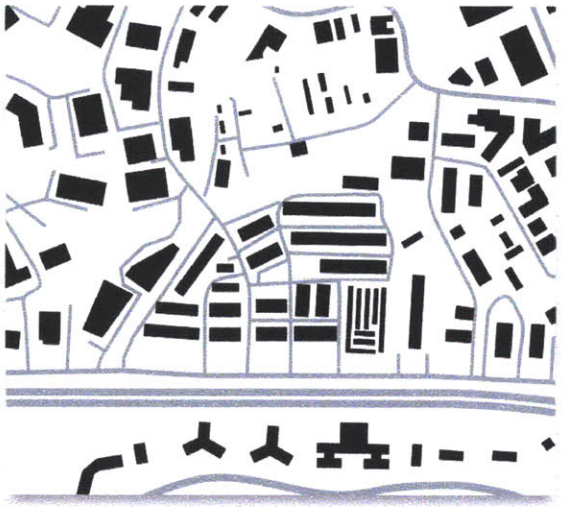


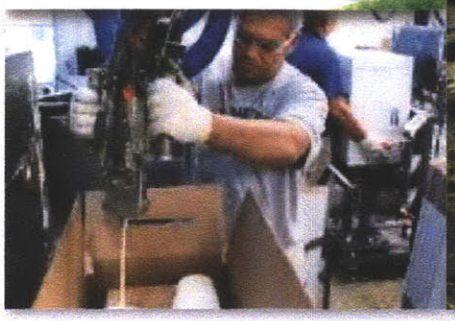
URBAN EDGE MANUFACTURING

This typology includes large-scale factories with advanced manufacturing technologies. The Urban Edge has conventional building forms, although it can also include clean rooms and fabrication labs. The location on the urban edge keeps factories within commuting distance of a skilled workforce, which is essential for the facilities' competitiveness. In some cases, the location is no longer on the edge as a city has expanded, but unlike the Legacy Edge typology, land ownership is consolidated and there may be room to add capacity without significant intervention from the public sector.

General Electric's Appliance Park is a good example of Urban Edge Manufacturing that was located on the outskirts of the city when land was cheap. Of course, it has since been subsumed into the growing metropolitan area. Green buffers separate it from surrounding residences, and it is distinctly separate from the surrounding urban fabric; security is high to protect intellectual property, but it has the effect of making the facility look like a prison (see photo at right). General Electric has some land for expansion, although its facilities are not yet being fully utilized. This typology also exists adjacent to Louisville International Airport, with UPS Worldport and Ford's Louisville Assembly Plant anchoring the area. Jefferson County does not have enough available land to replicate this model in another location.

Zoning	PEC, PRO
FAR	<1.0
Lot Coverage	10-40%
Industrial Uses	Light
Access	Highway





SUBURBAN MANUFACTURING

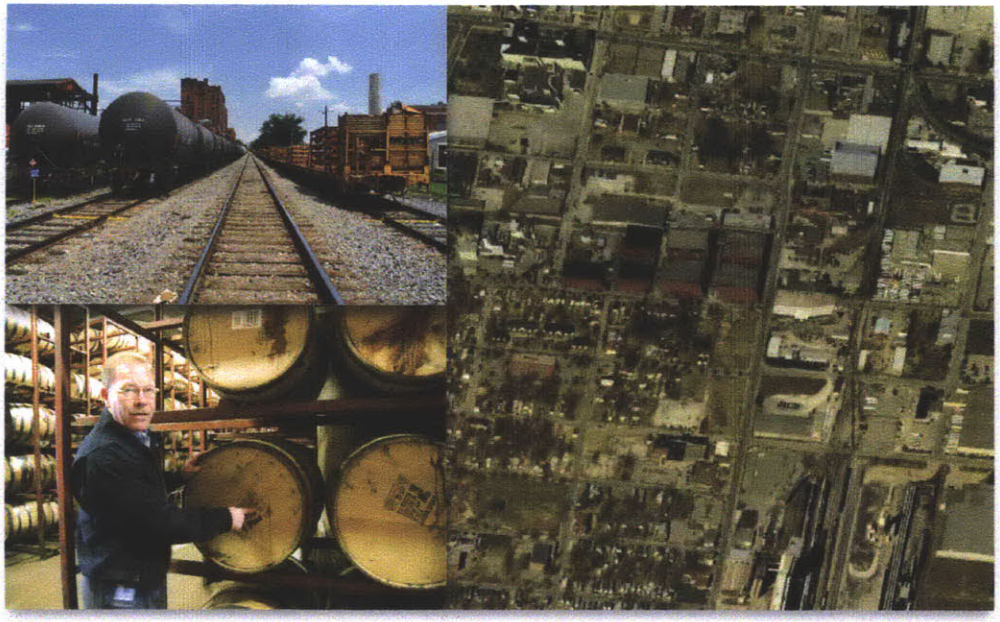
This typology evolved from the industrial parks described in Chapter 2. A single landowner was involved with the initial development and parcelization of the land. The central planning enables suburban manufacturing to have a predictable form with excellent access to interstate highway access. Light manufacturing activity is mixed with other uses including warehousing, offices, and lab space.

The Bluegrass Commerce Park is the largest industrial park in Kentucky, with 850 businesses and spread over 1,800 acres. Employing over 30,000 workers, it is a huge economic engine for a city with a population of just 29,000 (Jeffersontown is an independent municipality in Jefferson County).[8] Physically, it exhibits the quintessential properties of a suburban industrial park, with industrial buildings set into a park-like setting, adjacent to the interstate highway. Having far outgrown its initial 600 acres, the Bluegrass Commerce Park is running out of space to expand, and new development appears to be occurring in Bullitt County, Jefferson County's rural neighbor to the south.[9] In other words, it is a model that works, but Louisville does not have space to replicate it.

8 City of Jeffersontown, "Bluegrass Commerce Park."

9 Economics Research Associates, "Park Hill Industrial Corridor Revitalization - Market Analysis."

Zoning	EZ-1, M
FAR	<1.0
Lot Coverage	10-50%
Industrial Uses	Light, Heavy
Access	Highway



LEGACY EDGE MANUFACTURING

The final typology represents the areas with the greatest opportunity for new urban manufacturing. The Legacy Edge shares many similarities with the Urban Edge, as it also once developed at the city's periphery. In comparison, however, these areas have diverse ownership and were developed in more of an ad hoc fashion. In the absence of a dominant firm or industrial park developer to guide the process, a multitude of owners developed the land in a way that suited their own needs. In many cases, this lack of coordination has led to conflicting infrastructure and a diffusion of responsibility with regards to brownfields cleanup.

The Park Hill neighborhood is the prototype for this typology. The 1,400-acre industrial district has been the subject of a number of numerous planning studies for several reasons. Located near downtown Louisville, historic neighborhoods, the University of Louisville, and regional transportation infrastructure, the Park Hill area is ideally situated. It has a strong legacy of established industries, as well as underutilized properties that offer immediate and affordable development potential – it is the only place in the city that offers large-scale industrial infill opportunities. It is also embedded within West Louisville, a historically African-American area of the city that also has relatively high unemployment levels; job creation is a high priority.

PARK HILL SPATIAL ANALYSIS

Despite its competitive advantages – central location and lower land costs – Park Hill faces a number of design challenges that prevent it from attracting development. This section analyzes the neighborhood's physical conditions through mapping exercises and a transect analysis. Park Hill is shown to have sub-typologies of urban form, which confirm that the Legacy Urban Manufacturing typology is a hybrid condition that requires a nuanced set of interventions to bring it into productive use.

ADDITIONAL BACKGROUND

Several former manufacturing plants lie defunct or demolished in the area, including facilities that were once run by American Standard, Philip Morris, Reynolds Metals and Rhodia SA. Legacy industry that is still in operation includes the Brown-Forman and Heaven Hill distilleries and Sud-Chemie. New businesses in the area include Pro-Liquitech, Great Northern Manufacturing, Consumer's Choice Coffee, and Flavorman. Development costs are low, with land costs at $40-60/acre, as opposed to $100-200/acre in the surrounding region. Industrial rents are only $1-3/square foot as opposed to $2.50-$5/square foot in surrounding industrial parks.[10]

In 2008, economic development planners estimated that the district could support up to 770,000 square feet of new industrial space by 2014, generating up to 2,700 jobs and an economic impact of $336 million.[11] Although exact numbers are not available, interviews indicated that Louisville had been able to achieve new development at that kind of scale.

The most recent planning study was the Park Hill Industrial Corridor Implementation Strategy, led by EDAW (now part of AECOM) in October 2009. It was a comprehensive plan that was intended to tie together the eight separate studies that had been conducted in Park Hill and West Louisville since 2001. After consulting with stakeholders, recommendations were made in five areas: programs and policies, land-use enhancements, transportation enhancements, public realm improvements, and connecting with the workforce. Of these areas, the transportation component was the strongest, which should not be surprising given that a transportation planning study had been completed in 2007.

Ironically, the implementation component of the plan was its greatest weakness. A phased development

10 Ivey, "Park Hill Industrial Corridor Implementation Strategy."

11 Economics Research Associates, "Park Hill Industrial Corridor Revitalization - Market Analysis."

schedule is presented, along with a spreadsheet that makes vague reference to short- and long-term priorities, but a laundry list of recommendations is given and it is difficult to discern in what order they should be implemented. Multiple interviewees confirmed that what the report lacked, from their perspective, was a sense of how to implement the recommendations and how they would be paid for.

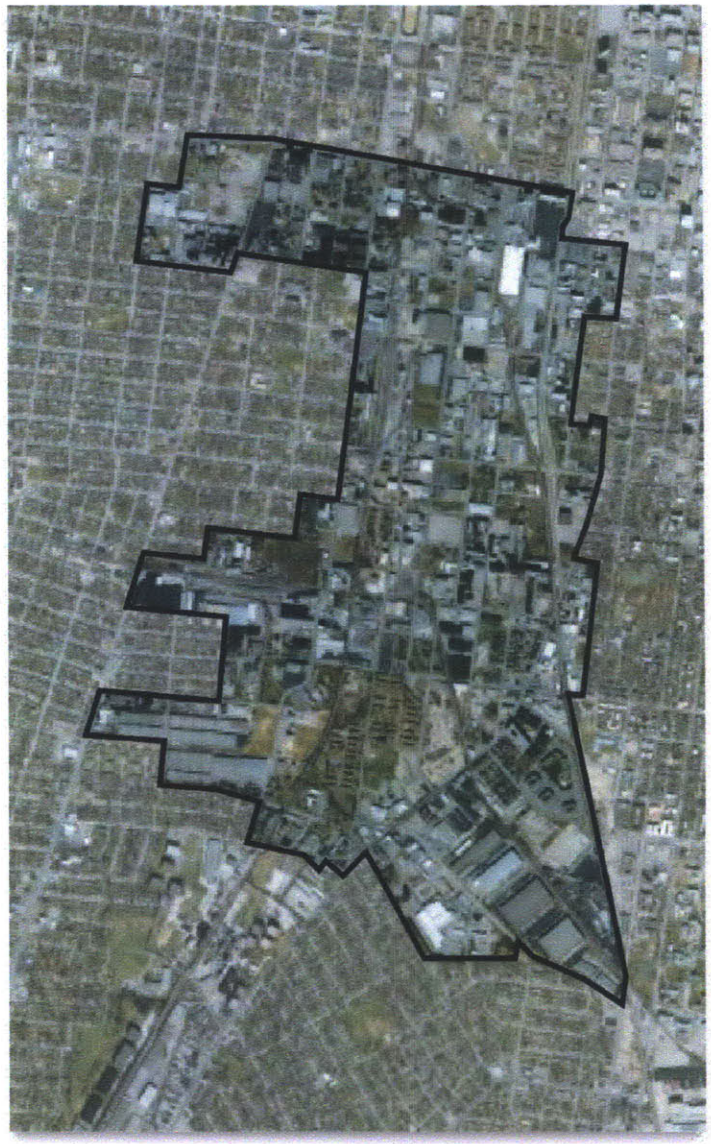
That is not to say that nothing has been accomplished. A business association has been established for the neighborhood. Improvements have been made to the 7th Street / 9th Street arterial, which provides unimpeded truck access along the neighborhood's eastern boundary. Metro officials are pursuing a strategy of improving highly visible "catalyst sites" that could attract additional private investment. However, Park Hill still has not attracted investment to the extent imagined in the implementation plan.

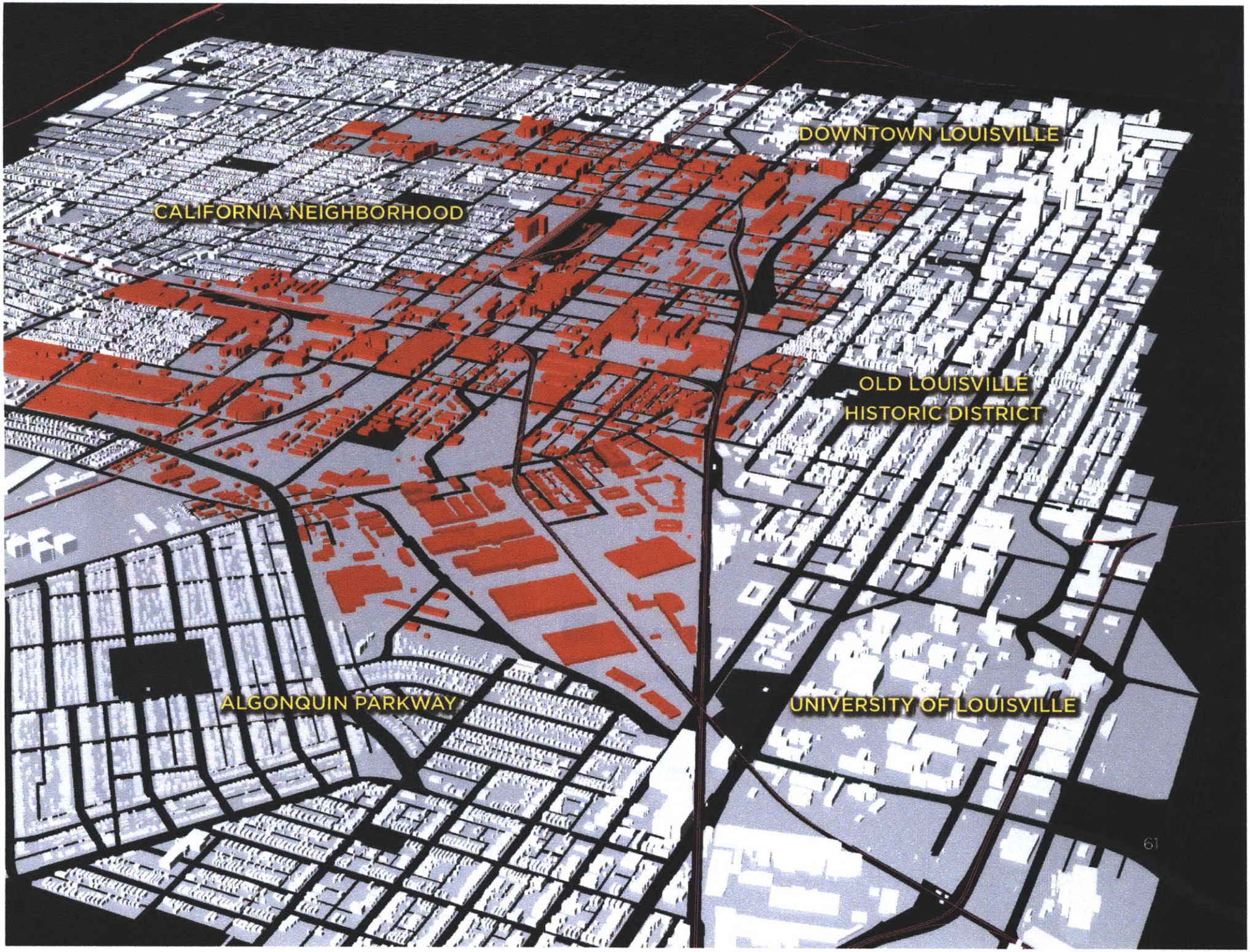
This thesis is not intended to supplant the EDAW plan, but rather to add a layer of understanding to it. EDAW was challenged with tying together a wide array of interests over a massive district, and ultimately many of the priorities are defined by their access and proximity to transportation improvements. This is a perfectly valid strategy, as it builds upon the momentum of public investment. However, there may also be a way to focus on the urban form of the district as the principal mans of guiding investment. The implementation plan does suggest establishing districts within the neighborhood; although they do address some of the differences in physical form, those differences are idiosyncratic and the districting has more to do with establishing a brand identity for a neighborhood that lacks a perceived "center of gravity." This thesis attempts to extract the differences in physical form in order to understand how those differences could guide the design and development of urban manufacturing at large.

GEOGRAPHIC CONTEXT

The Park Hill neighborhood has takes on an irregular shape (defined in the EDAW plan) that zigs and zags between the industrial corridor and the more residential neighborhoods around it. As can be seen in the aerial photograph, there is a significant amounts of open land, though it is not necessarily consolidated in manageable areas.

The three-dimensional model on the opposite page was built using GIS data from the Louisville/Jefferson County Information Consortium (LOJIC). A clearer picture emerges between the difference in scale between Park Hill and the surrounding neighborhoods. The transition is better managed along the southern boundary, as a Frederick Law Olmsted-designed parkway acts as a green buffer. The boundaries with Old Louisville and the California neighborhood are particularly abrupt.

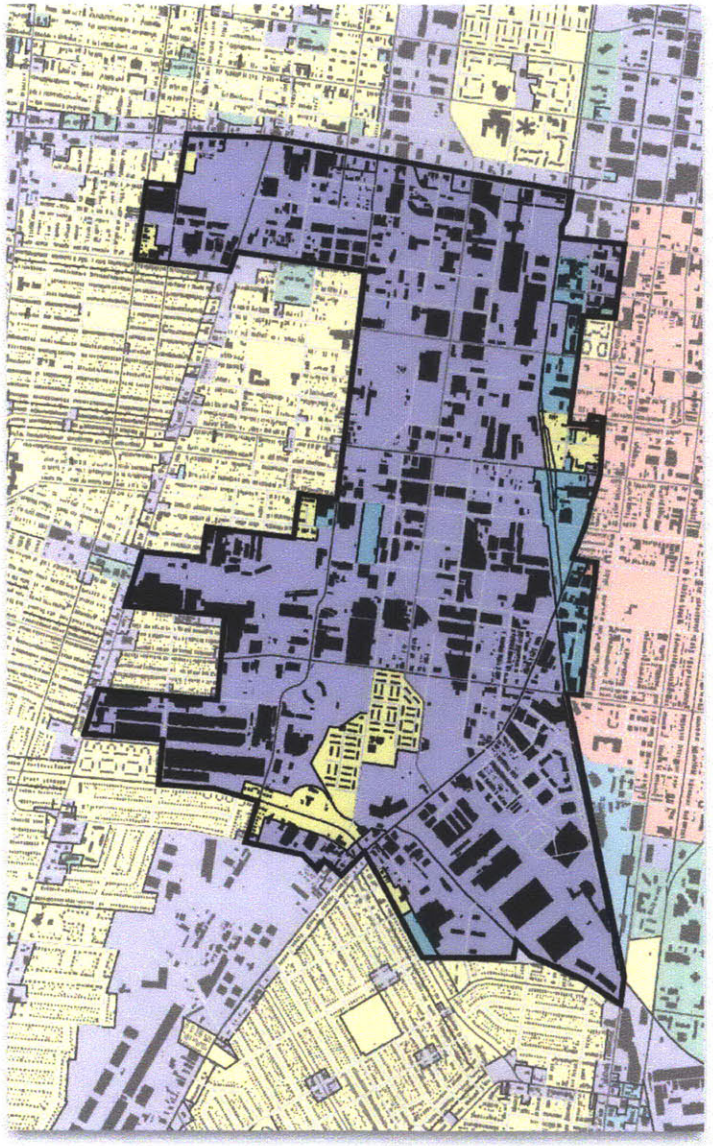



DOWNTOWN LOUISVILLE
CALIFORNIA NEIGHBORHOOD
OLD LOUISVILLE
HISTORIC DISTRICT
ALGONQUIN PARKWAY
UNIVERSITY OF LOUISVILLE

LAND USE

This figure-ground diagram is overlaid with existing land use information as collected from the LOJIC data. The district largely falls under the broad commercial-industrial land use category, with the notable exception of the Park Hill houses in the southern area. The neighborhood also divides Old Louisville and the University of Louisville from the California neighborhood and West Louisville.

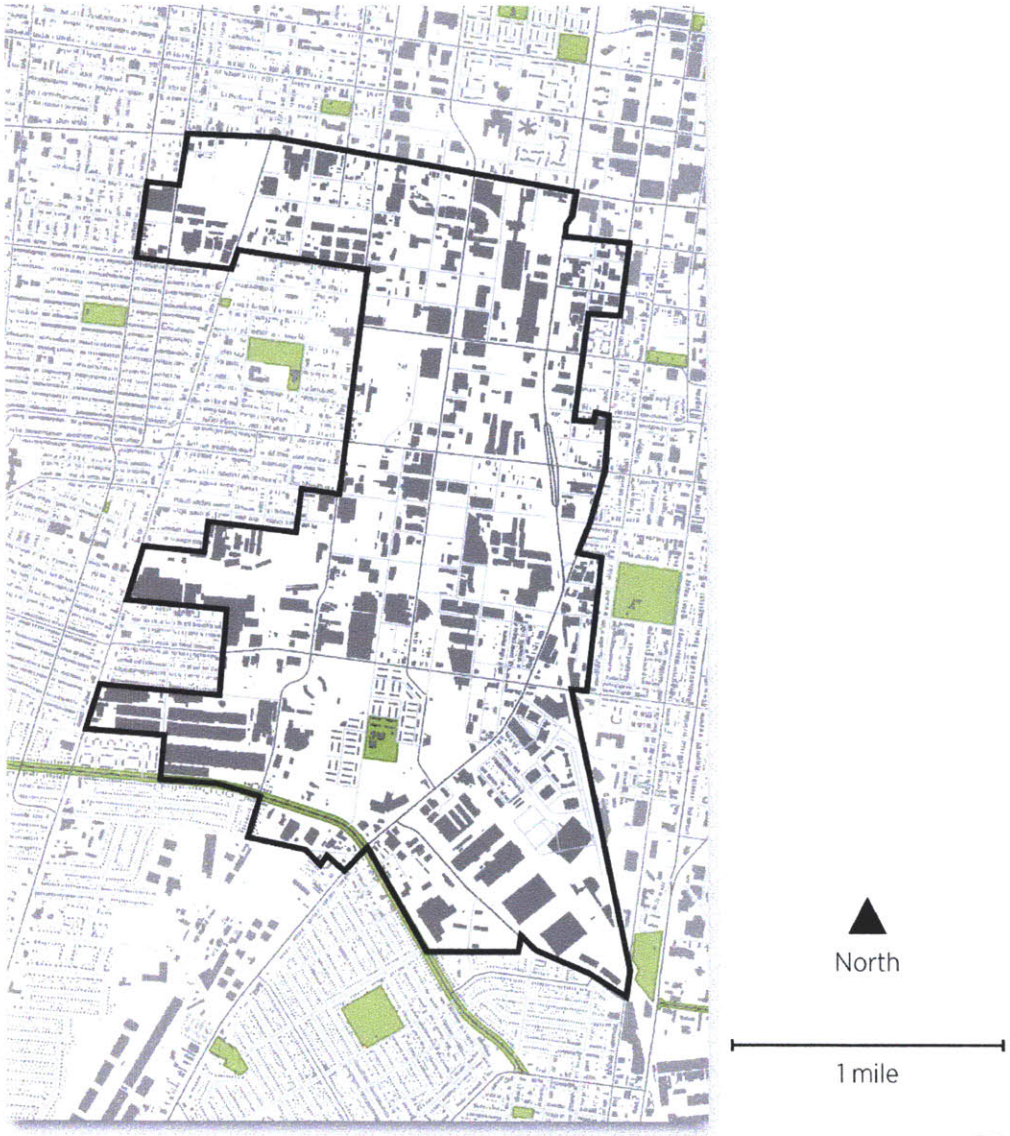
Louisville residents acknowledged that this is both a physical and a psychological divide, as some lifelong residents had spent little to no time in Park Hill.



OPEN SPACE

There is only one publicly-managed park within the neighborhood boundaries, the eponymous Park Hill Park. The aforementioned Algonquin Parkway along the southern boundary also serves as a highly visible landscape, although it does not offer much in terms of recreation opportunity.

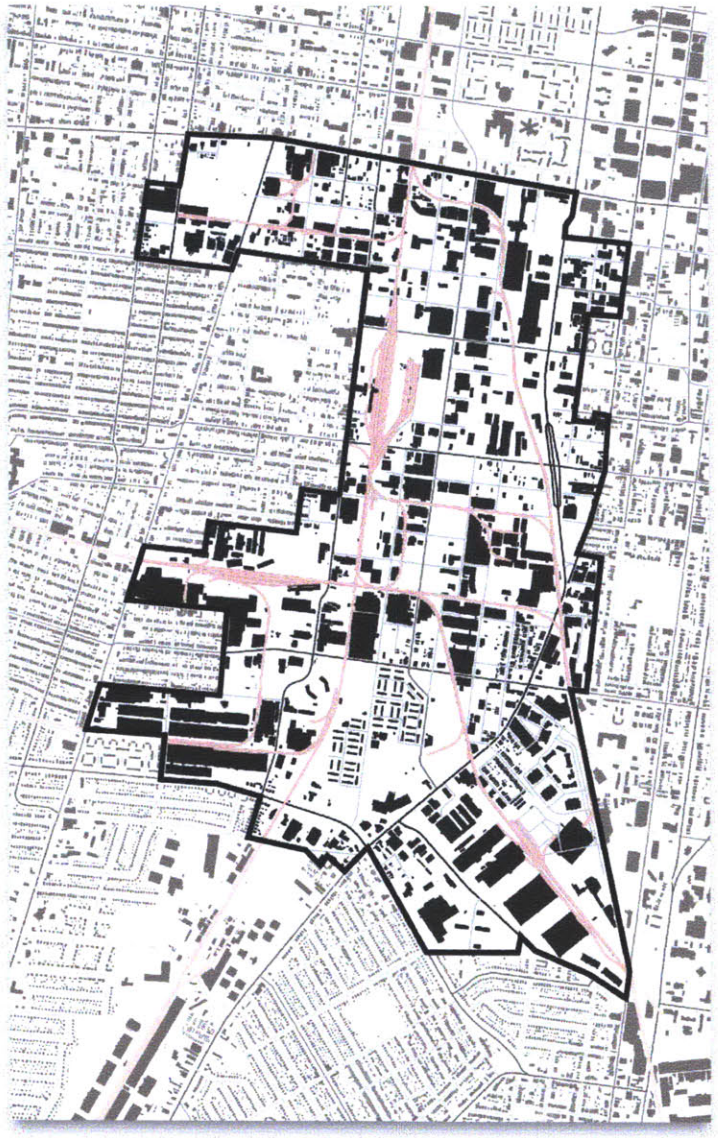
Given the relative paucity of open space in Park Hill, there may be opportunities to pursue partnerships with area landowners to open up some available land for public programming and the installation of green infrastructure. Additionally, the neighborhoods to the east and west could benefit from the installation of a green buffer, just as the parkway does along the southern edge.



RAIL ACCESS

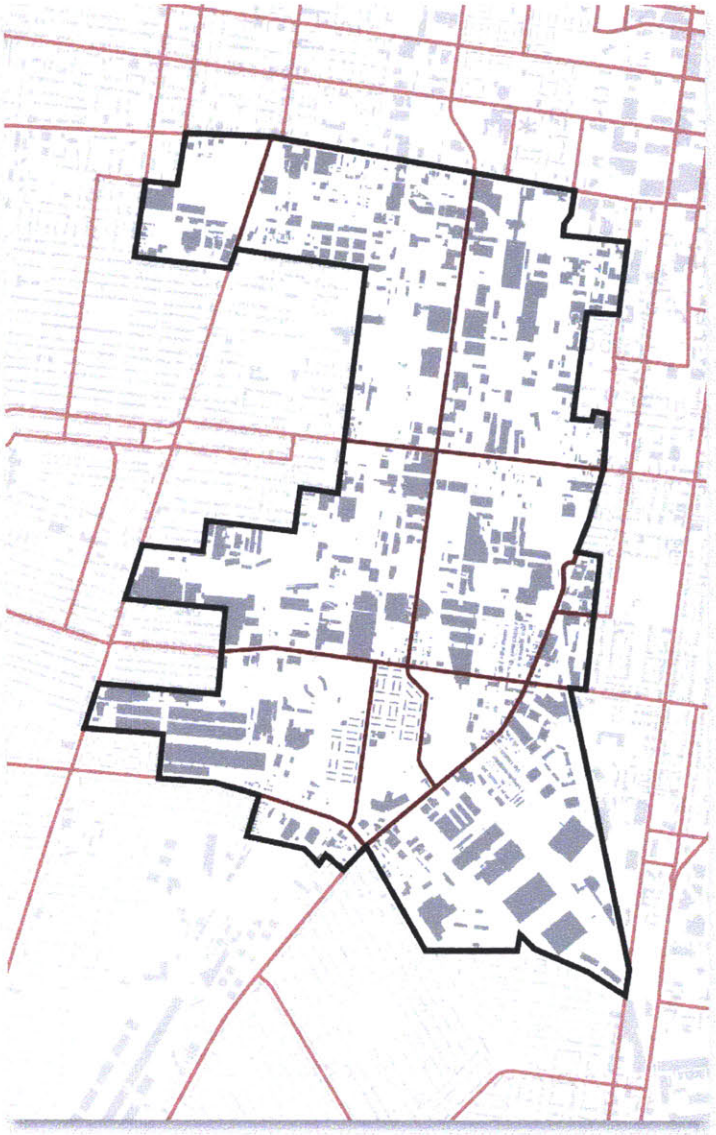
This figure-ground diagram shows the extent of the railroad tracks that crisscross Park Hill. The yards adjacent to the Consolidated Grain and Barge silo are particularly prominent in the northern half of the neighborhood. Note that the rail lines converge upon Park Hill from irregular directions, which gave rise to the similarly irregular street patterns in the southern portion of the site. The multiple spurs and the wide turning radii of the tracks also contribute to an irregular parcelization pattern.

The railroads predated the advent and eventual dominance for freight transport. Those tracks represent a latent infrastructural asset, but they are also a liability: Park Hill is littered with at-grade crossings that disrupt automotive traffic. When a train is passing by, motorists sometimes have to wait 15 minutes or more. In some places, underpasses have been installed to circumvent this problem, but not all of these underpasses have enough clearance to allow trucks to pass underneath. That said, Park Hill is uniquely served by freight rail, which could be an asset for food processors, machine parts manufacturers, and other users that could benefit from this access. The rail infrastructure in Park Hill could likely be consolidated so as to minimize conflicts and concentrate resources on reducing the number of at-grade crossings.



TRANSIT ACCESS

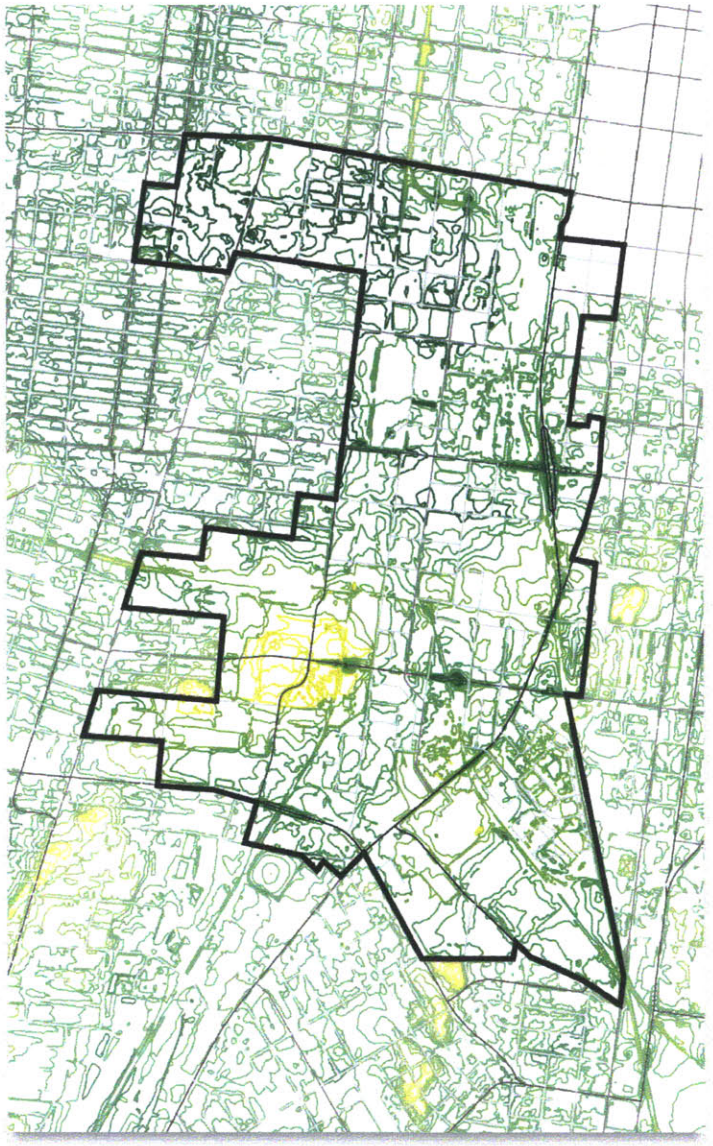
Park Hill is served by multiple bus lines, although the greater issue could be the frequency of service and the feasibility of transferring from one line to the other. Adjacent bus lines in surrounding neighborhoods provide additional access at the edges, meaning that most of the neighborhood is within a half mile of at least one bus line. This does represent a potential advantage for this infill site, as it provides access to a greater proportion of the workforce than the transit-poor suburban industrial park.



ELEVATION

Despite its name, Park Hill has relatively flat terrain. This is of course what made it possible for the area to be served by rail, and why it was a feasible location to locate manufacturing facilities. There is one significant hill, on the aptly named Hill Street, although this is somewhat obscured as this area has a relatively high density of buildings. Notably, there are low lying areas at the northern part of the site as well as in the California neighborhood, which could cause issues with regards to stormwater runoff.

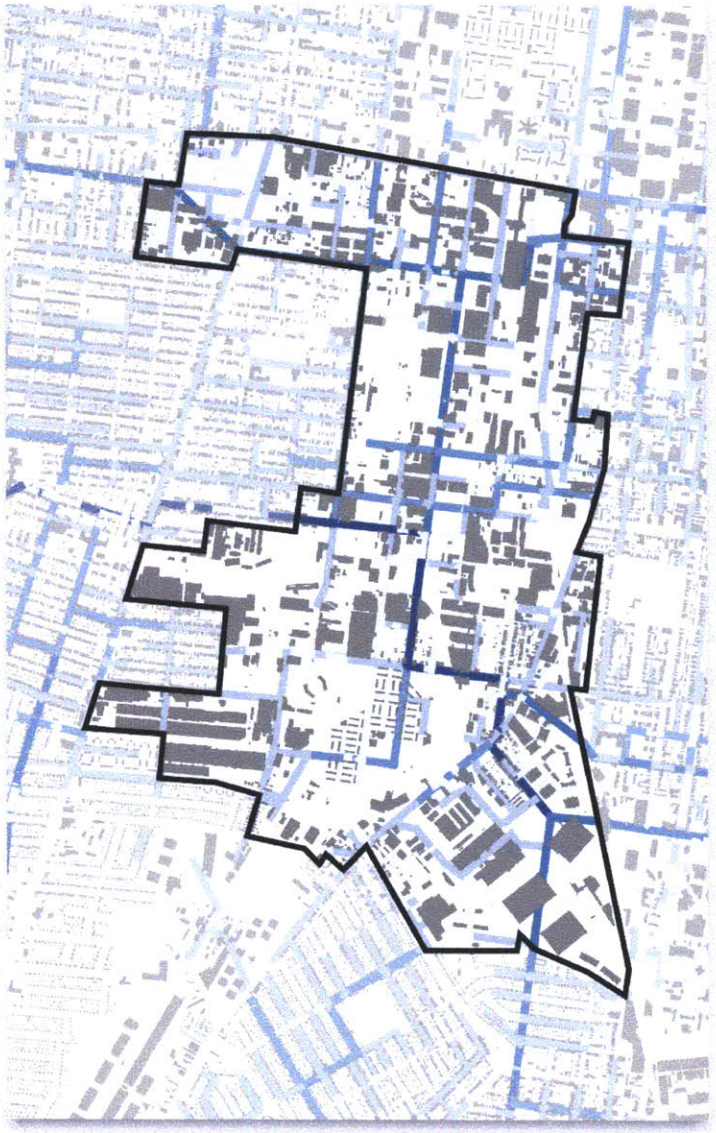
The railroad's grade changes and overpasses can also be seen in these 2-foot contour lines, in addition to the road underpasses that minimize conflict on Hill and Oak Streets. The 7th Street / 9th Street arterial, which runs north-south near the eastern border of the site, is free of at-grade rail crossings.



SEWER INFRASTRUCTURE

One of the major benefits of infill development is that it makes use of existing infrastructure, and the industrial-rated sewers in Park Hill are no exception. The sewer lines generally increase in size at lower elevations to handle runoff, though green infrastructure could help ensure that the system stays under capacity.

Although not pictured here, Park Hill is also served by three-phase power and adequate water lines. The neighborhood's infrastructural issues are mostly related to transportation conflicts, although at least one interviewee noted that broadband data access was also an area for improvement.



Major Sewer Lines

Minor Sewer Lines

North

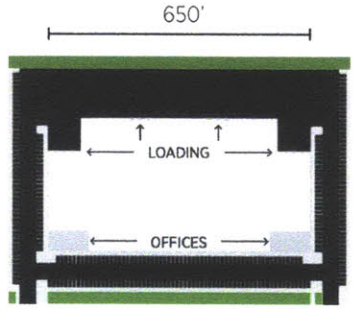
1 mile

PARCELIZATION

Louisville Metro officials and developers agreed that zoning was not a primary obstacle to attracting manufacturing uses in Park Hill (although like in most places, some would like to see the entitlement process streamlined). The area is permissively zoned in terms of both allowed uses and form requirements, with most land falling under the Enterprise Zone (EZ-1) designation. The problem is not that Louisville doesn't allow manufacturing uses within its borders, but rather that the available land has eroded over time. Note the awkward parcel shapes that have been created as the area developed in an ad hoc manner; this was not a master planned industrial park with parcels of regular shapes and sizes. The allowable setbacks and dimensional requirements are a secondary concern to the fact that the parcels are inefficiently divided.

The diagram on the opposite page shows the parcelization as it appears in the Louisville Metro records. The blocks, which are each formed by publicly accessible roads and/or railroad crossings, have been also been re-arranged to better elucidate their characteristics. They are color-coded and grouped by their zoning designations, as well as roughly organized in descending order of size. Rectilinear and roughly equilateral block shapes have been prioritized over irregular shaped blocks. Note that the blocks are further subdivided into separate parcels. They were kept in complete blocks to show potential continuity, in addition to presenting a more manageable diagram.

The blocks can also be compared with a benchmark 25-acre square, which represents the minimum marketable size for large manufacturers.[1] There are only a few blocks, never mind individual parcels, that meet this minimum. Many more appear to be in the range of approximately 15 acres, which suggests that may have been an efficient size for manufacturing activity in the past; a flexible manufacturing building can be squeezed into a 12-site (see below diagram). The unfortunate reality is that despite its collective 1,400-acre size and widespread prevalence of vacant or underutilized land, Park Hill is sorely lacking in easily developable parcels.



This diagrammatic site plan is for a 192,000 square foot flexible manufacturing building on a 12-acre site (0.4 FAR) with a parking ratio of 2 spaces per 1,000 sq ft.

1 Zawacki, interview.

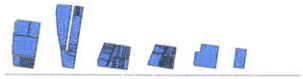
Parcelization

Block Morphology

Non-industrial zoning

C-M Commercial Manufacturing

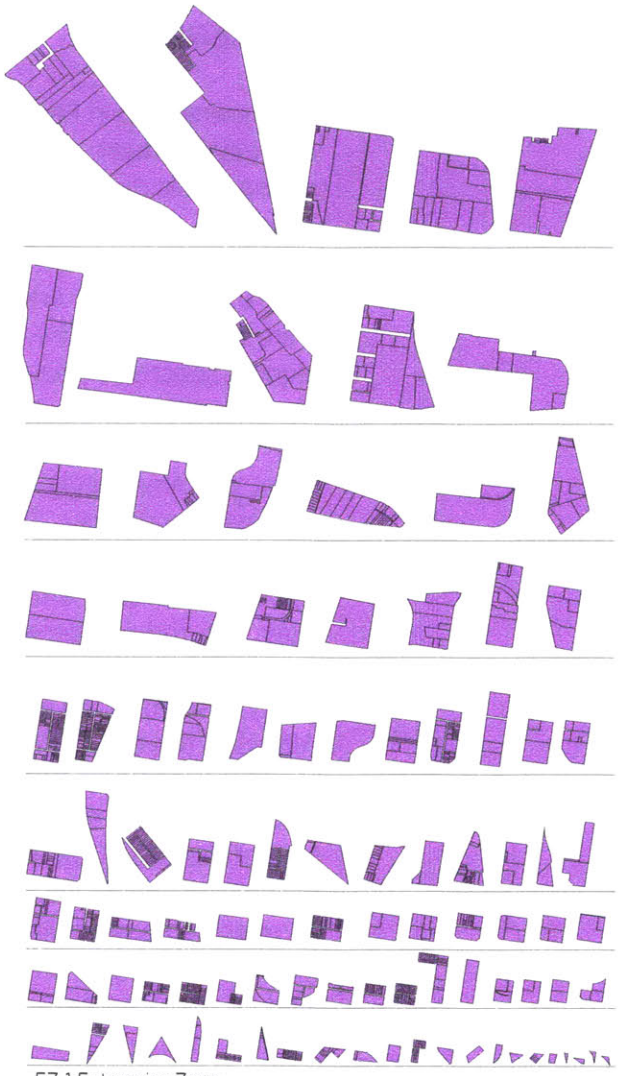
M-1 Manufacturing



M-2 Manufacturing

M-3 Manufacturing

Benchmark



EZ-1 Enterprise Zone

OWNERSHIP

Land ownership in Park Hill reflects many decades of ad hoc development, without a central land developer or strong public development corporation to guide efficient allocation. The diagram on the opposite page was constructed using GIS data from the Jefferson County Property Valuation Administrator's office. The parcels were sorted by owners' last names, and color-coded with along a spectrum (this means that similar last names, or similar entity names, will have closely matched colors).

What is immediately apparent is that there is not a dominant landowner. The most significant area of land is owned by Louisville Metro, which is targeting the former Rhodia Chemical Plant site as the first of its "catalytic" sites for redevelopment. Nearly every interviewee mentioned these parcels as a redevelopment opportunity; it seems to be a matter of finding the right tenant. Although there might be interest from smaller manufacturing firms, Metro officials are reluctant to subdivide the land when there are so few opportunities to aggregate land of this size. They are also acquiring parcels adjacent to the Park Hill Houses, which are eventually expected to be relocated elsewhere in the city. The housing is incongruous, surrounded on all sides by vacant and industrial land. It that land becomes available for redevelopment, though, the city could intentionally build a base for a new cluster of manufacturers.

Additional notable groupings are annotated on the opposite page. The northern edge is already slated for non-industrial uses. At the same time, former residential parcels in the interior of the neighborhood are being acquired for the growing operations of automotive parts company.

WRAP-UP

While these spatial analyses have illuminated some of the district-wide conditions within Park Hill, the more refined patterns can be difficult to detect on this kind of scale - this was one of the shortcomings of the EDAW implementation plan, which literally had a lot of ground to cover. The next chapter zooms in another level to the transect scale, showing the conditions of urban form at a finer grain and suggesting how design interventions could be applied.

These lots have been cleared and are expected to be developed into big box retail and a YMCA.

The Brown-Forman Company's 35-acre campus serves as their headquarters, though it is not the company's sole location.

United Catalysts Inc. has acquired more than a dozen parcels to support growing operations, including several lots that were drawn for single-family residential.

Louisville Metro owns the former Rhodia Chemical Plant site, and is acquiring smaller parcels to the west, adjacent to the Park Hill Houses and a local school (the non-industrial area without shading).

North

1 mile

FOUR | DESIGN ANALYSIS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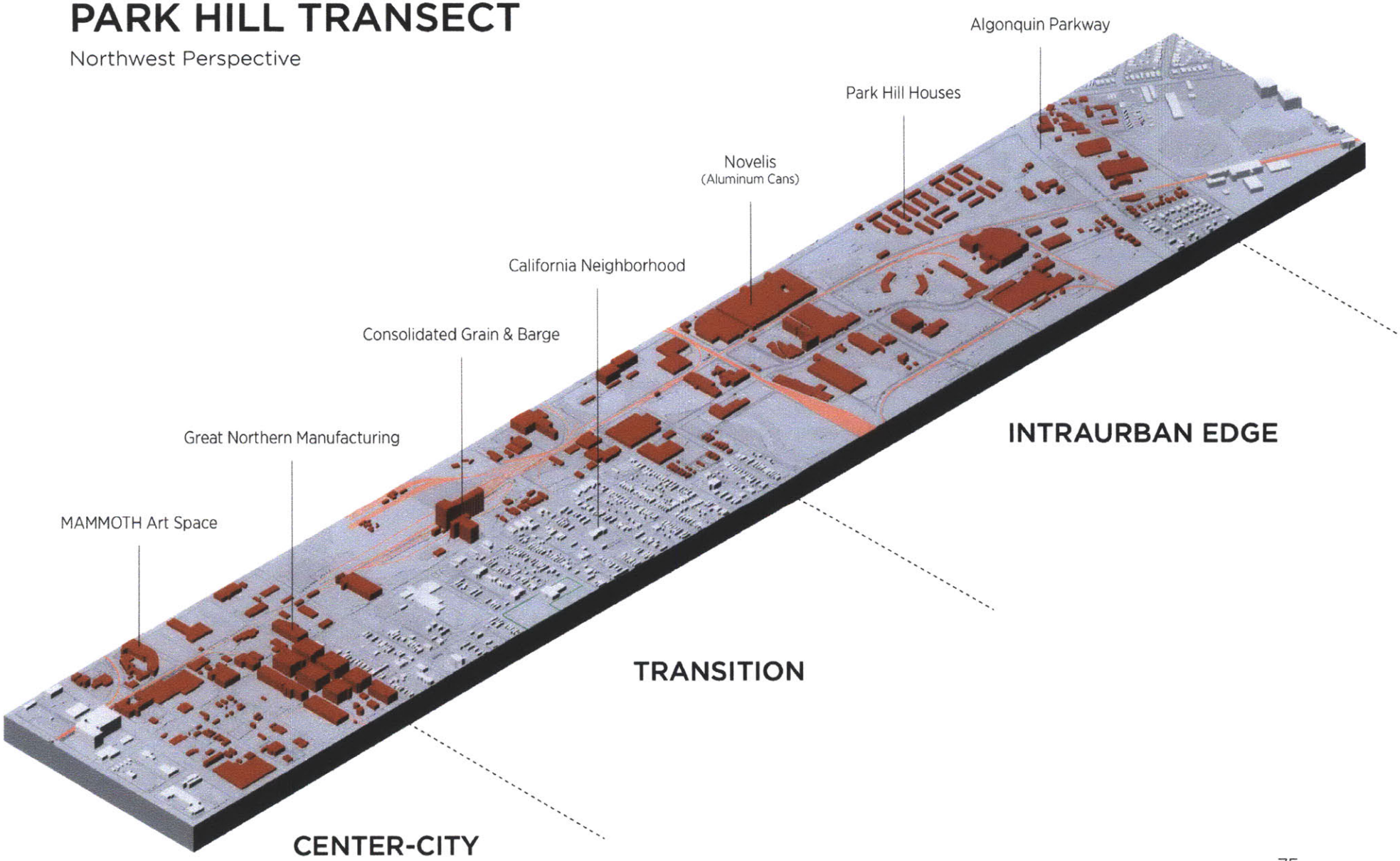
TRANSECT ANALYSIS

The Legacy Edge typology is distinct from the other manufacturing forms because of the diversity of forms within it. It does not have neatly organized tenants as seen in the Suburban typology, nor does it have the dominant factories that are seen in the Urban Edge typology. While there may be a diversity of uses and buildings in the Center-City, generally speaking the manufacturing activity is limited in scale.

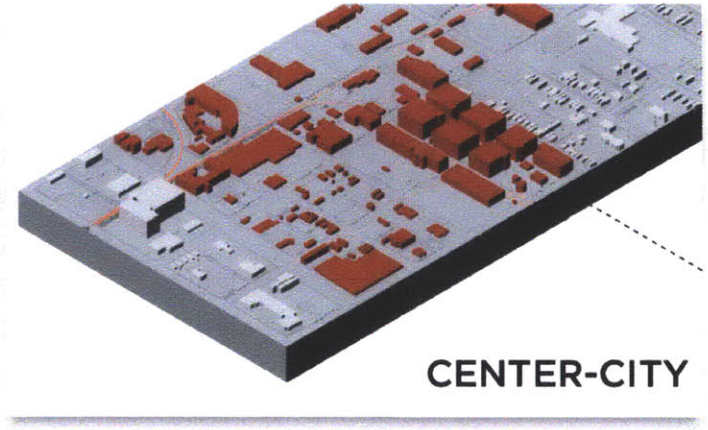
A close examination of a transect of Park Hill and its surroundings, running approximately north-south and measuring .4 miles across and 2.2 miles long, revealed a more intricate pattern within the Legacy Edge. The part of the neighborhood closest to Downtown Louisville exhibited most of the qualities of the Center-City typology. The southernmost part of the site with the most irregular street grid shows a larger production facilities, in some ways similar to the Urban Edge typology but on a smaller scale. The middle portion of the site represents transition - from industrial to residential, from silo to train, and from center-city to edge manufacturing. Each of the three types is described in further detail on the subsequent pages, accompanied by site photographs.

PARK HILL TRANSECT

Northwest Perspective



CENTER-CITY SUB-TYPE

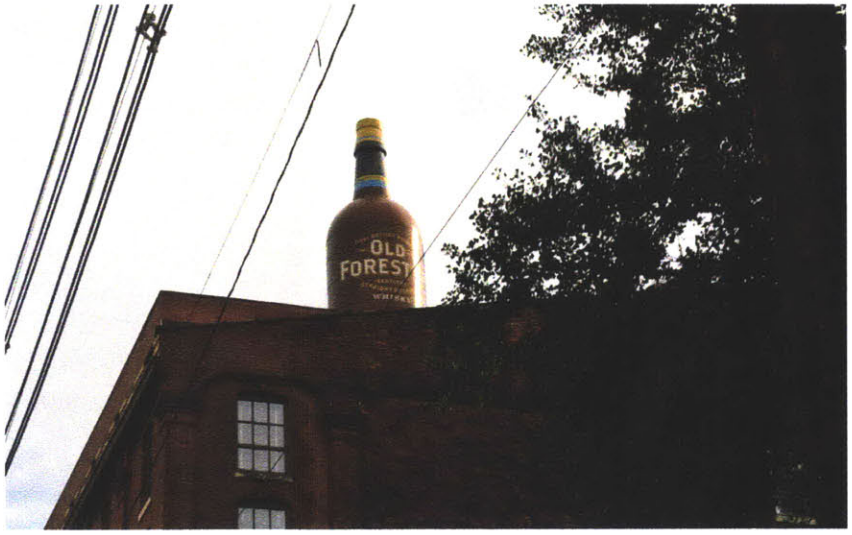


The northernmost portion of Park Hill shares many qualities with the Center-City Manufacturing districts. It is characterized by architecturally significant buildings that represent opportunities for adaptive re-use. It is not difficult to imagine how office, commercial, and retail uses could be introduced into this area, based on its proximity to downtown and neighboring retail and office uses. There are already plans to introduce a YMCA and big box retail on a recently cleared site.

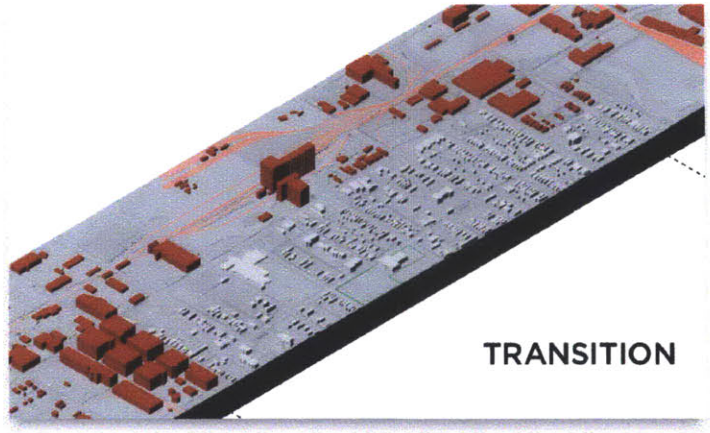
This area is also a good candidate for introducing housing. Although Park Hill may not have enough amenities to support large numbers of new residents, and given the desire to protect urban manufacturing space, housing could be introduced in a limited fashion. There is already interest, for example, in creating a co-op to provide live-work studios for artists and other creative professionals in a 130,000 square foot former storage warehouse (labeled MAMMOTH Art Space on the transect diagram).

Additionally, the Center-City Sub-Type would be a good place for small urban manufacturing. This area is easy to access and already has strong imageability along the southern frontage of Broadway. One of the most recent entrants to this area, Great Northern Manufacturing produces specialized building products on a small scale. Medium-sized distillers including Brown-Forman have also invested in the area, making it the right environment for related small manufacturers to move in. Flavorman, a custom beverage products company, has opened a publicly-accessible Distilled Spirits Epicenter, a.k.a. Moonshine University, which offers the opportunity to learn how to distill spirits from test batches to full production runs.

This is the densest and most accessible part of Park Hill, and its integration into the city is perhaps the easiest to accommodate.


OLD
FOREST

TRANSITION SUB-TYPE



The central portion of Park Hill presents much more challenging conditions. I have deemed it the Transition area for a number of reasons. The first is the most prominent feature in the area is a silo belonging to the Consolidated Grain & Barge, which serves as a transfer point for grain that is shipped through Louisville. Second, this area serves as a bridge from the dense, Center-City subtype to the north and the large-scale, Intraurban Edge to the south.

But the primary reason that this area deserves special attention is the transition between residential and industrial areas - or the lack thereof. The grain silo, with its massive parking lot and rail yard, sits directly across from single-family shotgun houses. On another road, similar houses are directly across from 14-story warehouses. It seems that little consideration had been given to providing buffers or any kind of nuanced treatment between these very different land uses. Now that they are established, perhaps there is an opportunity to bridge the stark divide.

The roads themselves could use improvements to make it more hospitable to Park Hill's residential neighbors. Streetscape details including trees, pedestrian lighting, bicycle lanes, and sidewalks would go a long way towards making the streets safer and more inviting. There is also a lot of underutilized land that could be programmed for public use - weekend markets, art installations, and demonstration gardens could be among the temporary uses that could invite residents of the California neighborhood to engage with Park Hill in a positive light. Where large amounts of land have to be reserved for industrial uses, green infrastructure could produce positive benefits by way of reducing stormwater runoff and urban heat island effect, in addition to improving the transition area's aesthetics.

In terms of attracting manufacturers, this land might be better suited as a reserve space for the time being - small manufacturers would do well to concentrate investment in the Center-City subtype to establish critical mass, while larger manufacturers will need the additional space in the Intraurban Edge.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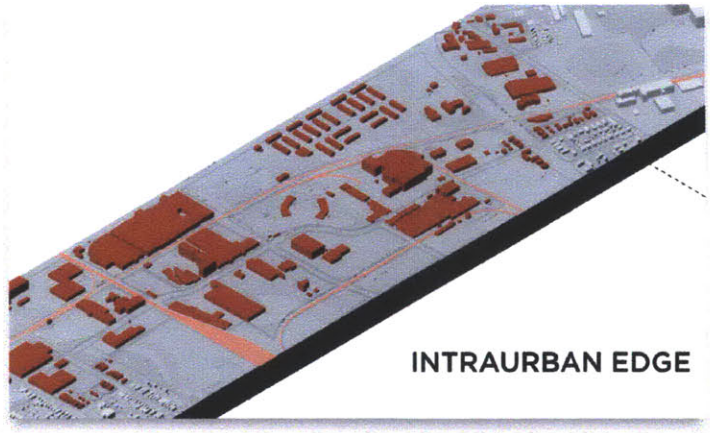
INTRAURBAN EDGE SUB-TYPE

Although it has been shown that Park Hill does not have a lot of developable industrial parcels, the largest ones that do exist or have the potential to exist are in the southernmost part of the district. The parcels are large enough to support manufacturing of a significant size, although not quite as large as the manufacturers at the Urban Edge. This is more of an intraurban edge, as it is surrounded by residential uses and the University of Louisville. This is also the area of Park Hill that could see the most dramatic changes in the coming years, as the Park Hill Houses (opposite page, bottom right) are expected to be relocated, and the Rhodia parcel is ready for redevelopment.

The Park Hill Houses, which are shown on the opposite page, do not make sense in their current location. As an island of housing (albeit with a school and community center) in a sea of industrial uses, it lacks the amenities and street life that characterize a healthy residential district. Interviewees indicated that the Park Hill Houses also have high crime statistics.

The University of Louisville is beginning to construct student housing, which could be more successful. In close proximity to the campus, the housing may have industry on one side, but student residents will also have access to campus life and its associated amenities. This approach, which begins with an established, mixed-use



residential community and expands into the Legacy/ Intraurban Edge is a better approach.

Compatibility concerns in this area will be less acute after the relocation of the Park Hill houses. This area can be the one that is largely dedicated to industrial uses with large footprints. Significant green buffers are a good practice, and the Algonquin Parkway (opposite page, bottom left) serves this purpose effectively and beautifully.

DESIGN PRINCIPLES

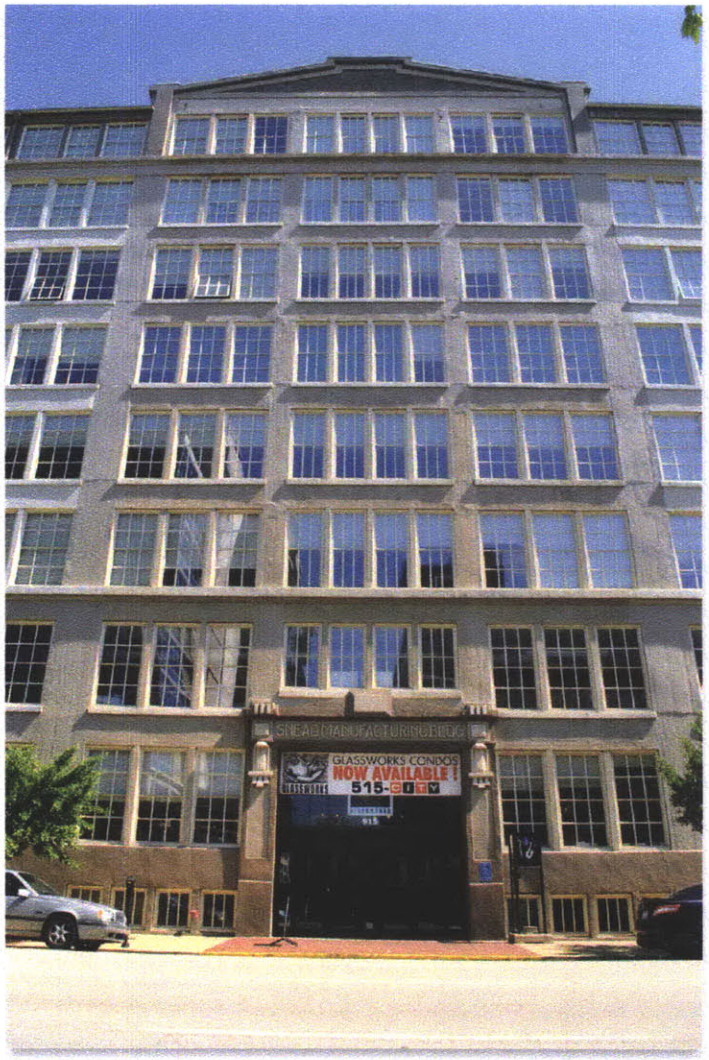
Having examined the physical characteristics of urban manufacturing on a variety of time and physical scales, from national trends to the specificities of the Park Hill transect, a unified set of design principles is hereby presented as a means of synthesizing the lessons learned. The potential application of these principles is explained with regards to Park Hill and Louisville, matching interventions with the typologies presented in the preceding sections.

Principle 1. Upwards Not Outwards

As manufacturing jobs are re-shored and demand for industrial space increases, planners should look to infill opportunities wherever possible. Industrial sites that are vacant and underutilized might be more difficult to develop, but manufacturing is an excellent opportunity to return that land to productive use. By focusing on the reuse of existing urban industrial land, outward sprawl can be avoided, along with its associated drawbacks of longer commutes and reduction of natural habitats.

Just as with infill development for residential and commercial space, the physical form of manufacturing will need to be adjusted for the urban context. Vertical Urban Factory demonstrated that vertically integrated production processes manifested in skyward physical forms beginning in the early 20th century. Where practicable, it would be prudent to adopt this form of production again, or at least adapt those buildings for small urban manufacturing.

The primary places to think about this form are in the Center-City, including the overlapping area in the Legacy Edge typology, as these areas are prime candidates for adaptive reuse in a dense, urban context.



Principle 2. Mix Uses and Scales

Most manufacturing facilities are designed in a utilitarian manner that focuses on inputs and outputs, creating "groundscraper" conditions in suburban and rural areas. Infill manufacturing requires a different approach that recognizes people as the most important factor in the competitive advantage of cities. Instead of single-use industrial parks and standalone factories, the Neo-Industrial City will have a mixture of uses and scales in order to encourage the confluence of users and activities that make for a vibrant economic cluster. Early urban manufacturing districts paid attention to details, with well-articulated guidelines for streetscape and façade treatments. Company towns went further, recognizing the importance of providing housing and amenities for employees. The Neo-Industrial City will draw upon these historical values, re-introducing human-centered design to manufacturing facilities.

This is particularly relevant to the City-Center and the Transition sub-type within the Legacy Edge typology. These are the manufacturing areas which have adjacent uses that can continue to be integrated into these typologies. Even the Intraurban Edge can benefit from a mixture of uses, as the University of Louisville student housing is introduced into Park Hill.

Principle 3. Transparency

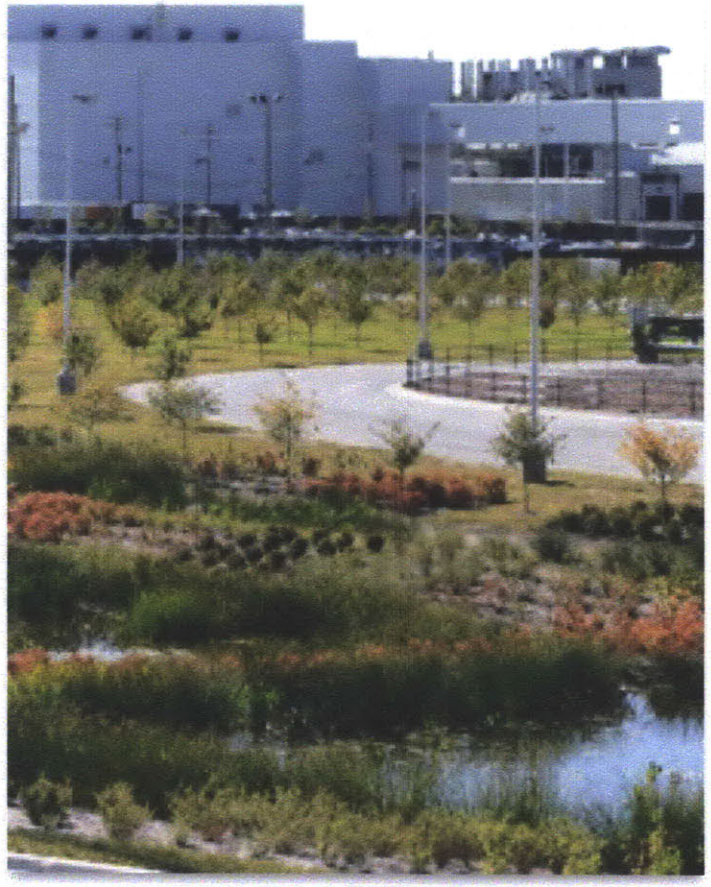
In a society that is widely perceived as being postindustrial, it is essential to educate the public about manufacturing processes. This general awareness is important to dispel lingering misconceptions about safety and pollution, presenting manufacturing as an appropriate and desirable activity within the city. When industrial processes were most noxious, factories moved out of the city and into windowless boxes, content to shut the public out. This attitude must be altered if industry is to become a good urban citizen. Transparency in industrial spaces is a proven concept to enhance marketability of cities and factories. Those manufacturers who take pride in their work should enable the public to share in that fulfillment.

This applies across all typologies, although the Center-City offers the best proximity to potential audiences and the highest potential for positive publicity benefits. The Louisville Slugger Factory and the Distilled Spirits Epicenter exemplify this principle.

Principle 4. Sustainability

Urban manufacturing has long had an exploitative relationship with nature, taking advantage of natural resources as inputs, while producing pollutants that detracted from those very inputs. Earlier design movements such as the Garden City sought to separate manufacturing activity from the rest of the city, but that concept emerged from an era with substantially different industrial processes. As technology has enabled cleaner, or at least more contained, forms of production, manufacturing can redefine its relationship with nature. Eco-industrial management practices can enable symbiotic relationships to take root, where the outputs from one industry can be utilized as the inputs of another. The facilities themselves can also deploy green infrastructure to enhance the environment around them.

This principle also applies across all manufacturing typologies, although the greatest intervention potential may be within the Legacy Edge, as the close proximity of related firms can encourage symbiotic relationships. The Transition sub-type, in particular, can use landscape interventions as a means of ameliorating its abrupt relationship with the surrounding neighborhoods. The local water district is already funding some green infrastructure improvements to reduce combined sewer overflow events.



Principle 5. Enhanced Connectivity

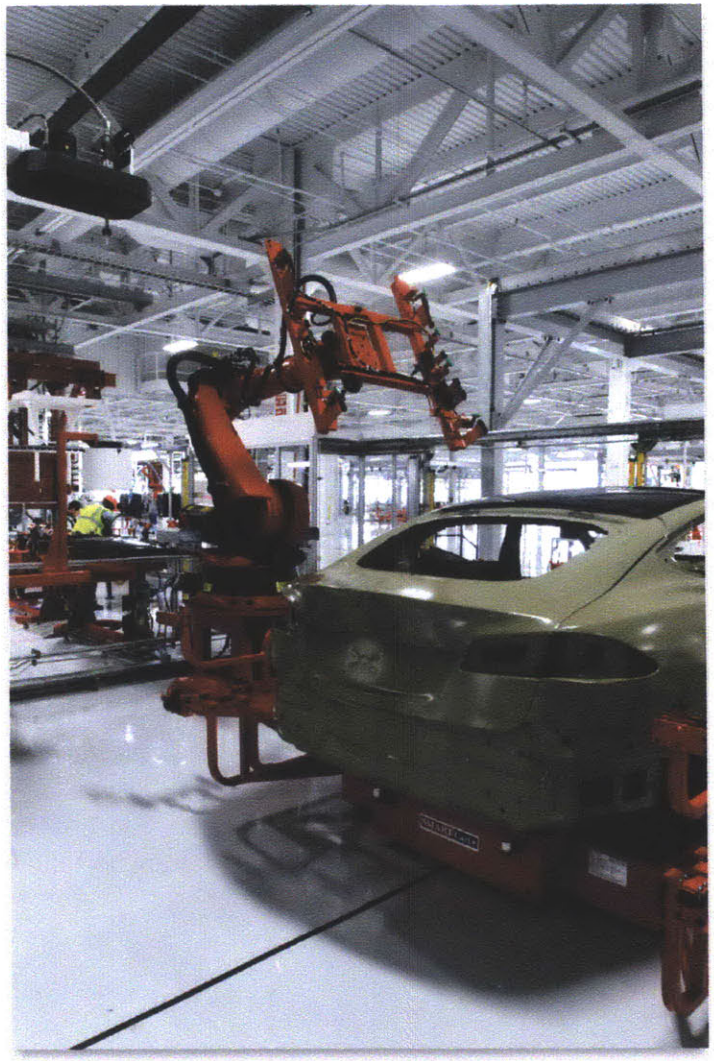
Cities historically evolved in geographically advantageous locations that enabled the easy movement of people and goods. As advancements in transportation technologies took root, the options for moving freight expanded to include waterways, railroads, interstate highways, and airways. In some cases these efforts have been coordinated and inter-modal connections are relatively seamless, but in many cases the differing transportation infrastructures have an antagonistic relationship that can hinder movement. Transportation planners must reconcile the competing infrastructures in a manner that minimizes conflict. Additionally, non-motorized transportation infrastructure will be incorporated as appropriate for the urban context.

This principle is especially important to bear in mind in the Legacy Edge typology, which evolved alongside multiple modes of transportation. In Park Hill, the prevalence of conflicts between rail and vehicular traffic represents one of its biggest competitive disadvantages. The district could also benefit from human-scaled transportation infrastructure.

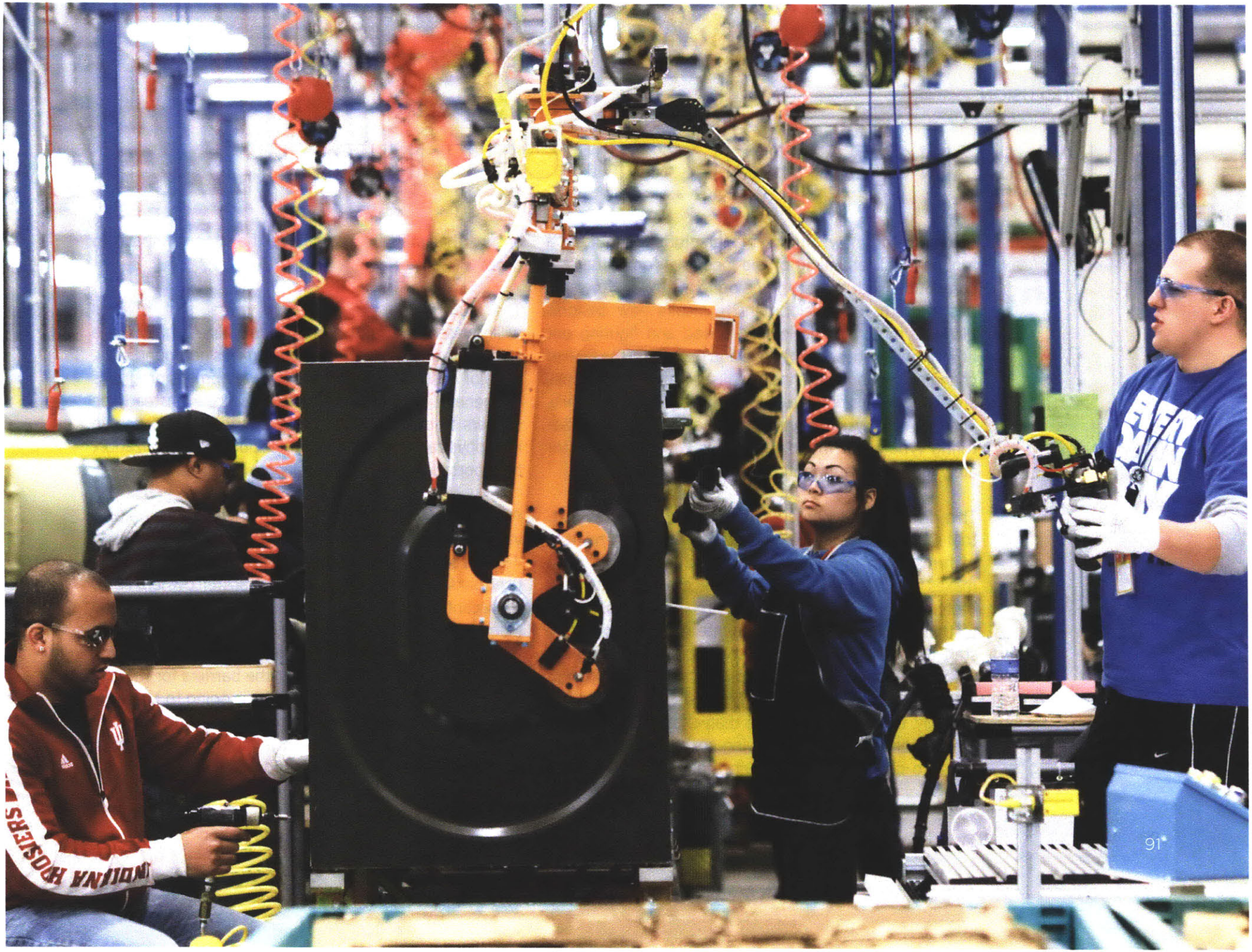
Principle 6. Adaptability

One of the major reasons that purpose-built factories experienced decline in cities was that they became obsolete with the development of new production technologies. As planners attempt to attract new manufacturing jobs to cities, they must consider the potential adaptability of manufacturing facilities. As firms grow or shrink, or as technology evolves, there needs to be sufficient room to accommodate such changes in the urban environment. Ultimately, this is what is going to ensure the long-term viability of the Neo-Industrial City.

This principle is an endorsement of having all of the manufacturing typologies in place. Each emerged in a particular technological environment, and they are competitive for different reasons. The challenge is to keep them relevant. In the Center-City, small urban manufacturers have led the adaptive reuse of older industrial buildings. In Urban Edge locations, advanced manufacturing techniques including robotics are being retrofitted into factories. Suburban industrial parks are seeing laboratories and light manufacturing uses fit into flex office buildings. What remains to be seen is how Legacy Edge areas can be brought up to date.



FIVE | CONCLUSION


INDIANA HOOSIERS

CHALLENGES AND OPPORTUNITIES

Planning for new urban manufacturing requires a fundamental rethinking of the industrial forms that are compatible with the city. One option is to look towards past patterns of development to inspire new designs. Planners must also be looking ahead and figuring out how to make cities competitive and resilient in the face of changing technologies; industrialists in many disciplines are already devising ideas about what this could look like. The task for physical planners is to address the manufacturing typologies within their cities with the appropriately matched treatments.

This diversity of form is what will give the Neo-Industrial City its competitive advantage. A healthy mixture of firms, both in terms of scale and industry, is what makes for a healthy manufacturing ecosystem. Cities are better positioned to attract entrepreneurs, as compared to their suburban and rural counterparts. Supporting start-up manufacturing will provide cities like Louisville with homegrown firms, developing positive relationships with companies from their early stages. As a long-term strategy, this is less risk-prone than chasing after established manufacturers and trying to persuade them to move to cities. It is important, though, that the cities ensure that start-up firms have the physical space to grow.[1]

The study about Louisville did reveal that political willingness alone is not enough to revitalize Legacy Edge Manufacturing. For instance, zoning was not found to be a major obstacle, and economic development programs are generally focused on the regional scale. Instead, the barriers to bolstering infill manufacturing are largely in the physical planning realm, including parcelization, transportation, and fractured land ownership.

A related issue is that of vacancy. There are over 6,000 vacant and abandoned properties in Louisville, but only 430 are actually owned by Louisville Metro. In 2013, the Landbank Authority was able to transfer ownership of 35 vacant properties. Efforts are underway to increase Metro's ability to pursue foreclosure on properties with municipal liens, and Metro is also assembling a legislative package that would lower the barriers for the city to pursue spot condemnation.[2] If it is going to have any meaningful kind of impact on the redevelopment of Park Hill, the city must continue to pursue these efforts to enhance its powers of eminent domain.

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1 Emig, "The Future of Manufacturing in Somerville."
2 Corbin, "Turning Eyesores into Assets."

There may be some opportunity for Louisville Metro to assemble and prepare sites for sale. There are already two redevelopment agencies which could take an active role, the Landbank Authority and the Urban Renewal Community Development Agency. As of the time this thesis was written, the Landbank Authority's public database did not show any large industrial properties available for purchase. The reasons for this are not explicitly known, but it seems likely that the Landbank Authority might avoid assuming control of industrial properties, since they might carry significant maintenance costs, environmental liability, and unknown marketability. These perceived risks would need to be addressed in order to incorporate tax-delinquent industrial properties into the Landbank Authority's inventory.

As a first step, Louisville would do well to inventory the existing parcels, including their existing uses and condition, in a similar fashion to Philadelphia's Industrial Land & Market Strategy. There is a natural dovetailing with the city's brownfield redevelopment program, although that program faces its own challenges. Funding is a perennial problem, as Louisville is the only big city in Kentucky; it is not in the direct interest of rural legislators to fund brownfield redevelopment.[3] The levels of contamination are also generally unknown, as property owners are responsible for cleanup when contamination has been revealed. It is in their interest not to investigate the level of soil contamination if they can avoid it.

A potential short-term strategy to bolstering manufacturing activity in Park Hill is to allow landowners to acquire adjoining, vacant side lots that are tax-delinquent. One of the more innovative ideas in Detroit Future City was to create an industrial side lot program to allow industry acquire nearby land for expansion.[4] This is a common practice for vacant and tax-delinquent residential properties in shrinking cities, and it could be adapted for industrial properties.

In the long run, there is an imperative for strong public intervention to overcome these misaligned interests and bring viable sites to market. Liability concerns are keeping many sites at an impasse; public policies that have sought retribution from polluters are standing in the way of the land's transformation. Better avenues for negotiated settlements, which may have to dramatically reduce the financial burdens on property owners, may need to be accepted in order to move forward. Additionally, if Louisville Metro decides to sell industrial land, it must be accompanied by a covenant not to sue or similar guarantees that future owners will not be held liable for any heretofore-undiscovered contamination.

The challenges of implementing effective programs to address vacancy and brownfield redevelopment are prerequisites to the adoption of the design principles proposed in Chapter 4. Assuming they are surmountable challenges, the future looks bright for the Neo-Industrial

3 Weyland, interview.

4 Page, interview.

City. Manufacturing has the potential to transform places in a positive manner; it is not the incompatible, noxious land use as it has sometimes been perceived. Urban planners and designers must join the conversation about re-shoring activity in the United States, because the pertinent question for our discipline is not *if* it is going to occur, but *where*. Cities have to be ready to re-embrace manufacturing, and the principles presented here are intended to be a starting place. There is no single answer to what the future of manufacturing will demand, but we can do a lot to create the right conditions for an innovative, dynamic, human-centered economy.

SIX | SOURCES


OLD
FORRESTER
BROWN-FORMAN

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INTERVIEW SUBJECTS

City Properties Group	*Bill Weyland*
Greater Louisville, Inc.	*James Reddish*
Initiative for a Competitive Inner City	*Kyle Polk*
Interface Studio	*Scott Page*
Louisville Metro	*Julienne Chen* *Mark Noll* *Tony Payton* *Haley Stevens* *Theresa Zawacki*
Underhill Associates	*J. Colin Underhill*
Urban Design Studio	*Patrick Piuma*