INDUSTRIAL URBANISM

PLACES OF PRODUCTION

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Massachusetts Institute of Technology

TEL AVIU UNIVERSITY אוניברסיטת תל-אביב

INDUSTRIAL URBANISM: PLACES OF PRODUCTION

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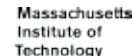For further information, please visit our website: **www.industrialurbanism.com**

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INDUSTRIAL URBANISM
PLACES OF PRODUCTION

Primer
Production
People
Places
Prospects

PRIMER

"Manufacturing still matters, but the jobs are changing".

-- The Economist, Special Report 2012

PRIMER

Since the Industrial Revolution, cities and industry have evolved together: from Manchester to Rochester, company towns and entire metropolitan regions have grown around factories and expanding industries. However despite this shared past, popular notions of manufacturing tend to highlight the negative aspects: pollution, environmental degradation, and the exploitation of labor caused by growing industry, on the one hand; and – almost paradoxically on the other – the blight, abandonment, and "shrinkage" resulting from the more recent decline of manufacturing from cities in the developed world.

Industrial Urbanism: Places of Production moves the conversation beyond these overly-negative characterizations, exploring the relationship between current urban planning practices and the places that are being designed and dedicated to the production of goods today.

In a time of dramatic shifts in the manufacturing sector -- from large industrial-scale production and design to small-scale distributed systems; from polluting and consumptive production to a clean and sustainable process; from a demand of unskilled labor to a growing need for a more educated and specialized workforce -- cities will see new investment and increased employment opportunities. Yet, to reap these benefits will require a shift in our thinking about manufacturing.

Bottrop, Germany. Photo: Guy Gorek on Flickr

The exhibition addresses three integrated themes: **Production**, **People**, and **Places**. These themes are presented, both separately and in relation to one another, as components that reposition the city as a key actor for industry and production and restore industry to its historic role as a crucial element in the weave of the urban fabric.

Looking ahead, in the quest to make cities competitive and resilient, we suggest exploring the following questions:

▶▶ **What are the contemporary relationships between city and industry?**
What might the future relationships between city and industry look like?
What physical planning and design strategies should cities pursue to retain, attract, and increase manufacturing activity?

Redefining the role of industry, making it an integral part of the city, is a spatial, social and economic challenge. More than two centuries after the start of the Industrial Revolution, policy makers, planners and designers have an opportunity to re-consider the ways industry creates places, sustains jobs, and promotes environmental sustainability.

This is the future of manufacturing. This is the future of cities.

PRODUCTION

"The object of all work is production or accomplishment and to either of these ends there must be forethought, system, planning, intelligence and honest purpose, as well as perspiration"

-- Thomas Edison

PRODUCTION

Manufacturing drove the emergence of cities during the Industrial Revolution, as companies located there to be closer to labor, transportation networks, and markets. More recently, with the advent of the automobile and truck transport (and their related infrastructure), this process has been inverted: sites outside the urban center have become more attractive and feasible, and uses requiring more space (and land) for their operations have relocated or expanded away from traditional downtowns. [1]

In addition to the technological and market forces that pushed manufacturing outside of the urban core, firms in the developed countries are facing both the challenges and opportunities of globalized markets. Industry and commerce are being reshaped by digital technologies and flexible borders that foster the flow of ideas, goods, and services; reduce barriers to international partnerships; and streamline the application of innovation in production and trade.[2]

[1] National Council for Urban Economic Development. *Urban Manufacturing: Dilemma or Opportunity?* Washington, DC: , 1993., 1.
[2] MIT Taskforce on Innovation and Production. A Preview of the MIT Production in the Innovation Economy Report, Cambridge, MA: Massachusetts Institute of Technology, 2013. p. 11-12.

Chevrolet Volt Factory. Photo: Jim Merithew, Wired.com Photostream on Flickr

Despite these apparent benefits, scholars note that globalization may present certain risks to industry as well.[3] The opening of international trade and communications threatens copyrighted content, trade secrets, and other proprietary information; even more troublesome and less obvious, there is a danger that as companies shift production abroad, their capacity to continue to innovate may be diminished, as they give up crucial opportunities for learning in the development process.[4] This state of affairs was predicted in 1987 by Stephen Cohen and John Zysman, who argued that the movement towards post-industrialism is shortsighted, as it produces 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." [5]

Today, due to these changing dynamics, as well as rising labor and transportation costs, domestic production is making a comeback in the (apparently mislabeled) "post-industrial" nations.

Political leaders now embrace these reports, paying special attention to the potential of skilled, living-wage employment opportunities: for example, President Obama made manufacturing one of the central tenets of his economic recovery plan, addressing the relationship between cities and industry:

"What's happening in Detroit can happen in other industries ... We can't bring every job back that's left our shore. But right now, it's getting more expensive to do business in places like China. Meanwhile, America is more productive ... So we have a huge opportunity, at this moment, to bring manufacturing back. But we have to seize it." [6]

Seizing this opportunity has important implications for cities, which stand to benefit from new investments and increased employment opportunities. However, a consideration of urban physical spaces and social realities is missing from many of these manufacturing-related reports and policy recommendations. Turning to the question of space, we see a troubling trend in the practices of post-industrial planning that have led to the abandonment of urban industrial land in Western cities. In some cases, vacant or underutilized factories and warehouses are converted to non-industrial uses, such as loft apartments or live/work space for artists; in others, former manufacturing sites are razed to make way for new residential and commercial districts. The irregular industrial spaces that remain as a result of these two processes are often insufficient to accommodate large or unique building footprints. And surprisingly, the surviving industrial land is quite expensive, relative to suburban and rural sites. While cities are being presented with opportunities for revitalization and job creation, planning and economic development strategies must also address design and spatial considerations.

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[3] Though most of the reports focus on the U.S., all of them are comparative, showing how economies such as China, India and Indonesia have risen into the top ranks of global manufacturing (competing with the US, Germany, Japan, France and Italy) and in the world's 15 top manufacturing economies, the sector contributes from 10 to 33 percent of value added. See, for example, Atkinson, Robert D., Stewart, Luke A., Andes, Scott M. and Ezell, Stephen J. *Worse than the Great Depression: What Experts Are Missing About American Manufacturing Decline*. ITIF, 2012; McKinsey Global Institute. *Manufacturing the Future: The Next Era of Global Growth and Innovation*, 2012; Pisano, G., Willy S., *Producing prosperity: why America needs a manufacturing renaissance*. Harvard Business Review Press, 2012; Pisano, G., P., Willy S. *Restoring American Competitiveness*, Harvard Business Review, 2009.
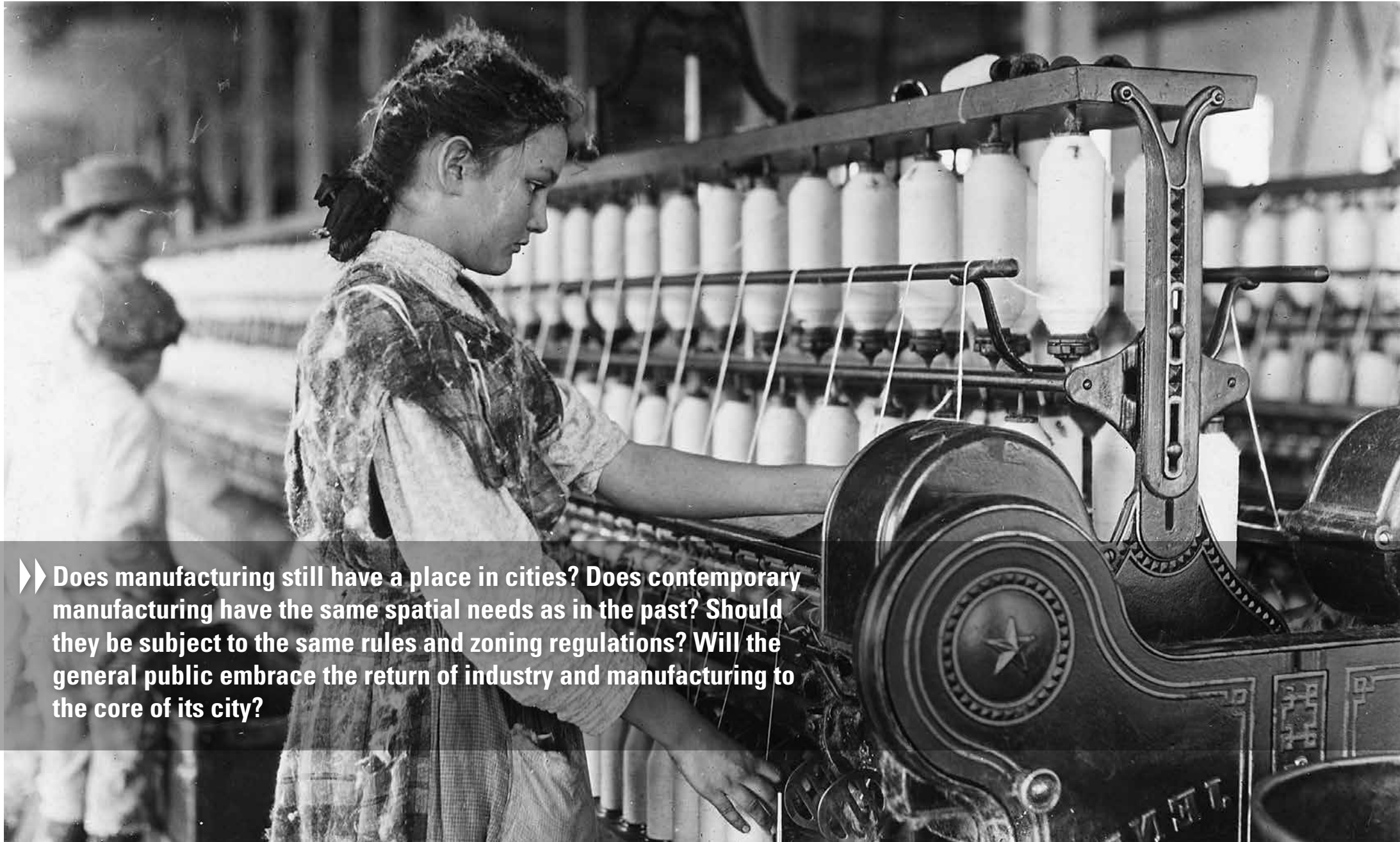[4] Ibid.
[5] Cohen, S. S., *Manufacturing Matters: The Myth of the Post-Industrial Economy*. New York: Basic Books, 1987.

[6] United States President Barack Obama 2012 State of the Union. http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address.

Does manufacturing still have a place in cities? Does contemporary manufacturing have the same spatial needs as in the past? Should they be subject to the same rules and zoning regulations? Will the general public embrace the return of industry and manufacturing to the core of its city?

Textile: Vivian Cotton Mills, Cherryville, North Carolina, 1908. Photo: Lewis Hine, US National Archives.
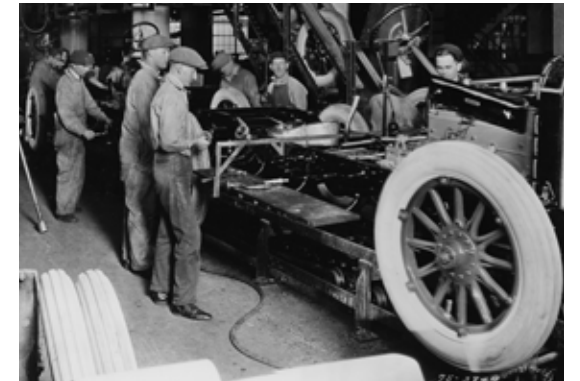
Assembly line: General Motors, ca. 1922. Photo: Frank Angelo papers, Bentley Historical Library, University of Michigan.

Microelectronic production: Manufacturing the Apollo Guidance Computer, ca. 1966. Photo: Raytheon, from the files of Jack Poundstone.

Robotic Assembly Line: KUKA Industrial Robots, 2007. Photo: Mixabest, on Wikimedia Commons.

PEOPLE

"One machine can do the work of fifty ordinary men. No machine can do the work of one extraordinary man."

-- Elbert Hubbard

PEOPLE

All production requires producers, all work involves workers, and new models for industry will call for and *be called for by* a new generation of industrial labor. As we take account of the emerging new modes of production and call for changes in the ways we plan and design our cities, we must also support the "makers" of this coming generation.

▶▶ **How do we envision the daily life of the industrial worker in the city of the 21st century? What should be the future relations between housing and industry? Can industry and housing coexist in proximity or even be integrated? Is there a way to design an industrial city while also enhancing livability and the quality of life of its inhabitants?**

Seagate Plant, Wuxi, China, 2008. Photo: Robert Scoble on Flickr

Shoe factory, Lynn, MA, 1895.
Photo: Francis Benjamin John.

Tobacco plant, 1922.
Photo: Department of Labor, Women's Bureau.

Manual telephone exchange, Ashkelon, Israel, 1963.
Photo: Israeli Government Press Office.

SACOM, assembly line, China, 2008.
Photo: Stichting Onderzoek Multinationale Ondernemingen.

Textile factory, Newberry, South Carolina, 1908.
Photo: Lewis Hine, US National Archives.

Canning factory at Kibbutz Givat Brener, Israel,1939.
Photo: Kluger Zoltan, Israeli Government Press Office.

Melli factory for combat boots, Kabul Afghanistan, 2010.
Photo: NATO Training Mission-Afghanistan.

Force protection industries inc., Ladson, SC, 2008.
Photo: Cherie Thurlby, U.S. Department of Defense.

Alexandria glass factory, Alexandria, VA, 1911.
Photo: Lewis Hine, Library of Congress.

Vultee plant, Nashville, TN, 1943.
Photo: Alfred Palmer, US National Archives.

3M Co. plant, New Ulm, MN, 1975.
Photo: Flip Schulke, U.S. National Archives.

Seamstress, Bnei Brak, Israel, 2013.
Photo: Michael Jacobson, LCUD.

PLACES

"The tallest building in the world is now in Dubai, the biggest factory in the world is in China, the largest oil refinery is in India, the largest investment fund in the world is in Abu Dhabi, the largest Ferris wheel in the world is in Singapore."

Fareed Zakaria

PLACES

The relationship between cities and industry is constantly evolving. The industrial revolution spurred large-scale urbanization as new technologies enabled the adoption of water wheels, coal-fired steam power, and intercity railways, dramatically changing the urban landscape. From a historical perspective, we can identify four key periods in the evolution of city-industry relationships:[7]

(1) Mercantile City: Pre-Industrial Revolution. The primary mode of production in this period was artisanal manufacturing in individual households; therefore, manufacturing activities were closely integrated with residential and commercial activities. The merchants' town that grew from the trade of goods and wholesale products became one of the defining patterns of urbanization in Western civilization.

(2) Industrial City: 1750 – 1880. The evolution of textile manufacturing and steam-engine technologies revolutionized production processes. Consequently, cities experienced unprecedented population increases, with manufacturing driving urbanization and economic growth.

(3) Planned City: 1880 – 1970. Toward the end of the 19th century, planning models suggested zoning regulations to handle the problem of factories' nuisance activities. The attempt to provide healthier living conditions for factory workers took shape in the form of company towns and Garden Cities, which later served as a prototypes for towns built after the end of World War II.[8] Countries such as United Kingdom, Israel, Russia, Iran, Sweden, and Japan also implemented these principles in construction of new towns, designating industrial lands as part of newly planned cities; however, these industrial areas were typically situated to have the lowest possible effect on residential areas.

(4) Piecemeal City: 1970 – present. During the 1970s, many countries, especially in the Western world, experienced rapid deindustrialization, and planning tools were developed to further segregate industrial activities from other land uses. The trend against locating manufacturing next to other uses, coupled

with Euclidean zoning practices that essentially prioritized residential and commercial uses of real estate over all others, particularly manufacturing, resulted in a massive loss of industrial land to commercial and residential uses in many cities. This trend in urban planning theory and practice further increased the divide between home and work, as the desire to maintain real estate values pressured development away from lower valued industry towards other, more profitable uses.

The diagram depicts abstract relationships between industrial typology and geographical location. **Storage & Distribution** facilities are located in the hinterlands, and tend to be sited where land values are the lowest. **Industrial Parks** are typically located far from city centers, either in the country or suburbs, or on the urban periphery. This form emerged after World War II and often dominates the industrial landscape today. **Office parks** are similar to industrial parks, but tend to support service industries, which are less land-intensive and depend less on rail and water transportation. They typically contain dense concentrations of white- and pink-collar employees, and due to their smaller footprints, (and lack of harmful industrial waste), they may be located within cities. **Legacy Urban Factories** exist within the city itself, even within Central Business Districts. These factories have often been grandfathered into cities that have otherwise made industrial uses illegal through land-use regulations. **Eco-Industrial Parks** most closely resemble the Industrial Parks identified previously, but they are organized around the common goal of environmental sustainability. **Innovation Clusters** are designed to benefit from agglomeration: that is, individual firms in similar industries can increase their productivity through their proximity to one another. These tend to be vertically integrated, including research, administration, production, and distribution.
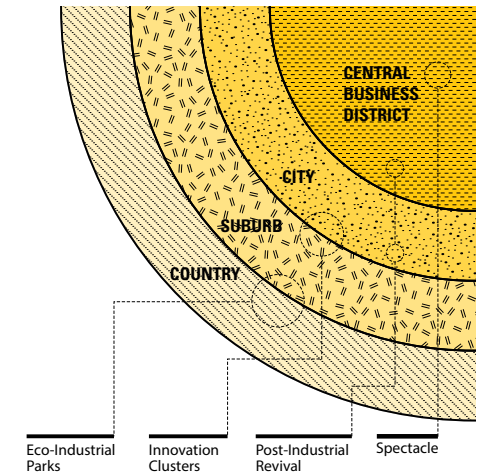
Existing Industrial Typologies:
Program and Geography

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[7] Kim, M., Ben-Joseph, E., "Manufacturing and the City", Paper presented at the *annual meeting for the American Collegiate Schools of Planning*, Dublin, Ireland, July, 2013.
[8] The creation of model company towns was particularly evident in Britain in the latter half of the 19th century, with the establishment of Saltaire (1888), Bournville (1895), Port Sunlight, Creswell, and New Earswick. In the United States, one of the first company towns to be built was Pullman, Chicago (1880).

This chronological evolution had an enormous economic, social, and spatial influence on cities, and contributed to the creation of three contemporary prototypes of industrial spaces: the **integrated**, the **adjacent** and the **autonomous**, as follows.[9]

Integrated. Residential, commercial and industrial land uses are fused or closely located in space. Often resulting from (unplanned) growth, manufacturing is an integral part of the city's structure. Different use-areas do not have clear, distinct borders and tend to dissolve into each other across the urban fabric.

Adjacent. Industrial and residential land uses are segregated by design and policy into distinct areas of the city (often via a physical barrier or natural elements), in an attempt to isolate incompatible land uses and prevent environmental hazards.

Autonomous. Standalone industrial/business parks or large factories are sited to work autonomously. Functioning as independent campuses, industrial areas are surrounded by open spaces and located in proximity to railways, highways, and airports, prioritizing the efficient movement of materials, goods, and laborers.

These prototypes — integrated, adjacent and autonomous — demonstrate three idealized stages in the separation of manufacturing from the city, the strengthening of the central management of industrial zones, and the influence of international companies on local economies and physical spaces.

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[9] Hatuka, T., Bar, R., Battat, M., Zilberdik, Y., Hanany, C., Hefetz, S., Jacobson, M., Lothan, H., *City-Industry*. Resling, Tel Aviv, 2014 (Hebrew).
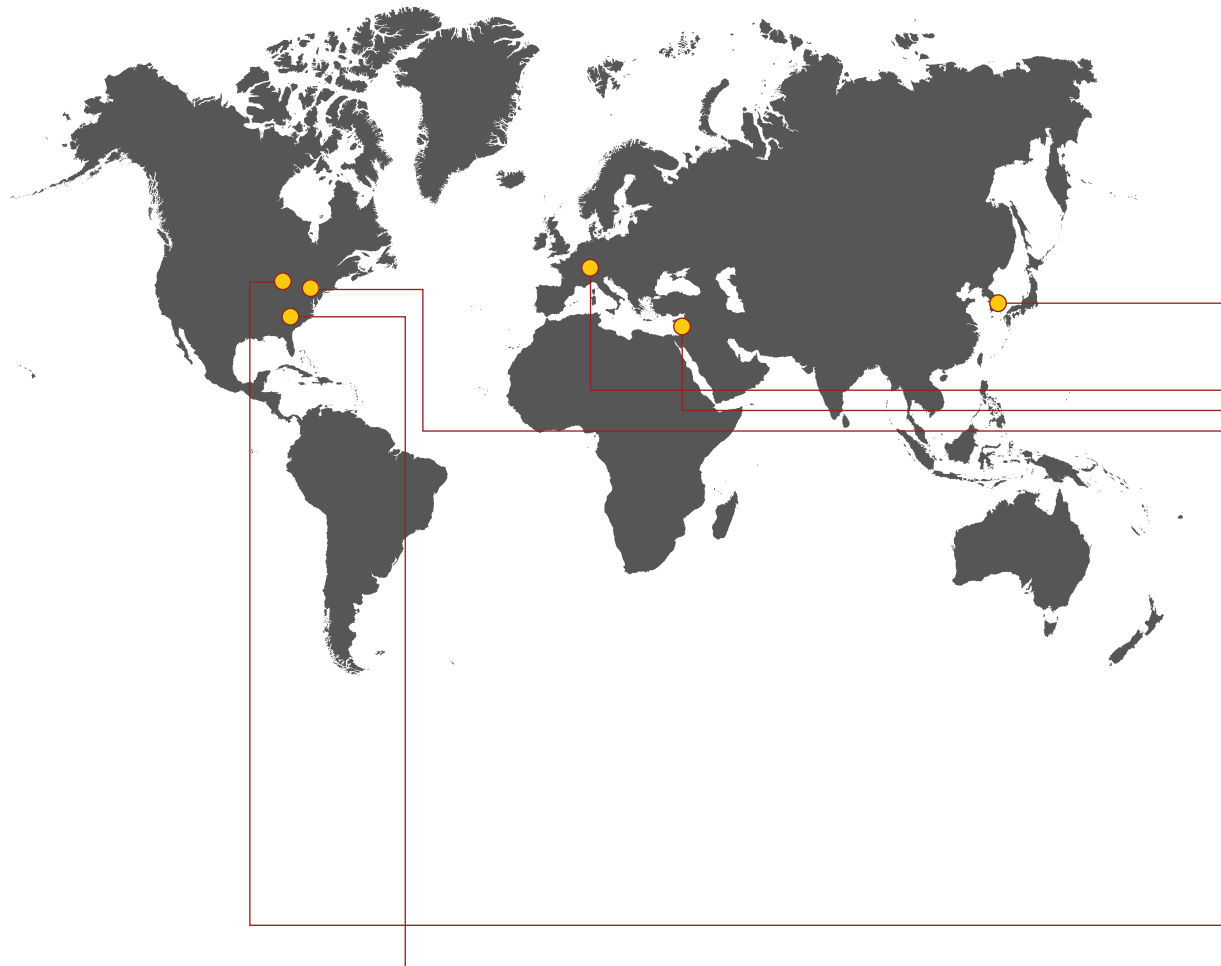
PROTOTYPE	Integrated	Adjacent	Autonomous
INFRASTRUCTURE	Layered	Parallel	Unified
PROGRAM	Mixed	Partial Zoning	Zoning
SKYLINE	Diverse	Diverse	Constant

Industrial fabric   Residential fabric   Public/commercial/open spaces   Roads/transportation
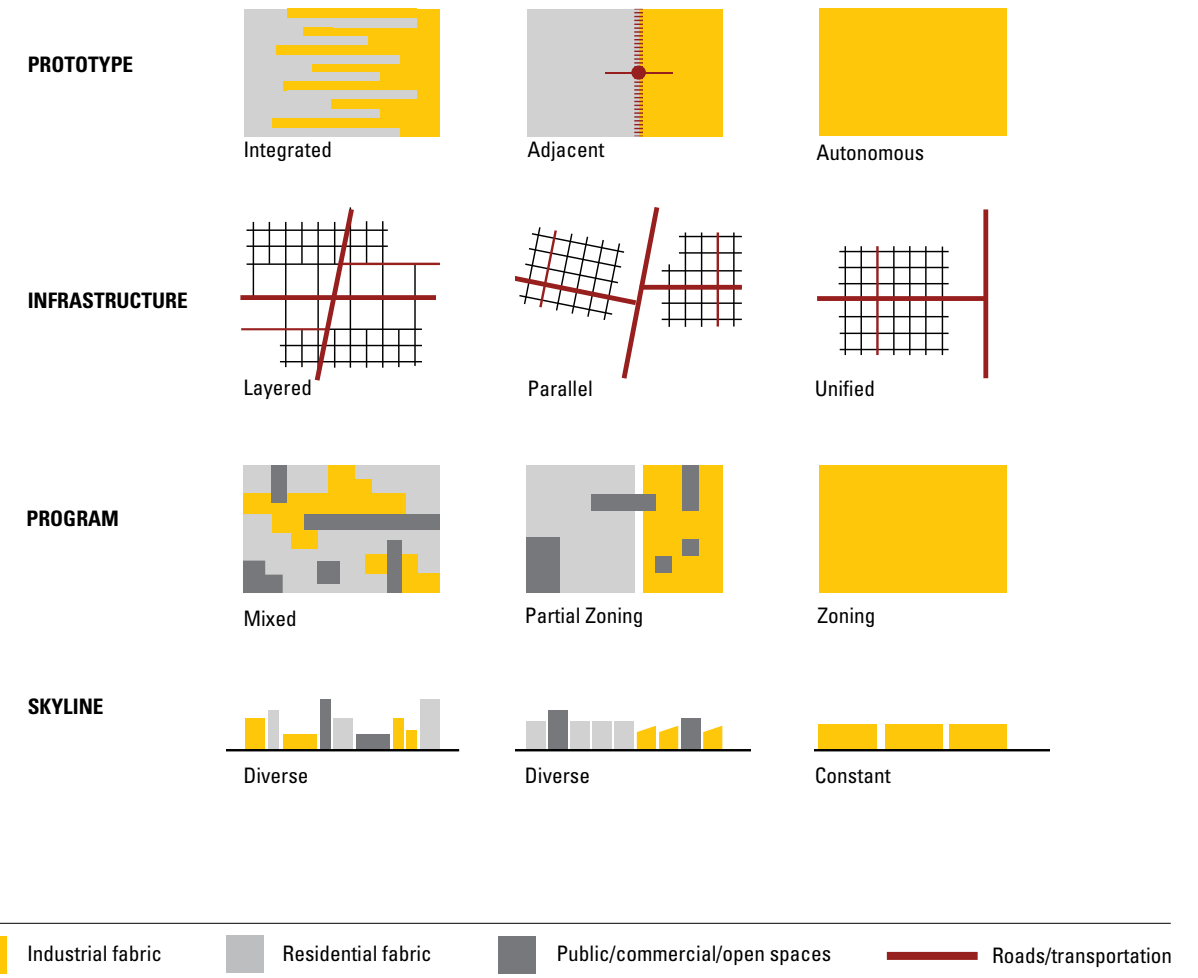
Prototypes of industrial areas

▶▶ Why is a particular prototype used in a particular city-region? Which of the prototypes is the most adaptive to environmental and social challenges? What parameters are being used to decide where manufacturing is sited? Which prototype serves the 21st century city best? What is manufacturing going to look like in the city of tomorrow?
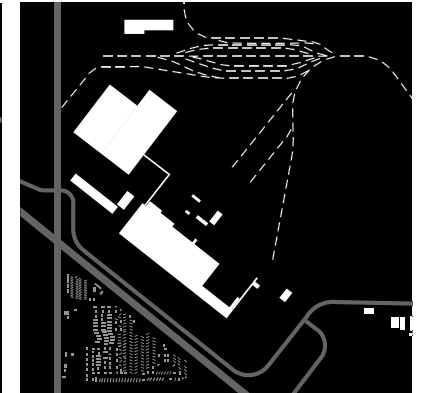
CASES

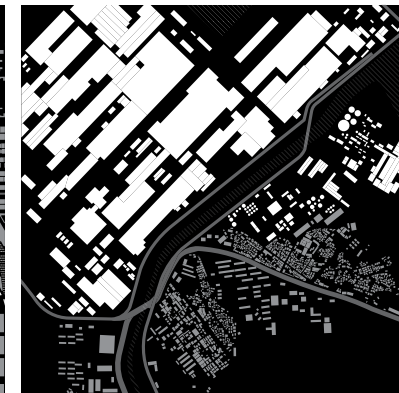**Munich, Germany.** Prototype: Integrated.
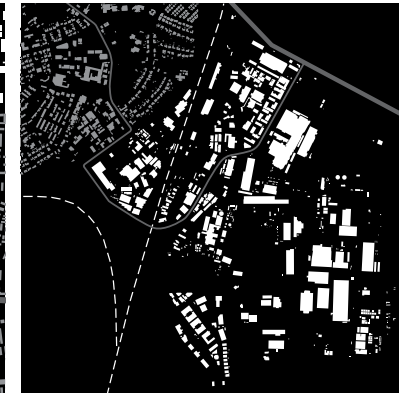
Kiryat Gat, Israel. Prototype: Adjacent.

Lordstown, United States. Prototype: Autonomous

Chicago, United States. Prototype: Integrated.

Pohang, South Korea. Prototype: Adjacent.

Atlanta, United States. Prototype: Autonomous

Photo courtesy Diego Delso,
Wikimedia Commons

PROTOTYPE: INTEGRATED
MUNICH, GERMANY

Munich
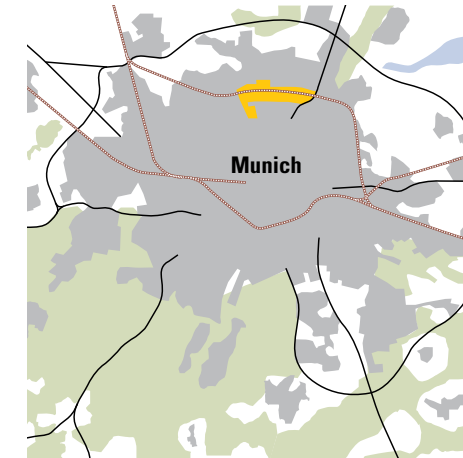
CITY PROFILE
Established: 1158
Overall area: 310.4 km²
Population: 1,378,000

INDUSTRY PROFILE
Area: N/A (0.5 km² for BMW plant)
Program: Automobile Assembly
Urban form: Industrial areas are tightly integrated with other land uses
Industrial typologies: Varies
Largest employers: BMW Werk Munich (10,000 employees)

Known for its electronics and advanced manufacturing, Munich is one of Germany's leading manufacturing regions, supporting a diverse range of industrial activities, ranging from small crafts to innovative service and high-tech assembly.

One of the city's most notable manufacturing plants, BMW Werk Munich, opened in the 1920s, originally to produce aircraft engines and power units. The site was rural land, and the surrounding area remained undeveloped until after the Second World War when the city expanded and the plant gradually became delimited by housing and commercial developments.

This pattern would change following 1972 when the Munich Olympic Park opened to the west of the factory, forming the final boundary for the site. Since then, the plant has expanded vertically rather than horizontally

Relationship

This diagram illustrates the combined area of the BMW plant and its neighboring industrial districts. Over the course of four decades residential and commercial areas have gradually grown around the factory. Today the campus is located south of a major train station and within a 15-minute drive of downtown Munich. Smaller manufacturing and related facilities surround the BMW plant. Their uses vary from automobile-to service-related firms.

Infrastructure

More than 50% of the vehicles assembled in this location are shipped by rail. Major arterial and collector roads also surround the site. However, a significant portion of the manufactured vehicles are directly delivered to the individual customers on site, which reduces the facility's reliance on infrastructure. Furthermore, 60% of the vehicles are manufactured on demand (just-in-time production), which reduces the need for excessive storage space. Due to the facility's spatial constraints, the plant utilizes a multi-level underground storage system instead of using exterior parking lots commonly found outside of auto assembly plants. The internal circulation system of the production line is also multi-layered, making the best use of limited space.

Relationship

Infrastructure

■ Residential fabric

■ Industrial fabric

■ Open spaces

▪ ▪ ▪ Railroad
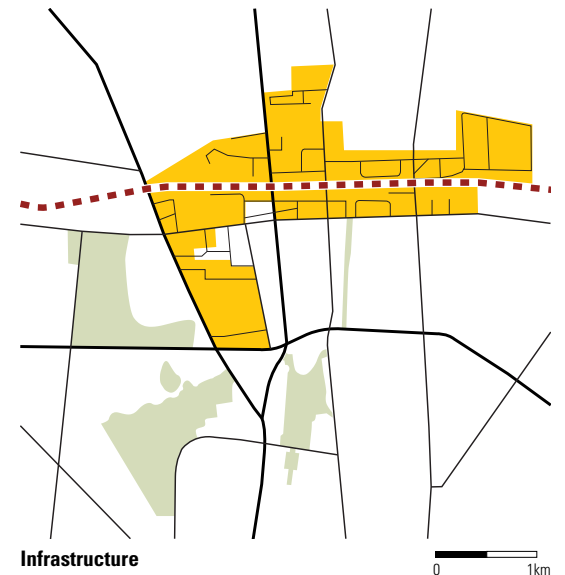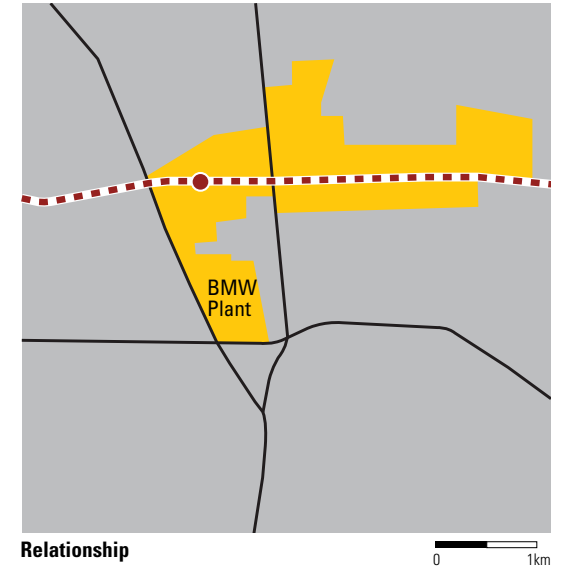
This figure-ground image illustrates industrial and residential building footprints in and around the BMW plant. The plant, shown in the southwest corner of the image, is located at the intersection of two major roads. The plant and the industrial area surrounding it can be identified by the larger, irregular shaped building footprints that reflect the nature and use of these specialized manufacturing facilities. The smaller residential buildings to the east are typical of German housing known for long, rectangular multi-family buildings. The residential neighborhood and the manufacturing campus face each other, where trees, sidewalks, and two-lane streets help to maintain neighborhood livability.

Residential fabric

Industrial fabric

Photo courtesy City of Chicago

PROTOTYPE: INTEGRATED

CHICAGO, USA

CITY PROFILE
Established: 1837
Overall area: 614.8 km^2
Population: 2,696,500

INDUSTRY PROFILE
Area: 73.8 km^2
Program: Apparel, beverage and tobacco, electric equipment, fabricated metals, furniture, leather and allied products, nonmetallic minerals, primary metal, paper, printing, textile, transportation equipment, miscellaneous goods
Urban form: Developed along major transportation networks, integrated with other land uses
Industrial typologies: Diverse in industry types and sizes
Largest employers: Not identified

Chicago is home to 2.7 million residents, the third most-populous city and part of the third-largest metropolitan area in the United States after New York City and Los Angeles. Thanks to its location, the city became a major transportation hub, and consequently, a major center for manufacturing, retail, and finance in the late-19th century. The city layout features a gridded street network with major diagonal arterial roads and railways radiating from the downtown center. In the 1980s, the city was losing industrial jobs, partially due to increased foreign competition, along with residential and commercial development pressures. In 1988 the city created its first Planned Manufacturing District (PMD) to retain industrially-zoned land and to prevent further job losses.[10]

As a result of Chicago's effort to protect manufacturing uses, there are now 24 Industrial Corridors; most of the land with a manufacturing zoning designation is located within or adjacent to one of those Industrial Corridors. The Industrial Corridors are tightly knit with the residential and commercial land uses, and exist as an important part of Chicago's urban landscape. PMDs are considered to have been effective in fostering manufacturing activities within Chicago, as they ensure long-term stability for industrial businesses looking to invest and expand within the city's districts.
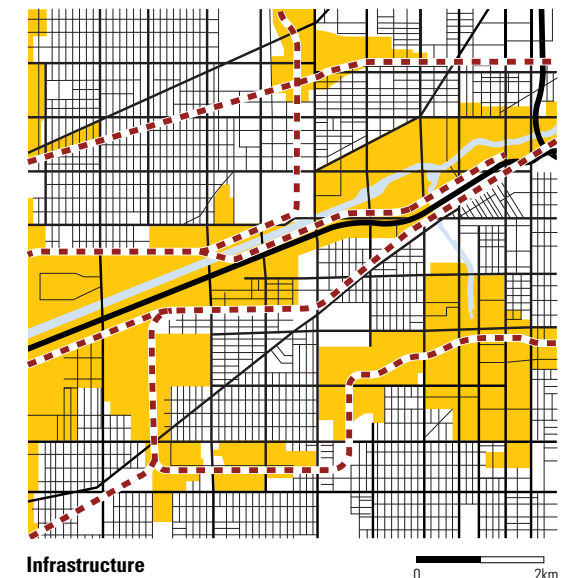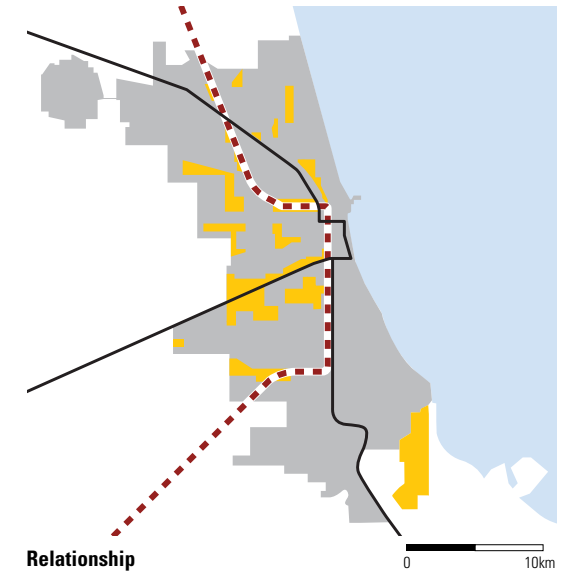
Relationship
This diagram illustrates the relationship between Chicago's Planned Manufacturing Districts (PMD) and the rest of the city area. PMDs are concentrated along major transportation networks, such as arterial roads, railroads and rivers, which results in a concentric, finger-shaped pattern that converges towards Lake Michigan and the downtown area. Such development patterns are consistent throughout Chicago's development history, which is also clearly illustrated in Chicago's 1904 Industry and Railroad Map and its 1965 comprehensive plan.

Infrastructure
This diagram depicts the infrastructure network and the resulting city fabric around one of the PMDs. An extensive railroad system and a network of collector roads connect the PMDs with the larger transportation system. The dense grid network of the local roads demonstrates the typical relationship between PMDs and Chicago's built areas. Chicago's PMDs are tightly integrated with the rest of the city fabric offering an urban pattern for accommodating industrial uses within a city.

Relationship

0   10km

Residential fabric

Industrial fabric

---- Railroad

Infrastructure

0   2km

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[10] Summarized from the Initiative for a Competitive Inner City (blog),
http://www.icic.org/connection/blog-entry/bp-protecting-chicagos-industrial-through-pmds/bp

This figure-ground image demonstrates Chicago's complex infrastructure and city fabric around the PMDs. A river, an arterial road, and a rail-line intersect along with manufacturing facilities are generally found around such transportation nodes. (Manufacturing facilities can be differentiated from the residential fabric through their slightly larger footprints.)
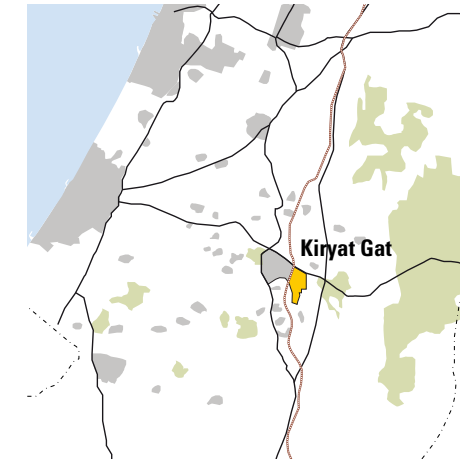
Residential fabric

Industrial fabric

Photo courtesy Kiryat Gat
Municipality

KIRYAT GAT, ISRAEL

Kiryat Gat

CITY PROFILE
Established: 1954
Overall area: 16.3 km²
Population: 47,500

INDUSTRY PROFILE
Area: ~ 6 km²
Program: High-tech and heavy industries
Urban form: Residential and industrial fabrics, separated by railroad
tracks
Industrial typologies: Diversity of industries and sizes, ranging
from small manufacturing facilities and large enclosed campuses
Largest employers: Intel (3,500 employees), HP Indigo (600
employees), Sugat Sugar (300 employees)

Kiryat Gat is home to one of the largest manufacturing plants for Intel, one of many high-tech firms fueling an industrial revival in the city. Production has played a vital role in the economy of this city since its beginnings as an Israeli New Town in the 1950s.

Threat of economic decline in the 1980s prompted government incentives to encourage foreign investment shifting Kiryat Gat's manufacturing portfolio from sugar and textiles to advanced production, including companies besides Intel, as Hitachi and Zenith Solar.

Despite its influence on the overall economy, industrial manufacturing remains spatially removed from the rest of the city. A pattern of single-purpose zoning reflects a distinct separation between residential neighborhoods to the west and industrial development to the east.

Relationship

Kiryat Gat's development pattern is bifurcated, with relatively dense, mostly-residential neighborhoods juxtaposed with a distinctly-industrial zone. This divide is also reflected in the city's socio-economic landscape: to the west, a variety of neighborhoods are home to diverse communities, which reflect a broad range of socio-economic conditions, but these communities have benefited little from the amenities in the industrial zone. Many neighborhoods face high unemployment and a high proportion of residents receiving public assistance. In the eastern half of the city, industrial employees lack a connection to Kiryat Gat's city center and companies have relied on enclosed campuses to service employees; the majority of these workers live outside of Kiryat Gat and commute to the city by car.

Infrastructure

Located 50 kilometers south of Tel Aviv and 40 kilometers north of Be'er Sheva, Kiryat Gat is surrounded by open, arid land devoted to agriculture production and wildlife preserves. Despite these natural surroundings, the Lachish Stream, which traverses the town, and the highways to the north and west, act as buffers, barring residents and workers from the immediate assets of the region. Currently, there is a single direct connection, the Israel Polak Boulevard, between downtown Kiryat Gat and the industrial zone, with scant pedestrian activity between the two.

Relationship

Residential area

Industrial area

Residential fabric

Industrial fabric

Open spaces

Railroad

Infrastructure
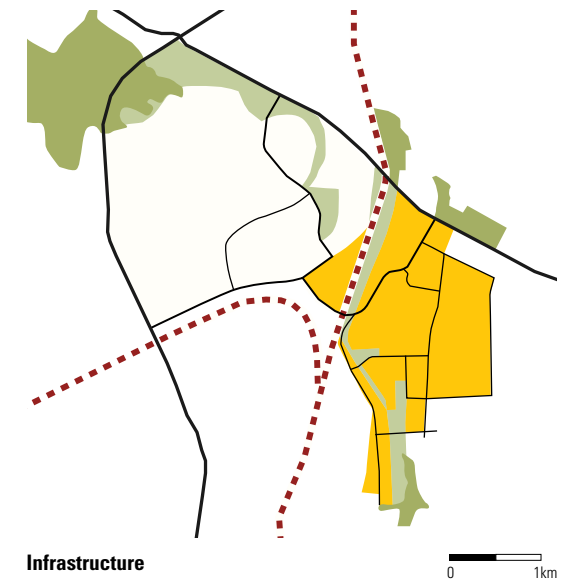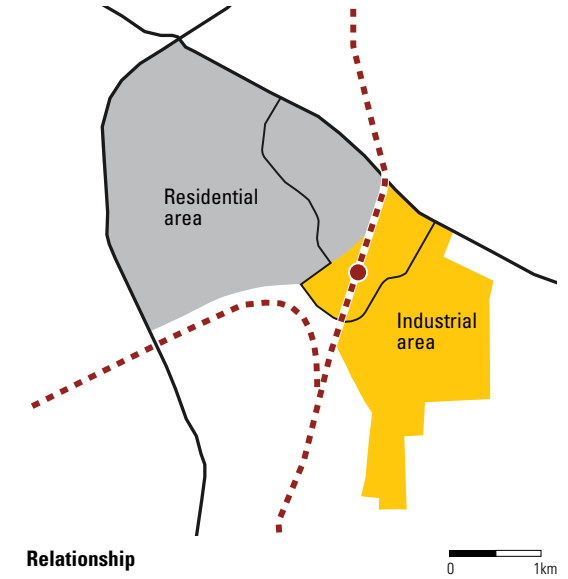
Due to incremental development from the northwest toward the southeast, Kiryat Gat's industrial area consists of several manufacturing typologies, including traditional manufacturers, large plants and enclosed high-tech campuses. The figure-ground diagram illustrates not only this spatial diversity, but also the stark difference between the residential and industrial fabrics in general.
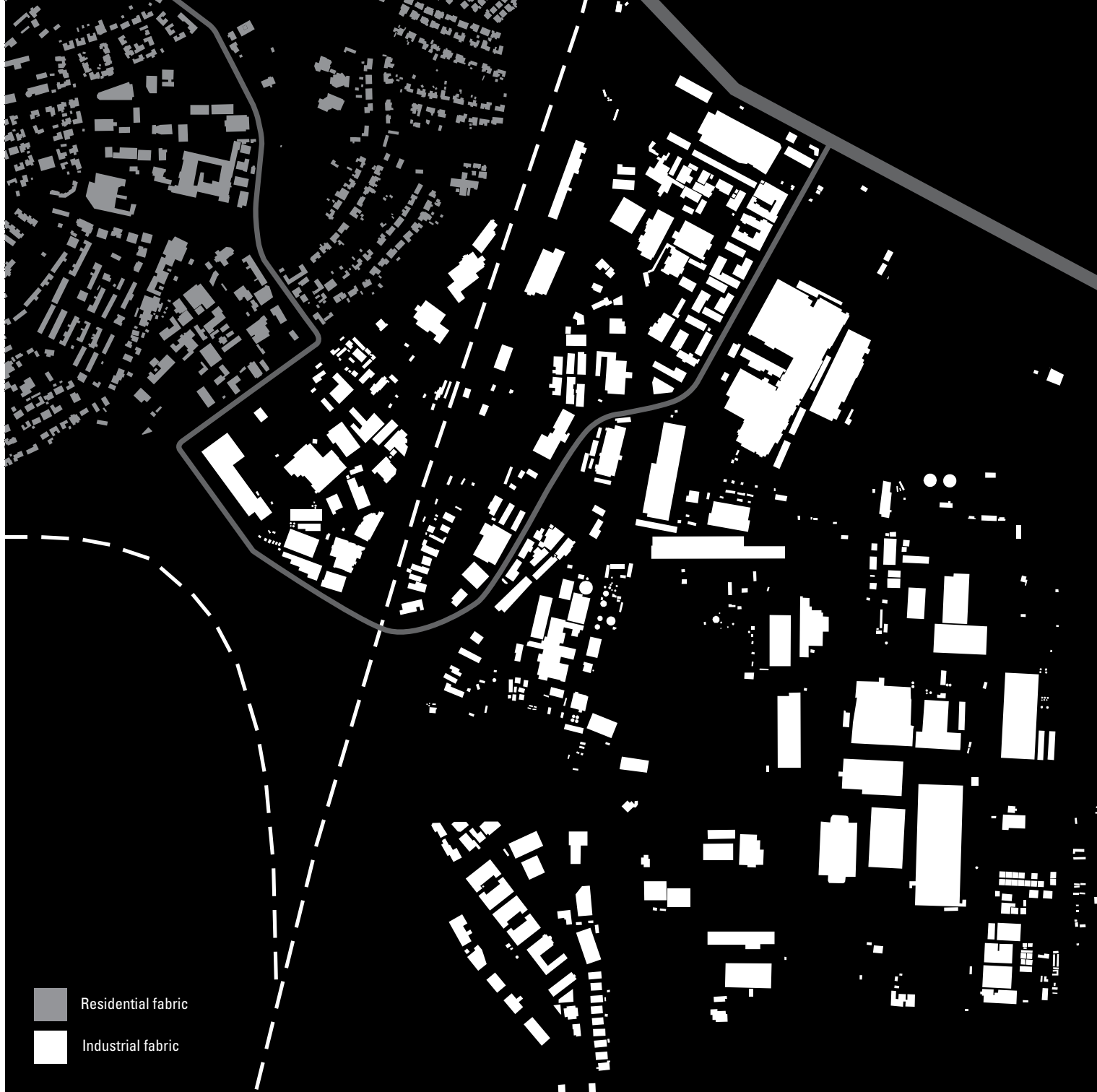

Residential fabric

Industrial fabric

Photo courtesy Minjee Clara Kim

PROTOTYPE: ADJACENT
POHANG, SOUTH KOREA

CITY PROFILE
Established: 1949
Overall area: 1128.8 km^2
Population: 523,500

INDUSTRY PROFILE
Area : 21.4 km^2
Program: Metal manufacturing
Urban form: Residential and industrial fabrics, separated by a river
Industrial typologies: Uniform in character and industry type, all of the factories are steel processing facilities; sizes range from small and moderate to a mega campus (POSCO)
Largest employers: POSCO (9,500 employees), Hyundai Steel Company (unknown)

Pohang was originally incorporated in 1949 as a maritime city, though it traces its origins to settlements dating back two millennia. Until the late 1950s Pohang was primarily a fishing port with seafood processing and marine products as its main industries.

The city underwent a major growth period following the 1960s when the Pohang Steel Company (POSCO) built Korea's first integrated steel mill, established with the help of a public subsidy and support from the Korean government. Today POSCO is the world's fourth-largest steelmaker.

Given its long history of development and mountainous topography, Pohang's street network does not reflect an orderly pattern. Despite this, two distinctive areas have emerged in the inner city: a historic city center to the north of the river and an industrial area to the river's south.

Relationship

The Hyeongsan River physically separates Pohang's southeastern industrial areas from the older, residential and commercial parts of the city, partially mitigating the environmental impact of manufacturing activities. An arterial road and a railroad line cross the river. Newer residential enclaves developed in the 1980s and 1990s spread around the southeastern periphery of the industrial zone. Surrounded by forest to the east and the East Sea to the west, the city's port access facilitates shipping to and from Pohang, making the location appealing to manufacturers.
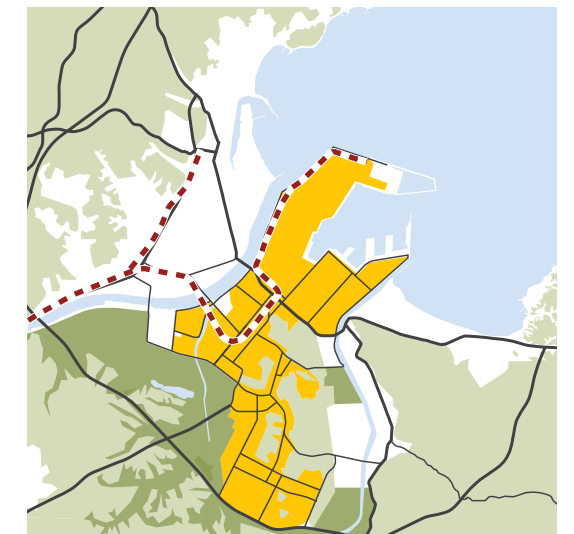
Infrastructure

Pohang's industrial land is subdivided into a finer scale by a network of smaller roads. The largest steel manufacturing company, POSCO, occupies most of the territory within Pohang's industrial zone, occupying the claw-shaped tip of the landmass. The smaller steel companies are all located to the south of POSCO. As shown in the diagram, the land for smaller companies is subdivided into relatively smaller parcels by the road network. Aside from the Hyundai Steel Company, which is the second largest factory in the area, the smaller companies largely depend on POSCO's production processes using scrap metals and other leftover resources.
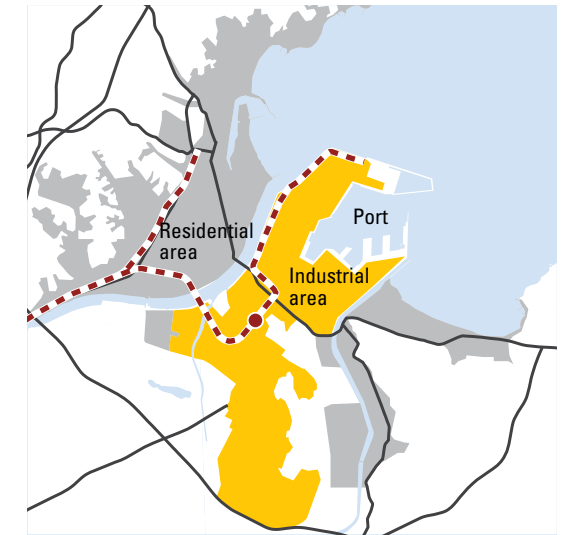
Relationship

0   4km

Residential fabric

Industrial fabric

Open spaces

Railroad

Infrastructure

0   4km

The figure-ground diagram of the east side of the POSCO campus illustrates the stark difference in scale between the industrial buildings and residential buildings. A stream separates the two land uses. Residential buildings are located in the southeast corner and POSCO's factories are to the northeast side where steel-rolling manufacturing processes are carried out.
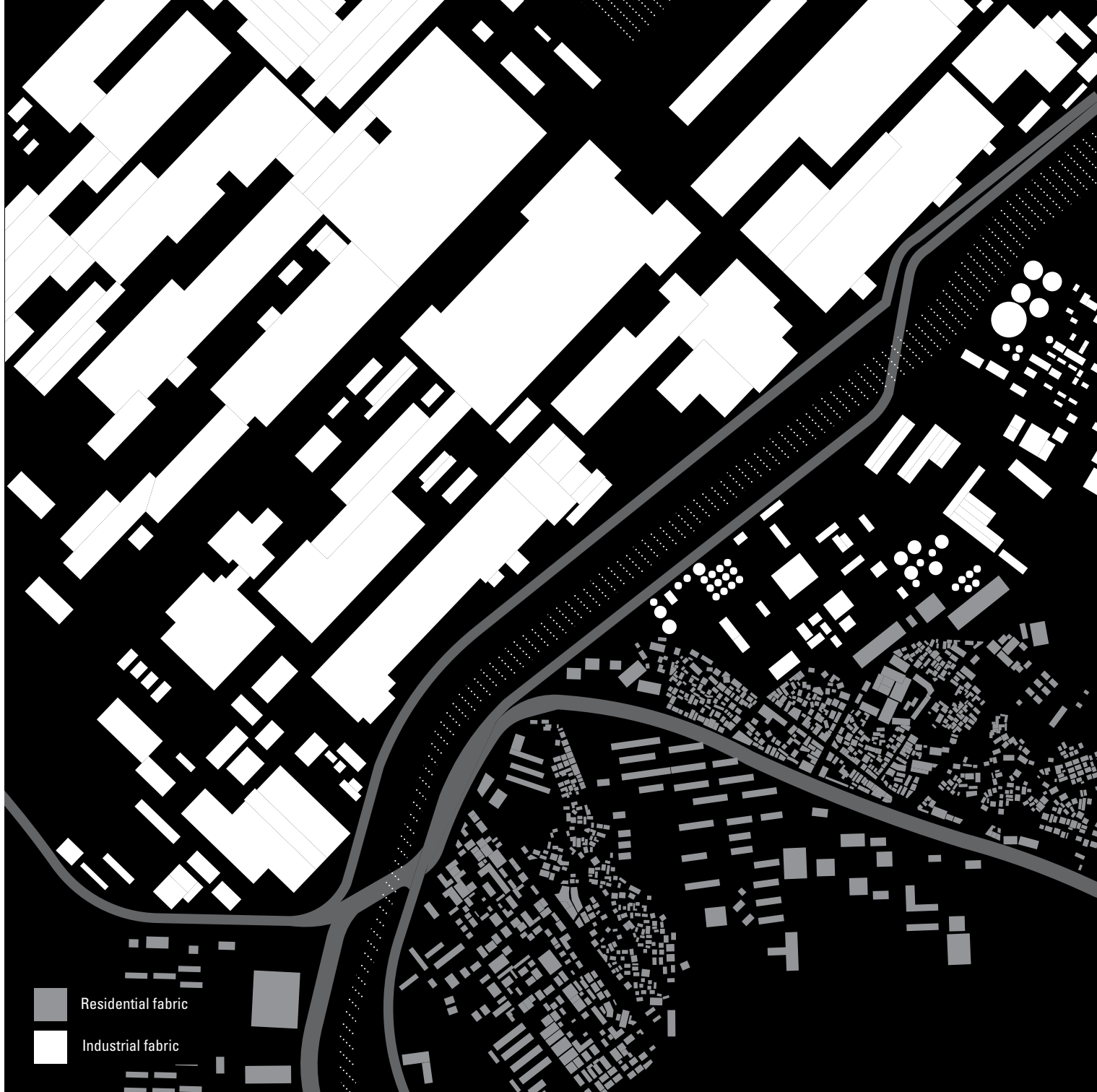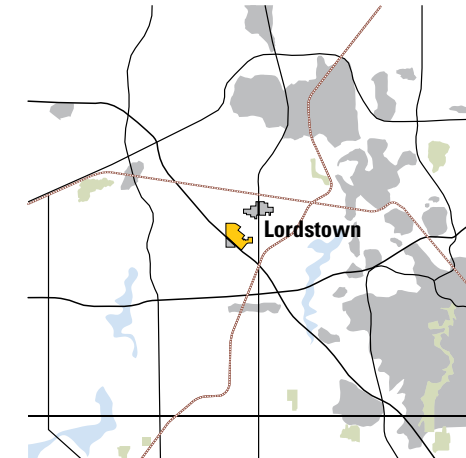

Residential fabric

Industrial fabric

Photo courtesy GM Lordstown

PROTOTYPE: AUTONOMOUS

LORDSTOWN, USA

CITY PROFILE
Incorporated: 1975
Overall area: 59.9 km²
Population: 3,400

INDUSTRY PROFILE
Area: 13.2 km²
Program: Auto assembly
Urban form: Assembly plant, located along arterial road and rail network
Industrial typologies: Single factory (Lordstown Assembly Plant)
Largest employer: General Motors (6,500 employees)

Lordstown is a village in northeastern Ohio, located equidistant from Cleveland and Pittsburgh. The village is best known for Lordstown Assembly, a General Motors plant that started production in 1966. Most of the residents work at the plant. Despite the village's small size, it supports more industrial jobs than any other municipality in the Youngstown-Warren-Boardman Metropolitan Statistical Area.

Lordstown's layout is dominated by the presence of the assembly plant and the adjacent rail yard. A majority of the land area is sparsely populated residential zones with only a small downtown commercial zone. Lordstown Assembly and the rail-lines occupy about one-quarter of the total land area. The city can be characterized as dependent on the Assembly Plant.

Relationship

Located in the middle of an agricultural area, the GM Lordstown complex essentially encompasses all of the town's industrial area. The plant is physically separated from the community though many of the plant's employees live in Lordstown and use its services and amenities. Company housing exists across from the complex with roughly 200 single-family homes housing the plant's employees. While multiple rail-lines connect the plant to the rest of the country, the automobile is the primary mode of transportation for employees living and commuting to the complex from other areas.

Infrastructure

The Lordstown site exists in physical isolation from the surrounding land uses, and is served by its own infrastructure. The site includes a large parking lot, connected to interstates 80 and 680. The highways cut through surrounding farmland, linking the site to the greater Youngstown region.

Relationship

0   2km

Residential fabric

Industrial fabric

Open spaces

- - - - Railroad

Infrastructure

0   2km
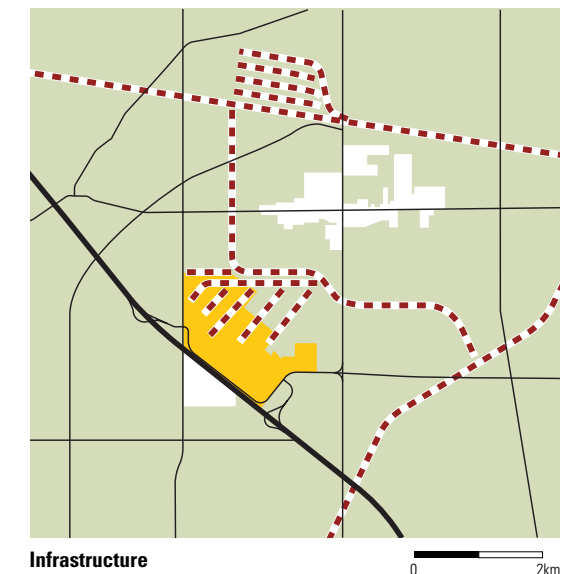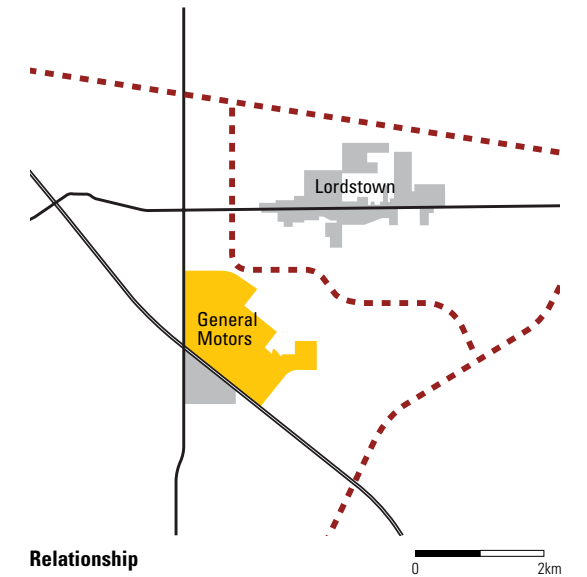
This figure-ground image shows Lordstown's two manufacturing facilities. These facilities not only dominate the industrial zone but also the surrounding agricultural region. A smaller residential cluster is located to the southwest of the site.
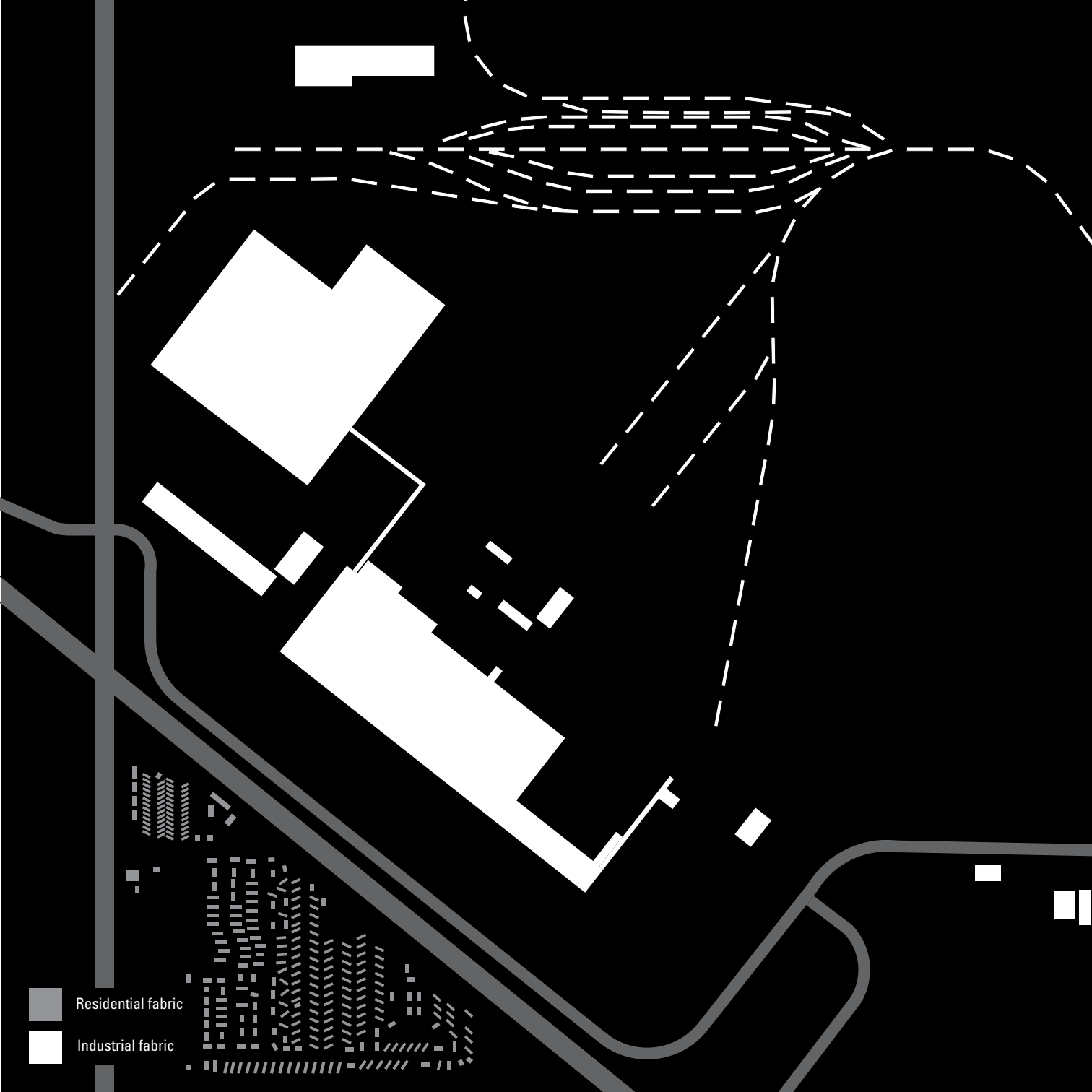
Residential fabric

Industrial fabric

Photo courtesy Chaim Van Prooyen

PROTOTYPE: AUTONOMOUS

ATLANTA, USA

Atlanta

CITY PROFILE (ATLANTA)
Established: 1845
Overall area: 343 km² (Atlanta metropolitan area: 21,690 km²)
Population: 432,800

INDUSTRY PROFILE
Area: Unknown
Program: Warehousing and distribution, printing, recycling
Urban form: Industrial district borders an international airport, with excellent highway access and room for expansion
Industrial typologies: Mix of small to large-scale industrial facilities that are mainly classified as light manufacturing uses
Largest employers: Fresh Pack (Wholesale Food Distributor), Geographics (commercial printing), Royal Food Service (wholesale food distributor), Vertis, Inc. (commercial printing services)

The Atlanta metro area is home to 5.5 million people, making it the largest city in the state of Georgia. It is also part of the ninth-largest metropolitan area in the United States. A number of industrial districts have been developed around the Hartsfield-Jackson Atlanta International Airport, one of the country's busiest, to the south of the city.

Technically, these industrial sites are spread across three different municipalities: The city of Atlanta to the northeast of the airport, the city of Forest Park to the southeast, and the city of College Park to the west. Each municipality has a zoned cluster of industrial land; suburban subdivisions surround these clusters. The industrial sites have excellent highway access and are also served by a large rail yard, located in Forest Park.

Relationship

The industrial land sits adjacent to Atlanta International Airport and is surrounded by suburban developments. These industrial facilities range from food to car manufacturing. As Noted, the industrial area itself is part of three different municipalities: Atlanta's Southside Industrial District (SID), city of College Park and Forest Park. One of the planned manufacturing districts, the Southside Industrial Park, was recently opened and developed on a former brownfield site.

Infrastructure

In general, smaller parcels define the SID, with an overall layout that reflects a separation of uses by level of intensity. The heavy-industrial companies and highest traffic-generating uses can be found along the Browns Mill Road and Empire Boulevard. The Zip/Browns Mill/Empire area is less uniform, with smaller lots and irregular spacing between buildings. The new Southside Industrial Park contains newer and uniformly larger light industrial lots while the Zip Industrial Boulevard is lined with a mixture of offices and other smaller-scale businesses.[11] Atlanta sits to the north of the SID, and is connected by the heavily used highways, interstates 75 and 258, as well as by rail and minor roads.
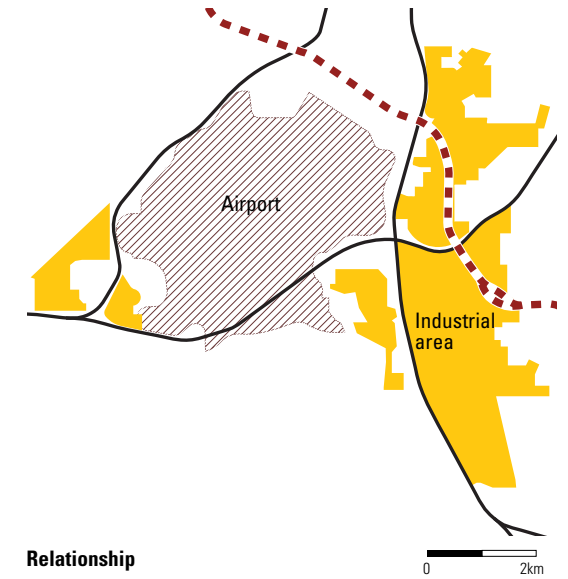
Relationship
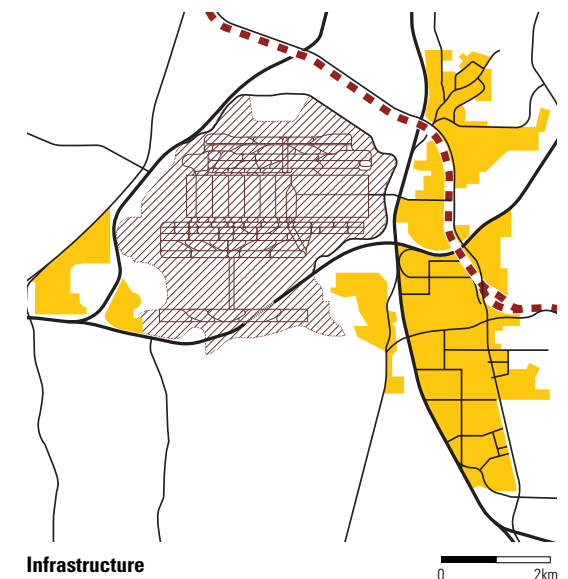

Airport

Industrial fabric

Railroad

Infrastructure

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[11] Georgia Institute of Technology, School of City and Regional Planning. "A Plan for Industrial Land and Sustainable Industry in the City of Atlanta." December 8, 2009. p.12

This figure-ground image shows the diverse mix of manufacturing spaces being used in the SID. The airport to the northwest dominates the industrial landscape with a variety of industry hugging the site from the southeast corner. Major highways and rail-lines traverse the site, strengthening Atlanta's position as a place where manufacturers are able to easily move goods by land and air.

Industrial fabric
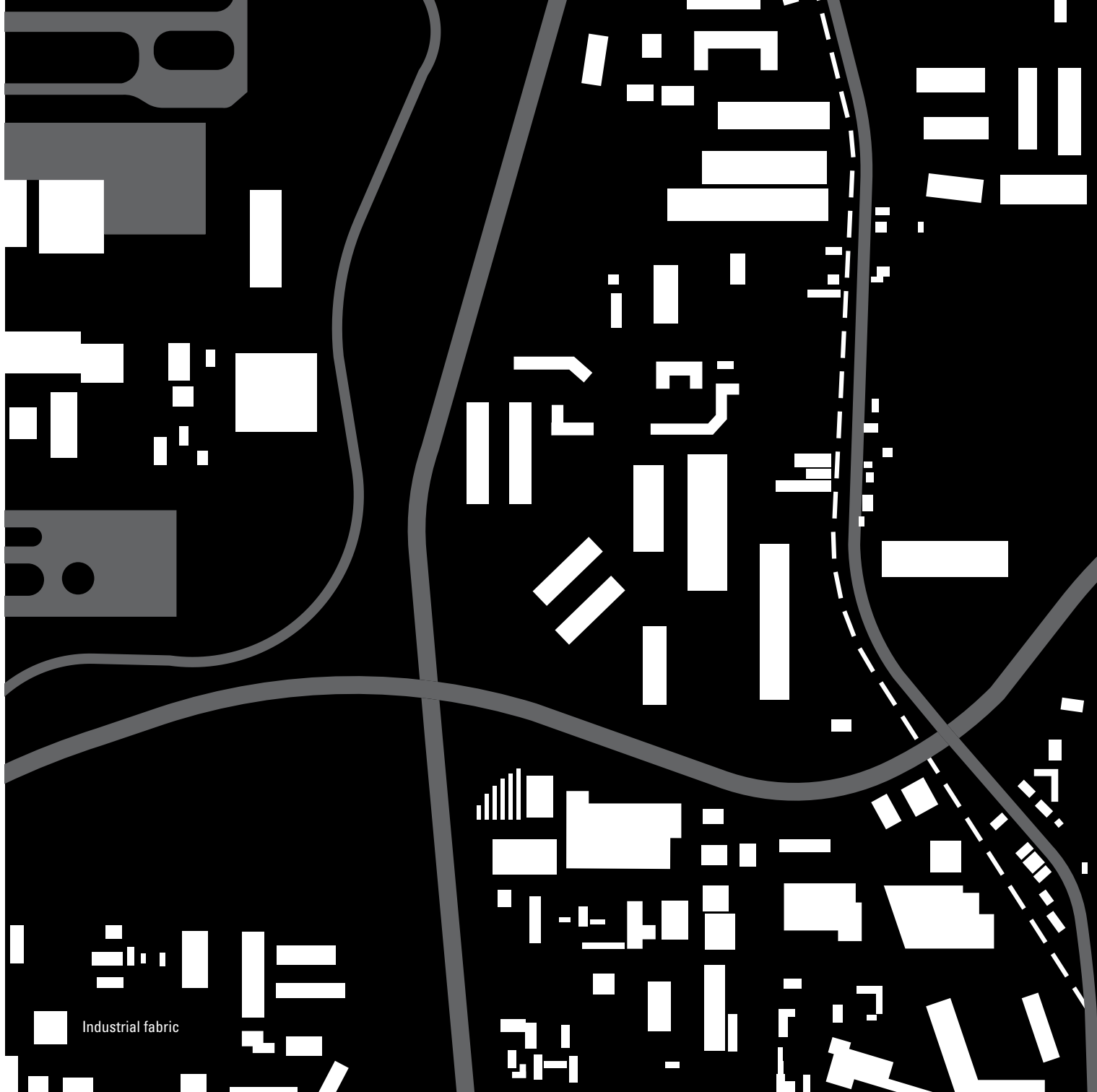
PROSPECTS

"Effective policy (or effective design) works on the boundaries between dream and reality, linking deep needs and obscure desires to open experience and test."

-- Kevin Lynch

PROSPECTS

Manufacturing constitutes a significant portion of the world's total economic activity, and industry occupies large areas of our built environment -- yet, we tend to think about industry in an economic or political context often divorced of spatial or locational considerations. As this exhibit shows, this detachment from the physicality of industry is becoming less and less sustainable. In the coming decades the question will not be *whether* growth in manufacturing is going to occur, but *where*.

There is no single answer to what future manufacturing will require, but cities can begin to set the stage and create the right conditions for re-embracing industry in their midst. In doing so, three key challenges can be identified: first, with the rapid growth of biotechnology, internet-related digital media and digital fabrication there is pervasive confusion regarding terminology (what exactly do we mean when we speak of "industry, "manufacturing" or "production?"[12]); second, is the general public's and political leaders' lack of exposure to modern industry (and consequent outdated perceptions about this sort of activity), combined with the lack of a clear strategy to encourage the return of industry to urban sites; third, is the limited and declining supply of urban land zoned for industry in cities.

While economic arguments for urban manufacturing and the policies that support it are maturing, the *spatial* strategies for supporting manufacturing are either scattered or nonexistent.

How does one address the challenges facing industry through spatial solutions? What criteria should guide the development of contemporary urban industrial spatial development? Furthermore, can we use industry as a prime catalyst in retrofitting cities? These questions are crucial in the process for the visioning of the future relationships between production, people and place.

Photo: Geri-oc on Wikimedia Common

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[12] See: *Made in San Francisco*. Report to the Board of Supervisors and the Mayor. Back Streets Businesses Advisory Board, City of San Francisco, 2007.

Industrial urbanism offers a chance to embrace **production** and locate living-wage jobs where people live. It would also bring measurable environmental benefits associated with shortening commutes and reducing the delivery distances between firms. Proximity between firms and facilities could bolster economic clusters' strength, due to the positive effects of increased knowledge spillover and a robust labor market. As planners attempt to attract manufacturing back to cities, they must consider the potential adaptability of the manufacturing facilities they encourage. As firms grow or shrink, or as technology evolves, there must be sufficient room to accommodate such changes. This, ultimately, is what will ensure the long-term viability of urban industry

Photo: Mixabest, on Wikimedia Commons

Today, urban manufacturing requires a different approach that recognizes **people** as a vital factor in the competitive advantage of cities. Instead of single-use industrial parks and stand-alone factories, industrial urbanism encourages the confluence of users and activities that create vibrant economic clusters. The new industrial urbanism should re-introduce human-centered design to manufacturing facilities.


Photo: ro_buk on Flickr

Places of production are often defined and controlled by the same regulatory mechanisms as were used almost 100 years ago. Cities continue to reduce the supply of industrial land through rezoning. As a result, the availability of urban land suitable for the kind of buildings and operations-intensive activities characteristic of manufacturing is shrinking. As demand for industrial space increases, planners and policy makers will need to consider infill sites wherever possible. As an added benefit, 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.

Photo: Hila Lothan, LCUD

In a society widely perceived as being "post-industrial," it is essential to educate the public about manufacturing processes. This general awareness – a true consciousness-raising – is necessary if we are to dispel lingering misconceptions that view industry as always unsafe and polluting and instead, present manufacturing as an *appropriate* and even *desirable* activity within the city. When industrial processes were most noxious, factories moved out of the city and into windowless boxes; the animosity was mutual: manufacturers were as content to shut the public out as the public was to banish them from downtowns. This attitude must be altered if industry is to be welcomed back, to re-assume its role as a good (and productive) 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 will enable the public to share in that fulfillment.

It is time to look at manufacturing with fresh eyes, to rekindle the attraction it once held for people who cared about cities, and to re-think and re-imagine industrial urbanism. This will be a major task for designers, planners, and policy makers in the years ahead, but it is one that is sure to bear fruit and lead to better place making.
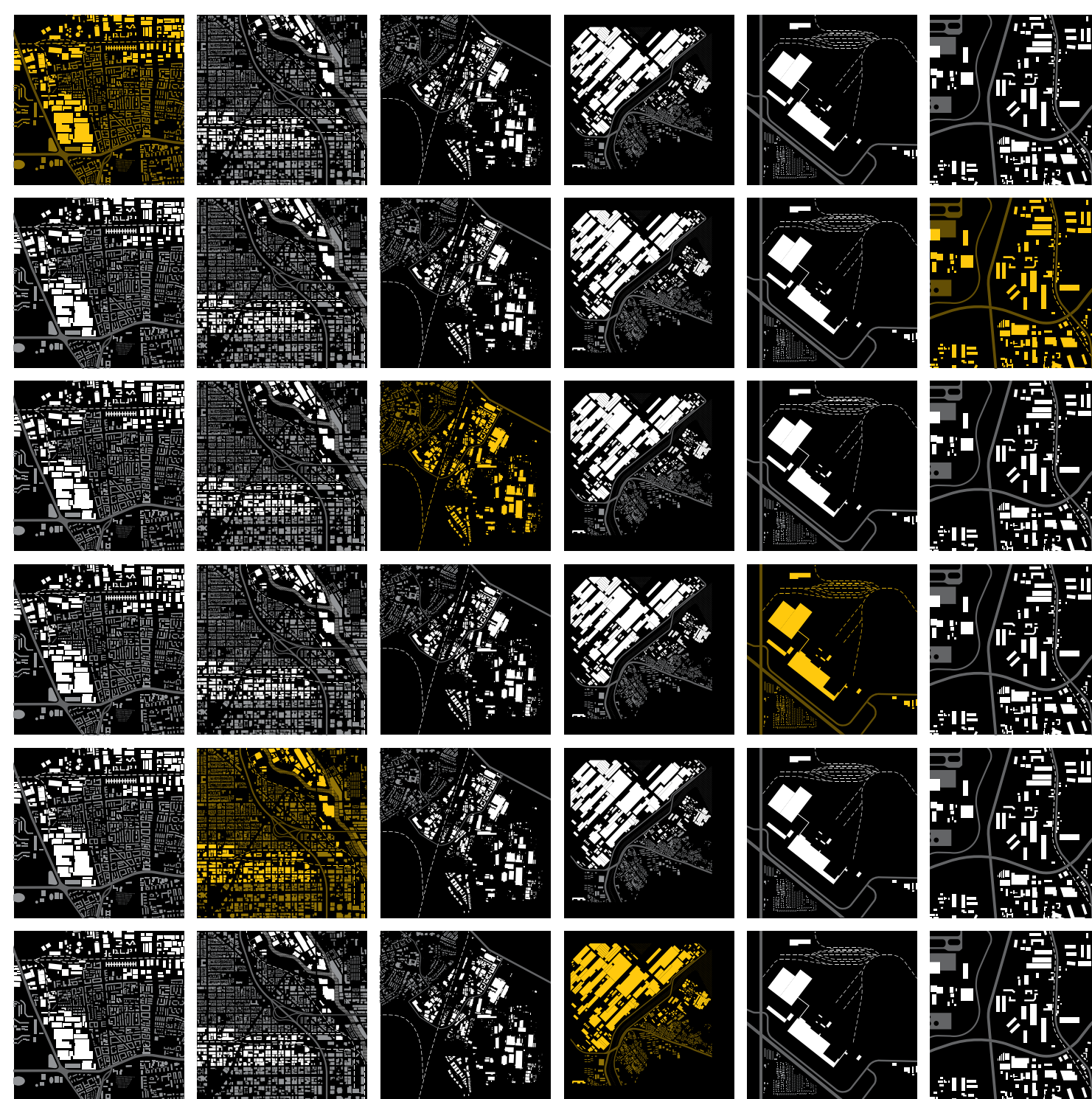
SELECTED BIBLIOGRAPHY

Atkinson, Robert D., Luke A. Stewart, Scott M. Andres, and Stephen J. Ezell. "Worse than the Great Depression: What Experts Are Missing About American Manufacturing Decline". Washington, DC: Information Technology and Innovation Foundation, 2012.

Bryson, John R., and Peter W. Daniels. *Service worlds: people, organisations and technologies*. Psychology Press, 2004.

Chicago Metropolitan Agency for Planning. "Metropolitan Chicago's Manufacturing Cluster: A Drill-down Report on Innovation, Workforce, and Infrastructure", 2013.

City of Chicago, Department of Housing and Economic Development. "Chicago Sustainable Industries", 2011.

City of Philadelphia, Philadelphia Industrial Development Corporation. "An Industrial land and Market Strategy for the City of Philadelphia", 2010.

Cohen, Stephen S., and John Zysman. *Manufacturing matters: the myth of the post-industrial economy*. New York: Basic Books, 1987.

Frej, Anne, and Allen Gause. *Business Park and Industrial Development Handbook*. Washington D.C.: Urban Land Institute, 2001.

Garnier, Tony. *Une Cite Industrielle: Etude pour la Construction des Villes*. Paris, 1917.

Georgia Institute of Technology, School of City and Regional Planning. "A Plan for Industrial Land and Sustainable Industry in the City of Atlanta", 2009.

Hall, Peter G., and Ann R. Markusen (eds.). *Silicon landscapes*. Taylor & Francis, 1985.

Hall, Peter. *Cities of tomorrow*. London: Blackwell Publishers, 1988.

Harrington, James W., and Barney Warf. *Industrial location: Principles, practice, and policy*. Psychology Press, 1995.

Hatuka, Tali. *The Factory: On Architecture and Industry in Argaman, Yavne*. Tel Aviv: Resling, 2011 (Hebrew).

Hatuka, Tali, Roni Bar, Merav Battat, Yoav Zilberdik, Carmel Hanany, Shelly Hefetz, Michael Jacobson and Hila Lothan. *City-Industry*. Tel Aviv: Resling, 2014 (Hebrew).

Helper, Susan, Timothy Krueger, and Howard Wial. *Locating American manufacturing: Trends in the geography of production*. Metropolitan Policy Program at Brookings, 2012.

Howard, Ebenezer. *Garden Cities of To-morrow*, Vol. 23. MIT Press, 1965.

Kim, Minjee C., and Eran Ben-Joseph, "Manufacturing and the City", the annual meeting for the American Collegiate Schools of Planning, Dublin, 2013.

Kotkin, Joel. "Cities Leading an American Manufacturing Revival", *Forbes*, 2012.

Leigh, Nancey Green, and Nathanael Z. Hoelzel. "Smart growth's blind side: Sustainable cities need productive urban industrial land." *Journal of the American Planning Association* 78.1 (2012): 87-103.

Lever, William F. "Deindustrialisation and the Reality of the Post-industrial City." *Urban Studies* 28.6 (1991): 983-999.

Massey, Doreen B., and David Wield. *High-tech fantasies: Science parks in society, science and space*. Routledge, 2004.

Massey, Doreen B., *Spatial divisions of labour: social structures and the geography of production*. London: Macmillan, 1984.

McKinsey Global Institute, "Manufacturing the Future: The Next Era of Global Growth and Innovation". 2012.

Mistry, Nisha, and Joan Byron. "The Federal Role in Supporting Urban Manufacturing." WhatWorks Collaborative, Pratt Center for Community Development, and Brookings Institution, 2011.

MIT Taskforce on Innovation and Production, "A Preview of the MIT Production in the Innovation Economy Report", Cambridge, MA: Massachusetts Institute of Technology, 2013.

Northam. Jackie. "As Overseas Costs Rise, More U.S. Companies Are 'Reshoring'", NPR National Public Radio, 2014.

Pisano, Gary P., and Willy C. Shih. "Restoring American Competitiveness". *Harvard Business Review,* 87.7-8 (2009): 114-125.

Pisano, Gary P., and Willy C. Shih. *Producing prosperity: why America needs a manufacturing renaissance*, Harvard Business Review Press, 2012.

Plant, Robert. "The Experts: Will 3-D Printing Live Up to the Hype?", *The Wall Street Journal*, 2014.

Rappaport, Nina. "Vertical Urban Factory". *Urban Omnibus*. 2011.

Rhie, Christopher. *New Urban Manufacturing: Neo-industrial Design in Louisville, Kentucky*. Thesis, Massachusetts Institute of Technology, 2014.

Wilson, William J. *The truly disadvantaged: The inner city, the underclass, and public policy*. University of Chicago Press, 2012.