FORD VS FIAT



A Comprative Urban Study

FORD vs FIAT

A Comparative Architectural and Urban Study

By: Yasna Hosseini, Shayan Mokhtarpour
Thesis Supervisor: Professor Filippo De Pieri
Department of Architecture and Design
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ABSTRACT

Today, long after deindustrialization in Europe and the United States, the footprint of industry is still visible through the lens of architecture. The 20th century gave an undeniable identity to many cities, such as Turin, Essen, Manchester, Pittsburgh, Chicago, and Detroit, among all; as the symbol of the most advanced industry of the early and mid-20th century, the automobile.

Detroit and Ford developed in tandem, and among industrial cities, Turin earned the nickname “the Italian Detroit.” Although Ford and FIAT differed in car design, they shared notable similarities in architectural approaches of factory buildings, such as Lingotto and Highland Park during the vertical factories era, and Rouge River and Fiat Mirafiori during the horizontal factories era. In certain visual frames, these structures were nearly indistinguishable from one another. This brought up the question: despite their different backgrounds and vastly different origins, why did these two cities converge so closely in the 20th century?

This thesis searches for the answer through a comparative historical and urban analysis of both cities. It examines urban expansion, socio-economic shifts, infrastructure development, and the profound impacts of World Wars I and II in relation to the birth and rise of the automobile industry.

By tracing both cities across a 300-year timeframe, with a primary focus on the transformative century between 1850 and 1950, it illustrates a comparative path between these two cities. Furthermore, this thesis depicts how a global architectural trend emerged and spread, originated from Detroit as the industrial pioneer and extended to Turin.

It demonstrates how advancing communication in the Machine Age created a prototype of industrial architecture, especially for automobile factories. By prioritizing utilitarian efficiency over traditional design, local architectural styles faded, which created a trend of global similarity. In true modernist fashion, these industrial complexes became visually detached from their geographic origins, making them unrecognizable from each other.

Ultimately, following the deindustrialization of cities, the thesis describes the destiny of this industrial phenomenon in Turin and Detroit.

Acknowledgment

We express our sincere gratitude to our supervisor, Prof. Filippo De Pieri, for his invaluable guidance and support during this project.

In addition, we honorably mention Professor Sofia Nannini for her generous assistance in choosing Detroit as a comparative partner for Turin and Professor Carlo Olmo for his extensive scholarly works.

From a Village to Motor City

The History of Detroit, 1701 - 1901

This section represented a History of Detroit from the foundation of the city to the beginning of the car industry. It began with a brief explanation of the city's roots and the path the city took from a military fortress to an economic center.

The beginning part of the chapter started with the Cadillac adventures on Lake Erie and his effort to build the fort at the most strategic point of the area in order to control the fur trade and to gain leverage in the confrontation with Britain. Ultimately, after briefly outlining how the city changed hands between the military forces of Great Britain and France, the text examines the administrative differences between these two European powers in their approach to Detroit.

At the end of the chapter, the narrative on the American Civil War progresses to the events of the American Revolution. In this part, numerical analysis was used to explain how the situation from an economic point of view changed, and after that, how the economic growth led to social and industrial development. These activities gave rise to the automotive industry. This is a topic that was only briefly introduced in this section, with its detailed analysis deferred to the second part, which focuses on the Ford factory.

Founding of Detroit: The village is born, 1701-1815

Antoine de la Mothe Cadillac and the foundation of Detroit.



Figure 1: THE LANDING OF CADILLAC. An artist's rendering of the landing of Cadillac illustrates the type of bateaux used for river transportation.
Source: David Lee Poremba, Detroit: A Motor City History (Charleston, SC: Arcadia, 2003), 11.

Antoine de la Mothe Cadillac, born in 1658, is a central figure whose name is closely tied to Detroit's early history and prosperity. By leaving the motherland in order to serve in the French army and became interested in America, he had this chance in 1694 to be the commander of the important western post of "Michilimackinac," where he was in charge for 3 years and created deep local knowledge in the geography of the Great Lakes region, mastering the complexity of the trade network and learning local customs to build alliances.[1]

Four years later, in 1698, Cadillac successfully convinced the French governors (mainly the Minister of the Colonies, Count Pontchartrain) to find and build a French fortification in the most strategic place, to control the trade and make the French stand strong in the region. His effort started the operation under his command and led him to become the commander of the fortification.

1 Sidney Glazer, Detroit: A Study in Urban Development (New York: Bookman Associates, 1965), 10.

In the next 10 years, Cadillac tried to stabilize and improve the situation in new French settlements, although the economic life depended on the garrison; he immediately made decisions to improve the trading system and manage the Indians around the fort, not only to provide safety but also to create the foundation of an actual city which later became Detroit.[2]

Despite his significant efforts, Cadillac was compelled to depart Detroit for Louisiana in 1711. While he had successfully laid the groundwork for a new society, his successor entangled the Fort in local conflicts with Native Americans. Nevertheless, the settlement was preserved by an impregnable garrison, leaving landowners indebted to Cadillac's strategic vision and defense planning. Sidney Glazer notes that life in Detroit remained refined during this period, characterized by pleasant entertainment, quality cuisine, wine, and a stable trade environment:

> **Detroit was in every respect most cosmopolitan for a remote outpost. For the majority, life was gracious. All accounts indicate that consumer goods were abundant. The attire of the upper-class families clearly indicated an emphasis upon style. The dinners often resembled feasts and gave evidence of a leisurely existence. Families of means entertained extensively and lavishly. Dancing began at eight or nine o'clock in the evening and continued through the early hours of the morning.[3]**

During those years, the administration was totally under the control of French army generals. The commandants somehow mixed the authorities-between the civilians and the military; in the absence of the government, they met with minimal opposition. The French general tried to follow the Cadillac path and improve the trades and continue to promote the lucrative fur trade.

2 Glazer, Detroit: Urban Development, 10-15.

3 Glazer, Detroit: Urban Development, 12

In addition, education was followed informally by the church and priests. As one of the few educated people, they took care of this responsibility for primary instruction; next to it, and as the population grew (mainly for the fur trade) with the newcomers, trained school teachers also came there and settled down. Meanwhile, wealthy families began to employ individuals who could provide instruction in academic subjects.

About forty years after the Cadillac era, in 1751, the historical reports show that the 50 years old settelment named had been changed to Ft Detroit; the population was 483 individuals, 33 of them were slaves, there were 471 cows (about one cow per person), and 160 horses. The settlement was located on the river side in the both sides of the fort. The farm was narrow but deep strips of land called ribbon farms. [4] [5]

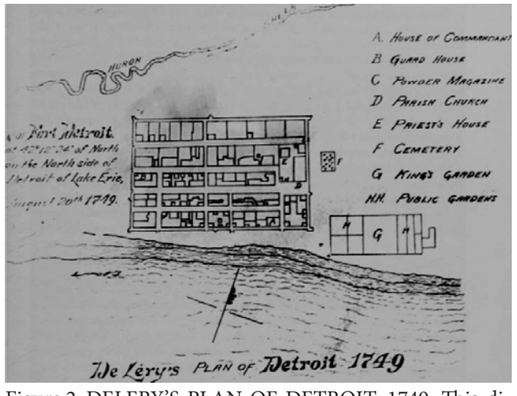


Figure 2: DELERY'S PLAN OF DETROIT, 1749. This diagram was drawn by French engineer Joseph DeLery in 1749 and shows the river that ran through what is now downtown Detroit.
Source: Poremba, Detroit: A Motor City History, 23.

4 Characterized by their narrow shapes and organic layout along the river, these plots became known as French farms. This specific arrangement enabled farmers to efficiently manage water for their agricultural needs. Today, the legacy of these farmers persists through the streets named in their honor, such as St. Aubin, Beaubien, and Chene.

5 Cadillac passed away in October 18 1730, in France, and he never came back to Detroit, but his legacy was continued there, and the Fort which he built in the early 18th century later became a motor town.

1760: The Seven Years' War and Robert Rogers:

Following the 1760 defeat of French forces and their Indian allies during the Seven Years' War (French and Indian War), Detroit surrendered to the British. By the 1763 Treaty of Paris, France ceded control of Canada after 230 years. Months later, Chief Pontiac led an unsuccessful Native American uprising to reclaim the Fort of Detroit.

At the end of this series of wars, British forces successfully saved the Fort of Detroit, and besides the Native Americans who were involved in the fur trade, the French civilians, especially the upper class, accepted the British authorities and worked friendly under their control.[6]



Figure 3: FORT PONCHARTRAIN DU DETROIT. Drawn from details given by Clarence Burton, this illustration of Detroit shows the fort as it was through the first three decades of its existence.
Source:Poremba, Detroit: A Motor City History, 19.

Detroit continued as a trading settlement under the control of the British garrison. The new British rules did not create major changes in Detroit's social life. British immigrants were living peaceful alongside the French, and despite the wars between the two armies, the local people were not affected by the differences in law or culture. Although lately The Britain government implemented specific civil law for the French community. Jonathan Carver, one of the greatest New England Travelers of the 18th century, described Detroit in that era like this:

> **"The river that runs from Lake St. Claire to Lake Erie (or rather the Straight, for thus it might be termed from its name) is called Detroit, which is in French, the Straight. It runs nearly south, has a gentle current, and depth of water sufficient for ships of considerable burden. The town of Detroit is situated on the western banks of this river, about nine miles below Lake St. Claire. Almost opposite, on the eastern shore, is the village of the ancient Hurons: a tribe of Indians which has been treated of by so many writers that, adhering to the restrictions I have laid myself under of only describing places and people little known, or incidents that have passed unnoticed by others, I shall omit giving a description of them. A missionary of the order of Carthusian Friars, by permission of the bishop of Canada, resides among them."** [7]

Detroit continued under British authority following the Pontiac War, transitioning into a trading settlement protected by a British Garrison. By relaxing French monopolistic licenses, Britain encouraged merchants to relocate, attracting new commerce and growing the population. Consequently, the military garrison became increasingly distinct from the broader community. Over time, the British altered Detroit's French character, evolving it into an entity that surpassed its original role as a mere military outpost.[8]

6 The Native Americans believed the fur trade had more wealth in France compared with the British era.

7 Glazer, Detroit: Urban Development, 16.

8 The new British commers were mostly men who had their families next to them, which is n contrast with the French settlers who were mostly soldiers and explorers, men alone without the family.

American Revolution, British Activity, and Henry Hamilton

During the American Revolution[9], Detroit became a focal point for the British Army due to two primary factors. First, the British recognized Detroit's unique capacity as one of the few regional communities capable of generating supplies for large-scale military operations. Second, maintaining control over the Great Lakes and their associated shipping lanes offered substantial strategic advantages for British forces.[10]

In 1783, by the end of the Revolutionary period and with the Treaty of Paris[11] establishment, Detroit was considered within the boundary that defined the new United States. Although Great Britain informally refused to withdraw the troops from the fort, it started four years of legal conflicts.

Finally, after 4 years of subsequent negotiation, Great Britain agreed to withdraw from Detroit and the illegally occupied ports around the lake. By this, as part of Jay's Treaty[12], the Detroit River became an international border, and Detroit, which is now officially part of the United States, was cleared of British forces and US law officially rules there.

There were two major problems for the United

9 1765–1783

10 Glazer, Detroit: Urban Development, 20.

11 The treaty of Paris which signed in 3 september 1783, formaly conclude the American revolution war, The key part of this Treaty consist on: 1- acknowledged the United States as a free, sovereign, and independent nation. 2-New Boarders (Atlantic Ocean in the east to the Mississippi River in the west, and from the Great Lakes in the north to the top of Florida in the south) 3- Troops Removal, which Forced Great Britain to withdraw the troops inside of American borders.

12 The Jay Treaty, signed in 1794, was an agreement between the United States and Great Britain that resolved outstanding issues from the American Revolution and averted another war.

States Government when it took control of the city. First was the military conflict with indians, which was directed by President Washington and under the command of General Anthony Wayne (Mad Anthony), and second was to Americanize the Detroit inhabitants who had different European backgrounds due to the French and English settlements.[13]

The American soldiers who were sent to the Detroit garrison found themselves in a non-familiar community. Although the People who lived there had a better mindset about new Born United States. But since the main economic connection was still with Canada, The majority spoke French, and the minority of English speakers who were left over had, far more the most part, British sentiments. The small other part of the community could introduce themselves with German, Italian, or other European backgrounds, including in the metropolitan area with several hundred indians.

From an economic perspective, The United States started to improve the waterways specifically between Detroit and Washington, DC, Although their efforts were not fundamentally effective, as Glazer said: "In 1802, 40 days were required for transmission of the letter from Detroit to Washington, DC. In addition, new rules were tried to enhance the fur trade and support the merchant who were came to Detroit repeatedly.

In terms of societal adoption, here can be mentioned the story of Father Gabriel Richard. This French-born priest quickly understood the principles of the American republic and had a key role in translating it to his parishioners. For over 30 years, he not only worked as a spiritual leader but also led the Detroit community in cultural and educational aspects.[14]

13 Glazer, Detroit: Urban Development, 21.

14 Glazer, Detroit: Urban Development, 18-22.



Figure 4: An American soldier crossing the bridge over the defensive moat at Fort Shelby, Detroit, late 18th century.
Source:Poremba, Detroit: A Motor City History, 46.

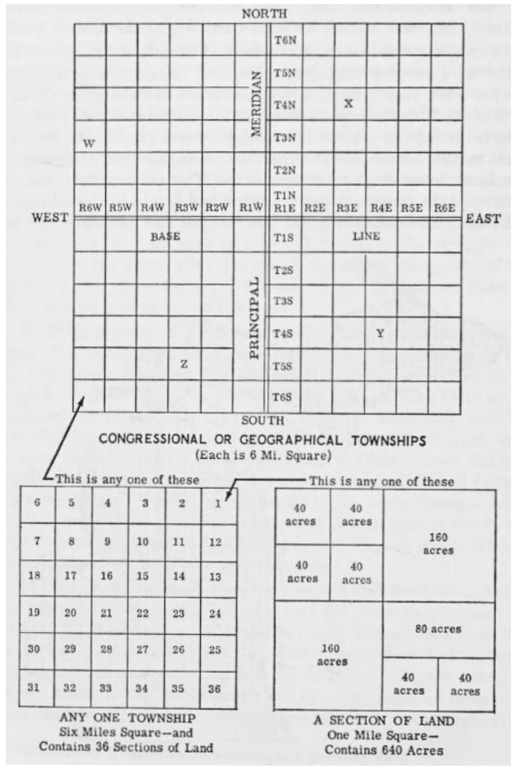


Figure 5: Diagram of the Public Land Survey System, illustrating the subdivision of townships into sections and acreage.
Source: online collections of the Library of Congress, Law Library.

Fire in 1805, Detroit new city map and state of Michigan

Following the American capture of the Detroit fort, residents were displaced from the adjacent territories. This transition, in addition to the Fire in 1805 and the recognition of the state of Michigan by the Government of the United States, eventually created the opportunity that led to a new city plan for Detroit.

The pioneering contributions of Lucius Lyon[15], William Burt[16], and John Mullet[17] established the conceptual foundation for Detroit's metamorphosis, transitioning from its origins as a military stronghold toward a structured township defined by neat squares. This architectural evolution was driven by the necessity for a fireproof, expandable framework capable of supporting a surging population.

Consequently, these urban requirements culminated in the adoption of an extendable grid. The city (fort) found the opportunity to fundamentally reshape itself from narrow riverfront farms into the character of the New Detroit. Although the transition was not free of confusion and delay.

Judge Augustus Woodward[18] was one of the people who had a strong effect in Detorit history and especially in the city planning of Detroit. He was the first chief justice in the Michigan Territory, and a Friend of President Thomas Jefferson. his city plan proposal had a critical role in changing the city's face. The plan suggests to rebuild Detroit not as a frontier outpost, but as a grand metropolis like Paris and Washington DC. Judge Woodward inspired his plan from the famed engineer and city planner Pierre L'Enfant[19] and Benjamin Banneker[20], a mathematican which had been involved in Washington, D.C. Planning.

The Woodward design was a modular system of equilateral triangles; the corners of these triangles served as a hub (circus), which was predicted to serve as an open public space like parks. The plan included a 200-foot-wide ground avenue for major transportation roads and a second road 120 feet wide. In all, the modular road system, Judge Woodward wanted two things: the first was to create city blocks wide enough to avoid new wildfires in the city, and the second was to create a modular system which can be expanded in the future as the city grows.

Although the judge unfortunately came equipped with secrecy and disregard for anyone who asks for an explanation. But the city plan did not succeed, as it was not successfully assigned to the city. The difficulty of the measurement in intricate angles over muddy, uneven terrain and the impatient landlords who wanted to build their

15 Lucius Lyon, 1800-1851, was a U.S. statesman from the state of Michigan. who played a critical role in the "Toledo war" in 1835-1836, and shaped the state of Michigan.

16 William Austin Burt, 1792 -1858, was an American inventor, legislator, surveyor, and millwright.

17 John Mullett (1786–1862), was a prominent surveyor based in Detroit, Michigan in the early 19th century. Under the Public Land Survey System, he was surveyor-general for the Northwest Territories and as such, assisted or led "in many of the government's original surveys of Michigan, Wisconsin, Illinois and Indiana," and especially in Michigan

18 Augustus Brevoort Woodward, 1774 –1827 was the first Chief Justice of the Supreme Court of Michigan Territory. In that position, he played a prominent role in the reconstruction of Detroit. He promoted an urban design based on radial avenues, as in Washington, D.C. and Paris, France.

19 Pierre "Peter" Charles L'Enfant, 1754–1825 ,was a French-American artist, professor, and military engineer. In 1791, L'Enfant designed the baroque-styled plan for the development of Washington, D.C.

20 Benjamin Banneker, 1731–1806, was an American naturalist, mathematician, astronomer and almanac author. A landowner, he also worked as a surveyor.

property as fast as possible after the fire were the main reason for the unsuccessfulness of the Woodward Plan.

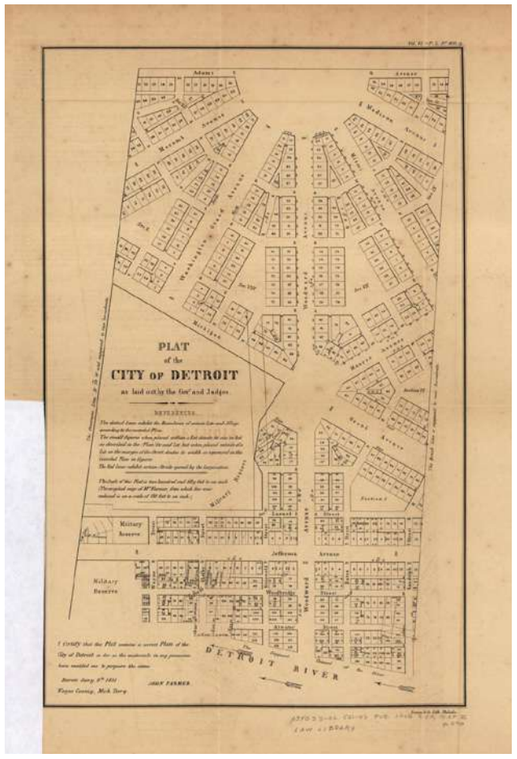


Figure 6: Plat of the City of Detroit as laid out by the Governor and Judges, compiled by John Farmer, January 8, 1831.
Source: online collections of the Library of Congress, Law Library.

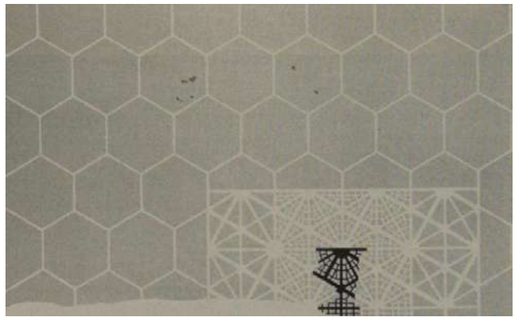


Figure 7: The core of Judge Woodward's plan set the growth patterns for the city. (From Trafficways for Three Million People, Detroit City Plan Commission, 1954.
Source:Glazer, Detroit: Urban Development, 66

A brief about the Jefferson Plan.

For the people of Michigan, this question exists: why do the roads go to Kentucky, Virginia, Missouri, almost any roads go south or east and west, not straight? Or why is there no ordered square or rectangular farm?

"The farms are irregularly shaped, a piece of land with boundaries marked by big boulders, tall trees, or other landmarks."

In 1785, when the plan had been discussed for settling in the north west territory, including Michigan, Wisconsin, Illinois, Indiana and Ohio,. President Jefferson suggested a more ordinary way for measuring and dividing the land.

The Jefferson plan was to divide all unsurveyed land in to mile square pieces with the parallel roads. In his plan, each one of the mile square sections contains 640 acres, which would be divided into four 160 acres farm or eight 80-acre farms, or six 40 acres farm.

In the Jefferson plan, each 36 one-mile square or one square with 6 miles in each direction would be a township joint together or big square 24 miles would be a county.

The Land Ordinance of 1785 established the basic pattern for surveying the land in north west teritorries, which became the states of Michigan, Wisconsin, Illinois, Indiana, and Ohio.[1]

1 Henrickson, Detroit Perspectives, 60-69.

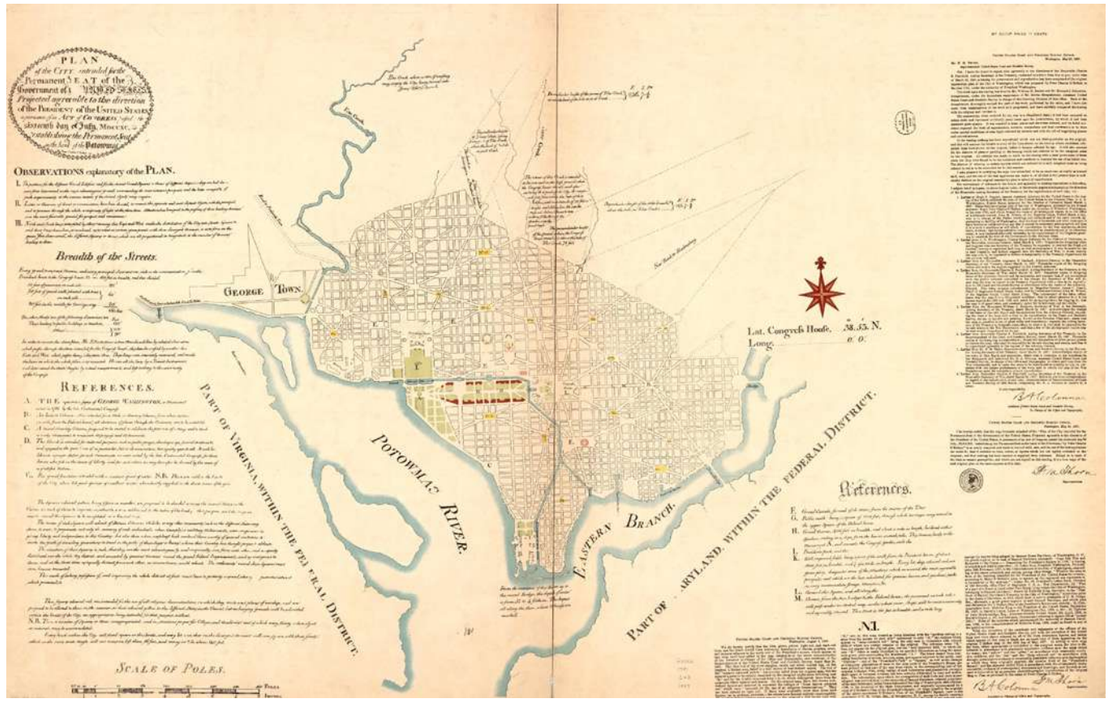


Figure 8: L'Enfant's Plan for Washington, D.C: 1791
Source: Library of Congress. Cf. Reps, The Making of Urban America, 251



Figure 9: The Ellicott Plan for Washington, D.C.: 1792
Source:Library of Congress. Cf. Reps, The Making of Urban America, 255

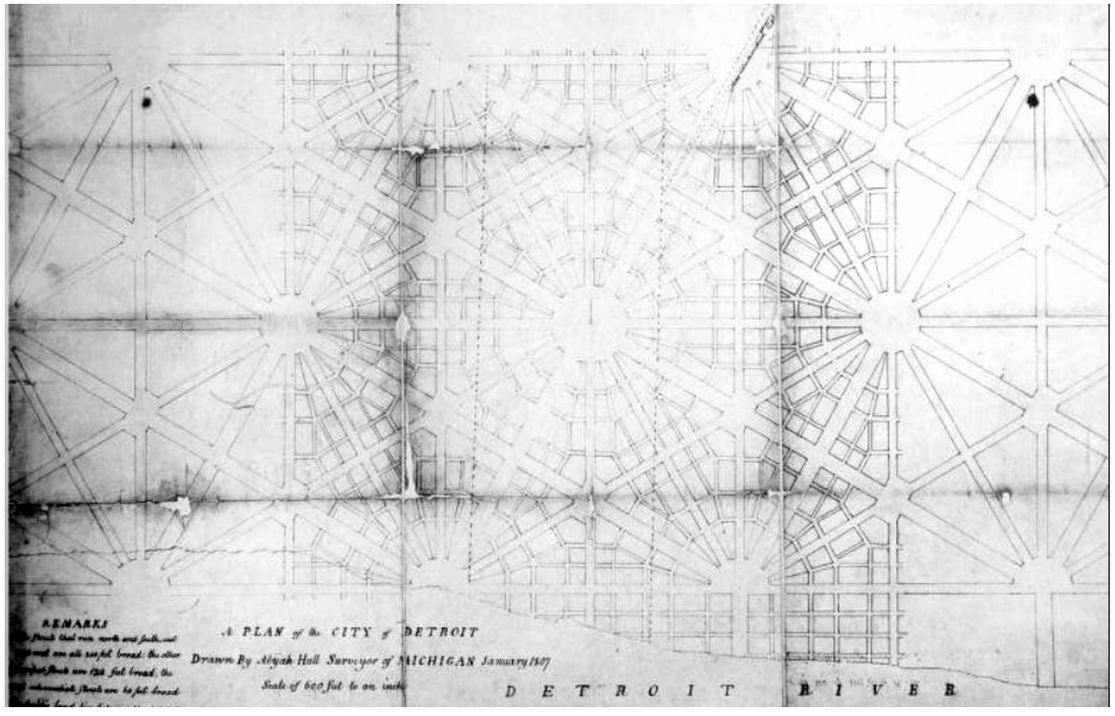


Figure 10: The Woodward Plan. After the great fire of 1805 demolished the entire town, this plan was drawn up in 1807 to rebuild the city.
Source:Reps, The Making of Urban America, 267.

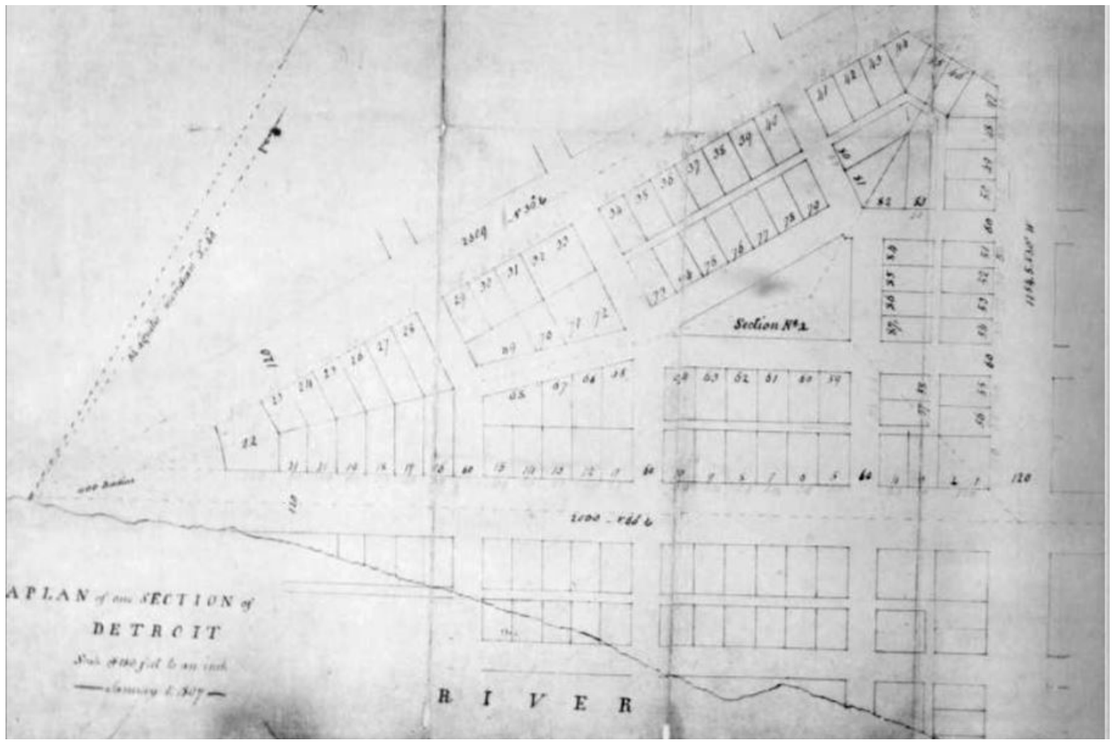


Figure 11: A Section of Judge Woodward's Detroit Plan: 1807
Source:Reps, The Making of Urban America, 268.

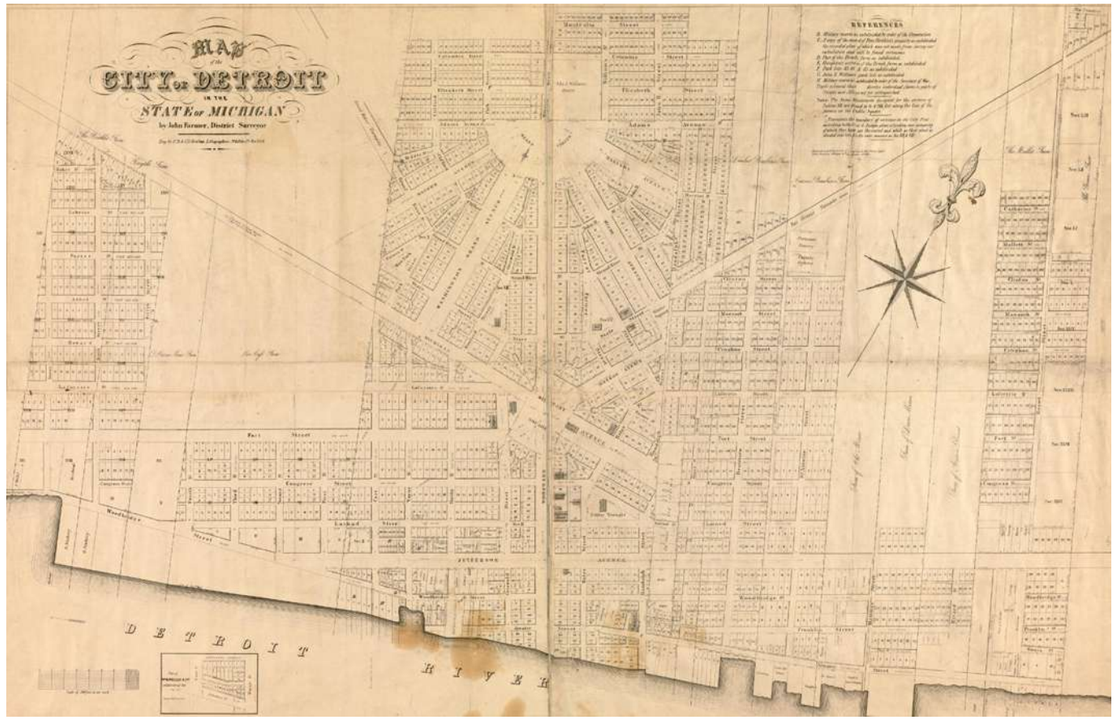


Figure 12: Map of the city of Detroit, 1835.
Source: Library of Congress Geography and Map Division Washington, D.C. 20540-4650 USA dcu.

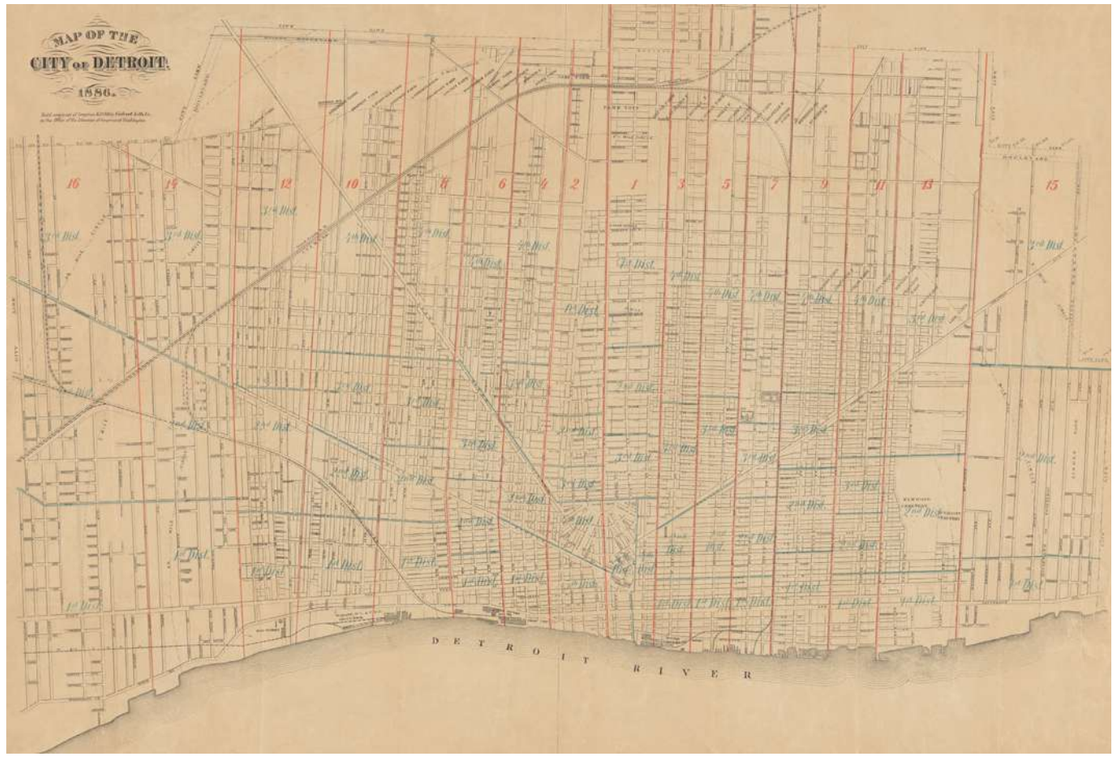


Figure 13: Map of the city of Detroit, 1886
Source: Lionel Pincus and Princess Firyal Map Division, The New York Public Library. "Map of the city of Detroit, 1886" New York Public Library Digital Collections. Accessed June 12, 2026

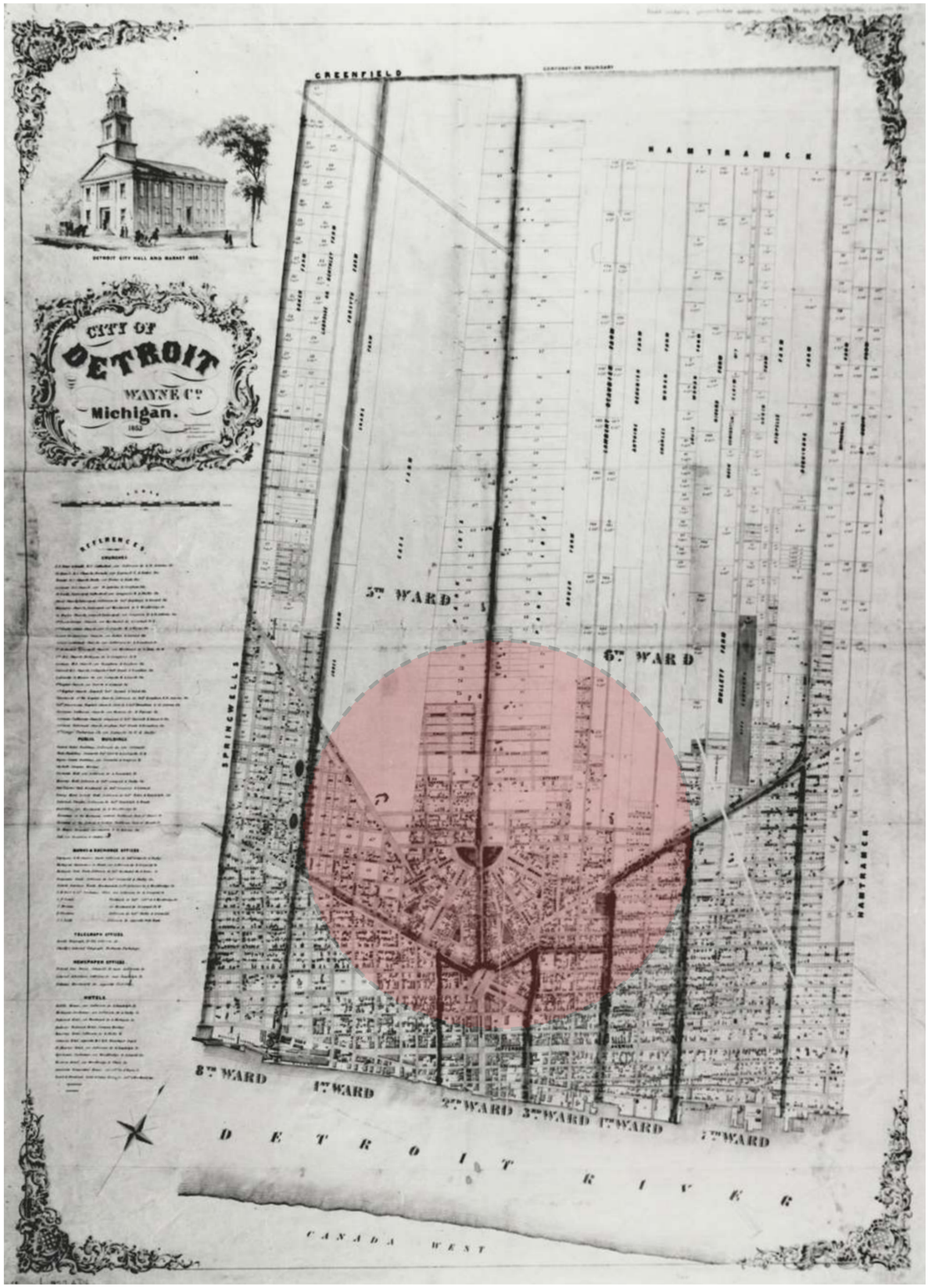


Figure 14: 1853 Ward map of Detroit, showcasing the city's growth and development from its early days as a military fort.
Source: Detroit Public Library Digital Collections, Resource ID: bh006566

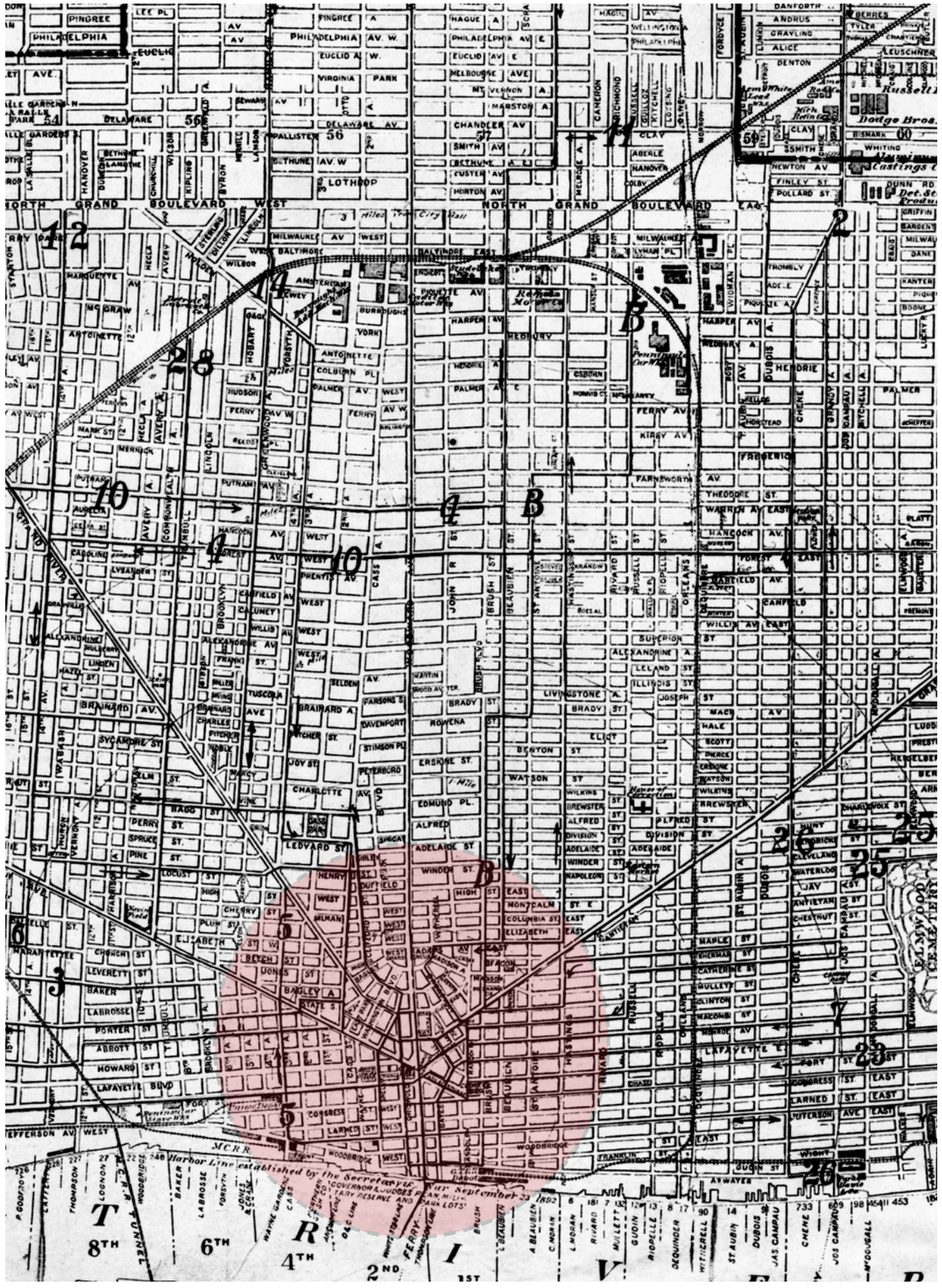


Figure 15: 1915, Center of Detroit, representing how the city was influenced by the Woodward Plan.
Source: From the Research Center Map Collection, Object ID:00.3.16722, Benson Ford Research Center. Modified by author, See Appendix for the complete map

The City Rises 1816-1865:

On March 29. 1815. British People from the Windsor area joined Detroit to take part in the gala "Pacification Ball" at Woodworth's hotel. This gathering was followed by the end of the military conflict between the United States and the British army[21], which is known as the Treaty of Ghent[22]. and the Rush-Bagot agreement[23], in the following, which made it stronger.[24]

During this conflict in the early 19th century, even an optimistic person in those days couldn't imagine that a new season in Detroit had begun. On one hand, the military conflict damaged Detroit's fledgling economy. On the other hand, many inhabitants did not believe in the potential of Detroit to one day become an industrial leader and one of the biggest cities in the United States.

In reverse, the Detroit population increased dramatically in the 19th century. With 1,400 residents in 1820 (excluding outlying areas), the city was ranked as the 47th largest in the nation. Over the following decades, the population grew significantly, reaching 2,200 by 1830 and 9,100 by 1840. By 1850, the city had climbed to 23rd in the national rankings with 21,000 inhabitants. This rapid expansion continued through 1860, when

21 The war in 1812, which is known as the Siege of Detroit or surrender of Detroit, or the Battle of Fort Detroit.

22 1814, The Treaty of Ghent was the peace treaty that ended the War of 1812 between the United States and the United Kingdom. It took effect in February 1815. Both sides signed it on December 24, 1814, in the city of Ghent, United Netherlands (now in Belgium).

23 1817, The Rush–Bagot Treaty or Rush–Bagot Disarmament was a treaty between the United States and Great Britain limiting naval armaments on the Great Lakes and Lake Champlain, following the War of 1812. It was ratified by the United States Senate on April 16, 1818,[1] and was confirmed by Canada.

24 Glazer, Detroit: Urban Development, 25.

Siege of Detroit

The conflict of 1812, variously termed the Siege, Surrender, or Battle of Fort Detroit, saw the fortification yield to British forces led by Isaac Brock[1] and the Shawnee warrior Tecumseh[2]. Commander William Hull[3] surrendered the stronghold along with a force of 2,500 soldiers, an act that resulted in his conviction for neglect of duty and cowardice by a military tribunal. Although initially facing a death sentence, President James Madison commuted it to a dismissal from service, honoring Hull's previous Revolutionary War contributions[4]. Control was eventually restored in 1813 following Oliver Hazard[5] Perry's naval victory on Lake Erie. This strategic success severed British logistics, enabling General William Henry Harrison's[6] troops to reoccupy the city on September 29, 1813.[7]

1 Sir Isaac Brock KB, 1769–1812, Major-General.

2 Tecumseh, 1768-1813, was a Shawnee chief and warrior.

3 William Hull, 1753 –1825, was an American military officer and politician. A veteran of the American Revolutionary War, he later served as governor of the Michigan Territory (1805–1813).

4 Poremba, Detroit: A Motor City History, 62.

5 Oliver Hazard Perry, 1785 –1819, was a United States Navy officer.

6 William Henry Harrison, 1773–1841, was the ninth president of the United States, serving from March 4 to April 4, 1841, the shortest presidency in U.S. history.

7 Poremba, Detroit: A Motor City History, 63.

Detroit became the 18th-largest American city with a population of 45,600.[25]

In the huge, significant growth in Detroit's population, many factors were involved, and Lewis Cass[26], as a territorial governor, played an important role in it. (Cass dominated the political life in Detroit for three decades. He ultimately served in the cabinet of President Andrew Jackson and President James Buchanan. He also served as a senator from Michigan and became the nominee for president from the Democratic Party in 1846.) Cass strongly believed Michigan needed more settlers for its future development as a state. During his time, he encouraged any program that would foster commerce and promote the cultural life of Detroit.

Next to it, there are some other reasons that can be counted as the main effective factors on Detroit population growth. The completion of the Erie Canal in 1825 created a water transport route between New York City and the leading cities around the Great Lakes.

Changes in transportation were not limited to the new waterways. The Michigan Territory started to create a network of roads. One of the most significant ones was the Chicago Road, which ran to Ypsilanti and thence through the southern tier of counties. This highway brought settlers to the Iish-Hills area[27]; next to it were the Gratiot Road, the Saginaw Road, the Territorial Road, and many others. It defined Detroit as a hub, especially a commercial hub in the region.[28]

In that time, another specific factor involved in Detroit's development, besides the road system, Detroit became the capital of Michigan Territory. In this role, Detroit attracted many visitors and official businesses. However, being the capital of the territory was temporary, and the seat of the government later in 1850 moved to Lansing.

The development in Detroit led to the creation of new facilities to meet new civilian needs. The University of Michigan was built in 1817[29], largely through the judge Woodward and supported by public funds. Also, the role of two Detroitian clergymen, Father Richard and Reverend John Monteth, in building the first faculty was undeniable[30]. In addition, besides the university, Father Richard was the first person to build a newspaper in Detroit. He launched the "Michigan essay" in 1809. Although he was not as successful as John P.Sheldon, who ran the "Gazette"[31] in 1817.[32] [33]

By 1837, Detroit was well established as an American city in terms of economy and production. The city's growth was aimed at the needs of the inhabitants, which changed rapidly by developing the Michigan railroads and the possibility of

25 Glazer, Detroit: Urban Development, 25.

26 Lewis Cass, 1782–1866, was a United States Army officer and politician. He represented Michigan in the United States Senate and served in the Cabinets of two U.S. Presidents, Andrew Jackson and James Buchanan. He was also the 1848 Democratic presidential nominee.

27 Glazer, Detroit: Urban Development, 27.

28 Glazer, Detroit: Urban Development, 27.

29 26 August 1817.

30 As Sidney Glazer wrote in the book "Detroit, a study in urban development": "The University was never a true University in the true sense of the word, even after its more effective reorganisation in 1821 as the University of Michigan."

31 This journal is officially known as the beginning of journalism in Detroit.

32 In 1837, the first city directory was published. It contains significant facts about Detroit at that time in 1837. These facts include the population of Detroit, the number of stores, professionals, luxury hotels, cultural life, bookstores, and several newspapers listed.

33 Glazer, Detroit: Urban Development, 27.

import and export of manufacturing workshops and agricultural products. The railroad gave this opportunity to merchants and city industrial leaders to access other cities fast and at a reasonable price.[34] [35]

Due to these facilities, the export from Detroit significantly increased and put the city among the important manufacturing centers in the United States[36]. The new Industries started to build up; special stores like bookshops and Tobacco stores rose, the services increased, and the consumer had the chance to choose from a wide range of products.[37]

In political aspects, Detroit took a hard route to gain control of the city by the citizens. In 1806, the political power was mainly controlled by Territorial officials, who were not willing for Detroit to have a strong mayor or political power. Around ten years later[38], with the leadership of Governor Cass, the situation changed, and the degree of self-government was restored. Cass's activity led to the establishment of self-urban government for the city in 1824[39]. Later on, in mid 19th centry[40]. The structure of the charter has been modernized. This document finally recognized Detroit as a City and gave the true power to the mayor of Detroit as the chief executive.

At the beginning of Detroit's corporate history. In urban terms. The government was faced with elementary problems. The city government started to address the basic needs of the citizens. Establishing the system of fire and Police protection, outlining essential public health, providing good drinkable water, founding a commendable school system, and maintaining streets and sewers were a few examples of their activities.[41]

As the city grows and rises, the role of Detroit politically and economically becomes more serious . Later on, when the mayor was no longer an honorary position, the problems became bigger, and the responsibility became heavier. At that time, political activity on the regional scale also increased. Although the influence of political figures competed with each other on a local scale, there were some prominent politicians like Judge Woodward, Zachariah Chandler, William Woodbridge, and Luiss Cass who had the chance to enter the United States Senate.

In mid 19th, Detroit was known as a cosmopolitan city. Among 21,000 people who lived there, 10,000 were foreign-born.[42] The majority of them was Irish Born, England and Germany were taking the 2nd and third position respectively.[43] In parallel with growth in political and economical aspect. From the early 19th century to 1861, Detroit society was shaped. The development in Detroit society was started by significant changes in the education system of the city.

Judge A.B.Woodward founded the University of Michigan in 1817; he planned the education system of the city at all levels, from elementary schools through to the university. The beginning schools were used for boys, although for the ladies, there were some Seminaries shaped (mostly managed by the ladies) to create educational equality among the Detroit women with a focus on ladylike conduct.[44] [45] A territorial act of 1827 provided for a system of public primary schools. About ten years later (1838), all school districts in the city were merged into one district. In 1842, education in Detroit became free, and in 1858, the Board of Education in Detroit established a high school for students who would have been unable to attend the private academy.

In parallel with developing the educational system and, in other words, as a result of it, the citizens' society started to be born. Each one of these societies, from "Detroit's young man's society"(1832) to the "Wayne county institution"(1840) and the "Working man Aid society" (1851), was formed because of specific activities, although according to the exigencies of the time, they were involved in other societal aspects and sustained the Detroit community.[46]

In a reciprocal dynamic with urban growth, Detroit's civil and social infrastructure expanded considerably during the nineteenth century. Intellectual and cultural advancements were catalyzed by the University of Michigan, which fostered the creation of the city's first public library and a subsequent network of bookstores, while the Detroit Free Press established itself as the city's foundational daily newspaper. Concurrently, the built environment of public welfare was heavily shaped by faith-based communities; this led to the construction of St. Mary's Hospital in 1845, followed six years later by the establishment of St. Vincent's Catholic Orphan Asylum in 1851.

Despite the theoretical prohibition of slavery under the Northwest Ordinance of 1787, anti-slavery activities in Michigan faced profound legal complexities. This friction, combined with Detroit's strategic geographic position, prompted local abolitionists to engineer a covert network known as the "Underground Railroad." Operating through a highly systematized but clandestine infrastructure of agents, secure stations, and intricately mapped routes, this network facilitated the escape of fugitive slaves toward emancipated territories. Within this system, Detroit functioned as the critical northern terminus of the central line originating in Cincinnati. While a significant portion of the displaced population settled in Detroit to reconstruct their lives, countless others were systematically transported across the river to Canada to secure absolute safety.[47]



Figure 16: Detroit in 1811.
Source:Poremba, Detroit: A Motor City History, 55.

34 The Michigan Railroad project started in 1837 as a state improvement. It was slowly extended westward through the second tier of counties, and then it was sold to a group of investors. (Represented by James F.Joy for approximately 2 million dollars.) New owners extended the line to New Buffalo. In 1852, Detroit connected to Chicago, and in 1854, The Tran departure Detroit for New York.

35 Glazer, Detroit: Urban Development, 29.

36 The most important early industries in the middle of the 19th century were shipbuilding and Tobacco. (Glazer, Detroit: Urban Development, 29.)

37 Glazer, Detroit: Urban Development, 29.

38 In 1815

39 which included a Mayor, Recorder, and a five-member council. After 3 years in 1827, the charter was changed and new rules added.

40 1857

41 Glazer, Detroit: Urban Development, 29-35

42 At that time borning of the ethnic neighborhoods, the Irish on the near westside and German in the east, more or less shows the new Detroit is taking form.

43 Glazer, Detroit: Urban Development, 36.

44 One of the famous ones was the guidance of Mrs. Hestor Scott during the years 1839 to 1842.

45 All of the schools of that time charged tuition.

46 Glazer, Detroit: Urban Development, 35-45

47 Glazer, Detroit: Urban Development, 46.

"Thanks God For Michigan", Detroit Among The Civil War 1861 - 1865

Prior to the American Civil War, Detroit experienced a period of significant demographic and economic expansion. The city's industrial landscape was characterized by a diverse array of manufacturing enterprises, including tobacco production, steam-powered sawmills, and specialized foundries for iron and brass. Complementing this industrial growth was the emergence of urban institutions such as financial centers, cultural venues like theaters and museums, and public spaces including gardens and markets. Technological progress further transformed the urban environment by the mid-19th century, evidenced by the establishment of telegraph networks, functional public transit systems, and the introduction of coal gas for street lighting.[48]

The Detroit River also played a significant role in Detroit's economic, population, and social life development. In those days, the river was used for transporting goods. Not only agricultural products, but also minerals and industrial fabrication were involved.

In November 1860, Michigan cast its six electoral votes for Abraham Lincoln for the presidency. At that time, Detroit was the 19th-largest city in the United States. By the start of the American Civil War, in the spring of 1861, "almost the whole population of the city gathered in Campus Martius for the loyalty demonstration." The day after, President Lincoln sent out a call to all state governors for 75,000 militia to serve for three months.

On 24 April 1861, the first infantry group was organised under the command of Orlando B.Wilcox. They were sent to Washington and became the first regiment to reach the capital of the United States to fight inside the Union.[49]

More soldiers, till May 13 of that year, were rapidly activated. The young men, group after group, were sent to the war with just short-term training.[50] In the beginning of the war, the majority in Detroit thought it was going to end soon.[51] But by the close of the war, approximately six thousand Detroiters were in service. On the home front, Detroiters were actively involved. During the war, Detroit not only used the social capacity that was achieved in the prewar situation to help the soldiers and their families, but also other organisations were founded and developed to help men at the front. "Both the city and Wayne County offered bounties to volunteers".[52] In 1861, the Ladies' Aid Society was formed in Detroit.[53] [54] The society's donations were widespread, from food to clothes and even land to build a hospital[55]. Many of these facilities, after the war ended, remained and started to help the civilians.

By the end of the war, Detroit's development expanded dramatically. The house-to-house mail, the city railways, and the more complicated factories were shaped.[56] The Detroit Public Library opened its collection of 5,000 books to the public on the top floor of Old Capitol High School. The Detroit Metropolitan police force was created by the state legislature, and the African American children were admitted to public school for the first time.

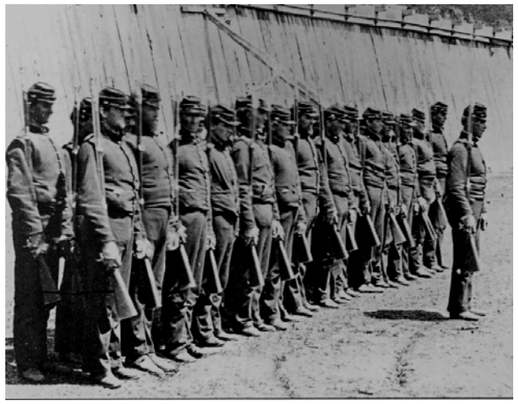


Figure 17: Preparing for the front: Recruits of the Second Michigan Infantry during a drill exercise at Fort Wayne, 1861.
Source: Poremba, Detroit: A Motor City History, 76.



Figure 18: A rare 1861 photograph of Union soldiers gathered at Campus Martius before departing for the front lines of the American Civil War
Source: Poremba, Detroit: A Motor City History, 74.

A Farewell from the Field

"My dearest wife, I write to you, mortally wounded, from the Battle Field. We are again defeated, And as this reaches you, your children will be Fatherless.

Before I die let me implore that in some way it may be stated, that General Pope has been outwitted and that McDowell is a traitor. Had they done their duty, as I did mine; and had had, as I had had, the dear old Flag had waved in triumph.

I wrote to you this morning. The letter was dated Sunday. It should have been dated as Saturday. Today is Sunday. And to-day I sink to the green Coach of our final rest.

I have fought well, my darling, and I was shot in the endeavor to rally our broken battalions. I could have escaped; but would not run till all hope was gone; and was shot about the only one of our Forces left on the field.

Our Cause is just. And our Generals—not the Enemy's have defeated us. In God's good time he will give us Victory.

And now, Good bye, Wife and Children. Bring them up I know you will, in the fear of God and love for the Savior.

But for you and the dear ones so dependent, I should die happy. I know the blow will fall with crushing weight on you.

Trust in him who gave Manna in the wilderness. Dr. Nash is with me. It is now after midnight; and I have spent most of the night in sending messages to you.

I send my silver watch to Johnny. And all my Military Equipment at home, guns, saddles, & etc are his. The Rebels took my horse, saddle, pistols and sabre from me as soon as they shot me. It is lucky that I had this pencil and paper in my pocket so as to write to you."

48 Electricity was used in the city at the end of the 19th century.

49 "Thanks God For Michigan",Abraham Lincoln said when he saw a large number of soldiers arrive in Washington, D.C. from Michigan.

50 Glazer, Detroit: Urban Development, 47.

51 Henrickson, Detroit Perspectives, 146.

52 Glazer, Detroit: Urban Development, 48.

53 This society was helping wounded soldiers in Hospitals, camps, and even on the battlefield. They also raise money and provide relief for soldiers' families.

54 Poremba, Detroit: A Motor City History, 76.

55 Harper Hospital was built on donated land, which was donated by Walter Harper and Nancy Martin.

56 James McMillan and John Newberry organised the Michigan Car Co., Jeremiah Dwyer organised the Detroit Stove Works. The first Bessemer steel in the United States was produced in Detroit. Hazen Pingree, who became the Mayor of Detroit lately, started his boots and shoes factory with Charles Smith, which became one of the nation's largest factories in the city.

The North's victory didn't create equality

About social equality and the race conflict. Although the slavery law in Detroit had been abolished in 1787[57], there was a long way to go to reach equality between Black and white inhabitants inhabitance. As an example, in 1861, the "color school1,2 and 3" had been officially given to the schools by the Board of Education in Michigan to separate white children from black children.[58]

The hateful atmosphere and the inequality in the law were notable at the time. The riots occurred, and Social fragmentation consisted of racial inequity in the social mindset as a rooted problem. This means that although slavery was forbidden years ago and the Union had won the Civil War, it hasn't led to immediate social equality.[59]

The Case of William Faulkner

This legal proceeding involved a Black tavern proprietor operating in downtown Detroit, who faced allegations of sexual misconduct involving two nine-year-old minors: Ellen Hoover, who was Black, and Mary Brown, who was white.

The judicial process concluded on March 6, 1863, with a guilty verdict delivered by the jury. This specific trial served as the catalyst for one of the most significant civil disturbances in the history of Detroit.

During the evening session on that date, Judge Witherell provided instructions to the jury, who returned with a conviction after only ten minutes of deliberation. Despite an opportunity for a final defense, the court sentenced the defendant to life imprisonment at the State Prison in Jackson.

A massive assembly gathered before City Hall, manifesting violent behavior and threatening the military escort in an attempt to reach the prisoner. Under significant duress, local officers requested reinforcements from the barracks, led by Lieutenant Van Stan. Upon their arrival, the confrontation intensified; while the soldiers managed to move the convict from the courthouse, the growing hostility of the mob eventually compelled them to discharge their firearms.

While the initial round of fire likely utilized blank ammunition, it only served to heighten the collective aggression. As the escort reached the vicinity of the jail, a second command to fire was authorized.

This subsequent volley resulted in a fatality, as a white citizen named Charles Langer was struck by a bullet, causing the unrest to spiral beyond the control of the authorities.

Even after the prisoner was safely detained within the jail and the military units withdrew, the aggregate of the crowd appeared intent on directing their hostilities toward any Black individuals encountered in the public thoroughfares.

By the conclusion of the event, numerous residences, primarily those of the Black community, had been destroyed by fire, alongside reports of extensive casualties. Although William Faulkner was exonerated seven years later following a confession by Mary Brown, the 1863 Detroit riot remains a poignant illustration of the racial polarization existing within the city during the American Civil War.[1]

1 Henrickson, Detroit Perspectives, 157-162.

57 Northwest Ordinance of 1787 technically forbade slavery in the territory, loopholes allowed enslaved people to remain in Michigan until the 1830s, particularly under British and French slave owners.

58 Henrickson, Detroit Perspectives, 146.

59 Henrickson, Detroit Perspectives, 146.

New Economic-Industrial Structure after the American Civil War

It is possible to categorize the wealth of people in Detroit before and after the Civil War, specifically in 1844, 1860, and 1866.[60] In 1844, the economic elite class showed more self-made persons, which means their fathers were not wealthy and they did not come from a rich family.

Furthermore, their roles were primarily landowners and fur merchants. which clarifies the simplicity of the economy and industry in that era.

In 1860, the wealth had grown. The 185 men were on the top list, meaning their wealth was over $50,000; among them, 34 had over $100,000. In this period, the economic role was mainly that of manufacturers, bankers, and capitalists. This shift in economic elite persons from the fur Merchant to most industrial activities represents economic growth and evolution of Industrial complexity among Detroiters.[61]

In 1866, wealth was generally higher than in the two preceding periods, and the growth path fully supported this statement from Rufus Tucker's observation:

"During the Civil War period, the wealthy were wealthier in relation to the masses than now, although there were fewer of them."

In conclusion, the Industrial and economic situation was clearly affected during the War era. Wealth generally increased, the product value rose, and the city was developed.

In deeper layers of the Detroit society, the tax records show the Industrial complexity after the war, which led to a complicated relationship between the capital and the society. As mentioned before, the growth of financial institutions like insurance and banks, alongside the reduction in the number of self-made persons and elementary industry, illustrates this shift.[62]

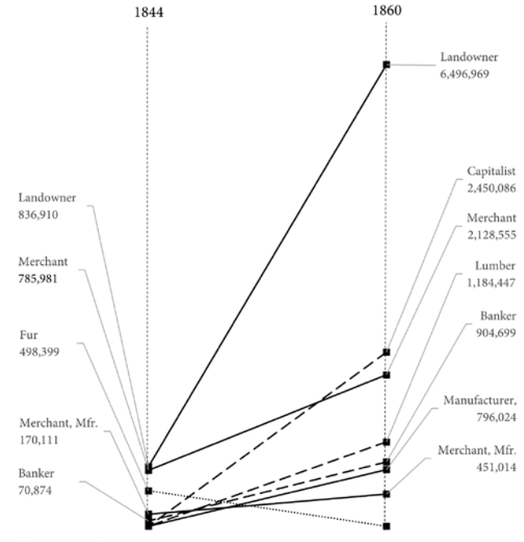


Figure 19

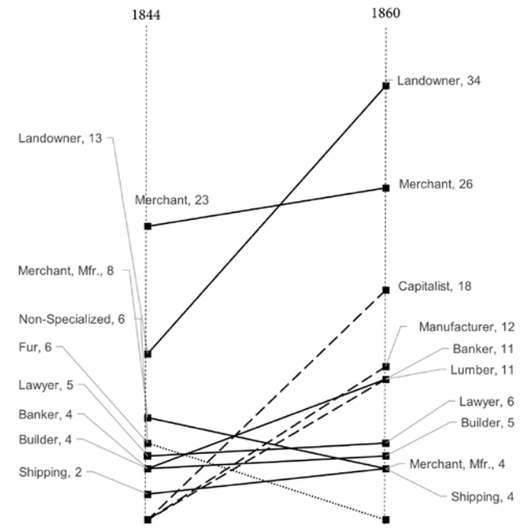


Figure 20

60 This categorization is based on tax payment records.

61 Check the following graphs.

62 Henrickson, Detroit Perspectives, 172-189.

Figure 19: Total Wealth Distribution by Occupation in Detroit 1844–1860. The visualization highlights the transition from elementary economic activities, such as the fur trade, toward more complex sectors like banking. This shift occurred alongside a general growth of capital across all categories, reflecting the city's overall economic expansion during this period.

Figure 20: Numerical Growth and Professional Diversification of the Detroit Elite 1844–1860. This chart illustrates the expansion of the elite class from traditional fur trading into diverse sectors such as banking, lumber, and specialized manufacturing.
Source: Author's visualization based on data from Henrickson, Detroit Perspectives, 172-190.



Figure 21: Proportional Shift in Detroit's Economic Structure 1844 vs. 1860. A comparative analysis showing the transition from an elementary, trade-based economy to a more complex industrial and financial framework.
Source:Author's visualization based on data from: Henrickson, Detroit Perspectives, 172-190.

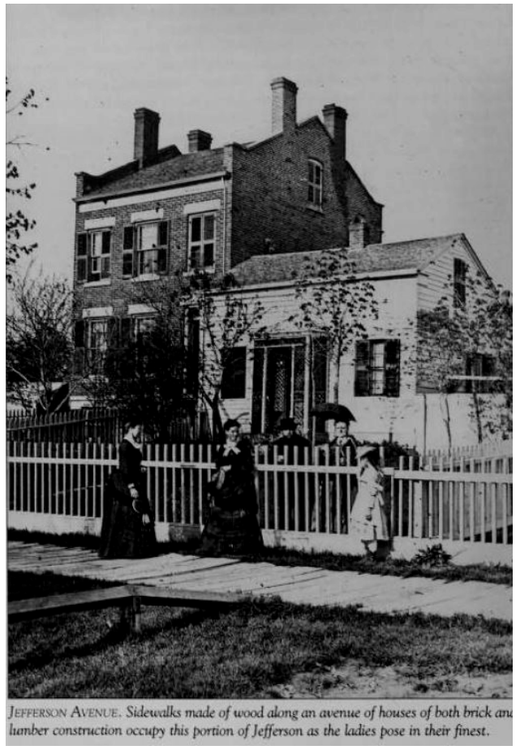

JEFFERSON AVENUE. Sidewalks made of wood along an avenue of houses of both brick and lumber construction occupy this portion of Jefferson as the ladies pose in their finest.

Figure 22: Jefferson Avenue, A 19th-century view of Detroit's mixed-material architecture and original wooden plank sidewalks.[1]
Source: Poremba, Detroit: A Motor City History, 72.

1 In the aftermath of the 1871 Great Chicago Fire, construction in Detroit shifted toward the use of more fire-resistant materials to ensure greater safety.

Modern Detroit Emerges (1866-1900)

After the Civil War, Detroit faced rapid growth in its Industrial frame work.[63] Alongside this effect, the population rose and, as mentioned before, became more complicated. These activities created a new face for the city and shaped modern Detroit.

Detroit's industrial development is understandable from the number of workers. In 1880, Detroit ranked 19th among other American cities. The majority of the products in those years belonged to the Tobacco Industry, with 64 establishments and a total of $2,716,000. Other Major industries are represented in Figure 20 and Figure 21.[64]



Figure 23



Figure 24

Figure 23: Value of product among the biggest industries in Detroit in the late 19th century.
Source:Author's visualization based on data from: Glazer, Detroit: Urban Development, 50.

Figure 24: The number of establishments among the biggest industries
Source:Author's visualization based on data from: Glazer, Detroit: Urban Development, 50.

63 In 1870, Detroit ranked 17th among American cities with a population of 79,000. Ten years later, the population in the city became 116,000, and at the beginning of the 20th century, the number increased to 285,000, and Detroit stood in 13th.

64 Glazer, Detroit: Urban Development, 40.

This amount continued to rise in the late years of the 19th century. In 1890 and 1899, the total value of the manufactured products was 39,158,000 and 55,000,000, respectively. This growth led factories to change their target market and start to sell the product in the National scale. [65]

The industry growth caused many thousands of people to immigrate to Detroit due to the unusual economic opportunities. "Although the native born residents came from all parts of the United States, the migration from rural Michigan was large."[66] The foreign-born also existed as a large and significant element in the Detroit population and identification. In 1880, 45,000 out of 116,000 of resident was foreign born, and 20 years later, in 1900, 96,000 out of 285,000 were of foreign birth. Among them, Germans were the most numerous, and after them, the Canadians, English, Scots, and Irish also constituted an important part. This Immigration defined Detroit as a multi-national society.

Immigrants in Detroit lived in clearly identifiable neighborhoods. "Some neighborhoods were ethnic, while others were economic." For example, in the 19th century, the Irish lived in the Lower West Side, and Germans were found around Gratiot and Hastings. Due to external immigrants from this neighborhood, because of the economic improvement. The ethnic neighborhood was losing its members, and many Detroitians became part of the dominant culture.

As a result, after a while, the basis that formed the neighborhoods was less national, but more eco-

65 The Michigan stove company (Garland Stoves), which began production in 1872 and employed 1,000 workers, was sold nationally with its branches, including one in Sacramento, California. Next to this company as an example, the tobacco company and companies like Frederick Stearns Pharmaceutical Manufacturing sold their drugs throughout the nation.

66 Glazer, Detroit: Urban Development, 52.

nomic. In this scenario, the neighborhood was essential to answer the call of the needs of the inhabitants, specifically in low-income classes who were related to their neighbors much more than others.



Figure 25: The Garland Stove on East Jefferson outside the Michigan Stove Co., Detroit, was famous for its stove production before car manufacturing. This company was among the pioneers which started to sell its product nationwide.
Source:Detroit Publishing Company photograph collection, Library of Congress.

In 1883, A survey took place to identify the average daily wage of Detroiters. This document shows $1.74 per day for an unskilled worker. Among the total workers under the study, which was 8611 workers, only 82 people took between $4.00 and $7.00 per day, and a total of 224 of them received less than ninety cents per day. In some specific occupations, the average payment was different in a wide range. For example, the barber rate was between $1.15 and $2.35, and the butchers ranged from eighty -five cents to $2.00.[67]

In relation to gender inequality, the women's wage was significantly different from men's. "In 1883, the average daily wage of 503 women was 78 cents." Even among them, 45 women received even less than 45 cents per day. And only 11 women reported about $1.75 or more as a daily wage. Among the women's occupations, the highest average belonged to milliners with $1.07.

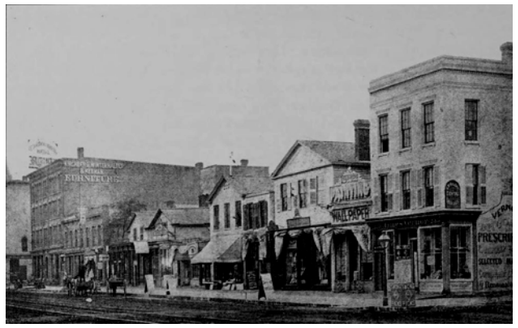


Figure 26: Woodward Avenue's commercial evolution in 1876.
Source: Poremba, Detroit: A Motor City History, 82.

Bartenders	$1.31
Cabinetmakers	1.68
Carpenters	1.59
Clerks and salesmen	1.92
Cooks	1.67
Gardeners	1.15
Hackdrivers	1.45
Janitors	1.25
Machinists	2.57
Masons	2.56
Millwrights	2.62
Painters	1.99
Photographers	2.5
Plasterers	2.4
Shoemakers	1.69
Printers	1.63
Teamsters	1.5
Wagonmakers	1.99

Table 1: The average Daily wages for selected occupations in Detroit
Source: Glazer, Detroit: Urban Development, 67.

67 With consideration of 12 hours of work a day, the standard of working hours was at that time. Although many of the workers successfully obtained 10 hours a day or less.

Labor Organizations

In parallel with growth in the Detroit industry, the social activities in the form of labor organizations[1] were shaped. In the post-war situation, names like Richard Trevellick[2] were synonymous with labor organisations. who was localized and established more than 200 Labor unions. The two most notable early labor organisations in Detroit are listed as follows:

- "Detroit Trade Assembly" was the first central union association in Michigan. This association was formed in 1864 by the influence of Richard Trevellick. With more than 5,000 members from 14 unions, this organisation was fighting for a higher daily wage and fewer working hours not only for the laborers in Detroit but also for all of them in Michigan. In 1872, the assembly began to decline due to factional and personality differences. And 1873 was the year it was officially dissolved.
- "Knights of Labor" appeared in Philadelphia in 1869 and reached Detroit in 1879. At that time, Charles Litchman, a shoemaker, came to Detroit with one goal: to encourage people to join the organisation. Although between 1880 and 1890 thousands of workers joined to this organisation, it also disappeared due to personal disagreements and differences in political perspective.

These two organisations did not prevent other labor groups from their activities. After or in parallel with them, other organizations were actively effective in the life of labor in their own. Detroit Council of Trades and Labor Unions, The railway brotherhood and The Grand International Brotherhood of Locomotive Engineers was numbered among many in Labor organisation between 1860 to 1890 active in Detroit Michigan.[3]

1 Labor association and Unions and any other shape of organisation dedicated to fighting for workers and labor legislation.

2 The British-born man, who was known for his efforts in the eight-hour day movement and other national liberal reforms.

3 Glazer, Detroit: Urban Development, 70-72.

Era of Pingree, the Economic Depression, and Solutions.

As 1890 rolled around, the population in Detroit reached 200,000 people. Of which roughly 20 percent were native-born. The urban rail lines now became electric, and the average work week was 60 hrs (10-hour working day). The first skyscraper[68] was built. Although the city looked to be making progress. The economic situation faced depression as a result of the financial panic. In this situation, Hazen Pingree, the shoe magnate, was elected as the mayor of Detroit. [69]

Pingree's actions in the Mayor position are known as significant strategic work that led Detroit to figure out its problems. One of the first steps taken by Pingree was the Vegetable Garden project in Detroit. This action created job opportunities for families who had been fired or didn't have a job for any reason. They could work on these gardens to prepare food for themselves and for their family. The "fight for establishing the public lighting commissions" and "urged the public ownership

68 The first skyscraper, the ten-story Hammond Building, at the corner of Fort and Griswold Streets, opened in 1890. Poremba, Detroit: A Motor City History, 88.

69 Poremba, Detroit: A Motor City History, 88.

of all city utilities" was another Detroit achievement during his mayorship.[70]

From 1866[71] to 1897[72], Detroit faced significant physical change. The downtown commercial area rapidly transformed; public buildings were becoming larger, City Hall on Woodward Ave. was completed in 1872. The spacious County Building was constructed in 1890. The number of hotels was also upgraded to reflect new elegance, and shops and stores were built up one next to each other. This commercial change was also accompanied by significant growth in the Industrial aspect, which was mentioned before.

In 1884, Belle Isle was opened as a city public park. Designed by Frederick Law Olmsted, who was the person designed NewYork City's Central Park. In two years, Belle Isle became a complex of a zoo, a cycling path, and a casino, which was open to concerts by the Detroit Opera House.[73]

Lately, after the Pingree time in 1899, the city was ready to enter into the new era; asphalt paving appeared on the streets of Detroit, the entire city was electrified, and the wiring of telephones was noticeable; in addition, the first independent automobile dealership opened, and Ransom Olds opened his first automobile factory in Detroit.

"Ransom E. Olds opened his first automobile factory in Detroit, on East Jefferson, near Belle Isle. The new Light Guard Armory was the site of the first-ever Detroit auto show, when Metzger and hardware merchant Seneca Lewis organized the Tri-State Sportsman's and Automobile Association exhibit. They displayed two steam and two electric cars. It was just the beginning."[74]



Figure 27: Detroit's vibrant city center in the late 1800s, with City Hall overlooking a square filled with citizens and horse-drawn traffic.
Source: Poremba, Detroit: A Motor City History, 87.

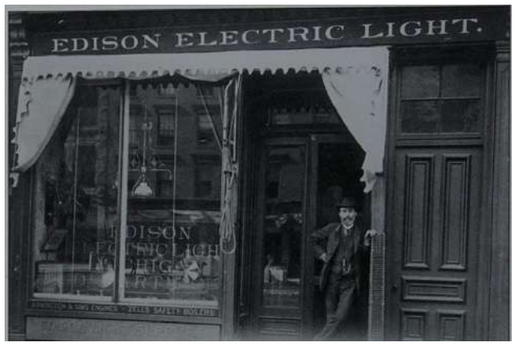


Figure 28: The historic Edison Electric Light Office at 153 Griswold, Detroit.
Source: Poremba, Detroit: A Motor City History, 88.



Figure 29: Mayor Hazen S. Pingree and the Agricultural Committee visiting an urban 'Potato Patch' in 1895—a pioneering relief program for the unemployed.
Source: Joseph Stanhope Cialdella, "A Landscape of Ruin and Repair: Parks, Potatoes, and Detroit's Environmental Past, 1879-1900," Michigan Historical Review 40, no. 1 (Spring 2014): 66.

70 Pingree also took many cases to the court. Two of his most important fights involved first with McMillan and Hendries, the owners of Detroit railroad companies, and with the Detroit board of education. He had found the web of corruption. Henrickson, Detroit Perspectives, 229.

71 after the American Civil War.

72 the end of the Mayor Pingree era.

73 Poremba, Detroit: A Motor City History, 85.

74 Poremba, Detroit: A Motor City History, 92.

The Beginning of the Automobile Industry in Michigan

One of the largest industries in Michigan is automobile manufacturing. This Industry began with steam-powered engines. Between 1886 and 1887, Ransom E.Olds built one of the first steam-driven cars.[75] Steam power was not used successfully at the beginning of the car industry. The major problem was that the steam in the boiler did not support long-range travelling. Second, it took time to create pressure in the boiler, and third was the problem of water freezing in winter, so the owner must empty the tank or keep it warm in the cold season of the year.[76]

After the steam engine cars, another type of power source for the early cars was a battery, which also had its own problems. The car range was one of the most important things in this matter. Next to it, although in the beginning of the 20th century cars were known as an expensive product[77], the battery car made this problem worse.[78]

Searching for fuel and developing car engines had started before 1886. The France and Germany were two countries that introduced engines which worked with coal gas. This fuel was also not widely accepted. Coal gas was expensive, and due to this matter, it was replaced with what before had been a waste petroleum product, gasoline. [79]

Before 1900, only a few gasoline cars had been sold; the movement was started. In 1894, Olds built his first gasoline-driven automobile and began driving it on the streets of Lansing. One year later, in 1895, he began to produce cars for sale and became one of the successful early car makers of those days. In Michigan and in the world.[80]

One year later, in 1896, Detroit heard the name that not only changed the city in the years after but also created a fundamental difference in industrial history everywhere in the world. In that year, "a young man in Detroit, named Henry Ford, built his first gasoline-driven car."

In the last years of the 19th century, several companies started to produce cars, although due to the high expenses and lack of supporting facilities, most of them did not last long. In general, at the beginning of the 20th century, the Automobile era started in Detroit. In 1901, the Olds Motor Works was working in Detroit, and two years later[81], the Ford Motor Company came into being.[82]



Figure 30: Pushing the limits in 1901. Ransom Eli Olds and John Maxwell testing the hill-climbing capabilities of the iconic Oldsmobile Curved Dash Runabout in Detroit.
Source: Lewis, Michigan Yesterday and Today, 398.

75 Later, some other models, like White, Stanley Steamer, and Locomobile, appeared on the market.

76 Ferris E. Lewis, Michigan Yesterday and Today (Hillsdale, MI: Hillsdale School Supply, 1956), 396.

77 before 1909 and the Ford Model T

78 Lewis, Michigan Yesterday and Today, 397.

79 Lewis, Michigan Yesterday and Today, 397.

80 Lewis, Michigan Yesterday and Today, 398.

81 1903

82 Lewis, Michigan Yesterday and Today, 400.

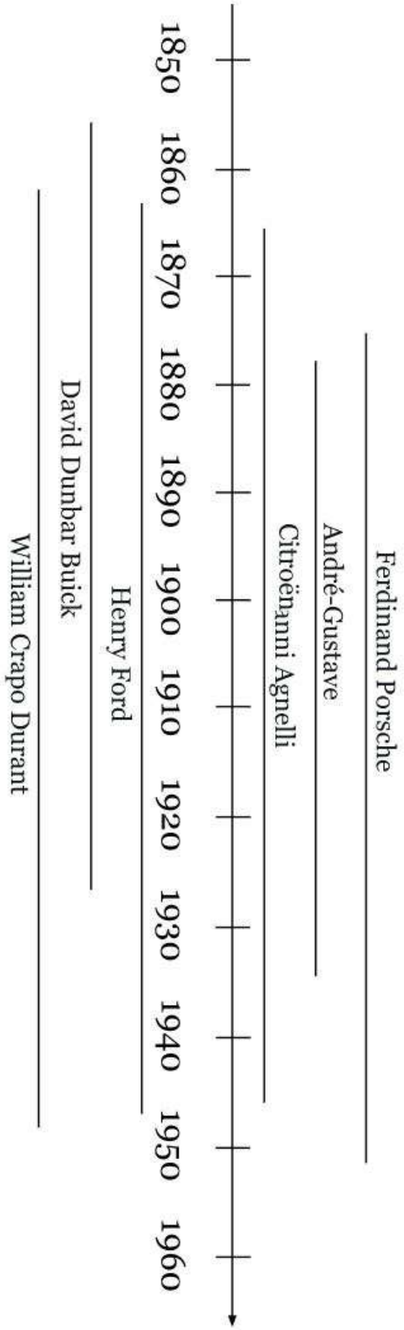


Figure 31: The lifetime of the most significant faces in the car industry, representing the golden era in car manufacturing.
Source: Author.

Conclusion

The path from the foundation of Detroit to the beginning of car manufacturing highlighted the ups and downs of the city's narrative.

The new Detroit was built on the remains of a military fort, which shifted repeatedly between Great Britain and French forces. This foundation created a unique historical path for the city and caused the rapid emergence of heavy industrial activities, chief among them automotive manufacturing.

This path was built on three distinct pillars; the first is the military conflict which led to technical development. Due to the strategic advantage of the city's location, Detroit was always attracting for Britain and France's armies; in addition to this matter, Detroit was responsible for providing war supplies for both armies depending on which controlled the city. This attraction and advantage, next to the immigrants who mostly came from industrialized European countries, created an atmosphere of development in industrial fields. everything was ready: the land, the technicians, money, and most importantly, the motivation provided by war.

The next pillar was social growth. This matter was driven by developing, University of Michigan, an inclusive education system, and social associations, which led to the emergence of significant Detroiters between the 18th and 19th centuries. Many of these historical figures advanced to the upper echelons of US policymaking, where they profoundly shaped the system, a shift that eventually drove capital investment, brain gain, and industrial development.

The third one was clearly the accessibility, which made Detroit a suitable location for industrial action.[83] The expansion of land routes, railways, and waterways shifted the city from a self-contained, isolated economy to a dynamic system capable of distributing its goods across the United States and to key trading centers such as New York and Chicago. This development years later appeared in the River Rouge plant and once more highlighted the effectiveness of the location and transportation for industrial development.

At the end, as is clear in Figure31, from the half of the 19th century to the half of the 20th, the world was faced with its most significant figures, each standing behind the huge car manufacturing company. That era could arguably be called an automotive paradise, but the question is, what makes Detroit important?

83 From the beginning, the city was the center of the fur trade. In another words, one of the reasons which force the French army to build the fort in this location was to control the fur trade. This ability encreased by deveopment of the transportation system.



Figure 32: 1889, Detroit before the car industry, Bird's-eye view.
Source: Library of Congress Geography and Map Division Washington, D.C. 20540-4650 USA dcu.

FROM ROYAL TO INDUSTRIAL CAPITAL

The history of Turin, 1798-1900

The chapter illustrates the story of Turin, beginning with its status as a royal city, and explains the journey of its industrialization up to the definitive birth of the automobile industry.
This chapter discusses the formation of its infrastructure, the foundation of industrialization, and the growth of a new social identity in Turin.
The narrative depicts the strategic placement of artisan workshops and large factories, highlighting how their geographical distribution was shaped by the availability of water power, the expanding railway network, and the urban transition driven by the city's customs belt (cinta daziaria) and toll system.
As the central highlight, the chapter examines the creation of industrial architecture as a new spatial language, tracing its birth and evolution through an eclectic style that combined massive, functional structures with neo-romantic and Liberty design elements.
Finally, it demonstrates how the rise of positivist science and the rigorous education of engineers and technicians merged with the practical expertise of the growing metallurgical industries. Supported by state-aided infrastructure development and a rich local base of ambitious entrepreneurs, could birth the automobile industry in Turin.

Turin from French Occupation to Italian Unification (1798–1861)

The political and social scope

Between 1798 and 1814, France conquered Piedmont twice, initiating a profound transformation of Turin. The first phase began in December 1798, when the full forces of the French Revolution occupied Turin and the Savoyard monarch, Charles Emanuel IV, abdicated. The subsequent annexation of Piedmont to the French Republic in February 1799 was short-lived, as a coalition of Austrian and Russian forces invaded Piedmont, defeated the French, and occupied the city in May 1799. The second, more impactful phase commenced in June 1800 when Napoleon Bonaparte recaptured Turin following his victory over the Austrian army at the Battle of Marengo. Following a general political settlement in 1802, Piedmont was annexed into the French First Empire, and it stayed under their control until 1814.After securing Turin, one of Napoleon's first edicts was to demolish the city walls and urban fortifications, deliberately stripping Turin of its identity as a fortress-city of the Savoyard dynasty. The French aimed to convert the former royal capital into an "open city" and a rationally designed center for commerce and services. To achieve this, a more rational organization was imposed upon the city, abandoning the old system of dividing Turin into 145 blocks named after saints, and instead administratively subdividing it into four districts: Po, Dora, Moncenisio, and Monviso, which reflected the four directions of traffic radiating from the center. In 1808, a system of sequential civic numbering based on the Parisian model was applied, greatly facilitating the flow of information and the movement of goods and people. French planners also envisioned the construction of new bridges, roads, and public squares, but ultimately, only the construction of a splendid new stone bridge over the Po River was fully implemented.

During the years of occupation, the powers and activities of the Church were severely limited, and modernized civil and commercial codes were established to make the city and its citizens more responsive to the central government in Paris.

Concurrently, the imposition of the Code Napoleon transformed the traditional social hierarchy by introducing civil equality, legalizing divorce, treating marriage as a civil contract, abolishing aristocratic primogeniture, and extending religious toleration to the Jewish and Waldensian communities.

The administration streamlined local government, eliminated the old city guilds, removed tariff barriers, and created a Chamber of Commerce to stimulate trade. Furthermore, public health and education were modernized[1].Despite these modernizing efforts, the attempt to completely restructure society frequently backfired, leaving the lower classes without traditional support systems. The French measures failed to have a noticeable impact on local religious practices, and the laboring classes remained heavily influenced by the priests rather than embracing anti-religious Enlightenment ideas. The living conditions worsened drastically due to the absence of supporting organizations.

The ambitious French plans for a state-run welfare system of shelters and soup kitchens failed due to a severe lack of funds and manpower, resulting in inadequate and filthy facilities. Instead of receiving help, the French authorities relied on corrective punishment, resulting in a decline in welfare status and poverty.

This misery was compounded by the devastating economic impact of the Napoleonic wars, which brought heavy tax burdens, high inflation, and compulsory military conscription, and by the departure of the Savoyard court, which bankrupted local luxury goods producers.

Ultimately, the authoritarian nature of these reforms, imposed upon a population suffering from severe economic depression, generated widespread resentment rather than popular support.

In the spring of 1814, the French imperial era in Turin came to an end with the arrival of Austrian troops. Initial plans to guide the transition using a mixed council of Napoleonic and Savoyard nobles were quickly abandoned upon the early return of King Victor Emmanuel I from exile. The king immediately abrogated all French legislation and restored the old Royal Constitutions of 1770. While the monarchy did not go so far as to revive ancient feudal bonds, it effectively reinstated a rigid caste system. The traditional Savoyard court once again became the exclusive focal point for the aristocracy's social activities, creating a profound separation between nobles and non-nobles. Concurrently, the central role of the Catholic Church was powerfully revived, while religious minorities lost their civil rights, with the Jewish community forced back into the urban ghetto.

The government also adopted an ultra-conservative economic approach by raising protective agricultural tariffs; this policy, combined with a series of bad harvests, worsened food shortages and urban pauperism. Culturally, the regime imposed a climate of strict moral and intellectual repression, heavily censoring publications, theaters, and education. Ultimately, this uncompromising reactionary climate fueled deep ideological divisions and personal animosities, culminating in open military rebellion, criminal trials, and the forced exile of young men from some of Turin's most illustrious aristocratic families.[2]

King Victor Emanuel I's stubborn refusal to accommodate the social and political realities that had emerged during the French occupation caused the birth of revolution in 1821. The strict, conservative climate pushed away the educated nobility and professionals to form secret societies to force the king to grant a constitution and lead a war of independence against Austria. Inspired by recent revolts in Spain and Naples, a group of young aristocratic army officers spearheaded a military insurrection in Turin in March 1821, echoing provincial demands for the adoption of the democratic Spanish Constitution. The uprising forced Victor Emanuel I to abdicate in favor of his brother, Charles Felix. Although the young regent Charles Albert briefly granted the constitution, he refused to lead a war against Austria and soon abandoned the revolutionaries. Lacking broad popular support, the rebel government collapsed in April after being crushed at Novara by royalist forces backed by Austrian troops, which subsequently occupied Turin until 1823.

In the wake of the failed revolution, Charles Felix ushered in a severe era of authoritarian reaction and repression in the capital. The new king ordered a sweeping purge of the army and the state bureaucracy, resulting in the arrest of over 3,800 people,and three were executed since many aristocratic ringleaders managed to escape into exile. The cultural and intellectual life of the city suffered immensely; the University of Turin was closed for an entire year, thoroughly purged of

1 The French established a Superior Council of Health to regulate medical practitioners and launch mass smallpox vaccinations, while also reorganizing the university into nine specialized schools under the leadership of prominent reform-minded local figures

2 Anthony L. Cardoza and Geoffrey W. Symcox, A History of Turin (Turin: Einaudi, 2006), 152-163

its progressive faculty (particularly in Theology and Medicine), and subsequently placed under the strict disciplinary guidance of the Jesuit Order. Furthermore, the government imposed rigid censorship on the local publishing industry, shut down the revolutionary press, and replaced it with conservative publications designed to preach absolute obedience to the Catholic Church and the legitimate monarchy. Ultimately, Charles Felix's deep distrust of his own governing class led him to spend as much time as possible away from Turin, significantly diminishing the city's role as a vibrant center of court and high society during the 1820s.[3]

Between 1831 and 1864,the era of Risorgimento started, when Italy unified and Turin became the political and intellectual command center of the Italian unification movement. Under the reign of King Charles Albert, a period of modernization shaped, and attempts were made to arouse patriotic pride by renovating royal residences, founding the Royal Gallery of Paintings, and erecting numerous public monuments in Turin's major squares. As the city's population swelled to nearly 140,000 by the late 1840s, its urban footprint physically expanded beyond the old walls, pushing north and west to develop the new neighborhoods of Porta Susa, Borgo San Donato, and Vanchiglia. In the turbulent wake of the 1848 revolutions, the Statuto constitution was granted by the king. The 1850s began a golden age under the prime ministership of Camilo Benso di Cavour, who vigorously modernized the economy through free trade and the construction of railways. Simultaneously, Turin became a cosmopolitan haven for thousands of political refugees fleeing reactionary regimes across Italy, turning the city into a vibrant national "think tank". [4]This powerful momentum culminated in 1861 when Italy was unified and Turin was proudly crowned its first national capital. To accommodate its massively expanded bureaucratic responsibilities, the city underwent a rapid urban "face-lift" that introduced broad avenues, public parks, and new state office buildings, enjoying a brief era of national glory.[5]

Transformation of urban planning during the Napoleonic era

During the Napoleonic era, Turin declined from the capital of the Kingdom of Sardinia to a provincial town. Although there was no outward enlargement of the city during this period, its urban plan was significantly reorganized. For this purpose, a public competition was held by the French in 1802; of the submissions, the drawings of two main designs survive today: the winning plan by Ferdinando Bonsignore, Michelangelo Boyer, and Lorenzo Lombardi, and a design by Giacomo Pregliasco.

Giacomo Pregliasco's design differed from the classical, formal French garden style, drawing instead on the picturesque English and Anglo-Chinese garden traditions. The proposals kept the historic Citadel intact because the French military recognized its strategic value for controlling the city and preventing insurrections. The design fully leveled the walls to connect the city grid with its surroundings through a perimeter canal and tree-lined roads.

The winning plan by Bonsignore, Boyer, and Lombardi was much less costly. The design preserved the surviving ramparts and transformed them into elevated public promenades, it also kept the citadel like the other alternative. To help revive the local economy, their plan proposed planting mulberry trees along these pathways to support silk production, as well as designing a river harbor to facilitate the delivery of goods. The layout aligned the city's main axes, utilizing rows of trees pointing toward the crossing of the Po (the future Piazza Vittorio) and Via Dora Grossa (currently Via Garibaldi).

Subsequently, the general plan of 1808 formalized the addition of the ring roads as continuous, tree-lined boulevards, the traces of which remain highly visible in Turin's modern street grid. During the subsequent Restoration era, the cleared spaces were utilized to construct the grand squares of Piazza Vittorio and Piazza Carlo Felice.

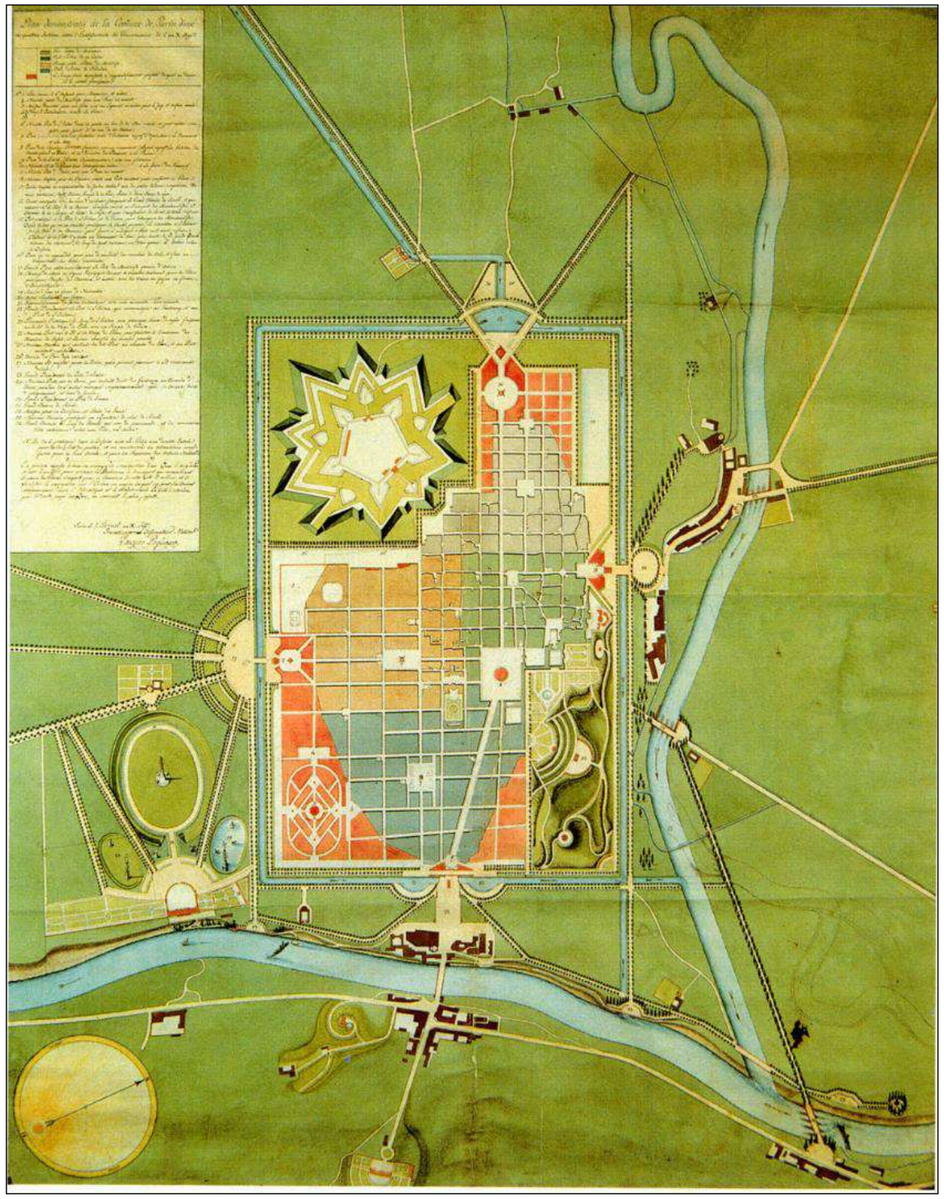


Figure 33: Giacomo Pregliasco, Urban Planning Project, 1802
Source: G. Bracco, edited by, City of Turin 1798-1814, Historical Archive of the City of Turin, Turin 1990

3 Cardoza and Symcox, A History of Turin, 164-169

4 Cardoza and Symcox, A History of Turin, 171-189

5 Cardoza and Symcox, A History of Turin, 194

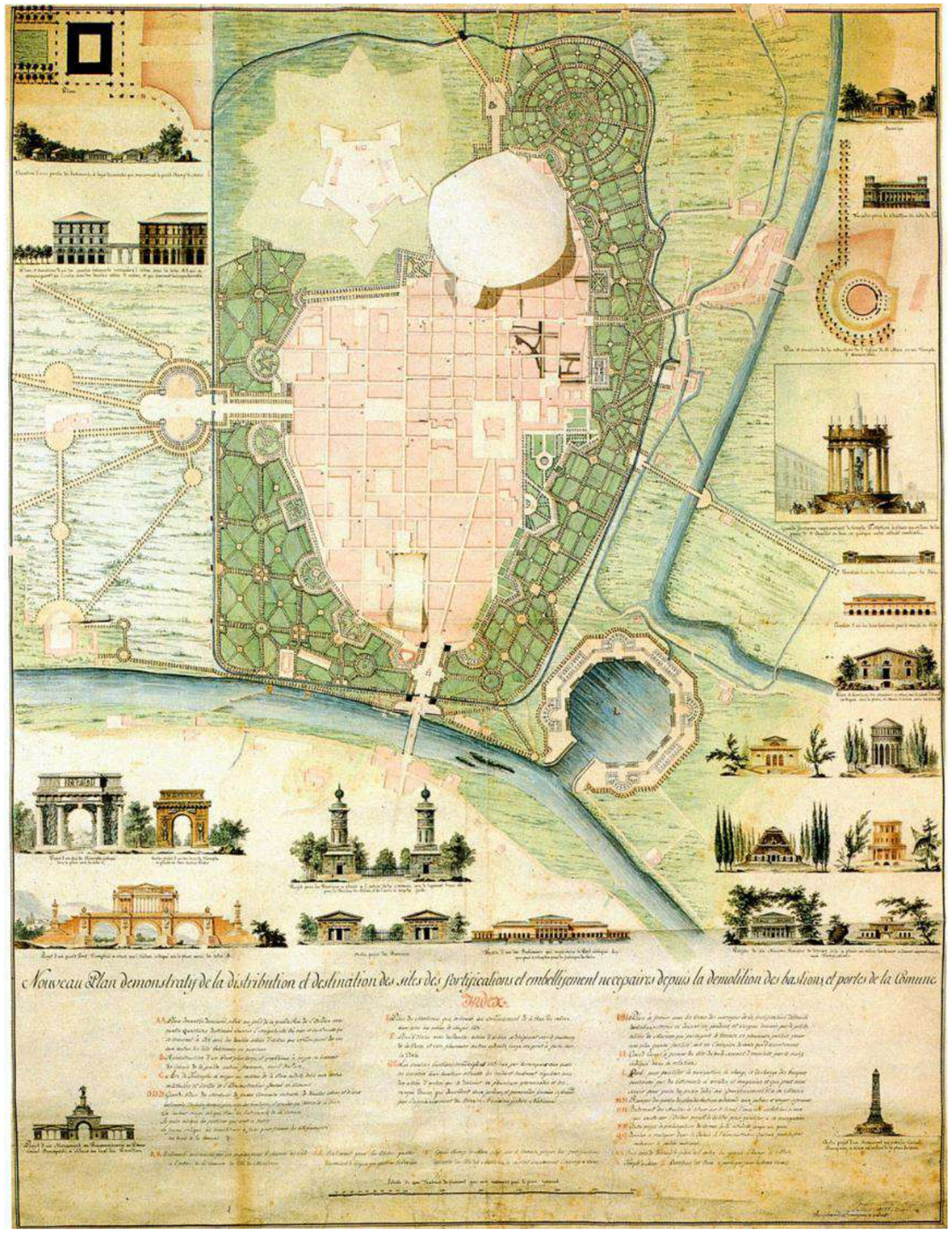


Figure 34: Ferdinando Bonsignore, Michelangelo Boyer, Lorenzo Lombardi, Urban Planning Project, 1802.
Source: G. Bracco, edited by, City of Turin 1798-1814, Historical Archive of the City of Turin, Turin 1990.

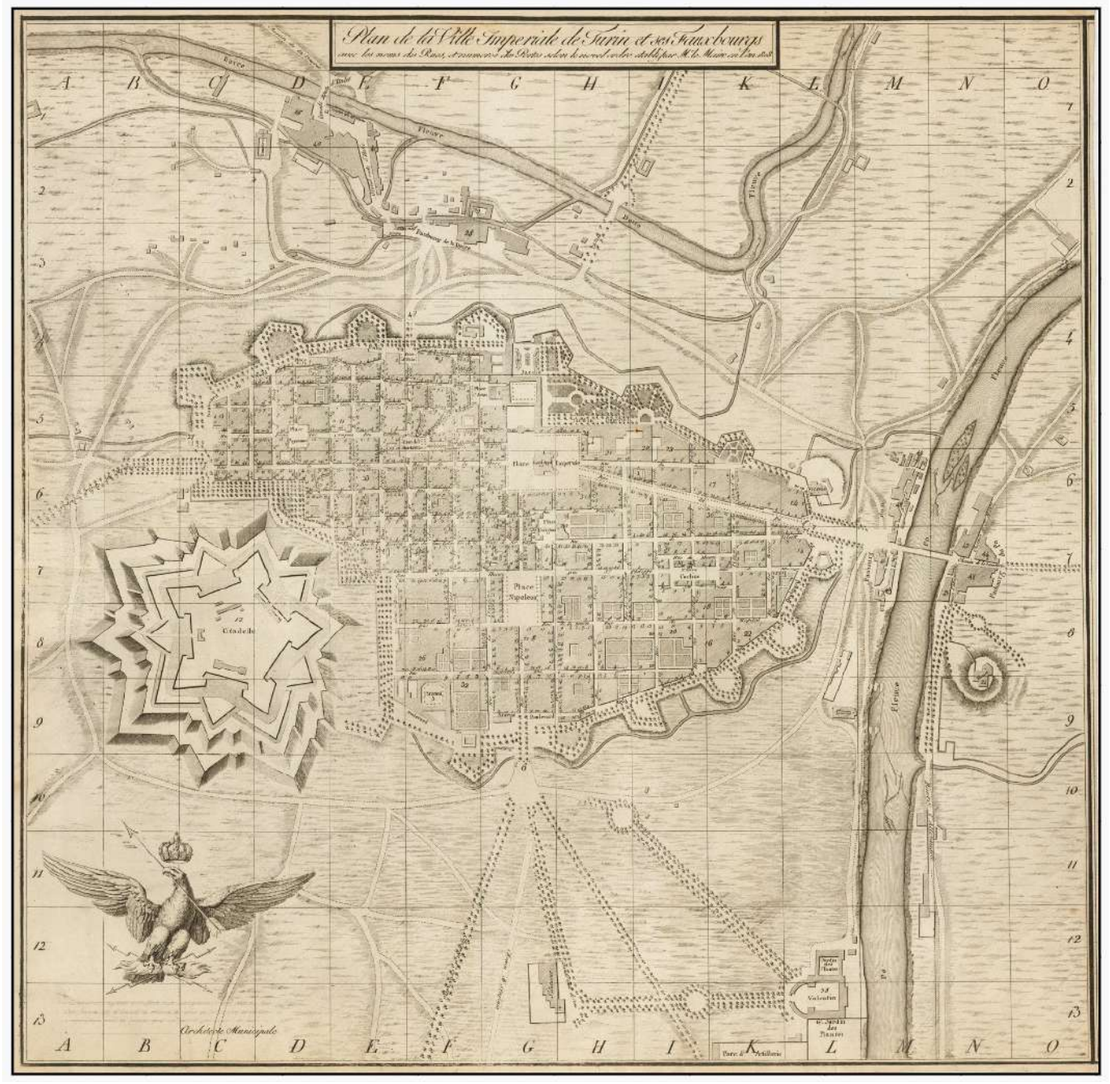


Figure 35: Map of the Imperial City of Turin and its Suburbs with the names of the Streets and numbers of the Gates according to the new order established by the Mayor in the year 1808.
Source: Lombardi, Lorenzo. Plan de la ville impériale de Turin et ses fauxbourgs, 1808. Map. Available on Alamy.com (Image ID: E0F3FE82).

The rise and fall of the capital (1861- 1870)

Turin as the Capital of Unified Italy (1861-1864)

After the Unification of Italy[6] Turin had a brief moment of magnificent power during 1861-1865. In 1861, it retained its power and became the national capital of unified Italy, and King Victor Emanuel II ascended the throne.

The Piedmont statement extended the bureaucracy and constitution, also legal, financial, and educational systems first developed in Turin to the rest of the country. As the national capital, the city underwent a rapid facelift with the construction of new state office buildings and the development of broad avenues, public parks, and additional services to support its increased governmental responsibilities and the growing number of civil servants. Between 1858 and 1864, the population soared from 179,635 to 220,000, reflecting the dramatic growth of jobs in the civil service and in those sectors of production that met the needs of a national political and administrative center.

During this year, the municipality started 47 new projects for beautifying the city and adaption as a capital. In September 1864, one-seventh of Turin's active population found employment directly in the public sector, while another 20%, for the most part, shopkeepers, artisans, construction trades people, and domestic servants, provided-services or products to the various branch es of the government and state institutions.

However, the sudden death of Cavour in June 1861 and the limited materials and human resources of the House of Savoy made it impossible for Turin and the political class to dominate Italy properly, which handed more concessions to the old regional states, eroded the city's claims to national leadership, and set the stage for the transfer of the capital.[7]

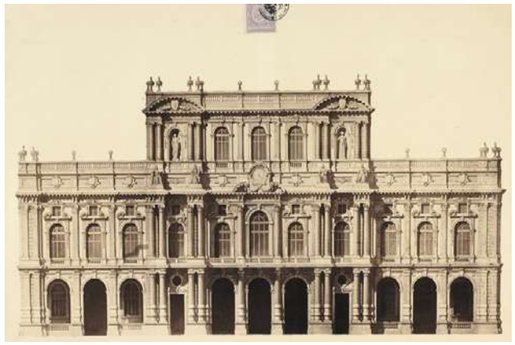


Figure 36: Palazzo Carignano, serving as the first Parliament of the Kingdom of Italy, and is now the "museum of Risorgimento" with the biggest collection of the period of Risorgimento and the Italian Unification. The picture depicts the building in July 1864
Source: Archivio Storico della Città di Torino available via Museo Torino online platform.



Figure 37: Palazzo Madama served as the Senate of the Kingdom of Italy and is now transformed into the Civic Museum of Ancient Art The picture depicts the building in 1841
Source: Available on Libreria Antiquaria Bourlot online platform.

6 here is a brief Summary of Italy Unification focused on Turin's impacts: from 1848 many political refuges headed to Turin from the whole peninsula, including scholars, writers, political figures, and journalists due to the Moderate Preventive Revolution that occured in 1848. this caused an increase in the publishing of newspapers and journals that promoted national aspiration, growth in liberal minded elites.and adoption of Italian as the official language of parliament and public education. Beside this political leadership in Turin Cavour's diplomatic success in removing Austria from Lombardy, together with Garibaldi's conquest of the Bourbon Kingdom of the Two Sicilies and the subsequent annexation of central and northern duchies through plebiscites, enabled the unification of the Italian peninsula under King Victor Emmanuel II.

7 Cardoza and Symcox, A History of Turin, 195–196

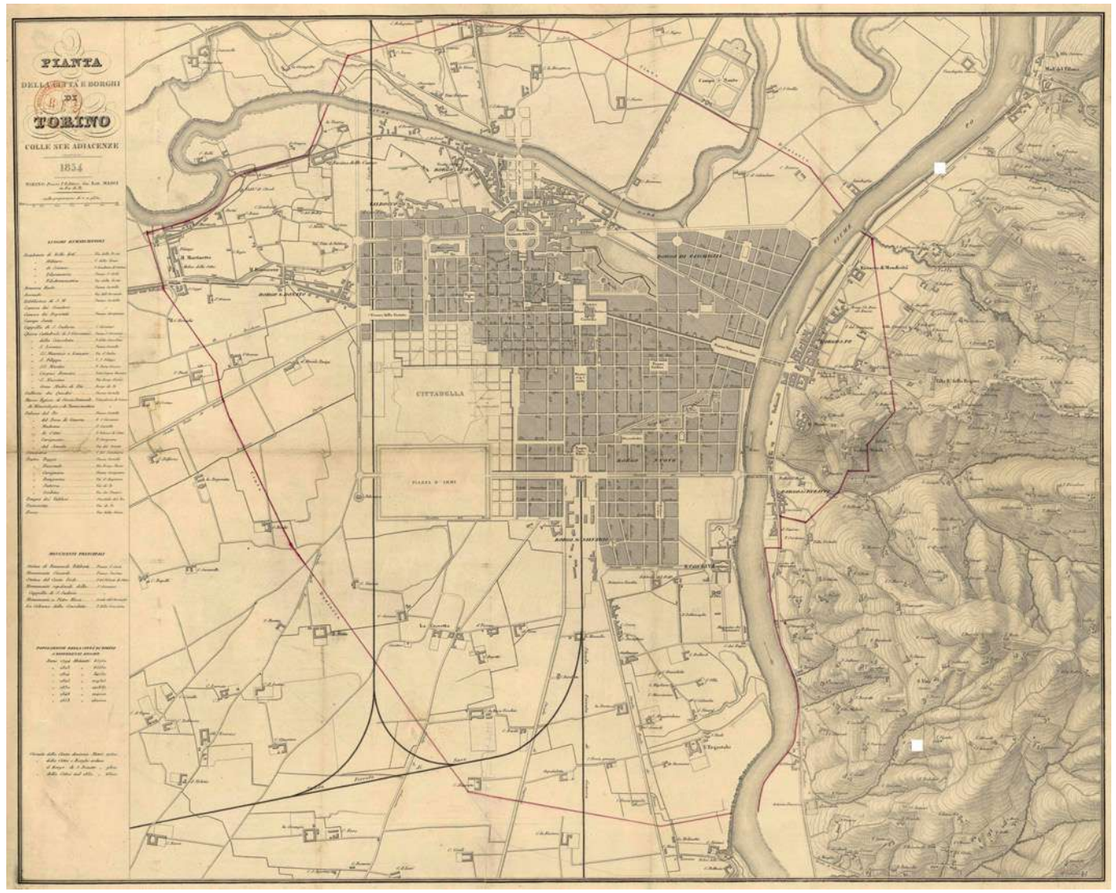


Figure 38: Map of Turin in 1854 showing city limits
Source: Atlante di Torino online platform.

The Customs Limit

Figure 3 illustrates the map of Turin in 1861, dividing suburbs and the city by the line which represent the customs belt of the city. The formation of the belt orginates from the period of peace in Europe by Treaty of Aachen (Trattato di Aquisgrana), when European urban areas experienced greater security and tranquility and expanded the cities.

In Turin, with the Statuto di Carlo Alberto in 1848, the power was given to the municipality to manage finances and collect tolls. These developments led to the approval of the project to build the Turin Customs Belt, One of the reasons for the construction of this wall was to collect tolls on the entry of people and goods into the city.

The project began in 1853 and was completed in 1856. This belt, 16.5 km long[1], was formed on the right bank of the Po River in accordance with the orographic pattern of the area and connected to the existing villa walls with spanning 4.5 km[2] and, On the left bank of the river, which was the plain part of the city, was 12 km long and included a thick wall with ditch, an internal guard road and external peripheral roads.

Following the formation of these walls, neighborhoods outside the city walls were formed around the city. The openings in the walls designated for the passage of people and goods were called 'Barriera' (Barriers). Subsequently, the neighborhoods that formed outside these walls were known as 'Borghi' or 'Borgate', though they were often referred to by the metonym 'Barriera.

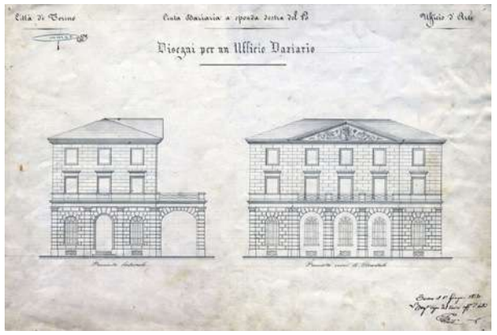


Figure 39: Edoardo Pecco, a Customs office on the right bank of the Po/Drawings for a Customs Office, 1 June 1854
Source: Lupo, Le due cinte daziarie di Torino, 24.



Figure 40: Piacenza barrier custums office, now the municipal police office
Source: museotorino.it

The customs belt booths were built within these walls, and the surrounding land was used for housing the Customs guards, these buildings were built with an eclectic style.

1 there is a discrepancy about the periphery of the belt, In the Primary source, Lupo, "Le barriere e la cinta daziaria," in Storia di Torino VII, 305, the number is mentioned 16.5 Km while the historical map from 1861 (available at atlanteditorino.it) mentions the number, 17,500 meter, on the margin of the document.

2 the presented map does not illustrate the belt on the right side of Po river.

The main neighborhoods outside the customs belt were called in the First order Barriera di Nizza (today Piazza Carducci), Barriera di Francia (today Piazza Bernini), Barriera di Milano (today Piazza Crispi), all three on the flat part, Barriera di Casale (today Piazza Borromini) and Barriera di Piacenza (today in a widening of Corso Moncalieri opposite Via Marsala), both in the hilly area.

Secondary barriers included Barriera di Stupinigi (today at the intersection of Corso Lepanto, Turati, and Unione Sovietica), Barriera di Orbassano (today at the intersection of Corso De Gasperi with Via Fratelli Carle),Barriera di Lanzo (today Piazza Baldissera), Barriera di Vanchiglia (today at the intersection of Corso Belgio and Tortona), and in the end, with some minor toll huts that were called "Baracconi".[1]

Following the transfer of the capital to Florence in 1865, and to compensate for the resulting economic stagnation, areas like Barriera di Milano and later Barriera di Lanzo transitioned into industrial hubs during the late 19th century. By the early 1900s, the original 1853 customs belt was outdated because many factories and working-class neighborhoods had expanded rapidly just outside of it. To fix this and capture the lost tax revenue, Turin established a second, much larger customs limit (cinta daziaria) in 1912, which doubled the city's enclosed perimeter from 16 to 32 kilometers. This massive new boundary incorporated almost the entire municipal territory, specifically targeting the heavily industrialized areas around the Dora river and the main roads leading to Rivoli, Stupinigi, and Nizza.

The 1912 customs belt was ultimately short-lived. In 1930, a national law officially abolished the city tolls across Italy, replacing them with a new system of consumption taxes. Consequently, the physical walls, barriers, and toll infrastructure were completely dismantled. The spaces where the toll gates (barriere) once stood were transformed into large public squares (such as Piazza Bengasi, Piazza Massaua, and Piazza Baldissera) that became the new urban hubs for their neighborhoods, while the former path of the wall became an outer ring road for the city.[2]

1 Giovanni Maria Lupo, "Le barriere e la cinta daziaria," in *Storia di Torino*: Vol. 7, ed. Umberto Levra (Turin: Einaudi, 2001), 302–310.

2 Chiara Devoti, "Connotazione dei luoghi non centrali attraverso la cartografia storica," in La storia della città per capire, il rilievo urbano per conoscere. Borghi e borgate di Torino, ed. Pia

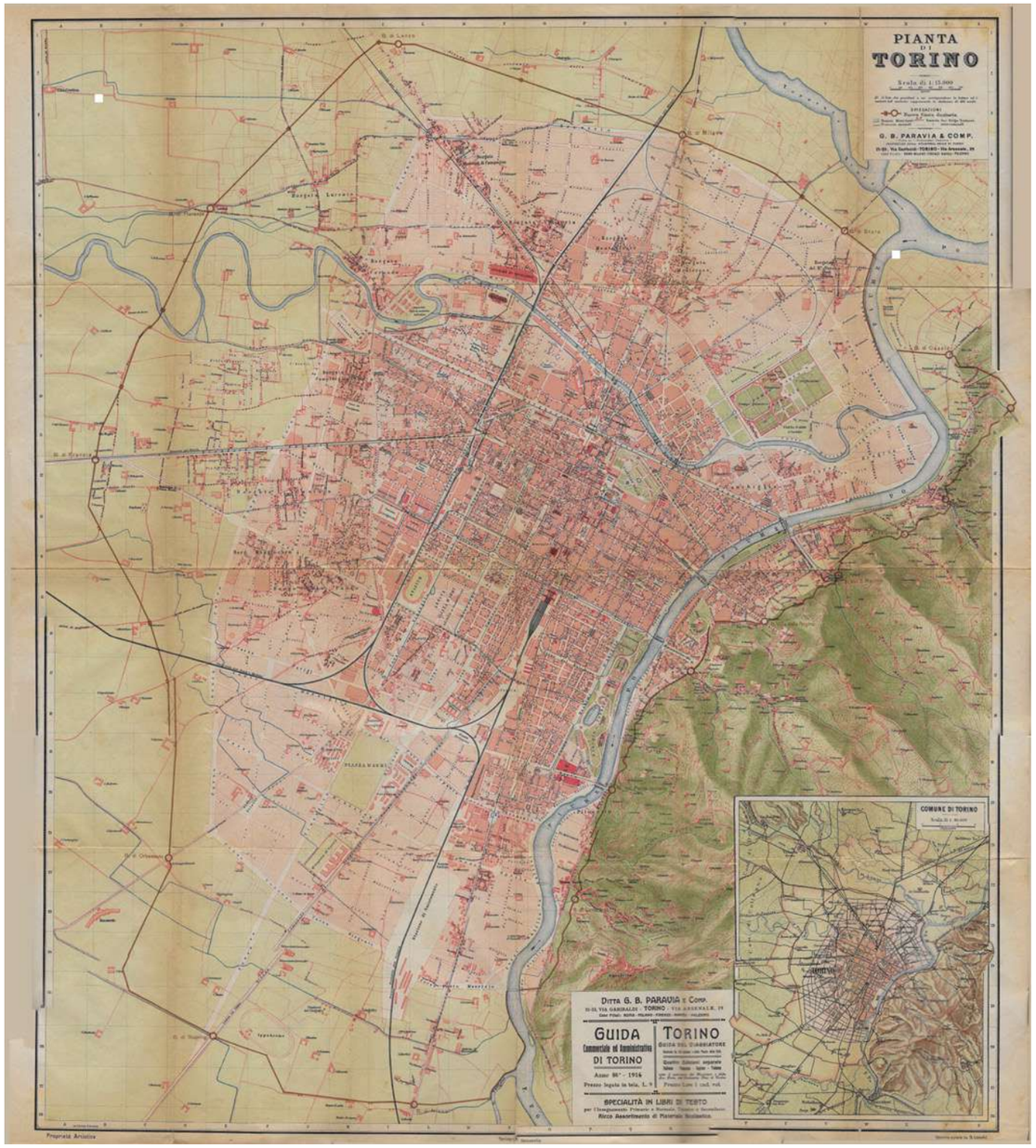


Figure 41: Map of Turin in 1914 showing the new city limits
Source: Atlante di Torino online platform.

The Capital Transfer and the Massacre of 1864

In 1864, Turin lost its ancient status as the home of the royal court and its recently acquired status as the capital of the Kingdom of Italy. The transfer happened as a result of the September Convention with France. "According to its terms, the French emperor promised to evacuate his troops from Rome within two years, on the condition that Italians transferred their national capital from Turin to Florence within six months." Even as the chamber of deputies voted for Rome as the eventual capital of Italy in March 1861, it was not expected that this would happen so soon; such a fast transfer caused an immediate reaction of outrage and disbelief from the population, which saw it as a gross injustice and a betrayal of Piedmont. In addition, the announcement of the transfer published on the 20th of September 1864 in Gazzette Torinese triggered the final reaction of people and caused a demonstration on 20 to 22nd of September . on 21st of September There was even talk of compensation for the city,The national government's solution to compensate for Turin's problems was to grant a budget of 100 million lire and an annual subsidy which had no effect on the city's lost sense of morale and pride which provoked the mayor's action, explaining that Turin is not for sale by responding "If the transfer is necessary for the good of the country, what's the point of compensation? And if, instead, it is disastrous, as we believe, Turin thinks too highly of Italy and of itself to sell itself.[8]"

On the evening of 21 September, worried people gathered in Piazza San Carlo and Piazza Castello to demonstrate which was in confrontation with the transfer to Florence because, apparently it seemed like people renounced Rome in deference to the Pope, as one of the most heard slogans was "Turin or Rome."

This was met with an unexpected response from a squad of Royal Carabinieri, who opened fire without warning on the people, resulting in 11 deaths and many wounded. The next day was even worse for demonstrators who were angry at the Carabinieri and continued the demonstration. They gained severe responses from both Carabinieri and army troops. The bloody clashes left in their wake a heavy toll of 50 dead and 130 wounded demonstrators.

Turin, after four centuries of being the house of power and after all the efforts for the unification of Italy, was in the bad light and people started to realize that the unification was not that positive for them, as the Countess Balbo Bertone di Sambuy said, "we in our little Piedmont used to be quite happy without these brothers from another bed[9]".



Figure 42: Piazza San Carlo during the Massacre in September 21, 1864
Source: Atlante di Torino online platform.

Afterward, dismissal of the Prime Minister, the Interior Minister, and disbandment of the company of public security guards by King Victor

8 www.atlanteditorino.it

9 Cardoza and Symcox, A History of Turin, 197

Emanuel II changed the people of Turin's favorable opinion of him.[10]


CITTÀ DI TORINO

CONCITTADINI!

Risparmiamo nuovo sangue! Ad evitare conflitti è necessità che ogni cittadino, a sera, rimanga nella propria casa. *Di questo vi scongiuro.* Confidiamo tutti che il Parlamento salverà l'Italia.

Torino, dal palazzo municipale addì 25 settembre 1864.

Il Sindaco
RORA

Figure 43: Announcement by the Municipality of Turin that the Mayor invites for calm after the Turin Massacre, urging citizens to trust in the Parliament to save Italy.
Source: atlanteditorino.it

The Post-Capital Crisis

The transfer of the capital started by the departure of important institutions and groups that had long defined Turin's identity and made the city an important cultural and artistic center in Italy. In addition, this was accompanied by the loss of jobs that had been created for the local community. Ultimately, it was accompanied by a global agricultural recession, financial scandals, and bank failures.

From April to May 1865, the parliament of Turin closed its doors, the governmental ministries and the rest of the state bureaucracy, such as court, international diplomatic corps, public offices, and state monopolies, followed afterward and moved to Florence. This process finished by the end of summer.

After the Massacre and the transfer, to the public of Turin, the king appeared passive as he agreed to the transfer. Citizens felt hostile toward the "ungrateful" Italy, regretted the wisdom of unification, were anxious about the future, and had nostalgia for the good old days. This crisis of identity also found cultural expression in a surge of "Piedmontism."

There were also many economic reasons why this change could be considered catastrophic. At the time, Turin was the center of consumption and with little production, as many jobs were administrative and governmental or military, which were the most tangible group as they lost their jobs or had to relocate. Not only them but also many talented groups and intellectuals who had migrated once into the city now mostly left, which led to the closure and suspension of local newspapers and magazines.It also marked a difficult time for the University of Turin, as it lost its eminent scholars and scientists and faced the withdrawal of Catholic intellectuals. With the loss of national scientific societies and technical offices, the university lost the opportunity to draw in the best students in Italy.

Another consequence was the relocation of wealthy families.

While Turin was serving as the capital, about half of the people were employed in some form of manufacturing, but not in a strong kind; most of these factories were home workers or employees in small artisanal enterprises that produced textiles or processed food products. Only one-fourth worked in an acceptable and proper industrial factory. By the transfer and decrease in population ,between 1864 and 1870, the demand for their production of luxury goods like vermouth, silk, liquors, and chocolate decreased. Also, there was a sharp drop in business for hotels, hostels, shops, cafes, and jewelries.

As expected, the real estate market was also not doing well, as after a three-year period of investment in the urban property, in the second half of 1865, the rate of return had reached 20%. Subsequently, rental rates and investment returns in real estate across most of the city remained low for the remainder of the decade.

In the end, it can be said that this change affected almost all the citizens and was followed by migration, change in career, or unemployment. The rich could recover by transferring their investment to the suburbs or moving to the new capital and adapting to a new form of life. Other than that, approximately half of the workhouses and artisans went bankrupt and disappeared by 1866. The most tangible group was the low and middle-class, who worked in the governmental service sector and tried to join the industrial and construction workers or state railroad and armaments plants, which did not seem like a considered and secure replacement. Still, five years after the transfer, according to statistics, the unemployment rate in Turin in 1871 was 20%. The epidemic of cholera on top of that worsened the situation and caused the loss of 1300 people during 1866 and 1867. Between 1864 and 1868, the population declined from 220,000 to 191,500.[11]

The Industrial Maturity (1871- 1900)

The Multidimensional Foundations for the Birth of Industry Infrastructure, science, social reform (1871-1881)

After the unfortunate events of the protests, loss of identity and jobs, and the spread of cholera, the city was vulnerable and needed recovery.

Even during the temporary status of capital, the city felt the vulnerability of a monofunctional economy, so from that moment on ideas and plans for a new identity were put forward. In 1862, the mayor, Emanuele Luserna di Rorà declared, "It is to industry alone that we must dedicate the aid and active forces of the city," Similarly, in 1865, Professor Parini, in his book Avvenire di Torino, concluded, "After a brief lull, while a lively crowd throngs its porticoes, numerous carriages will travel its streets, and columns of smoke will rise from the suburbs, tending to obscure the blue sky." However, this industrial future faced several obstacles. Turin lacked coal, resulting in excessively high fuel prices and limited use of steam power. this issue was later addressed by the abolition of entry duties on coal and the implementation of special railway tariffs. Also, the canal branches of the Dora River were saturated, causing problems for motive power. this was partially solved by opening of new canals and development of the existing ones[12] funded by state aid, as compensation for the departure of the capital (300,000 lire subsidy per year until 1866). Hydraulic power was chosen as the best option because of its availablility, low cost and abundance.

In addition to these measures, there were plans for free technical education and better migration persuasion to meet labor demands.[13]

10 www.atlanteditorino.it

11 Cardoza and Symcox, A History of Turin, 196–198

12 This problem was never completely solved until the introduction of electrical energy in 1895. before that new division of Dora river , extension of Michelotti canal, use of the water of Stura , restoration of agricultural canals for massive industrial use were the actions. and the most highlighted one, on 15 april 1868 water capturing from ceronda (a upstream from venaria to into stura) began diverted in 2 canals, the first one become operation in 1870 and the second one in 1874 , their capacity was increased in 1878.this answered the decrease in costs but not the power motive problem.

13 Pierre Gabert, Turin, ville industrielle: Étude de géographie économique et humaine (Paris: Presses Universitaires de France, 1964), 96-98.

In addition, strategies were applied to enhance other aspects, the city fathers, the municipal council with a group of aristocrats, bankers, merchants, lawyers started to collaborate to enhance the sanitation. The first advancement was the establishment of the first Ufficio Sanitario (public health office) to bring modern public health policies to achieve a better harmony and efficiency with the traditional scourge of epidemics. As a result of the new methods, a new wave of cholera in 1873 resulted in 5 deaths, which was a significant improvement compared to the 1,300 deaths in the previous wave.

There were also efforts on recalling the patriotic pride of the people of Piedmont and their endeavour through the unification of Italy. The construction of patriotic monuments with involvement of the middle class, the opening of the national museum of the Italian Risorgimento, holding sports events and public concerts were some of the actions taken by the city council.

Another notable transformation was the creation of Positivism in the 1880s. This vision claimed to provide a new science of society based on positive facts and the scientific method. As such, it envisioned a world of material progress guided by science and technology, rather than religion or tradition. In Turin, the university, publications, and municipal leaders originated this perspective, promoting an optimistic vision of the city's production, science, and technology to advance industry, economic prosperity, and military strength. This paradigm drew the attention of different political factions such as Moderate liberals, democratic lefts, socialists, and freemasons, who embraced the secularity and progress for the city and its anticlerical vision.

By the 1880s, Effective professors such as Filippo De Filippi[14], Michele Lessona[15], Giulio Bizzozero[16], Luigi Pagliani[17], and Cesare Lombroso[18] were part of the science faculties at the University of Turin. Also, in line with the vision of "City of Science," the mayor of Turin, Count Ernesto Balbo di Sambuy, and other municipal leaders opened a modern campus in the Valentino district, which boosted research and teaching in the sciences and the medical field. Such extraordinary figures first advanced the medical faculty and then the city by easing the problems of factory life and enhancing sanitation. From another perspective, most notable was the influence of Galileo Ferraris, physicist and electrical engineer, and the most important figure in 19th century in applied science. He had a profound impact on the development of electrical power for production and transport, both through his invention of alternating current electrical motors and through his involvement in the introduction of electrical street lighting to Turin.

After years of efforts, the city started to show a modest revival. Compared to most other cities in the peninsula, the population grew faster, and by 1881 the population reached 250000 people.

Between 1871 and 1881, the ranks of domestic servants and artisans continued to shrink, while the number of people employed in manufacturing rose by 44%. This increase in manufacturing employment contributed to nearly half of the total population growth during this period, highlighting a significant shift in the workforce, and led to expansion in financial sectors, and provided economic necessity for more banks. In 1870, this marked the decade of prosperity for Turin's banks, resulting in a stable top rank among the banks in Italy for Turin.[19]

14 Professor of Zoology.

15 a pioneering translator and popularizer of Darwin's works.

16 founder of the General Pathology Laboratory at the university and pioneer in social medicine.

17 Founder of Hygiene society.

18 father of modern criminology, professor of Forensic Medicine.

Agriculture Crisis (1880- 1894)

After a brief period of modest revival, issues occurred in the agriculture sector. This sector was highly bonded with the chemical and food processing industries, the urban elite's capital, and daily laborers.

At that time, Turin faced significant foreign competition in rice, grains, and pampas, as competitors offered lower prices that threatened the city's agricultural exports. To address this challenge, the association Lega Agraria was founded in 1885. After a two-year lobbying effort with the government, tariffs and import duties were imposed on these products. However, since Turin served as the principal transit center for Italian goods to France and England, the import duties on trade with France proved unsustainable. Efforts to reach a satisfactory agreement failed, ultimately leading to a commercial war with France in 1888.

As a consequence, France not only rejected all Piedmontese products, such as oil, wine, and silk, but also imposed a very high tariff on Italian goods alone, and ultimately recovered all the capital it had lent Piedmont for creating new industries.[20]

Banks Hegemony, Rise and Fall (1880- 1894)

As mentioned, the 1870s represented a decade of prosperity for banks and the financial sector. The establishment of Banca di Torino and Unione Banche Piemontese e Subalpina during this period was proof of this economic welfare. This era also marked success for well-developed institutions such as Banco Sconto e Sette, Banca Industria e Commercio, and Banca della Piccola Industria. However, the commercial war with France destabilized the situation. Land values declined, and wealthy investors, along with principal local banks, shifted capital from agriculture to a speculative boom in urban real estate in Rome and Turin, where land prices increased five to tenfold after 1885. When the construction boom collapsed and real estate prices plummeted during the winter of 1887-1888, Banco Sconto e Sette and Banca di Torino found themselves in difficult positions with unfinished projects and loans difficult to collect, leading to their collapse. Other banks, such as Credito Torinese, Banca Subalpina, Banca Popolare di Torino, and Banca di Torino also closed their doors for good . This was an end to almost three decades of preeminent position in Italy's banking center. as a consequence of economic depression and disruption of exports to France, the silk industry faced severe problems, many small factories and shops closed, and between 1890 and 1891, the the rate of bankruptcies was double the total number of bankruptcies that occurred between 1879 and 1886. Ultimately stocks were still falling until early 1891. The consequence was poverty for middle class, increase in vagrants and resurgence of crime against property and revival of mass immigration.[21]

19 Cardoza and Symcox, A History of Turin, 199–204

20 Cardoza and Symcox, A History of Turin, 201

21 Cardoza and Symcox, A History of Turin, 202

An overview on Industrilization

1881- 1900

After the economic crisis Many industries resisted for the following reasons. First, Many of the industries had already flourished in prosperous years, so their strong foundations helped them withstand the crisis. Additionally, the school of positivism had a profound impact on this matter. Second, there were different resources of capital for factories. Many of them were run by family capital and not banks, so the crisis did not affect them significantly. Third, the fall in land prices had facilitated the opening of factories and the establishment of the first units outside the traditional working-class neighborhoods. And caused expansion in industrial areas.

In the late 19 century, railway network continued to develop regionally and internationally which caused importance in Turin's railway workshops and better marketing for industries' production.

In 1883 new railway workshops opened near Porta Susa station employing about 2000 worker.

Among other types of industries in 1889, the Arms Factory with 879 workers, the Arsenal with 716, the Precision Laboratory with 706, and the Military Foundries with 454 were biggest factories in the city. [22]

22 Gabert, Turin, ville industrielle, 100.

The Formation and Evolution of Railway System in Piedmont

Until World War I, rail transport was a vital factor for factories, bringing raw materials, exporting semi-finished or finished products, and discharging waste products; it was also vital for power plants and commercial establishments, which loaded fuels onto train wagons. Since the function of the road was mostly for the passage of animals and people on foot or in carriages, trains could travel much faster in the growing period of factories. A significant advantage for factories was the presence of siding plants, which enabled direct loading and unloading adjacent to factory premises. This arrangement facilitated the rapid and efficient movement of large volumes of goods. [1]

According to Figure 15, Between 1852 and 1856, the Turin-Novara single line was completed. Afterward, between 1855 and 1864, the expansion of the railroads in the northern part of the city started with the use of Dora station as the terminal of a stretch of the railroad that reached Milan in a few years. It was located in the barriera di Lanzo, inside farmland and near the regional customs office. Then, construction of the Turin-Ceres line finished in 1869, with a subsidiary station at Porta Milano (former Ponte Mosca) in Borgata Vittoria. This line in 1880 connected to the Arsenale at Borgo Dora, which was a vital and productive point since 1840. In 1889, train stops were added in Corso Vercelli (formerly Strada Reale d'Italia) and on the left bank of the river for Officine del gas, Officine Moncenisio, and Officine Meccaniche Gilardini. From 1890 to 1915, the line also connected to the Ansaldi factories. [2] a

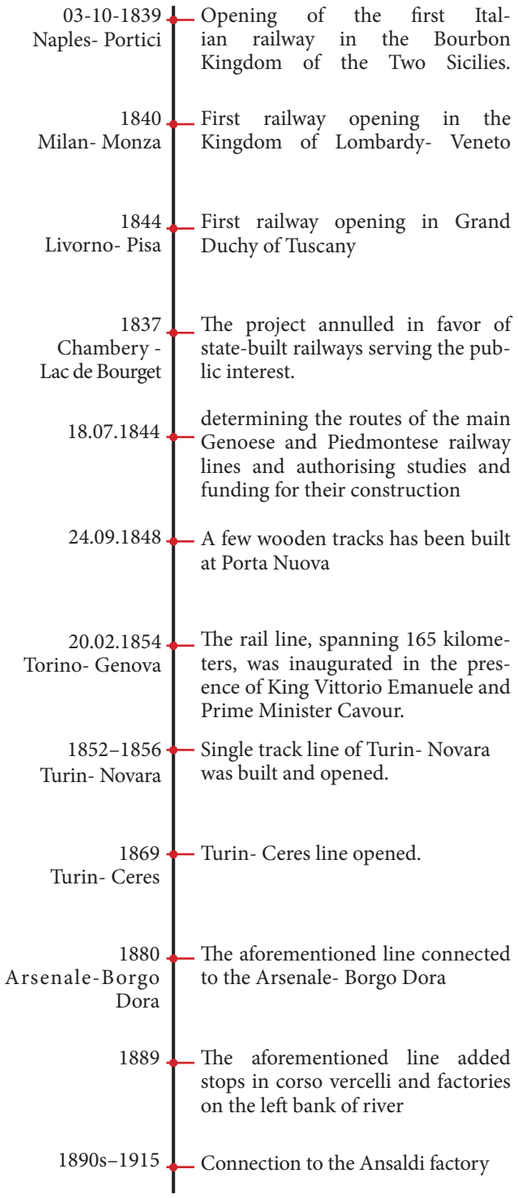


Figure 44: Timeline of railway history in Turin
Source: Ballatore, Storia delle ferrovie in Piemonte, 8-85 passim.

1 Paolo Arlandi, Binari per gli stabilimenti: il tempo dei raccordi industriali a Torino (Pinerolo: Alzani, 2016), 13.

2 Luigi Ballatore, Storia delle ferrovie in Piemonte: dalle origini alla vigilia della seconda guerra mondiale (Turin: Il Punto, 1996), 8-85 passim.

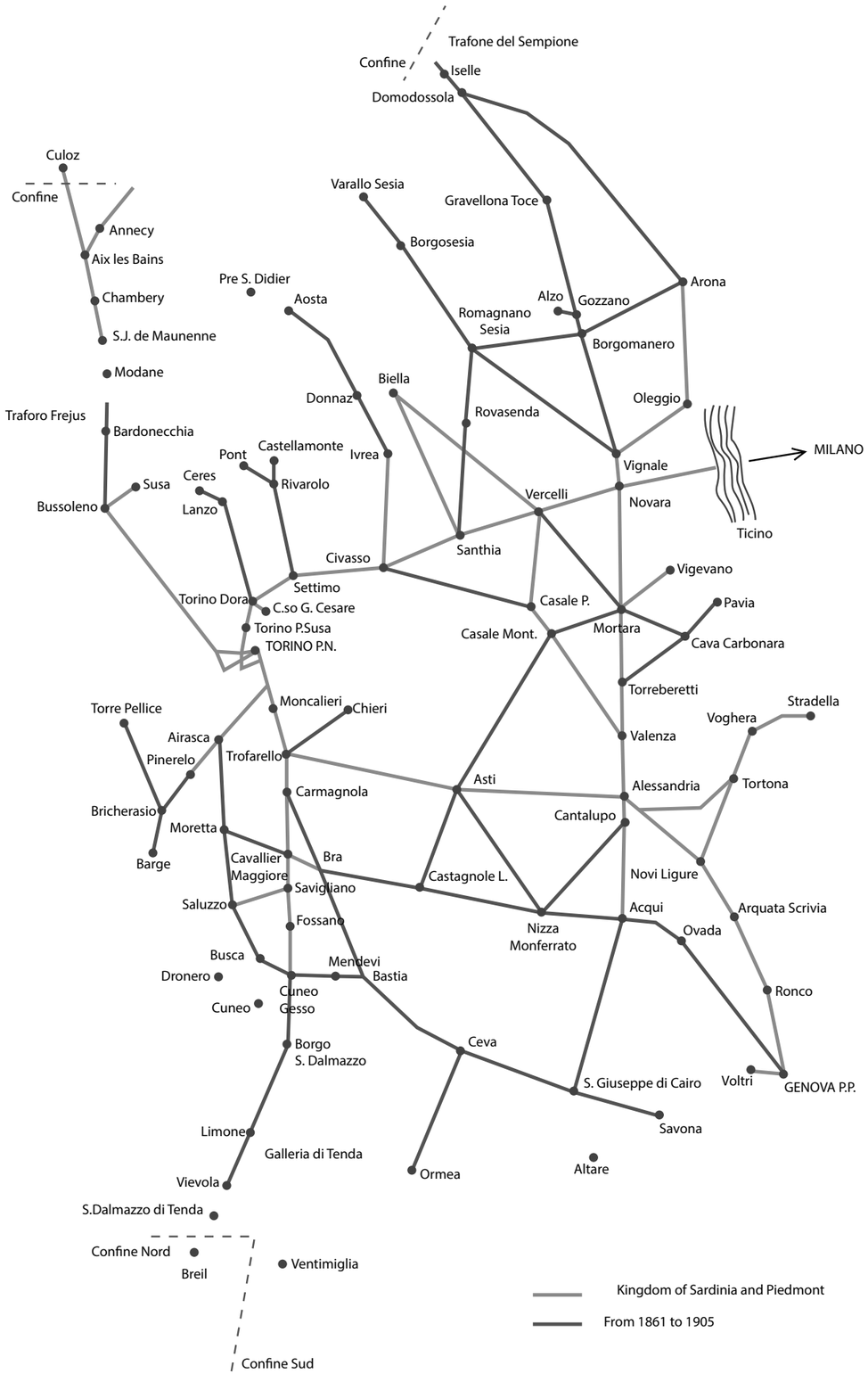


Figure 45: Railway network of Piedmont. Redrawn by the author based on Ballatore (1996).
Source: Ballatore, Storia delle ferrovie in Piemonte, 221.

Infographic of Industries

According to Table 1, the metallurgical industries almost tripled their workforce, as did the textile industry, and the leather industry doubled its staff. In comparison, food, clothing, and furniture had slower growth as a consequence of capital exchange and migration of the wealthy class. Unlike people's predictions, these industries didn't collapse; they survived due to rapid population growth and improved relations between Italy and the the rest of Europe. According to Table 2, during the years of prosperity and before the "Hard Years (1888-1893)", the number of employees in manufacturing industries increased from 47,875 in 1871 to 68,870 in 1881, from 22.51% to 27.24% of the city's population, and represented the greatest growth of all. The workforce employed in commerce rose by 0.47% , transportation by 0.20%; in contrast, service personnel decreased by 0.91 % due to the departure of capital. The army also lost its relevant importance and faced 031% decrease in the workforce-to-city population ratio with the lowest increase in the number of workers. The second rate of increment belongs to students and underscores the university's importance during the Positivism era. As industrialization expanded in the city, it drove out the agricultural lands to

Branches of Industry	**1861**	**1881**	**1898**	**Increase (In %)**
Food	6337	5880	7010	9,6
Wood and Furniture	5205	7520	8016	33
Chemicals	2616	1173		
Construction	369[1]	4306	7200	40,2
Leather and Hides	1357	2007	2990	54
Metal Working	5925	10168	14120	58
Textile	2938	5532	9840	70
Clothing	23919	26554	31730	24

Table 2: Employment statistics in Turin's industrial sectors (1861–1898). considering the fact that mechanization during that period was very slow, the numbers are under-reported .
1. This number is far from reality.
2. For 1881- 1889
Source: Gabert, Turin, ville industrielle, 101.

Categories	**1871**				**1881**				**Difference**	
	Men	Women	Total	% of Pop.	Men	Women	Total	% of Pop.	+	–
Manufacturing Industries	29165	18710	47875	22.51	41901	26969	68870	27.24	20995	
Agriculture	6858	3929	10787	5.07	5874	4364	10238	4.05		549
Commerce	8312	3521	11833	5.56	10027	5227	15254	6.03	3421	
Transportation	1883	242	2125	1.00	2720	337	3057	1.20	932	
Service Personnel	9474	11838	21313	10.02	9807	13231	23038	9.11	1726	
Army	6916		6916	3.25	7436		7436	2.94	520	
Students	11100	7004	18104	8.52	14295	12598	26893	10.64	8789	

Table 3: Comparative table of some occupational categories according to the 1871 and 1881 censuses
Source: Gabert, Turin, ville industrielle, 101.

the suburbs and caused a decline in the number of workers in this sector.

Remarkably, the number of professional industries decreased while the number of workers increased. This happened as a result of the disappearance of small-scale shops and the concentration of labor in large factories. Following the total expansion, artisanal categories such as bakers and tailors also increased, due to their population-oriented nature.

Figure 15 illustrates the major industries in and around Turin in 1889. The prosperity of the wool and cotton industries led to their expansion into surrounding cities. In contrast to the silk sector, the trade restrictions were beneficial for them. The jute industry also opened establishments in Grugliasco, Poirino (1880), and Giaveno (1889). The chemical industry has had a slight development since its establishment in 1862. Major

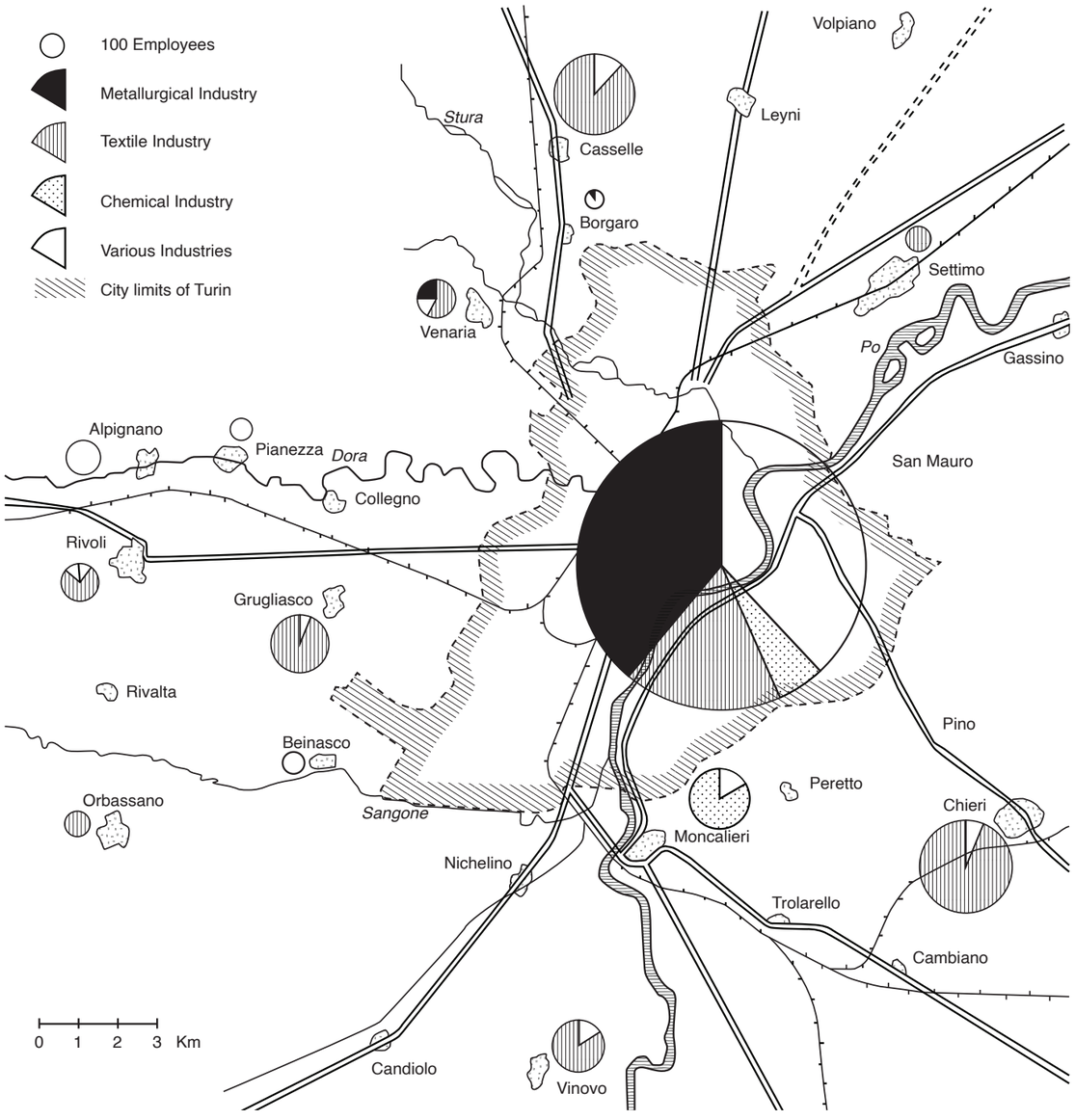


Figure 46: The major industrial sectors in the region of Turin in 1889, Redrawn by the author based on Gabert
Source: Gabert, Turin, ville industrielle, 105.

candle manufacturers faced significant recession due to advancements in city electrification. In contrast, the varnish industry benefited from the development of railway coachbuilding, and the Ratti & Paramatti company (founded in 1847) gained recognition for the quality of its varnishes. The metallurgical industry was notably advanced in terms of workforce size and factory scale. Among the leading companies in this sector was Diatto, which specialized in the manufacturing of metal wagons and carriages with exports even to the USA. In 1884, Michele Ansaldi established his first factory specializing in machine tools; this facility soon employed 300 workers. By 1895, Ansaldi had opened additional workshops and branches in Genoa and Milan, which he consolidated under the name “Emporio Mecanurgico Italiano” (Italian Mechanical Emporium). His enterprises also produced lithographic, typographic, and agricultural machinery, as well as artillery equipment. Ansaldi recruited a significant number of workers from government workshops. These establishments later formed the foundation of the FIAT Grandi Motori (Large Motors) division.

Figure 8 shows the spread of industries in terms of their kind and variety. Industries expanded significantly compared to 1862, when they were centralized in the northern part of the city, intensively south of the Dora River, and artisans were concentrated in the city center. Industries around the Dora River (metallurgy, textiles, tanneries, etc.) were growing due to the establishment of new branches and the transfer of existing ones, mostly in the chemical sector due to their pollution, from the center, which was driven by the hydraulic power source. At the time, Arsenal was the only major industry in the center and in the West, the railway workshops were present.

The situation around Porta Nuova and Valentino didn’t change much compared to 1862, but in contrast, in Barriera di Nizza, the expansion of the industries that contained mostly chemical and a low number of metallurgical and other variables is noticeable. Finally, in the southwest , beyond Palazzo di Armi, the industries were absent.[23]

23 Gabert, Turin, ville industrielle, 101-109

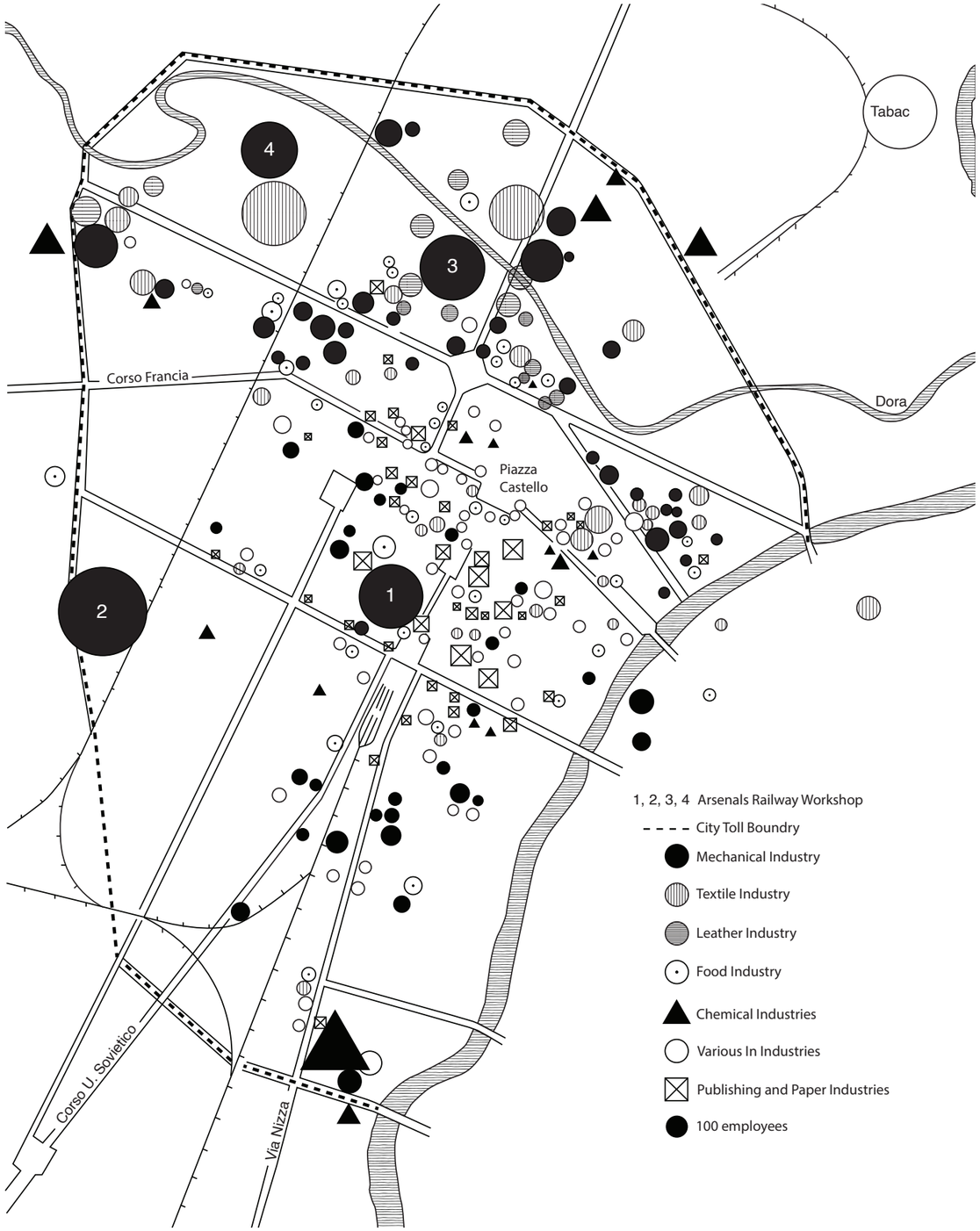


Figure 47: Industries of Turin in 1889, Redrawn by the author based on Gabert
Source: Gabert, Turin, ville industrielle, 109.

L'esposizione Italiana

The Italian Exhibition held in Turin in 1884 showcased various industries on a vast scale and attracted an unprecedented number of visitors. The most notable aspect of the exhibition was the electrical illumination of the entire exposition, carried out by the Electrotechnical Section under the presidency of Galileo Ferraris. A great result of this exhibition for Turin's Industry was the transmission of electricity over a distance of 40 km, from Lanzo to Turin, which happened for the first time as a result of Gaulard's work on Transformers. As mentioned before, Turin, as a city with great access to water sources, did not have sufficient access to coal, so generating thermal power was a challenge. After a while, in 1885, the evolution of hydroelectricity enabled the transmission of electricity from Tivoli to Rome over a distance of 26 km. This made the true Italian Industrial Revolution one step closer.

In 1889, two small plants were established in Cuneo and Susa. In 1891, the city of Genoa began receiving electricity from Gorzente, located 30 kilometers away. In 1890, the Florence-Fiesole tram line marked the first application of electricity for traction. By 1898, the Ministry recorded 2,264 establishments across Italy with a total installed capacity of 86,175 kW, and total consumption was estimated at 100,000,000 kilowatt-hours in 1899. From this period onward, improvements in transportation technology enabled hydroelectric power to definitively surpass Thermal power electricity generation.

In Turin, electricity modestly introduced in 1888 with a small thermal plant of 735 kWh. Later, in 1896, the Società Anonima Alta Italia was founded in Turin, providing the city with 4,000 kW of hydroelectric power.[1]

In 1889, the Italian exhibition (L'esposizione Italiana) was held for the second time and opened a pivotal era for turin's industry as the first Italian-made automobile built by Michele Lanzo was presented.

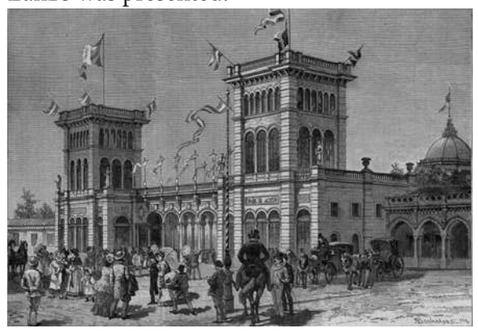


Figure 48: The Main Facade of Exhibition
Source: Source: Torino e l'Esposizione italiana del 1884: illustrated chronicle of the National-Industrial and Artistic Exhibition of 1884, No. 2-3, p.31

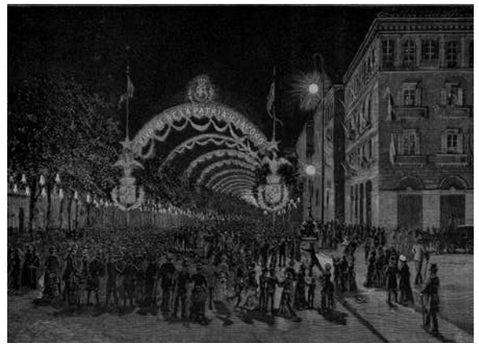


Figure 49: The illumination of Corso Vittorio Emanuele II, on the evening of April 27 1884
Source: Torino e l'Esposizione italiana del 1884: illustrated chronicle of the National-Industrial and Artistic Exhibition of 1884, No. 9, 177.

1 Gabert, Turin, ville industrielle, 116

Evolution of architectural style

Between 1867 and 1890, Turin's industrial architecture evolved. In the beginning, many artisans and factories had the same characteristics as residential buildings. Over time, an eclectic style took shape, combining neoromantic features, the hall prototype, and the Liberty style.

OGR

Officine Grandi Riparazioni Ferroviarie(Great Railway Repair Workshops) is one of the most

important buildings of this period. Its construction began in 1884, and it was the result of the combination of two workshops located near Porta Susa and Porta Nuova. The need for production and delivery of materials, city growth, overpopulation of the center, growth in production, and a lack of space led to the transfer and combination of two workshops into one structure at the current Via Boggio. The eclectic style of this building included neo-Romantic features of Rundbogenstil with the Gable facades characterised by details in the walls and polifora windows, bricks alternating with masonry in horizontal strips, opening with low arches, the frank language of structure that affected the exceptional dimensions (130.52 by 139.8 meters) of the hall resulted in a grand productive space, sawtooth roof with partially glazed windows provided indirect and constant lighting.



Figure 50: Officine Grandi Riparazioni, Torino, 1925
Source: Alberto Cordara Collection via Wikimedia Commons.



Figure 51: Interior view of the hall
Source: Società Consortile OGR-CRT via MuseoTorino.

Società Anonima Elettricità Alta Italia

This building , which originated in the same context as the railroad repair yards, built in 1897, was a power plant located on the current Via Bologna, designed by Turin engineer Ermenegildo Perini with an eclecticism that varies from the large neo-Gothic windows on Via Bologna to the classicism of its side walls, and supplied power for the first public lighting grid in Turin.



Figure 52: Central building Alta Italia, View from Via Bologna
Source: Siemens Historical Institute, c.1901 via Archivio Storico Lavazza.

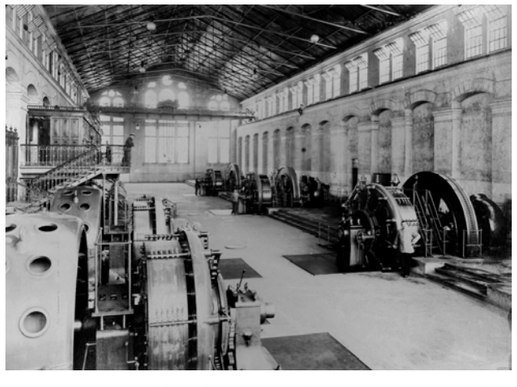


Figure 53: Central building Alta Italia, View from great hall
Source: Siemens Historical Institute, c.1901 via Archivio Storico Lavazza.

Officine Meccaniche Ansaldi

This building, on Via Cuneo in Borgo Aurora (built 1886-1899), designed by Pietro Fenoglio, was also a key point in the evolution of industrial style. This massive factory caused a transformation in types of industries in that region, from textile and hide industries to a great metal industry.

The 25,000 m² site encompassed two blocks along Via Cuneo to the north and south and included two principal buildings. The first was a foundry situated along the eastern border on current Via Generale Luigi Damiano, featuring a neo-romantic façade composed of twelve identical bays, each 200 meters long and divided into two floors. Each bay was topped with a gabled roof characterized by sawtooth profiles oriented perpendicular to the street. Both the first and second floors contained three-mullioned windows, complemented by masonry in the tympana; windows, grouped in threes, extended the full height of both floors. The façade exhibited a clear hierarchy: the lower section, with its two-story windows, conveyed a sense of lightness and was designed with rhythmic and modular repetition, evoking a neo-romantic sense of noble variety. In contrast, the filled spaces of the tympana and roof capping anticipated the rigidity and repetition characteristic of mechanical production. The serial nature of the twelve bays is amplified by the essentiality of the design of the broken roof-capping line that is counterpointed by the oculi of the tympana.

Second, an immense T-shaped building parallel to the foundry. This building had three bays and two floors covered with a saw-tooth roof, the first in Italy.[24] The iconic image of the Ansaldi complex is the image that we can still see today of the front façade of the foundry facing the eastern border of the lot on the sloping Via Generale Luigi Damiano.[25]

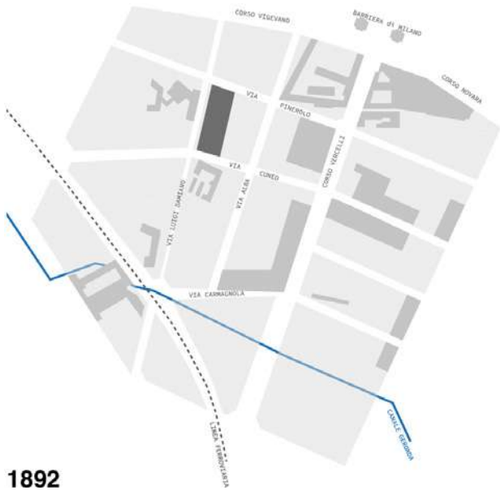


Figure 54: Master Plan of Officine Meccaniche Ansaldi in 1892
Source: Costanza Pacini, Le Officine Grandi Motori: Progetto di riqualificatione dell'ex area industriale (Turin: Politecnico di Torino, 2023), 12.



Figure 55: The facade on Via Generale Luigi Damiano
Source: Politecnico di Torino 1984, 1:427.

24 The development of this complex began in 1905, following an agreement between Michele Ansaldi and Giovanni Agnelli, which led to the establishment of Fiat-Ansaldi. In 1906, after Michele Ansaldi's resignation, he sold his share to Fiat. In 1907, in collaboration with the San Giorgio company, the name changed to Fiat-SanGiorgo, producing submarines. In 1918, the plant was sold to the Ansaldo Group and became Ansaldo San Giorgio. Fiat repurchased the plant in 1923, marking the official establishment of Fiat Grandi Motori. In 1972, the plant was officially relocated to Trieste. Throughout these years, the building underwent significant expansions and renovations in various distinct architectural styles, which will be discussed in the following chapter.

25 Comba and D'Attorre, Torino 1914-1976, 53-54

Pietro Fenoglio (1865- 1927)

Pietro Fenoglio was born in a family of builders, studied in the Royal Engineering of Turin, graduated in 1889, and immediately began to work in the architectural field afterward in his established office.

Many of the planners who worked in his office later became involved in the design of the factories of Turin. In the early 1900s, he was involved in the design of many plants from scratch or in their expansion. He also forged strong ties with Antonio Parcheddu, who was responsible for the development of reinforced concrete in Italy.

In 1902, he moved his studio and home near Barriera di Lanzo, at the city border of Borgo San Donato and Martinetto (in the current Via Pricipi D'acaja). he designed this building with many characteristics of Liberty style inspired by Belgian and French Art Nouveau. The two sides of the facade consist of bow-windows with large colored glass panels divided by the wavy cut of an elegant sinuous line and surmounted by a niche that seems to find a direct reference to the shelters designed for the Paris metro by Hector Guimard (1867-1942). The building was also consecrated that year by the International Exhibition of Modern Decorative Art in 1905.

Other than Officine Meccaniche Ansaldi, one of the notable examples of his work is the expansion of Manifattura Rossi in 1905 , where he designed a manufacturing pavilion with a sawtooth roof and a palazzina. In the field of industrial architecture, the Fiorio Tannery (1900), the Metzger Brewery (1903), the Gilardini Factory (1904), the Itala Factory (1905), the Concerie Italiane Riunite (1906), the Ballada Foundry and Enameling Factory (1906), and the Venchi Unica Factory (1907) are just some of the numerous projects he completed in the city.

Having abandoned his design work, in 1912, he joined the Board of Directors of the Banca Commerciale Italiana and was one of the promoters of the Società Idroelettrica Piemonte. His financial-industrial activities occupied him until his death in Corio Canavese on August 22, 1927.[1]



Figure 56: Pietro Fenoglio – La Fleur
Source: Wikimedia Commons.



Figure 57: Details on the Facade of the building Casa Fenoglio – La Fleur
Source: Archivio Torino Sparita.

1 This is integrated data from Comba and D'Attorre, Torino 1914-1976, 53–54, and the digital archives of MuseoTorino accessed April 11, 2026 https://www.museotorino.it/view/s/8f33369480474d1ca5703b39ea8880c4



Figure 58: Casa Fenoglio – La Fleur
Source: Archivio Torino Sparita.



Figure 59: Villa Scott
Source: CulturaItalia Online Repository.

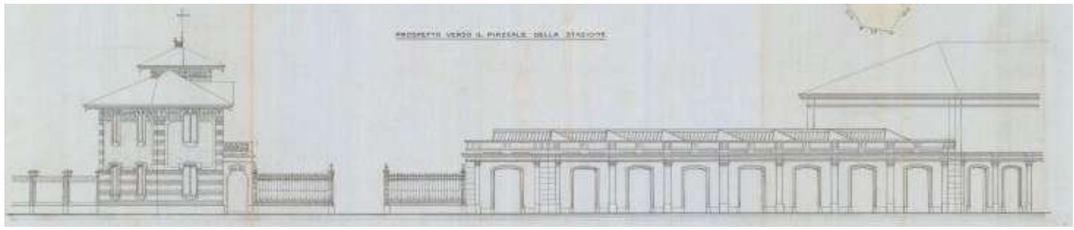


Figure 60: Construction project for the expansion of building at Via Cecchi 63 which transfered to Rossi Manufaturing, 1905
Source: MuseoTorino online platform.

The Birth of Automobile Industry

Technicians, mechanics, and engineers played a major role in the birth of the automobile industry because of their inventions. Initially, Virginio Bordino worked on Cugnot's invention and adopted the steam engine for road driving in 1854. Later, Professor Bernardi In Verona who had been working on the improvement of internal combustion engines, installed one of his four-stroke gasoline engines on a tricycle in 1882, and later on a two-wheeled car, with which he covered more than 60,000 km "without major incident". Also, Giovanni battista Ceirano, a mechanic who came from cuneo to turin and built bicycles under the name "Welleyes.", in collaboration with engineer Faccioli built first Welleyes automobile in 1898. Other than that, Michele Lanza displayed his first car in the Italian exhibition in 1898. Later in 1896, in the section of gas and gasoline engine, the Carrera company with 130 workers started engine manufacturing.

Other than the engine, A part of the automobile that Turin successfully produced was the coach, because of its long experience in coach building from the 18th century and having important companies such as Diatto, Sala, Locati, etc. also, in railway workshops of Turin, foundries and arsenale a part was dedicated to the production of wagons, wheels, and axles, where, with the aid of engineers, improvements were gained.

In the late 1890s, an automobile was a luxury item serving as a means of entertainment for aristocrats. Pioneers like Giovanni Battista Ceirano, Michele Lanza, Vincenzo Lancia, etc., were developing their ideas and building the early forms of automobiles in their workshops. Due to the

upper class's interest in this sport, the first automobile race took place in 1895 on the Turin-Asti-Turin route, where a Daimler won, and the second on the Turin-Alessandria-Turin route, which Luigi Storero won on a De Dion tricycle.

It was in this context that a group of aristocrats and nobles met in chic cafes and talked about the future of the automobile. Some believed the automobile should belong particularly to the rich, while others saw its potential for industrialization.

Nine of these aristocrats and stakeholders established a company in collaboration with many technicians, engineers, mechanics, and workers to produce automobiles on an industrial scale. On July 11, 1899, at Palazzo Bricherasio, they signed the Act of Incorporation and established "Società Italiana per la Costruzione ed il Commercio delle Automobili" (Italian Society for the Construction and Trade of Automobiles), with a capital of 800,000 lire in 4,000 shares. Agnelli was secretary of the first board of directors, A. Faccioli the first technical director, and Enrico Marchesi the commercial director. This was the starting point of F.I.AT.[26]



Figure 61: The Bordino Steam Carriage-1854
Source: MAUTO – Museo Nazionale dell'Automobile di Torino collection.



Figure 62: "The Founders of Fiat" by Lorenzo Delleani Work commissioned by Fiat from the painter Lorenzo Delleani, depicting the founding members of Fiat gathered on July 11, 1899, for the founding of the Fabbrica Italiana Automobili Torino. From left: Luigi Damevino (standing), Roberto Biscaretti di Ruffia, Carlo Racca (seated), Cesare Goria Gatti (standing), Emanuele Cacherano di Bricherasio, Michele Ceriana, Giovanni Agnelli, Lodovico Scarfiotti, and Alfonso Ferrero di Ventimiglia (seated).
Source: Photo by the author

26 Gabert, Turin, ville industrielle, 118-120.

CONCLUSION

Unlike many industrial cities, Turin was neither a harbor city nor situated on a plain conducive to industrial development. The city possesses a long history, beginning with the Romans, and served as a royal capital both before and after Italian unification. Nevertheless, Turin successfully transformed its identity into the industrial capital of Italy, surpassing Genoa and Milan. Given its location, surrounded by the Alps and hills to the north and east, lacking marine access and natural energy resources such as coal, oil, or gas, this transformation is particularly remarkable.

The answer to how this occurred lies in multiple aspects of the city's history, beginning with its remarkable capacity for urban adaptability. Over the centuries, Turin evolved from a closed fortress-city into an open commercial hub. As the city underwent dramatic expansion in the 19th century, the old defensive walls were eliminated. In their place, the municipality constructed the cinta daziaria (customs belt) to collect tariffs on goods and transit. This boundary unintentionally spurred the formation of the barriere—new peripheral neighborhoods where factories and a growing immigrant workforce concentrated just outside the toll limits, laying the urban groundwork for mass industrialization.

Furthermore, industrialization ultimately saved Turin from economic ruin and from becoming a mere "museum city." Following the traumatic transfer of the national capital to Florence in 1864, the city was stripped of its bureaucratic identity, leaving thousands unemployed. To reinvent the ex-capital as a city that "works and thinks," a powerful synergy emerged between Turin's aristocratic elite, wealthy investors, and the scientific community of its university. Faced with a severe lack of coal, the city turned to innovation, prominently showcased during the Italian Exhibitions of the late 19th century. Brilliant minds like the physicist Galileo Ferraris spearheaded the development of hydroelectric power, harnessing Alpine rivers to provide cheap, abundant electricity for the city's factories. Concurrently, state-supported infrastructural expansion drastically improved the railway network, creating direct sidings to factories that solved the region's transportation challenges.

Initially, Turin's post-capital economy relied on luxury and food-processing trades rooted in its royal past and agricultural proficiency, such as silk, vermouth, and chocolate. However, the agricultural depression of the 1880s and a devastating tariff war with France severely crippled these sectors. In their place, the metallurgical and mechanical industries rose to prominence. Benefiting from a proud local tradition of carriage and bicycle manufacturing, these growing mechanical sectors merged with the venture capital of Turin's aristocratic and financial elites. Ultimately, this rich convergence of technical expertise, infrastructural modernization, and mobilized capital built the definitive foundation for the birth of Turin's formidable automobile industry.

Ford Motor Company

Piquette, Highland Park and Rouge



The subsequent chapter examines the trajectory of the Ford Motor Company throughout the twentieth century. The narrative commences at the Mack Avenue plant, the company's inaugural site, before progressing to the Piquette Avenue plant, where the Model T was born. Ultimately, the focus shifts to the Highland Park plant, which serves as the primary subject for comparative analysis in the third section alongside the Lingotto plant in Torino.

The examination of Highland Park begins with a historical retrospective, tracing the facility's evolution from its inception through the First World War, the interwar period, and the Second World War. The narrative then explores the transition of assembly operations to the River Rouge complex, the subsequent abandonment of the original structures, and the site's current state. Following this historical overview, the document delves into a detailed analysis of the building across three fundamental pillars: Urbanization, Architecture, and Structure.

Subsequently, the study briefly touches upon the River Rouge complex to complete the industrial path forged by FMC in the 20th century. This provides the necessary foundation for the third section, which is dedicated to a comparative study of the two preeminent industrial leaders, Ford and FIAT.

Detroit and the beginning of Car Manufacturing in 20 century.

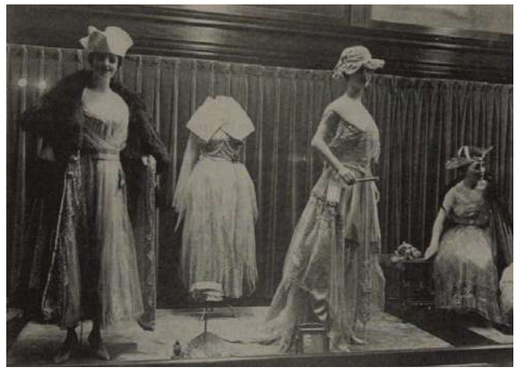


Figure 63: The twilight of Gilded Age elegance. Mannequins model opulent gowns and elaborate millinery in a historic 1916 display window at J. L. Hudson Co.
Source: Henrickson, Detroit Perspectives, 211.

Detroit was faced with a significant increase in the population at the beginning of the twentieth century. From the numerical point of view, the city population rose from 285,000 in 1900 to 465,000 in 1910.[1] This growth occurred in the context of industrialization as a foundation of economic and social developments.

At the beginning of the twentieth century, Detroit's population was made up of a mix of Technicians, capitalists, inventors, and laborers. Detroit's Heavy key industry was listed as iron, brass, and copper. Next to those, Tobacco, Stove, Rail cars, and shipbuilding were the main manufacturing in the city.[2]

These industry firms were developed due to the Hard and soft infrastructure. The capitalist which was 44 Detroit millionaires out of 71 in nationwide[3], next to the technicians and inventors, were made up due to the pre-industrial era in Detroit, creating the Industrial Elite society.

Besides this elite level, labor also existed and was raised by the huge Immigration occurred at the beginning of the twentieth century. This wave of immigration raised the number of foreign-born people, grew the African American society, and developed the ethnic neighborhoods which declined and disappeared with Modern industrial Developments.

Alongside soft infrastructure, The Hard one was also involved. The development in the railway system, in parallel with the waterways and ship transportation, opened access to other cities in the nation, mostly New York and Chicago.[4] This access allowed the factory owners and Industrial leaders to export their products to other cities fast and at reasonable prices.



Figure 64: Downtown traffic on Woodward Avenue, 1907.
Source: Poremba, Detroit: A Motor City History, 98.

This parameter, next to the Technological Development in the Electricity and Telephone, was the main effective event in shaping the Detroit Modern industry with the leadership of the car manufacturing.

Ransom E.Olds was a man who rolled the first

1 Glazer, Detroit: Urban Development, 79

2 Poremba, Detroit: A Motor City History, 93

3 Poremba, Detroit: A Motor City History, 96

4 Poremba, Detroit: A Motor City History, 60-80

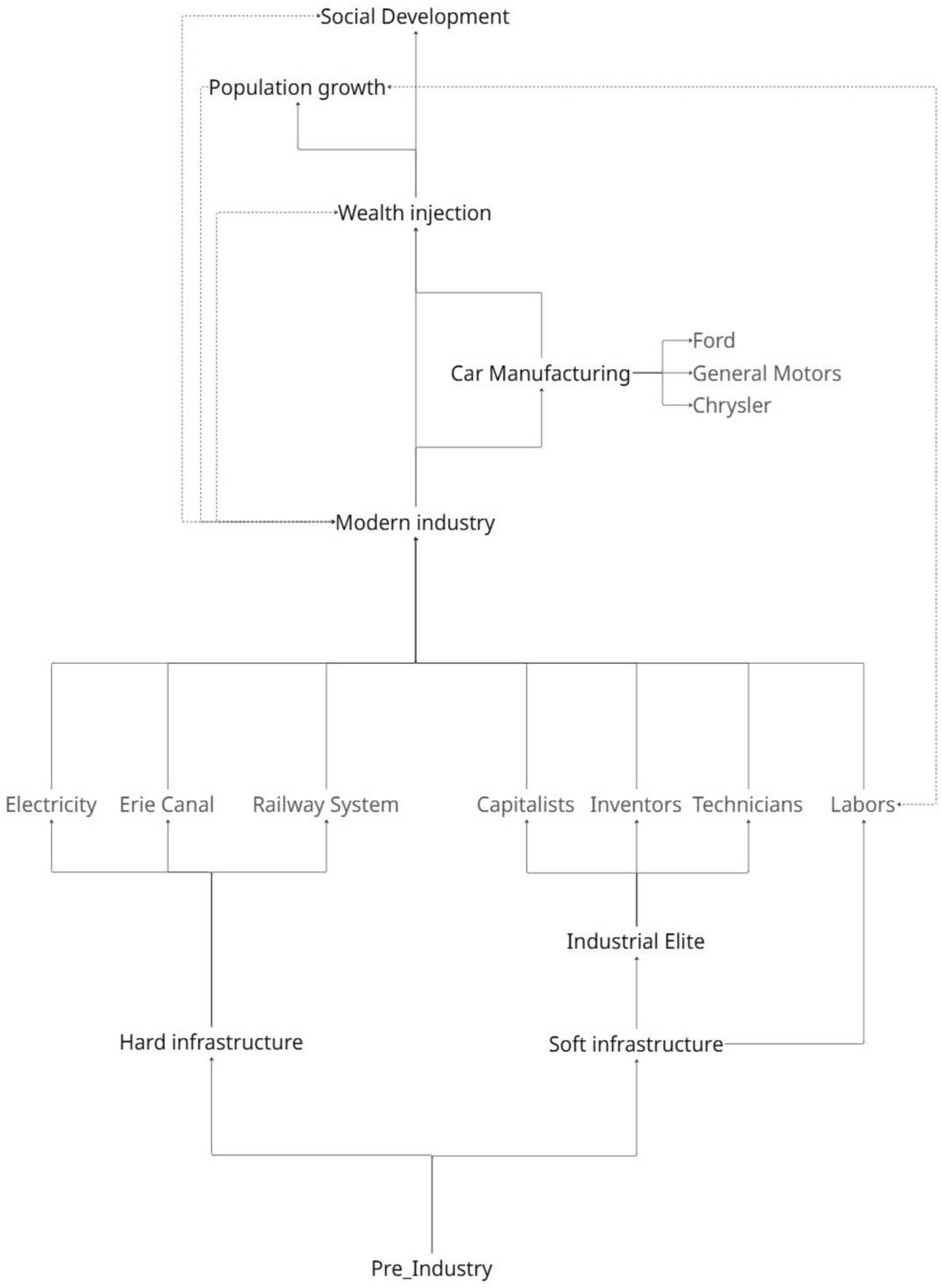


Figure 65: How the Foundation of industrialization formed in Detroit.
Source: Author

American car. In 1901, soon after car manufacturing, one after another started to shape Detroit's face. In the early 20th century, till 1905, there were 7 Major automobile companies active in Detroit: Pierce-Arrow, Packard, Max Well Briscoe, and, most notably, Ford Motor Company was among the pioneers.

In the beginning, facing cars as a modern product led them to build it not only for Michigan but also for different contexts all over the nation. This development race, next to the ability of transportation and sending the product to different destinations, created a huge competition between the car manufacturing companies.

The first models were produced very slowly and expensively This made the car a luxury item only available to people from the upper economic class, whose purpose in acquiring it was not only speed in transportation, but also secondary purposes, such as car racing or sightseeing around the city, were pursued.

Subsequently, intense competition among manufacturing firms shifted the market focus from the affluent to lower-income demographics as companies pursued greater capital. While this transition initially relied on lowering manufacturing expenses, the later introduction of Fordism and mass production techniques ultimately made these products accessible to the working class.

Ford Before Fordism

Henry Ford was born as the eldest of six children on July 30, 1863, in Dearborn Township, Wayne County, Michigan . He left his hometown at the age 16 and, with some years of experience in his own shop in Dearborn as a mechanical advisor to Detroit, started a journey that created one of the most outstanding personalities in the twentieth century. [5]

In Detroit, he started to work in different engine companies. Flower Brother's Machine Shop, Dry Dock Engine Company, and Westinghouse "Road Expert". After a short turn back to Dearborn and marrying Clara J. Bryant, Ford began his experiment in the Edison Illuminating Company as an engineer at the age of thirty. In parallel, he developed his private workshop in 58 Bagley Street[6], in the yard of his house, where he spent most of the nights for seven years to develop his first petrol-driven car.

Finally, in 1893, the first gasoline-powered car was placed on the road. Building on this success, Ford began working on his second prototype, which was markedly improved and tested in 1898. This succession led him to officially leave his position at the Edison Company and establish Detroit Automobile Company with capital of $50,000 for the commercial manufacturing of his original prototype.[7]

For two to three years. Ford was involved as a manager and main stakeholder in the Detroit Automobile Company.[8] During this period, he was completely unsatisfied and disappointed with the company's approach and its "slow, tedious cut and fit method". He believed that car manufacturing can reduce the price through standardization and aim at the middle-class customers instead of producing high-priced automobiles for luxury buyers. In other words, Ford believed an Automobile

5 John J. Horgan, "Henry Ford: Captain of Industry," Studies: An Irish Quarterly Review 10, no. 39 (September 1921): 438.

6 Horgan, "Henry Ford: Captain of Industry," 440.

7 Horgan, "Henry Ford: Captain of Industry," 438-440

8 Glazer, Detroit: Urban Development, 81.

is not a luxury product, but instead it could be simple, cheap, and accessible for people who are even working in the company that produces it.[9]

"You gentlemen," said Mr. Ford, " have been ac customed to the slow, tedious cut and fit method that we have been using in our manufacture of automobiles. This method will not do, the costly automobile will not do_ The success of this company depends upon our producing a car that is cheap enough for the salaried man to buy; light enough in weight so that the cost of the upkeep, tires, etc., would not be prohibitive; so simple in construction that the average man could keep it in repair, so perfect and uniform in its components that these parts would be on sale in all hardware stores and could be purchased at as low a comparative price as the parts for the lady's sewing machine. We do not want to cater to the rich man, we should drop the large car (they had marketed two of the larger type, a four cylinder Model B in 1905 and a six-cylinder, 50 horse power in 1906 or 1907), we will perfect Model T, design special machinery to produce it at a lower price than any other car on the market and stick to the one model. It is my whole ambition to build a car that anyone can afford to own, and to build more of them than any other factory in the world."[10]

This disagreement led him to sever his connections with Detroit Automobile Company in 1901. He purchased a new machine shop at Park Place in Detroit and tried to build his own car, once more entirely without assistance. A few months later, the Detroit Automobile Company ultimately collapsed, and from its remains, Cadillac Automobile Company under the direction of Henry Leland was shaped.

Ford's lonely work in his machine shop allowed him to customize prototypes due to his vision. This activity created a vital stepping stone that led to the founding of the Ford Motor Company in 1903. The company that changed the production way and influenced people's lives all around the world.



Figure 66: Portrait of Henry Ford, 1886
Source: McMichael, Alfred G. Portrait of Henry Ford. Photographic print, November 20, 1886. Photographic Vertical File Series. Object ID: 84.1.1660.892. Benson Ford Research Center.

"I will build a car for the great multitudes. It will be large enough for the family, but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one-and enjoy with his family the blessing of hours of pleasure in God's great open spaces."[11]

Ford, Mack Avenue Plant, Piquette Ave Plant, and the beginning of Fordism, 1903-1910

Mack Avenue Plant

In 1903, Ford Motor Company was founded by Henry Ford and other stakeholders.[12] The company developed itself in order to create Standard Automobile at a reasonable price and compete with other competitors.

At the beginning of the company, they started their work in April by renting an old wagon manufacturing garage (50'*250') on Mack Avenue for the Price of 75$ per month. This building, which is lately known as a Mack Plant, hosted the company for nearly 18 months till october 1904 and was the house of two pioneer models of the company, Model A and AC.



Figure 67: Ford Motor Company's first manufacturing plant on Mack Avenue, rented in 1903. This archival photograph from Dearborn, Michigan, captures the humble beginnings of the automotive giant during its foundational years.
Source: Lindy Biggs, The Rational Factory: Architecture, Technology, and Work in America's Age of Mass Production, 90.

Although the FMC[13] almost adjusted the building with their essential needs due to the high demands of Model A, after a short time, they were still suffering from space constraints. They added another story on top of the building for the paint shop and additional storage almost immediately[14], but this modification did not solve the problem. Finally, in 1904, the board of the company decided to replace the building with a new factory in Piquette Ave in center of Detroit which named Piquette Plant.

Mack Avenue Plant burned down in August of 1941, and nowadays, no remains are left from this Iconic building as the starting point of the FMC. Henry Ford built a model of this building in the scale of 1/40 in Greenfield Village, and with some significant differences, he did his best to preserve the memory.



Figure 68: Ford Motor Company Employees outside Mack Avenue Plant, Detroit, Michigan, 1903-1904
Source: Lindy Biggs, The Rational Factory: Architecture, Technology, and Work in America's Age of Mass Production, 90.

9 U.S. Department of the Interior, National Park Service, "Ford Piquette Avenue Plant," National Historic Landmark Nomination, NPS Form 10-900 (2005), 10.

10 E. C. Shumard, "Foresight of Henry Ford," Scientific American 113, no. 26 (1915): 557.

11 National Park Service, "Ford Piquette Avenue Plant," 10.

12 National Park Service, "Ford Piquette Avenue Plant," 11.

13 Ford Motor Company

14 National Park Service, "Ford Piquette Avenue Plant," 12.



Figure 69: Construction Progress, Ford Motor Company Mack Avenue Plant Replica in Greenfield Village, December 1944
Source: From the Collections of Edison Institute Photographs, Object ID:EI.1929.P.B.20363, Benson Ford Research Center.



Figure 70: Mack Avenue Plant Model.
Source: Benson Ford Research Center.

Ford Car Model	Year Built	Year of Out Production	Price	Place of Production	Note
Model A (Original)	1903	1904 (September)	$850 (Runabout), $950 (Tonneau)	Mack Avenue Plant	The first commercial model produced by the Ford Motor Company; running gear was supplied by Dodge Brothers.
Model B	1904 (Fall)	1906 (April)	$2,000	Piquette Avenue Plant	A large four-cylinder touring car assembled on the third floor of the Piquette plant.
Model C	1904 (Fall)	1905 (December)	$800	Piquette Avenue Plant	A two-cylinder light runabout introduced to replace the original Model A.
Model F	1905 (February)	1906 (April)	$1,000	Piquette Avenue Plant	A two-cylinder mid-priced touring car.
Model K	1906	~1908	$2,800	Piquette Avenue Plant, Bellevue Avenue Plant	An expensive model favored by early stockholder Alexander Malcomson; running gear was made by Dodge Brothers.
Model N	1906 (July)	1908 (June)	$600	Piquette Avenue Plant, Bellevue Avenue Plant	A highly successful low-priced runabout that made Ford the leading US automaker; used vanadium steel on a limited basis.
Model R	1907 (April)	~1908	$750	Piquette Avenue Plant	A slightly more refined variant of the Model N.
Model S	1907 (July)	~1908	$700 (Runabout), $750 (Roadster)	Piquette Avenue Plant	Another refined variant of the Model N; the Roadster version was introduced in April 1908.
Model T	1908 (October)	1927 (May)	Initially $850, dropped as low as $260 by 1923	Piquette Avenue Plant, Highland Park Plant, Branch Assembly Plants	The “Universal Car” that put America on wheels; 15 million were sold, serving as the catalyst for the mass-production moving assembly line.
Model A (New)	1927 (November)	Not specified in sources	Not specified in sources	River Rouge Complex	A completely new design to replace the Model T; featured safety glass, a three-speed transmission, and hydraulic shock absorbers.

Table 4: Early Automobile Models Produced by the Ford Motor Company (1903–1923)
Source: U.S. Department of the Interior, National Park Service, “Ford Piquette Avenue Plant,” National Historic Landmark Nomination, NPS Form 10-900 (2005), 10.

Piquette Ave Plant

The Piquette Ave Plant is located in Piquette Ave, Beaubien, Michigan. On January 26. 1904 Board of Directors authorized the company treasurer to take an option of 3.11 acres, an entire city block boundary with Beaubien Street on the east, Brush St. on the West, Piquette Avenue on the south, and Michigan Central Railway line on the North. The land is located about three miles north of the Detroit River in an undeveloped area of the city, but with amazing accessibility to the railway system.

FMC bought the land for $1,000 and started the construction of a new building with a maximum limitation of $76,500. Henry Ford and John Dodge were responsible for the board's confirmation of the architectural plan prepared by the Field, Hitchman & Smith construction company. The Factory consisted of a three-story brick building 56 feet wide and 388 feet long, with a brick powerhouse located on the north face corner of the factory building, with dimensions of 36'*57'. The first floor contained an area for testing cars, a machine shop, and a shipping department. On the second floor, a magneto assembly, an additional machine shop, and a storage area were located, and the third floor contains drafting rooms, body trimming, painting, and varnish operations, with most of the space devoted to final assembly and storage.

The Ford Motor Company was based at the Ford Piquette Plant from 1904 until 1910, at which point operations were consolidated and moved to the new Highland Park "Crystal Palace." Throughout this period, the site saw the construction of numerous additional structures and the development of key innovations that paved the way for the moving assembly line and the era of mass production.



Figure 71: Ford Cars outside the Piquette Avenue Plant, Detroit, Michigan, circa 1906
Source: Photographic Vertical File Series. Object ID: 84.1.1660.P.O.1937. Benson Ford Research Center.

Building Name	Operation	Dimensions (ft)	Year Built	Demolition Date	Note
Main Factory Building	Auto assembly (Models B, C, F, K, N, R, S, T), machining, and administration.	56' x 388'	1904	Not demolished	A 3-story brick building measuring 56 by 388 feet, known as the birthplace of the Model T.
Powerhouse	Generated electricity using fire tube boilers, steam engines, and dynamos.	36' x 57'	1904	~1936–1937	A 36 by 57-foot brick building located near the northwestw cwworner of the main factory.
Engine-Testing Building & Paint Shop	Testing engines and painting.	Not Specified	1906	~1936–1937	The Ford board of directors authorized $14,000 for its construction.
Heat Treatment Plant	Treating parts made from vanadium steel.	50' x 120'	1907	Between 1908 and 1921	A 1-story metal building (50 by 120 feet) divided into a "Grinding Room" and "Furnace Room".
Chassis Room	Likely received/supplied bodies to the completed chassis.	~75' x 175'	~1908 or earlier	Between 1908 and 1921	An iron or steel-framed building measuring roughly 75 by 175 feet fronting Piquette Avenue.
Warehouse & Unloading Sheds	Storage and unloading materials from railroad spurs.	~100' x 150'	~1908 or earlier	~1936–1937	A roughly 100 by 150-foot brick building at the northwest corner of the property.
Test House	Specific testing operations.	~35' x 65'	~1908 or earlier	~1936–1937	A 35 by 65-foot brick building adjoining the powerhouse.
Snagging Room	Removing rough edges from castings or forgings.	30' x 90'	~1908 or earlier	~1936–1937	A 30 by 90-foot brick building located just west of the main factory.
Minor Outbuildings	Miscellaneous support (Soldering Room, Oil House, Laboratory, Wash Room).	Small	~1908 or earlier	~1936–1937	Small structures placed amidst the other outbuildings in the courtyard.
Studebaker Detroit Service Building	Automobile assembly and service for the Studebaker Corporation.	Not Specified	1920	Not demolished	A 4-story reinforced concrete building added by Studebaker, connected to the original Ford plant via a bridge.

Table 5: Building List, Ford Motor Company, Piquette Plant.
Source:U.S. Department of the Interior, National Park Service, "Ford Piquette Avenue Plant," National Historic Landmark Nomination, NPS Form 10-900 (2005), 2-23



Figure 72: Clara Bryant Ford and Myrle Clarkson Driving Ford Model N at the Piquette Avenue Plant, Detroit, Michigan, 1906
Source: Clara Bryant Ford and Myrle Clarkson Driving Ford Model N at the Piquette Avenue Plant, Detroit, Michigan. Photographic print, 1906. Photographic Vertical File Series. Object ID: 84.1.1660.1375. Benson Ford Research Center.

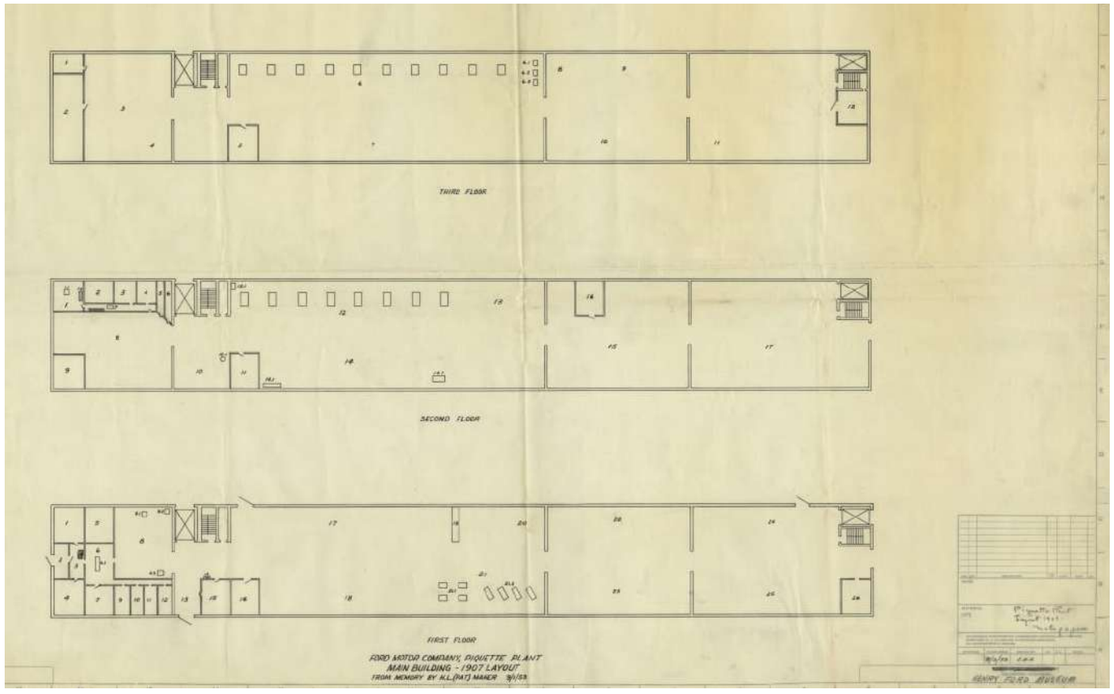


Figure 73: Floor Plan, Ford Motor Company Piquette Avenue Plant Main Building, 1907.
Source: Maher, H. L. Ford Piquette Avenue Plant Layout (1907). Technical drawing, September 3, 1953. Fair Lane Papers Subgroup. Object ID: 64.167.1.552. Benson Ford Research Center.

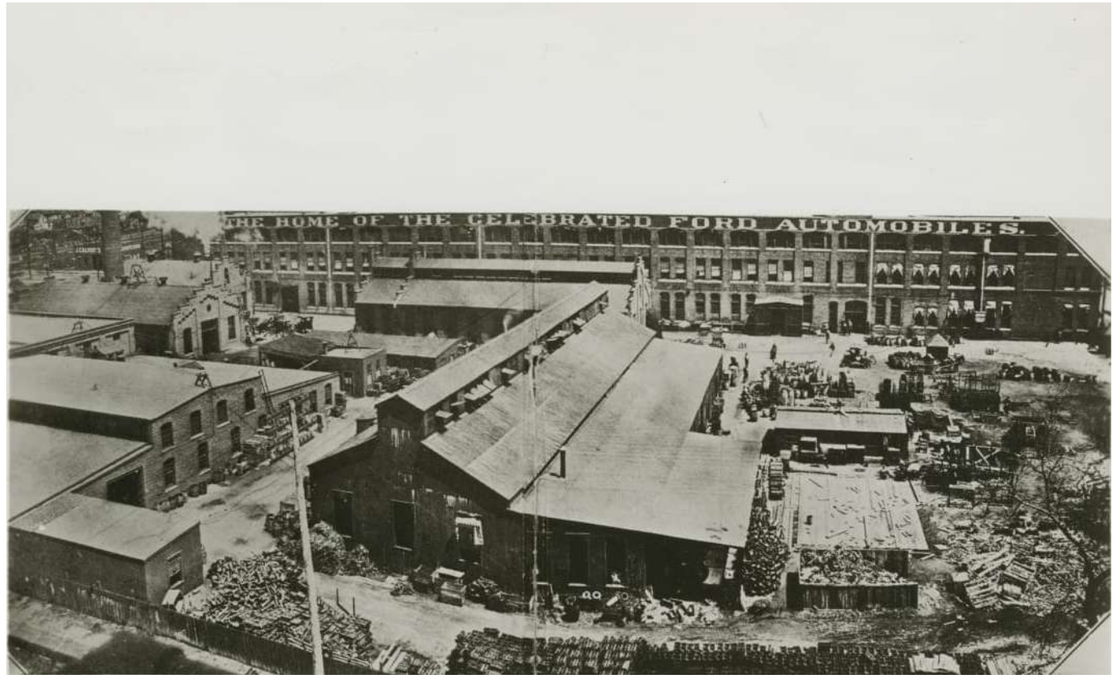


Figure 74: Aerial View of Ford Motor Company Piquette Avenue Plant, 1908
Source:Ford Motor Company. Photographic Department. Aerial View of Ford Motor Company Piquette Avenue Plant. Photographic print, June 1908 (printed August 3, 1936). Photographic Vertical File Series. Object ID: 84.1.1660.P.833.66544.1. Benson Ford Research Center.



Figure 75: Ford Motor Company, Piquette Avenue Plant from Inside, 1906.
Source:Ford Motor Company Piquette Avenue Plant. Photographic print, 1906. P. E. Martin Papers Collection. Object ID: 64.167.823.3. Benson Ford Research Center.

Foundation and innovation in assembly methods in parallel with Piquette Ave Plant and Bellevue Ave Plant

During six years of activities on Piquette Avenue, Plant FMC produced different models with different approaches. Model K, which was one of the most expensive models, to Model N, which is known as the foundation of mass production, with the Model T a few years later.

Different approaches in car design emerged from a strong conflict within the company between stakeholders. On one hand, Henry Ford encouraged the board to lean towards mass production, and on the other hand, Alexander Malcomson insisted that the company make expensive cars for the high economic class.[15]

With this background, Henry Ford decided to open the Bellevue Avenue Plant in order to follow two separate goals. First is to exclude Malcomson and his followers from the board profit cycle[16], and second is to create a specific section for producing automobile components under his observation, which were mainly produced by the Dodge brothers before. This action improved the mass production possibility by reducing the car price as a result of controlling operations and quality at FMC.[17]

Finally, on July 12, 1906. Henry Ford's effort paid off, and Malconson sold his 255 share out of 1000 to him for 175,000 $ and withdrew from the FMC. Soon after, two other members followed him, and Henry Ford took effective control of the company and led it to mass production with the help of standardization and the assembly line in the next few years.[18]

15 National Park Service, "Ford Piquette Avenue Plant," 12-15.

16 Charles K. Hyde, "The Dodge Brothers, the Automobile Industry, and Detroit Society in the Early Twentieth Century," Michigan Historical Review 22, no. 2 (Fall 1996): 58.

17 National Park Service, "Ford Piquette Avenue Plant," 15.

Assembly Line and Birth of Model T

J.Kent Smith was a British metallurgical engineer. Who introduced the vanadium steel to Henry Ford. This steel advantage was its strength compared with ordinary steel, making it possible to use it in Automobile Parts subject to heavy stress. This innovation was accepted by Mr. Ford and was limitedly used in models N, R, and S in the Piquette Avenue Plant. Soon after, the role of this technology was shown in the Ford Model T, which created an enormous advantage for this model among others. [19]



Figure 76: Portrait of Charles Sorensen, 1918
Source: From the Collections of The Henry Ford, Object ID: 84.1.1660.P.O.1046, Benson Ford Research Center.

18 National Park Service, "Ford Piquette Avenue Plant," 15.

19 National Park Service, "Ford Piquette Avenue Plant," 17.

Alongside material innovations which led to creations successful Model T, the assembly line was examined for the first time on Piquette Ave. In 1908, when FMC was using the traditional assembly method named "Station assembly," they reached one of their records in car production in one single day. On 4 June 1908, the piquette Ave Plant successfully produced 101 Model N in one day.[20] Which was significantly more than their regular number of about 70-80 cars per day at that time. This goal was achieved without an assembly line and was a result of the standardization and process management in the company. Charles Sorenson, the product manager in 1908, took charge at FMC with progressive ideas. He and his team mates working on sunday in third floor of piquette Plant to develop the first model of the assembly line.

Sorenson believed assembly is simpler, easier, and faster. His Idea was that, instead of station assembly where the chassis remains in one place, and the workers bring the various components into the chassis, they can start from one end of the Plant with the frame and move it through the building to add axels and wheels, then pass it through the stockroom instead of moving the stockroom to the chassis.

In July 1908, Sorenson and his team were involved to creat prototype of the assembly with the involvement of Henry Ford. The Sorenson team finally built their first model N with the assembly line in Piquette Plant. But the FMC and Henry Ford did not use it at that time due to the building limitations. The mass production of the Model T was postponed due to relocation and centralization of FMC to their new Location High Land Park.

20 In comparison with 15 cars a day in Mack Ave Plant.
(Source: National Park Service, "Ford Piquette Avenue Plant," 12.)

Various strategies were implemented to enhance production speed and maximize profitability during the development of the assembly line. Initially, industrial engineers transitioned from grouping machines by category to arranging them according to the specific sequence of operations. This evolution led to the implementation of the gravity assembly line, which was subsequently advanced through the introduction of belt and conveyor systems. Over time, these techniques evolved into the sophisticated methods utilized in modern manufacturing.



Figure 77: Ford Model N Chassis in Assembly Room, Piquette Avenue Plant, Detroit, Michigan, 1906
Source: From the Collections of The Henry Ford, Object ID: 84.1.1660.P.833.37307, Benson Ford Research Center.

Highland Park

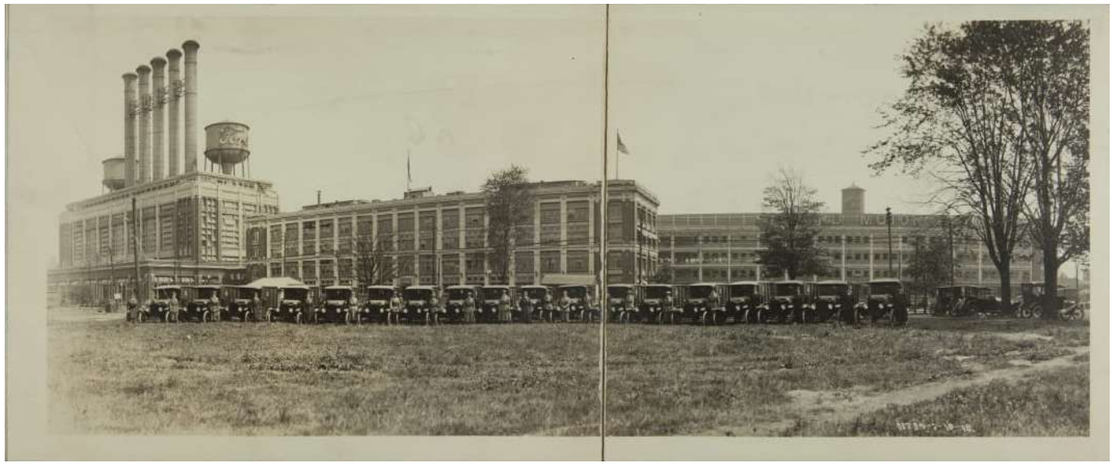


Figure 78: A historic July 1918 panorama at Ford's Highland Park facility, featuring rows of Model T vehicles lined up in front of the factory complex and its landmark power station.
Source: July 18, 1918. From the Collections of The Henry Ford, Dearborn, MI. Courtesy of The Henry Ford Public Digital Collection, Object ID: 441551

Building Life Cycle

Due to the absolute necessity in 1908 for FMC to expand the factory. The Highland Park project was started. Introducing the Model T by the company led to a flood of orders that the Piquete factory couldn't handle.[21]

Ford Motor Company started to look for land around the city to build the new factory. In 1907, when the factory only had 5 months to deliver 6,000 Model T, the board agreed to purchase the 60-acre tract of land in the rural village of Highland Park, at the junction between Woodward Avenue and Manchester Street.[22]

The property, formerly utilized as a horse racing track, was acquired by the Ford Motor Company (FMC) for $62,000.00. This specific location provided several advantages, including reduced tax rates and access to the railroad system; however, its most significant attribute was the substantial amount of land available for subsequent growth.[23]

At the beginning of the project, Ford business manager[24] had chosen an architectural team for this new project, but soon after, with Henry Ford's disagreement, the project was given to Albert Kahn, who was well-known in those days specifically due to his innovations in industrial architecture and Packard Plant.[25]

"Historian David L. Lewis describes this first encounter in his article " Ford and Kahn. Ford asked Kahn, "Can you build factories?" Kahn's reply, "I can build anything. "Well, come over here," said Ford, "I want to talk to you about that new building we are planning..." Larry Raymond, director of architectural development and archivist for Albert Kahn Inc., stated that Ford took Kahn to his site on Woodward, which was then a horse farm and race track.

"I went over", Kahn later recalled to a friend, "It was the first time I had ever met Mr. Ford." [26]

The cooperation between Ford and Kahn was challenging for both. In the beginning, Henry Ford did his best to make it clear that he wanted everything under one roof. Soon after, when Kahn suggested building the factory in the middle of the site to secure the view from nearby to the building, Ford strongly refused and explained his mindset about the systematic expansion in parallel with the company's development in the future.[27]

Kahn:

"I didn't think it was possible, but I didn't want to tell him that. I wanted to see what could be done. Ford was no help. He could not explain just what he wanted. But when I showed him the first rough drawings, he said "You've got only part of the idea. Now if we can do this, and then do that..." That's the way he has always been. I was not finished with that first design before I realized the magnitude of his conception. And yet even after I had finished I still had a blind spot. I suggested to him that he had vast acreage behind his plant, and urged him not to build the front of his factory so close to Woodward Avenue. Why not center it? I asked. He looked at me and laughed. "You still haven't got the most important part of the scheme." he said. "That vacant space is for expansion. By this system we can add on units, link by link." All I ever did (said Kahn), was to take his instinctive hunch and reduce it to a working formula.[1]

The layout of the Highland Park factory was strongly dictated by the FMC. Ford's chief construction engineer, Edward Grey, worked closely with Kahn and provided information about dimension management and how the machine would be arranged in the future factory. [28]

On the other hand, Kahn was doing his best to design the structural envelope, which can incase ford manufacturing Ideas. He was utilizing his reinforced concrete system alongside massive windows for maximum light and vibration resistance.[29]

In April 30, 1908. The Plan was finalized, and the FMC Board officially approved it. B.M Zadek Co. had been selected as a general contractor and signed the first contract with the company with the net price of 180,714 $ on August 3, 1908.[30]

The project was started and It was hard to believe the company that put a nation on the wheels was built by wagons and horses. The construction process proceeded without interruption for nearly two years, concluding in late 1909. Throughout this period, the work was carried out continuously and under hazardous conditions. The budget was totally provided from the company's profits without bank loans or any other investment methods.[31]

In 1909, the original four-story factory was completed with a roughly 262 meters by 22 meters wide. With foyer facilities tower around it, massive windows, and a facade covered by reinforced concrete and red bricks. By ending this contract and with the budget extended to 250,000$, the FMC moved into its new home on the first day of

21 National Park Service, "Ford Piquette Avenue Plant," 22.

22 April Kay Jacques, "Inside the Crystal Palace: A History of Henry Ford's Highland Park Plant" (Master's thesis, Michigan State University, 2008), 12.

23 Jacques, "Inside the Crystal Palace," 16.

24 James Cauezens

25 Charles K. Hyde, "Assembly-Line Architecture: Albert Kahn and the Evolution of the U.S. Auto Factory, 1905-1940," IA. The Journal of the Society for Industrial Archeology 22, no. 2 (1996): 12.

1 Jacques, "Inside the Crystal Palace," 71-72

26 Jacques, "Inside the Crystal Palace," 71.

27 Jacques, "Inside the Crystal Palace," 72.

28 Hyde, "Assembly-Line Architecture," 14.

29 Hyde, "Assembly-Line Architecture," 14-15.

30 Jacques, "Inside the Crystal Palace," 72.

31 Jacques, "Inside the Crystal Palace," 72.

January 1910. [32]



Figure 79: Ford Highland Park Plant under Construction, circa 1909
Source: From the Collections of Vertical File Series, Object ID: 84.1.1660.P.O.4877, Benson Ford Research Center.

The Factory officially started its work at the beginning of June 1910, and became the house of mass production and Fordism. In the beginning years of working in the new factory, the demand of model T was dramatically raised from 20,277 in 1910 to over 78,000 by 1912.

This wave of orders creates a new build factory once more over crowded by machines, cars, and workers. This high demand, next to the physical possibility for the FMC, led them to try the assembly line method, which was tested before as a prototype in a piquette factory in 1908 by Charles Sorensen and his team. The use of the primary model of the assembly line, which was only used to assemble pre-prepared car parts, successfully reduced the process time from 20 min to roughly 13 min.[33]

Building on this success, FMC tried to develop a continuous moving assembly line, which relied on gravity slides in December 1913. This general line reduced the time requirements to build one car from scratch, from 12 hr to just 93 min.[34]

With the eye-catching development in the speed of car manufacturing, the FMC decided to develop the Highland Park factory by adding a new shop in 1914. This shop was mainly started with a factory named W and X in 1914, and later expanded by two other buildings (Factory Y and Z) in 1915, with a fully automated assembly line on each floor, which was connected to the other floors' lines by gravity slides. Ultimately, the final assembly stage took place on the ground floor, serving as the culmination of the production sequence after the product had progressed through every preceding phase.[35]

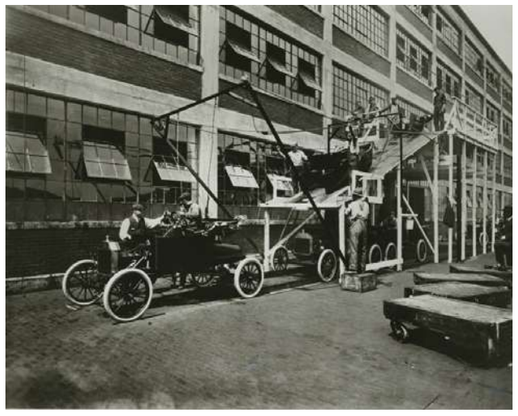


Figure 80: Workers using gravity slides in the assembly process at the Highland Park Plant.
Source: From the Collections of Vertical File Series, Object ID: 84.1.1660.P.O.4877, Benson Ford Research Center.

32 Hyde, "Assembly-Line Architecture," 12.

33 U.S. Department of the Interior, National Park Service, "Highland Park Ford Plant," National Register of Historic Places Inventory -- Nomination Form, NPS Form 10-300 (May 1977), 10.

34 National Park Service, "Highland Park Ford Plant," 6.

35 Biggs, The Rational Factory, 123-125.

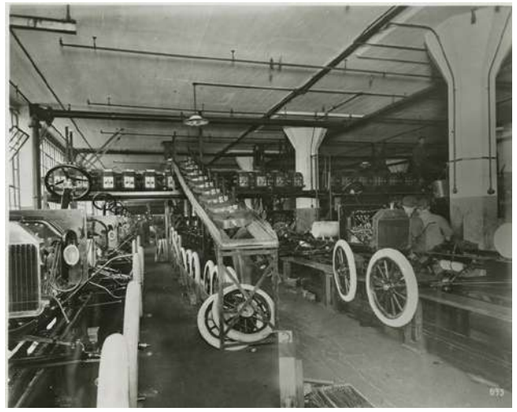


Figure 81: Ford Highland Park Plant under Construction, circa 1909
Source: From the Collections of Vertical File Series, Object ID: 84.1.1660.P.O.4877, Benson Ford Research Center.

This fast and huge development in the assembly line has had two side effects for the FMC. First is the company turnover in the use of skilled workers. In this period, Henry Ford decided to use the unskilled workers widely. The reason for this action was the rooted knowledge of traditional car making, which was incompatible with the new methods. In fact, the assembly lines break the work down into very simple parts, and each worker is responsible for one or two or a maximum of three simple actions. In these terms, unskilled workers were more useful since they could be educated and replaced easily.[36] Second, this change created a boring atmosphere for the workers. That's why in the years leading up to 1914, the turnover rate[37] for the company dramatically increased. In this situation, Henry Ford launched the 5$ wage for 8 hours a day In July 1914[38]. This action also successfully reduced the turnover rate for the FMC in those years. Although soon after, due to the economic depression after WWI, the purchasing power turned back to its origins, even with 5$ per day.

> **"Thousands of unskilled Southern and Eastern European immigrants swarmed into the Highland Park factory. By 1914, the Ford Motor Company employed 12,880 workers, and the overwhelming majority (9,109) were foreign-born. The five largest nationality groups-Poles, Russians, Romanians, Italians, Sicilians, and Austro-Hungarians -constituted a majority of the workforce and came from the least industrialized areas of Europe. Generally, American industrial leaders and factory managers rated these nationalities low in their "racial efficiency," as they defined industrial skill and efficiency in terms of work habits and work discipline."[39]**

The growth in factory mechanization and assembly lines led to huge car production, which later became known as the mass production movement. In this situation, FMC was breaking her records on consecutive days. The engineers decided to decentralize the factory.

Decentralization in this stage means the factory decided to create small assembly buildings in other towns and places nationwide and export cars in "knock down" kits. After that, the complete automobile will be assembled in the secondary factory, much closer to the delivery point.[40]

> **"At the same time as Ford was bringing production in-**

36 This approach lately led the company to use foreign-born workers widely and make huge gender replacement possible, especially in the war, when women took the place. The Ford English Schools and other educational activities were as follows after this decision. Henry Ford insisted on Americanisation.

37 The turnover rate is the percentage of the total workforce that leaves over a given period.

38 Which doubled the average working wage per day in those days

39 Stephen Meyer, "Adapting the Immigrant to the Line: Americanization in the Ford Factory, 1914-1921," Journal of Social History 14, no. 1 (Autumn 1980): 69.

40 Karel Williams, Colin Haslam, and John Williams, "Ford Versus 'Fordism': The Beginning of Mass Production?" Work, Employment & Society 6, no. 4 (December 1992): 521

house, output of the Model T was increasing rapidly: the company which shipped 21,000 cars in 1910, shipped 199,000 cars in 1913 and no less than 585,000 cars in 1916 (Appendix: table 2 col. i). Factory space for this output could not be obtained simply by extending Highland Park. In Autumn 1912, the company announced a new policy of decentralising final assembly to 'branches' so that Highland Park could concentrate on the vital work of component production (Ford Times September 1912). By spring 1915, the company had opened 24 branch assembly plants in all the principal cities, and most of Highland Park's output left the factory as knocked-down kits (Ford Times April 1915). When Ford's policy was to cut the price to the consumers spread across a continental market, the policy of branch assembly had its own powerful logic. Up to 1912, the consumer paid a freight charge on top of the Detroit list price; West Coast consumers paid a substantial $75 premium for delivery to their local dealer. Branch assembly dramatically cut these freight costs; the freight rate per pound weight on kits was significantly lower than on finished cars (Jones 1916), and it was possible to pack more than 20 kits in a freight car, which would only hold 3 finished cars (Ford Times February 1913)." 41



Figure 82: Workers Preparing Ford Model T Automobile for Shipping, Highland Park, Michigan.
Source: From the Collections of Vertical File Series, Object ID: 00.1334.263, Benson Ford Research Center.

41 Williams, Haslam, and Williams, "Ford Versus 'Fordism,'" 521.

In April 1917, the US officially entered the war. FMC became a heavy military manufacturer. Henry Ford, who was famous for his pacifist stance, placed his massive industrial empire entirely at the disposal of the US government. [42] Highland park reduced production of the Model T[43]and dedicated itself to war production.[44] [45]
The social atmosphere was also affected by the war. The increase of women's labor in the factory to take the responsibility mainly in the manufacturing jobs[46], the suspicion and surveillance occurred between workers from different European nationalities, and also the war inflation effect on 5 dollars per day was the most notable social effect on Highland Park during the war.[47]

42 Williams, Haslam, and Williams, "Ford Versus 'Fordism,'" 55.

43 By November 1917, the main factory was assembling only 527 cars a day, and by July 1918, the factory was producing no more cars at all. Williams, Haslam, and Williams, "Ford Versus 'Fordism,'" 55.

44 The Eagle boats, the Tanks with a Model T engine, the Liberty aircraft engine, the war helmets, and the field gear were the most significant products.

45 Williams, Haslam, and Williams, "Ford Versus 'Fordism,'" 550.

46 Henrickson, Detroit Perspectives, 293.

47 Allan Nevins, Ford: Expansion and Challenge, 1915–1933 (New York: Charles Scribner's Sons, 1957), 324-537.

Product	Quantity	Notes
Steel Combat Helmets	820,000	The factory received this order in October 1917.
Liberty Aircraft Engines	3,940	The company originally contracted to build up to 12,000 of these 12-cylinder engines, but 3,940 were completed by the armistice.
Liberty Engine Cylinders	415,377	Ford engineers revolutionized production by using welded steel tubing instead of boring out solid steel blocks, reducing the cost from $24 to $8.25 per cylinder.
Ambulances	2,000	The U.S. government placed an initial order for 2,000 Ford chassis for ambulances in May 1917, which required few changes to the Highland Park factory lines.
Cars, Trucks, and Ambulances	~39,000	This represents the total company-wide production of vehicles supplied to American and Allied forces during the war, with Highland Park acting as the primary manufacturing hub.
"Eagle" Boat (Submarine Chaser)	1 (Prototype)	The very first prototype of this 200-foot warship was built inside the Highland Park plant's six-story craneway before mass production was shifted to the River Rouge complex.
Tanks (Two-man and Six-ton)	15 (Experimental)	The U.S. Army ordered 15,000 two-man tanks powered by Model T engines and 1,000 larger six-ton tanks, but the war ended before mass production got underway. Fifteen were completed for experimental purposes.
Miscellaneous Equipment	Unspecified	The plant also manufactured caissons, submarine detectors, armor plates, shells, and gas mask components.

Table 6: War Production, Ford Highland Park Plant.
Source:Williams, Haslam, and Williams, "Ford Versus 'Fordism,'" 550.



Figure 83: Progress on Prototype Eagle Patrol Boat, Ford Highland Park Plant Craneway, March 1918.
Source: From the Collections of Vertical File Series, Object ID: 84.1.1660.P.833.21664, Benson Ford Research Center.

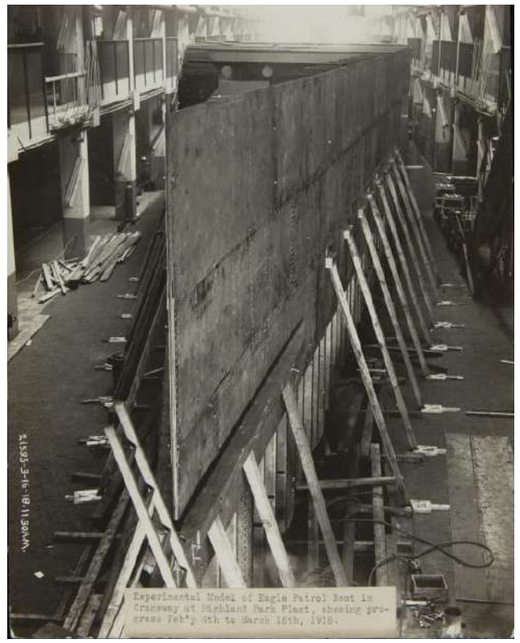


Figure 84: Progress on Prototype Eagle Patrol Boat, Ford Highland Park Plant Craneway, March 1918
Source: From the Collections of Vertical File Series, Object ID: 84.1.1660.P.833.21664, Benson Ford Research Center.

After the war, the FMC started a rapid retooling to shift back from war manufacturing to the Model T. This process took only three weeks, and by December 1918 the company produced about 1000 cars a day.[48]

Soon after, in the recession of 1920, the company was shut down from late December 1920 into January 1921. In this period, Henry Ford started to sell surplus materials to survive the country once again without involving itself in the Bank loans.

After the economic crisis, Highland Park and FMC once more came back to their glory days and experienced its peak year in its lifetime between the two wars. At this time, the factory became what was later known as a city within a city from the early to mid-1920s.

In 1924, Highland Park reached its absolute peak of employees. Roughly between 68,000 to 69,000 were working there. This massive workforce made the factory comparable to the 4th largest city in Michigan.[49]

During these years, the Highland Park Plant functioned as a self-sufficient metropolis, the administration building housed the theater, photogallery, post office, and telephone exchange[50]. The Ford Commissary opened to help workers combat post-war inflation. This commissary sold high-quality groceries, meat, shoes, and clothing at 10 to 20 percent below retail price.[51]

On the other hand, and beside of this workers' facilities. The 1920s are known as a shift to a high-pressure era and a harsh working environment, alongside the assembly line speeding up. Harsh new rules were continued, even to a strict ban on sitting and leaning against machines. The aggressive management techniques by Charles Sorensen and Harry Bennett led to chaos, workers' movement, death, and disease among the workers of the company.[52]

> **"The men were forbidden to whistle, sing, or talk. Since most tasks demanded complete concentration, the men were supposedly too busy to chat; while safety was also a factor, for talking men might forget due precautions. A much harsher rule forbade sitting down at any time. "When we were not working," recalls W. Allen Nelson, who served many years at Highland Park and the Rouge, "we stood at our benches. There wasn't a place to sit down, and if you sat, or even if you leaned against a machine, you were liable to be fired.... You didn't sit down at all." It was a leg-weary body of men who tramped out of the factory. Gencral Motors laid the same interdict on talking and sitting, but it was less strictly enforced."[53]**



Figure 85: Henry Ford and Harry Bennett, headed the Ford Service Department, 1942.
Source: From the Collections of General Photographs Series, Object ID: P.833.77289.1, Benson Ford Research Center.

48 Nevins, Ford: Expansion and Challenge, 88.

49 Jacques, "Inside the Crystal Palace," 43.

50 [inside Crystal Palace, 43]

51 Jacques, "Inside the Crystal Palace," 109.

52 Nevins, Ford: Expansion and Challenge, 296.

53 Nevins, Ford: Expansion and Challenge, 514.

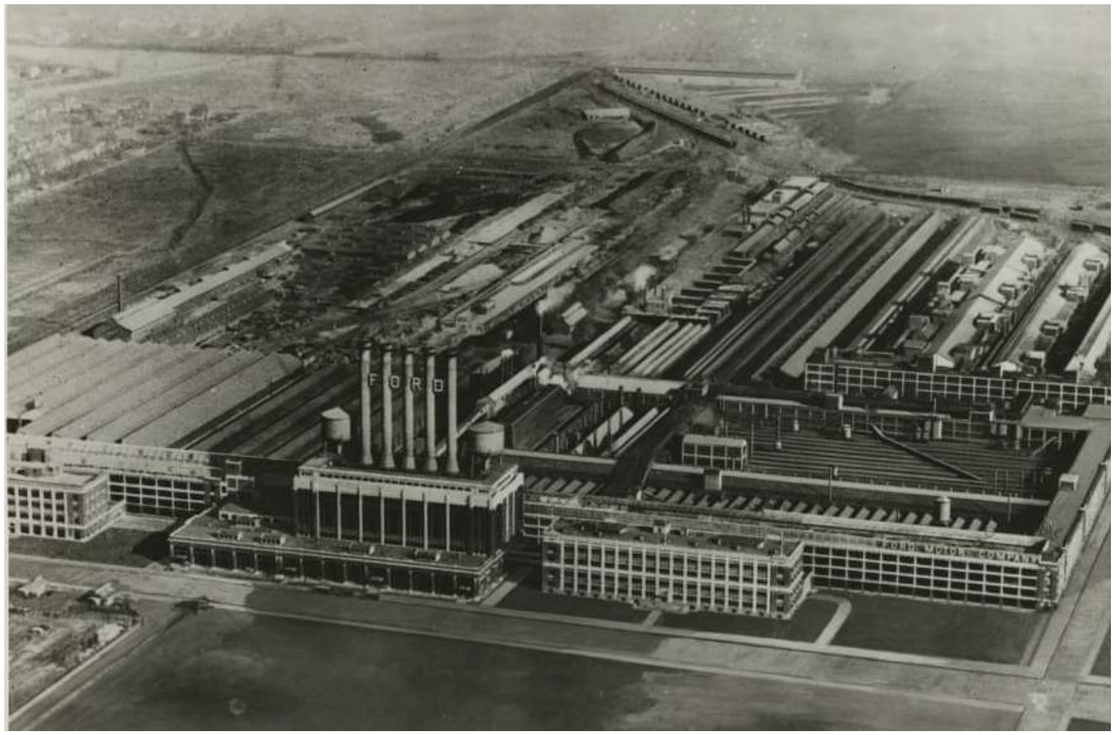


Figure 86: Aerial View of the Highland Park Plant, 1923
Source: From the Collections ofPhotographic Vertical File Series, Object ID: 84.1.1660.P.833.35891, Benson Ford Research Center.



Figure 87: Ford Motor Company Executive Harry Bennett, circa 1935
Source: From the Collections ofPhotographic Vertical File Series, Object ID: P.O.322 Benson Ford Research Center.

In 1927, the 15 millionth Model T was rolled off the Highland Park. Marked the official end of one of the most iconic cars in human history, an Automobile which put one nation on a wheel and an end to a massive manufacturing run.[54]



Figure 88: Charles Sorensen Stamping the Fifteen-Millionth Ford Model T Engine on the Last Day of Model T Production, May 26, 1927
Source: From the Collections of General Photographs Series, Object ID: 64.167.833.P.49135, Benson Ford Research Center.

In the 1930s, Highland Park continued its work as a secondary production site for Ford. by 1929 the plant still employed 14,000 workers and housed the world's largest forge and second largest lacquer and paint manufacturing complex[55]. With producing textiles, artificial leathers, glasses, radiators, batteries, and roller bearings. The Highland Park was involved in car manufacturing, but not as a main factory like before[56].Henry Ford additionally utilized the premises for the rigorous testing of his technological innovations, focusing significantly on the development of soybean-based automotive finishes.[57]

With the start of WWII, the FMC prepared itself to enter the war production once more. The Highland Park plant was involved in the production of anti-aircraft gun director, Tank manufacturing, and Aircraft components. Align with the new Plant in River Rouge.[58]

> in the years between 1914 and 1917, the first building in Ford's new factory, Rouge River Plant, was built. Although the construction process continued until 1940. In the late 1920s, FMC started the transportation operation to the new site. Many facilities left Highland Park alongside the stop of production model T, and when the company prepared itself to start new car manufacturing, Ford introduced the Model A new.

During the Second World War, the famous Highland Park commissary was forced to close due to the Michigan Public Act 271 of 1941. This makes it illegal for employers to sell items to their employees that the company did not manufacture or handle itself.[59]

After the war, the factory returned to civilian production[60].Between 1945 and 1947, truck and bus production returned to Highland Park. In those years, the Plant was assembling 43 different truck models at a rate of 400 vehicles per day.

Years after Henry Ford's death[61], in 1953, the operations were broken down into several businesses. The Truck assembly separated and became "Detroit Truck Plant". Following this, the workforce rapidly fell from 7,800 employees in 1954 to 2,800 by 1956.[62]

As the Plant was continuously changing due to the different types of production and due to the high cost of building preservation. Many historical structures were demolished. The iconic original powerhouse, with its five towering smoke stacks, was demolished in July 1959.



Figure 89: Powerhouse at the Ford Motor Company Highland Park Plant, October 1923.
Source: From the Collections ofPhotographic Vertical File Series, Object ID: 84.1.1660.1207, Benson Ford Research Center.

In 1960, Building A—A four-story reinforced concrete structure spanning over 4,600 square meters and featuring expansive windows—was razed. Its demolition took place alongside the removal of Buildings O, B, and E.[63]

Finally, in 1973, the Tractor assembly line was moved to Romeo, Michigan. And by this decision, the final major assembly line left Highland Park forever, and manufacturing in Highland Park was officially ended.[64]

After 1973, the FMC mainly used the complex as a giant warehouse. After a decay in August 1981 due to the economic recession, FMC sold the 102-acre complex to real estate developers. Ford continued to use a small part of the site as its document archives.[65]

Although in 1978 the site was known as a national historical Landmark (Before that, in 1956, the site was listed in the Michigan state register of historic sites) [Tayler, Highland Park Ford Plant, 38], over the decades, the majority of the buildings were demolished or fell into ruins.

Today, the site is complicate mix of ownership and uses. The most significant surviving structures were the service building (building OO), the executive garage (Building NN), and the Machine shop (Building AA). [Tayler, 38] Although these buildings are now abandoned, vacant, and suffer from water intrusion and vandalism, they still hold their memories and define their character features.[66]

54 Jacques, "Inside the Crystal Palace," 43.

55 Jacques, "Inside the Crystal Palace," 45.

56 Jacques, "Inside the Crystal Palace," 44.

57 Jacques, "Inside the Crystal Palace," 44.

58 Jacques, "Inside the Crystal Palace," 48.

59 Jacques, "Inside the Crystal Palace," 46.

60 Although during the Cold War, the Highland Park factory shortly produced military facilities like bazooka rockets for the US army.

61 1947

62 Jacques, "Inside the Crystal Palace," 50.

63 Jacques, "Inside the Crystal Palace," 82.

64 Jacques, "Inside the Crystal Palace," 44.

65 Jacques, "Inside the Crystal Palace," 113.

66 Ilene R. Tyler, "Highland Park Ford Plant: Documentation and Redevelopment," APT Bulletin: The Journal of Preservation Technology 46, no. 2/3 (2015): 38.

Urban and Geographical context

Location and Transportation.

The primary reason that forced FMC to relocate from Piquette Plant to Highland Park was the land limitation. Soon after 1903, when the operation started in Piquette Plant, the company faced the emergence of the need for bigger spaces. This need was expanded by the first testing of new assembly methods like assembly lines in the piquette.

In 1907, FMC finally purchased the land 6 miles from the Detroit city center, in the conjunction between Woodward Ave and Manchester St. This 60-acre track of land had been extended in 1918 by adding another 40 acres and became one of the most iconic industrial buildings in the 20th century.

This land had been used as a horse tracking area and was chosen by The FMC because of its fundamental advantages for use for industrial purposes. Besides the ideal geology for heavy industry, the land was far enough from the city center to offer lower tax options. Rail accessibility was acceptable and allowed the company to bring raw materials in and export products to delivery points. After all, the chosen location was not as far from the labor-inhabitant center to lose labor attraction and was not too close to be involved in complex land taxes and land shortages.

Although the Highland Park factory met many important requirements and became the most important house for decades. There were also specific requirements which the land could not provide.

The water access was one of the most fundamental problems in Highland Park. The land was located 58feet above the Detroit River without any specific access to the river to provide water for industrial operations, shipping, drinking, and power plant needs.

In this situation, FMC provided water with three wells for industrial purposes and changed the PowerPlant from single steam engines to a mixed-fuel power plant. Besides this, the drinking water was provided by the City[67], and the complex was never connected to the river for shipping and waterway transportation.[68] [69]

After starting the operation the Highland Park factory completely transformed the surrounding rural area into a dense urban center, while the FMC aggressively engineered the social fabric of the neighborhood where the workers live.

The Highland Park population exploded from 425 residents in 1909 to over 47,000 in 1920.[70] The factory was deeply embedded in the nearby neighborhood and the workers' living space. They side walk led directly to the Plant space without high fences or separation elements. This caused the creation of a "walk-in neighborhood" around the factory and allowed the workers to walk to work.

Later on, when the River Rouge plant started operation and with the spread of automobiles among the middle class, the "Walk in neighborhood" and the easy access to the factory were changed. The workers used public transportation or their personal vehicles to go to work. [71]



Figure 90: Ford Highland Park Plant Administration Building and Powerhouse, 1918.
Source: From the Collections ofPhotographic Vertical File Series, Object ID: 84.1.1660.P.833.23326, Benson Ford Research Center.

Although in the field of housing, Henry Ford and General Motors almost never built houses for the workers[72], the social engineering was strongly followed by the company. The "five-dollar per day"[73] gave the company leverage for its goals in social engineering, specifically in working neighborhoods.

Ford Social Engineering and the Personal Lives of the Laborers.

For Henry Ford and in general, FMC, the labor personnel's life was very important. This importance led the company to involve it self into their personal life with aggressive interactions at some point.

FMC created a psychological department with a team of 150 investigators[74] who dedicated themselves to unannounced investigation of workers' personal lives by interviewing with their family, friends, or neighbors and scrutinizing their cleanliness, sobriety, and thrift.[75]

If the worker's condition were unsatisfactory, The company reduced the wage and gave them six months to fix the problem; if not, they will be fired from the company.

Next to this investigation project. Henry Ford strongly believed in Americanization. He did his best to dismantle the ethnic neighbourhoods and create a dependent middle-class of laborers familiar with American life, culture, values, and language. These activities occurred alongside the development of the assembly line and the decision to hire foreign-born workers, mainly with European backgrounds. This working class was not familiar with the job, and because of this situation, they were very educable in comparison with previous professional workers who were rooted in old car manufacturing methods and had strong resistance to education and alignment with the new methods.

During this project, besides the language center, the company did its s best to remove the labor background and develop some kind of uniformity. By removing the ethnic neighborhood, increasing the wages, and encouraging them to live in single-family houses[76], the company successfully and indirectly relocated 13,000 families in a

67 Crystal Palace 15-17]

68 [Tyler, 37]

69 The issue was eventually addressed in 1917 through the selection of the River Rouge plant in Dearborn. At this facility, Henry Ford negotiated a landmark agreement with the U.S. government, securing permission to excavate and widen a new canal for ship navigation in return for a commitment to manufacture Eagle boats for the U.S. Navy.[Rational Factory, 142]

70 [study in urban development, 122].

71 Rational Factory 136-160

72 in this research period, the company only had one small experiment in housing development shortly after WWI, which built about 250 houses in Dearborn, not Highland Park. [Ford expation, 348.)

73 introduced in 1914.

74 [Mayor, Adopting the Immigrants, 70]

75 [Raff, Henry Ford Pay, 71]

76 which they called middle-class houses.

short period of time.[77] [78] [79]

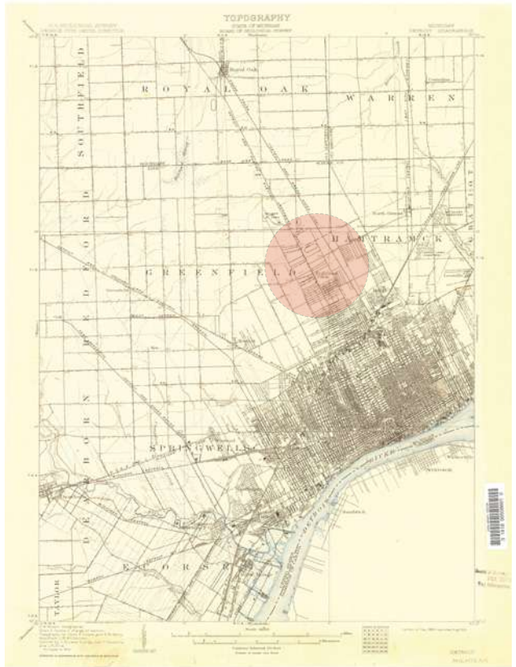


Figure 91: Detroit, 1905, Before the Highland Park plant.
Source: Adapted from U.S. Geological Survey, original scale 1:62500, accessed May 31, 2026, via USGS Topoview. Highlights added by the author.

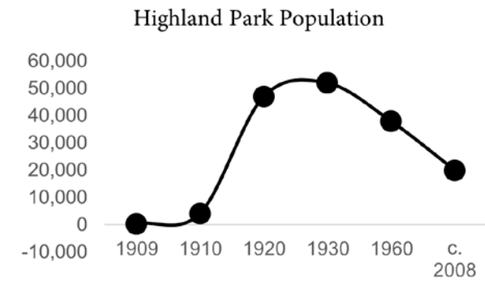


Figure 92: Highland Park population trends from 1909 to c. 2008, illustrating the dramatic demographic spike centered around the expansion of Henry Ford's Highland Park Plant and its subsequent mid-century decline.
Source: Data compiled from Glazer (1965) and Jacques (2008).

77 The proportion of employees found to be living in poor neighbourhoods fell from 20% in 1914 to 1% in 19165. [Making men Ford 128]

78 [Loizide, making men ford 2007, 128]

79 This relocation strategy primarily focused on immigrants of European descent. In contrast, African Americans were neither encouraged nor allowed to leave racial enclaves, a policy designed to ensure they did not integrate into the white labor force. [making men, 130]

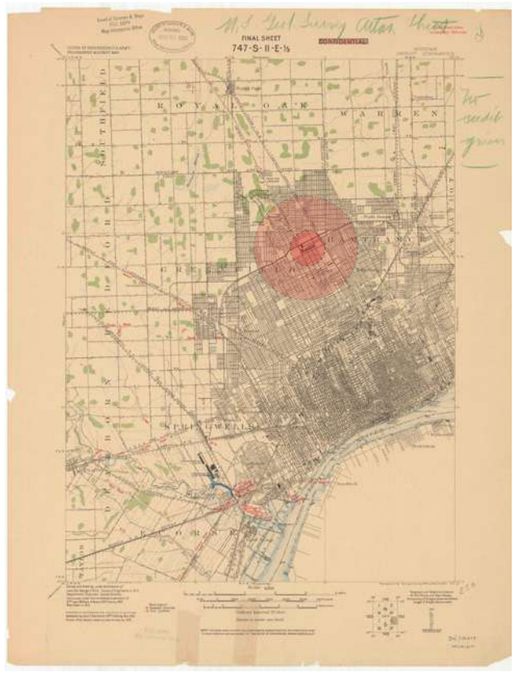


Figure 93: Detroit, 1918, A representation of the Ford Motor Company (FMC) Highland Park location and the surrounding neighborhood development.
Source: Adapted from U.S. Geological Survey, original scale 1:62500, accessed May 31, 2026, via USGS Topoview. Highlights added by the author.



Figure 94: Quitting Time at Ford Highland Park Plant, Highland Park, Michigan, circa 1915.
Source: From the Collections ofPhotographic Vertical File Series, Object ID:P.O.4235.B, Benson Ford Research Center.

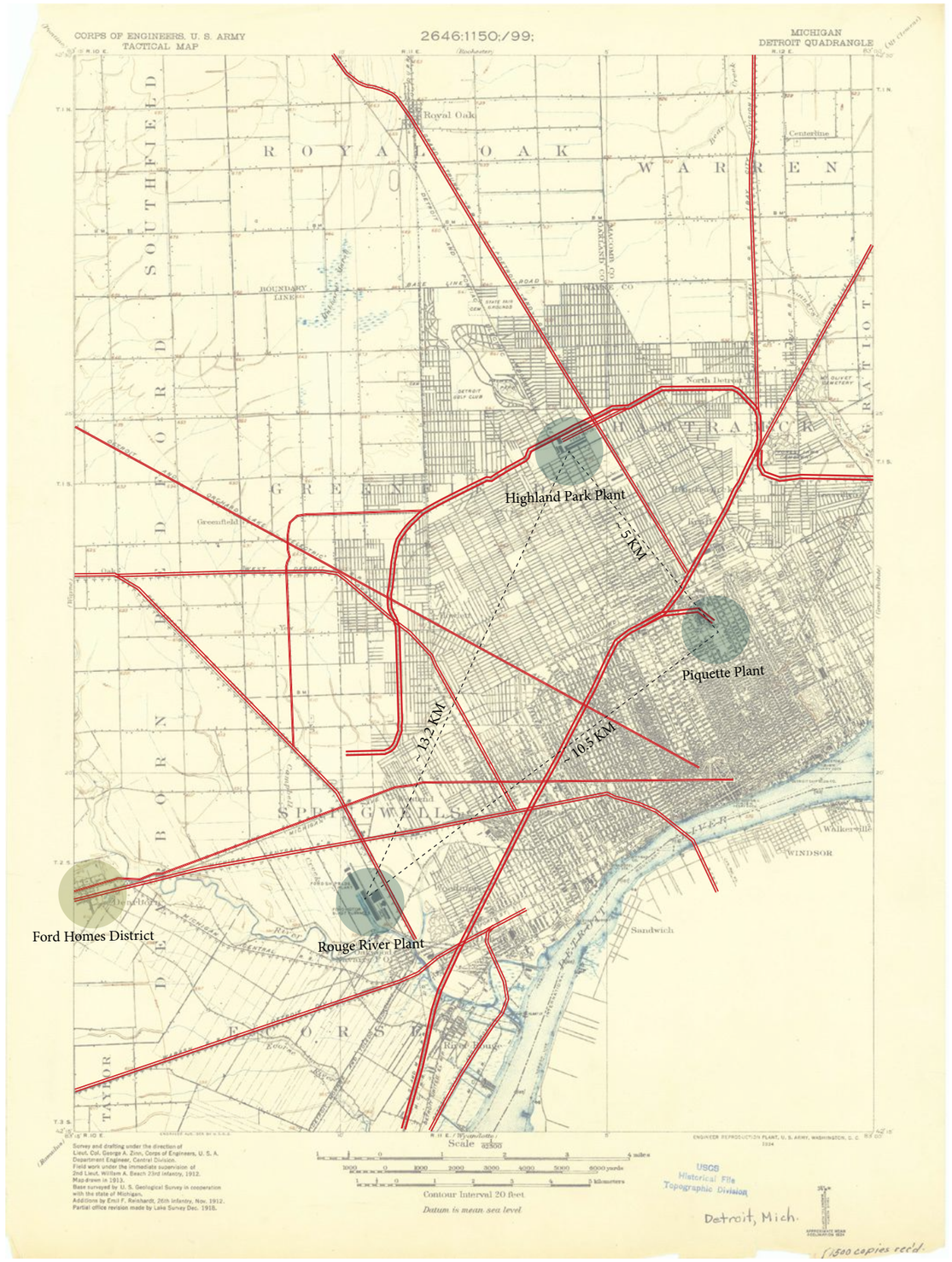


Figure 95: Detroit, 1935,
Source: Adapted from U.S. Geological Survey, original scale 1:62500, accessed May 31, 2026, via USGS Topoview. Highlights added by the author.



Figure 96: Aerial View of Ford Rouge Plant, 1930
Source: From the Collections of Photographic Vertical File Series, Object ID:84.1.1660.P.833.55282.A, Benson Ford Research Center.



Figure 97: Ford Neighberhood.
Source: From Photographs for the Company Series, Object ID:64.167.189.N.544.2, Benson Ford Research Center.

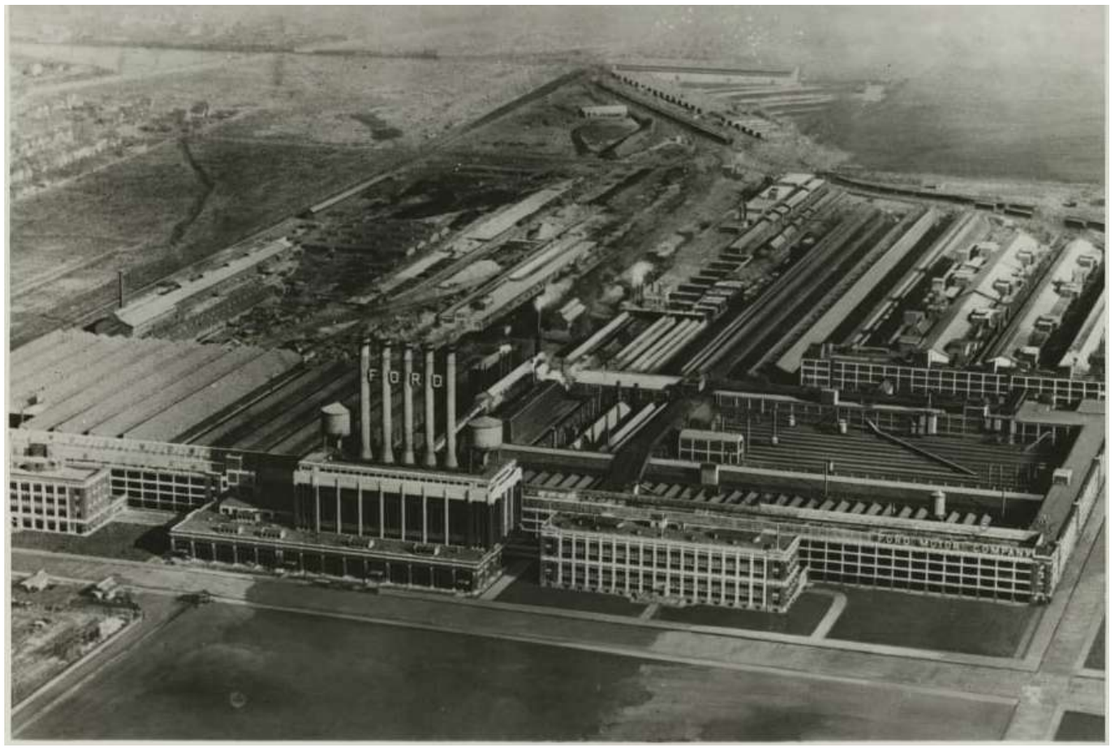


Figure 98: Aerial View of Ford Motor Company Highland Park Plant, 1927.
Source: From Photographs for the Company Series, Object ID:64.167.833.P.48953.A, Benson Ford Research Center.

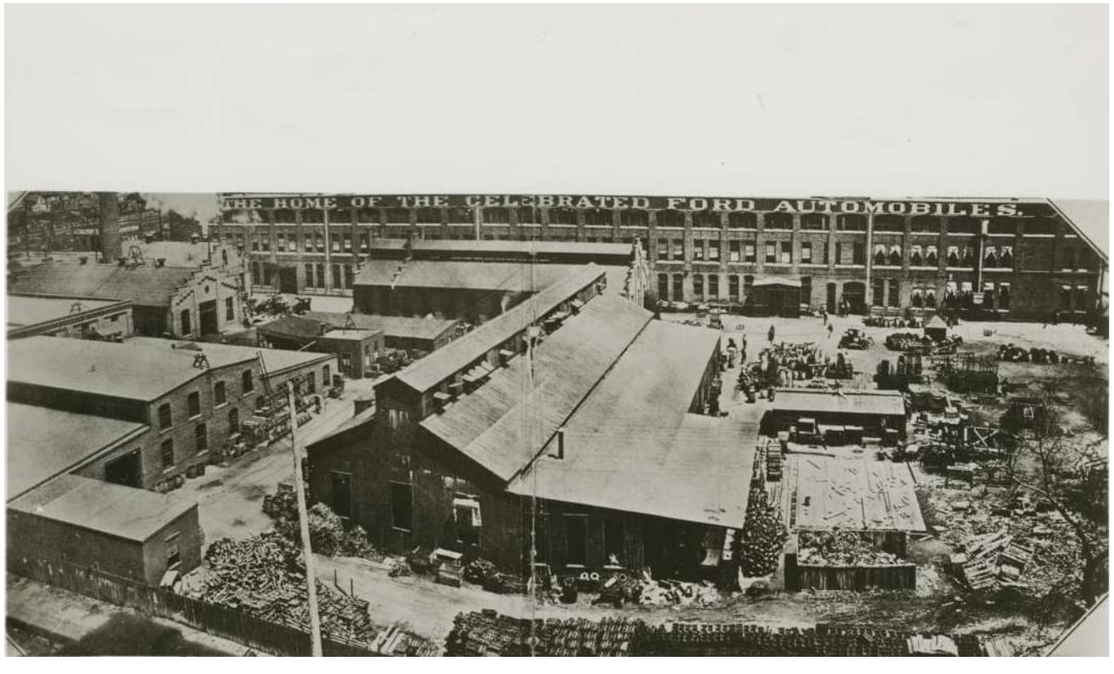


Figure 99: Aerial View of Ford Motor Company Piquette Avenue Plant, 1908
Source:Ford Motor Company. Photographic Department. Aerial View of Ford Motor Company Piquette Avenue Plant. Photographic print, June 1908 (printed August 3, 1936). Photographic Vertical File Series. Object ID: 84.1.1660.P.833.66544.1. Benson Ford Research Center.

Architectural Expression

Daylight Factory, lighting and fenestration.

The transformation of the company's structure was driven not only by scientific breakthroughs and the introduction of the assembly line but also by strategic management choices.

Untill end of the 19th century, the factory was mainly built with masonry materials. At that time, there was no difference between the production results of the industry; a factory was a factory without major differences in the building shape.

Although the Ford Highland Park was not the first industrial building that went beyond the traditional Industrial design, there is no doubt it was among the pioneers. The usage of reinforced concrete created numerous benefits for the company in different perspectives and aspects.[80]

From an industrial point of view, creating lighter and stronger configurations helped buildings for heavy industry operations occur in one building and under one roof. Next to it, one of the most significant opportunity happened by the reinforced concrete was the emergence of the giant windows on the facades, which led to the daylight factories concept in the future.

The daylight Factory concept was not just a structural possibility, but also was a management decision that was not only made by Henry Ford or the board of the FMC, but also made by the biggest industrial leaders of the era.

This action was effective on the working atmosphere. Although the electricity was widely used at the beginning of the 20th century, the usage of the huge windows just to absorb natural light into the manufacturing spaces seems meaningless.[81] But due to the fact that the FMC was aware of the huge effect of these windows and daylight factory in general on the workers' sanitation, the work accident rate, and moreover, the loyalty of the workers, they decided to widely use it in their Factory and specifically in Highland Park.

Vertical factories gained popularity prior to the rise of the Daylight Factory, with Ford's Highland Park plant representing a hybrid of these two architectural trends. At the dawn of the Industrial Revolution, the surge in production led manufacturers to build vertically rather than horizontally. This shift was driven by two primary factors: first, the logistical ease of moving materials between floors compared to long-distance transport across an expansive industrial site; and second, the constraints of power transmission systems. Utilizing shafts and primarily hydraulic power sources, a main shaft could efficiently distribute power across different levels of a single building more effectively than across a spread-out industrial complex.

However, by the mid-20th century, technological advancements completely reversed this dynamic. As a result, vertical factories were phased out and replaced by horizontal layouts.

80 The highland park manufacture factory was not a singular building with reinforced concrete; this topic was faced with an industrial site with different buildings and different materials as follows, but the focus is on the era of reinforced concrete, which is presented in the original main factory building: building A or The cyristal palace, Original first major structure in the site, other name is four story building, demolished in 1960, see the table [].

81 Ford Motor Company mainly worked 24 hours per day. Which means the artificial light was used widely, and the daylight was not essential



A B

Figure 100: A: Menier Chocolate Factory, Noisiel, France.
Source: From Photographs for the Company Series, Object Rappaport, Vertical Urban Factory, 122.

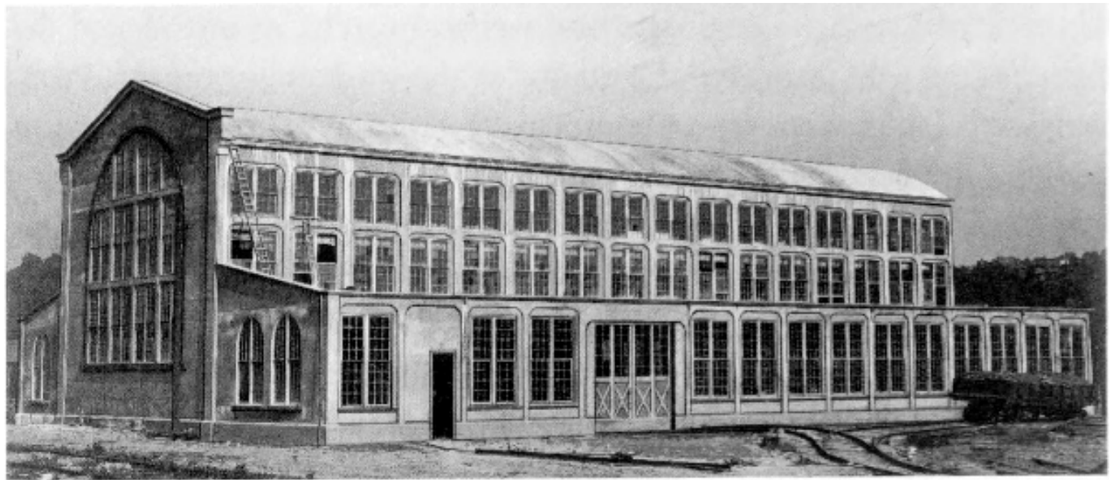


Figure 101: The evolution toward the Daylight Factory occurred alongside the development of the Piquette Plant, exemplified by Robert Cummings's 1905 architectural design for the Taylor-Wilson Manufacturing Company.
Source: Biggs, The Rational Factory, 98.

Changes in the working method have had a serious effect on the worker's loyalty. The work became much simpler than before. Every worker had to repeat three or a maximum of four tasks during a day, and due to this fact, they lost their willingness to continue the boring job every day. This matter dramatically increased the replacement rate in the FMC, which the board decided to reduce at all costs. As a result of the 5 dollars per day for 8 hours of work, the daylight factory came to control this importance. Later on, the targeting of the foreign-born workers and Americanisation can be considered under these consequences.

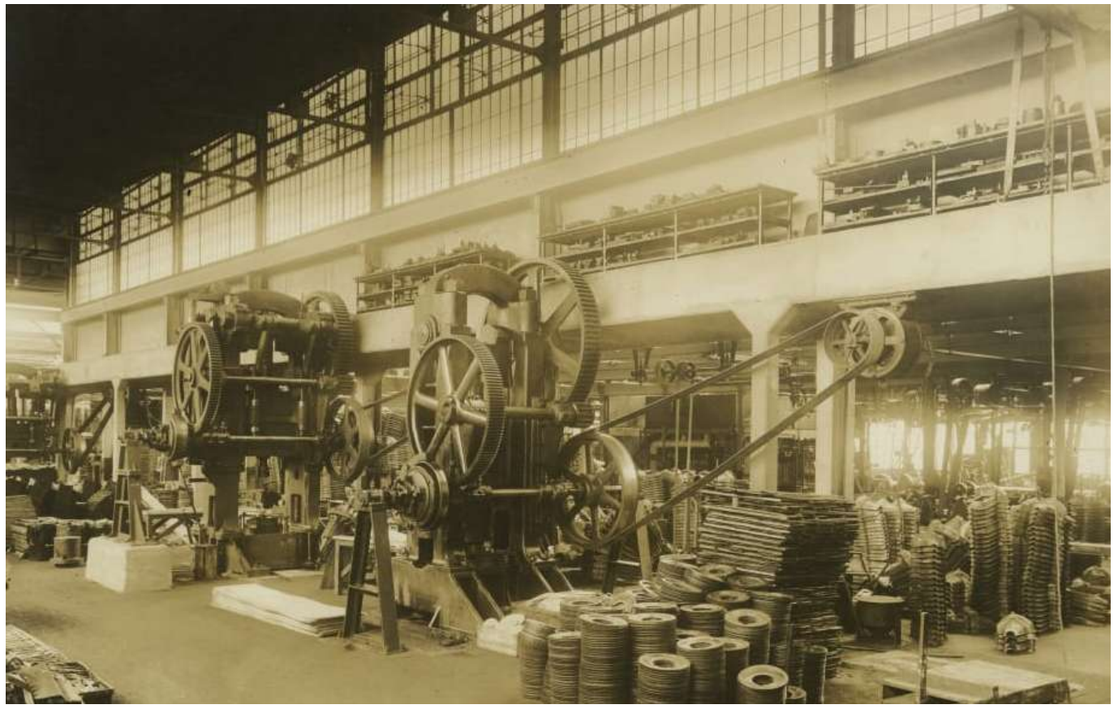


Figure 102: Stamping Presses at the Ford Motor Company Highland Park Plant, circa 1913.
Source:Ford Motor Company Highland Park Plant. Photographic print from Photographic Vertical File Series, Object ID: 84.1.1660.P.05393, Benson Ford Research Center.



Figure 103: Ford Motor Company, Piquette Avenue Plant from Inside, 1906. Illustrating the atmospheric impact of expansive window designs on interior environments.
Source:Ford Motor Company Piquette Avenue Plant. Photographic print, 1906. P. E. Martin Papers Collection. Object ID: 64.167.823.3. Benson Ford Research Center.

Innovation and Decoration, The values to express

Albert Kahn has a famous sentence: "The architecture was 90% business and 10% art"[82]. Due to this approach, he designed the buildings in the Highland Park plant in two different ways. On the one hand, the building alongside Woodward Avenue[83] represents the FMC identity. These buildings were designed and decorated with better materials, such as marble and wood, for interior and exterior in order to create a strong public face for the fledgling company. On the other hand, the building, which was located deep into the factory land and was visible only to the workers and company staff, was designed as simply as possible. The decoration was significantly reduced and The materials chosen were simple. it seems the only importance for them was the operation inside without wasting material and time.

Due to the historical documents which left from the demolished buildings, This strategy was clearly understandable. For instance, the administration building was highly decorated. This building, next to the sales and service building, featured large stone blocks, intricate tile cornices, marble floor, carved wood paneling, and elaborate plaster ceilings. [84]

Another building, which was used for its decoration and played a its own role in establishing Ford as an industrial leader in history, was the power house building.[85]

Unlike other companies that tried to hide their power house deep inside and among the other buildings, Ford decided to locate this building in front of the complex as close as possible to Woodward Avenue, with full view to the public.[86] The power house was designed and located to show the Ford Motor Company's power and Modernity. To make sure that the public could marvel at the facilities, the building was designed with enormous glass windows. To allow pedestrians passing by on the avenue to easily look inside and admire the massive, gleaming generators.[87]

Inside the powerhouse was also notable. FMC designed a balcony for visitors who came on a tour to see the massive power engines not only as a functional facility but also as a work of art.[88] [89]

Moreover, alongside these features, the power house also has an interesting story beside its 5 chimneys, which is represented by William Vernor, the mechanical engineer for the power house in the book "The Rational Factory:

"More than glass made the powerhouse a showcase. It contained the finest fittings available: brass and copper fixtures, chains, and rosettes, mahogany handrails, and "all workmanship first-class in every particular." At the top of the powerhouse hung the huge FORD sign between the five stacks. William Vernor, the mechanical engineer for the powerhouse, explained years later that only two stacks were needed, but Henry Ford wanted the sign and insisted it be hung between powerhouse stacks, so there had to be five."[90]

82 [inside the Crystal Palace, 70]

83 like the power plant and the customer service building

84 [inside Crystal Palace 74-76]

85 The advertisement campaign on this building is clear from the postcards and other flyers from that era)

86 [Ford expansion and challenge, 619]

87 [Rational Factory, 104-105]

88 [inside Crystal Palace, 81]

89 ("At a time when business, especially the automotive industry, kept its secrets under lock and key, Ford's openness was revolutionary."
[Inside The Crystal Palace, 23])

90 [The Rational Factory, 103]

In terms of other types of buildings inside the complex, as mentioned before, there were no significant decorations noted. Kahn's design process was highly systematized and efficient. The time next to the function was the most important parameter for him and for the company, stripping away stylist markers and complex masonry means less craftsmanship and material are required.

Later on, by continuing this approach in the next expansion of Highland Park and beginning the design process in the River Rouge plant[91], the Kahn method was shifted from the use of reinforced concrete to the glass and steel plant.

These Plants became widely famous because of the short build time, specifically during wartime.[92]

In Kahn and Ford's mind, decoration was a wasteful extravagance on the buildings that only workers saw up close and were kind of invisible to the public.[93]



Figure 104: Albert Kahn, Henry Ford, Mr. Martin, and Charles Sorensen in Ford Engineering Laboratory, April 1942
Source: From the Collections of Photographs for the Company Series, Object ID:64.167.189.P.16943, Benson Ford Research Center.

91 1920-1930

92 The glass and steel Plant later on became famous as a 5-year plant, widely used in River Rouge FMC and also visible in Highland Park. This approach is also classified as one of the main reasons that change the product approach from Vertical Factory to Horizontal ones.

93 [Hyde, assembly line architect, 17]

In these huge industrial sites, only workers were in the buildings, and as John H Van Deventer, an engineer and writer who published a series of articles about River Rouge, describes:

> **"Sheeler's quiet landscapes provide concrete images for John Van Deventer's description of the plant. "I have said that the first impression of the River Rouge is of vastness and complexity. The second impression is that of motionless quiet. Unless one enters a building, there does not seem to be much going on. One does not see many people in the yards; perhaps the reason being that space is so vast that men are less noticeable. As a matter of fact, comparatively few men are required outside the buildings because of the extent to which mechanical transportation has been developed.[94]**

An idea which look the factory as a machine not only reduced the decoration to optimise time and material, but also created a fundamental change in the design principles of industrial architecture. Highland Park worked as an anchor between a traditional mill, like a piquette factory, and a modern renovation plant like River Rouge. This transformation is mostly notable through the buildings. Construction techniques and materials alongside innovation and new process development in assembly lines and production operations. In addition to the FMC situation, economic decisions and limits also played a significant role in this transformation between the three noted buildings.

94 [The Rational Factory, 103]



Figure 105: Powerhouse at the Ford Motor Company Highland Park Plant, March 1938.
Source:From the Collections General Photographs Series, Object ID:64.167.833.P.70009, Benson Ford Research Center.



Figure 106: B: Ford Motor Company Institutional Message Advertising Campaign, "Servant of the Millions," 1924.
Source:From the Collections of Ford Motor Company Automobile Advertisements Series, Object ID:64.167.19.416, Benson Ford Research Center.

Taylorism in Design

To eliminate wasteful time, a core tenet of Taylorism, the Highland park mainly designed specifically around the production process. Rather than forcing the production line to fit in the standard building shell.[95]

The Highland Park Factory also tried to control the movement of the workers by architectural principles. Workers who had enjoyed control over how they could perform a task previously in the Piquette Plant were strictly controlled firstly by machines, lines, belts, and the ongoing nonstop process. Second, by the strict rules imposed by the factory to maximize the possibility of production. [96]



Figure 107: Assembly Line at Ford Motor Company Highland Park Plant, circa 1925.
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.O.7823. Benson Ford Research Center.

95 Biggs, The Rational Factory, 77.

96 Biggs, The Rational Factory, 106.

"Along with [the assembly line] was the other bad treatment and the fear psychoses which was developed. I worked, for example, about 40 to 50 feet from a water fountain and during the summer you would work 8:00 to noon and 12:30 to 4:30 and never be able to get over this 40 to 50 feet to get a drink of water. If you did the assembly line would move so fast you would be behind and it would be impossible to catch up. I have seen people go to the washroom and get fired when they came back because their job was behind."[97]

This new method is mostly significant in Highland Park. The numerical statistics from the years ending in the First half of the twentieth century consist of an enormous succession of these restricted methods, which were dictated by design and management rules in FMC.

This spatial control is clearly reflected in the "Labor Productivity and Automobile Output" chart. As the factory's design eliminated waste motion, the man-hours needed to build a car plummeted from over 1,200 to under 200, while total production surged vertically. The architectural layout physically forced workers to keep up with this relentless pace. However, this rising production line experienced a sudden drop in 1917–18. This dip marks a historical shift: following the U.S. entry into World War I, Ford temporarily rearranged the Highland Park plant to manufacture heavy military materiel like Liberty aero engines and steel helmets

97 Biggs, The Rational Factory, 133

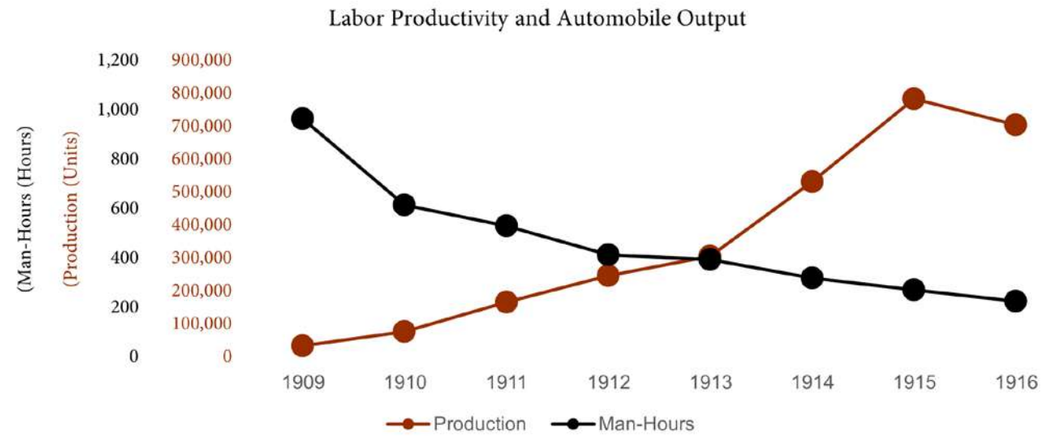


Figure 108: Labor Productivity and Automobile Output.
Source: Created by the author based on data from Biggs, The Rational Factory, 106,107.



Figure 109: Foote-Burt Machine Boring Holes in Model T Motor Block, Ford Highland Park Plant, circa 1914.
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.219. Benson Ford Research Center.

Definition of Fordism, By Historian Douglas Brinkley:

"The restless approach to management that would sweep the industrialized world during the next fifteen years and that remained the business norm ever since...The basic idea was that the product itself may or may not be improved (in the case of the Model T, it was barely changed during nineteen years of production), but the system behind it must be made better, continuously."[1]

1 Jacques, "Inside the Crystal Palace," 24.

Materiality

The approach of maximum production was not just represented in Taylorism assembly line and the non-decorated Plant. But also, it can be found in the Material selection for each part of the building due to the specific needs of that part.

For instance, the machine shop floor was covered with timber placed over the rock or cinders on the concrete foundation. The machine shop was where the heavy cutting and grinding took place. The wood floor, specifically when it is placed on its edge with the grain facing up, would effectively dampen heavy vibration. Plus in the machine shop, oil played a significant role in most of the operations, wood was incredibly effective in absorbing the oil which spilled on the ground and preventing workers from slipping and falling. [98]

In the heat treatment building, the floor was covered by bricks with concrete patches under the machinery to resist the high temperature of the mold treatment and the extreme pressure of heavy machinery without cracking.[99]

The foundry floors where the melted metal was poured into the molds were covered by Dirt with occasional patches of brick and concrete. Dirt was effective for this space because of its strong resistance against the extreme temperature of molten materials.[100]

Upper assembly floors, where lighted operations took place, were covered by one-inch-thick maple wood laid over cinders to provide a reliable, durable surface for workers who are standing all day long.[101]

With the stark contrast to the dirt and oil-soaked wooden floors in the factory. The building which are representing by the FMC to the public had been built with totally different materials. The administration building, the sales building, and even the power plant were built with much more expensive materials like marble, terrazzo, rubber tile, and decorative wood panel. [102]

By considering different materials for different rooms with different operations. [103]Highland Park Plant was designed precisely to keep operations running smoothly.

98 Jacques, "Inside the Crystal Palace," 84,85.

99 Jacques, "Inside the Crystal Palace," 85.

100 Jacques, "Inside the Crystal Palace," 85.

101 Jacques, "Inside the Crystal Palace," 85.

102 Jacques, "Inside the Crystal Palace," 75.

103 Dirt for heat, wood for oil, vibration, and brick for furnaces.



Figure 110: Crankshafts in Machine Shop at the Ford Motor Company Highland Park Plant, 1915. Representing the wooden floor.
Source:From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.2296. Benson Ford Research Center.

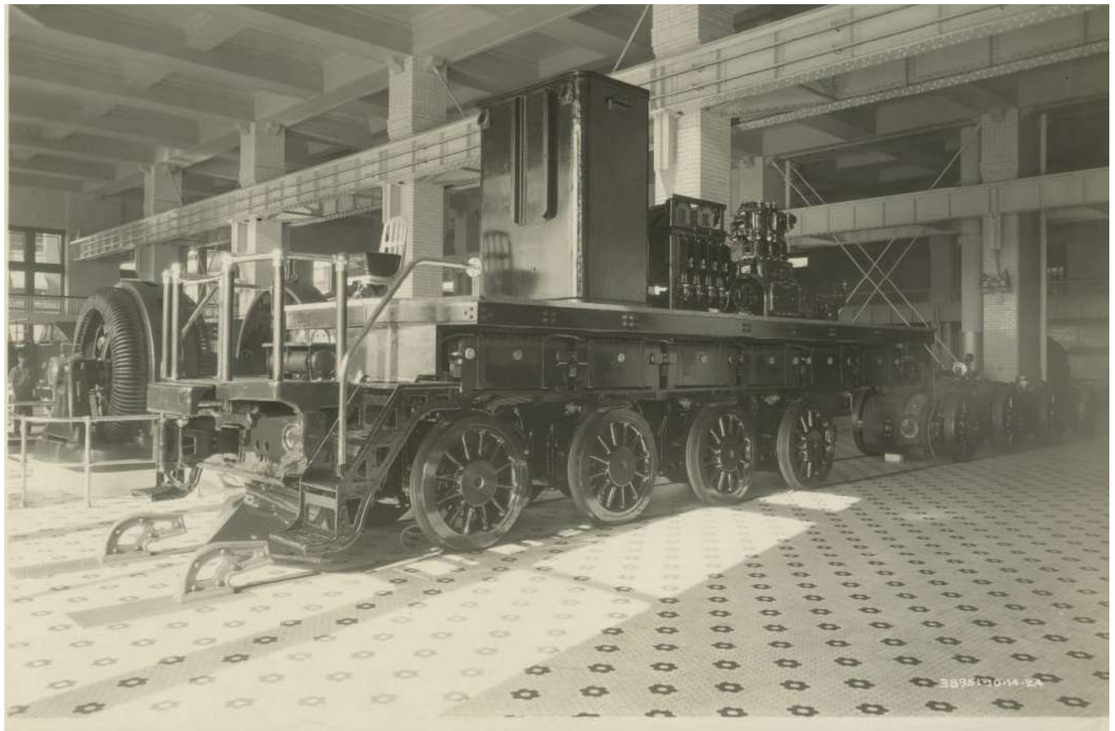


Figure 111: Interior of the Ford Motor Company Highland Park Plant Powerhouse, October 1924. Representing the ceramic Floor.
Source: From the Collections of Detroit, Toledo, and Ironton Railroad Photographs. Object ID: 64.167.548.P.833.38951. Benson Ford Research Center.

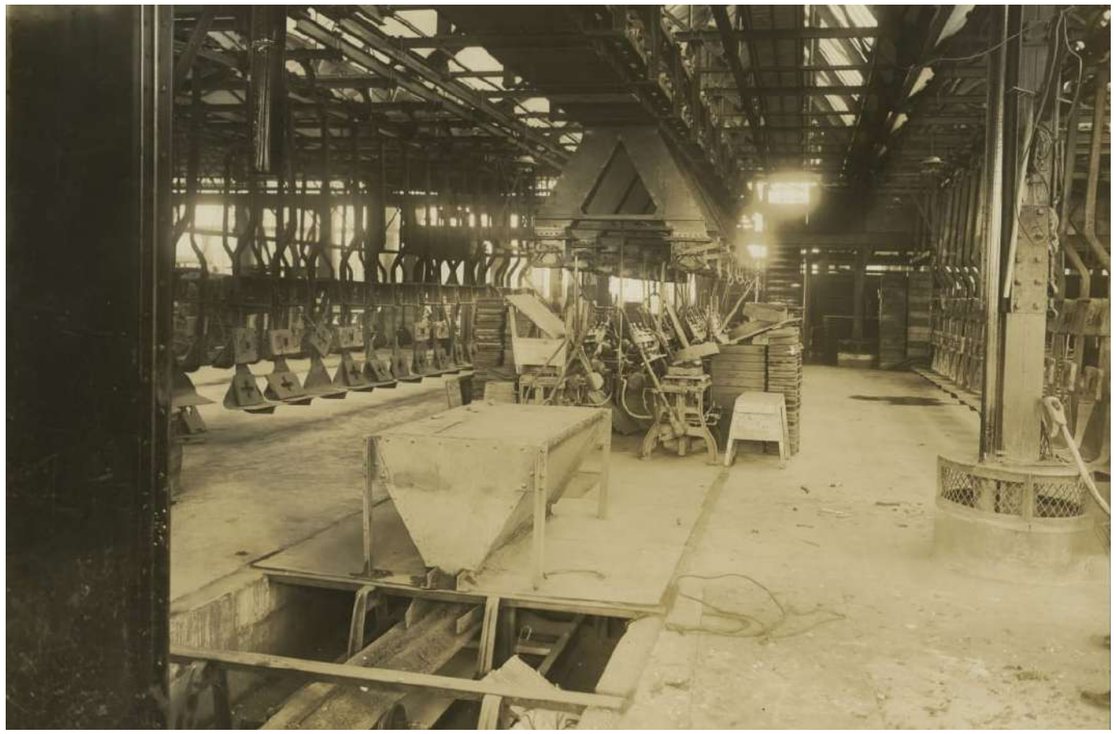


Figure 112: Molding Machines and Conveyors in Foundry at Ford Motor Company Highland Park Plant, circa 1910. Representing the reinforced concrete in floor materiality.
Source:From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.05301. Benson Ford Research Center.



Figure 113: Renovating Ford Motor Company Highland Park Plant Buildings, 1940. Representing thick reinforced concrete in floor.
Source:From the Collections of General Photographs Series Object ID: P.833.73000.2. Benson Ford Research Center.



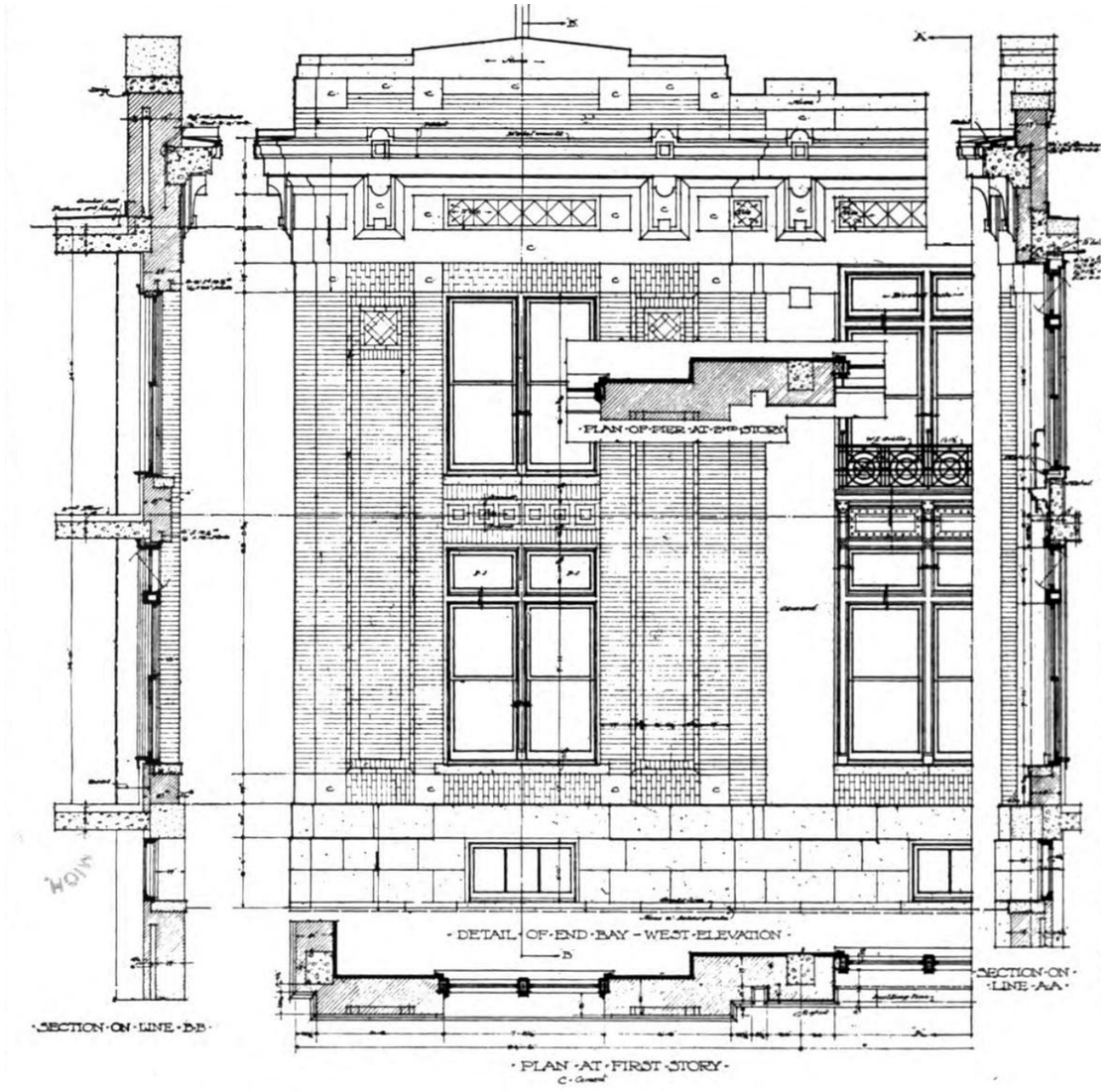
Figure 114: Ford Motor Company Highland Park Plant Administration Building, December 1947 in Front. Machine Shop Building in the back. Representing the differences in facade Detail and materiality.
Source:From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.85044.8. Benson Ford Research Center.





Figure 115: FMC Highland Park Plant Administration Building, December 1947. Facade Detail and Materiality.
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.O.4927. Benson Ford Research Center.

Figure 116: Highland Park Plant, Administration Building, circa 1947. Facade Detail and Materiality.
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.980. Benson Ford Research Center.



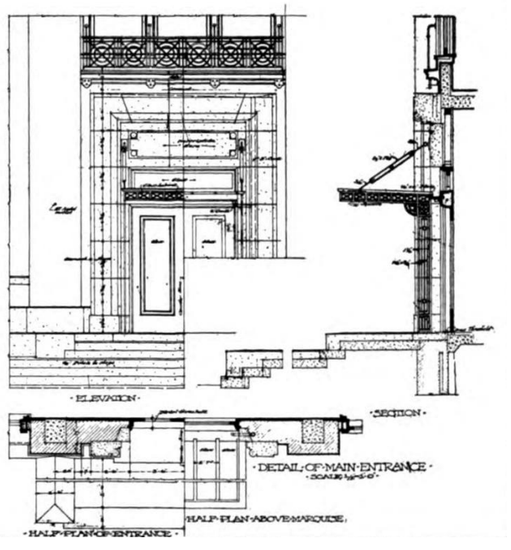


Figure 117: Details of Administration Building.
Source:Albert Kahn and Ernest Wilby, "Details of Administration Building, Ford Motor Co., Detroit, Mich.," architectural drawing, The American Architect 99, no. 1851 (June 14, 1911).

Structural Aspects

Building structure and technical motivations

The most significant structural innovation in the Highland Park complex is the wide use of reinforced concrete. Julius Kahn, Albert Kahn's brother, developed and optimised the proven use of concrete mainly in Europe, and after the invention of his method, for the first time, tested it in Packard Plant Building No.10.



Figure 118: Albert and Julius Kahn.
Source:Photograph courtesy of Albert Kahn Family Collection. Leo M. Franklin Archives, Bloomfield Hills

Although Michael G. Smith, in his article in 2019, under the title of "The first concrete Auto Factory," noted this importance, the Packard No10 was not the first one, definitely it was among the pioneers.

The reason for the usage of reinforced concrete was mainly embedded in its undeniable benefits. The resistance against fire, which all the industrial buildings suffered from in those days[104], was one of the most important ones. In addition, durability, speed, and economic reasons were among other beneficial parameters.

Khan's proposal for the first phase of Highland Park, the famous four-story building, was a reinforced concrete structure with a section of approximately 8x8 meters. With the elevator and staircase in the four towers around the main part of the building, which is known as a flexible functional area. [105]

By almost completely removing the masonry load-bearing walls, The fenestration area of the facade was maximized to 80%. This method, which is lately named the "skin and bone" architecture, led to widespread use of huge windows in the facade due to the availability of concrete beam-and-column systems, and daylight plant emerged.[106]



Figure 119: FMC, Highland Park, 1909.
Source:Trussed Concrete Steel Co., Kahn System of Reinforced Concrete: General Catalogue D (Detroit: Trussed Concrete Steel Co., 1904), 2.

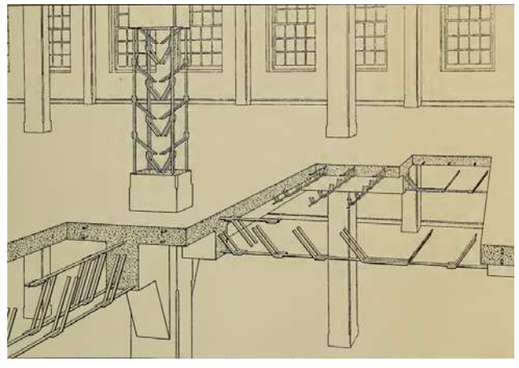


Figure 120: Perspective of general adoption.
Source:Trussed Concrete Steel Co., Kahn System of Reinforced Concrete: General Catalogue D (Detroit: Trussed Concrete Steel Co., 1904), 2.

104 In the "Sanborn Fire Insurance Map," the building with reinforced concrete was mentioned under the title: "Reinforced concrete, Fireproof construction".

105 Albert Kah, Industrial Architecture, 20.

106 Albert Kah, Industrial Architecture, 20.



Figure 121: The Kahn Trussed Bar.
Source:Trussed Concrete Steel Co., Kahn System of Reinforced Concrete: General Catalogue D (Detroit: Trussed Concrete Steel Co., 1904), 15.



Figure 122: Perspective of general adoption.
Source:Trussed Concrete Steel Co., Kahn System of Reinforced Concrete: General Catalogue D (Detroit: Trussed Concrete Steel Co., 1904), 2.



Figure 123: RougePlantConstruction.Representingdifferent approaches with steel and glass.
Source:From the Collections of Automobile Plant Construction Photographs, Object ID: 2012.47.64. Benson Ford Research Center.

The Highland Park Plant was not fully made up of many-story buildings. The steel and glass were also listed among the most significant innovations, which increased the building operation speed significantly. This speed increment was important during wartime, or in other words, production pressure during the war led the owners, decision makers, and architects to this way, and the concept of 5 years plant.

The steel and glass building in Highland Park is widely dedicated to heavy industrial operations, which would not be possible in a place in multi-story building. This technique, alongside technological development[107] and the necessity of speed in production operations, led the company to choose a horizontal layout instead of the previous vertical one.[108]

Besides the reinforced concrete in the era of inventions and mass production, everything was rapidly changing, and every day the company was faced with new problems. They tried to fix it as fast as possible.

In the history of industrial architecture. Two things created a huge difference. First was the significant change in structural methods, which was mainly expressed by reinforced concrete and, soon after, steel structure, which was mentioned before. And the second one was electricity.

Electricity created a dramatic development in industry and industrial architecture as follows. This effect can be categorized in two different ways. The first was the invention of the lighting system, and the second was its effect on transportation, machine location management in the factory, and the mechanisation of industrial operation by the invention of the electric engines.

The lighting system significantly affected the companies at the end of the 19th century and the beginning of the 20th century. This option created a much better working environment. Make it cleaner and significantly reduce the working related accident. On the other hand, the artificial lighting systems created the possibility of 24hr working a day, which alongside a “5 dollars a day” for an 8-hour shift and with 3 shifts a day.

This possibility, with the help of artificial lighting, had a huge effect on mass production and, in other words, made it possible. But the lighting system was not the end of the story. The invention and wide usage of the electrical engine was at least as effective as artificial lighting, if not more. This innovation changed the historic form of production and eliminated the need for a central shaft powered by central sources.

The introduction of electric motors allowed each machine within the factory to be positioned independently. This removed the restrictive requirement of connecting to a building’s central shaft to access power, granting unprecedented freedom in floor layout. [109]

“Unit drive systems allowed the industrial engineer new freedom to experiment with shop floor layout. Without the shafts the engineer moved away from the parallel rows of machines; new arrangements improved production flow, made better use of floor space, and increased efficiency. All of this helped the industrial engineer move toward his goal of increased production, which in many cases rose by 20 or 30 percent with the new arrangements.“[110]

107 which makes horizontal transportation easier than vertical transportation

108 This approach switching is completely clear in the differences between FMC Highland Park Plant and River Rouge Plant Dearborn.

109 Biggs, The Rational Factory, 85-90.

110 Biggs, The Rational Factory, 86-87.

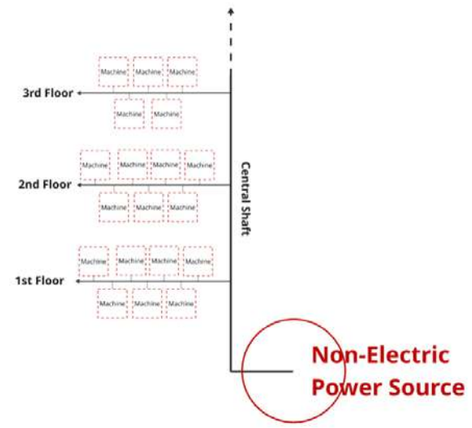


Figure 124: Diagram,Representshowpowerwastransmitted in traditional factories before the invention of electric motors.
Source: Author

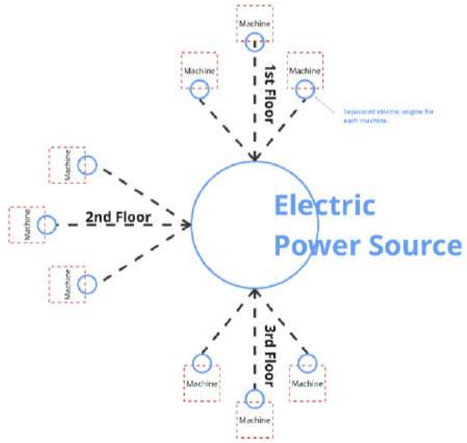


Figure 125: Diagram,Representshowpowerwastransmitted in traditional factories After the invention of electric motors.
Source: Author

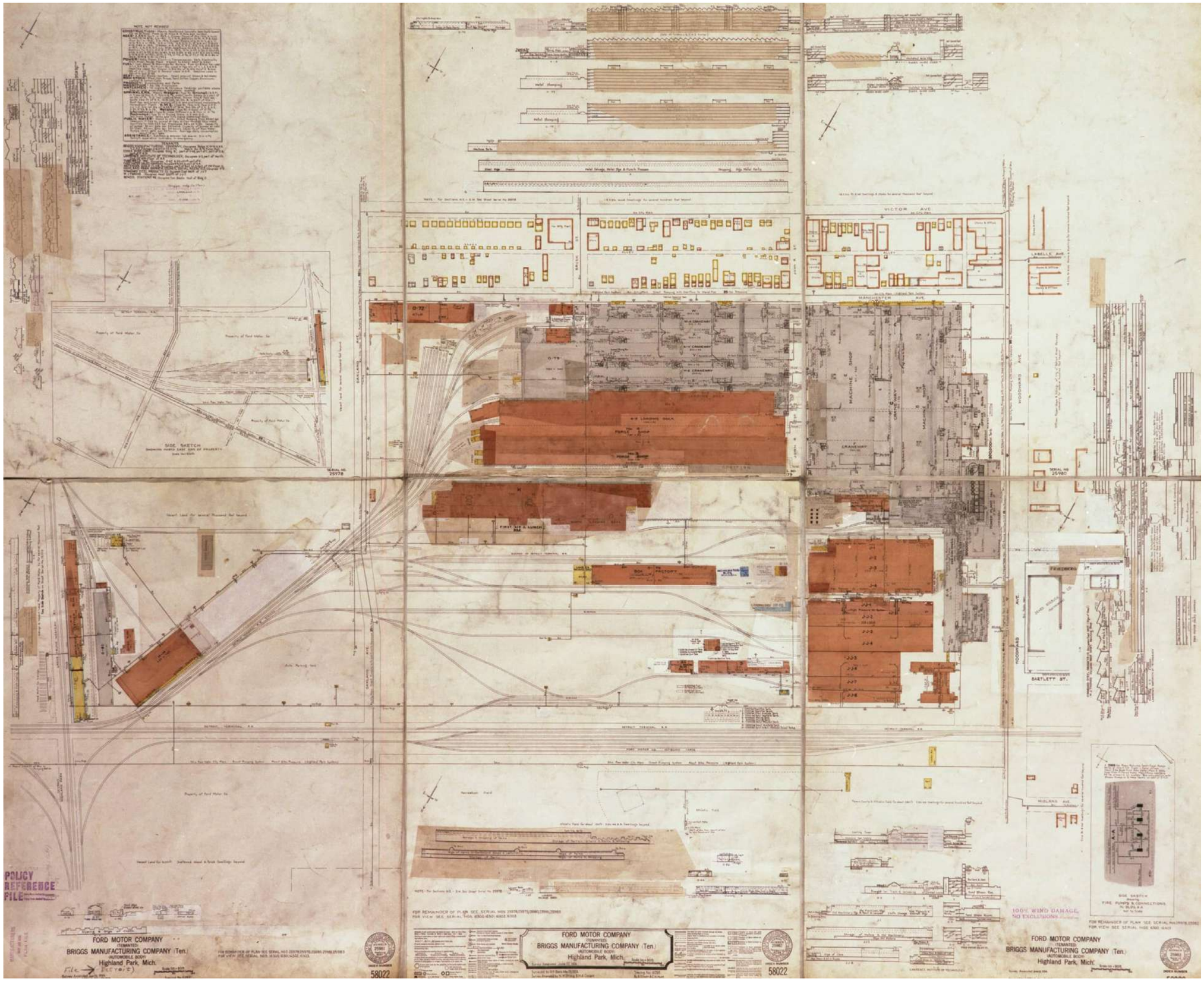


Figure 126: Fire Insurance Map of Briggs Mfg. Co. at Ford Motor Company Highland Park Plant, Surveyed June 22, 1934
Source: From the Collections Manufacturers' Mutual Fire Insurance Company Records, Object ID: 86.1.1694.3. Benson Ford Research Center.

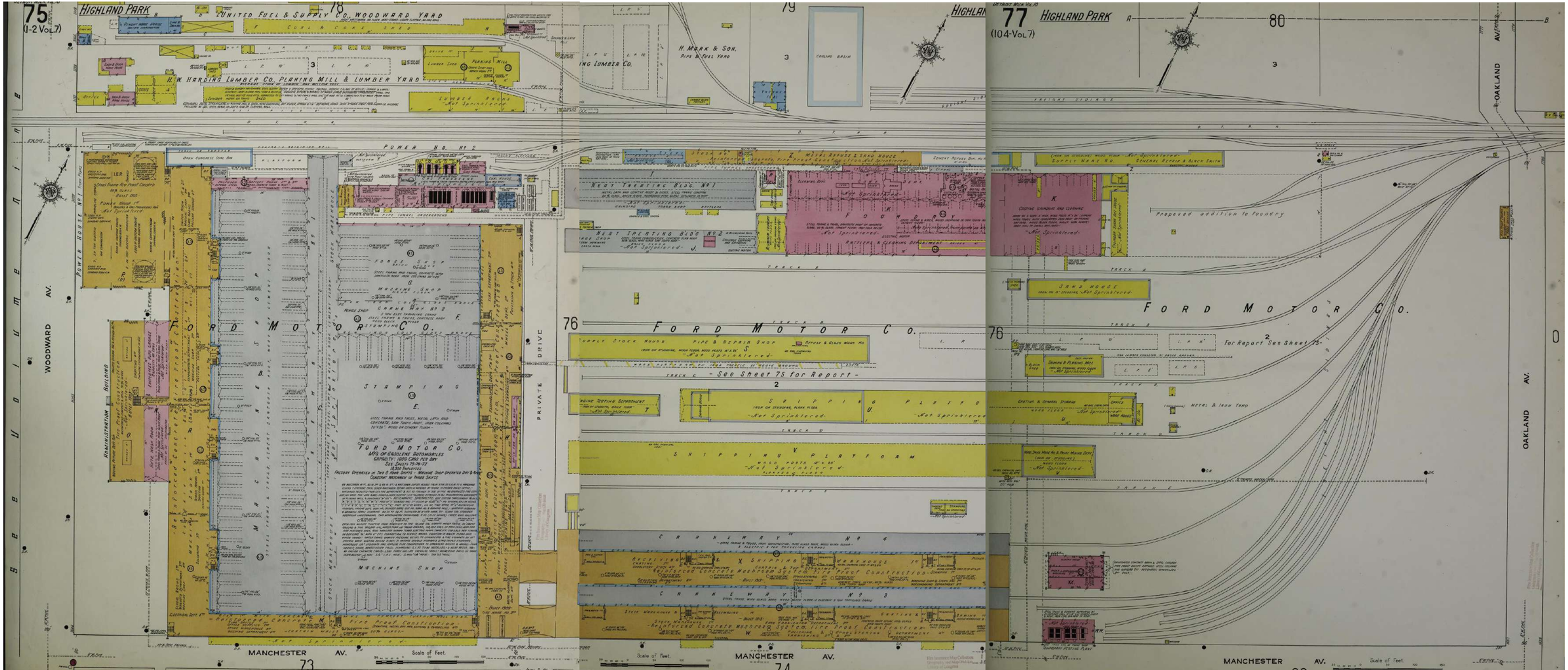


Figure 127: Image 75-77-79 of Sanborn Fire Insurance Map from Detroit, Wayne County, Michigan, 1915.
Source: Sanborn Map Company, Vol. 10, 1915.

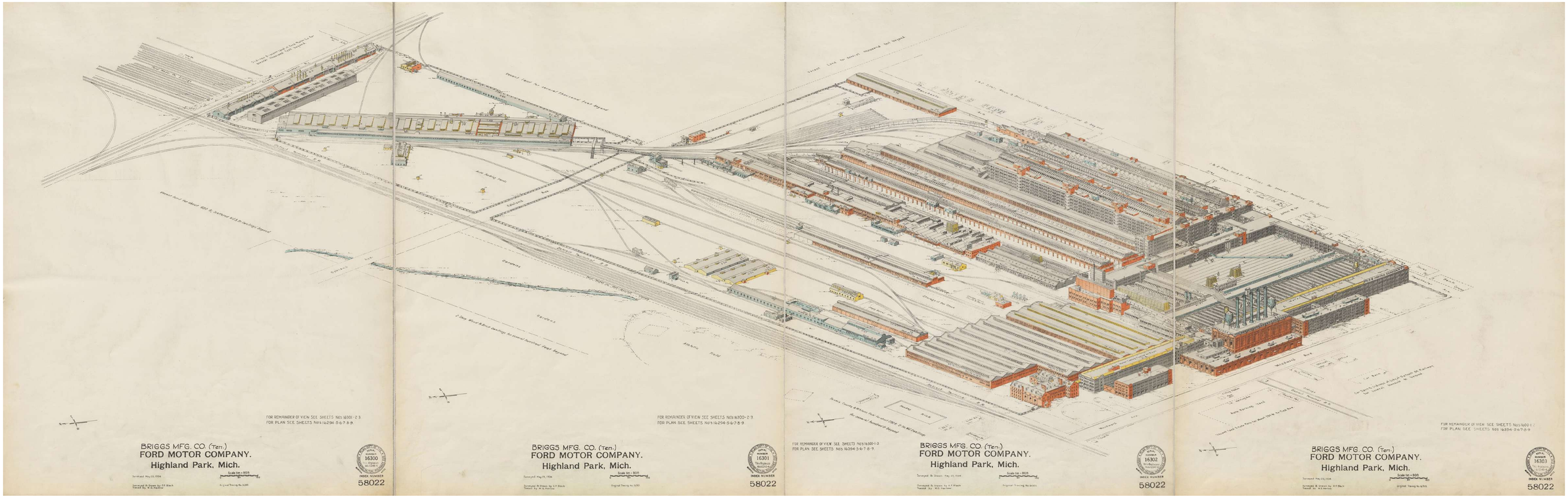


Figure 128: Fire Insurance Map of Briggs Mfg. Co. at Ford Motor Company Highland Park Plant, Surveyed May 23, 1924.
Source: From the Collections of Manufacturers' Mutual Fire Insurance Company Records, Object ID: 86.1.1694.2. Benson Ford Research Center.

Roudge River Plant

The Ford Rouge River Plant[111] was started to build in 1917. Henry Ford, soon after Highland Park started the operation, found out the limitations which the company was facing. At the top of the list were the essential needs for the production of the fundamental Automobile components for the assembly line. Although at that time, Highland Park was actively producing assembly Parts, that was not enough for the company's needs due to several reasons. First, the production rate did not meet the assembly line requirements. Second, Ford thought that if he successfully produced everything from scratch, the company would be guaranteed from the market fluctuation. Due to this importance, not only was the designing process shaped to build a new plant for controlling all the process under his hands, but also he went one step further to buy a chain of mines and farms to provide raw materials for the company.

The RR Location was located on the coast of River Roudge dearborn michigan. The reason behind Henry Ford choosing this piece of land[112] was not because of the immense importance of land from an industrial point of view, but because it was cheap and he only had to pay about seven hundred thousand dollars for purchasing it.[113]

This number for one thousand acres was nothing. Specifically when comparing it with the million-dollar contracts signed between Ford and the US Navy for production of war submarines and, most importantly, the Eagle boats.

The eagle boats project was not only created economic benefits for the company but also led the company to achieve significant concessions from the Navy, like enhancing the canal depth for ship transportation. This development provided a crucial opening for improvements in material handling and established the possibility of a waterway link for import and export principles in the system.

"Based on this information, we can conclude that the rapid development of the River Rouge (RR) plant was primarily driven by the urgent demands and opportunities of war production. The necessities of wartime manufacturing intersected with the expansion of the transportation system, leading designers to create horizontal steel-and-glass buildings rather than traditional masonry mills (like the Piquette Avenue plant) or reinforced concrete structures (like the Highland Park plant). Although this new approach introduced significant changes, it retained fundamental features from Highland Park—such as the expansive 'daylight factory' design—and integrated them with the 'five-year plant' concept.[114]

In addition, flexibility was another fundamental approach followed in RR. This option allowed the FMC to produce the Model T again after WWI and alongside with th finalizing of the war manufacturing. This flexibility led the First building[115] to start Model T production, Model A production, and even Fordson Tractor production in its lifetime.

This approach led Ford to attract governmental benefits because of its ability to quickly switch between the products. Once more, from the civilian production to War production in WWII.

Despite that, the design of RR was set up like a feed plant for Highland Park in 1927. The company introduced Model A, and RR was chosen as a final assembly line for this model; because of this decision in that year, the RR plant started to assembly car base on its own.

The RR Plant was formed like a fort. In opposite of Highland Park plant, which was mainly known as a walk-in factory, the Rouge was surrounded by the net of railroads, walls, and a river. The only entrance into the site was under extreme control. There were no specific monumental buildings like Highland Park to convey the company identity. [116]

In fact, the only thing which represented the owner of the company was a banner on the top of the highly controlled entrance door.

Even the offices were not built on the RR site. At this time, replacing the office outside the industrial complex was one of the modern management principles. Although the work was extended and the administration staff was increased next to the labor, mainly, the previous office buildings were proposed as enough and acceptable spaces for those activities. Plus, the modern manager prefers to be located in the center of the cities and not get caught up in trivial problems. In addition, other companies like General Motors hired Kahn to design their complex-specific office buildings in the center of Detroit. These changes result from an increase in production rate and accordingly an increase in the administrative staff[117]. By the way, as time passed, the production was transferred to the RR from the Highland Park plant.

> **"Whenever production warrants it the practice of bringing the machine to the part rather than the part to the machine is followed. Eighteen Highland Park departments are being moved to the Rouge in order that all operations from the melting of ore to the final assembly of the motor may be made continuous. It is easier to move the machine to the Rouge plant than to bring castings to Highland Park in constantly increasing numbers."**

Ford Model T was at its golden time in RR[118], although in 1926, when FMC decided to replace it with a new model, it took 6 months for them to adjust the company to it. This clarifies how the company developed itself into the new needs of the market and, in general, in the era. The flexibility came from the repeated factory losses and represents how far a factory like RR can go.

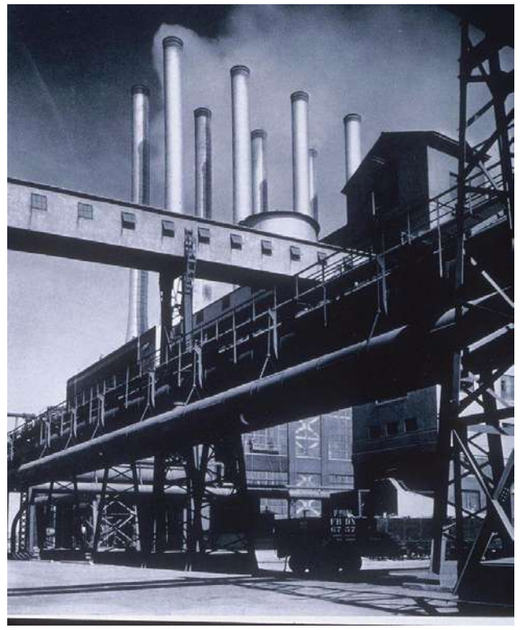


Figure 129: Dearborn: Ford Motor Company general view: Main Power House.1917-25.
Source: Part of Visual Arts Legacy Collection, Jstore ID: 13552604

111 RR

112 Due to the Sorenson sadys

113 Biggs, The Rational Factory, 138.

114 The "five-year plant" emerged from a strategic concept where industrial facilities were designed for a limited lifespan, prioritizing rapid construction and operational speed. By intentionally reducing building durability, companies could significantly lower both capital costs and production lead times. This architectural shift toward horizontal glass-and-steel plants allowed major manufacturing firms to dramatically increase production rates, a necessity that became particularly critical during the mobilization efforts of the two World Wars.

115 Building B, probably because of the word "Boat".

116 Even the RR Powerhouse, which was extremely bigger than Highland Park, with eight chimneys, but no sign of FORD, and with no monumental aspects. In fact, there were no viewpoints for the civilians to see the Powerhouse. FMC, although, created controlled tours for tourists and visitors, which started in Highland Park and continue to 1980th.

117 Biggs, The Rational Factory, 156-157.

118 Biggs, The Rational Factory, 150.

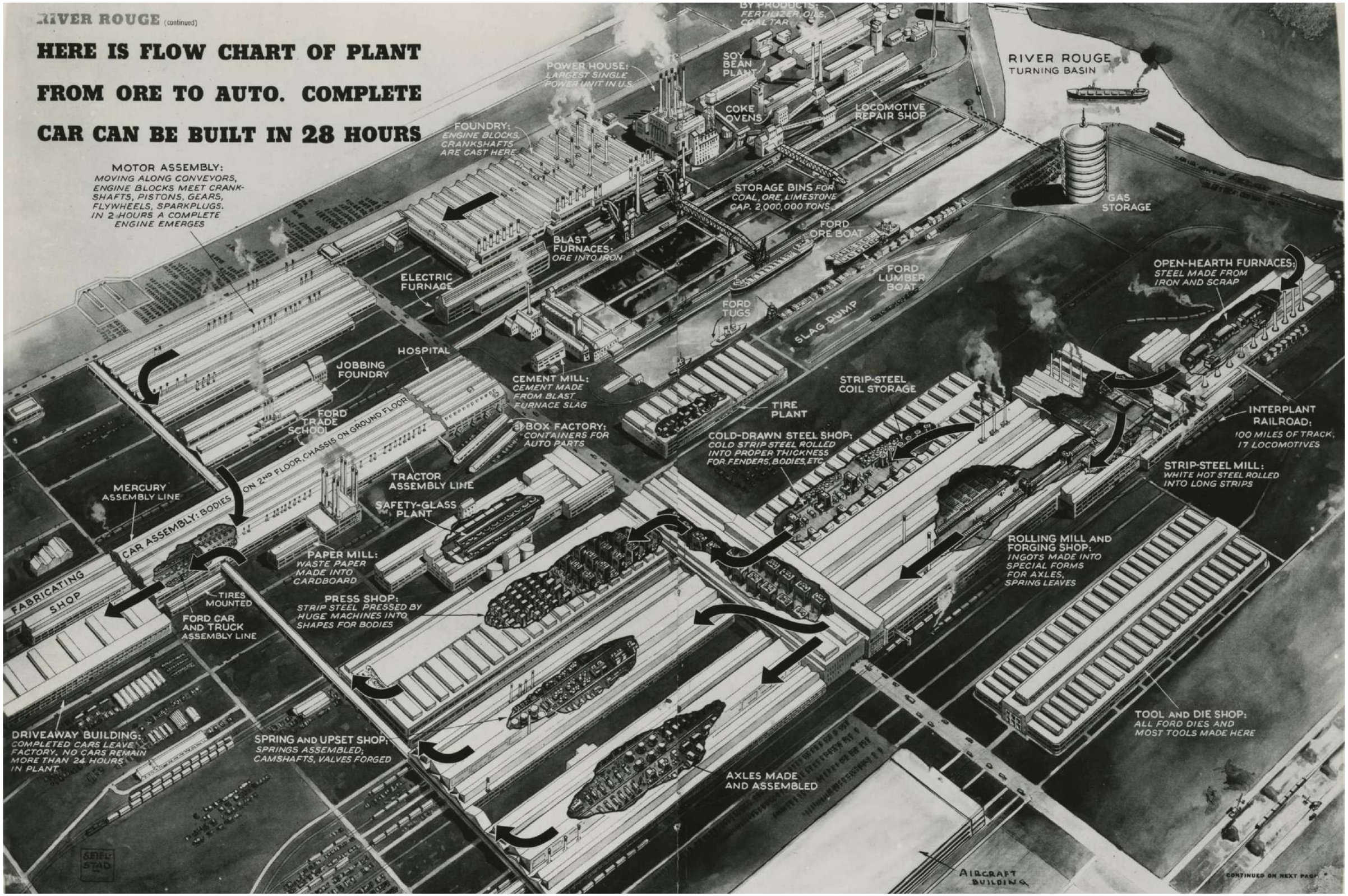


Figure 130: Ford Rouge Plant Pictorial Flow Chart, "Complete Car Can Be Built in 28 Hours," 1940.
Source: From the Collections of Photographic Vertical File Series, Object ID: 84.1.1660.P.833.75060, Benson Ford Research Center.

The Human Component: Systemic Power and the Filtered History of Fordism.

The rapid transformation in FMC from the Mack Avenue Building into the River Rouge plant was not just the result of technological development. Rather, this huge evolution was based on the critical decisions that took place in the company's history, together with the social engineering and fundamental knowledge about the production process among the high-ranking managers and developers.

Henry Ford himself can be listed among the inventors before business management, although alongside the Ford Motor Company development, these managerial aspects became stronger and stronger in his personality. This means he was familiar with the work principles, and his knowledge in the work he was doing was well known to everyone.

On the other hand, the process from Mack to Rouge was not only on Ford's shoulders. Ford bought the total share of the company,[119] [120] and changed the work into the family business. Even before, due to his share of the company stack He was the person who made the final decisions. But in fact, according to many documents, he delegated authority to his son Edsel and Charles Sorensen[121], and they were faced with the main responsibility of the Company.

Even after Henry Ford, his son, and his high-ranking management team, there was a chain of command including a complicated network of managers, foremen, and other decision-makers who were creating a technical body of the factory and had a huge influence in decision-making.

119 1919

120 Glazer, Detroit: Urban Development, 82.

121 Biggs, The Rational Factory, 153.

In architectural fields, it was also notable if we consider Kahn as Ford's architect; his approach was readable, notable, and understandable. But the important question is how much his personality was effective in architectural decision-making? Who was behind his name, and how were those people effective in the architectural decision?

Taken together, the architectural output is the result of integration between Ford engineers and Kahn architects, leading us to recognize that these transformations also depended on anonymous individuals within the system. Although famous figures of the 20th century like Henry Ford, Albert Kahn, Sorenson, and Bennett were not ignorable, the history of the company, mass production, and architecture would have been different without them.

In addition to this matter, the historical path was created in the Mack, Piquette, Highland Park, and RR plant. This change in the buildings besides of the key figures, clarifies strong motivation for mass production in the 20th century.

Between the two World Wars, the production reached its peak with methods which were tested and developed daily. Between 1903 and 1927, the FMC produced the Model T, the only model that created the meaning for mass production and put a nation on wheels.

Although the model was not faced with significant changes during its lifetime, the approach and the method behind it were changing, testing, and improving day by day in three different plants to make the process faster and cheaper.

This fact created a perfect example to present how the story took place behind this effort. Through technological development, the introduction of the assembly line, and the reliance on factory building advertisement, World Wars I and II War production, flexibility, everything under one roof, daylight factory, reinforced concrete, glass and steel, Horizontal layout instead of vertical one, social engineering, hidden resistant against the labor communities and many other significant events which all occurred under the model T production.



Figure 131: Ford Model T Roadster, August 1925
Source:From the Collections of Photographic Vertical File Series, Object ID: 84.1.1660.P.833.43570, Benson Ford Research Center.

In conclusion, beyond the strategic decisions that propelled the company along this trajectory, the human element remains a central theme. Countless individuals were systematically severed from their cultural identities and compelled to abandon their heritage to function as components within the vast industrial machine engineered by Ford and his technical team.

The actual lives and hardships of the labor force represent a reality that extends far beyond the sanitized narratives found in the official documents published by the Ford Motor Company. Throughout its history, FMC aggressively generated promotional materials centered on its economic campaigns. The existence of an internal photography agency and the company's own newspaper, coupled with its substantial influence over the broader media, created a vast reservoir of filtered documentation that continues to challenge researchers in the industrial field. Conversely, to establish a historical balance and move closer to the authentic experience of the working class, it is necessary to scrutinize subjects that were systematically excluded from the company's research centers and official archives. Critical topics such as the labor movement, racial inequality, the true impact of the five-dollar day as a pressure lever, and the forced nature of Americanization were notably absent from the records presented to the public eye.

An exhaustive examination of this parameter lies beyond the immediate boundaries of the current study; however, it is noted herein to preclude biased interpretations of the historical narrative and provide a more balanced perspective on the industrial evolution under discussion.

Conclusion

The Model T was produced from 1908 to 1927. The 19 years of production without a significant change represent the company's effort in high-speed production. In other words, FMC dedicated all the resources to increasing production speed without any significant change in the outcome.

Throughout this nineteen-year span, the Model T was the sole civilian automobile manufactured at the Highland Park facility. While the firm simultaneously engaged in military manufacturing or the assembly of trucks and ambulances, these endeavors were typically limited to brief intervals and often used designs fundamentally derived from the original Ford Model T architecture.

This period, with a single outcome, contains a long list of notable developments and innovations in the Ford Motor Company. For instance, material innovation was among the pioneers. The use of stronger steel in car components and the soy-based color for car painting could be listed as examples in this field.

Next, the Innovation in materials. The technological development involved dramatically increasing the production speed and reducing costs in parallel. Piquette Avenue and the first examination of the assembly line changed Ford from a small car manufacturer in Detroit to one of the industrial leaders of the century; later, the development of material transportation like gravity ramps, overhead monorails, chutes, and cranes. In parallel with some general but important developments in the industry, like widespread usage of electric engines, it was listed among the innovations in the technical and process management aspects.

Next to this technology, the architecture of the plant was changed. The new technology faced different needs in terms of architecture and spatial management. The multifunctional spaces, the concept of everything under one roof, the notable change in architectural technology, technique, and material like the usage of reinforced concrete instead of masonry materials, and later on replacement with steel and glass. The plant was among this list.

In addition, Ford's name is always associated with the social engineering of the working class. The unification and Americanization, Ford English school, and systematic background removal were noted next to the labor relocating and demolition of the ethnic neighborhoods was among the important actions and social innovations which had been done by Ford Motor Company.

At the end of the first half of the 20th century, the company was not dedicated to producing different models; instead, they focused on developing a single model step by step, making it better. Meanwhile, they did their best in the background and in the production process, assembly line, materiality, and social management. This approach is in parallel with two WW, where FMC has a significant role in it: not only created a huge need and, as a result, huge advantages for the company, but it also created a strong opportunity for it by creating a series of demands which could be perfectly answered by the Ford method. The emergence of essential needs on one hand and mass production on the other hand. Although it was not easy to specify which one is the cause and which one is the effect of the other.

Ultimately, whether driven by one factor or a synthesis of many, this historical trajectory established a framework that catalyzed numerous innovations still influencing modern life nearly eight decades later. Examining this progression offers a comprehensive perspective for future scholarship aimed at illuminating industrialization's impact on urban society, architectural heritage, building technology, and the evolution of material application.



Figure 132: Ford Motor Company Employees, Piquette Avenue Plant, Detroit, Michigan, 1906
Source:From the Collections of Photographic Vertical File Series, Object ID: 84.1.1660.P.O.2199, Benson Ford Research Center.

FABBRICA ITALIANA AUTOMOBILI TORINO

The chapter traces the journey of industrialization of Turin from the emergence of the automobile industry to the definitive collapse of the “city-factory” model, focusing primarily on FIAT. It explores how a radically new urban identity was forged through the powerful convergence of entrepreneurs, capital, technological innovation, massive waves of human labor, advanced machinery, and new energy sources.

Structurally, the narrative follows FIAT’s footprint across the city. Starting from its creation , policy and methods to gain a strong foundation, to its settlement and expansion in Corso Dante, Grandi Motori, Lingotto, and Mirafiori. Showing a gradual transformation of architecture, highlighting the innovations, marking its peak novelty and fall in Mirafiori.

A central focus of the chapter is dedicated to Lingotto, a building that makes a statement through its architecture and became a symbol of Futurism, marked with unique novelties and definitive superiorities in Europe. The building is analyzed through its urban context, architectural expression, innovation and decoration, rationalism of work and structure to explain the criteria that shaped this building.

The Industrial Expansion and Automobile Fever

From 1901 onward, the Italian peninsula experienced an unparalleled period of Industrial growth, with a highly favorable international economic climate, aided by the state, entrepreneurs, and new commercial banks between 1896 and 1908, which, economically, made Italy unique and Turin among all.

Turin ranked in the top 3 urban centers with the highest numbers of workers, energy consumption, and mechanization of production. The industrial population more than doubled, while warehouses and factories accounted for one-fifth of all the new constructions in the city. Industries like textile firms lost their dominance and focused on exports, while modern steel, hydroelectric, and machine industries entered the field with the prominent effect of engineering in their expansion. Between 1905 and 1911, the leading automobile industry five folded its workforce and employed one-third of the city's entire manufacturing population by 1911.[1]

A major reason for this expansion was electricity, starting from 1896. Following Galileo Ferraris' advice, hydroelectricity was harnessed from the three closest mountain torrents.[2] The electricity was developed through the monopoly of Elettricità Alta until 1907, and with the support of automobile investments, with the capital of 25 million in 1908, became the largest Italian company at the time and the owner of Turin's tramways. But its exclusive control over electricity pricing posed potential risks to the stability of local factories. Following a referendum, Turin implemented a municipal energy policy in 1907 to provide affordable power for businesses and street lighting. The city's Azienda Elettrica Municipale (A.E.M.) established its first facility, the Martinetto thermal plant, in July 1907, followed by the Chiomonte hydroelectric plant in 1909. As a result, electricity production and distribution expanded rapidly. Improved distribution and increased supply reduced prices and enhanced availability for industrial users. Power production rose from 2,242,000 kWh in 1908 to over 18 million kWh in 1911, and reached 68,850,000 kWh by 1918. This growth led to a 22% decrease in energy prices in 1907 and a 45% reduction between 1907 and 1914. By 1918, industrial clients accounted for 58% of A.E.M.'s total energy sales. Ultimately, it can be said that the rapid growth of electrification had a significant impact on the expansion of industries, particularly the automobile industry.[3]

In 1907, there were 71 automobile factories in Italy, 32 in Turin and 15 in Milan. During that year in Turin, other than Fiat, there was Michele Ansaldi, whose company was absorbed by FIAT, and was collaborating with Matteo Ceirano to build the S.P.A. automobiles. Giovanni Ceirano, who had sold his patents also to FIAT, left the same year to found the S.C.A.T. company. Vincenzo Lancia, the FIAT racing driver, opened his own factory in 1906. The 32 automobile manufacturing companies of 1907 had capital exceeding 68 million lire, while Italy exported 1,283 cars in the same year, worth 11,848,000 lire. In 1907, FIAT achieved a profit of 35.85% relative to its capital and reserves. The desire to sell caused the depreciation of the equipment not to be considered, and 90,000,000 lire were invested between 1905 and 1907. Turin was home to a total of 56 companies in the automotive auxiliary and accessory industries. In June 1906, 1,755 people worked directly in automobile manufacturing, which employed over 5,000 people in total. FIAT had 628 employees and exported 50% of its production, representing 75% of Italian automobile exports. Its overall production accounted for approximately 50% of Italy's total output.

By 1907, due to the world economic crisis, automobile exports collapsed, resulting in large losses appearing in the balance sheets, and workers were severely affected by unemployment. This crisis shaped the organization of the first major trade union federations.

As a result, many companies sold their factories at rock-bottom prices or transferred their activities to machine tools and automotive accessories, and others continued through loans.

Fiat, while losing 7 million lire out of 9 million lire, raised new capital in 1908 and adopted a new system; Fiat acquired stakes in the major companies that supplied raw materials, semi-finished products, and automotive components. On the other hand, a new method was used to increase the efficiency of the workers and raise production. These methods helped Fiat to lower the price of its cars by 50% and, in the end, it came out of the crisis far more powerful than other companies such as SPA, Itala, SCAT, Rapid, and Lancia.[4]

This long-running project of Industrialization of Turin, accelerated significantly after 1900 with the planning of Mayors and the aid of banks, prominent investors, and influential figures. Mayors like Secondo Frola (1903–1909) and Teofilo Rossi (1909–1915) had a huge impact through actions that lowered production costs, increased access to affordable electrical power, and improved the technical qualifications of the labor force. They modernized transportation, social services, and telegraph and telephone networks to enhance communication within the industrial triangle (Turin-Genoa-Milan).

They reduced tax burdens on manufacturing, invested in trade schools to train industrial workers, and transferred public properties to industrial developers on highly favorable terms to encourage the construction of new factories. These actions were highly costly for the municipality but would be calibrated by the loans from principal banks and institutions like the Cassa di Risparmio and the San Paolo. These actions changed the face of Turin totally to an industrialized city.

Economic prosperity driven by factory advancement expanded the wealth among the city's elite and caused the creation of rich neighbourhoods with expensive Art Deco villas in the foothills of Turin.

While industrial buildings were being stripped of ornamentation and their components mass-produced in factories, the luxurious Art Deco residences were rising at the foothills. These villas, crafted with the meticulous labor of artisans creating unique decorations, split the city's identity into two distinct architectural realms. This made Turin the major international center of the Art Deco movement in modern architecture.

The Industrial Revolution also enhanced the middle class's situation. Consumption of meat, butter, and wine increased especially after 1908, and they joined in leisure activities in cinema, sports, and other forms of voluntary group participation Turin was achieving success in various areas. In the film industry from the early 1900 till the WWI, Turin became an important center. On

1 Cardoza and Symcox, A History of Turin, 206-207

2 the Doire Ripaire, Stura di Lanzo, and Orco. The electricity was transferred from two lines first, Bussoleno in the Susa Valley and Castellamonte in the Orco Valley. In this way, by 1898, Turin had access to 4,000 kW of power at 10,000 volts, which was a big success compared to the 735 kWh thermal power plant in 1888.

3 Gabert, Turin, ville industrielle, 116- 117

4 Gabert, Turin, ville industrielle, 122- 123

the threshold of WWI Turin had 14 production companies and between 40 and 50 theaters, attracting large numbers of actors and actresses. In sports, Turin was the main center in Italy, with a special relation with new sports. As a fact, Turin had the first automobile road race in 1898, and the first national truck race in 1900, with a lot of adherents from the wealthy class. On the contrary, cycling had supporters among both the working class and the wealthy class. Soccer was the most pioneering sport with the leading role of the Italian Soccer Federation, and during the first decade of the 1900s became home to two professional squads, Torino and Juventus, which were followed by their prominent popularity

Overall, Turin's special status in sports resulted in the construction of a national stadium on the occasion of celebrating the fiftieth anniversary of the unification of Italy in 1911.

Turin's industrial growth after 1900 revitalized its intellectual life. New publishing houses augmented established ones like Pomba, Paravia, and Loescher, leading to an increased output of investigative reports, economic texts, historical works, and manuals. Local press readership more than doubled, and the city's main daily, La Stampa, began to compete with Milan's Il Corriere della Sera. Under Alfredo Frassati, La Stampa featured prominent contributors, including economist F. S. Nitti, criminologist Cesare Lombroso, elite theorist Gaetano Mosca, and young economist Luigi Einaudi, who would become Italy's first post-1945 president. Many of these figures also launched La Riforma Sociale, a leading journal edited by Einaudi after 1900, which offered in-depth analysis of national economic and social issues for an informed public.

This economic prosperity was not equally welcome for all groups. While the middle class enjoyed new opportunities, the working class remained without a pay raise while the cost of living was increasing in the expanding city. However, the capacity of the city was not in pace with the expanding population; between 1901 and 1915, the population rose by 43%. In the working-class neighborhoods on the outskirts of Turin, which experienced a dramatic 500% population increase from 1891 to 1911, residents faced overcrowding, high rents, and elevated levels of tuberculosis, alcoholism, suicide, and infant mortality.

There was a stark contrast between the extremely low standards of living and the strict, disciplined environment of the workplace. This shared collective hardship bound the workers into a common class identity. Unlike the middle class, whose interests centered on mainstream entertainment and sports, this distinctive working class forged their own leisure rituals and social dynamics, centered exclusively within their own neighborhoods.[5]

5 Cardoza and Symcox, A History of Turin, 210-212

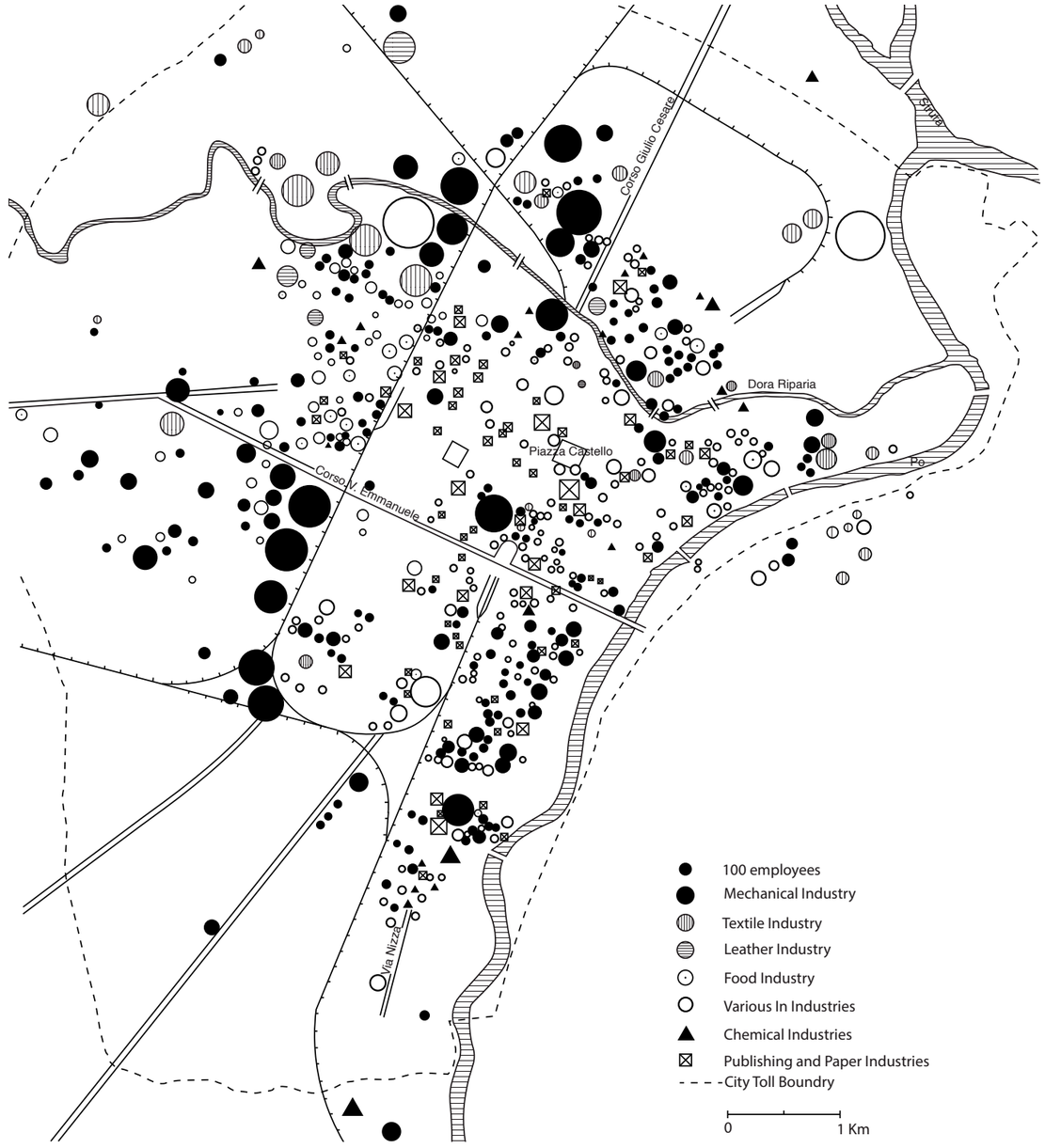


Figure 133: Industries of Turin in 1914, Redrawn by the author based on Gabert
Source: Gabert, Turin, ville industrielle, 109.

Fiat Grandi Motori

Officine Meccaniche Ansaldi[6] grew over the years, and the founder was about to produce hydrocarbon combustion engines in March 1905, but with the encouragement of Banca Commerciale Italiana, he decided to combine with Fiat, and this was the birth of Fiat Ansaldi, and the company started the production of "light four-cylinder cars. After a short time, disagreements rose, which led to the resignation of Michele Ansaldi and the absorption of his workers by Fiat under the new name of Fiat Brevetti.[7]

After that, due to Fiat policy for bringing other companies under its fold, Fiat absorbed San Giorgio shipyard di Muggiano, producing combustion engines for shipyards, submarines, and submarine torpedo boats. The factory included a mechanical processing department, a foundry, and a modest forging plant.

Between 1911 and 1913, due to the growing need for production of engines for merchant ships and submarines, Fiat decided to build an engine workshop. The project began under the design of engineer Giacomo Matte Trucco, a large reinforced concrete building on the northern side of Via Pinerolo, 160 meters long, 35 meters wide, and 18 meters high, including a central bay housing, the large-engine manufacturing departments, the related test room, and two two-story lateral bays housing the sections dedicated to small-scale manufacturing, assembly, and auxiliary services.

In 1916, Fiat San Giorgio was sold to the Genoese Ansaldo group, and its name changed to Ansaldo San Giorgio. The factory during WWI, with 4,000 workers, produced diesel engines for submarines, torpedo launch tubes, floating mines, and several hundred aircraft engines for military aircraft. After the war, it demobilized war production, reduced manpower, and started construction of mercantile use engines.

In 1923 the company was bought back by Fiat and this was the birth of Fiat Grandi Motori, which was dedicated to the construction of diesel engines for any application and in particular for marine use . the plant went on a major renovation containing covering some courtyards, closing the forging facilities, expanding the facilities for producing medium-sized engines, building a new foundry, a new shed for engine assembly and testing, and a large warehouse and materials storage building along Corso Vercelli, bringing the plant's total surface area to 37,000 square meters which completed in 1928.

In 1935, due to the increase in production, some minor workshops transferred to Lingotto, while the building also expanded in Via Cuneo. A building with reinforced concrete was built, dedicated to large machines and equipped with two two-story lateral wings suitable for extending small- scale machining. And on the eve of the Second World War, this enormous facility had nearly 5000 workers and extended across two clearly defined cores over a total surface area of approximately 115,000 square meters.

During WWII, the factory continued its work despite the bombings. In 1943 and 1945, the workers had multiple strikes against the war and the fascist regime. On 28 April 1945, the workers of Fiat Grandi Motori, along with other factory workers, occupied the factory and, with the aid of the Garibaldi Brigade, gained control over the factory.

Following the post-war reconstruction in 1951-1954, Grandi Motori expanded and updated the premises and production facilities, which was facilitated by the availability of space on the south side of via Cuneo, which was moved to the Mirafiori complex in 1950, and by the new production capacity it gained increase in orders between 1957 and 1960. And in the early 1960s during the era of profitability for the factory, it covered a surface area of 182,000 square meters, including 85,000 covered area.



Figure 134: "La basilica" designed by Giacomo Mattè Trucco in 1911, located on the north of Via Pinerelo at the corner of Via Mondovi. the building was called in this name due to the ceiling height, long hall and its greatness
Source: Archival photograph of FIAT Grandi Motori, available on La Repubblica

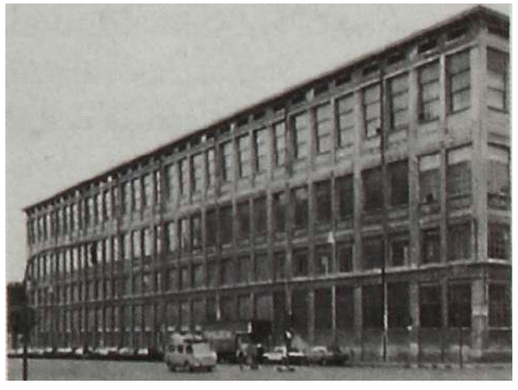


Figure 136: The Lingottino building designed by Engineer Giovanni Chiesa built in 1926 and located at the northeast corner where Corso Vercelli and Corso Vigevano intersect
Source: Archival photograph of FIAT Grandi Motori, available on MuseoTorino

From 1966, the factory started downsizing and by 1971 it transferred totally to Trieste. Due to the closure of San Marco shipyard of Trieste a policy of compensation applied to support employment and develop related industries.[8]

After a series of changes in functions for Fiat TTG and Fiat CIEI, the complex went through reduction of industrial activity and shut down completely in 1996. 80 % of the buildings were demolished in 2010 with a plan to build a residential area which is not in operation yet.[9]



Figure 135: Demolition of Fiat Grandi Motori in 2010, while few buildings like Ex officine La basilica was at the left side of the picture preseved until present.
Source: Photo by Laura Tori, available on La Repubblica.



Figure 137: aerial view of the complex in 1940
Source: Archival photograph of FIAT Grandi Motori, available on La Repubblica

6 for more information about the building look at page 30

7 Comba and D'Attorre, Torino 1914-1976, 68

8 https://www.istoreto.it/to38-45_industria/schede/fiat_grandi_motori.htm

9 Paolo Arlandi, Binari per gli stabilimenti. Il tempo dei raccordi industriali a Torino (Pinerolo: Alzani, 2016), 319

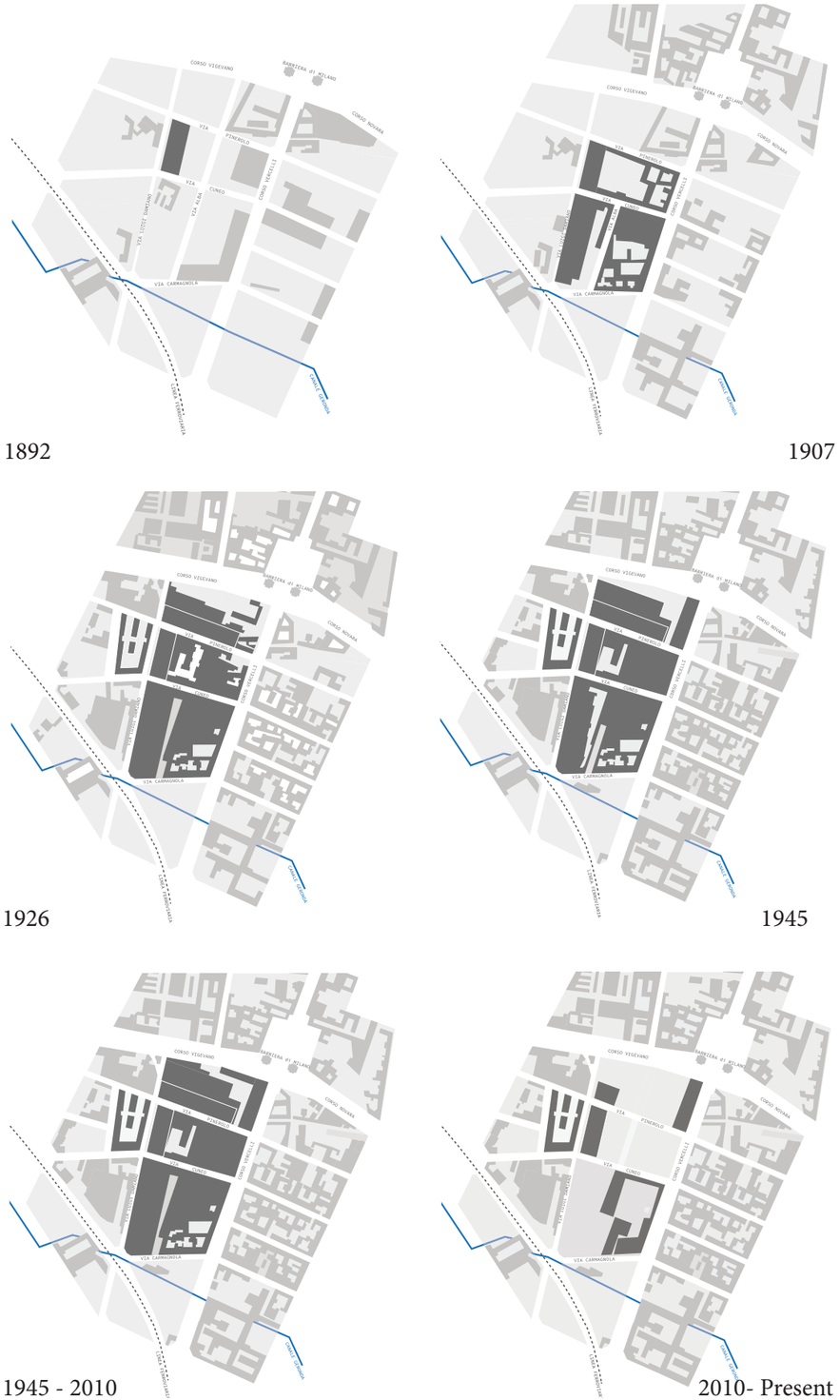


Figure 138: The expansion of Fiat in northern part of the city through the years
Source: Costanza Pacini, Le Officine Grandi Motori: Progetto di riqualificatione dell'ex area industriale (Turin: Politecnico di Torino, 2023), 12-13.



Figure 139: Current state of the Lingottino building, view from Via Cuneo, 2026.
Source: Photo by the Author



Figure 140: Current state of the La Basilica building next to Ex Officine Ansaldi (later FIAT Grandi Motori), view from Via Cuneo, 2026.
Source: Photo by the Author



Figure 141: Current state of the Interior view of Ex Officine Ansaldi (later FIAT Grandi Motori), 2026
Source: Photo by the Author



Figure 142: Current state of the Interior view of Ex Officine Ansaldi (later FIAT Grandi Motori), 2026
Source: Photo by the Author



Figure 143: Interior view of Ex Officine Ansaldi (later FIAT Grandi Motori)
Source: Centro Storico Fiat available on Facebook



Figure 144: Current state of the facade of ex Officine Ansaldi (later FIAT Grandi Motori) under preservation, view from Via Generale Luigi Damiano, 2026.
Source: Photo by the Author

Fiat of Corso Dante

In March 1900, the first Fiat factory was inaugurated. A production plant was built on Corso Dante at the corner of Via Chiabrera with a primary area of 12000 m2, that through time, underwent a set of expansions until 1915 . The primary quarter was covered by bright-lit industrial sheds and was organized for 550 skilled workers with forges, furnaces, and a chassis and engine assembly section, using a propelling force produced by three 4.5-Hp electric motors.

Enrico Marchesi and Giuseppe Bellini were in charge of the designs and expansions of the factory. Starting from 1900, Marchesi looked into the design of covered structures of the Societa Nazionale Officine Savigliano and based on them added floors to the existing buildings and factories of Corso Dante or lengthened them in order to expand them. On the other hand, Valeti Bellini began a new phase in the building of production spaces in his designs, covering the courtyard with a system of vertical saw-tooth roof, using a grid of 3.6m* 5m cast iron pillars.

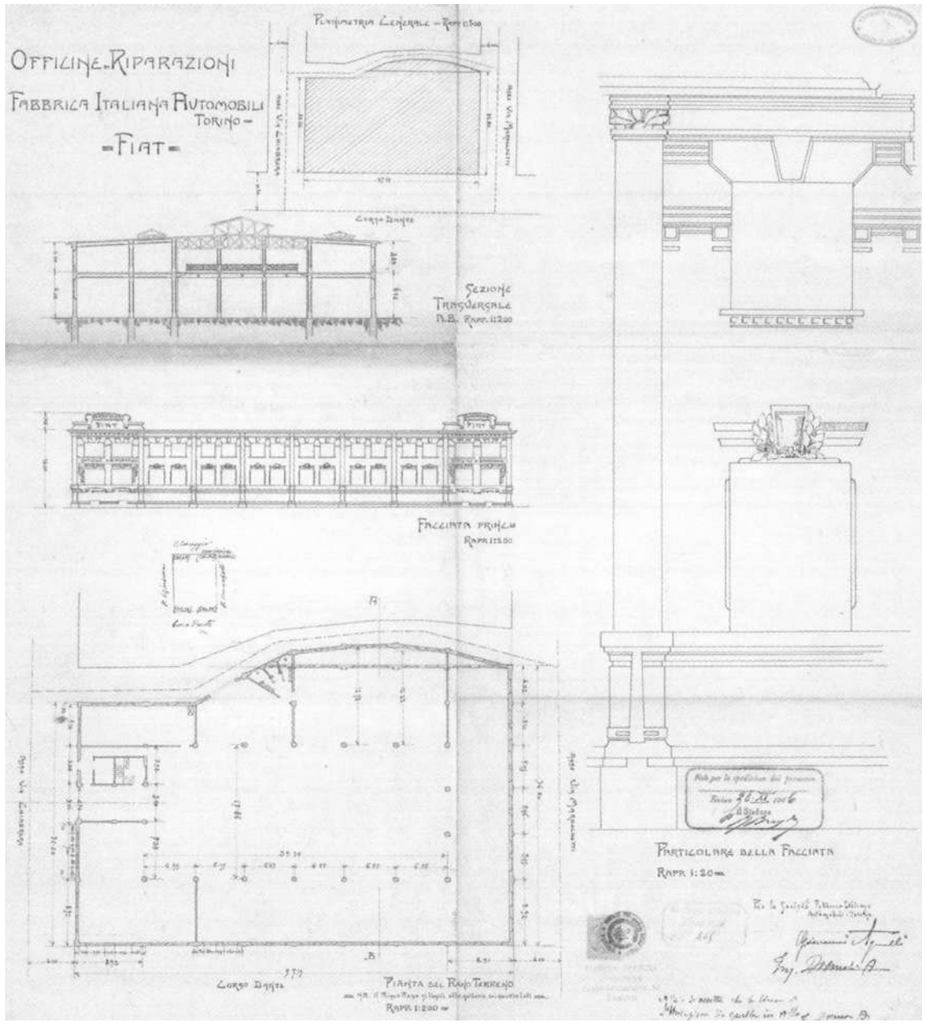


Figure 145: New Fiat Repair shop on Corso Dante between Via Chiabrara and Via Marochetti, Designed by engineer Alfonso Premoli, 1906
Source: Comba and D'Attorre, Torino 1914-1976, 58

In 1906, the engineer Alfonso Premoli started construction of a very large building for Fiat in south Corso Dante between Via Chiabrera and Via Marocchetti, intended for offices but mainly for repair shops, using reinforced concrete with galleries on two levels that extended along a great top-lit 20m*40m salon. On the main facade of the building, the name of the company was shown on two cornices on the front wall. This complex raised the production of FIAT up to 2000 vehicles per year.

From 1905, the speed of construction increased due to the use of reinforced concrete. On the other hand, Giacomo Mattè Trucco started his work in the planning offices of Fiat Brevetti. He studied American standards codified by Ernest Ransome and Albert Kahn through their projects for United Shoe Machinery Company in Beverly, Massachusetts, and the Ford Old Shop Plant at Highland Park near Detroit, which was based on a network of 8*6 reinforced concrete square pillars with blunted edges and Crittall steel windows. Also, Antonio Porceddu (founder of a construction company licensed by Hennebique concrete patent) entered the company at the same period. Together with Giacomo Mattè Trucco, they worked on a daylight factory model, which led to the design of new workshops of Corso Dante with a square grid of 7.7 m in 1905.[10]

A notable building in the complex of Corso Dante was the building on Via Marochetti, designed in 1912 by Giacomo Mattè Trucco. Innovatively, using a reinforced concrete structure made it possible to have large windows, which made this plant a daylight factory. It was built in 1913, with approximately 25000 square meters in 5 stories, subdivided into five departments: body shell processing, painting, stamping of metal parts, upholstery, and assembly and finishing. For the first time, opposed to the traditional organization and flow, the plant was based on a bottom-up vertical organization of production. The same system was later followed in Lingotto. The building could not serve this function for long, because of the increasing importance of aviation orders during World War I, it changed its application to the



Figure 146: Arial photo of Fiat di Corso Dante -1955, on the right the daylight factory designed by Giacomo Mattè Trucco in 1912 in visible
Source: Available of Immagini del Cambiamento online platform.

10 Comba and D'Attorre, Torino 1914-1976, 69-70



Figure 147: Office building of Fiat di Corso Dante
Source: Available of Centro Storico Fiat online platform.

manufacture of aircraft engines.[11]

The factory, with subsequent expansions, eventually occupied the area between Corso Massimo d'Azeglio and Via Monti, Via Tiepolo, Via Tiziano, and Via Marocchetti. Other departments, including the body shop on Via Madama Cristina, were located in the surrounding neighborhood. Soon, FIAT of Corso Dante showed its limitations in transportation due to its distance from the railway. For solving this problem, a strategy presented on June 23, 1915, to the municipality to connect the plants to the FS railway through a ring road, the connection, originating from the Torino Smistamento at the ideal extension of Via Garessio, would curve eastward through a partially built-up area to be expropriated, run along Corso Spezia, Via Santena, Corso Galileo Galilei, and terminate at Via Chiabrera near the factory, where a double-track section would serve as a yard. However, the ring road was never built because it was overtaken by the decision, made in the early months of the year, to build a new FIAT production plant in the Lingotto region.[12]

11 Duccio Bigazzi, "Strutture della produzione: Il Lingotto, l'America, l'Europa," in Il Lingotto: 1915-1939, ed. Carlo Olmo (Torino: Allemandi, 1994), 283.

12 Arlandi, Binari per gli stabilimenti, 118.



Figure 148: Current state of the ex-office building of FIAT as the Centro Storico Fiat, 2026.
Source: Photo by the Author

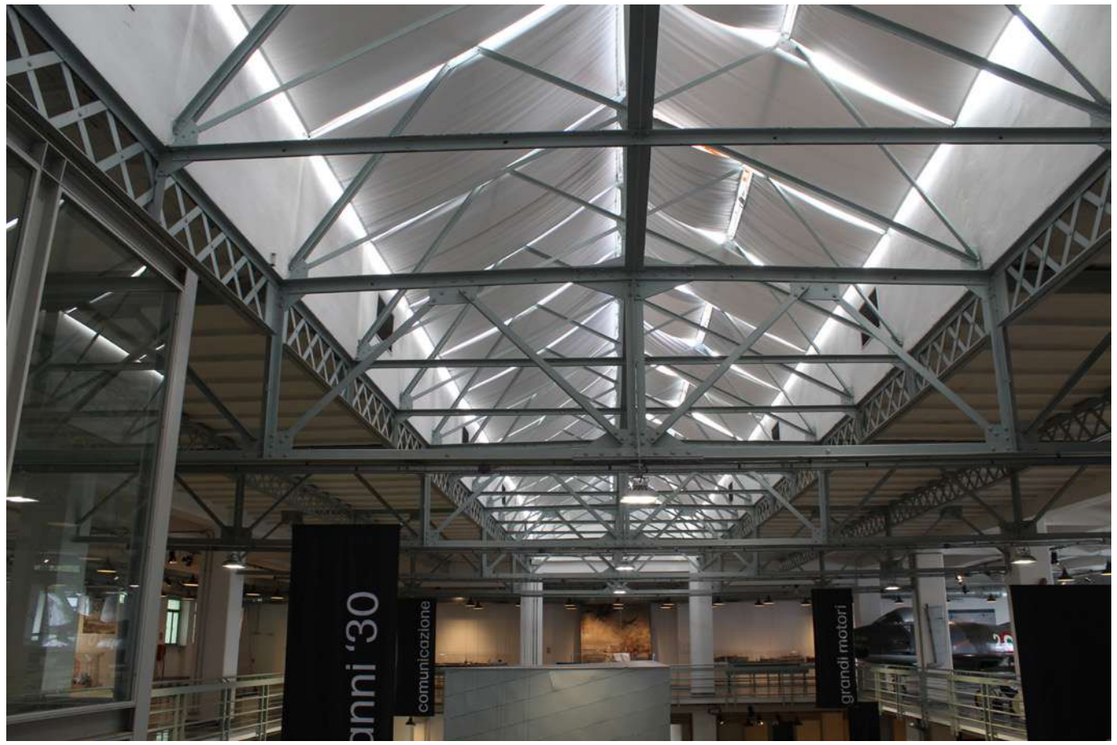


Figure 149: Interior view of the Centro Storico Fiat (former FIAT office building), showing the steel roof trusses and skylights allowing natural light to enter, 2026.
Source: Photo by the Author



Figure 150: The view of Via Gabriele Chiabrera: during the factory's active years, this street was ceded to Fiat and was completely lined with factories. Now, on this street, only the office building, repair shop, and Management Building remained.
Source: Photo by the Author



Figure 151: Fiat repair shop and Management Building (Officine di Riparazioni e palazzo della direzione Fiat)
Source: https://centrostoricofiat.com



Figure 152: Ex-training school of FIAT (Scuola Centrale Allievi FIAT), which now serves as a commercial and residential complex
Source: Photo by the Author



Figure 153: Current state of the ex Fiat repair shop and Management Building
Source: Photo by the Author

Lingotto

Building life cycle

As Fiat grew in the north of the city near the Dora River and along Corso Dante, the increasing demand for production, the traditional organization of workflow and the system, along with the lack of proper space, led to the construction of a new building in the Lingotto district. The first appearance of the Lingotto building in Fiat's documents is in June 1915, where it is described as "a new large establishment, American style." However, the uncertain market outlook and the outbreak of war convinced the board to initially abandon the massive investment. [13]

Looking at the situation of Fiat and Turin under the shadow of the upcoming war, the population of anti-war and neutralists outweighed the pro-war, and Turin was the only city in Italy to anticipate the declaration of war in May 1915 with a general strike of protest. However, all this could not prevent Turin from becoming a giant arsenal after the summer of 1915. While the construction of new factory space became fivefold, the decision about the Lingotto factory also changed.[14]

In 1916, with Italy's entry into WWI, the need for war-related products increased, and manufacturing was required on a greater scale. In October 1916, with the aid of investment incentives provided by wartime fiscal legislation, the project was resumed and executed this time.[15] During WWI, Fiat increased its capital more than sevenfold, quadrupled its production of motor vehicles, and enlarged its workforce from 3,500 to more than 40,000, equal to a quarter of all the workers in Turin. Also, controlled three-fifths of Piedmont's engineering sector and accounted for 92% of the country's production of trucks and 80% of its airplane engines by the end of the war. At the same time, Fiat expanded its exports to Italy's allies, whose armies absorbed almost half of its production.[16]

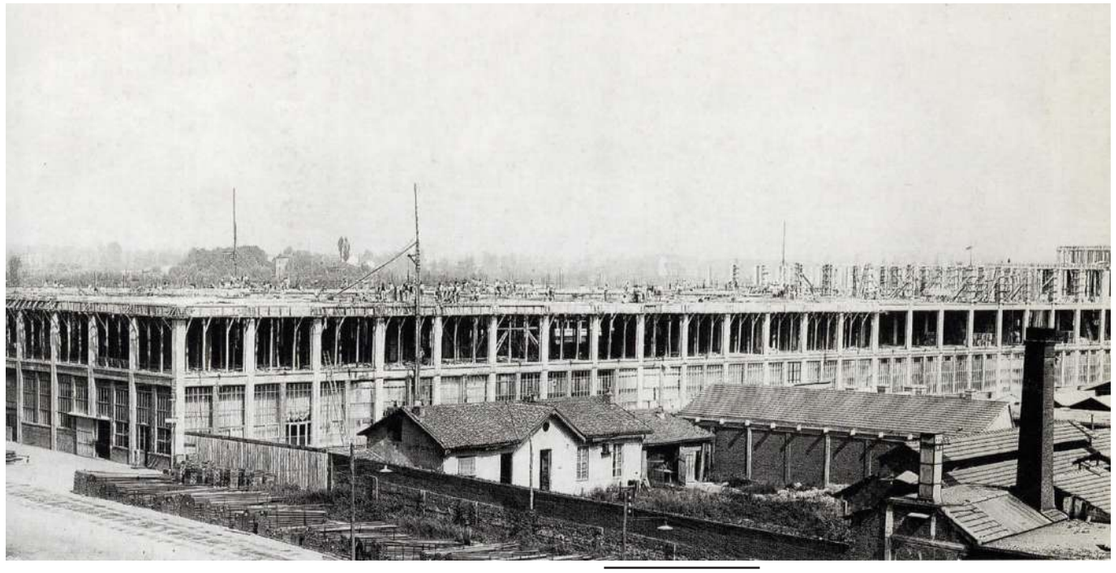


Figure 154: The first images of the Lingotto refer to the construction work at the site opened on September 17, 1916.
Source: Carlo Olmo, ed., Il Lingotto: 1915-1939 (Torino: Allemandi, 1994), "Un segno nella pianura," fig. 1.

13 Bigazzi, Strutture della produzione, 281.

14 Cardoza and Symcox, A History of Turin, 210-219- 220

15 Bigazzi, Strutture della produzione, 281

16 Cardoza and Symcox, A History of Turin, 210-220- 221

The construction site of the plant opened on September 17, 1916, authorized with building permits for a warehouse on Via Millefonti and the main industrial facility. The project, designed by engineer Giacomo Matté Trucco and presented on September 22, 1916, shows two long parallel buildings in five storeys, connected at the ends and in the central parts by five crossroads. The building had two distinct connections with the railway.[17] The press shop had come into operation in 1917, which housed, in its 16,000m^2, not only the actual pressing but also the forging, and the heat treatments. At the same time, work was progressing on the main building, where a real architectural dreadnought in concrete and iron was coming to reality. [18]

Due to the severe conditions of war, the working hours of laborers increased to 80-100 hours per week under strict military discipline while facing food shortages and severe inflation. This fueled immense anger among the workers and shaped Italy's biggest antiwar movement in August 1917, and faced with the army equipped with tanks, led to 50 deaths and 800 arrests.

After the war, however, Italy was victorious but severely damaged; the pattern of industry had been distorted, the balance of trade disrupted, and the railroad system allowed to deteriorate seriously. The war industry that guaranteed Turin's economy now started to collapse. Fiat dismissed 8000 workers to adapt to the peacetime market conditions, and the prices reached 300 % of the pre-war level by the end of 1918 and 465% by 1920.

So Turin became a major center for the rise of moderate socialism and the revolutionary left. The primary movement that emerged was a

17 Arlandi, Binari per gli stabilimenti, 183

18 Bigazzi, Strutture della produzione, 281



Figure 155: The first phase of construction work at Lingotto
Source: Olmo, Un segno nella pianura, Fig. 2



Figure 156: A conveyor belt operating within the foundry towers at the Fiat Lingotto plant, 1929.
Source: Olmo, Un segno nella pianura, Fig. 62

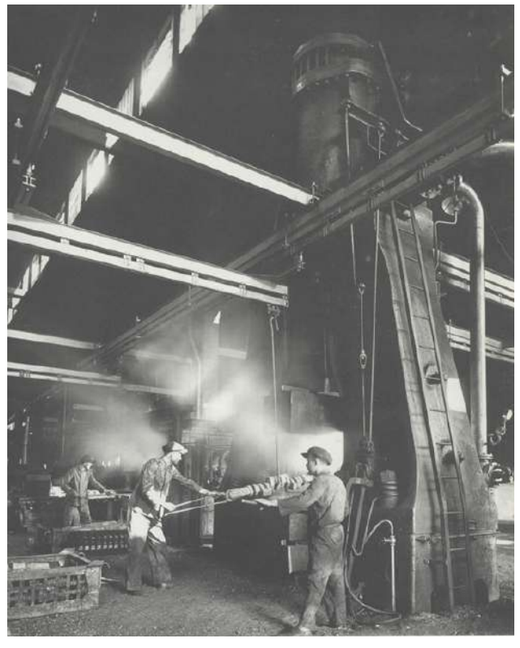


Figure 157: Workers utilizing a 10,000 kg Chambersburg drop hammer during the forging of an engine crankshaft, 1934.
Source: Olmo, Un segno nella pianura, Fig. 64.

radical campaign for worker self-management. Guided by a group of militant Marxist intellectuals, most notably Antonio Gramsci and his journal Ordine Nuovo, Turin's highly politically aware industrial workforce began forming "factory councils." These councils were explicitly designed to act as Italian equivalents to the Russian Soviets, giving workers a direct role in running the factories and preparing them for an eventual revolutionary seizure of power. This revolutionary movement led to two massive confrontations in 1920, often referred to as the Biennio Rosso (Red Biennium). The April general strike and the September occupation, where the movement reached its peak in Turin, where 150,000 workers took control of the plants. Protected by armed "red guards," the factory councils attempted to run industrial production themselves without management. The movement was defeated by the resistance and opposition of Turin's industrialists, the Socialist party, and labor unions, which stopped the strike and isolated Turin's revolutionary vanguard. These events paved the way for Fascism to gain power in Italy, followed by rage against lefties, which led to a massacre in December 1920 in Turin when armed Black Shirts rampaged through working-class neighborhoods, burning union halls and killing local leftists. The intense fear generated by these "red years" gave Benito Mussolini's small extremist Fascist movement a massive surge in support as the vanguard of a middle-class reaction against socialism.[19]

The construction of the building was finished in 1926, and during this period, things changed constantly in the context of the modern world. During construction, new parts were continuously added to the design and additional lands were bought, while facing problems for buying neighbourhood lands, in 1918 the Lingotto became a public utility by the order of a prefectural decree,

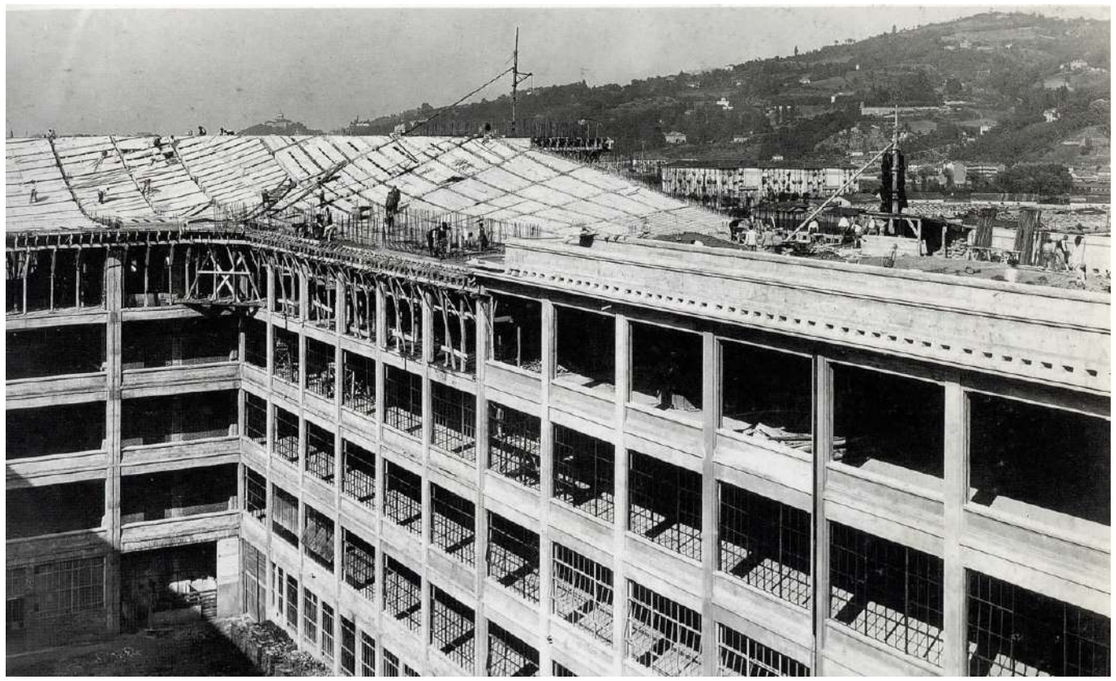


Figure 158: Construction of the test track
Source: Olmo, Un segno nella pianura, fig. 3

19 Cardoza and Symcox, A History of Turin, 210-221- 228

and this led Fiat to expropriate the holdout properties.[20] While constructing, a group of technicians were sent to United States for two months to closely study the methods and production organization of the American automobile sector, studying especially Ford Motor Company and other companies such as Dodge, Hudson, Nash, Packard, Pierce Arrow, and component manufacturers such as Fisher Body and A.O. Smith to update their system of machinery with them to need less number of labor among with the Taylorism method for a better work organization and to use maximum efficiency. This method, which was already applied to the building on Via Marochetti due to the trip to united state in 1912, also started to be used in the constructed part of the Lingotto factory.[21]

In July 1919, the famous rooftop test track was incorporated into the project, requiring the entire building to be raised by one floor and altering its structural volume, which in 1921, became operational.[22] The transfer of manufacturing departments containing bodywork and final assembly from the Corso Dante plant occurred throughout 1922 and in the same year Fiat decided to construct a new office building along via Nizza, Palazzina Uffici (office building), signaling that the center of the company is moving to the Lingotto complex, which was constructed and opened in October 1923 with the transfer of general management and central services to it. The factory was officially inaugurated on May 22, 1923, in the presence of King Victor Emmanuel III.[23]

In 1926, another important trip to united state happened, Ugo Gobbato and the highest-ranking managers of the Lingotto plant (including Genero, Rosso, and Callabioni) departed for Detroit and spent two months conducting an exhaustive study of American factories, they concluded that the secret to American low-cost mass production was primarily the result of "study, order, method" and the coordination of the production flow rather than just automated machinery.

They reached a better understanding of Taylorism and started applying the method more strictly. It came functional in Lingotto through a vertical integration, raw materials entered the ground floor, and as the car was assembled, it moved upward, finally emerging as a completed vehicle on the roof track. A year later, in 1927,to maximize productivity, Fiat added a new method for work organization, the "Bedaux system", which was first applied to a limited group and then expanded throughout the factory. During this period,the number of workers skyrocketed, growing from 10,203 employees in 1923 to 16,803 in 1925. The absolute peak for this era was reached in May 1926, with 18,131 workers employed.[24]

Further additions to the building occurred between 1926 and 1927 when lateral wings were added to the office building. During the expansion, two helical ramps in the north and south were also added to allow motor vehicles to drive up autonomously to the rooftop test track. In 1932, the production of aviation motors was transferred to Lingotto, requiring structural modifications to the upper floors.[25]

20 Comba and Olmo, In presenza del Lingotto, 126

21 Bigazzi, Strutture della produzione, 284-288

22 Comba and Olmo, In presenza del Lingotto, 130

23 Bigazzi, Strutture della produzione, 288- 289

24 Bigazzi, Strutture della produzione, 305- 307

25 Arlandi, Binari per gli stabilimenti, 183-184



Figure 159: The north ramp
Source: Olmo, Un segno nella pianura, fig. 7

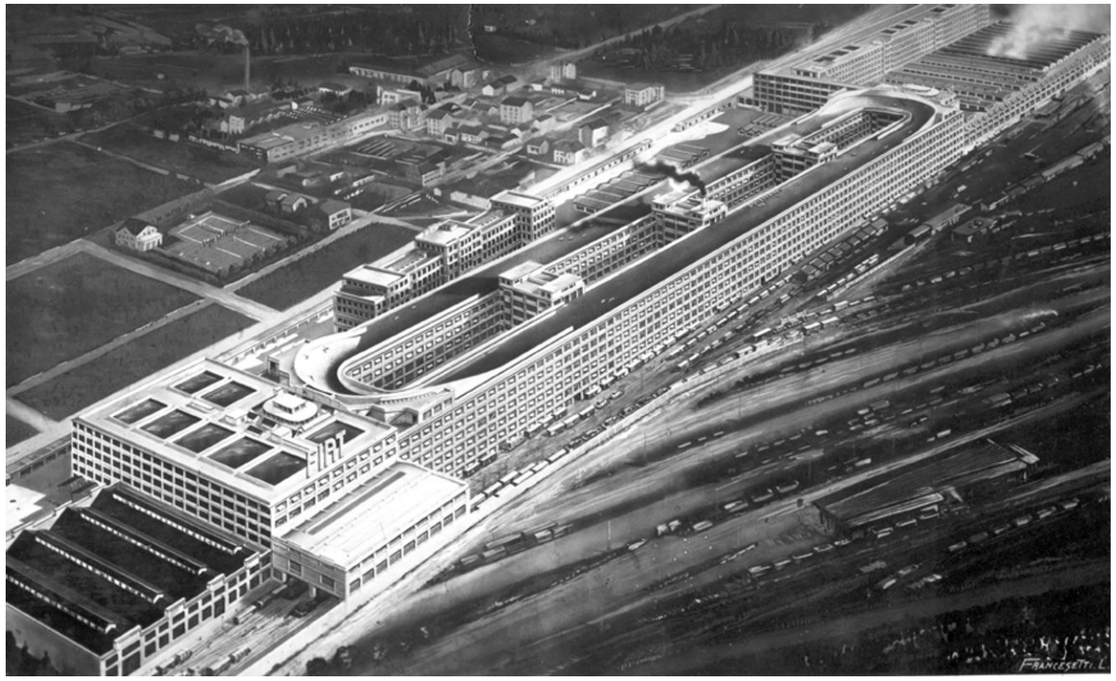


Figure 160: Historical view of Lingotto building with the test track on the roof, 1928.
Source: Photograph by Francesetti. Available via Wikimedia Commons.

By 1934, the shift to all-metal car bodies required the installation of massive new presses (up to 2,000 tons) and a further expansion of the stamping facilities. Despite these upgrades, the vertical layout of Lingotto proved too rigid for modern mass production. Fiat leadership realized the building was becoming obsolete in different ways, such as structural limitations with the narrow column grids and inefficient vertical transport that interrupted the production flow and lacked modern social facilities, while Lingotto did not even have a company canteen or department refectories. The Mirafiori plant was planned to cover these errors .

The construction began in 1937, and in 1939, Mirafiori opened while Lingotto produced a peak of 52,858 vehicles with a workforce of 19,636. The plan was to transfer everything from Lingotto gradually in a stage of low production to avoid interruption in production flow, but due to the start of the Second World War, Lingotto continued its work while producing war materials. In June 1940, English airplanes bombed Turin, damaging both the Lingotto and Mirafiori plants. As a result, a fluid integration between Lingotto and Mirafiori was shaped, sharing men and machinery to reduce the risk that a bombing would cause a total production blockade. Driven by the unbearable conditions of war, industrial workers in Turin initiated massive spontaneous strikes in March 1943. These actions continued with strikes in Milan and, along with other events, contributed to the temporary removal of Mussolini from power. However, the intervention of Nazi forces subsequently exacerbated the situation.

The ineffectiveness of civil authorities led the population to rely on Fiat and the Catholic Church. Fiat provided its own social welfare programs and managed to maintain workforce size and payroll despite reduced production. After September 1943, Fiat engaged in a complex balancing act by collaborating with Nazi authorities to protect its plants and jobs, while simultaneously offering clandestine support to the resistance movement and establishing connections with the Italian government in the south.[26]

The reconstruction phase of the autocentres, continued until 1947. In early 1947, the division of tasks between the plants was refined. Lingotto concentrated on the tasks of preparatory and miscellaneous production. The machine tool repair workshop, electric machine assembly, and the aircraft engine repair were transferred to Lingotto.[27]

26 Cardoza and Symcox, A History of Turin, 234-237

27 Roberto Testore, "Tra passato e futuro," in Mirafiori 1936- 1962, ed. Carlo Olmo (Torino: Allemandi, 1997), 255.



Figure 161: Effects of the bombings during the air raid of March 29, 1944
Source: Archivio Atlante di Torino. Available via Atlante di Torino

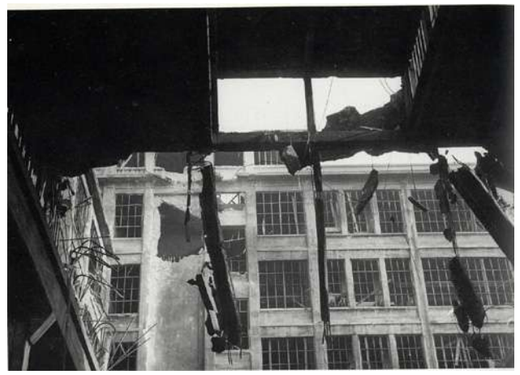


Figure 162: Allied bombardments, 1943–1944
Source: Olmo, Un segno nella pianura, fig. 27



Figure 163: Effects of the bombings during the air raid of November 30, 1942
Source: Archivio Storico della Città di Torino. Available via MuseoTorino

In 1948, after the definitive transfer of the assembly lines to the Mirafiori plant, Lingotto became an "Automotive Auxiliary Workshop" (OSA). During this period, the production of automotive parts continued at the facility, and by the late 1950s, the production of household appliances such as refrigerators and washing machines was also added to its activities.[28]

However, The post-war economic boom brought a massive influx of southern Italian immigrants to Turin, overwhelming the city's housing and social services. In the late 1960s, a new generation of young, rootless immigrant workers, frustrated by horrible living conditions and the grueling pace of the assembly line, ignited a massive wave of labor militancy

. In the summer of 1969, known as the "Hot Autumn," a revolutionary alliance of students and workers brought violent strikes to Fiat's gates.

The economic crises and rampant terrorism (by groups like the Red Brigades) of the 1970s severely weakened the company. In the fall of 1980, Fiat's CEO, Cesare Romiti, announced the dismissal of 14,000 workers. The unions responded with a bitter 35-day strike that paralyzed Turin. The standoff ended in a historic defeat for the labor movement when 40,000 Fiat managers and foremen marched through the streets demanding a return to work, forcing the union to capitulate. Following this turning point, Fiat rapidly downsized and automated.[29] In 1982, manufacturing at Lingotto officially ceased, and its final railway operations were shut down in June.[30]

In 1983, a competition was held between 20 invited architects to imagine the building's future. Renzo Piano and his team won the project and planned to transform the building into a multi-use condominium.

Also, in 1986, the Ministry of Cultural Heritage placed a strict preservation order on the central office building, the ramps, the roof track, and the structural grid, declaring it a symbol of industrial architecture.[31]

The transfer started in 1994 with the inauguration of the underground concert hall, which was the result of transforming the forge and smithy departments. In 1995, the Palazzo Uffici was sold back to the Fiat Group to serve once again as its corporate headquarters, undergoing a meticulous philological restoration.

Between the late 1990s and the 2000s, the building's vast spaces were sectioned into distinct zones, housing an exhibition center, hotels, shopping galleries, cinemas, and the Polytechnic University of Turin in the north wing.[32]

The Lingotto today stands completely transformed, from a closed, highly disciplined industrial machine into a diverse, public urban space that hosts trade fairs, university students, and tourists.[33]

28 Arlandi, Binari per gli stabilimenti, 183-184

29 Cardoza and Symcox, A History of Turin, 249-256

30 Arlandi, Binari per gli stabilimenti, 184

31 Comba and Olmo, In presenza del Lingotto, 132

32 Comba and Olmo, In presenza del Lingotto, 139-142

33 Comba and Olmo, In presenza del Lingotto, 124



Figure 164: Lingotto after adaptive reuse
Source: Photo taken by the author, July 2026



Figure 165: the test track of Lingotto after adaptive reuse
Source: Photo taken by the author, July 2026

Urban and Geographical context

At the end of 1915, Fiat bought the lands located between the Torino Smistamento station and Via Nizza, reaching from the north to Via Oneglia (Current Via Biglieri) and from the south to strada del giairino (Current the underpass of Lingotto). At that time, the area was primarily farmland with farmhouses and some small factories. In October 1916, the city council permitted the removal of some streets and the occupation of land for the planned factory, which was called Lingotto.

One of the land selection reasons was its potential for a railway connection to avoid the transportation problems that existed in FIAT Corso Dante. In the beginning, the new factory requested the railway connection with Torino Smistamento, and the project was authorised in July 1916, envisioning a set of five rails in the FS area converging into the actual connection that entered the FIAT area, oriented South to North with an oblique orientation that in the Fiat area was subdivided into several tracks running parallel to the railway boundary.

The construction site for the plant opened in September 1916, and Giacomo Mattè Trucco presented the design. During the construction of the plant, a temporary connection with the tramway was also activated on the side of Via Nizza, mainly used for the transport of timber. After the start of Production in Lingotto, in the Turin Smistamento area, a special Fiat Yard was established, equipped with tracks for receiving and delivering complete trains. The traffic consisted of wagons carrying raw materials and semi-finished products coming in, and long strings of wagons carrying new cars going out.

Between 1918 and 1922, more areas were added to the Lingotto industrial zone aligned with the incorporation of the railway into them. The mentioned area included Villa Robilant, dating back to the 18th century, which was transferred to a warehouse with a rail connection to it serving the factory. The actions contained the addition of a small building intended as a shed for the locomotive in use on the connection and the internal tracks. On the other hand, Fiat requested the municipality to eliminate certain streets planned in the urban development plan but not opened to traffic. Also, regarding FIAT's Proposal, the planned overpass from Via Nizza to Corso Girgenti (currently Corso Giambone) was changed to an underpass to avoid massive embankments, which started execution later in 1928.

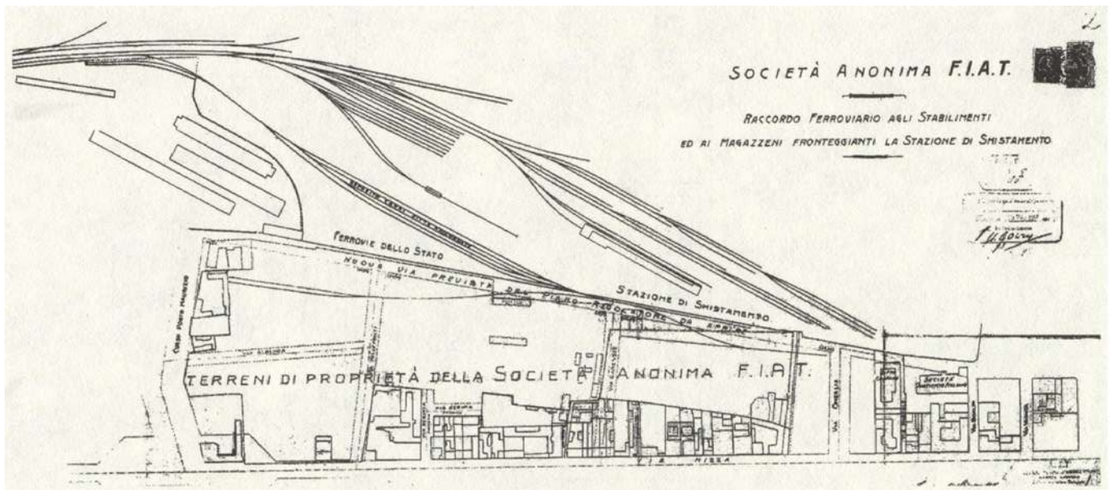


Figure 166: Lingotto District (July 1916) – Route of the railway connections from the shunting station to the future workshop buildings of the project currently being developed.
Source: Comba and Olmo, In presenza del Lingotto, fig 1

In 1930, the internal transport service took place on a yard between the plant and the railway, which extended for about two kilometers. The traffic includes a movement of 22,295 goods wagons per year, not counting the thousands of loads transported by trucks and the Internal tuggers that were responsible for moving small quantities of material from one department to another. The foundry, the unloading area for refractory earths, the carpentry shop, the accumulation of scrap metal from processing, the presses, the shipping sector, and other departments were reached by internal tracks through the interposition of turntables.

With the construction of Mirafiori, the track layout in the railway area, outside the plant's perimeter, underwent several modifications to connect these two factories directly without interference with city traffic, but due to the grandness and Completion of the new factory the need for Lingotto factory disappeared which led to the decision of selling the factory, this decision also changed due to Italy's involvement in WWII to and Lingotto continued the production, which also included war material.

From 1939, the automobile production in Lingotto stopped while the production of aircraft engines, which started from 1932, continued. After WWII, Lingotto became the "Automotive Subsidiary Workshop" ("Officina Sussidiaria Automobilistica- OSA). Since the Scalo FIAT station was located in the Lingotto area and acted as the main "railway junction", all the heavy traffic related to the transport of full trains for Mirafiori also passed through this route. Due to these reasons, the traffic on the railways continued. Finally in 1959, with the high production in Mirafiori, as a solution, additional rails were created to handle the traffic of wagons with the aid of 4 automotors for the direct move of the wagons.

From 1970, due to a decrease in the production of Lingotto and the transfer of different sections, such as the FIAT Lubrificanti facilities on via Passo Buole, which was downsized to warehouses due to its transfer to VillaStallone in 1970, the inner rail traffic decreased and was limited to sheds near underpasses. Beyond that, towards via Passo Buole, the tracks were still in place but were decommissioned. By the shutdown of Fiat Lingotto in June 1982, the dismantling works of the machinery were done, and on the railway connection with Turin Smistamento, the gates were closed. In 2001, with the departure of the last industrial sector (aircraft engine production) in Lingotto neighbourhood and its transfer to Rivalta, the last need for industrial rail infrastructure in the area was eliminated to free up space for Olympic projects.[34]



Figure 167: Railway yard at the Fiat Lingotto plant- 1967
Source: Centro Storico Fiat. Available via Facebook

34 Arlandi, Binari per gli stabilimenti, 181-185

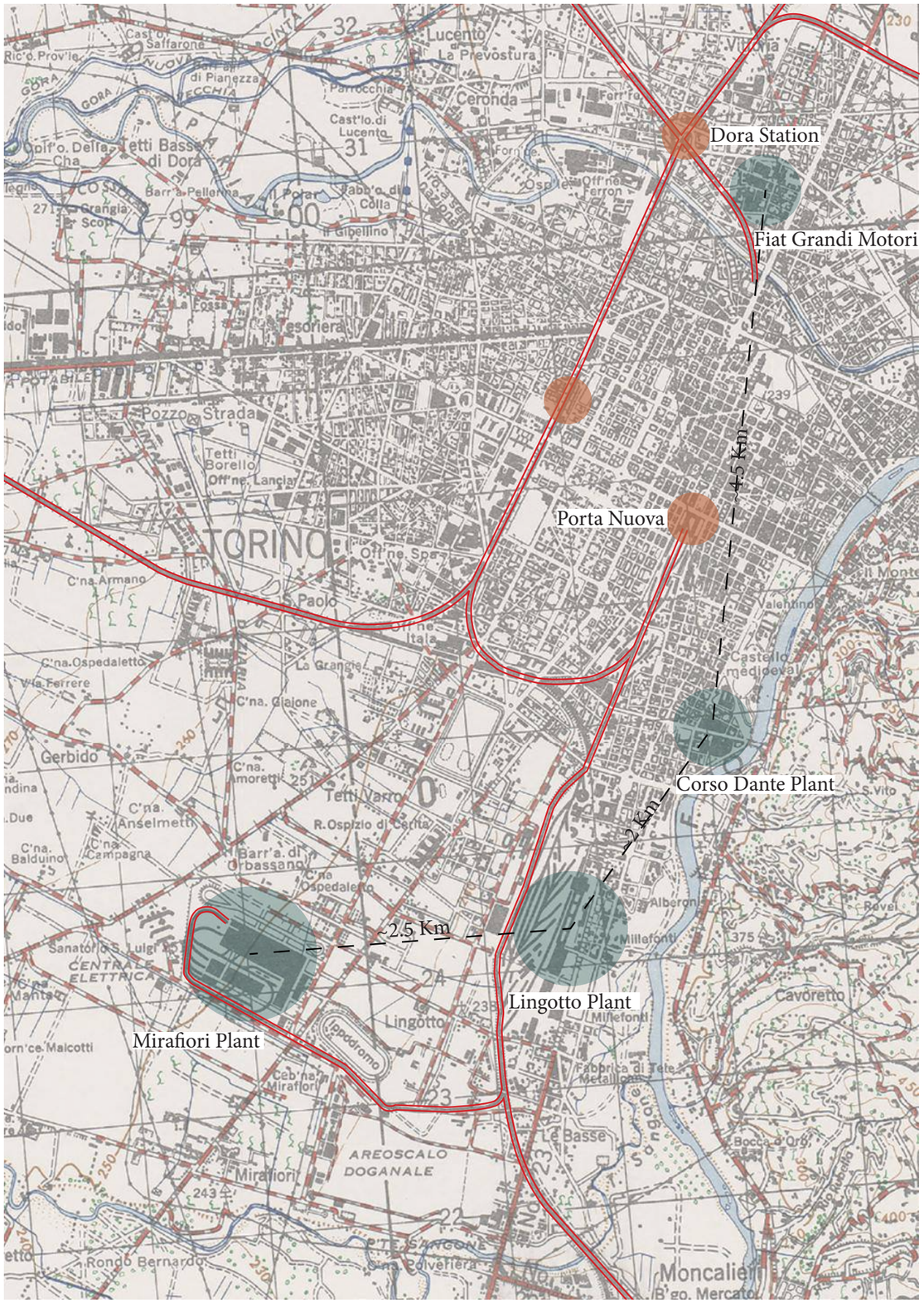


Figure 168: The relation of Fiat Plants in Turin with railway, the base map is American Military Map of Turin from 1944 and edited by the Author
Source: https://www.atlanteditorino.it/zoom/1944_USA.html

Architectural Expression

Daylight Factory

Lingotto is one of the few Industrial buildings that possess architectural value. By the time it was built, it was immediately embraced by Italian futurist artists and architects.[35] Among all architectural reasons, the significance of Lingotto lies in its early connections with the image of the automobile. This iconographic value of the building was shaped independently through its depiction by architects, painters, writers, and photographers, making it the most represented industrial architecture in the 20th century after Highland Park.[36]

This was the time that the layout of the factory, from a series of shops, went to a large-scale building where everything happens under just one roof, with the principles of linear organization. [37]However, it was not because of this linear organization that the building was constructed in this narrow shape with about half a kilometer length, but it derived from the shape of the land and through Fiat's difficulties to acquire the neighboring artisans and farmlands while keep-

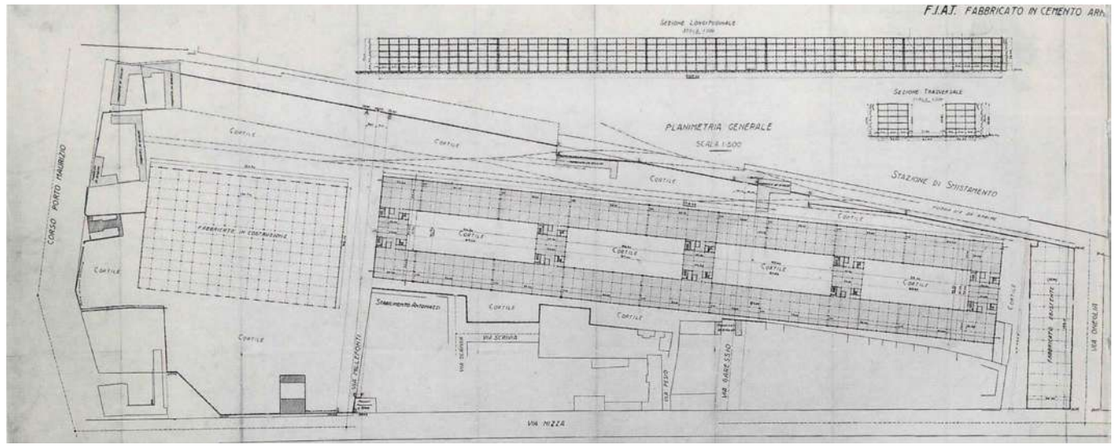


Figure 169: following the preliminary single-sleeve solution was the double-sleeve solution with closed courtyards, still based on the 8x8 ml module. Based on this second solution, the project submitted for a building permit to the City of Turin on September 22, 1916, five days after work began. The relevant permit was granted only on March 28, 1917 (84 AETC).
Source: Anna Maria Zorgno, "Un grande cantiere," in Il Lingotto: 1915-1939, ed. Carlo Olmo (1994), fig. 8

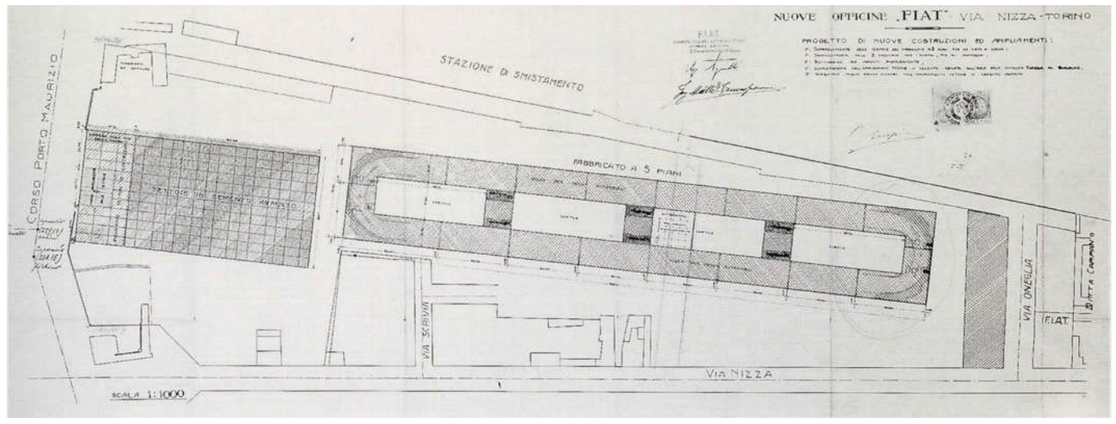


Figure 170: the final design with the grid of 6*6 with addition of the test track of the roof
Source: Zorgno, Un grande cantiere, fig. 26

35 Nina Rappaport, Vertical Urban Factory, 2nd ed. (New York: Actar Publishers, 2020), 131

36 Comba and Olmo, In presenza del Lingotto, 121

37 Rappaport, Vertical Urban Factory, 133

ing itself along the railway.[38]

The designer of the project, Giaccomo Mattè Trucco, after a couple of experiences with reinforced concrete in Corso Dante's shop, went through various stages for the design of Lingotto. In the initial step, he designed a continuous longitudinal building wing, utilizing an 8 m by 8 m structural grid with a depth of 24 meters and coffered ceilings. This configuration featured a comb-pattern layout, with four avant-corps oriented toward Via Nizza.

After that, a closed courtyard solution was developed by revising the initial design, which was drawn in red pencil on copies of the original drawings. Maintaining the 8 m by 8 m grid, this version transformed the building from an open comb layout into a double-winged structure with closed courtyards measuring 32 meters in depth (comprising four 8-meter bays). This configuration formed the basis for the official project.

Another version was a highly detailed design comprising 35 drawing sheets, though undated, included several core elements that would later define the final Lingotto structure, while also exhibiting significant differences. This version reduced the structure to a 6 m by 6 m grid, with wings five bays deep, and reconfigured the layout into three longitudinal and three transverse wings creating four identical closed courtyards. The building also had one helical ramp located in the center of the building and spanning all five floors.

In August 1916, the final version was produced, consisting of two long parallel buildings along Via Nizza, connected at the ends and at central points by five cross structures, thereby forming four closed courtyards.

The building was conceived according to principles of standardization, repetition, and modularity. At a macro level, it comprises four modular blocks, each subdivided into four additional modular units, resulting in a total of sixteen blocks, all organized on a 6 m by 6 m grid.[39]

The reinforced concrete structure made it possible to maximise the natural light with large windows with central-tilt operating panels allowing them to open for better ventilation.[40] However, it was not the first daylight factory of Turin, as Giacommo Matte Trucco and Antonio Porcheddu already experienced the earlier version of it, Corso Dante shop, and Fiat Grandi Motori, but it was definitely the largest.[41]

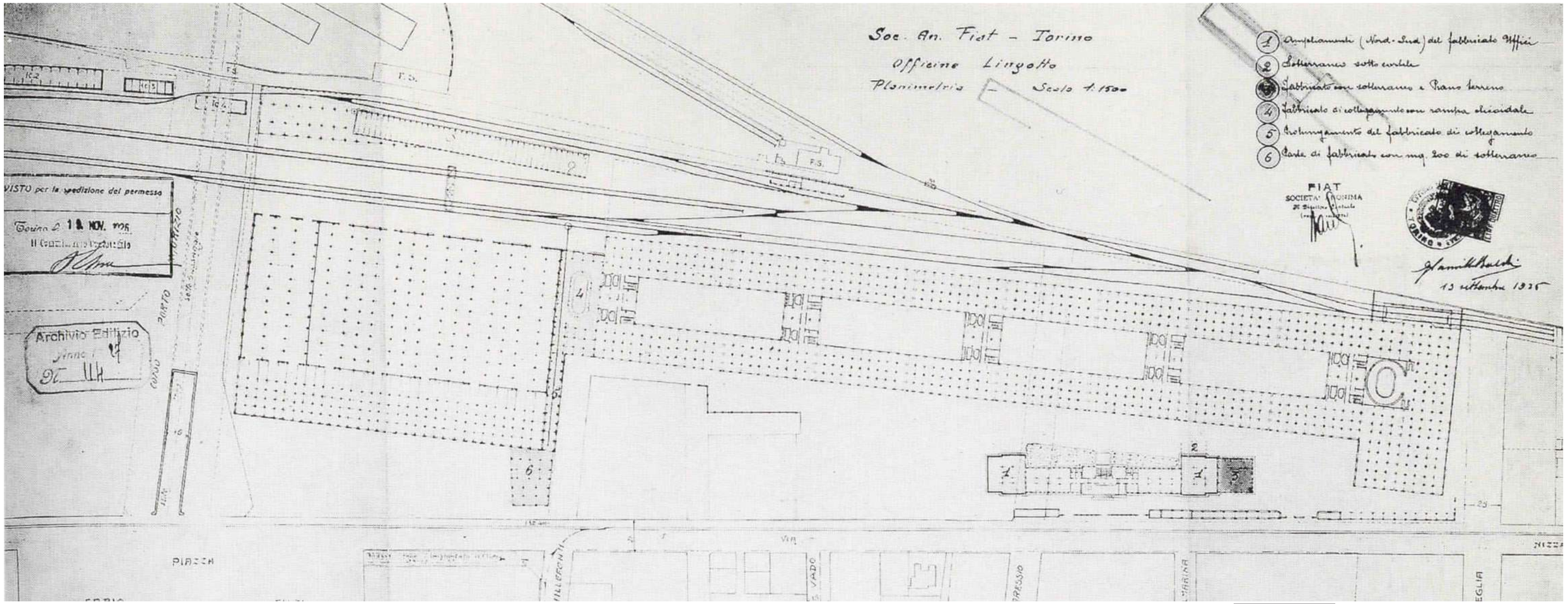


Figure 171: Architectural plan and layout for the second expansion of the Lingotto complex, including the design for the South Ramp (rampa sud), June 1926
Source: Zorgno, Un grande cantiere, fig. 34

38 Comba and Olmo, In presenza del Lingotto, 122

39 Zorgno, Un grande cantiere,, 99-105.

40 Rappaport, Vertical Urban Factory, 133

41 Comba and D'Attorre, Torino 1914-1976, 71

Innovation and decoration, the values to express

Right in front of the production workshop and parallel to Via Nizza, "Palazzina" was built in 1922, housing general management and all central services, such as the commercial direction, automotive and aviation technical offices, accounting, and procurement.[42]

While production workshops represented industrial architecture and modernist standards that rejected traditional ornamentation, Palazzina, with its traditional decorations and classical columns, reflected its status as the center of corporate power. Each of these buildings had a value to display.[43]

The palazzina was designed by Giacomo Matté Trucco and completed by Vittorio Bonadé Bottino, who added two symmetrical lateral blocks to accommodate the additional managers required for the implementation of the newly adopted Bedaux system (bedonizzazione).[44] The interior featured marble furnishings in the entrance atrium, including an L-shaped bench with a small table, a clock, two chandeliers, and six wall lamps. The "Sala Consiglio" (Board Room) was finished with wood panelling, a large central table, twelve chairs, and three Art Nouveau chandeliers (which are to be reassembled, as they are no longer present on site). The facade was constructed using a stone-cement technique, which was widely used in Turin at the time, and included classical columns and the Fiat name at the top. Outside the building, there was a bicolored cobblestone pavement featuring the Fiat logo and additional mosaic inscriptions. Beyond the fence, mosaic writings marked 'car parking lines,' some of which extended onto public ground.[45]

On the other hand, in the workshop building, there was no noticeable decoration to express feelings, even Giovanni Agnelli told Matte Trucco not to visit the biennale in order to avoid aesthetic concerns. What divided Lingotto from a boring series of shops was its unity, in size, novelty, and innovation. Innovative because the industry was integrated with architecture in the body of the building. The test track of cars became an Inseparable part of the building that made fundamental changes to the building and became a grand part of its identity. From the top, this futuristic frame was integrated with the view of the Alps, which made it even more desirable to visit. Afterwards, the ramps were constructed, and they were influenced by multi-story garages. The north ramp featured an elliptical layout constructed within the grid of the building. In contrast, the south ramp was built completely on a separate structure in an oval shape, while still serving as an essential part.

This combination of features created a paradox with the soul of industrial architecture, which was typically characterised by cubical volumes and straight lines. This outcome resulted from the collaboration of structural groups like the Porcheddu company and concepts by engineer Emilio Gay, along with architectural direction by Giacomo Mattè Trucco for the test track and North Ramp, and Vittorio Bonadè Bottino for the South Ramp. Above all, this unique structure attracted people from all over the world to exhibit, even from the United States, which had long been the leading role model in factory prototypes.



Figure 173: Historical view of racing cars on the rooftop test track of the Fiat Lingotto factory, Turin.
Source: Circa Press Catalogue (2021), 10. Courtesy of Circa Press



Figure 172: Lingotto's reputation and the variety of audiences from all over the world, From right to left, 1. Visit of American students in 1931, 2. The Manchurian mission visits in September 16, 1938, 3. The French trade mission visit in September 1, 1934, 4. Federal Minister Andrea Gastaldi visits Fiat in 1992, 5. Salesians at Lingotto in April1934, 6 and 10. The architect Le Corbusierwho visited the plant one in 1925 and once in 1934 7. The Sovereigns of Belgium, accompanied by the king Vittorio Emanuele III in September 1922,8. Group of Ethiopian figures in June 1924, ,11. The racer Antonio Gaudino who broke the 24-hour record in Argentina in a Fiat, July 1929
Source: Carlo Olmo, ed., Il Lingotto: 1915-1939 (Torino: Allemandi, 1994), In visita alla officine Fiat Lingotto, images selected from Figs. 30–53 and edited by the author

42 Bigazzi, Strutture della produzione, 289

43 Rappaport, Vertical Urban Factory, 133

44 Comba and D'Attorre, Torino 1914-1976, 93

45 Comba and Olmo, In presenza del Lingotto, 139-140



Figure 174: The exterior of the management building with a stone-cement facade, which is decorated with classical columns at the entrance , the photo is taken in 1920s.
Source: Olmo, Un segno nella pianura, Fig 19



Figure 175: The state of the art of Palazzina, July 2026
Source: Photo taken by the author



Figure 176: The marble stairs of Palazzina
Source: Olmo, Un segno nella pianura, Fig 20



Figure 177: The Council Chamber on the first floor. The wrought-iron chandeliers cast a soft light; the damask and briar-root paneled walls, enriched by large glass bookcases, surround the enormous inlaid table where the factory discussed its development over many years of activity.
Source: Simonetta Conti, La Stampa, 9 July 1982.Cited in Olmo, Un segno nella pianura, Fig 23



Figure 178: The Garage and Sita management office
Source: Olmo, Un segno nella pianura, Fig 26

Rationalisation of Labour

At the beginning of production in the Lingotto factory, it can be doubted that it was designed based on assembly line production. But it was definitely inspired by the linear organization of the production space, which was sufficient to justify the reference to the "American use".By the two-month mission by a commission of Fiat technicians in early 1919, Reference was made to the difference between production in line, which is represented in an almost symbolic form in the Lingotto plan, and its "mechanization" with the assembly line. So it was possible and sufficient to adopt the plant for the assembly line.

Until this new system, mobile squads of workers moved around the factory to complete the work, such as the chassis assembly. But the fundamental change was that instead of moving the worker, the work, with the use of roller conveyors, moved to the worker. The inspiration of the work organization of Ford Motor Company, which was based on the method of Frederick Taylor, took quite some time to apply in Lingotto. Fiat saw Taylorism as a solution to reach higher production and efficiency of the workers, After the trip of 1919, the system seemed like a sheer copy of the American system, and despite the cost, the production was not as expected. That is why there were two more trips in 1922 and 1926 to study the system more accurately, while architecture acted as an infrastructure to create the base through a building that was Spacious, bright, and ordered,[46] it was a fundamental need to update the tools, so they adopted the machines, conveyors, and equipment for transport to reduce the need for manual work and understood the philosophy of the need for study, order, and method.[47]

However, the system of assembly lines highly affected the workers. In a definition, it can be said that the worker described as "a cell assigned to a given place that does not need to move; unlike the cliché factory literature, there was a paradoxical silence in the factory. No one had anything to say, and even if they had, no one had time or desire to answer[48]. Everything was mechanized, the plant, people, and even their names, to achieve speed and efficiency. The workers stayed in their place and repeated their job constantly, and if they couldn't keep up the same speed, they were automatically thrown out of the mechanism. As workers became an integrated part of the machine, the system itself enforces discipline and pace.[49]

It was impossible to activate a sense of direction through architecture due to the size of the factory, so there was a code for each of 6155 columns, a 4-digit number, the first one designated the floor, the second and third the pillar, and the fourth the number of the row in which the pillar is located. The rows were numbered from left to right when facing south, and the columns were numbered from north to south within the rows. Other parts of the building were also numbered: the transverse beams were identified by letters from north to south, the courtyards by Roman numerals (also from north to south), the staircases by the letter of the beam and numbers indicating whether the staircase was on the left or right when facing south, and the elevators by the beam's letter and a position number. [50]Like the building itself, the workers were identified by a letter and a number, and those who moved between the sections wore an armband.[51]

46 Bigazzi, Strutture della produzione, 282-285

47 Bigazzi, Strutture della produzione, 306- 307

48 Bigazzi, Strutture della produzione, 291

49 Bigazzi, Strutture della produzione, 286

50 Bigazzi, Strutture della produzione, 295

51 Bigazzi, Strutture della produzione, 291

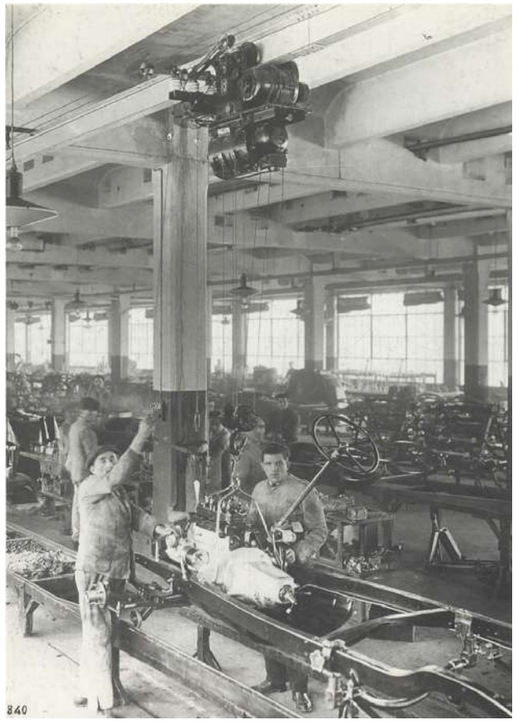


Figure 179: montage of the engine onto the 501 chassis (April 1925). The assembly line is not yet mechanized; the engine is lowered using an electric hoist. These assembly operations took place in Workshop 5.
Source: Carlo Olmo, ed., Il Lingotto: 1915-1939 (Torino: Allemandi, 1994) La razionalità produttiva, Fig 73



Figure 180: The phase of Installing the bodywork onto the 501 chassis. This operation still took place off the assembly line and constituted one of the most serious "bottlenecks" in the Lingotto production cycle (April 1925).
Source: Olmo, La razionalità produttiva, Fig 74



Figure 181: The body welding and assembly lines of the 1500. The use of portable electric tools is clearly visible.
Source: Olmo, La razionalità produttiva, Fig 101

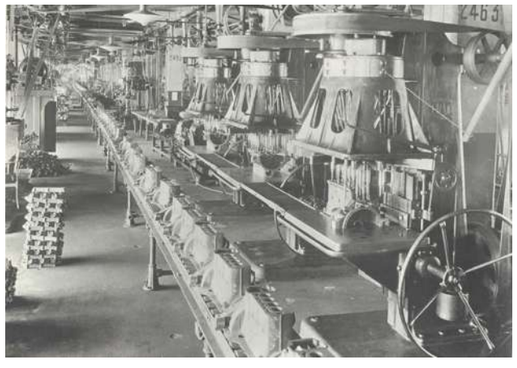


Figure 182: The processing line for the 109 engine blocks, located in Workshop 2 (September 1926) In the foreground, a group of multiple-spindle drilling machines manufactured by Fiat.
Source: Olmo, La razionalità produttiva,, Fig 67

However, Taylorism was considered costly at Fiat as the preliminary planning and definition of work methods required by the system was "extremely laborious and expensive" to implement. Taylorism demanded a radical restructuring of the entire factory's organization with major effects on all parts of the plants, including the fragmentation of workshop management on a functional basis; it also provoked resistance from technical production managers who felt the Tay-

lorist organisers were trying to strip them of their traditional duties and authority.

To overcome these organizational friction points, Fiat shifted to a new system called Bedauxisation, becoming one of the first European companies to adopt it, just after Lancia, under the supervision of the Italian Bedaux Society, of which Giovanni Agnelli was named president. Unlike Taylorism, the Bedaux system aimed to increase productivity without radically altering existing technical work methods. Instead, it introduced analytical control over individual and group performance to reduce labor costs through precise time-study analysis of worker effort and speed.

The system was defined by the B index, where 1B equals the amount of work an average worker can perform in 1 effective minute, including the corresponding rest time. And 60 B is the normal amount of hourly work; by reaching more than that, each worker receives a 75 percent bonus on the 1B payment. The system was implemented at Lingotto in May 1928. It began with a small group of 39 workers and expanded rapidly to over 7,200 employees by June 1933.

To analyse the Bedaux system efficiency, a wider context should be considered. The system grew during the Great Depression, which caused lower demand, uneven factory use, and shorter workweeks.[52] In 1931, Lingotto made just 17,632 vehicles, about a third of the 1926 total (49,369)[53]. Even in this difficult environment, Bedaux intensified control over performance. The Time Study Office documented rising Bedaux/hour scores, from 62–63 B in late 1928 to 70 B in late 1929, evidence of increased worker effort.

The years of the Bedaux system(1927–34) also saw a general decline in workers' conditions, marked by intensified work effort, reduced earnings due to shorter work hours, employment instability, seasonal sales and irregular availability of work (hiring mostly in first six month of the year), fluctuating work force, progressive reduction in total employment, layoff and rehiring with lower grade and transfer between workshop causing dequalification

These challenges fueled widespread hostility among workers. Conflicts escalated, resulting in departmental stoppages and even violence against time-study staff. During this period, the Bedaux system became the primary focus of worker discontent at Lingotto. The anti-fascist press denounced the adoption of Bedaux as a "rationalization of rag-pickers," whose sole purpose was "pushing worker output and exploitation to the extreme limit."

The official Bedaux system ended in 1934–35, when new regulations reinstated full piecework and reduced the Bedaux bonus from 75 percent to 100 percent. However, the technical and accounting tools developed under Bedaux remained in use, and analysts continued to apply the same methods long after the system was abolished.[54]

52 Bigazzi, Strutture della produzione, 312- 314

53 Bigazzi, Strutture della produzione, 306

54 Bigazzi, Strutture della produzione, 315- 318

Structural aspects

The Lingotto workshops are volumetrically composed of two blocks, 507 m long, parallel to each other, connected transversely by short sections, forming a single building with four large, aligned courtyards. The workshop buildings were designed by engineer Giacommo Matte Trucco in collaboration with the structural team of Giovanni Antonio Porcheddu, who held the patent for Hennebique in Italy. The building envelope was closely linked to the organization of the production cycles, providing wide halls to make enough room for the assembly line. The transverse sections house elevators, stairs, services, locker rooms, canteens, etc. The external dimensions, not counting the successive ramps added to the ends of the building, are: 507 m * 80 m, with a height of 27 m; the courtyards measure 96.3 * 31.5 m.

From a construction point of view, this complex is the result of the compositional point of 16 three-dimensional multi-storey modules with a rectangular or L-shaped plan, in turn made up of the repetition of the 6x6 m grid, which constitutes the basic module of the building's skeleton.

The workshop sleeves are 24 m wide and originate from the joining of 4 spans of 6 m each; in the longitudinal direction, every 10 spans (60 m) there is an expansion joint.

Structurally, the 6x6 m module is defined by 4 load-bearing pillars, two main beams (with a 6 m span), 4 secondary beams (with a 6 m span and a 2 m centre distance), which support a continuous slab. On the top floor, the pillar module is 6x12 m to allow for greater width in correspondence with the assembly line of the complete vehicle. [55]

The testing runway and the northern ramp, built 1919-1924, were both designed by and built under the supervision of Matté Trucco. After the dismissal of the Porcheddu company, Matté Trucco was joined by the engineers Cartesegna and Vittorio Bonadè Bottino as members of the work directorate. In 1921, when Cartesegna left the construction site, Fiat formally established a dedicated Technical Office for Lingotto to take over the control of the ongoing construction and building maintenance.

In 1919, the construction of the runway began. The two curves were placed over the roof covering the factory, each forming a parabolic half-bowl shape connected to the flat section of the

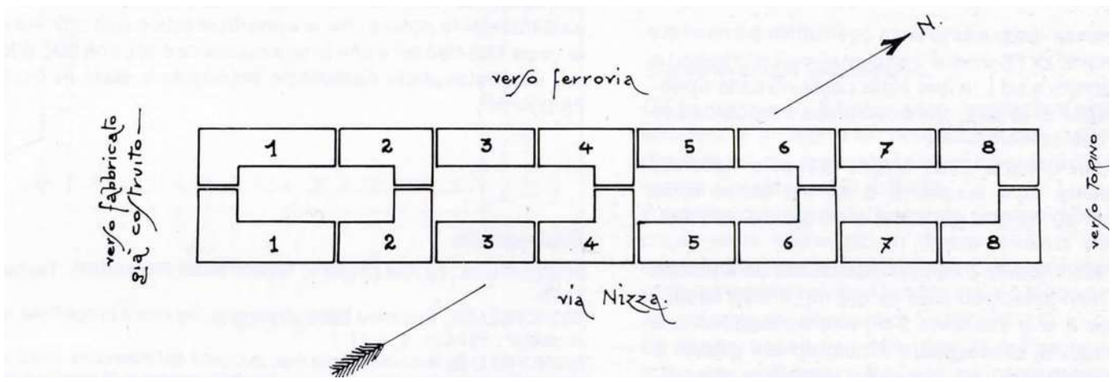


Figure 183: The modular blocks of the plants
Source: Nelva and Signorelli, Avvento ed evoluzione, 155

55 Riccardo Nelva and Bruno Signorelli, Avvento ed evoluzione del calcestruzzo armato in Italia: il sistema Hennebique (Milan: Edizioni di scienza e tecnica, 1990), 156.

runway. A new structure meant to support the weight of the bowls was put on top of the building structure. The problem of the connection to the building underneath the bowls was solved by the parapets of the runway, which contain chambers shaped like truncated cones positioned under the parabolic bowls of the runway.

The north ramp (designed in 1923-1924) and the south ramp(designed in 1925-1926) were based on the model of the multilevel garage with spiral ramps patented in 1925 by engineer Emilio Gay, based on a concept of Giovanni Agnelli. The north ramp was placed in the northern expansion of the Grandi Officine and was inserted into the grid with an almost elliptical layout. It was developed on upside-down U-shaped beams propped on pairs of beams perpendicular to them.

While Vittorio Bonadè Bottino was designing the south ramp, Giacomo Matte Trucco was removed from the Lingotto construction site. His 20-year collaboration with Fiat was broken off, and he was only contacted in 1929 to test the stability of the runway. Bonadè Bottino replaced him as the sole supervisor of work on the Lingotto construction site and completed the project.

From 1926, the construction of the south ramp took place within a space of 6 bays and inside a rectangular perimeter whose smaller sides were connected by semicircles. The south ramp was not connected to the grid at the base. In fact, the ramp rested upon parallel longitudinal beams supported by outer pillars and inner twin pillars that go on to support the roof cover by a system of radial beams connected to the longitudinal beams. The south ramp occupies an oval space completely free from the building's structural grid. It is not connected to the side walls and has an interweaving of pillars and ribs.[56]

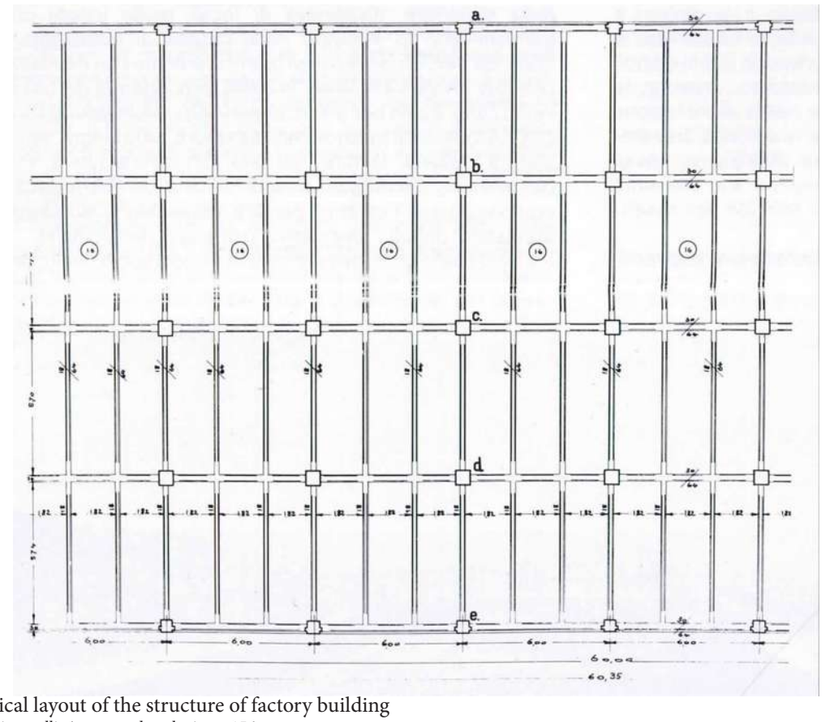


Figure 184: Typical layout of the structure of factory building
Source: Nelva and Signorelli, Avvento ed evoluzione, 156.

56 Comba and D'Attorre, Torino 1914-1976, 92

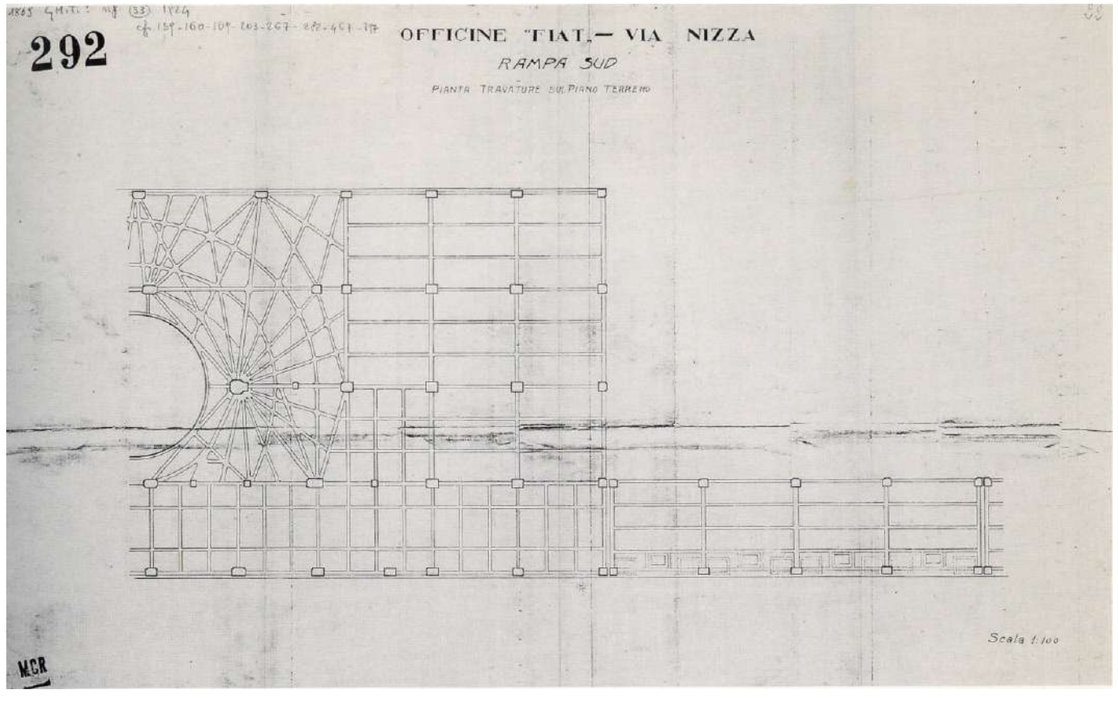


Figure 185: The Southern Ramo
Source: Olmo, Il Lingotto, Fig 33

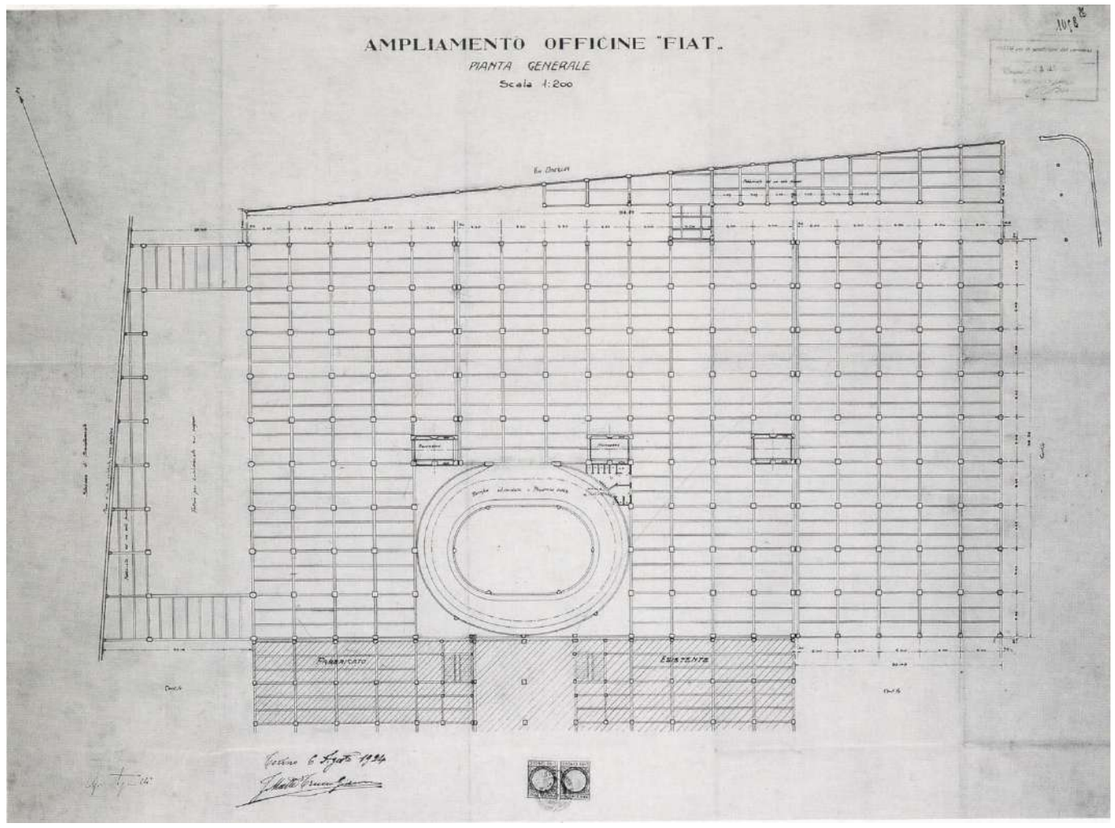


Figure 186: The North Ramp
Source: Olmo, Il Lingotto, Fig 33

Fiat Mirafiori

In 1936, Fiat decided to build another plant. This decision had different reasons. One was that Lingotto's vertical organization had expired. Already when Lingotto was inaugurated, the River Rouge plant of Detroit was working with a critical organization transition from vertical to horizontal. Lingotto also constantly faced bottlenecks due to its rigidness and constant need to lift. Another reason was that Fiat wanted to break free from a hesitant, constrained growth pattern and it needed a facility capable of guaranteeing massive production volumes; finally, its design incorporated the logic of a war economy, it anticipated the needs of national self-sufficiency.

Between April and June 1936, a horizontal, single-floor layout was approved, and land acquisition was ratified. From November to December 1936, a six-week trip to the United States was organized to observe Ford's River Rouge plant, Chevrolet's Forge Plant in Detroit, Plymouth in Detroit, Buick in Flint, and Pratt & Whitney in Hartford to study the horizontal organization and flow of work.

Afterward, construction began in 1937, while the design consisted of a series of repeated modules.[57] This repetition shifted architectural value from style to dimension and from form to modules. The modules had the grid of 20*20 covered by M shaped trusses which allowed for freer movement of machinery compared to the River Rouge plant's 12 by 12 meter grid. Mirafiori became the largest factory in Italy, comprising a single-level complex with 300,000 square meters of covered area and two main sections. The principal factory (officine principale), contracted in 1938 for automobile production, was an immense workshop measuring 500 by 740 meters and occupied six of the factory's eight lots. Each lot measured 120 meters by 260 meters and was equipped with bomb shelters, dining halls, dressing rooms, and workshops. The second building, subcontracted in 1937, was dedicated to airplane engine production.

An additional building, subcontracted in 1938 along Corso Settembrini, housed the foundries and the central block of the thermoelectric plant, including tool storage and forges. The factory complex was organized horizontally, divided into sections with the assembly line at the center, and was integrated with the adjacent rail yard, tracks, and train convoys for the delivery of supplies and raw materials. [58]The Mirafiori complex was officially inaugurated by Benito Mussolini on 15 May 1939, although it was still largely under construction.[59]

The construction of Mirafiori marked the introduction of German architectural realism in Turin, which originated from the philosophy

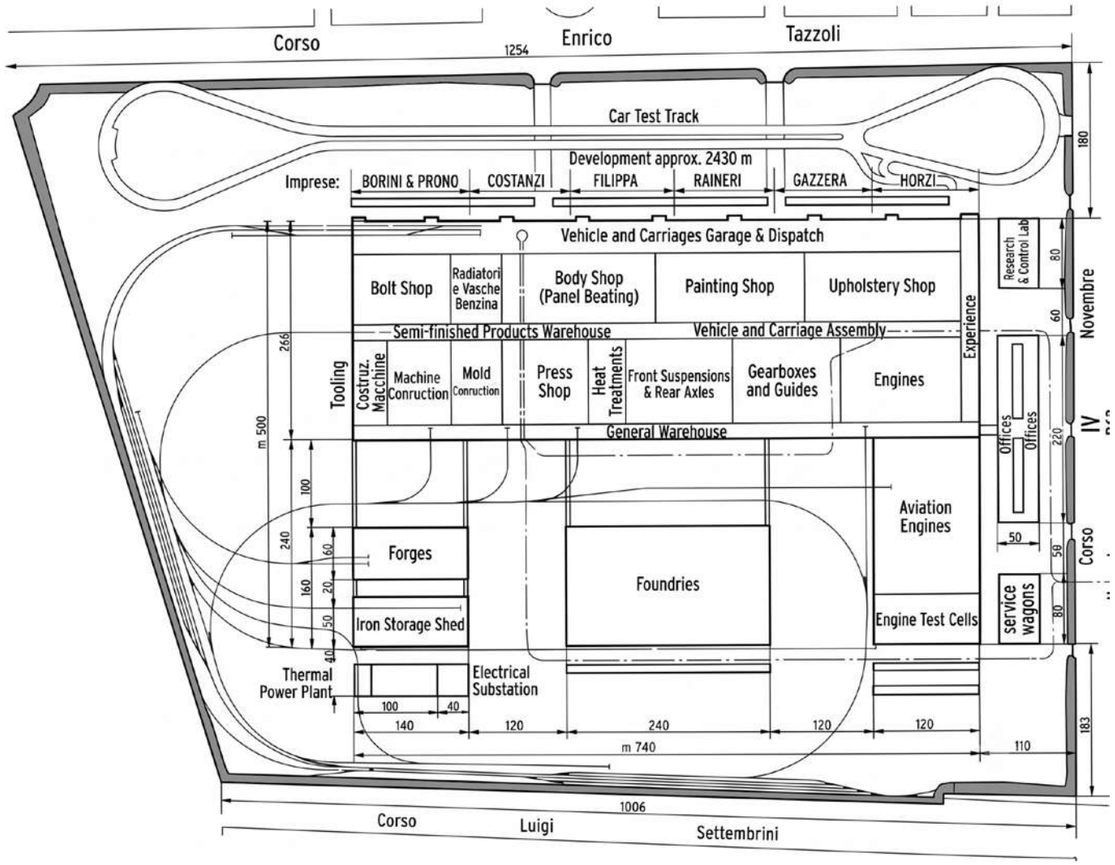


Figure 187: General site plan (planimetria generale) of the Fiat Mirafiori factory complex, 1938
Source: Adapted by the author from Bigazzi, Strutture della produzione, 243 ; originally from Archivio Storico Fiat (AsF)



Figure 188: Aerial view of Fiat Mirafiori plant in Turin , 1939.
Source: Centro Storico Fiat. Available via Facebook

57 Bigazzi, Strutture della produzione, 281- 282

58 Comba and D'Attorre, Torino 1914-1976, 170-171

59 Bigazzi, Strutture della produzione, 243

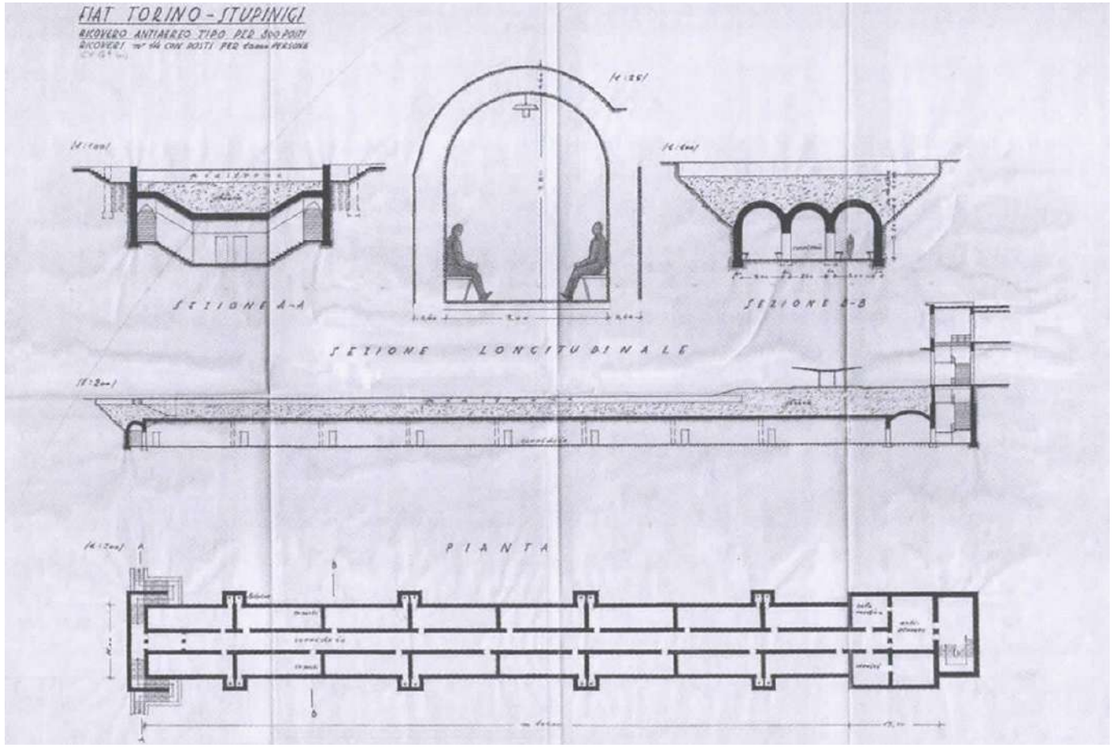


Figure 189: 800-person air-raid shelter design, Fiat Mirafiori plant,1936
Source: Comba and D'Attorre, Torino 1914-1976, 164



Figure 190: Descent into the factory's underground shelters during the bombings,1943
Source: Olmo, Mirafiori 1939- 1962, Fig. 22

of economic construction and was subsequently implemented by the Divisione Costruzioni e Impianti Fiat in the design of houses, schools, churches, sports centers, and exhibition halls. [60][61]

During the war, Mirafiori concentrated on mechanical work for automobile, aircraft engines, and truck body production. Fiat saw modest production growth in 1940- 41. But after that, even with the German contracts, a steady decline happened, and in 1944, the production was barely enough to avoid layoffs.

The deteriorating wartime economy led to severe hardships, prompting massive citywide strikes led by the workers in March 1943, November 1943, and March 1944. In June 1944, heavy bombing incursions and a major fire severely damaged the foundries. Due to war damage to the factory, Fiat decided to decentralize its plants to Modena, Florence, Vercelli, and Novara. Another decentralization plan was developed due to German orders in 1944 to create emergency workshops for aircraft engine production on the Gardesana state road.

Immediately following the war, Mirafiori's operations were paralyzed by a lack of electricity, coal shortages, and a demoralized workforce. Despite optimistic forecasts, the factory only managed to reach a modest output of 1,000 cars and trucks per month in October 1945. Between late 1946 and early 1947, repeated work stoppages occurred as the company focused on rebuilding facilities and restoring machinery.[62]

To jumpstart the recovery, Fiat executives made their first post-war visit to the United States in December 1946 to study new industrial advancements. In April 1947, Fiat signed a crucial technical cooperation agreement with Chrysler, allowing Fiat engineers to study American progress. [63]

By June 1947, Fiat partnered with the Detroit-based consulting firm Giffels & Vallet to design highly advanced, automated paint and foundry systems. They finalized a massive foundry project in 1949, introducing extensive automation and modern material-handling systems that replaced the initial, more rigid setups.[64]

By the early 1950s, Mirafiori's modernization was completed, aligning its production capabilities with the highest American industrial standards and cementing its role as the engine of Italy's post-war economic boom.[65] A 30.9 million dollar loan from the Marshall Plan helped significantly with this modernization. Throughout the decade, the factory underwent continuous architectural and mechanical expansions, adding new warehouses and press shops, as well as extending the main workshops.[66] By 1956, the productive space reached a vast footprint of over 300 hectares, employing around 60,000 workers.

Moreover, Mirafiori reached its peak production during the years of the economic miracle in the 1960s. Production skyrocketed from roughly 100,000 cars in 1950 to 1.5 million vehicles fifteen years later, driven by the mass production of iconic models like the Fiat "600" and "500." Concurrently, Fiat ran its most intense training operation ever, bringing thousands of young people through its company school to prepare them for the highly organized industrial environment.

To accommodate this massive influx of workers immigrating largely from the South Italy, Fiat built 78 residential buildings between 1949 and 1971. This social shift, alongside a new generation of students at the Polytechnic, shaped an era of social conflict and restructuring from 1969 onward. The factory became the epicenter of a permanent and intense social clash.[67] It endured the longest season of industrial conflict in the developed West and inspired massive labor protest movements throughout the 1970s. Afterward, the plant also had to survive subterranean challenges posed by terrorist groups targeting the corporate order, which reached their absolute peak of vio-

60 Luigi Ravelli, the Fiat engineer visited German factories with particular attention to the exterior treatments of industrial buildings as well as to the hygienic and health-related facilities provided for workers. [Comba and D'Attorre, Torino 1914-1976, 171]

61 Comba and D'Attorre, Torino 1914-1976, 171

62 Bigazzi, Strutture della produzione, 249- 255

63 Bigazzi, Strutture della produzione, 259

64 Bigazzi, Strutture della produzione, 265-266

65 Cardoza and Symcox, A History of Turin, 244

66 Bigazzi, Strutture della produzione, 270

67 , Tra passato e futuro, 7-9

lence between 1976 and 1980.[68]

During this era, Fiat began adapting its technological systems toward "lean production" to survive global competition. In the 1980s, Fiat introduced plans for workforce diversification. The company remained highly competitive by restructuring its operations, heavily investing in robotics, and launching successful new car models like the 'Uno'. However, this modernization meant that Fiat cut its local workforce in half and began moving its investments and production abroad.

As a result, the Turin metropolitan area lost approximately 90,000 industrial jobs between 1981 and 1991. This recovery proved short-lived, as Fiat lost its global competitive advantages in the early 1990s. The automotive sector entered a period of "slow agony," marking the definitive end of the Fordist "city-factory" era. Production continued into the 21st century, but at a drastically reduced capacity. Today, actual production activity is described as "rarefied" or heavily thinned out.[69]

Conclusion

In the 20th century, Turin went through a huge transition in the development of industries. While older traditional sectors, such as the textile, clothing, and food processing industries shrank, the automobile spread over the city. Initially driven by a variety of competing brands, this expansion was soon dominated by the absolute superiority of Fiat.

Turin witnessed the rise of gigantic factory buildings. At the beginning of the century, there were few large structures like the Officine Savigliano. Over the next 50 years, however, the city changed with massive factories like Grandi Motori, Corso Dante, Lingotto, and Mirafiori occupying massive parts in the south and north. These developments were followed by new architecture, the spread of urbanisation, and significant social shifts.

Industrialization shaped a new language of architecture, with the massive use of concrete, metal, and glass, and the speed and scale of construction rose. Factories could only be understood from an aerial view and no longer through a human perspective. urban spaces transformed to serve cars. Decoration lost its identity, and functionality was the only matter; this effect was so massive that still, the footprint of Turin's industrialization is much more visible than any other era.

As a result of mass construction, buildings were reduced to sheer, repetitive shells, built as quickly as possible with little regard for quality. This phenomenon also happened in the five-year plant of Kahn in the Fordist era , the nazism architectural realism of Germany, and many other places.

The industrial concentration caused an explosion of urbanization. The factories not only changed the physical face of the city but also attracted unprecedented waves of immigrant workers from all over Italy, especially the South. This demographic shift shaped strong working-class districts on the peripheries, such as Barriera di Milano and Borgo San Paolo, to accommodate the influx. Like the factory itself, the worker housing developed specific architectural criteria, most notably the case di ringhiera (walkway-railing houses), which became a signature feature of working-class neighborhoods.

The evolution of these factories was deeply entangled with the World Wars. However, the workers inside these plants were continuously tested under grueling conditions. The drive for maximum efficiency introduced harsh discipline characterized by Taylorism and the Bedaux system as early as the 1920s, which only intensified under the Fascist regime. While the post-war "economic miracle" eventually granted some workers access to modern consumer goods like housing and automobiles, widespread job insecurity persisted due to ongoing industrial modernization and global economic instability.

This paradox, paired with a massive new wave of uneducated immigrants facing miserable living conditions in the 1950s and 1960s set the stage for a massive social rupture. The resulting alienation contributed to the emergence of the "Hot Autumn" of 1969, a period of unprecedented labor militancy, student-worker alliances, and violent unrest that paralyzed Fiat.

Ultimately, Fiat gradually left the city by the end of the city-factory era, putting behind 90,000 industrial workers. Once again, people and the city had to find their identity, as they did after the transition of the capital.

68 During the late 1960s and 1970s, Turin and its Mirafiori plant became the epicenter of an intense, prolonged social clash, sparked by a powerful alliance between militant industrial workers and radicalized university students. Driven by grueling factory conditions, overcrowding, and a desire for sweeping social change, this "new left" movement culminated in the "hot autumn" of 1969, which was characterized by wildcat strikes, barricades, and violent clashes with police under the chant "What do we want? Everything!"

In the immediate aftermath, mainstream unions successfully negotiated a national contract that yielded significant material victories, including equal wage hikes, a forty-hour workweek, and the right to hold assemblies within the factories. However, because these concessions fell short of a true social revolution, extremist factions escalated their tactics throughout the 1970s, plunging the city into a dark period of terrorism, kidnappings, and assassinations led by groups like the Red Brigades and Front Line. Ultimately, this decade of disruption ended in a decisive defeat for the labor movement in the fall of 1980; after Fiat's management announced mass layoffs to reassert authority, a grueling thirty-five-day strike faltered when tens of thousands of managers, foremen, and ordinary workers took to the streets to demand a return to work, forcing the divided unions to capitulate and permanently shifting the balance of power back to the industrialists.

69 Cardoza and Symcox, A History of Turin, 256-260



Figure 191: Advertising service for the new Fiat 500, 1957.
Source: Olmo, Mirafiori 1939- 1962, Fig. 59.

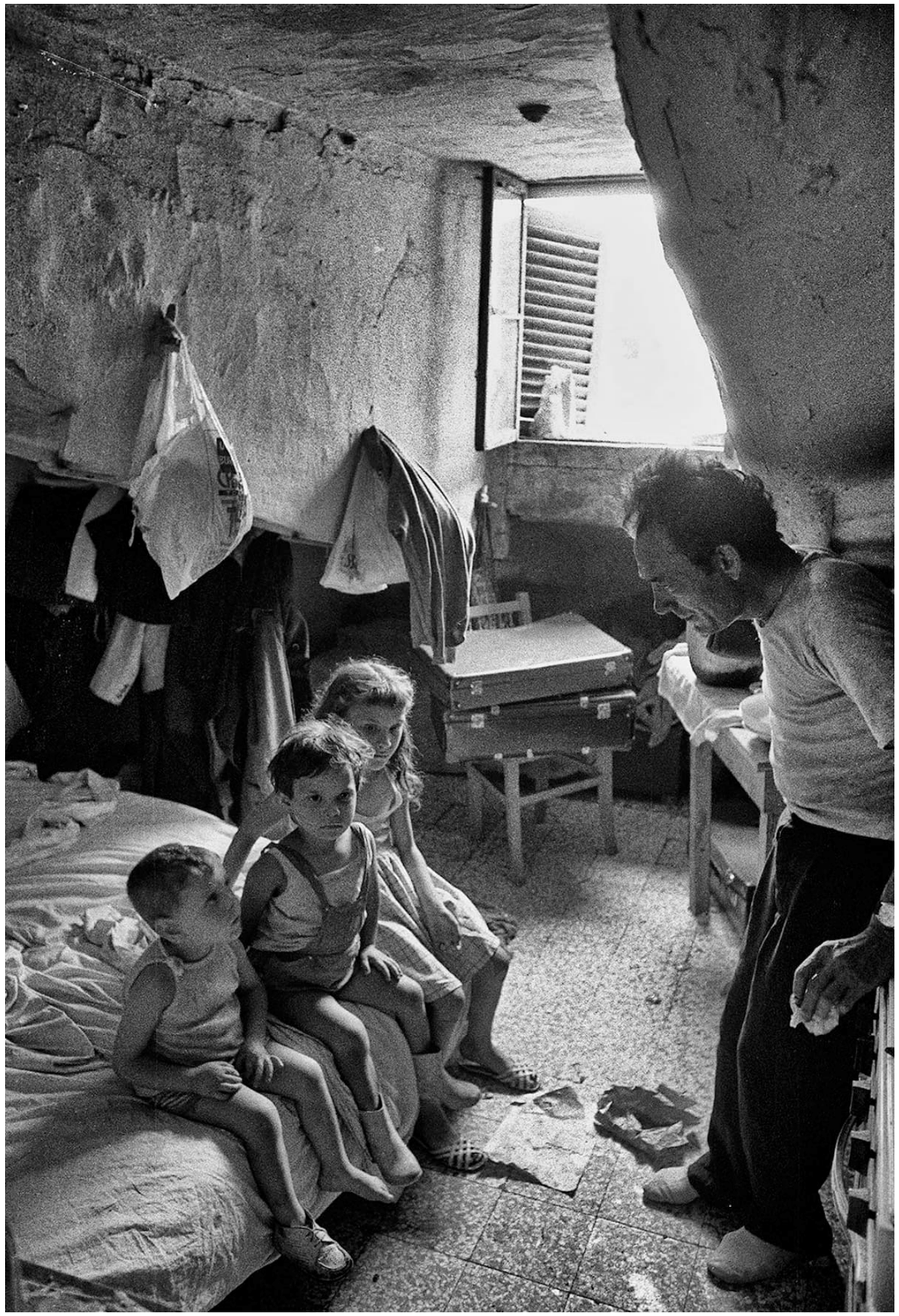


Figure 192: A Southern Italian immigrant family inside a cramped attic apartment in Turin's historic center, 1969
Source: Mauro Vallinotto, Torino '69 series, via Galleria FIAF Torino.

Ford and Fiat in the 20th Century

Piquette, Highland Park and Rouge River Plants

Fiat Corso Dante, Lingotto and Mirafiori Plants



Between Ford and FIAT and in parallel between the two cities, Torino and Detroit, a strong basis for comparison is noticeable. First, both cities were known nationally as important industrial centers with similarities in production (car manufacturing) and historical timeline. In addition, two leading companies, Ford and FIAT, created an emblems of mass production which made the dream of owning a personal car come true for many people and families in both countries.

With this background, which was developed in previous chapters, this section aims to create a comparative discourse on two different scales. At the urban scale to raise questions about the fundamental similarities from the geographical context to emerging early industry and find out how thes parameters had an effect on shaping the car industry. Moreover, the narrative continues to the end of the 20th century by highlighting different historical events like World War I and II next to the economic booms and crises, which significantly affected their path and created differences. In the next section, the analysis traces the rise and fall of Ford and FIAT. The trajectory of the two companies can be traced through analogous architectural developments, which were broadly comparable with each other and highlighted with the focus on two famous buildings, FORD Highland Park and FIAT Lingotto.

Promised Land, European Founders, and the Creation of Differences

Historically, it would be a big challenge to create a comparison between one city in the United States and one in Europe. Specifically, when both of them were the industrial leaders in the 20th century. The root of this difficulty lies in the deep thought of the two different approaches that are widely used in these two continents.

In the beginning, that would be true if the early European adventurers and colonists were considered the most important force that shaped modern America. On one hand, their European mindset and background were indisputable in their actions. This background gave them technological, economic, military, and various civic advantages, which led the upper hand as they encountered new lands that belonged to Native Americans.

On the other hand, the new land created new opportunities. After decades, new principles laid the groundwork for fundamental change in their approaches while they faced new conflicts. First, competition between European countries based in America required new changes in the most important aspects of the economy, military, management, and urban planning; and Second, after decades, the new American-born generation with European backgrounds thought differently from their colonist fathers. Over time, the collective identity of the new settlers in America broke away from their European heritage at a rapid pace, leading to the creation of a new American identity. With the initial formation of the United States, this process accelerated and culminated in the birth of the American identity.

As a result, this change in approach, next to the specific geographic demands of the time, step by step shaped a city which is far different from its homologous ones like London and Paris, although they were built by French and British Forces.

European Immigrants in America started to transform the cities, which mostly had a military background and were formed due to military reasons, into economical agricultural centers in order to guarantee a long-lasting approach there.[1] [2]

Regarding this new identity, we can conclude European actions in America were far different from their actions in their motherland[3]; the reason behind creating a new identity in urban planning. Even nowadays, the huge differences between European centers and American centers are clearly visible.

In Europe, the cities were shaped by their huge historical background. Torino in Italy has roots in the Roman Empire. Although the golden age for the city was not those times. In Turin, the Roman buildings, medieval ones, and Baroque buildings, next to the modern age, are recognisable. While in the United States, cities never had the Roman experience, the Medieval, the feudalism, or the Baroque. This framework highlights the vast difference in the origins of European and American cities, although the modern-era similarities brought by industrialization in both continents are undeniable.

1 Driven by profound technological advancements during the final phase of the Industrial Revolution, urban centers began a fundamental transformation, evolving from agricultural-based economic hubs into industrial centers.

2 For example, one of the first factors that shaped Detroit's face in the beginning was the fur trade, and the French farms out of the fort; this approach encouraged people to come and live in the city to benefit from the city's commercial and agricultural advantages, alongside the crucial advantage of security. This approach built a new city that was more than just a military fortress.

3 New lands, new demands.

Later on, at the end of the 18th century[4], by shaping the United States of America, the difference between the American model and the European model in urban planing became clear, As Glaeser mentioned in his article "Cities dying, 1998". In American territories, governmental funding and support were particularly favored low-density rural areas. This is why the European capital not only became important because people chose to live there, but also because governmental benefits for centuries have transformed it into a center of capital accumulation, where many citizens are eager to live even though the cost of living remains remarkably high. [5]

Later on, industrialization was different in these two countries. In the beginning, the citizens of the US were comparing their cities with industrial hubs of the EU, like Manchester. For them, it was a nightmare to see their living place surrounded by irregularity, noise, endless dirt, and smoke. To avoid the European model of industrialization, corporate leaders of industrial architecture proposed to attempt to design clean and regular townships. This approach had two main origins, which made it possible.

First was land: the vast land with low density. [6]making it possible for them to build an industrial city from scratch.

The second was the power source. The majority of industrial buildings in the late 19th century and the beginning of the 20th century used their own power plants.[7] and were much cleaner in comparison with their European counterparts. which mainly used the water mill as a power source.



Figure 193: Assembly Line at Ford Motor Company Highland Park Plant, circa 1925.
Source: From the Photographic Vertical File Series Object ID: 64.167.721.P.833.73830.3, Benson Ford Research Center.

4 July 4th, 1776.

5 The capital of the US, Washington D.C, is not even comparable with the European capitals like London or Paris; this is because it was compatible with Industrial or commercial centers in the US, like New York or Chicago.

6 By the late 19th century, Europe was highly dense and thoroughly committed to the railroad, with few people living more than 10 miles from the rail line. This density was considered an important weak point in urban planning for industrial cities. This approach led the US to accept the automobile faster. Later on, alongside city development, the automobile was considered an undeniable fact, which was not the case in European cities.

7 Which were mainly based on steam engines.

Regarding industrialization, American engineers sought to address the long-standing challenges encountered in Europe. Geographically, America offered expansive, undeveloped land for urban planning, a resource that had become increasingly scarce in Europe. European urbanization was traditionally anchored to capital centers and established transport networks, such as railroads. Furthermore, while the early Industrial Revolution in Europe suffered from technological limitations that led to undesirable industrial environments, America encountered its industrial wave at a stage where alternative development paths were viable. This divergent progression was driven by two primary factors: first, the benefit of European hindsight, which prompted American planners to reconsider production management; and second, the availability of favorable conditions such as vast geographic areas, abundant fresh water, and emerging technologies.

The cleanliness was addressed by using different power sources[1]. The slums were addressed by company housing and vast neighborhoods around the city center; furthermore, the concept of the daylight factory as a successful attempt in order to reform the industrial sites and, in general, industrialization in the public mind can be considered, which was necessary for industrial development[2].

Next to these material aspects, there were more or less hidden social actions which were implemented by industrial leaders[3] and created a social class which was totally different from the previous generation who endured harsh labor in the early mills.

This action was followed by removing ethnic neighborhoods, investigation services, and social management approaches, which occurred with the help of pressure leverage like Ford's 5 dollars a day. On the other hand, these social reforms ultimately led to the formation of a middle class that enjoyed a better image and greater wealth, living[4] in single-family homes[5] that were far superior to their previous minority neighborhoods. Interestingly, this social class was less skilled than their fathers and predecessors, because mass production required less skill[6].

1 Steam power instead of watermills, which were soon replaced by electricity and changed the face of a factory.

2 Although workers probably have more important motivations in order to find a job in the factories. But the systematic approach to decrease the dirt and smoke, or in other words, improve the picture of the industrial city in the public consciousness, is undeniable.

3 Specifically, the reference here is to the Ford and Agnelli families) and tried to create a middle class of workers who were disconnected from their origins (In the United States means disconnection from their European background, and in Italy means disconnecting from their southern culture.

4 Especially in America.

5 The company housing was not Ford's common practice, but on the other hand, FIAT was in the opposite camp, building many houses for the workers. This approach, although both were following similar goals, later created an enormous problem for the city of Turin.

6 See Section Three.

Detroit and Turin: A long list of modern similarities and Fundamental Differences

Post-Napoleonic and Woodward Plan:

By reducing the scale and focusing on Torino and Detroit, the differences and similarities became detailed. Although the general aspects of differences between European and American cities[8] remained the same.

Turin and Detroit both were fort cities, which became industrial leaders in their region. Although the fort era in both cities is not comparable[9], together, their histories are not without similarities. Woodward's plan in Detroit was created after the city fire in 1805; a repeating hexagonal shape influenced by L'Enfant's Design for Washington, D.C. Judge Woodward considered the series of wide avenues and parks. His plan was not only built up to reduce density and promote cleanliness, but also to prevent other tragic fires in the future of the city.

On the other hand, at that time, Torino was facing the post-Napoleonic era. The new city plan was also being developed at the same time. By Gaetano Lombardi's plan[10], the city of Turin, which had recently lost its fortifications, found its chance to experience wide boulevards where the old walls once stood. In addition, Lombardi designed monumental squares at the four cardinal access points to connect the city[11] to the surrounding royal suburban residences[12].

In the mid-19th century, both cities faced rapid population growth. In parallel with this growth, industrialization step by step found its own place in city life and created a strong motivation for people around[13] to come and start their new life in the new city.

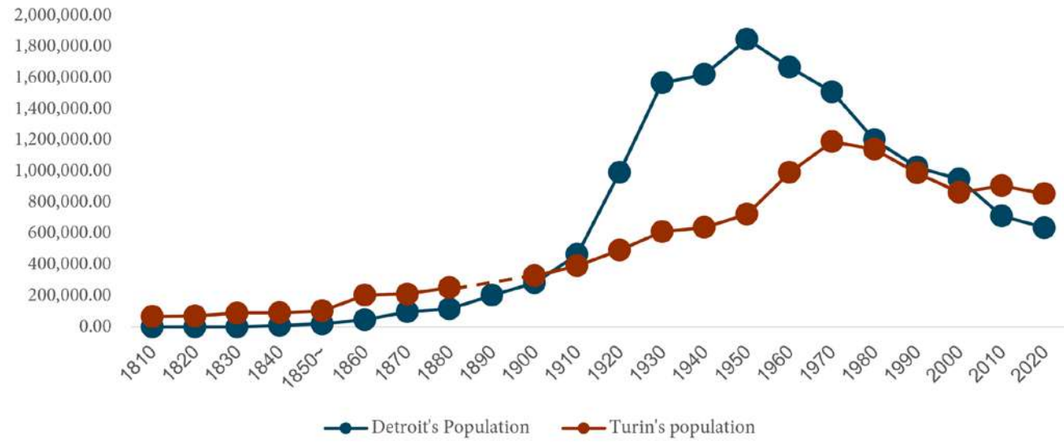


Figure 194: Comparative population trends of Turin and Detroi
Source: Created by the author based on Pierre Gabert, Turin, ville industrielle (1964); Sidney Glazer, Detroit: Urban Development (1965); ISTAT (Istituto Nazionale di Statistica) census data (1971–2020); and U.S. Census Bureau decennial censuses (1970–2020)

8 Which were briefly mentioned in the previous section.

9 There is more than 2,000 years of difference between Roman fortification in Turin and French forts in Detroit, although Turin was expanded and kept its new walls till the Napoleonic era.

10 1817

11 Which was the capital and the King's seat.

12 Notable outcomes of this plan included the creation of Piazza Emanuele Filiberto (now Piazza della Repubblica) to the north, which kept the productive and commercial Borgo Dora outside the formal urban limits, and the semi-octagonal Piazza Carlo Felice (1825) to the south, which formed a majestic entrance providing direct access to Piazza Castello.

13 For Detroit, mainly Europeans, and for Italy, mainly immigrants from the south.

Industrialization and the basis of the Automotive Industry

Torino and Detroit are comparable in terms of their fundamental ability to become industrial centers in the late 19th and the beginning of the 20th century.

In the 19th century, when Detroit became a hub of transportation, Turin controlled the Alpine gateway and the Po trade routes. This information shows how the geographical advantages of the two cities created a context for their industrial futures.

Moreover, Torino and Detroit had another geographical advantage. This is a strong comparison point between the two cities. Both of the cities are located significantly close to other major economic hubs at the national and regional levels. On the one hand, Turin, in proximity to Milan and Genoa, was notable in national scale, and on the other hand, Detroit is significantly close to Chicago and New York. On a regional scale, Toronto for Detroit, and Lyon and Geneva for Turin are notable.

In addition to this matter, the emergence of industry in these areas was a function of local needs and available resources. Both cities were known as a bedrock of metalworks. On one hand, Detroit had the rail car industry alongside stove manufacturing, and on the other hand, Turin, with its military arsenals, foundries, machine tools, and railway carriage manufacturing, created a favorable industrial context which was not only related to automobile manufacturing but also helped to develop skilled workers, including a workforce of metal molders, machinists, and engineers. [14]

The difference between the first generation of industrial managers in the automotive industry across the key cities of Detroit and Turin, represented by the corporate giants Ford and FIAT, lay in their tangible skills in automotive engineering. Although the presence of inventors like Karl Benz makes Europe somewhat of an exception, it is crucial to note that Ford was not merely a producer and commercial manager; he was an inventor with practical capabilities in automobile manufacturing who brought the initial Ford models to life with his bare hands. In contrast, the founders of FIAT were individuals with military ranks, such as Agnelli[1], or aristocrats without any practical expertise in automotive mechanics, whose names cannot be counted among inventors.

1 Who initially held a minor stake in the company

14 The industry listed in the last paragraph did not represent a full picture of active industries in both cities. At the end of the 19th century and beginning of the 20th century, for instance, Turin was also known for its silk textile industry.



Figure 195: Road network distances between Detroit (DTT) and major contemporary industrial and commercial centers in North America. Note: Distances are calculated based on actual road routes, not straight-line distances.
Source: Author, Approximate Scale: 1: 12,500,000



Figure 196: Road network distances between Detroit (DTT) and major contemporary industrial and commercial centers in North America. Note: Distances are calculated based on actual road routes, not straight-line distances.
Source: Author, Approximate Scale: 1: 12,500,000

Two World Wars and their effect on Industrialization development[15]

When the automobile manufacturing found its place, nothing affected it as much as the two World Wars. WWI[16] accelerated Henry Ford's ambitions. While Highland Park[17] was providing the Ford Model T, the war effect led to building the massive horizontal complex along the coast of the River Rouge.

This opportunity acted like a launch pad for FMC to, on one hand, stand alongside the country and American values and on the other hand, develop its infrastructure to enhance the production technique even after the war and with civilian products. [18]

This perspective also worked for FIAT in Turin. World War I created a golden era for FIAT. The fledgling FIAT, like Ford, was driven by military contracts for trucks, aircraft engines, and weaponry. This truly transformed the company and funneled government wealth towards it. In other words, war served as a driving force for FIAT, Leading to the construction of factories like Lingotto[19], which was modeled with a close look at American examples such as Highland Park or the Packard plant.[20]

World War II was also effective in the mass production and shape of these two cities and the newly established factories within them as industrial leaders. [21]

Detroiters dramatically improved their approaches in mass production and completed the path from Vertical to Horizontal plant by increasing construction speed and introducing five-year plans. This approach did not occur exclusively in Detroit, but was also clearly detectable on a national scale.

Turin, on the other hand, was grappling with carpet bombing. These operations mainly targeted industrial and manufacturing sites that were involved in war production.

In terms of social aspects, both cities were facing worker riots and labor conflict in that time.[22]Although this kind of conflicts were rooted in different causes.

For Detroit, WWI was a turning point. The huge wave of immigration created a diverse labor fabric with different backgrounds.[23] A deep divide emerged among workers who shared a workplace or collaborated in some way. This was especially true since their mother countries were at war with one another, while they, with their new American identity, were busy manufacturing new vehicles that were destined to be used in that same war.

Although this topic was soon controlled by the FMC by accelerating Americanisation and establishing Sociological Department and investigation offices.[24]

At FIAT, the social dynamics were distinctly different. First, FIAT workers were mainly Italians, and the factory was rarely faced with a huge number of immigrants from different countries. Although lower levels of conflict among the workers, especially those with a Southern and northern background, are worth mentioning. Instead in this time frame in Turin, the labor protests[25] were mainly encouraged by political motivation.

During WWII, while the FMC was highly controlling its workers, FIAT was becoming a hotbed of anti-fascist resistance; the massive anti-fascist strikes by workers in 1943 was a pivotal moment in the fall of the fascist regime.

15 Undoubtedly, war is always accompanied by tragedy. In this chapter, the perspective on the war is mainly based on opportunities created by it in the industrial sector of the city, and it creates a baseline for comparison in terms of comparing two wars and two cities.

16 1914-1918

17 Built 1909, operated 1910.

18 With the help of governmental contract.

19 After a few years' delay.

20 Giovanni Agnelli visited American Ford plants and brought back "Fordist" principles, adapting them into Lingotto's famous vertical, continuous-flow architecture.

21 The war caused a dramatic divergence in how these cities experienced industrialization.

22 First half of the 20th century. WWI and WWII.

23 Mainly European backgrounds.

24 Americanisation refers to Ford's systematic effort to remove the European background of the workers, and define a new American middle class. personality. This effort is widely explained in Chapter 3

25 Which sometimes became seriously violent.



Figure 197: Crankshafts in Machine Shop at the Ford Motor Company Highland Park Plant, 1915. Representing the wooden floor.
Source:From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.2296. Benson Ford Research Center.



Figure 198: Used Car Lot at Ford Motor Company Highland Park Plant, June 1940.
Source:From the Collections of Plant Engineering Construction Photographs Series Object ID: 64.167.721.P.833.73830.3, Benson Ford Research Center.

Post Industrialization Period

Postwar and economic prosperity years

After WWII, there was a massive pent-up consumer demand for civilian automobiles. This demand on a global scale led to the creation of a post-war golden age which was followed by a massive increase in production rate specifically in the United States, a country where the infrastructure was barely damaged during the war and as Europe entered its reconstruction phase, numerous opportunities were created for them.

American industrial sectors sought to reap substantial economic advantages within Europe's high-demand marketplace via strategic frameworks such as the Marshall Plan, concurrently facilitating the reconstruction of the continent.[26]

Turin and Detroit were certainly not exempt from this era of profound profitability; indeed, both corporate entities, serving as primary representatives of their respective urban industrial sectors, were deeply engaged in this process.

Although Ford and FIAT, on the one hand, were enjoying the post-war economic boom, they were struggling with more or less similar problems on their internal front.

From 1950 to 1970, three years before the energy shock and economic crisis that emerged following the sharp surge in oil prices in 1973, Ford and FIAT were reaching their maximum production capacity. The Mirafiori industrial complex, which is highly comparable with the River Rouge plant, had a huge number of 140,000 workers. At the time, Turin was known as a single-company city in which almost everything was dominated by FIAT; dozens of related factories also worked with it, and if you asked someone in the city about their job, you would most likely be met with a four-word response: "I work at Fiat."

Italy started to rebuild its damaged industry through political reform after defeating fascism; meanwhile, the US aid in the form of the Marshall Plan was notable as a massive opportunity for industrial developers. This aid significantly increased the production rate and stabilized the post war market backed by American technology.

Alongside the Marshall Plan during the postwar economic boom, the fledgling government of the fledgling government of Italin republic promoted[1] an incentive package for investment in heavy industrial sectors, besides reducing fuel prices and widely developing the supporting infrastructure like roads and highways, in addition to the governmental post-war loans.

1 The transition from the monarchy to the republic occurred on June 2, 1946.

On the other hand, in Detroit, Ford was facing an enormous order list for civilian cars. For many workers, the years were "like an arrival of the promised land."[27] High wages and overtime pay allowed workers to achieve a middle-class lifestyle, which was caracterized by single-family home ownership, new appliances, and new cars.

Throughout much of the postwar interval, the unemployment rate remained under five percent, and labor unions like the UAW[28] secured gen-

26 Although these efforts later, during the Cold War, turned into a lever for suppressing leftist movements among European workers to prevent Soviet influence in the Green Continent.

27 Henrickson, Detroit Perspectives, 435.

28 The United Auto Workers (UAW) is a major American labor union representing over 390,000 active members and 580,000 retirees in the U.S. and Canada. Headquartered in Detroit, Michigan, it negotiates contracts across the automotive, aerospace, and agricultural imple-

erous "Treaty of Detroit" contracts. Their activities in the 1950s guaranteed workers' job security, health benefits, pensions, and a share of production.

Ford and Fiat: Leftists and Social Equality in the Post-War Era

The post-war climate in these two industrial hubs revealed a stark divergence. While Turin grappled with the physical and psychological ruins of conflict, the youth of Detroit—spared the harrowing sight of bombers overhead—approached this new era with a fundamentally different perspective.

Regarding the immediate political landscape, the 1946 municipal elections in Turin saw a decisive victory for Marxist parties, who secured sixty percent of the vote. However, the equilibrium shifted rapidly by 1948, with the sweeping national triumph of the Christian Democrats; Turin was transformed into a critical frontline in the burgeoning struggle against communism.

During the 1950s, the United States exerted considerable pressure on European industrial giants [29]to marginalize leftist unions within their facilities. Utilizing the Marshall Plan and various aid packages as strategic leverage, the American government effectively initiated anti-leftist campaigns across the continent.[30]

The US pressure was effective; in 1951, left lost once more Turin's city hall to the center right and in FIAT, the CEO, Vittorio Valletta, launched a full-scale offensive against the communism-dominated CGL and FIOM unions. FIAT and its CEO systematically fired communist workers and imposed strict factory discipline. A couple of years later, by 1955, the FIOM Union lost its majority in FIAT internal commissions for the first time[31].

After decades of defeats in the 1960s and 1970s, left-wing activities became more and more close to radicalism. The new left was shaped and separated itself from the mainstream. This group which was deeply rooted in students of the University of Turin and FIAT laborers created revolutionary extra-parliamentary groups like Lotta Continua[32] and Potere Operaio[33]

In 1970, amid the severe global economic crisis, the first communist municipal government was formed. Although It could not prevent Turin from facing serious radicalism in the left party. This led to a decade of tension, assassination, and kidnapping.[34]

By 1980, militant left-wing labor definitively ended due to the economic problems in the late 20th century. The relationship between these two is embedded in the 1980s financial crisis and the unsuccessful efforts of the left-wing movement against the company managers, with Fiat at the forefront.

By the late 1970s, FIAT was sliding toward irreversible decline, suffering from massive debts, falling car sales, rising oil prices, and problems with absenteeism and sabotage on the assembly lines. This circumstance led the company to start the rigid anti-leftist decision making. In 1980, CEO Cesare Romiti used this dire financial situation to announce the immediate dismissal of 14,000 workers and the furloughing of 24,000 others. While management justified this as a strict economic necessity to save the company, they strategically targeted labor activists, who featured prominently among those chosen to be fired[35].

In reverse, when the unions responded to the mass layoffs by calling a 35-day strike, they found that the economic crisis had severely weakened their own ranks. Because the workers had already been suffering from years of inflation and recession, the enthusiasm of the rank and file quickly collapsed "in the absence of any strike fund or paychecks."[36] The workers were simply too poor to endure a prolonged strike without income.

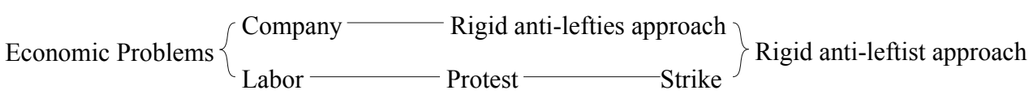


Figure 199: Representing how economic problems led to anti-Leftist approach.
Source: Author

This shows how the economic crisis at the end of the 20th century created a power struggle between the workers and the factory owners instead of being logically worked out in favour of the left parties. To put it another way, the connection between the total eradication of the militant left and the devastating collapse of labor unions and the broader left-wing movement resulted from the economic problems.

Production Methods and Reasons Behind Decentralization

The second half of the twentieth century, soon after the economic prosperity that led two cities to reach their peak point of car production, faced the companies with serious problems. Since industrial development was fundamentally known as a global phenomenon, the problems were usually the same in different geographical contexts; for example, the struggle between the stakeholders, capitalists, and managers on the one hand and the workers' union on the other was not related to geographical location, but it had different particularities in FIAT and Ford.[37] The outline of the fundamental problems which two factories, FIAT and Ford, were facing in the late 20th century can be summarized as follows:

Technological development has reduced the usage of the human workforce in different parts of the production sections. This development, which emerged through extensive financial, time, and scientific investment in assembly line improvement, led the two companies to reduce their reliance on the workers.

ment industries.

29 Most notably FIAT

30 This geopolitical strategy was hardly unique to Europe; throughout the Cold War, the global stage, extending even to the Middle East, became a theater of conflict between the two superpowers, though their methodologies were meticulously adapted to local geopolitical and cultural demands.

31
CGIL : Confederazione Generale Italiana del Lavoro) is the oldest and largest national trade union federation in Italy.
FIOM: (Federazione Impiegati Operai Metallurgici). It is the CGIL union that represents blue- and white-collar workers in the metal, engineering, and automotive industries.

32 Continuous struggle.

33 Workers Power.

34 Extremist left-wing factions like the Red Brigades and Front Line.

35 The economic crisis gave Fiat the legitimate leverage it needed to clean house.

36 Cardoza and Symcox, A History of Turin, 258.

37 Additionaly the other problems that had global aspects was effected bout factories, but different contexts created different approaches, and different approaches led to far different results. At the end, although both of these factories figured it out successfully and were still producing their cars and leading the industrial world, these differences created different identities for each one.

Besides this technological development, the new management strategy was significantly effective. At the forefront: decentralization. This fundamentally changed all the previous aspects of mass production. In the late 20th century, Ford and FIAT, which before were dedicated to their maximum effort in centralizing their production process in massive sites like Mirafiori and Rouge River plant, faced the reality of the difficulty of the methods.

Centralization created huge advantages by reducing transportation costs[38]; however, in the post-war era, the advantage shifted to other producers who accepted higher transportation costs in exchange for lower labor wages[39] and relocated the production centers to third countries.

This action created several advantages. FMC and FIAT developed this approach, to on the one hand become closer to material resources and on the other hand pay less for a similar job in comparison with wages in the EU and the US.

Ultimately, both of these companies had no choice but to decentralize[40]

part of their production process. But among this, FIAT was one step behind.

In the late 20th century, the company was faced with serious financial problems and widely used governmental benefits to keep production possible.[41]

38 Specifically in the buildings like Rouge River or Mirafiori, where the company produces the component from scratch instead of just being an assembly center.

39 In the centers which has lower wage rate.

40 Although this decentralization had big differences from what was maintained before with the same name in the 1920s

41 At that time, decentralization referred to the assembly plant, which was responsible for assembling automobile kits which were produced in the parent company

Before the 1990s, FIAT was indeed an active player in international export. But their production inside Italy was "largely protected by the domestic market." In other words, during that time, FIAT was sheltered from full foreign competition. As these protections were lifted in the last decade of the 20th century, FIAT found itself in a free market environment, which gave it two options: first, to continue the traditional way and remove itself from the market, and second, to replace production methods, start decentralization, and find its own competitive advantage.

Rubber Plantations and a Small Example of Competitive Advantage.

When establishing the River Rouge complex, Henry Ford pursued a deep vision aimed at controlling raw materials through upstream production, which prompted him to purchase rubber plantations in Brazil. Shifting the rubber manufacturing facility from Highland Park to a second-tier country like Brazil not only generated significant savings in running costs, such as labor wages, but it also did not noticeably raise transportation costs. Because the raw materials ultimately needed to be transported from Brazil to Michigan anyway, this move replaced the transit of raw materials with fully manufactured, assembly-ready tires.

located in Turin or Detroit. This method helped Ford or FIAT to significantly reduce the transportation fee. In other words, they transport a ready car KIT instead of an assembled car. And the assembly process was outsourced to assembly companies, which were much closer to the delivery points. However, in the new decentralization method, they not only kept the assembly plant near the final destinations but also relocated the main industry, which was responsible for creating car components from scratch..

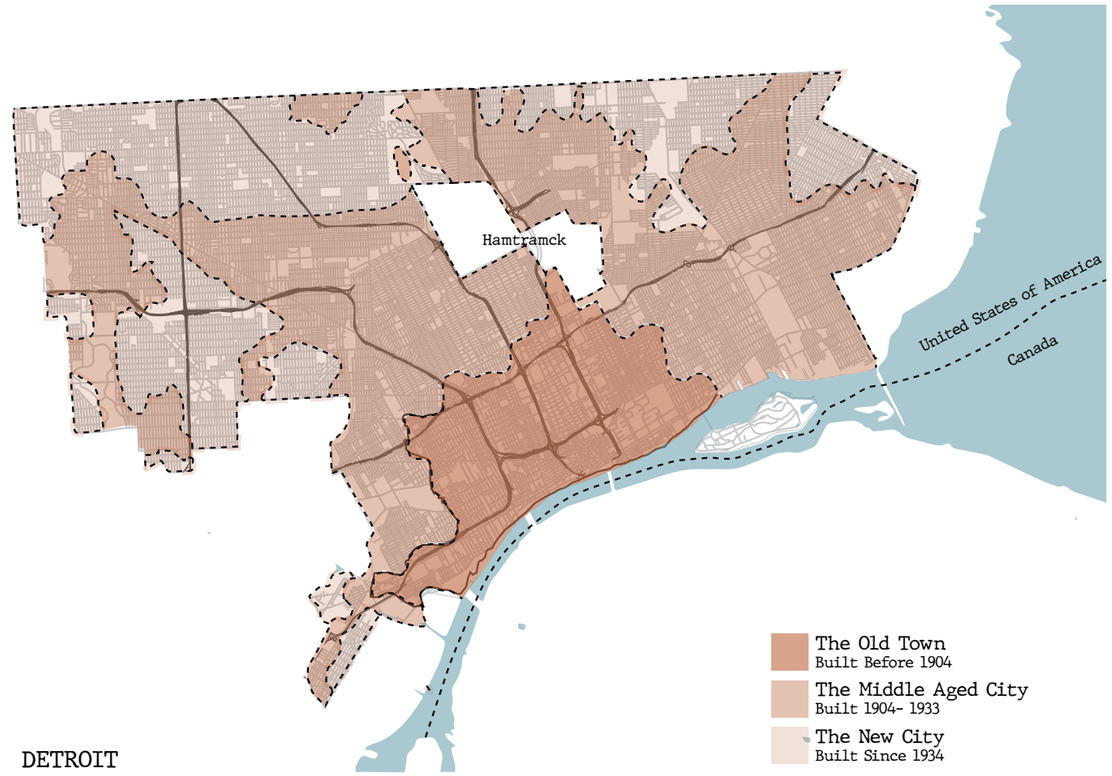


Figure 200: On the top the territorial expansion of Detroit from 1890 to the Present and, on the bottom the territorial expansion of Turin from 1854 to present. both maps are drawn to the same scale.
Source: Drawn by the Author based on the series of maps.

Ford and Fiat: A Comparison between Automotive factories buildings in the 20th Century
The case of Fiat Corso Dante and Piquette Plant

Fiat started production at its Corso Dante workshops in 1900, while the Ford Motor Company began production in 1903 by renting a wagon manufacturing workshop known as the Mack Avenue Plant.

On one hand, Fiat continued its manufacturing evolution across three other primary sites in Turin: Grandi Motori, Lingotto, and finally Mirafiori. On the other hand, Ford expanded through the Highland Park plant in Detroit and the River Rouge Complex in Dearborn. Although these companies grew on two different continents, the era of industrial modernization and rapid communication converged their manufacturing styles over time, making both their technology and their physical environments remarkably similar.

This architectural and operational resemblance is most evident when comparing Lingotto to Ford's Highland Park plant. Among these early facilities, the Mack Avenue Plant is outside the scope of comparison due to its temporary status and short timeframe of use, roughly one year. Additionally, while Fiat Grandi Motori presents comparable architectural aspects, its different type of heavy industrial production, such as large diesel engines, leaves it out of this specific discussion. When comparing Fiat Corso Dante with the Ford Piquette Avenue Plant, it is clear that although they did not follow the exact same sequential production logic, they both played a bridging role. They served as transitions between traditional and undeveloped styles of 19th-century workshop structures and the highly integrated "daylight factories" of the 1910s and 1920s.

However, because the Corso Dante site underwent a much longer and more massive expansion through the years, only its first-phase constructions are directly comparable to Piquette.

In terms of layout, Piquette's factory hierarchy relied on a multi-story vertical format across three floors. It operated with a bottom-up component layout where materials were hoisted upwards, utilizing freight elevators to move progressive assemblies down toward final vehicle completion. Conversely, Fiat Corso Dante followed a horizontal layout that territorially divided the work across a decentralized footprint. While Piquette divided its operations by floor plan, the early stages at Corso Dante distributed work across single- or two-story pavilions, dividing the work between north shops, south shops, and the shop on Via Madama Cristina.

The facade of the main building at the Piquette plant is comparable to that of the Fiat repair shop and Management Building, as both structures are adorned with decorative elements. The facade of the Corso Dante shop demonstrates clear inspiration from Turin's Liberty style, incorporating designed window and door fences with floral motifs and floral stucco reliefs at the corners. The windows feature low arches with plaster decorations on their frames, and the building displays rustic ashlar masonry on the ground floor. In contrast, the Piquette plant, based on the standard New England mill design, presents a decorative stepped brickwork facade topped by an ornamental parapet, with low-arched window openings along the sides and rectangular, multi-pane double-hung wood windows.

It is evident that both of these buildings had unnecessary decorations that were rooted in the prototype of traditional industrial buildings; however, their decorations are from different origins.

The structural frameworks of both companies' initial facilities relied heavily on traditional building methods and masonry load-bearing walls. At the Piquette plant, these external masonry walls were supported internally by a grid of square timber posts and heavy wood beams that held up thick wooden floors. In contrast, wood was entirely absent from Fiat's structural palette, as it did not fit the industrial building traditions of Turin; the early single-story masonry shops at Corso Dante were instead completed with iron-tied roof trusses and overhead skylights.

Both sites served as foundational testbeds for mass production. In 1908, at the Piquette plant, Ford's production manager, Charles Sorensen, and a small team conducted an early experiment with a moving assembly line on the third floor. This location primarily provided the operational and conceptual groundwork by organizing workflow and testing production logic. At the Corso Dante site, engineers experimented with vertical production flows within a new five-story facility designed by Giacomo Matté Trucco and constructed by the Porcheddu Company in 1913. This facility featured a modern reinforced concrete frame and expansive industrial windows.

Ultimately, while the Piquette plant served Ford

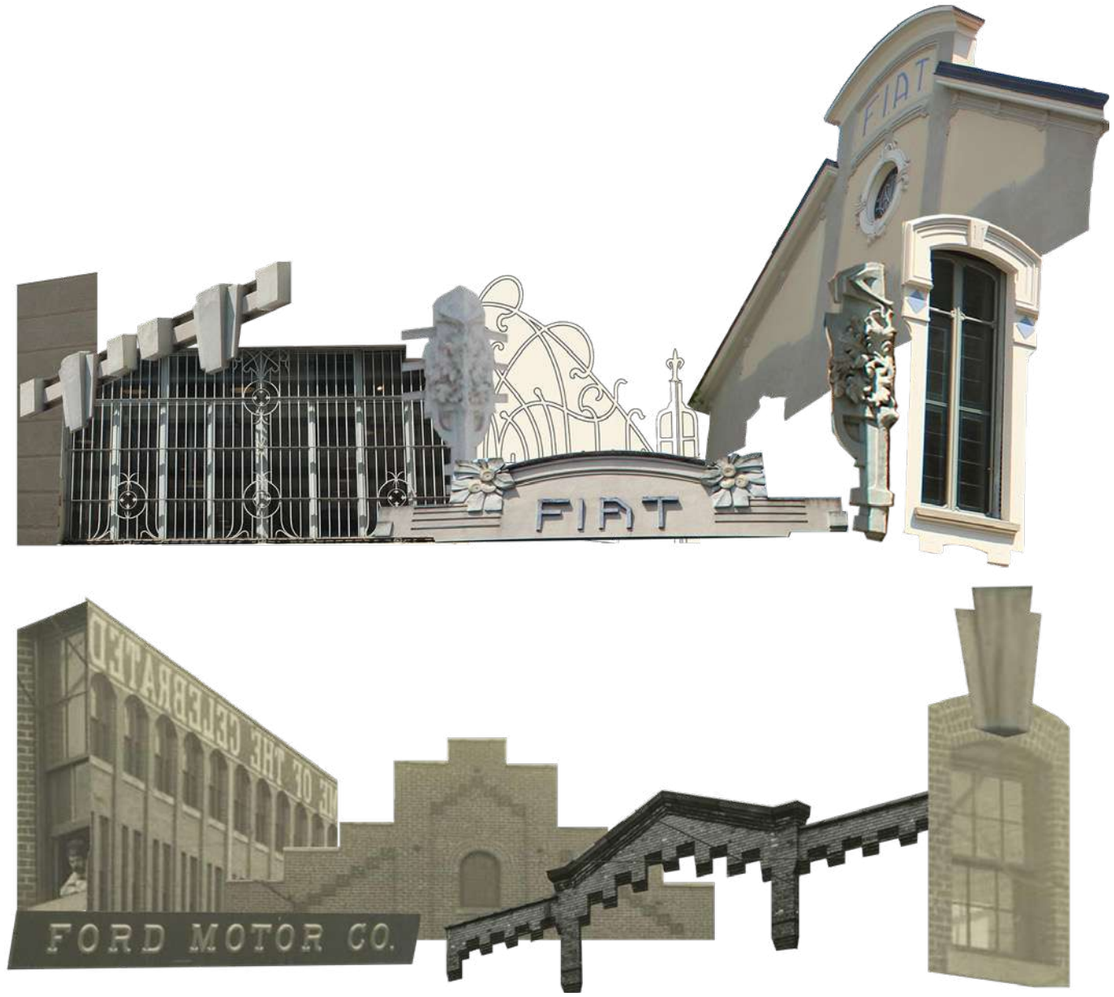


Figure 201: Elements in pre daylight factories in Fiat Corso Dante (at the top), and Ford Piquette ave plant (at the bottom
Source: Illustrated by the author

for roughly six years before being sold as operations outgrew its layout, Fiat's Corso Dante site remained a permanent fixture until the 1950s, expanding massively along the southern edge of Valentino Park. Though these buildings were fundamentally distinct in their regional executions, both carried the final architectural markings of traditional 19th-century manufacturing plants before the onset of full vertical Fordism.

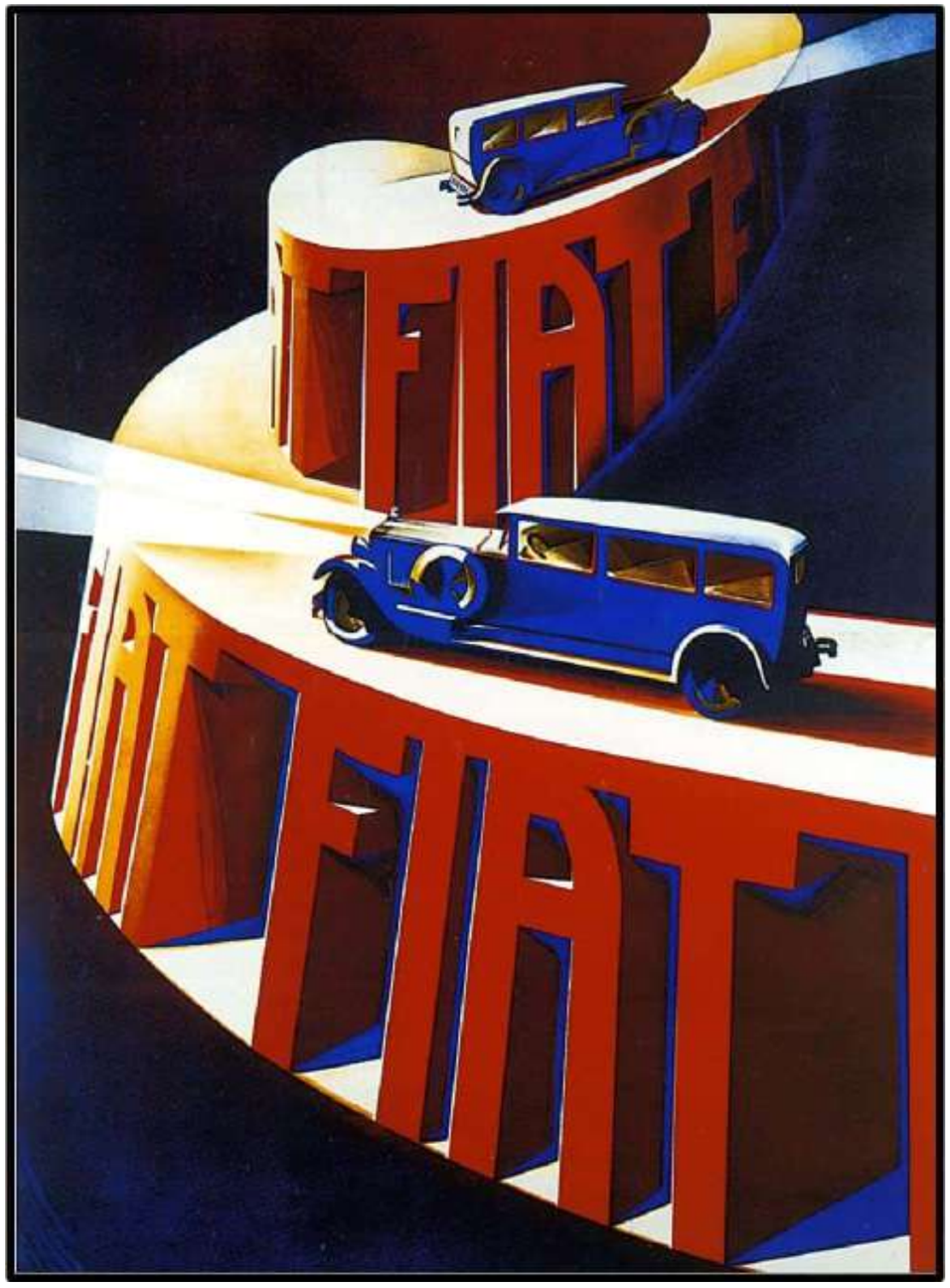


Figure 202: Fiat Automobile Vintage Car Poster Advertisement printed in the early 1900's.
Source: : Poster by Giuseppe Riccobaldi del Bava. Available via Wikimedia Commons.

The case of Lingotto and Highland Park

Urban and Geographical Context

By the expansion of both companies the need for vaster space increased. Ford needed more space for production of model T and FIAT needed to solve the transportation problem on top of the other issues. Finally both complexes were shaped with different layouts and organization, the reason is behind two main criteria, the shape of the land and the policy of construction and expansion.

The shape of land was itself the result of land acquisition opportunities. The land acquisition for these two companies went through a completely different situation. Ford bought a vast land in the corner of Woodward Ave and Manchester Avenue because it had a low tax, railroad access and opportunity to expand. The land was previously a hotel, horse racing track, school and waterworks, which was demolished after the acquisition of 1907.

On the other hand, 8 years later, FIAT bought a land with long narrow shape squeezed between Via Nizza and Torino Smistamento which was relatively proximate to Corso Dante due to the similar reasons such as the railroad access and having the ability of expansion. However the land acquisition didn't go as smooth as it went for the Ford company, as property owners including widows that their social status was tied to their land, artisanals and aristocrats were present in the territory that was demanded by FIAT. The series of purchases of these lands resulted in the formation of a very long and rectangular piece of land. The differences in the land shape created a fundamental distinction between the two companies.

Highland park grew in a piece of land that was proportionally more relative to a square while Lingotto constructed in a long narrow strip, and while highland park had major a connection with 3 main streets on top of the connection with railroad, lingotto had its major connection only with Via Nizza street.

On the other hand, the construction of the buildings developed with different methods. While Kahn suggested initially building Highland park in the center of the land, Ford refused as his approach was to start from the street sides, add on units and link them together, in the other words, FMC wanted each square inch of the land work for further expansion and development. By considering this policy Highland Park went through 3 different phases of horizontal expansion including new land acquisitions. It can be claimed that lingotto on the other hand was constructed similarly with Kahn's initial idea , to construct the building in the center, and then expanded vertically, meaning that different parts mostly add on to the building instead of addition of many new buildings.

As a result, while these complexes shared similarities in other aspects, their layout and organization followed different stories. The trend from vertical factories into the horizontal ones next to the shift in construction material (from reinforced concrete to glass and steel building) are noticeable in Highland park, but in Lingotto's site this transition is barely notable, although both continued their production systems in single-level or massive integrated complexes at the Rouge plant and Mirafiori.



Figure 203: An arial view of the Ford Highland park complex, 1914
Source: Ford Motor Company Archives. Digital image courtesy of Detroit Free Press.



Figure 204: An arial view of the Lingotto complex, 1961
Source: Archivio Nazionale Cinematografico della Resistenza - Fondo Bertazzini (001992_003). Available via Politecnico di Torino (imgdc.polito.it).

Architectural Expression

After the piquette factory, in the context of Detroit, the foremost industrial center in the United States, collaboration of Albert Kahn and Henry Ford resulted in a revolution in both automobile manufacturing and architecture, along with the record in production and dimension.

During this era, the United States promoted a version of modernization that was different from Europe. This cultural divergence explains why Europe viewed Lingotto as futuristic, while Highland Park was seen purely as a utilitarian tool. The American approach was rooted in strict rationalism and high operational efficiency. Conversely, European modernist architects approached industrial design from an intellectual, and artistic perspective; With pioneers like Le Corbusier, who drew inspiration from cars and aircraft to design buildings , and exceptions like Giacomo Mattè Trucco created the first futuristic buildings.

Within these factories, Albert Kahn gave a distinct architectural identity to places of mass production. He developed a repeatable prototype for industrial facilities and then mass-produced this architectural template like a manufactured object and by spreading it along the world he again stripped the design's individual and national identity, designing hundreds of factories for Stalin in the Soviet Union, and more within the United States, totaling over 2,000 structures worldwide. Giacomo Matté Trucco was among the European architects who inspired from this prototype to advance the design of Lingotto by building it as a daylight factory.

In terms of comparison as two factories has different spatial layout and size, it seems more correct to compare the main factory buildings together.

Looking through the layout of Highland Park, acomparable factory building to Lingotto can be the building A with the nickname of Crystal Palace. These two buildings share vast comparable criteria as the team of Fiat that was sent for the trip to the United States, including Giaccomo Matte Trucco, visited and studied this building, next to the other notable factories.

However, while the Highland Park complex was larger overall, comparing these two specific buildings shows that Lingotto was much larger than Building A. Lingotto is approximately half a kilometer long, 80 meters wide, and five stories tall with a test track on its roof; Building A (Crystal Palace) was 263 meters long, 23 meters wide, and four stories tall.

despite the size, the appearance of the two buildings was very similar, as they were both daylight factories. both facades featured wide and tall windows with Crittall steel framing[42] that replaced the traditional wooden dividers, with concrete grid. for both factories, this type of building improved worker health and morale, enhanced Productivity and supervision, reduced labor turnover and enhanced better ventilation.

42 Both imported from England.



Figure 205: Ford Highland Park Plant under Construction, circa 1909



Figure 206: Ford Highland Park Plant,Crystal palace building, circa 1914

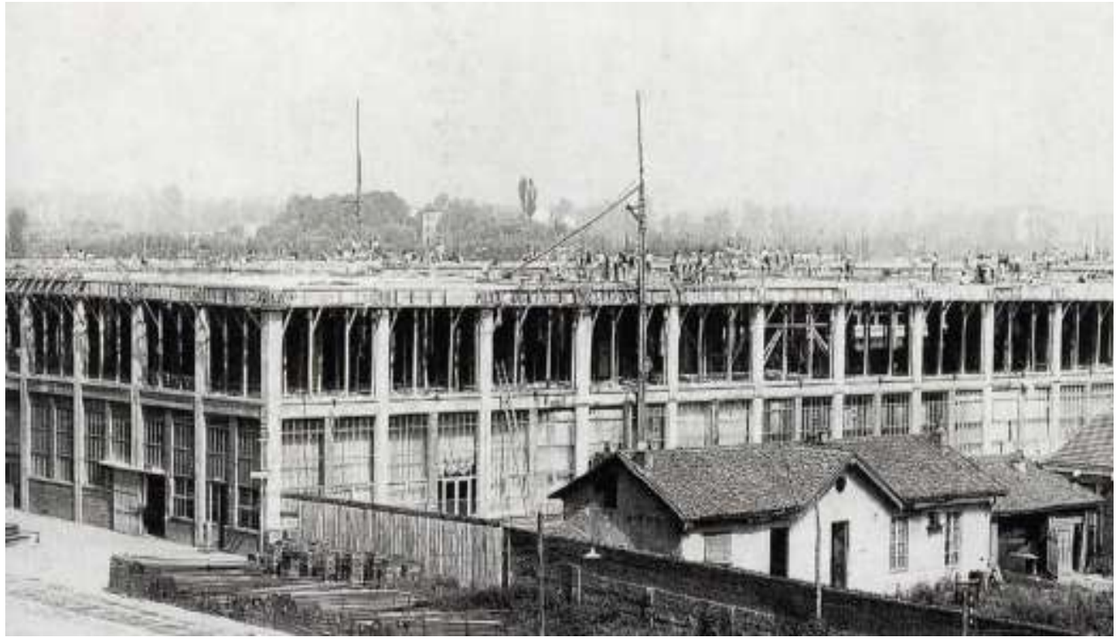


Figure 207: Lingotto Plant under Construction, circa 1917
Source: Olmo, Un segno nella pianura, fig. 1

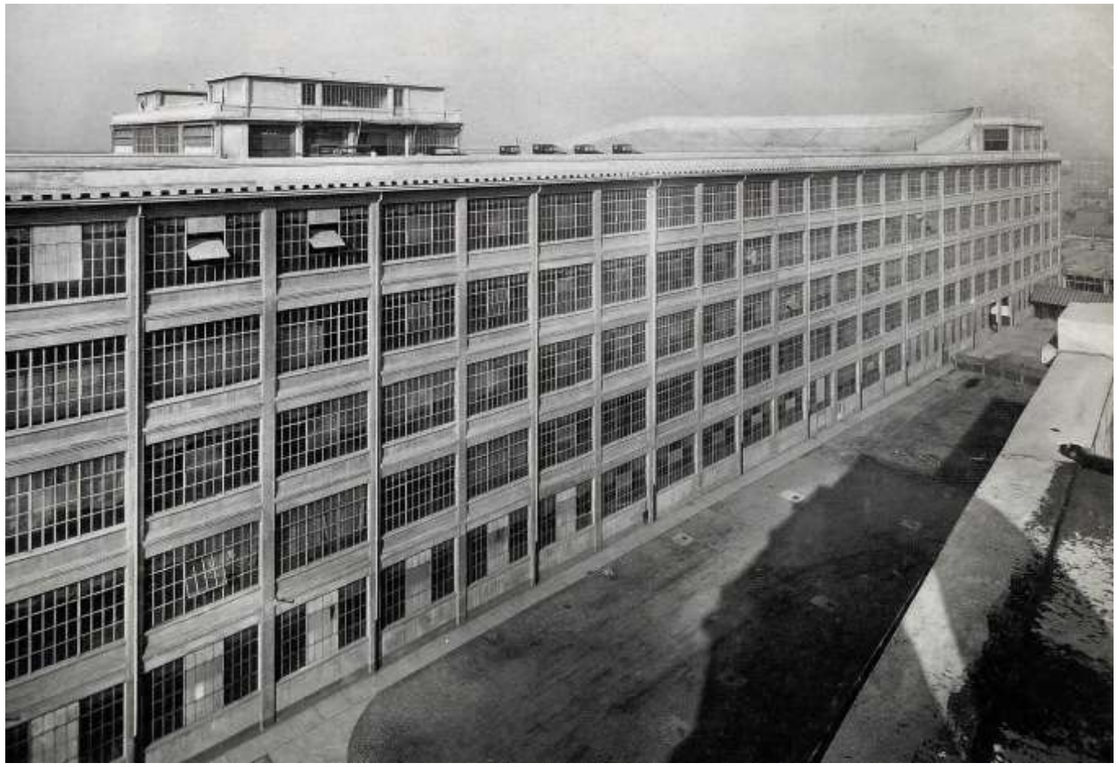


Figure 208: Lingotto Plant under Construction, circa 1924
Source: Olmo, Un segno nella pianura, fig. 9



Figure 209: Ford Motor Company's Highland Park Plant, Highland Park, Michigan, circa 1947
Source:From the Collections of Photographic Vertical File Series Object ID: P.833.85044.1, Benson Ford Research Center.



Figure 210: Workers Moving Automobile Bodies at Ford Motor Company Highland Park Plant, 1914
Source:From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.402, Benson Ford Research Center.

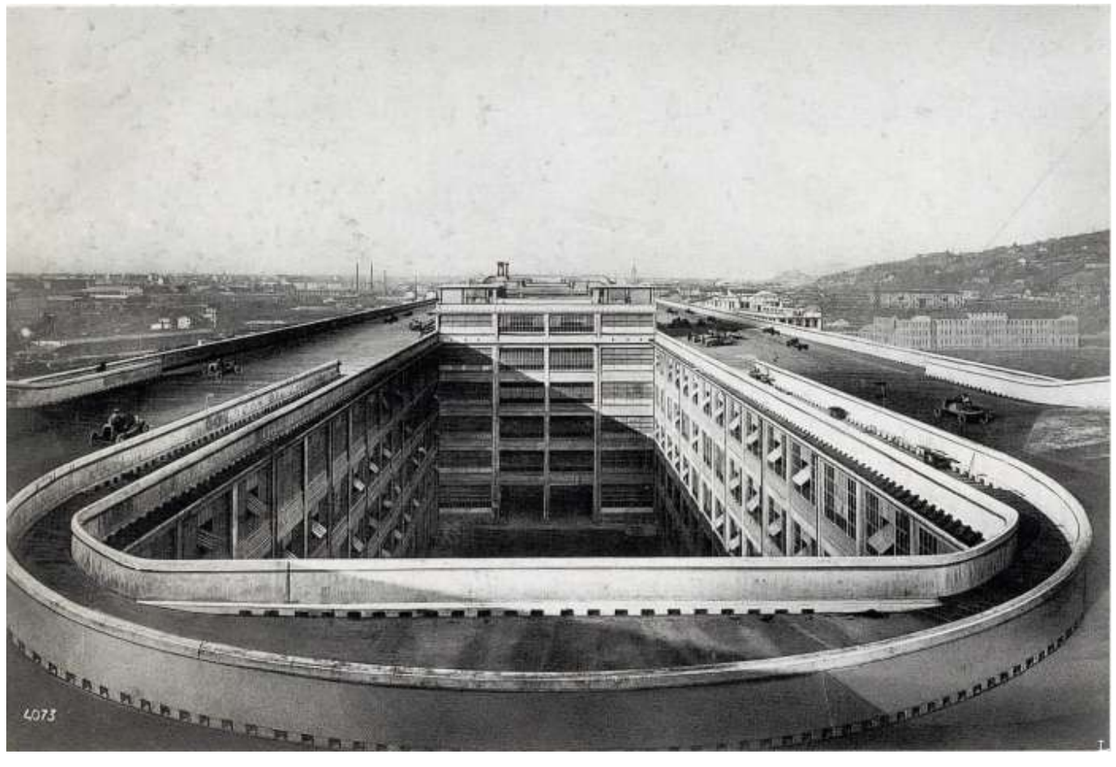


Figure 211: A view from Lingotto's roof with the test track
Source:Olmo, Un segno nella pianura, Fig 26

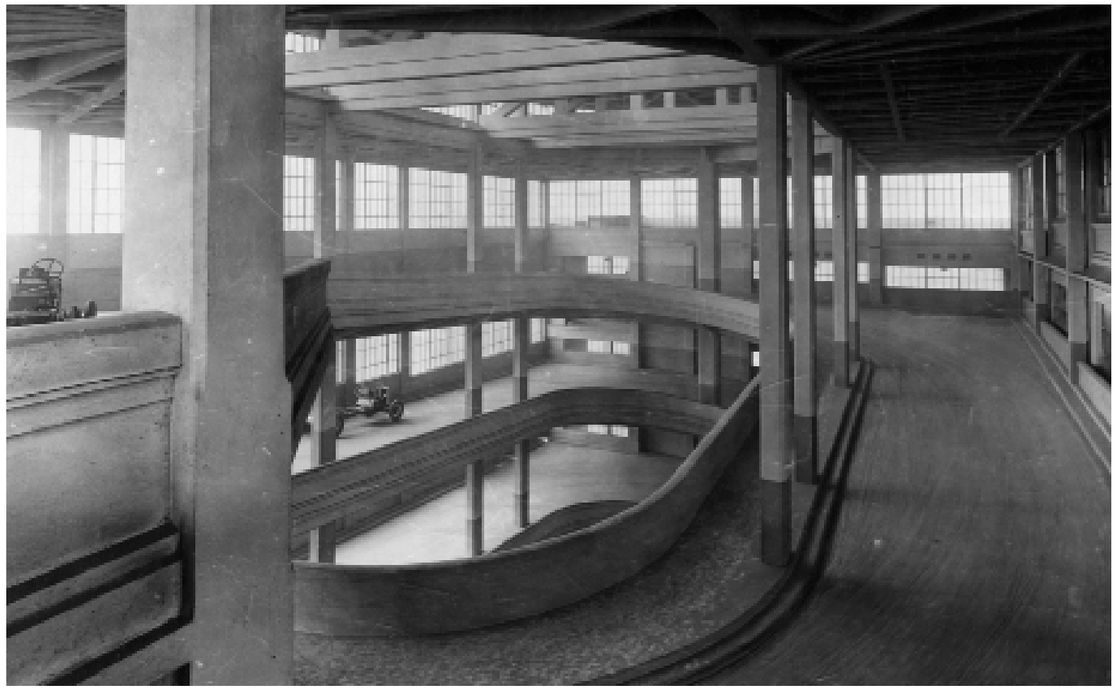


Figure 212: The southern helical assembly ramp of the Fiat Lingotto factory, designed by Vittorio Bonadè Bottino.
Source: Architectural Archive of the Pinacoteca Agnelli

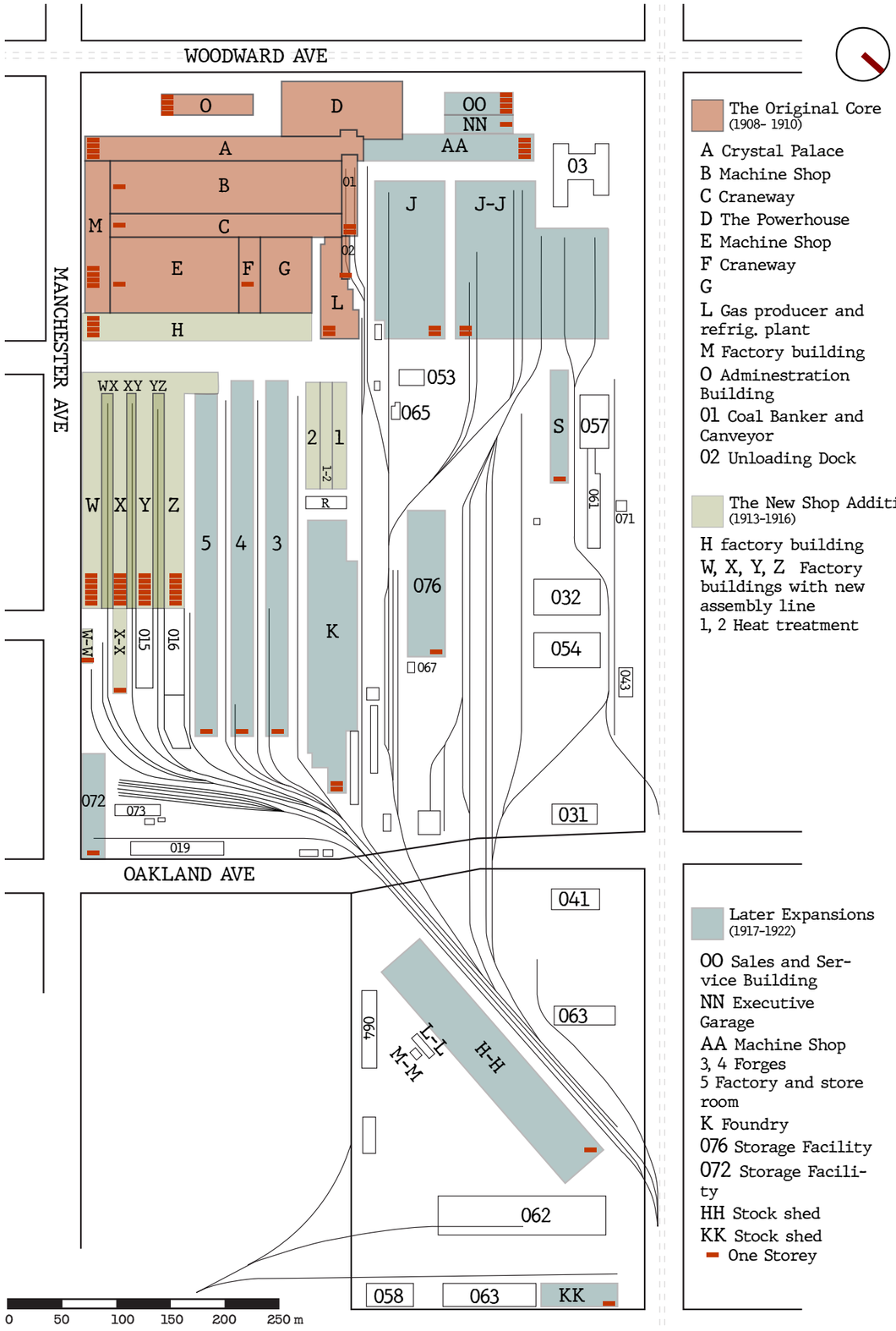


Figure 213: The plan of Highland Park in 1920. The map is drawn on the same scale of Figure 114.
Source: Illustrated by the author

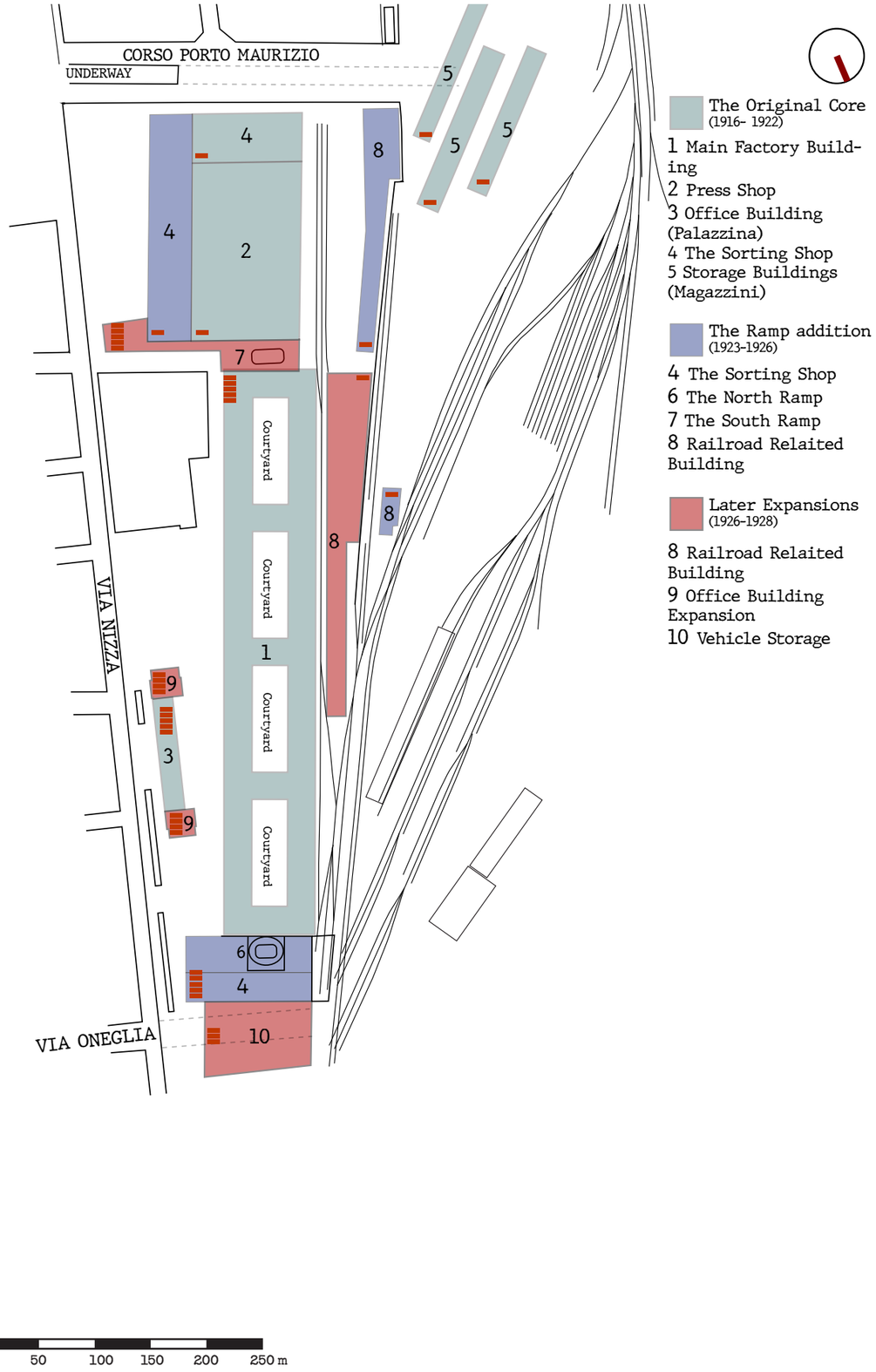


Figure 214: The plan of Lingotto in 1930. The map is drawn on the same scale of Figure 113.
Source: Illustrated by the author

Innovation and decoration, Values to express

A noticeable change from traditional to modern factories was the absence of decoration. As matters shifted from appearance to functionality, policies focused on avoiding waste of material or time. Highland Park and Lingotto were both constructed based on these policies.

While both workshop buildings in the complex expressed themselves without typical decorations, the public showcase was a major matter. As a statement of power, both administration offices were evidently decorated, and both were located inside the complex next to the main avenues, Via Nizza in Turin and Woodward Avenue in Detroit. However, Ford changed the policy in their next complex and moved the management office of the workshop area.

In Palazzina, the administration building of Fiat, the facade was done with the stone-cement technique and decorated with tall neoclassical columns at the entrance; for Ford, the building featured a base of large stone blocks, with brick columns rising between the windows to give the illusion of greater height. Decorative tiles featured above the windows, and the roofline cornice was adorned with diamond-shaped tiles along its entire length. Both buildings were opened to a large lobby viewing a massive marble staircase.

Another key difference between these two buildings is the novelty of the test track and the ramp. While the problem of bottlenecks could be solved with more freight elevators, Giaccomo Matte Trucco and afterward Vittorio Bonade Bottino designed unique ramps of the north and south wings that were in contrast with the logic of mass production buildings. This contrast became an attraction point for the rich and famous people to visit this public showcase as one of the construction innovations of 20th century.On the other hand, the powerplant was the public showcase for Ford, something that was absent at Lingotto. Expressing itself from afar with five massive smokestacks, to write the “FORD” in between them, built with premium materials such as polished brickwork, pristine tiled floors, and large, immaculate corporate viewing windows,to turn the plant into an attractive stop for public tours.

Another distinct policy at Highland Park was the architectural hierarchy to cut costs. Decorative elements, such as the stamped-cement roof cornices, were reserved exclusively for public view, while the internal courtyards and rear facades facing the railway tracks were left entirely plain. This visual hierarchy is absent at Lingotto, where the clean, unadorned rhythm of the reinforced concrete grid covers the exterior walls and the internal courtyards with absolute uniformity.



Figure 215: The Administration office of Ford motor company in Highland park
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.833.956, Benson Ford Research Center.



Figure 216: The Administration Office of Fiat in Lingotto, featured on a historical postcard sent from Turin to the Military Health Director in Benghazi, dated January 15, 1928
Source: Edizione G. C. Torino, 1928. Private Collection.

Rationalism in Labour

The system of rationalism of labour was applied to both factories through two criteria: first, the assembly line and the sequence of production flow, and also through the scientific management methods. Both Highland Park and Lingotto were the first homes to the assembly line. Ford pioneered in this matter, and Fiat followed . This system was adapted through the visits to the United States, including Highland Park, with the purpose of increasing production. This globalization of methods put the workers of factories in the same situation; however, they were continents apart.

The assembly line system in both companies was applied to reduce workers' movements, eliminate wasted time, and increase efficiency. Highland Park started with a moving assembly line in 1913, while Lingotto in 1921 was not fully adapted to this method, as instead of a moving assembly line, Labours worked in a linear way. Methods converged after the further visits to FMC, but the way of application was in contrast.

In Highland Park, the system was top-down. Raw materials or heavy components were lifted to upper floors, and as assembly progressed, components descended by gravity to meet the final, continuously moving chassis assembly line on the lower levels. In Lingotto, instead of a descending sequence, raw components arrived at the ground level via the adjacent railway lines, and through the assembly line, the car was produced floor by floor until it finished on the roof, where it was tested on the rooftop test track.

This extreme harmony of machinery required the complete adaptation of the human workforce to keep up with the pace and avoid accidents. Taylorism was the initial method implemented in both factories. This marked a radical shift away from traditional craft working, which had required highly specialized skills and independent worker movement across different parts of the shop floor. Under this new combination of the assembly line and Taylorism, tasks were broken down into repetitive, simple, and tiny operational steps. Instead of the worker moving around the factory, the work moved to the worker, which increased the efficiency.

However, Fiat shifted from Taylorism to the Bedaux system because implementing Taylorism proved too costly, and its preliminary planning and definition of work methods were extremely laborious and expensive to execute. Moreover, Taylorism changed the entire structure of the factory and the management of the workshops. This caused strong opposition from the technical production managers, who felt that the organizers of this system were taking away their traditional duties and power. To overcome these organizational friction points, Fiat adopted the Bedaux system. Unlike Taylorism, the Bedaux system allowed Fiat to increase productivity and reduce labor costs through precise time-study analysis and analytical control over individual and group performance, all without the need to radically alter the existing technical work methods.

Despite being separated by an ocean, workers in Detroit and Turin faced a deeply similar reality of industrial injustice and exploitation, as scientific management reduced human beings to mere cogs in a massive corporate machine, stripping away their artisanal pride and testing them under exhausting physical conditions. Management handled the resulting worker dissatisfaction in different ways; Ford famously introduced the Five-Dollar Day wage to combat massive employee turnover but paired it with aggressive personal surveillance through a "Sociological Department" that inspected workers' homes, savings, and moral habits. Conversely, Fiat workers faced intense speedups under the Bedaux system that only worsened under the pressure of the Fascist regime, and while the company offered industrial paternalism through healthcare and social clubs, it kept wages much lower than those in Detroit.

Ultimately, this shared environment of industrial injustice led to a parallel history of labor resistance across both continents, because while Ford workers eventually unionized through intense battles in Detroit, Lingotto became a legendary hotbed for trade union organizing, massive strikes, and political resistance that permanently shaped the social history of Turin.

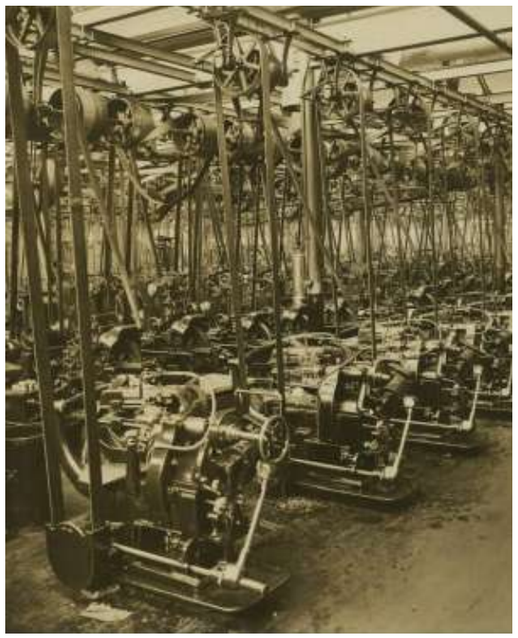


Figure 217: Machine Shop at Ford Motor Company Highland Park Plant, circa 1913
Source: From the Collections of Photographic Vertical File Series Object ID: 84.1.1660.P.03749, Benson Ford Research Center.



Figure 218: A set of Gleason gear cutting machines, Lingotto
Source: La razionalità produttiva, Fig 65

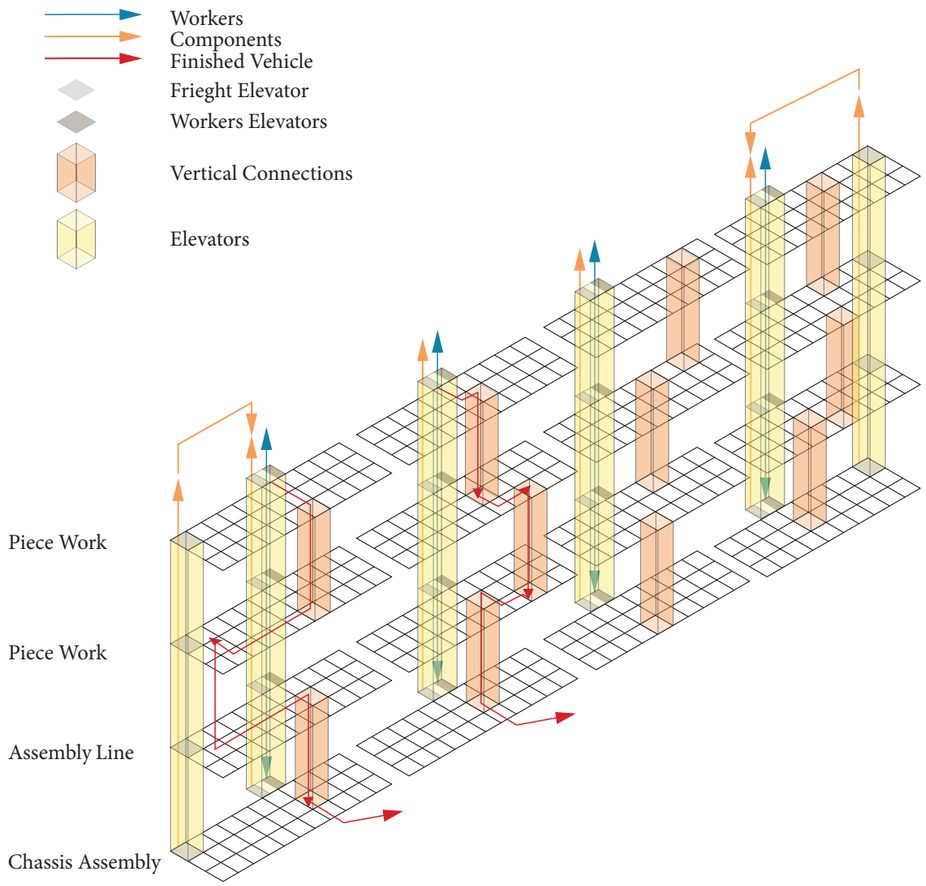


Figure 219: The top-down process and Vertical flow of in Crystal palace
Source: Illustrated by the author based on Rappaport, Vertical Urban Factory, 158

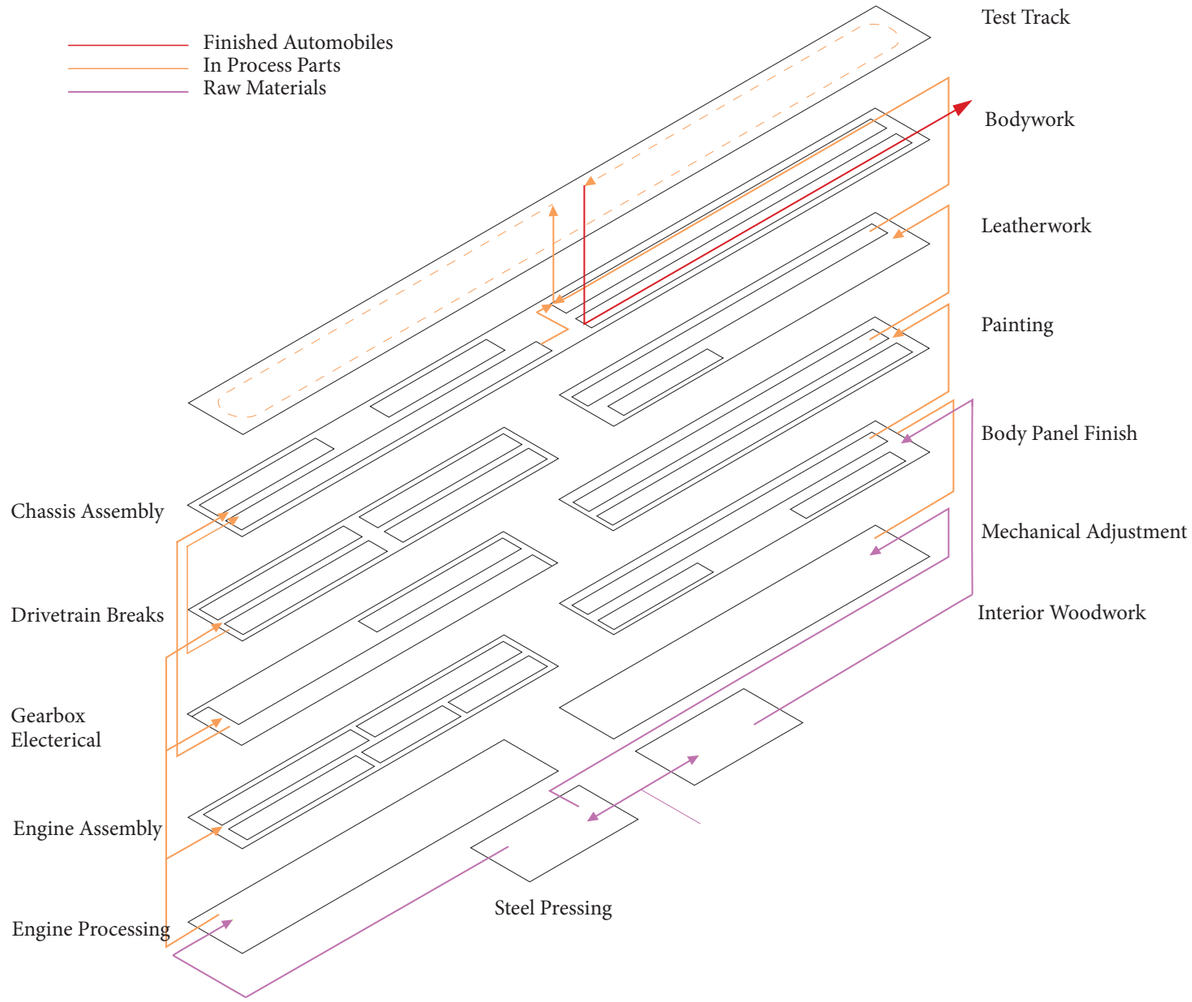


Figure 220: The Bottom-Up process and Vertical flow of in Lingotto
Source: Illustrated by the author based on Rappaport, Vertical Urban Factory, 132

Structural Aspects

The novelty in structure was the reason behind the speed of construction, the creation of daylight factories, and multiple changes in building levels. Initially, factories were constructed as single-level masonry buildings, later evolving into multi-level reinforced concrete structures, and eventually returning to single-story designs utilizing metal structures and metal truss roofs. While reinforced concrete enabled rapid construction, metal structures allowed for even faster assembly and supported wider bays.

In Highland Park, this structural shift is clearly visible: before 1916, most buildings were multi-story reinforced concrete, whereas after 1916, most were single-story metal structures. However, this shift did not happen in Lingotto until the new factory was constructed in Mirafiori. Instead, Lingotto pursued incrementalism over the years through vertical and lateral additions to the main shop using a reinforced concrete structure. On the other hand, Highland Park expanded horizontally using both metal and reinforced concrete structures.

Observing the initial phase, both Highland Park and Lingotto were constructed mainly with reinforced concrete, except in certain parts, such as foundries, press shops, or covered courtyards where metal structures with trussed roofs were used. reinforced concrete offered the opportunity for fast construction in the 20th century. The average building time in Highland Park was about 1 to 2 years, which was extraordinary compared to the past. This timeframe was relatively longer for Lingotto due to its greater size and the integration of all operations into a single building.

Reinforced concrete also made the creation of daylight factories possible as structural grids expanded. This wider grid, measuring 8m × 6m in Highland Park and the Crystal Palace, and 6m × 6m in Lingotto, created room for assembly lines and the free movement of goods. Concrete also allowed for structural novelty in Lingotto, which was expressed in the construction of the ramps and the test track to create non-linear forms. However, this phenomenon is missing in Highland Park, as it is a strictly utilitarian building.

Although both complexes initially adopted reinforced concrete, their development diverged as Highland Park transitioned to metal structures while Lingotto continued to expand with reinforced concrete.

The case of Mirafiori and River Rouge Plant

During the construction of Lingotto in Turin, the Ford Motor Company determined that a vertical factory organization was unsuitable for the increasing scale of production. A similar realization occurred in Turin approximately twenty years later. While the Rouge plant formed during World War I, the Mirafiori plant became an important element of war production during World War II. It is worth mentioning that the relationship between wartime conditions and factory development was more complex than a simple linear progression. War prompted the introduction of new production lines, including airplane engines, diesel engines for submarines, floating mines, etc. But Factories also faced increased risks of attack during wartime. This threat was much less pronounced in the United States due to its geographical isolation, whereas factories were directly exposed to wartime attacks. This distinction represents a key difference in the war time frame.

Instead of occupying existing urban areas as in previous periods, both companies constructed significantly larger facilities to address spatial and infrastructural requirements. The occupation was so vast that the district around the factory would be called a city within a city.

Ford acquired 450 hectares of land in Dearborn, near Detroit, an area approximately twice the size of Monaco, and developed 640,000 square meters of covered space. In Turin, Fiat purchased 300 hectares of land in Mirafiori, comparable in size to New York's Central Park, and constructed 300,000 square meters of covered space. Both sites maintained proximity to railroad lines, continuing established industrial traditions. Additionally, both companies invested in road infrastructure, including underpasses and viaducts for goods transportation. On the other hand, both companies shifted away from a walk-in neighbourhood and relied on public transport and private automobiles.

Another similarity between the two companies was their proximity to a river. Both factories utilized the river for industrial waste disposal and as a resource for their power plants. However, the Rouge River was connected to open waters, was deeper and broader than the Sangone, enabling the construction of canals to accommodate large lake cargo steamers and facilitate the transport of materials.

Due to the availability of land, both factories expanded horizontally and were deeply integrated with truck loops, rail yards, and internal train convoys. The adoption of horizontal layouts eliminated the need for high load-bearing structures, leading to a shift toward metal construction in both plants. The structural grid was expanded to allow greater flexibility in material use, with a 12 by 12 meter grid in the Rouge plant and a 20 by 20 meter grid in Mirafiori. Both companies retained the daylight factory system using massive curtain walls to let in the light for maintaining the workers' morale.

Both factories eliminated all minor decorative elements, reducing their structures to purely functional envelopes and fully utilitarian forms. At the Rouge Company, even the main Power House, notable for its eight stacks, lacked monumental decorations or corporate signage. Mirafiori similarly adopted a German-influenced realism, maintaining a strictly utilitarian aesthetic. Both companies, following the logic of short-term planning, constructed buildings of low quality intended primarily for function rather than longevity.

Another distinct change was at Mirafiori; unlike Lingotto, the new factory had social spaces, such as dining rooms, along with amenities like wardrobes and showers. In contrast, the Ford Motor Company did not consider dining rooms necessary, instead minimizing time allocated to non-work activities. For example, lunch breaks were limited to 15 minutes, with meals provided by a lunch wagon system or brought from home.

Both factories underwent extensive mechanization, which significantly reduced the need for human labor and led to widespread layoffs and downsizing. Economic factors prompted both companies to expand operations internationally. The Mirafiori plant did not cease operations entirely but entered a prolonged period of decline, drastically reducing its capacity into the 21st century. However, many parts of the factory are neglected and abandoned. At the Rouge Company, many older structures became obsolete; today, approximately half of the original buildings designed by Albert Kahn no longer exist. However, the River Rouge plant remains operational and continues to play a significant role in Ford Motor Company's activities.



Figure 221: "Ford Motor Company" Sign at the Ford Rouge Plant, September 1937
Source: From the Collections of General Photographs Series Object ID: 64.167.833.P.68753.D, Benson Ford Research Center.



Figure 222: A conflict between United Auto Workers organizational director and Ford security personnel in River Rouge Complex, May 26, 1937
Source: Photograph by James E. Kilpatrick, Associated Press.



Figure 223: The Mirafiori plant, aerial view of the front of the office building, 1950.
Source: Olmo, Mirafiori 1939- 1962, Fig. 22



Figure 224: Police forces clashing with and arresting a striking worker during the labor protests at the Fiat Mirafiori plant in Turin, 1969
Source: Photograph by Mauro Vallinotto. Courtesy of FIAF

The End of the Industrial Dream

The comparative narrative of these two industrial giants is one rooted in the American method of mass production and the other defined by a strategy of adapting American principles to meet specific Italian demands. Ultimately, both reached the same point in their respective home cities: abandonment.

At the end the Lingotto and Highland Park went out of service, while their younger brothers, River Rouge and Mirafiori, were still producing limited models.

Removing the functionality from those two major factories in proximity to the city center in Torino and Detroit has heavily cost both municipalities. Besides the physical aspects of this problem, the named plants were completely embedded in the urban fabric and dramatically shaped the context by its presence.

By removing the function from them, the neighbourhoods around were suddenly disconnected from their source. The reason behind it was gone, and just a structural shell remains. A huge outmigration wave from the city occurred for the workers who didn't have a reason to continue their lives inside, leading to abandoned neighborhoods that turned into centers of social delinquency. The neighborhoods, which once represented the industrial prosperity and American dream, were now facing vast land of homes without inhabitants and massive social problems.

Conclusion

In conclusion, the narrative can be divided into subtopics with different scales. On a macro scale, Torino and Detroit, despite their different origins, had undeniable similarities in the 19th and 20th centuries. On the other hand, at the micro scale, Ford and FIAT, or Highland Park and Lingotto, were built and developed with a number of similarities and differences across all three phases, shaping their rise and decline.

In terms of similarities between Torino and Detroit, both cities have important neighbors[43], and the early industry that emerged in those urban environments was notable and played a significant role in the development of the car industry.

For instance, the stove manufacturing in Detroit developed specific skills like foundry work among the Detroiters. Furthermore, other industries like car (light wagons) manufacturing and bicycle crafting, step by step, shaped a context of professionals, inventors, and mechanics. In another city, Torino had the same experience; the wagon and carriage manufacturing in the city, next to the military artillery manufacturing, developed a similar professional class in the city.

By shaping the car industry in both cities, this long list of similarities continued from the 19th century into the 20th century. In that time, the atmosphere in both cities was summed up in one word: speed. Speed in everything, in transportation, in production, and in total life; in addition to this, globalization and modernization were happening in both cities. Many individuals were traveling between Europe and the United States, developing and transporting knowledge and technology beyond the borders; they learned from each other and taught each other. As a result, a similar phenomenon, adjusted to different contexts, emerged and led to the creation of a form of Industrialization compatible with Europe and the US.

At this scale, besides their similarities in the 20th century, the differences are big and notable. On the one hand, Turin represents a city with a long and strong background in monarchy, with the experience of being the capital of the nation, and on the other hand, Detroit lacked any specific political experience, whether as the capital of the nation or as the state center.[44] [45]

Besides the origins differentiation, the historical trends were affected by other parameters, such as the geographical aspects. For instance, the location of cities became extremely important in World Wars I and II, where Torino was facing carpet bombing, the Detroit industry was rapidly developed and enhanced the production rate to fulfill the dramatic rise in war demands. Alongside these other aspects of the 20th century, like shaping the workers' union, the Cold War, and economic crises were shaping other sides of differences.

By zooming from Torino and Detroit into the two specific companies, FIAT and Ford, and even one step further, Lingotto and Highland Park, the comparison becomes clearer and more accessible. In other words, the differences and similarities between these two buildings can be expanded to the company and even to the cities. The architectural aspects are the first step in concluding the similarities and differences between these two factories.

43 New York and Chicago, along with Milan and Geneva, although they have differences in origins and identity, were not without similarities.

44 Michigan was officially recognized as the 26th U.S. state on January 26, 1837. The seat of government of Michigan officially changed from Detroit to Lansing on March 17, 1847.

45 This difference in Origins led to the creation of historically different trends affecting industrialization and mostly the car industry.

The idea of speed and fast transportation was a matter that can be confidently stated: introduced in Europe[46] and developed in the US by introducing the assembly line and mass production. The matter that approximately closed the historical trends in both cities[47] and the shape of those buildings' facades were long, stretched, with huge windows and concrete materials similar to many other buildings in their generation.

The reason behind this unification in industrial buildings can be found in the massive technological development, which created new values and led to a new era with a comparably wide range of elements between the United States and Europe. Furthermore, this technological development not only affected the buildings' shape[48], but also the inhabitants' lifestyles were faced with a kind of globalization as a result of modernisation. This effect, in different geographical locations, led to different historical paths, which are mainly characterized by clearly finding similar parameters in their historical trends, alongside numerous differences which exist due to the different aspects like origins and geography.

By entering the second half of the twentieth century when decentralization started, and abundance occurred, the differences were highlighted extremely.In those years although the path from Highland Park to River Rouge is still compatible with Italy, Lingotto to Mirafiori, other significant historical trends demolished those cities' similar aspects.[49]

As the flames of war died down in Europe, political approaches in European countries became closer to those of the United States, although important differences remained. For example, in Italy, the average building life cycle is longer than in the United States[50], and industrial buildings were no exception. While Highland Park was abandoned and used only as an archive for FMC documents, Lingotto continued producing cars and later refrigerators for several decades. Moreover, when FIAT finally decided to leave Lingotto, the building changed function under a well-thought-out reuse project, whereas Highland Park was totally abandoned and out of service, with conflicts in ownership and legal problems.[51]

Although, despite these differences, the similarities in the post-industrialization era were no less. For instance, both cities are suffering from leftover neighborhoods. The neighborhoods, which were closely built to the former manufacturing sites in those golden days, faced an existential crisis when the factories became out of service and abandoned, which later, by a chain effect, led to economic and crime-related problems.

46 Due to the efforts of Carl Benz and the numerous inventors, mechanics, and engineers.

47 The path which started from the daylight factory and assembly line in Piquette Avenue and FIAT Corso Dante and continued to Lingotto and Highland Park and was later perfected at the River Rouge and Mirafiori plants. Meanwhile, this trend is accompanied by the development from a daylight factory into a 5-year plant under the shadow of war and the pressure of decision-making. This evidence represented how both companies (And in general the global vision of these two mindsets, one in Italy and the other in the US.) were affected by each other, although they were not fighting in the same front.

48 Which was one of the primary effects.

49 In post war decades, after the fall of fascist regime in Italy, and representing the Marshall Plan, created a pressure leverage for the US to gain the upper hand and control the leftist activities in Western Europe during the Cold War.

50 Traditionally.

51 Whether the Lingotto adaptive reuse project was successful or not is out of the scope for this paper; here, the only reason behind mentioning this is to create a comparison context with these two buildings in the post-industrial era, industrialization, and decentralization.

In conclusion, on a micro scale, Ford and FIAT, and in macro, Detroit and Turin were a complex of similarities and differences. The reason behind this paper was to primarily find and highlight the historical trends in those industrial cities by focusing on their origins in the pre-industrial and industrial era and highlighting the comparable elements to create a comparison context within industrial aspects. This matter was shaped by focusing on those two factories and two specific buildings among them and expanding it in reverse to both cities in order to highlight the main similarities and differences.



Figure 225: Automobile in corsa by Giacomo Balla, 1913
Figure 226: Image courtesy of the Italian Art Society

Appendix



Antoine Cadillac
1658-1730



Pontiac
1714/20-1769



Henry Gladwin
1729/30-1791



Benjamin Banneker
1731–1806



Oliver Perry
1785 –1819



William A. Burt
1792-1858



Lucius Lyon
1800–1851



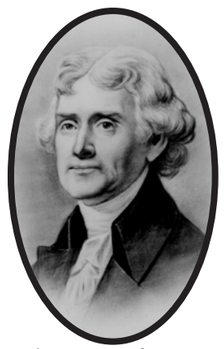
Hazen S. Pingree,
1840–1901



Robert Rogers
1731-1795



Henry Hamilton
1734–1796



Thomas Jefferson,
1743–1826



Anthony Wayne
1745-1796



David D. Buick
1854–1929



William C. Durant
1861–1947



Henry Ford
1863–1947



Ransom E. Olds
1864–1950



George R. Clark
1795-1818



Pierre L'Enfant
1754–1825



Gabriel Richard
1767–1832



Tecumseh
1768-1813



Giovanni Agnelli
1866–1945



Ferdinand Porsche,
1875-1951



André Citroën
1878-1935



Charles Bowles
1884 –1957



Sir Isaac Brock KB
1769–1812



William Harrison
1773–1841



Augustus Woodward
1774 –1827



Lewis Cass
1813–1831



William Murphy
1890–1949



Gerald Buckley
1891–1930



Harry H. Bennett,
1892–1979



Walter P. Reuther
1907–1970

1- **Antoine de la Mothe, sieur de Cadillac,** 1658-1730, was a French explorer, military officer, and colonial administrator

2-**Pontiac or Obwaandi'eyaag**, 1714/20 – 1769, was an Odawa war chief known for his role in the war named for him, from 1763 to 1766 leading Native Americans in an armed struggle against the British in the Great Lakes region.

3-**Henry Gladwin**, 1729/1730 – 22 June 1791, was a British Army officer who served in the French and Indian War and Pontiac's War.

4-**Robert Rogers**, 1731 – 1795, Lieutenant-Colonel, was a British Army officer and frontiersman

5- **George Rogers Clark**, 1752-1818, was an American military officer and surveyor from Virginia who became the highest-ranking Patriot military officer on the northwestern frontier during the Revolutionary War.

6-Henry Hamilton, 1734 – 1796, was a British Army officer and colonial administrator.

7-**Anthony Wayne**, 1745–1796, was an American soldier, officer, statesman, and a Founding Father of the United States.

8- **Gabriel Richard P.S.S**, 1767–1832, was a French Catholic priest and a professed member of the Society of the Priests of Saint Sulpice. He ministered to the French Catholics in the parish of Sainte-Anne-de-Détroit, as well as Protestants and Native Americans living in Southeast Michigan.

9- **William Austin Burt**, 1792–1858, was an American inventor, legislator, surveyor.

10-**Lewis Cass**, 1782–1866, was a United States Army officer and politician. He represented Michigan in the United States Senate and served in the Cabinets of two U.S. Presidents, Andrew Jackson and James Buchanan. He was also the 1848 Democratic presidential nominee.

11-**Lucius Lyon** , 1800–1851 was a U.S. statesman from the state of Michigan.

12-**Thomas Jefferson**, 1743–1826, was an American Founding Father and the third president of the United States from 1801 to 1809.

13-**Pierre "Peter" Charles L'Enfant**, 1754–1825 ,was a French-American artist, professor, and military engineer. In 1791, L'Enfant designed the baroque-styled plan for the development of Washington, D.C.

14-**Benjamin Banneker,** 1731–1806, was an American naturalist, mathematician, astronomer and almanac author. A landowner, he also worked as a surveyor.

15-**Augustus Brevoort Woodward,** 1774 –1827 was the first Chief Justice of the Supreme Court of Michigan Territory. In that position, he played a prominent role in the reconstruction of Detroit. He promoted an urban design based on radial avenues, as in Washington, D.C. and Paris, France.

16- **Tecumseh**, 1768-1813, was a Shawnee chief and warrior who promoted resistance to the expansion of the United States onto Native American lands. A persuasive orator, Tecumseh traveled widely, forming a Native American confederacy and promoting intertribal unity. Even though his efforts to unite Native Americans ended with his death in battle during the War of 1812, he became a folk hero in American, Indigenous, and Canadian popular history.

17-**Sir Isaac Brock KB**, 1769–1812, Major-General, was a British Army officer and colonial administrator from Guernsey. He is best remembered for his victory at the siege of Detroit and his death at the Battle of Queenston Heights during the War of 1812.

18- **Oliver Hazard Perry**, 1785 –1819, was a United States Navy officer.

19-**William Henry Harrison**, 1773–1841, was the ninth president of the United States, serving from March 4 to April 4, 1841, the shortest presidency in U.S. history.

20-Giovanni Agnelli, 1866–1945, was an Italian industrialist and principal founder of Fiat S.p.A., established in 1899. Under his leadership, Fiat became a cornerstone of Italy's automotive industry, significantly contributing to the country's industrialization during the early 20th century. Agnelli also served as a Senator from 1923 to 1944.

21-**André-Gustave Citroën**, 1878-1935, was a French industrialist and the founder of French automaker Citroën.

22-**Ferdinand Porsche**, 1875-1951, was an Austrian-German automotive engineer and founder of the Porsche AG.

23-**Charles Bowles**, 1884 –1957, was an American politician from Michigan, and served as Mayor of Detroit in 1930.

24-**David Dunbar Buick**, 1854–1929, was a Scottish-born American inventor, widely known for founding the Buick Motor Company.

25-**William Francis Murphy**, 1890–1949, was an American politician, lawyer, and jurist from Michigan.

26-**Gerald Enmett Buckley**, 1891–1930, was an American radio commentator in Detroit, Michigan. He successfully campaigned for the recall of Mayor Charles Bowles in the wake of corruption allegations. Prior to his death, Buckley had served as an investigator for Henry Ford, and as a special investigator for the United States government.

27-**Hazen Stuart Pingree**, 1840–1901, was an American politician and businessman who was the 43rd mayor of Detroit from 1889 to 1897 and the 24th governor of Michigan from 1897 to 1901.

28-**Henry Ford**, 1863–1947, was an American industrialist and business magnate. As the founder of the Ford Motor Company, he is credited as a pioneer in making automobiles affordable for middle-class Americans through the system that came to be known as Fordism.

29-**Ransom Eli Olds**,1864–1950, was an American businessman and executive who was known as a pioneer of the American automotive industry, whom the Oldsmobile and REO brands were named after. He claimed to have built his first steam car as early as 1887 and his first gasoline-powered car in 1896. The modern assembly line and its basic concept is credited to Olds, who used it to build the first mass-produced automobile, the Oldsmobile Curved Dash, beginning in 1901.

30-**Walter Philip Reuther**, 1907–1970, was an American leader of organized labor and civil rights activist who built the United Automobile Workers (UAW) into one of the most progressive labor unions in American history.

31-William Crapo Durant, 1861–1947, was an American businessman. A leading pioneer of the United States automobile industry, he was the founder of General Motors and a co-founder of Chevrolet.

32-Harry Herbert Bennett, 1892–1979, was a boxer, naval sailor, and businessman. From 1915 through 1945, he worked for Ford Motor Company and was best known as the head of Ford's "service department", the company's internal security agency. While working for Henry Ford, Bennett's union-busting tactics made him an enemy of the United Auto Workers (UAW) trade union.

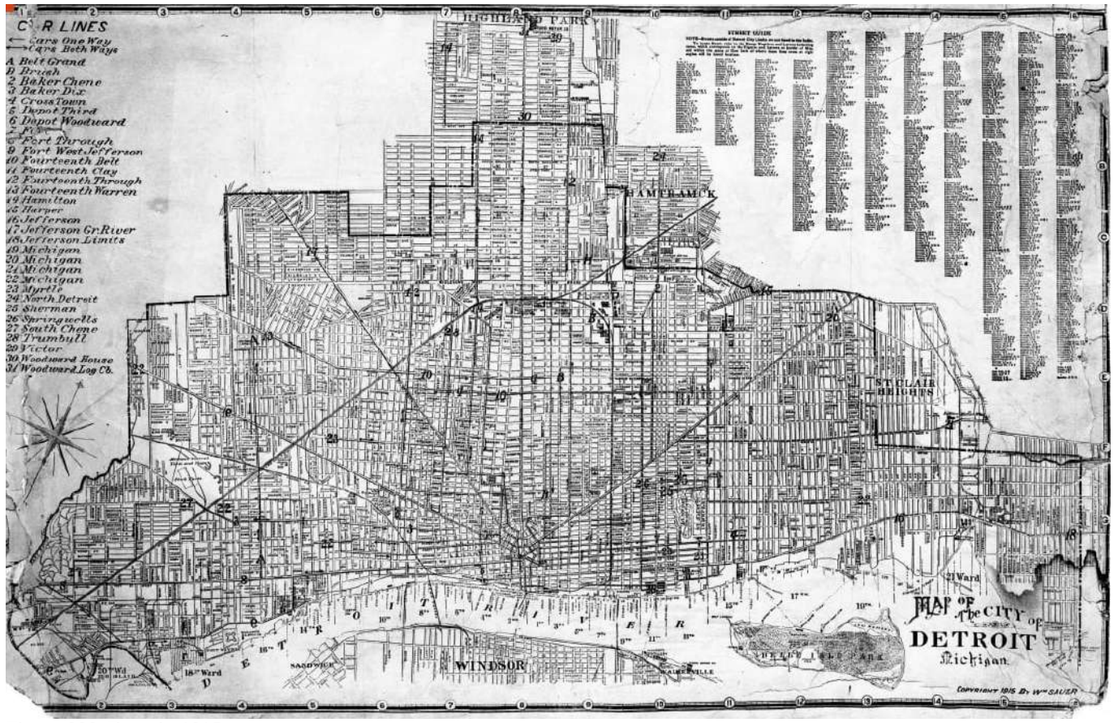


Figure 228: Detroit, 1915.
Source: From the Research Center Map Collection, Object ID:00.3.16722, Benson Ford Research Center.

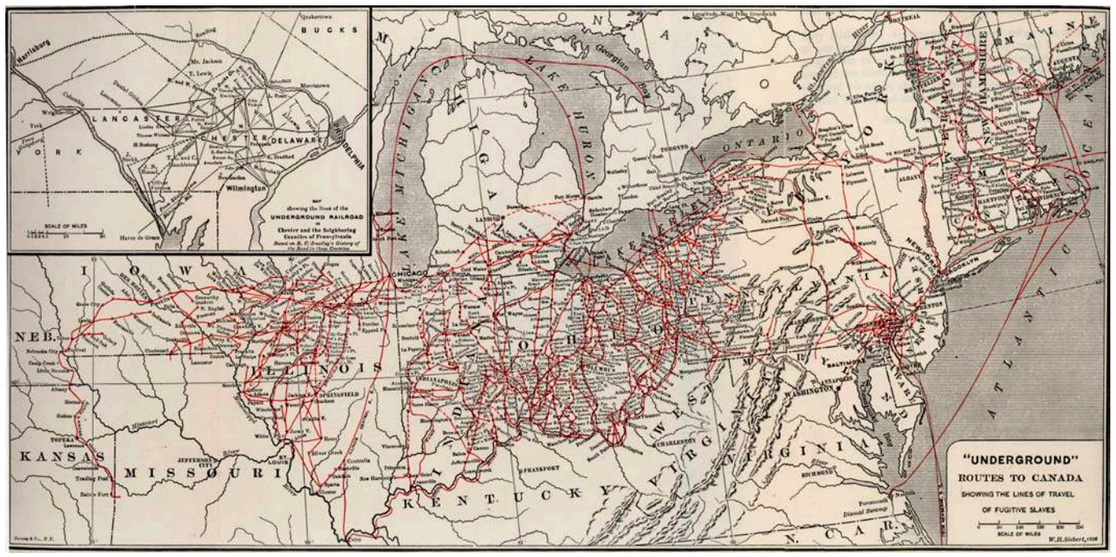


Figure 231: Underground" routes to Canada: showing the lines of travel of fugitive slaves
Source: Macmillan Company, "Underground" Routes to Canada: Showing the Lines of Travel of Fugitive Slaves, map (Chicago: The Newberry Library, 1898).



Figure 229: The rugged reality of early road travel. A vintage automobile caught in deep ruts, showcasing the difficult conditions that predated modern infrastructure.
Source: Lewis, Michigan Yesterday and Today, 402.

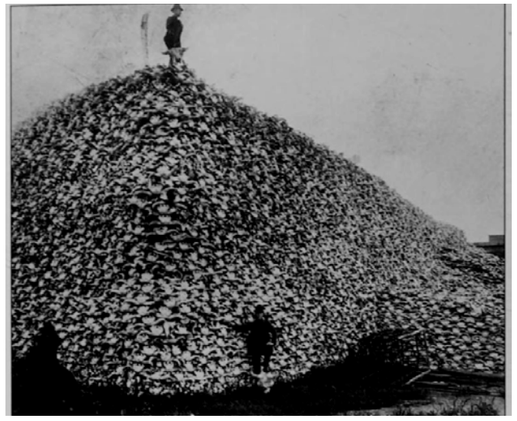


Figure 230: The industrial aftermath of the bison slaughter: Buffalo bones stacked for processing into fertilizer and other byproducts in Springwells, Michigan."
Source: Poremba, Detroit: A Motor City History, 86.



Figure 232: Map of Michigan and Wisconsin, 1891
Source: David Rumsey Historical Map Collection.

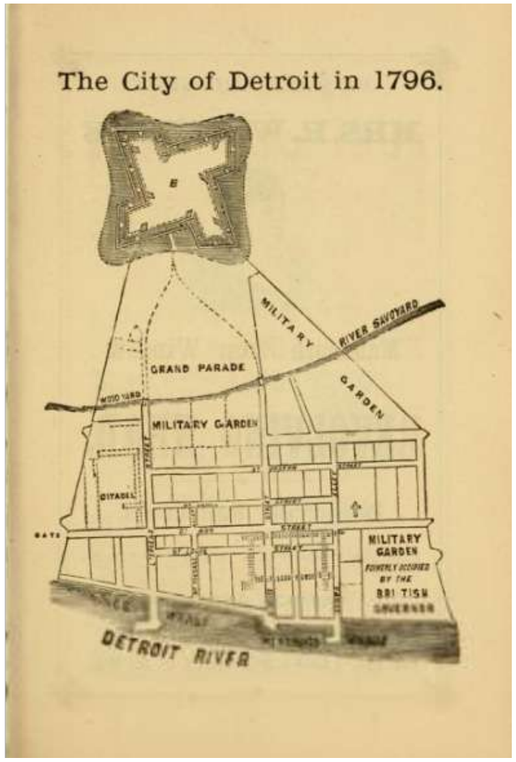


Figure 234: Detroit 1893
Source: David Rumsey Historical Map Collection, Available online on: https://www.davidrumsey.com/luna/servlet/s/78g640

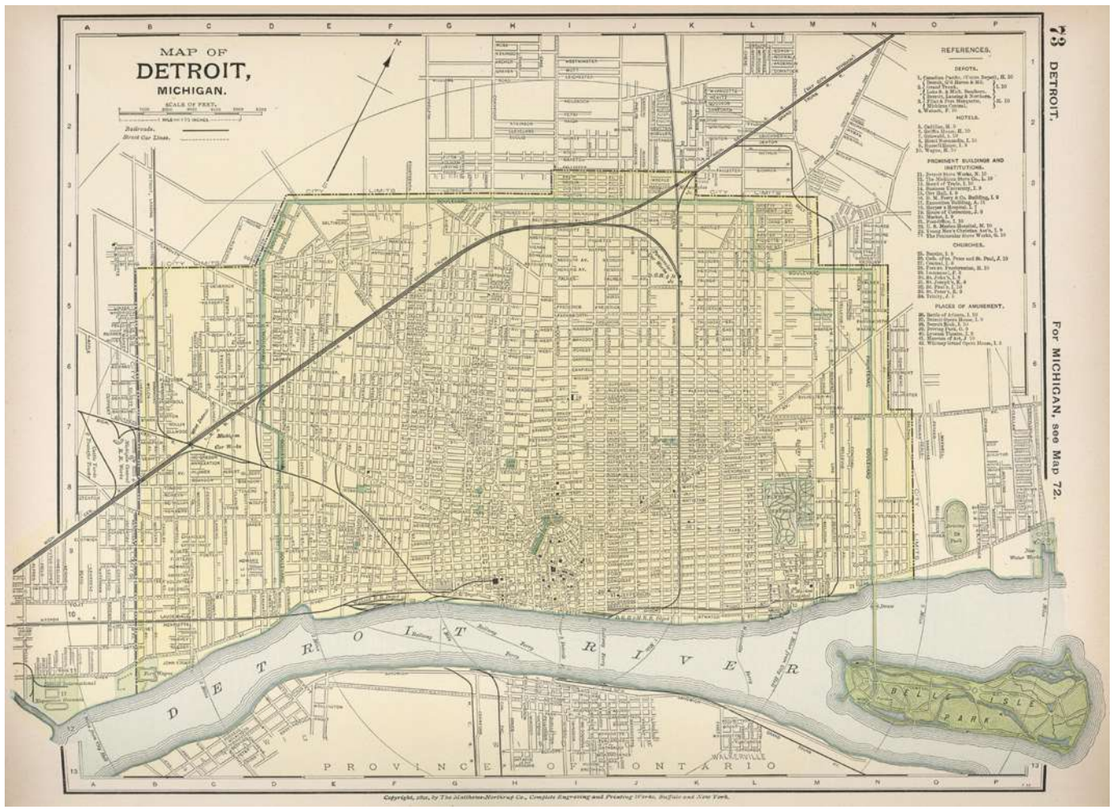


Figure 233: Map and manual of the city of Detroit, 1796.
Source: Library of Congress, Physical Location: F574.D4 F26

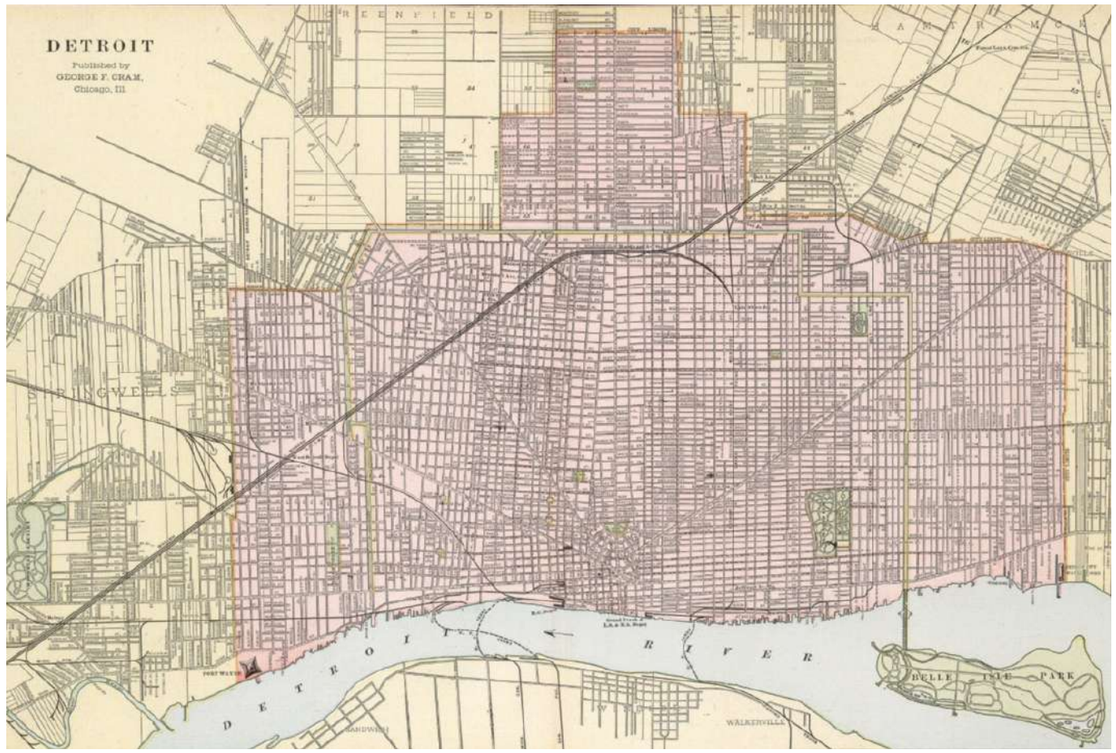


Figure 235: Detroit 1901.
Source: David Rumsey Historical Map Collection, Available online on: https://www.davidrumsey.com/luna/servlet/s/9c9558

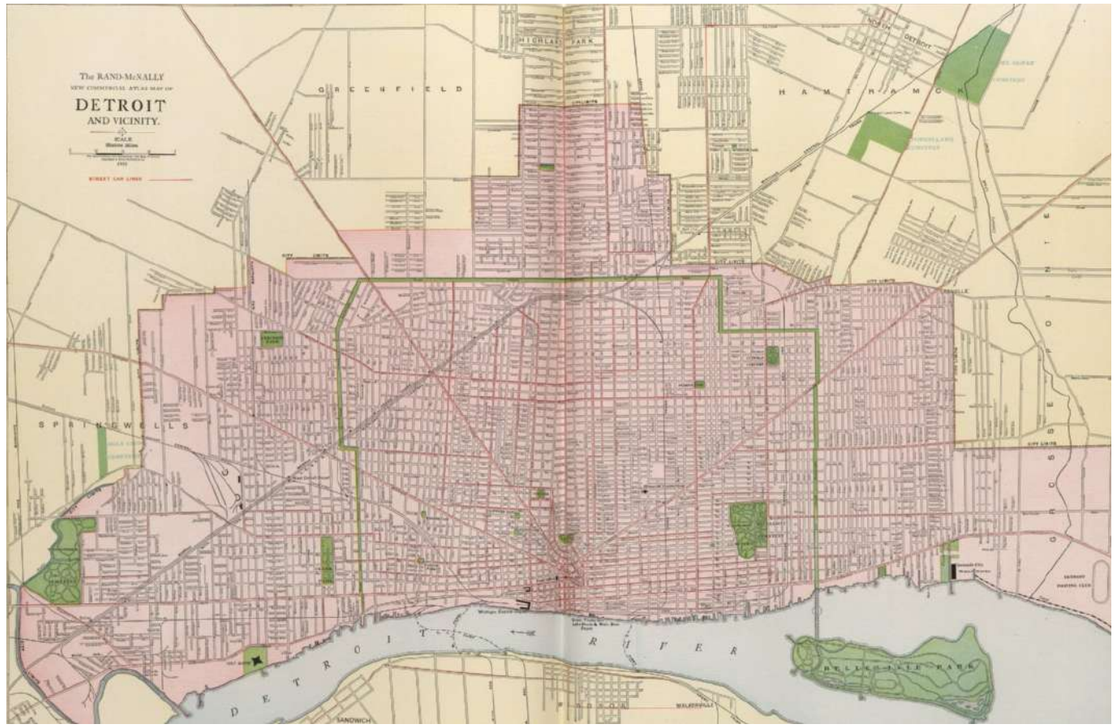


Figure 236: Detroit 1912.
Source: David Rumsey Historical Map Collection, Available online on: https://www.davidrumsey.com/luna/servlet/s/k29ad8

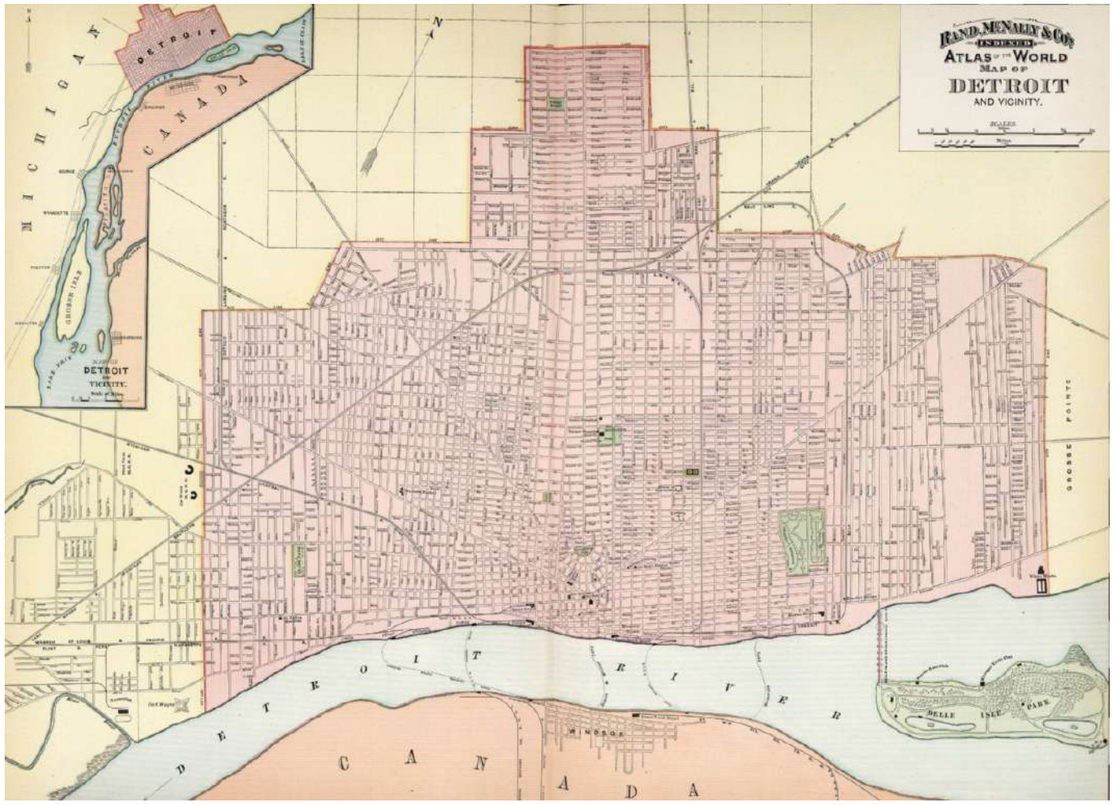


Figure 237: Map of Detroit, Michigan, 1891.
Source: David Rumsey Historical Map Collection

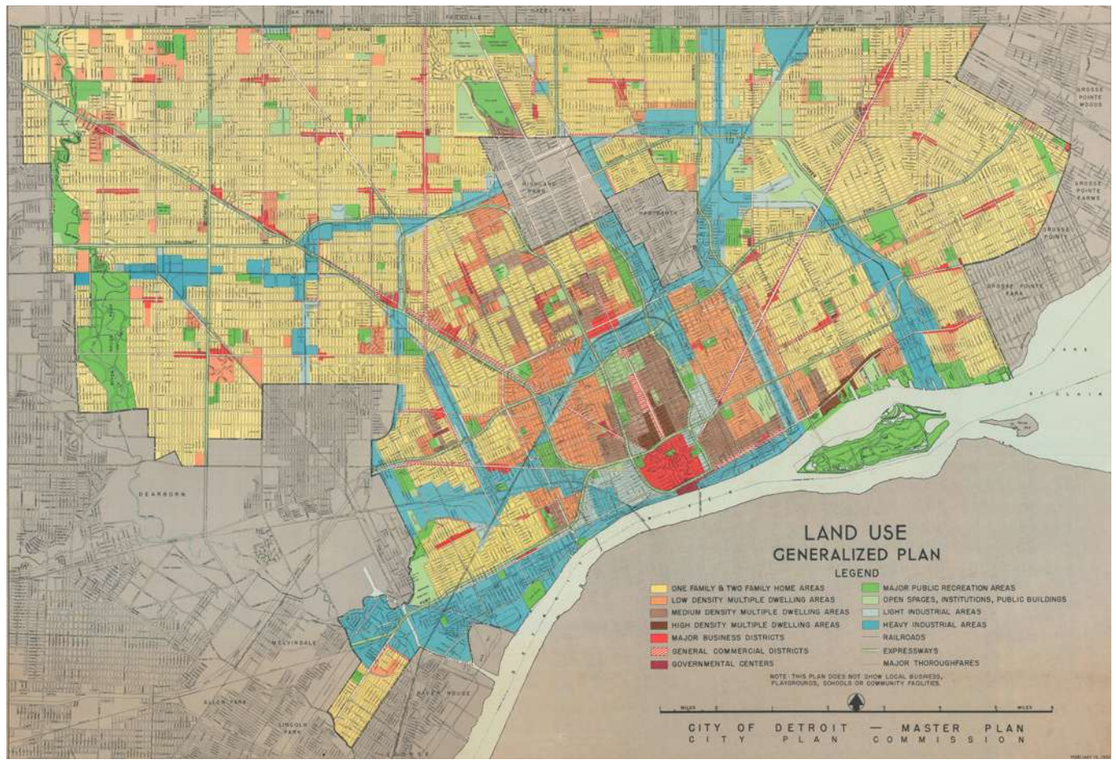


Figure 238: Detroit land use generalize plan 1950.
Source: city plan commission, ID: OCLC 43971117.

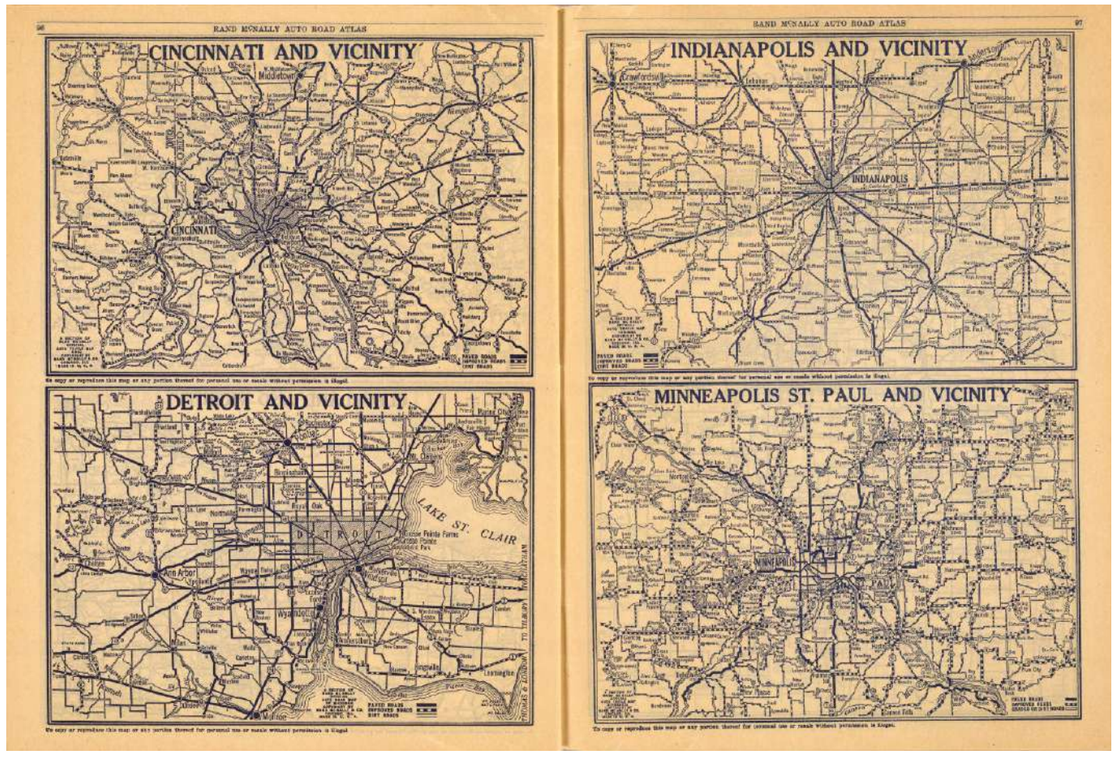


Figure 239: Road Maps, Cincinnati, Detroit, Indianapolis, Minneapolis St. Paul.
Source: David Rumsey Historical Map Collection, Available online on: https://www.davidrumsey.com/luna/servlet/s/hk4913

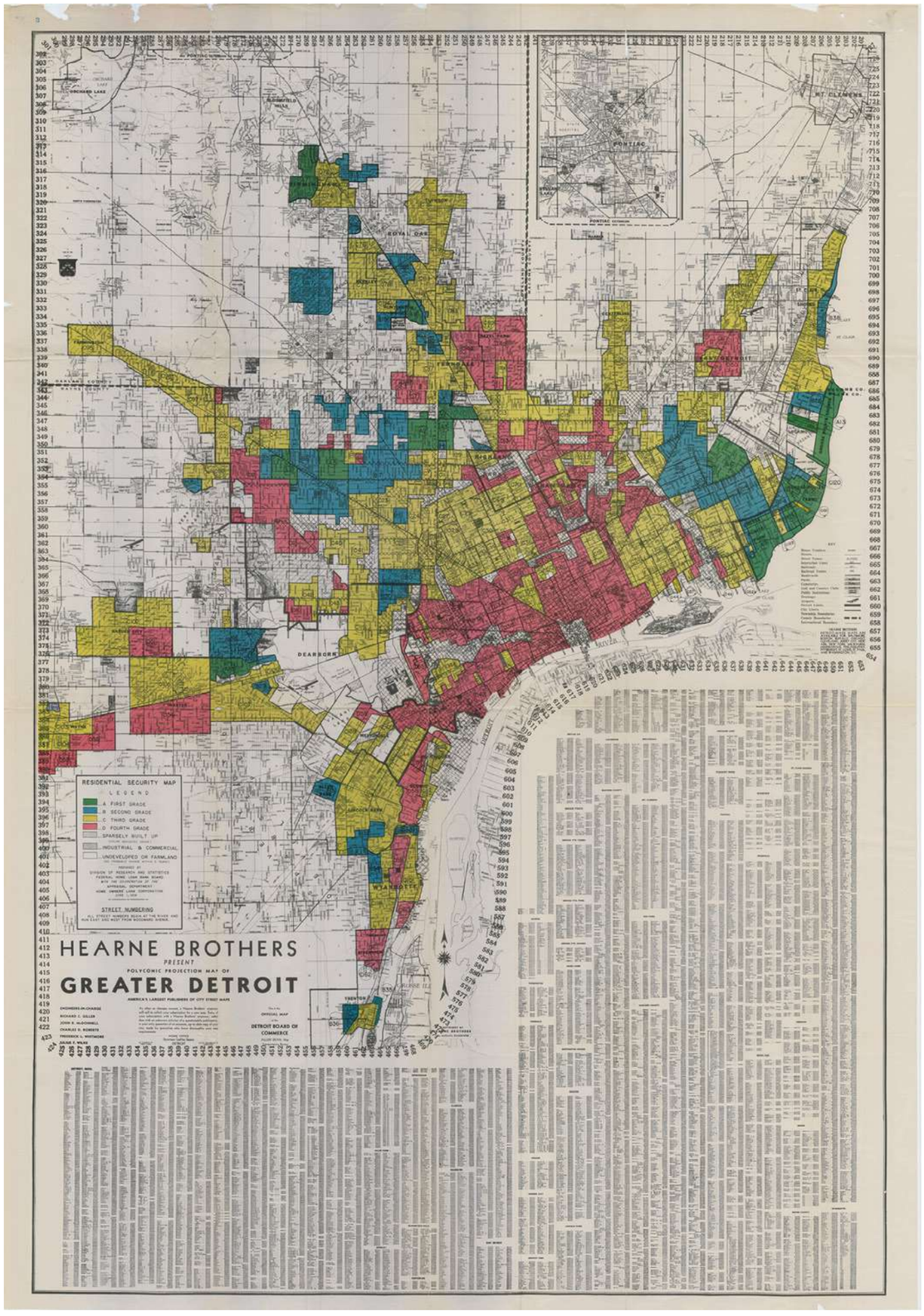


Figure 240: Historical "Residential Security Map" of Greater Detroit, 1939.
Source: Home Owners' Loan Corporation, 1939. Available on: https://detroitography.com/2014/12/10/detroit-redlining-map-1939/

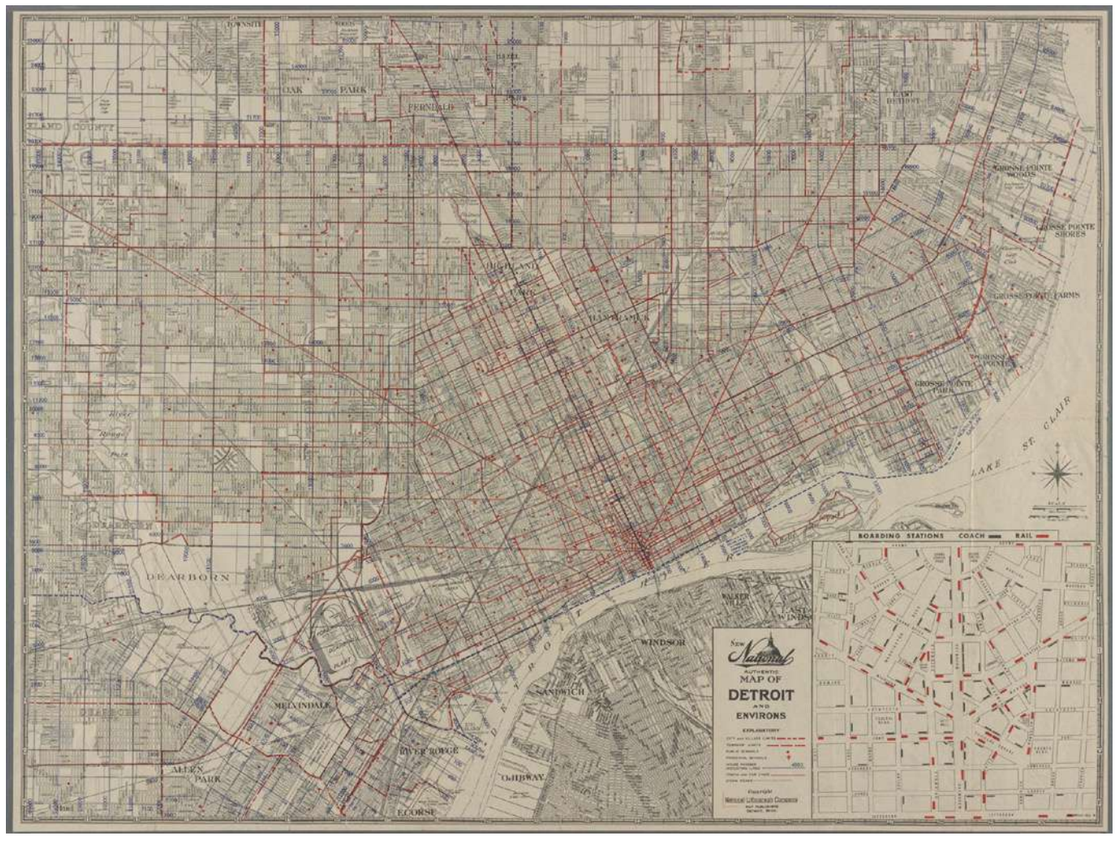


Figure 241: Detroit Street Guide 1947.
Source: NYPL Catalog ID (bnumber): b10615510.

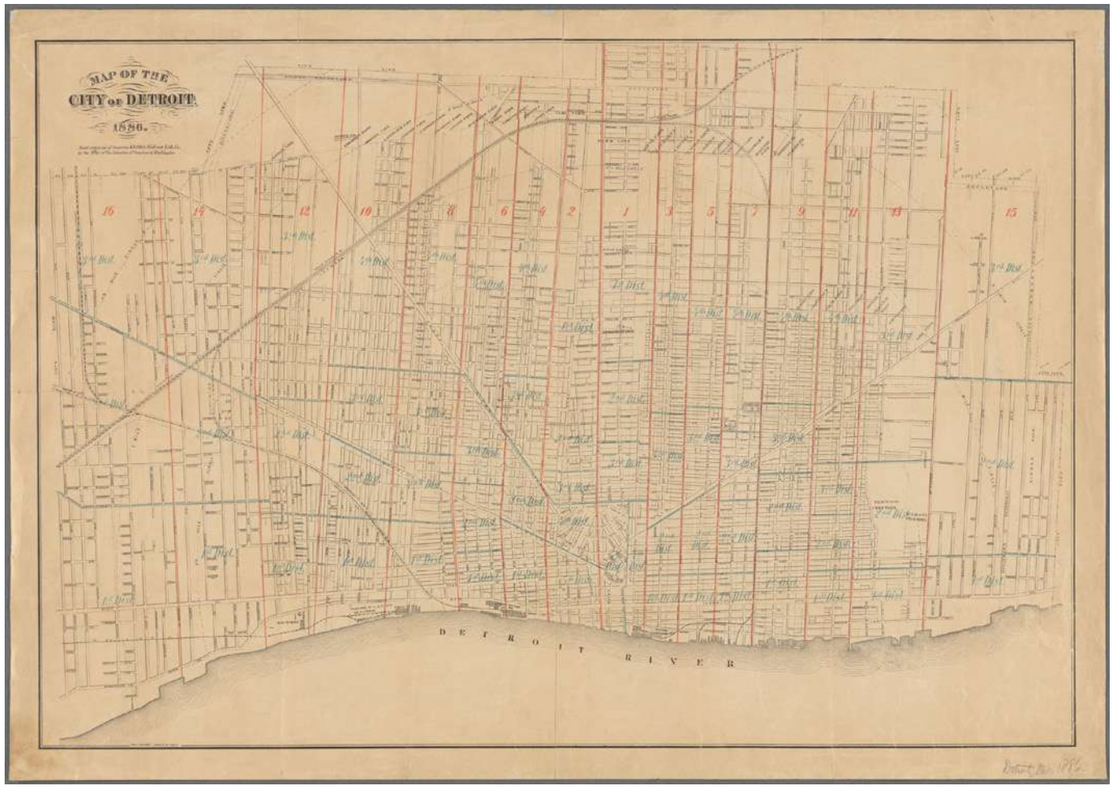


Figure 242: The rugged reality of early road travel. A vintage automobile caught in deep ruts, showcasing the difficult conditions that predated modern infrastructure.
Source: The New York Public Library, Universal Unique Identifier (UUID): 54b7c3e0-aadb-0135-52f2-511543a581a9

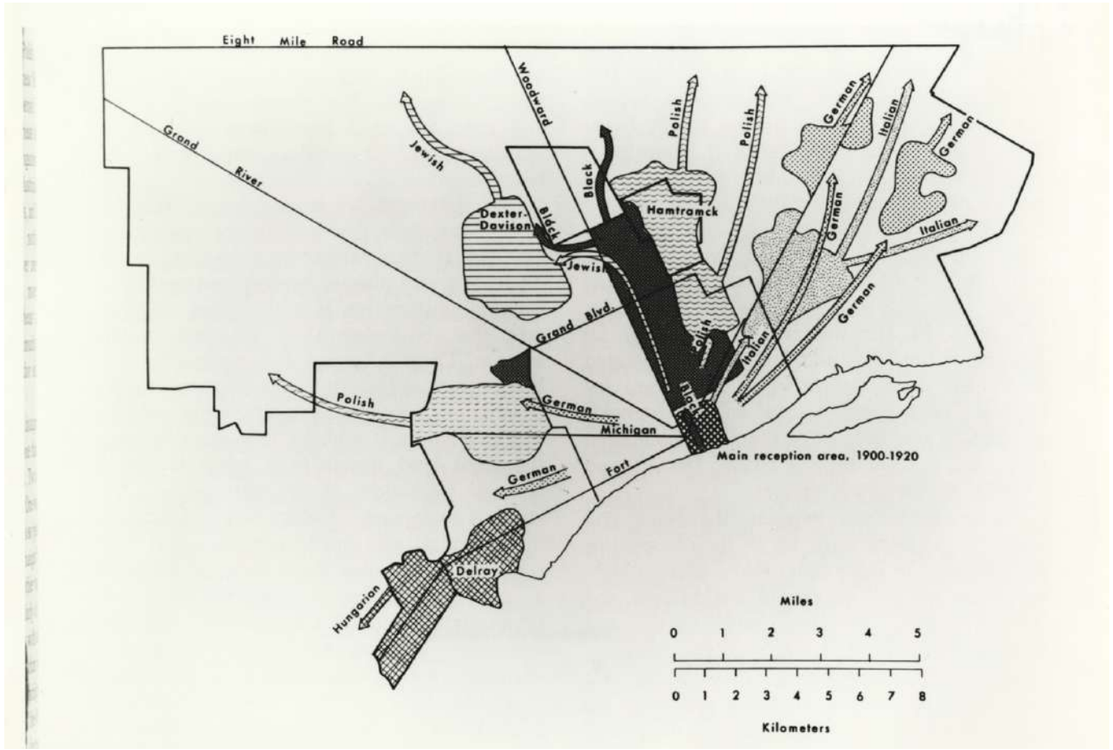


Figure 243: Ethnic Migrations in Detroit 1900 – 1950
Source: Digital Collections, Burton Historical Collections, Available online on: https://detroitography.com/2014/11/26/map-ethnic-migrations-in-detroit-1900-1950/

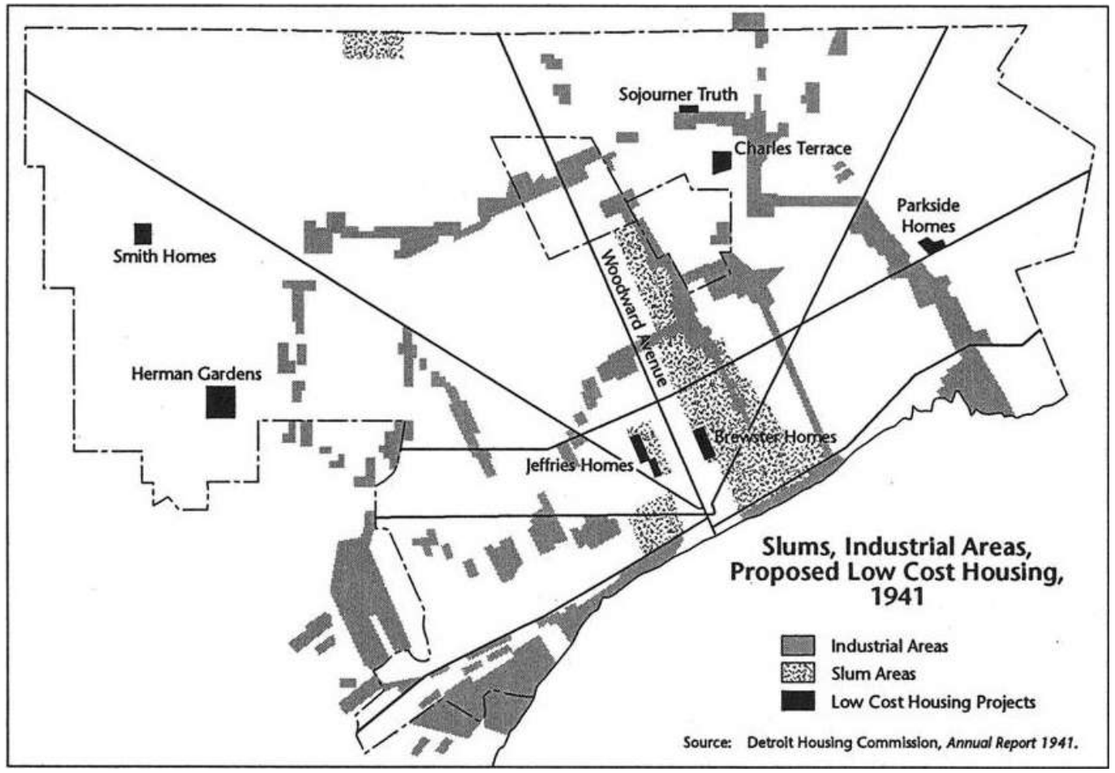


Figure 244: Slums, Industrial Areas, Proposed Low Cost Housing, 1941.
Source: Detroit Housing commission, Annual Report 1941.

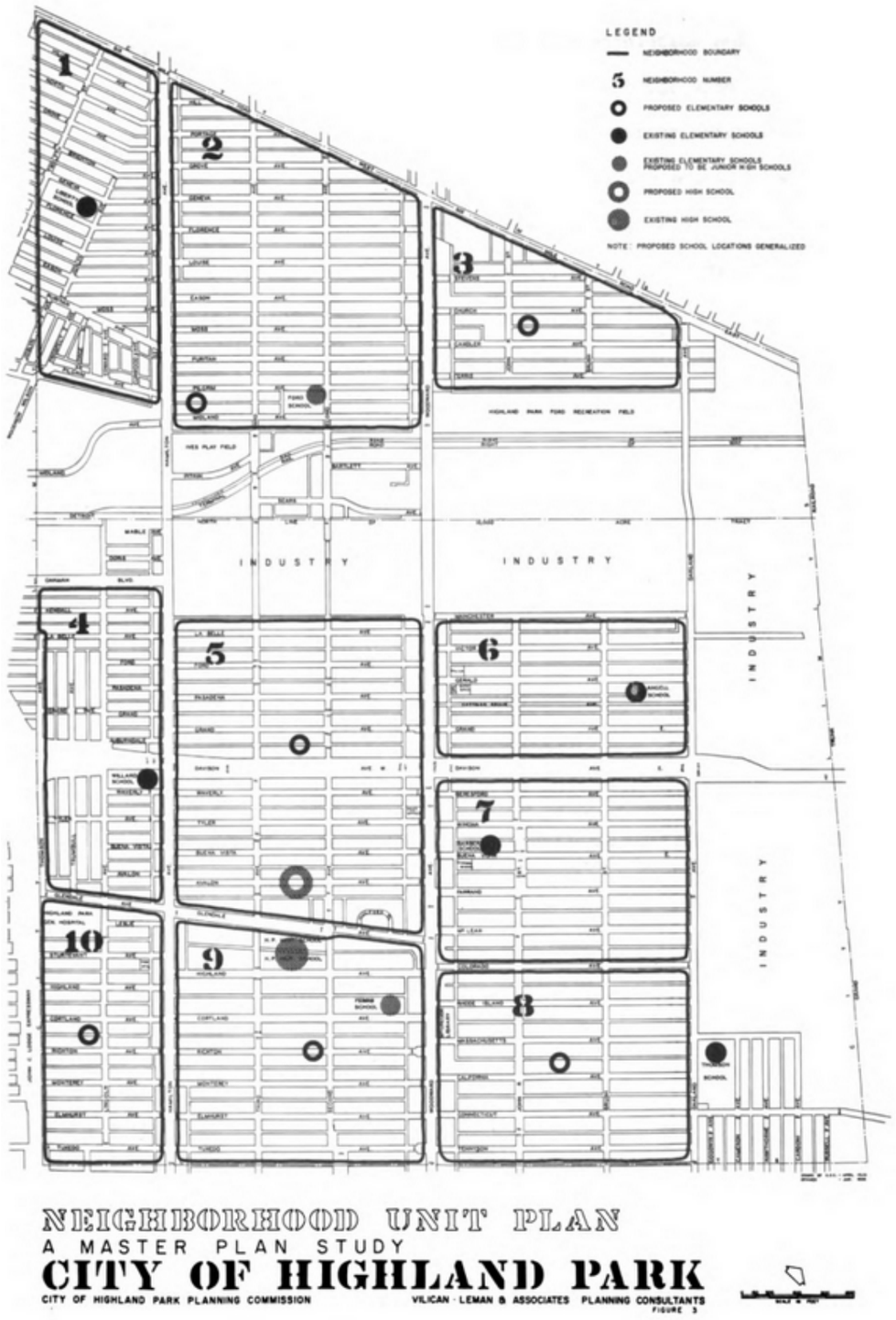


Figure 245: Map: Highland Park Neighborhood Units 1958
Source: https://detroitography.com/2021/04/14/map-highland-park-neighborhood-units-1958/

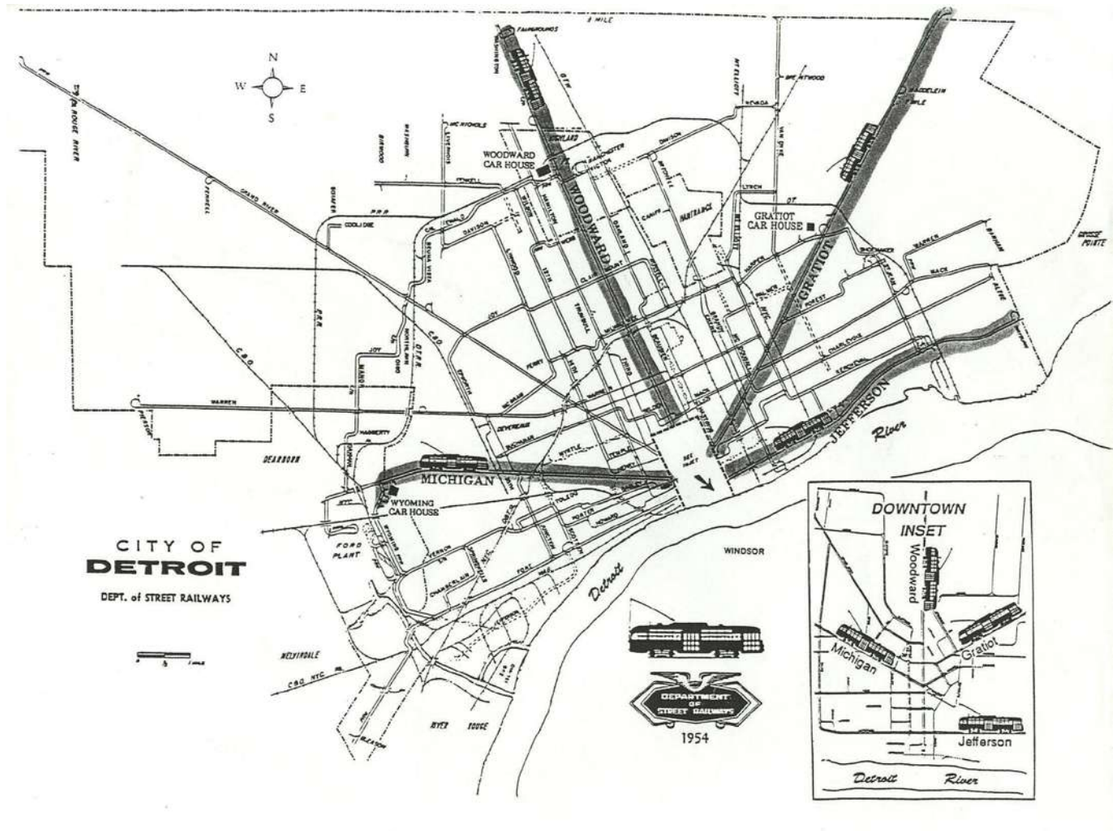


Figure 246: Detroit street railways 1954.
Source: DEPT. of STREET RAILWAYS.

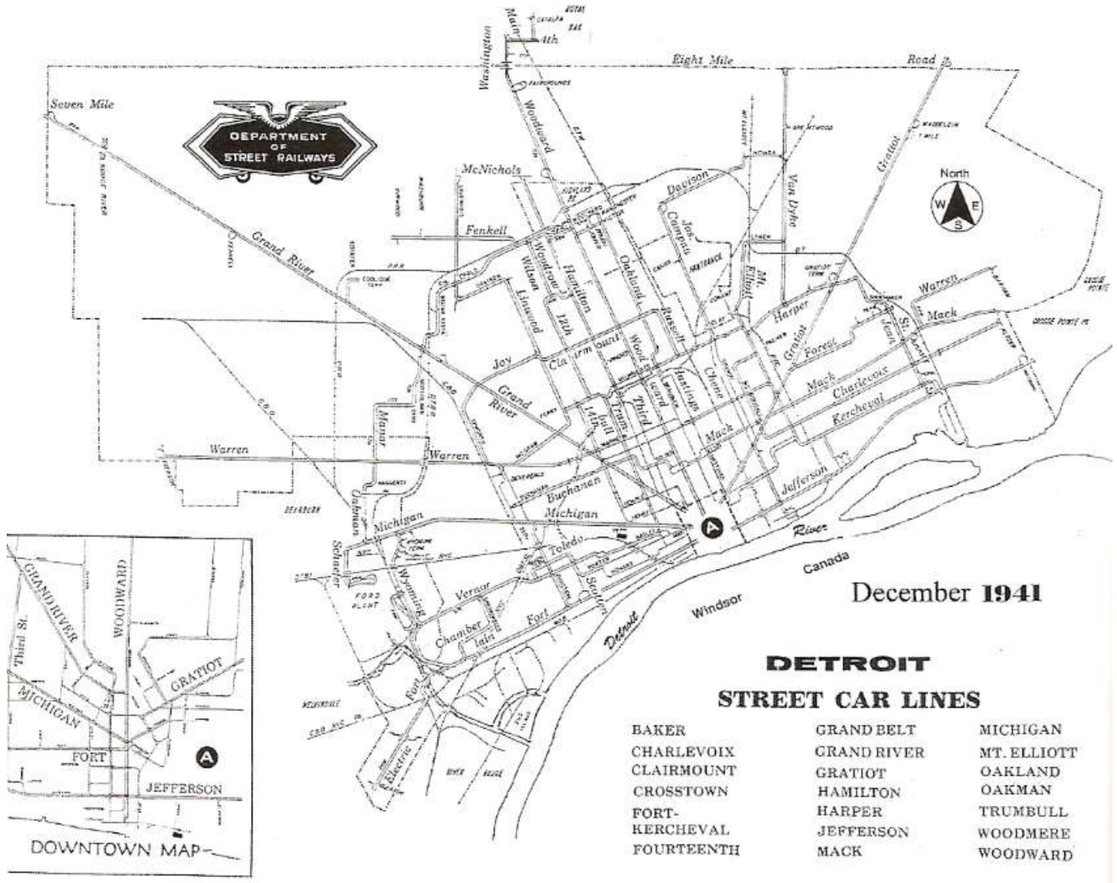


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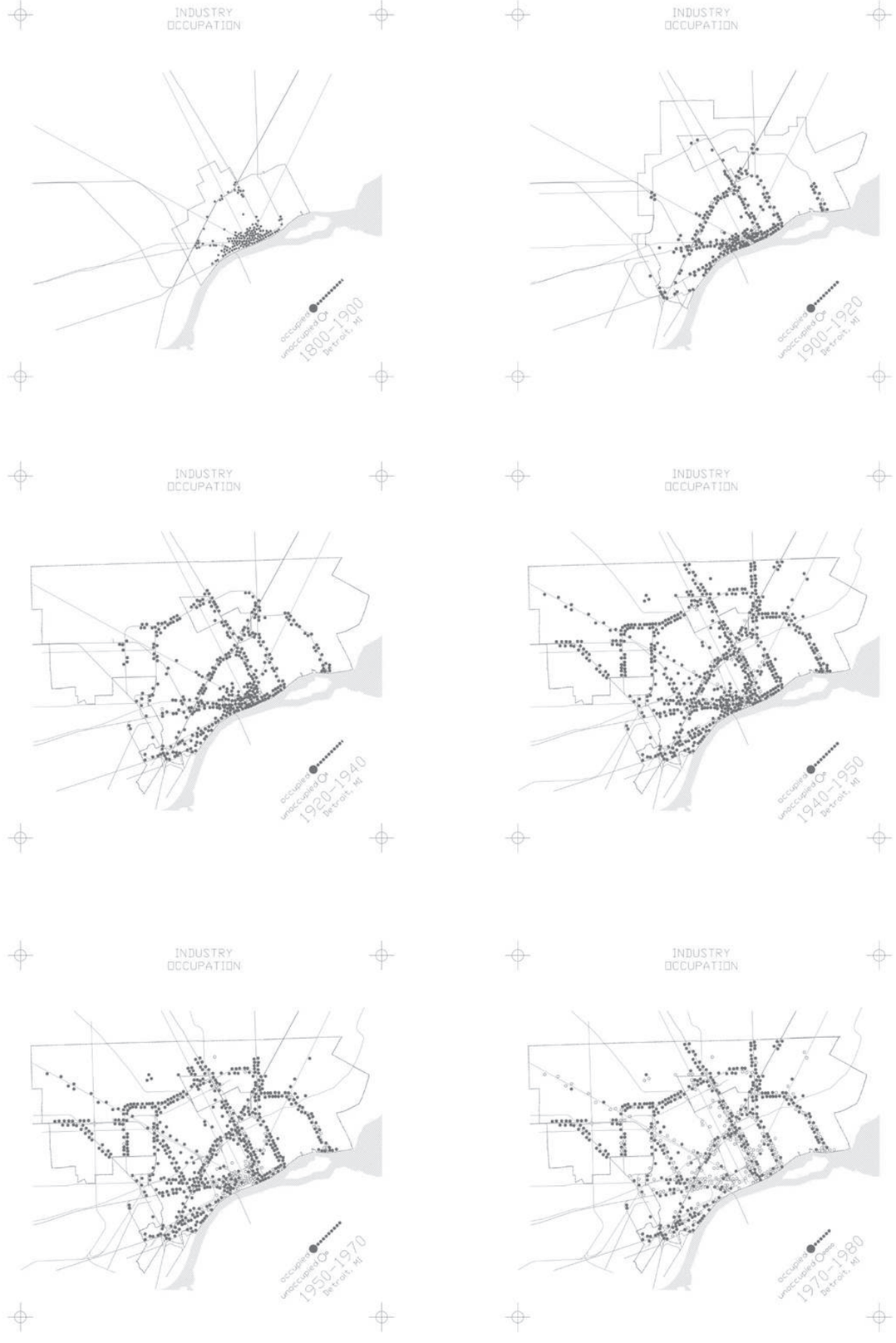




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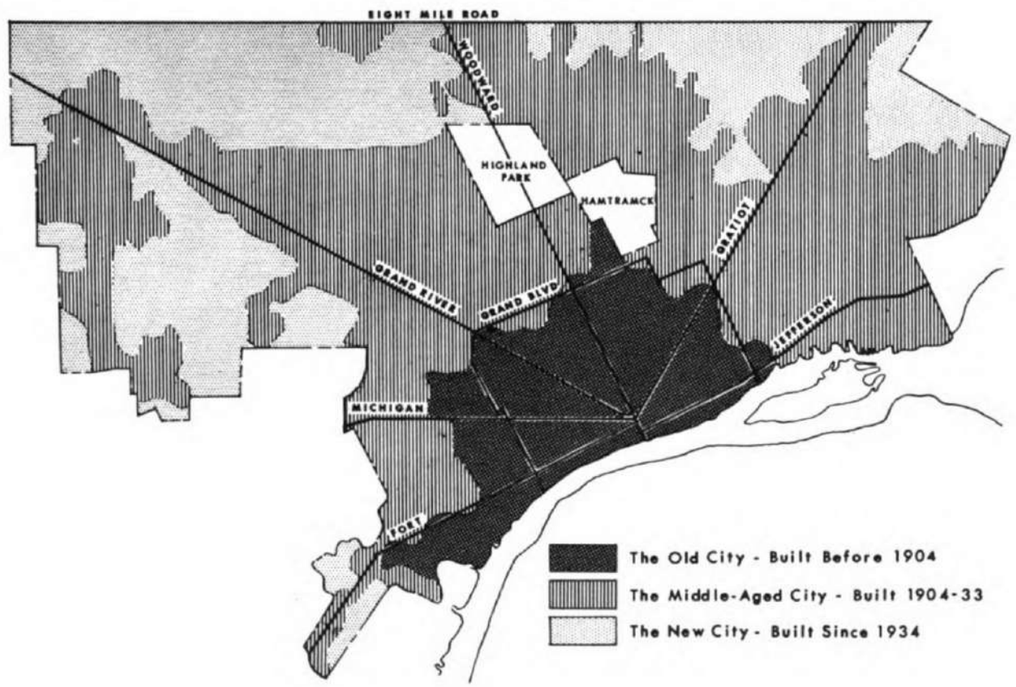


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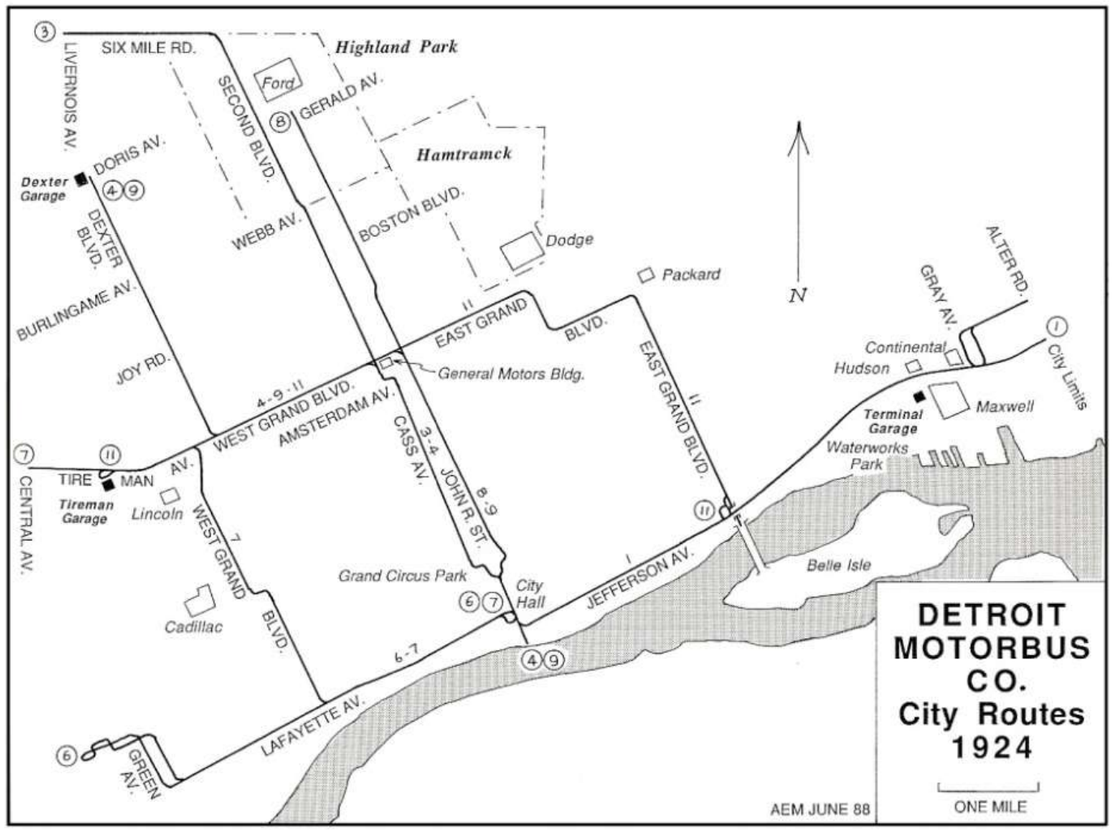


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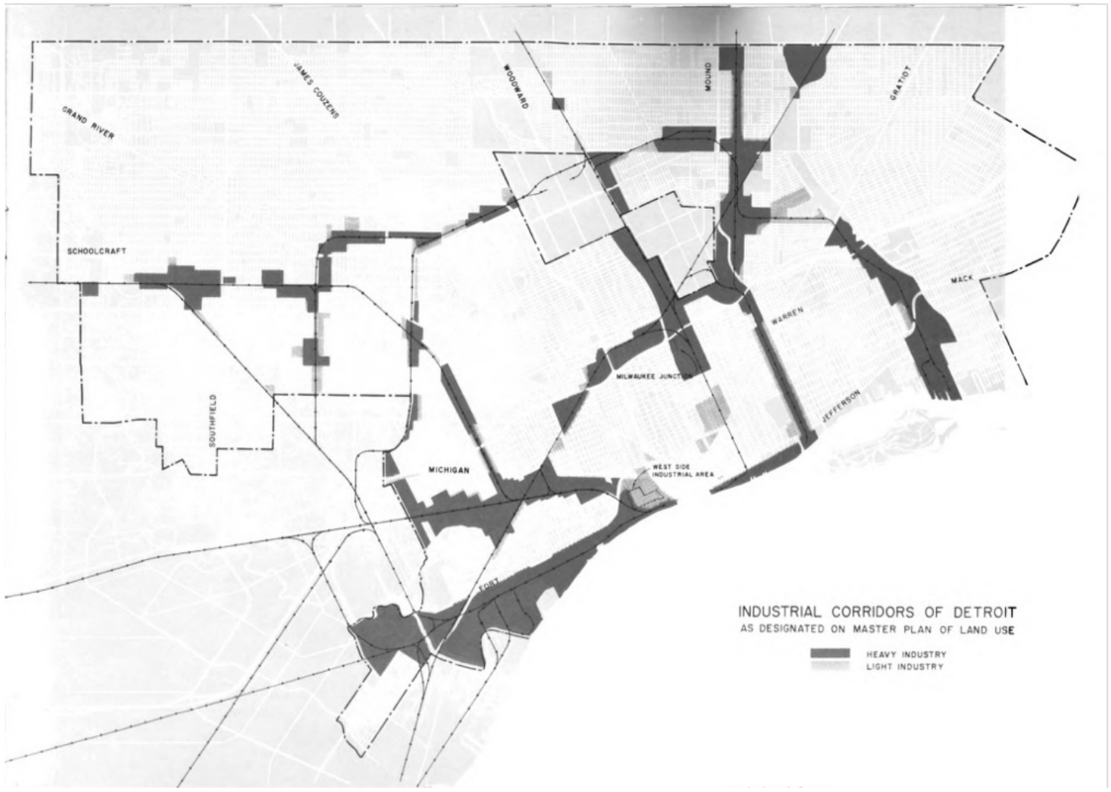


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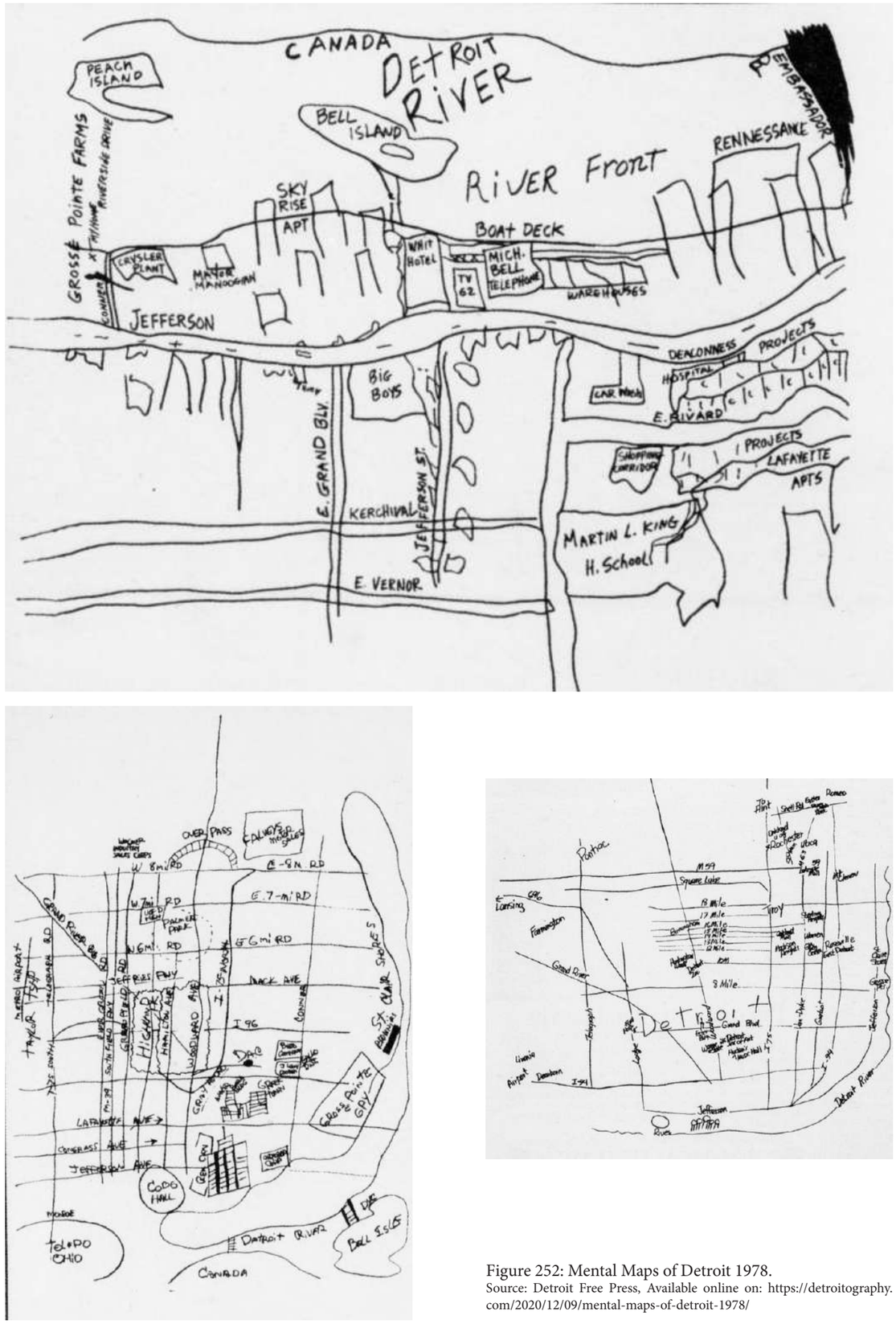
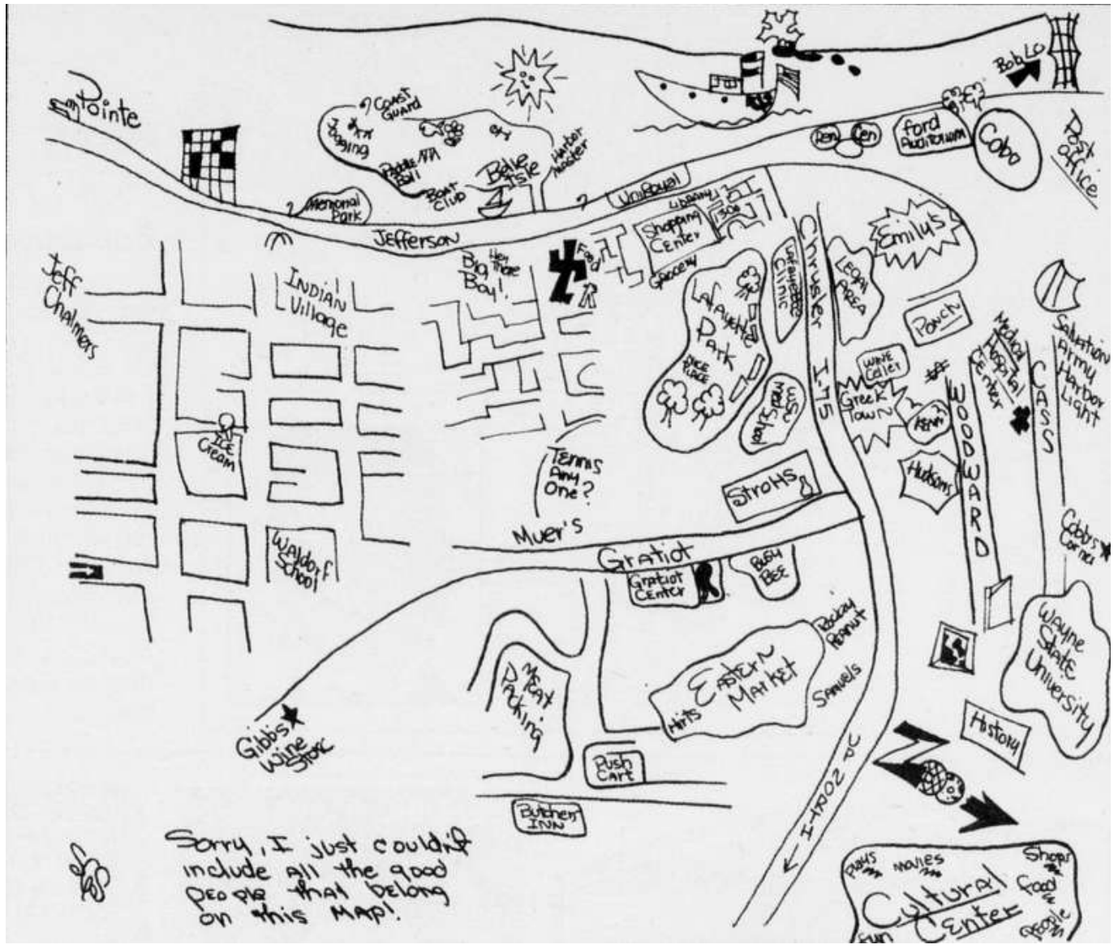


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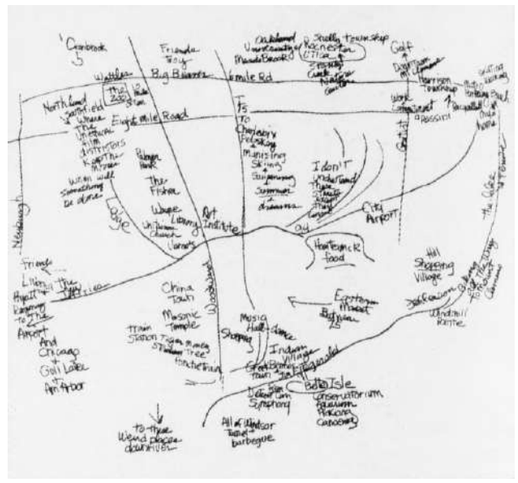


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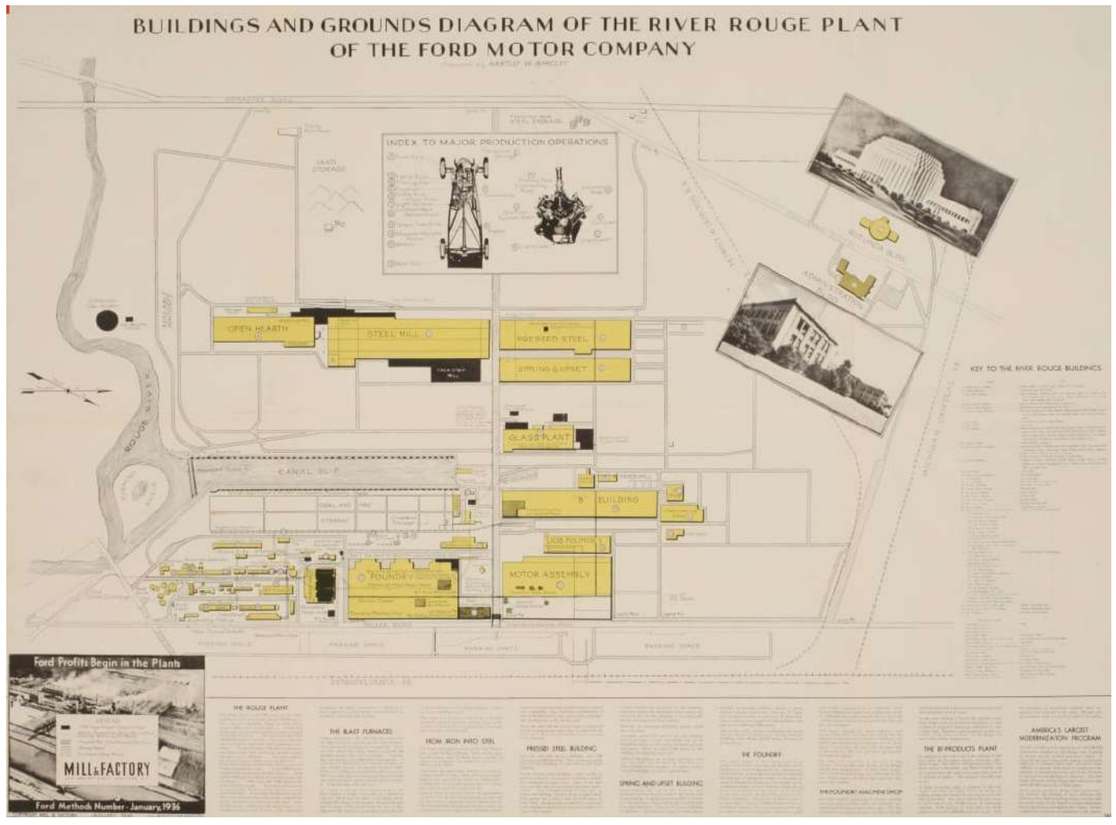


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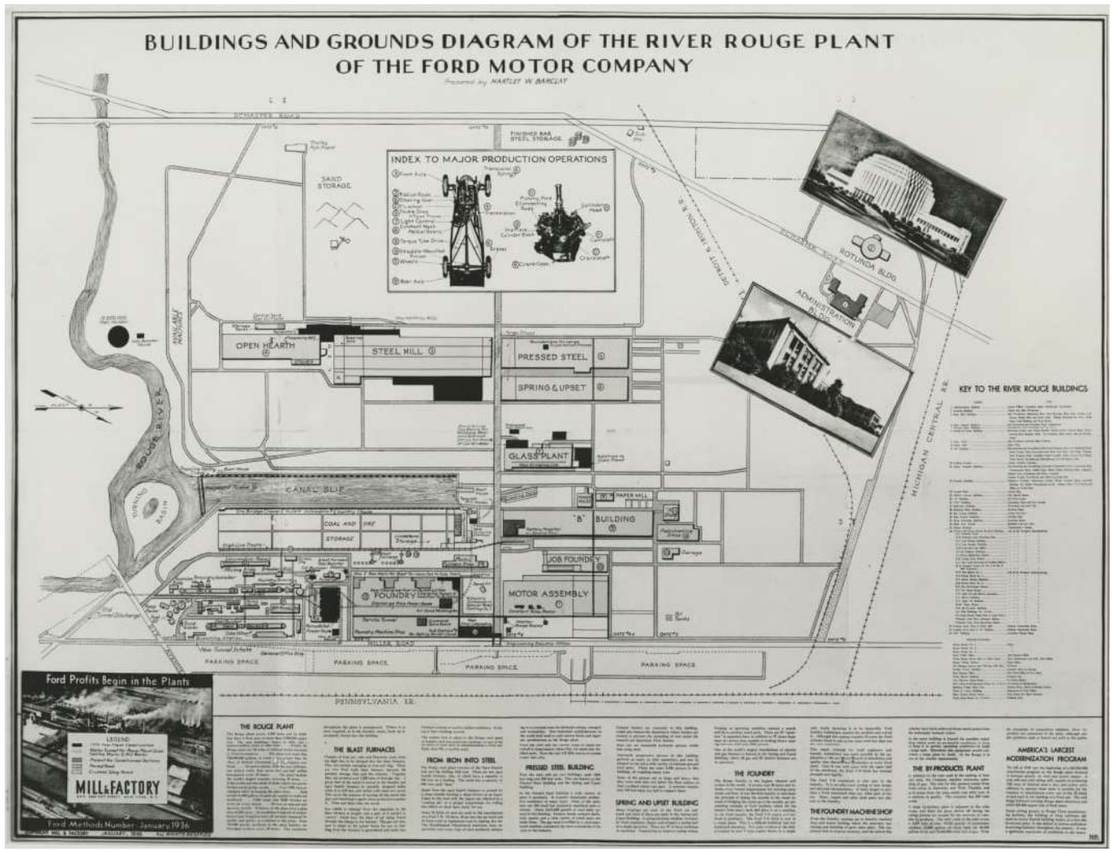


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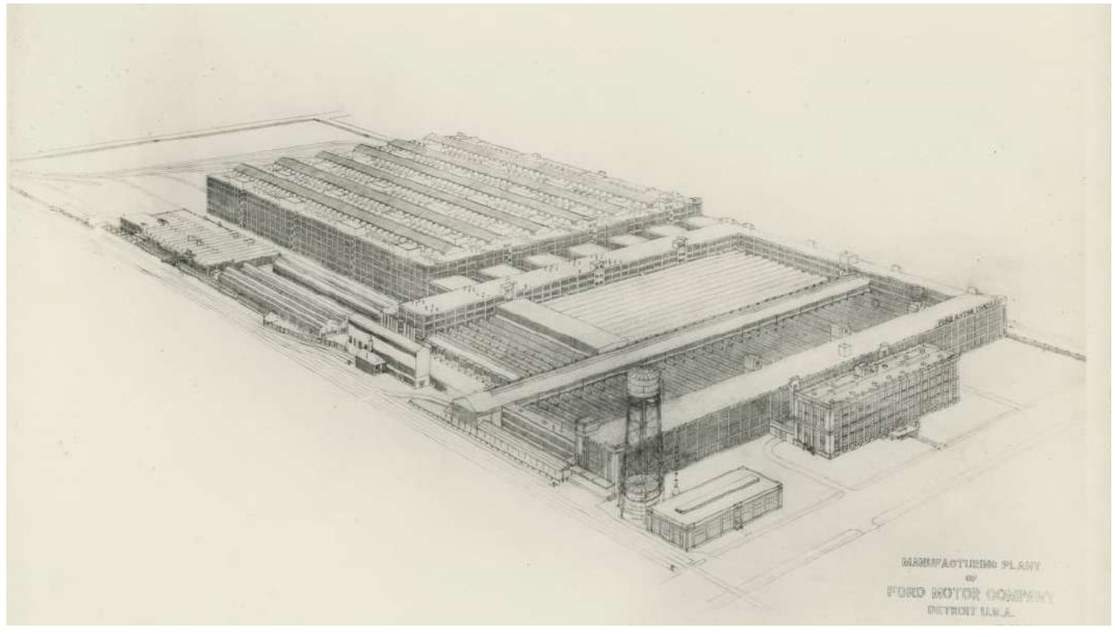


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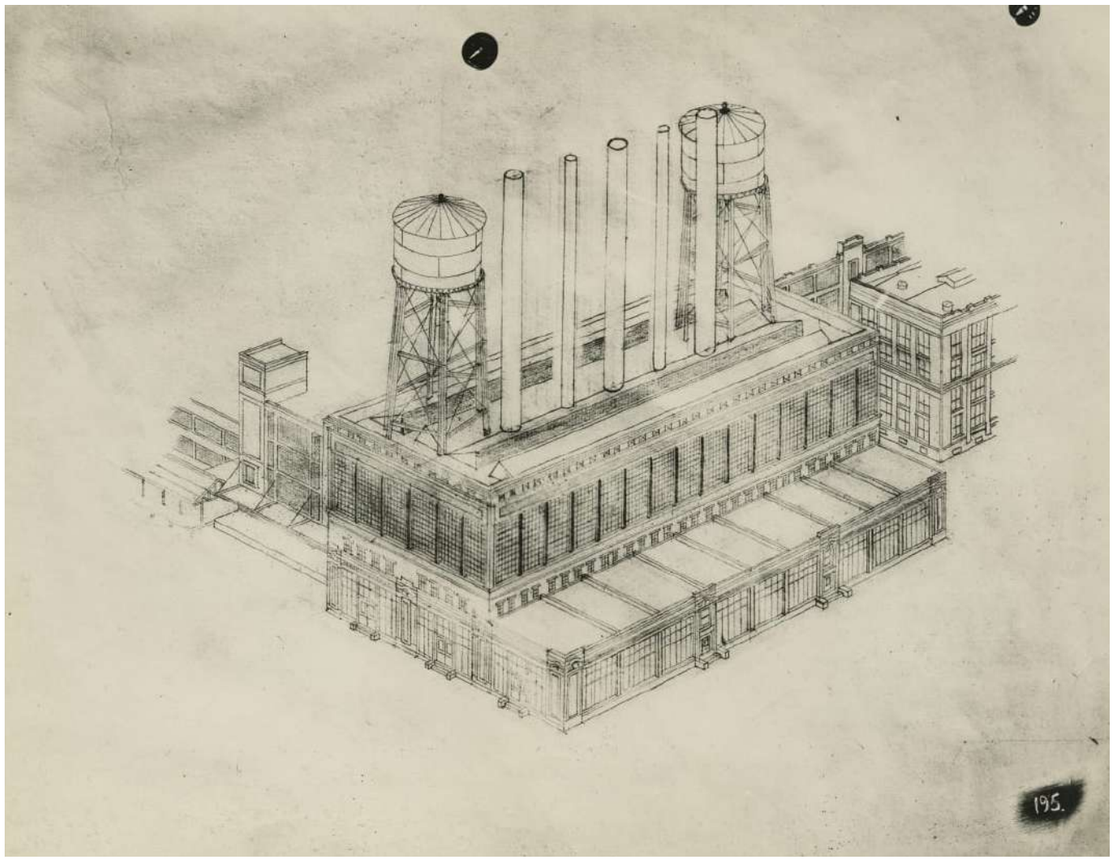


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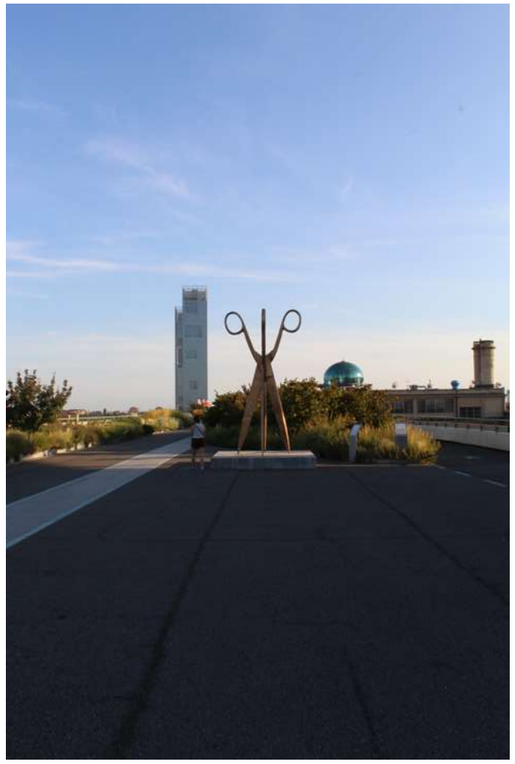


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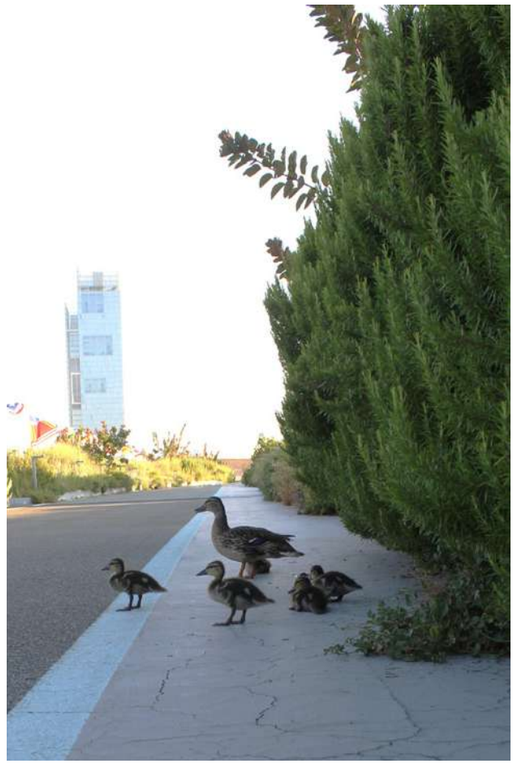


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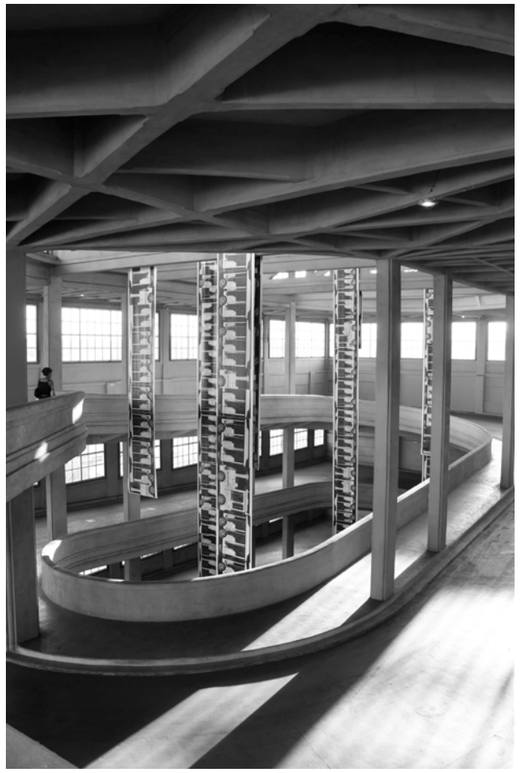


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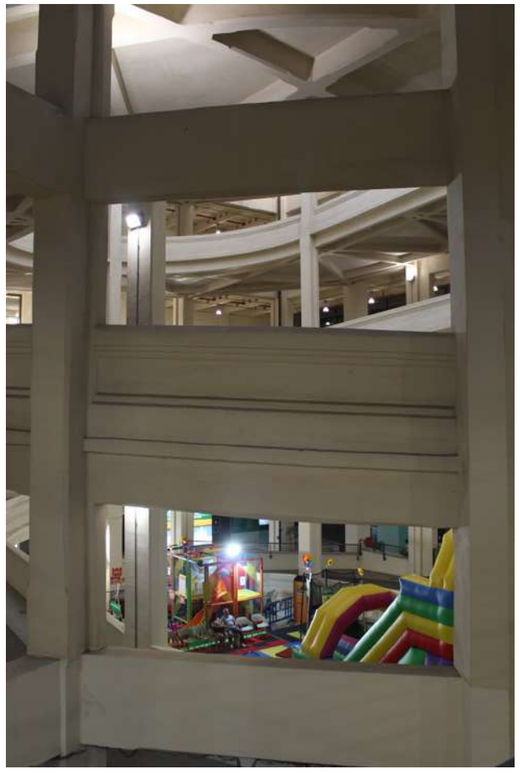


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This thesis is the result of a comparative study between Torino and Detroit through the lens of industrial heritage, focusing on two main car manufacturers in each city, Ford and FIAT.

The historical roots shape the first two chapters of this thesis. The research starts from the early development of Detroit and the post-Napoleonic era in Torino to outline the main reason for the emergence of the car industry and clarify the historical trends that led to the creation of a suitable context that transformed these distinct towns into prominent motor cities.

In the subsequent chapters, our focus narrows to the companies. The historical path through the early factories, multi-story daylight facilities, and later to the glass and steel mass production hubs is analysed. The similarities and differences highlighted specifically in critical historical moments like WWII represent how the production patterns crossed the seas and developed in different contexts.

In the final chapter, the comparison takes place and highlights the similarities and differences between these two cities, first on a macro scale, from historical roots and with the regional perspective, and second, on a micro scale, in comparing aligned buildings in each factory. For future studies, we hope our effort clarifies the similarities and differences between Torino and Detroit and creates a reliable platform for further academic attempts.

