

XXVIII International Seminar on Urban Form
ISUF2021: URBAN FORM AND THE SUSTAINABLE AND PROSPEROUS CITIES
29th June – 3rd July 2021, Glasgow

Infrastructure landscapes: automobility and granularity in São Paulo and Detroit

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Abstract

This paper presents a cross-cultural comparison of the social, cultural, institutional and physical context and impacts of automobility and urban granularity in two global automotive capitals: Detroit and São Paulo. It uses a combination of descriptive history and comparative mapping to describe and measure urban change due to automobile interventions. It finds that both cities, under quite similar forces, have actually taken divergent pathways toward infrastructure landscapes.

Keyword: infrastructure, downtown, São Paulo, Detroit

Introduction

Detroit is the American capital of automobile construction, synonymous with the rise and fall of manufacturing. As the shrinking center of a metropolitan area of over four million inhabitants, Detroit has struggled to keep up with its own automobile offspring. Most notably, its downtown has drastically transformed due to the rise of automobiles. Like Detroit, São Paulo is a manufacturing hub known for automobile production. The city is the Leviathan of Latin America at over twelve million inhabitants, occupying an area over 1,500 km² and producing over \$120 billion in goods and services in 2018 alone. And like Detroit, most of São Paulo's current manufacturing success was built up over only a few decades.

Much of the growth in both cities came from rapid automotive industrial production growth in the early 20th century. As a result, each city has strongly imposed automobility on their urban fabric. Our paper describes the history and impacts of two distinctive types of auto-oriented renewal in the historic cores of Detroit and São Paulo's, which rarely operated in tandem. Physical automobile infrastructure was meant to spur a modern granularity of automobile-scaled architecture and urbanism, yet created urban disconnections even in synchronicity. More commonly, it created internal disorganization and long-term vacancy out of tandem. Both processes prioritized metropolitan ambitions over historic urban context, replacing valuable ecological and cultural landscapes with hostile infrastructure landscapes (Shannon & Smets, 2016).

Methodology

Methodologically, this paper connects historical and morphological research to unveil similarities and differences in infrastructure landscapes across both Americas. The cultural, political, institutional, and economic history of auto-oriented renewal in Sao Paulo and Detroit uncovers shared and divergent contexts behind the creation of these infrastructure landscapes; morphological mapping uncovers their impact on both cities over time. Early 20th-century cultural ambitions for a Gesamtkunstwerk of new infrastructure and urban development to herald the automobile era were stifled by a growing institutional disconnect between traffic engineers and urban designers, compounded by an economic failure to support high-quality development around newly constructed infrastructure. Both cities currently seek to replace the resulting mixture of missed opportunities, auto-oriented architecture, and hostile infrastructure, reconnecting infrastructure and humane granularity, transitioning from automobile ‘pipes’ to sustainable and walkable ‘sponge’ urbanism (Secchi, 2016).

São Paulo

Founded by Portuguese Jesuits in 1554 as an indigenous colony, São Paulo has grown from a frontier gateway to the Brazilian hinterland during the Gold Rush to “the locomotive of Brazil” and “the city that never stops” over the past centuries. By the late 19th century, São Paulo was on the verge of major political, social, economic, and cultural transformations. The apex of the coffee economy, the end of slavery (1888) and the Proclamation of the Republic (1889) triggered profound urban transformations at the city’s core, aiming to modernize, beautify, and eliminate all colonial traces.

The 1881 map shows a still typical Portuguese-American colonial city with a non-gridded plan adapted to local topographical and hydrographic conditions, characterized by narrow and curving streets. The city is surrounded by farms and rural sites (known as *rossio*, roughly equivalent to English commons) and the first gridded suburban expansions to the south and northwest.

Spreading out like tentacles, radial roads built on ancient indigenous paths connect the historic village to nearby and more distant surrounding areas. These roads connected São Paulo to surrounding villages and rural areas, other regions of the Brazilian territory both inland and along the coast, and even to Cusco in Peru via the intercontinental Peabiru Way. We could think of these roads as the structural backbones of the urban development of 20th century residential suburbs. The rail system also played an important role in urban and regional mobility and structuring. In 1867, privately owned British São Paulo Railway Company opened São Paulo’s first steam-powered railway connecting the rural hinterland to the coast. The North Railway connected São Paulo to Brazil’s capital Rio de Janeiro in 1877. Early railways focused as much on early commuters as they did on intercity travelers, creating small suburban railroad settlements a few kilometers apart. In the village core, public space was characterized by singular elements such as plazas and church

squares, large enough to encompass significant gatherings and housed the main urban facilities such as public buildings, monasteries and churches. Between these spaces, streets served mainly as a passage and concentrated commerce, industry and everyday services. Not yet straightened and pipelined, rivers crossed through downtown and the railway.

In the next five decades until 1930, São Paulo asserted itself as “The Metropolis of Coffee”. Although the city did not hold the production or the exportation facilities, all the commercialization, the banks and the headquarters of the major coffee companies were in São Paulo – as were the homes of their owners and senior employees. Inspired and influenced by the Haussmann's renovation of Paris (1853-1870), São Paulo implemented a profound remodeling program of the central spaces of the old colonial village during the administration of its first two republican mayors, Antônio Prado e Raimundo Duprat. This program widened roads, created new significant public space and constructed new public buildings such as Teatro Municipal (1904-11), and the construction of Anhangabaú Park. An electrical streetcar system opened in 1900 and unlocked a range of new residential suburbs.¹ Furthermore, buses gained ground as a more flexible modality, which had the capacity to reach up narrow, steep and unpaved streets where streetcars and trains could not reach – and were cheaper to run.

By the early 20th century, industrialization was still insipid but World War I and the collapse of the coffee economy proved an impetus behind Brazil's industries, with Sao Paulo at its core. In 1920 the first industrial park on the banks of the Tiete River was inaugurated and in 1921 the first Ford Motor Company automobile factory, designed by the same engineer from Highland Park Ford Plant in Chicago, was inaugurated.

The 1930 map shows a consolidated downtown with European inspired boulevards and parks such as Anhangabaú Park, as well as French-designed Dom Pedro II Park occupying part of the Tamanduateí river valley. The plan also shows the effects of modern transport such as streetcars and modern facilities such as libraries, colleges, and theaters. Downtown's urban form is characterized by huge blocks that will be subdivided and re-parceled over the following decades, increasing the total public area, and decreasing the average size of blocks.

The 1930 Plan of Avenue proposed major downtown renovations, reflecting the growth of São Paulo as a regional and increasingly national industrial powerhouse. The intensification of the municipality's interventions, With strong federal support, municipal interventions grew larger and more drastic, with the construction of large public facilities like the Mário de Andrade Library and the Pacaembu Stadium, a central ring road influenced by the work of Eugène Hénard, and the first boulevard radials influenced by the work of Joseph Stübben. These new roads were accompanied by intense real estate speculation resulting in

¹ The streetcar system operated until 1968, when the first subway line was inaugurated.

verticalization: blending the city's European appearance with new features characteristic of North American cities.

In 1950, Robert Moses predicted a rapid growth of cars in the "Public Improvement Program of São Paulo."² Given the financial impossibility of immediately building a subway network, Moses proposed replacing electric trams by autobuses as a "reasonable and economical solution", which resulted in the acquisition of 500 vehicles and improvements in asphalt paving. Four years later, in 1954, the first parking garage opened in downtown with 14 floors. The car city was afoot. The 1954 map shows the effects of these plans on public space such as pipelining rivers for road implementation, but also the private building demolition and verticalization disrupting the downtown colonial parcel structure.

The period between 1965 and 1979 was marked by a cycle of restructuring urban interventions aimed at adapting downtown to the new metropolitan dimension of the São Paulo agglomeration. Road and subway interventions strongly impacted downtown and its surrounding neighborhoods. The most emblematic car-centric infrastructure work of this period is without a doubt the Minhocão Elevated Highway and The Dom Pedro II Interchange. The first is an elevated expressway whose sole purpose was to create a fast east-west connection. In addition to destroying an old boulevard, Avenida São João, it created a huge scar in the middle of the Bela Vista residential district that led to its devaluation and consequent deterioration. Another complex of grade-separated highways, an elevated metro line and station, and a metropolitan bus terminal decimated Dom Pedro II Park and channeled the Tamanduateí River.

The 1974 map reveals these massive public and private interventions. Entire blocks were demolished for road and metro projects around downtown, and private speculation densified the first housing districts around the downtown core. Major roads tore through downtown, transforming it from a place of permanence but to a place of passage, and taking up the little open space left in the urban core.

Restructuring slowed down between 1980 and 2000 leaving several postwar interventions even incomplete. Meanwhile, the urban core is seeing revitalization, including the implementation of the Calçadões (1974-75), a system of downtown pedestrianized streets, and specific restorations of significant historic buildings.

The 2004 map shows a stable street grid with dense building construction with little open space left. The street constitutes most of the public open space, as car-centric interventions have eaten up the urban core's few parks and squares.

In the last decade and a half, the city hall does not have a structured project for downtown, leaving only isolated initiatives. Adventurous solutions are presented without much internal cohesion or agreement with

² SOURCE OF PLAN. The car per inhabitant ratio at that time was 1 per 32, today the ratio is 1 per 2.

downtown stakeholders for holistic improvements. Furthermore, the low income of most downtown residents limits investment in downtown's increasingly crumbling building stock. Public authorities fail to maintain historic districts, rather considering them as "degraded". Today, crowded and upscale areas like República, Consolação and Bela Vista Districts lie just around the corner of some of the city's most struggling areas, like Crackland in Campos Elísios area and the surroundings of the Dom Pedro II Park area. This characterizes downtown São Paulo as a Global South "patchwork" of heterogeneity and ambivalence configuration where social and economic upswing and downswing trends live together ("the city of the rich and the city of the poor" in the words of Bernardo Secchi). Furthermore, the urban fabric remains pierced by anachronic and out-of-scale car-centric infrastructures built through massive public investments mainly in the post-war era.

Detroit

Rising from the ashes of an 1805 fire, the current form of downtown Detroit was defined by territorial judge Augustus Woodward, who set up the city's fabric to mirror his baroque hometown of Washington D.C. By the late 19th century, downtown Detroit already comprised a significant concentration of riverfront commerce, with inland retail, a fledgling office district, and a variety of residential districts accessed by an early streetcar system. Woodward's original radial plan had only been very partially implemented, as land speculation mostly expanded the city in a more or less regular grid. Downtown established itself as the heart of a late-19th century metropolis of around 200,000 people, complete with new public buildings and several public spaces, mostly occupied by pedestrians, horses and buggies.

This pattern would drastically change in the following decades with the rise of the automobile, first introduced to Detroit in a downtown backyard shed by engineer Henry Ford. This was the product that would ultimately launch Detroit from a provincial backwater with little homegrown industry to the largest manufacturing city in the world by the early 20th century. Ford soon left downtown to set up his factories elsewhere in the region, followed by a slew of other car manufactures. As car production and population growth skyrocketed in the early 20th century, downtown became the commercial and institutional heart of a metropolis of millions in the span of only a few decades. The city's own product, the automobile, soon began to harm the downtown by promoting suburbanization of people, retail, and offices, and by jamming downtown's streets and parking lots as early as the 1910s. By the 1920s, the city had already conducted its first road widenings to make way for cars, and the first parking garages and lots had begun to appear throughout downtown. The 1929 map shows how wider roads had already eaten away many of downtown's radial streets, and how parking had taken up several former park spaces.

During the following decades, the car made a deeper mark on downtown, increasingly supported by public policies to clear old neighborhoods for urban renewal and construct a network of urban freeways throughout the metropolitan region in an effort to keep downtown accessible for increasingly suburbanizing customers and commuters. Unlike Sao Paulo, rapid transit never materialized. Instead, a drastic ring of freeways would be constructed in the postwar era around downtown, surrounded by blocks that were cleared with federal money, consolidated into parcels for private redevelopment, yet mostly remaining vacant in the decades to follow. Downtown's modernization under its own renewal czar Charles Blessing failed to take off as the city's population peaked in the 1950s. Nevertheless, the 1961 map shows the early results of downtown Detroit's modernization efforts as the first traces of block consolidation and freeway construction.

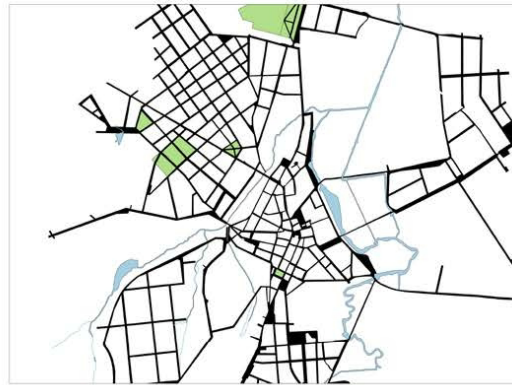
As urban renewal and freeway construction was underway in the 1960s, public and political skepticism grew on its effectiveness. Most of the cleared renewal sites failed to attract new investments, and many renewal projects displaced Detroit's African American population. After massive civil disorders in 1967, the planning and development paradigm changed for downtown Detroit. The freeway ring was completed, but further publicly funded renewal projects mostly halted. Instead, private stakeholders became the biggest shapers of downtown, for example by constructing the Renaissance Center, which consolidated several downtown blocks into a massive office, hotel and retail complex in 1977. As the 1977 map shows, the riverfront blocks had indeed significantly consolidated and the downtown freeway ring had been completed.

Between 1977 and 2018, much of the change in downtown's urban fabric was due to larger, privately funded projects, with the city merely acting as a facilitator. For example, a sports district cleared dozens of blocks on the northern end of downtown for stadiums and parking. A corporate campus cleared and consolidated several blocks on the western end of downtown, and three mega-casinos were constructed on consolidated blocks around downtown. Over the past decade, a mortgage billionaire has bought up many historic downtown buildings to create a hub for his workers and as a national destination for the Creative Class (Florida, 2002). This has prompted yet another wave of coarsening downtown grain, resulting in a stark contrast between a vibrant downtown core with newly renovated buildings, surrounded by the infrastructure landscape of parking, auto-oriented stadiums and casinos, and urban freeways.

1884



1881



1929



1930



1951



1954



1977



1974



2001



2004



2018



2017



Figure 1 – Comparative maps to scale depicting blocks, car space and parks space in Detroit and São Paulo between the late 19th century and today.

Conclusion

Figure 1 shows the drastic transformation of both urban cores as they propelled into the automobile era. We see the insertion of larger car infrastructure into the existing urban fabric, which has increased the amount of space dedicated to cars, especially after the mid-20th century. In both cities, street widening, highway and viaduct construction, demolition of entire blocks for urban renewal have significantly impacted their urban fabric over the past decades – severing not only the physical fabric, but also the social and cultural fabric of both downtowns. In both cities, this process has been similarly imposed from the top down, without much democratic or community input. While São Paulo's infrastructure was built under two dictatorial regimes (from 1930 to 1945 and from 1964 to 1985), Detroit's infrastructure was similarly imposed by federal institutions with military ambitions in mind, and local opposition out of mind.

However, we also see a divergence between a coarsening urban grain in Detroit and a splintering of the urban grain in São Paulo. Statistical calculations of the number of intersections indeed show this pattern in effect: whereas the number of intersections in Detroit have decreased by almost a quarter since the late 19th century, they have only increased in São Paulo by 15%. This is due to the different approach to urban freeway construction in both countries. Detroit reflects the ability and ambition to use urban freeway construction for real estate speculation, as entire swaths of urban land were cleared by the government for privately funded redevelopment alongside new freeways. After decades of developer hesitance, these cleared blocks are now filled with a mixture of mega-casinos, stadiums and corporate campuses, surrounded by car parking. In São Paulo, due to everlasting economic and financial constraints, the public expropriation for urban infrastructure was limited to just the routes themselves. This has left a patchwork of incomplete blocks, which instead of urban frontages contain the backs of buildings and useless remnants of green spaces.

Future research will delve deeper into the drivers of the similarities and divergences in São Paulo and Detroit's infrastructure landscapes, and measure their impact on the urban experience at eye level.

SAO PAULO	Car Space	Number of intersections per km2
1930	28%	69
1954	31%	79
1974	34%	80
2004	34%	79
2017	34%	79

DETROIT	Car Space	Number of intersections per km2
1929	33%	87
1951	33%	86
1977	39%	72
2001	38%	72
2018	38%	66

Table 2 – Comparing car space and intersections between São Paulo and Detroit

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