



# NEW YORK CITY'S SUBWAY CENTURY

## *Rail Transit's Role in Growth and Development*

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**T**he subway has shaped New York City. More than any other public works program or municipal project, the subway has shaped the city's development and sustained its global competitiveness over the past 100 years. The subway's profound impact on the city's growth and development—particularly in the outer boroughs—surpasses that of the city's other widely acclaimed infrastructure projects, such as the Brooklyn Bridge and Robert Moses' highway network.

The innovative, early 20th century transit system still serves the 21st century metropolis well—a tribute to visionary planning and advanced engineering design. The October 2004 centennial of New York's first subway line provides an occasion to look back at how dramatically the city was transformed in the years that the subways were built.

### **Forging a Vision**

New York City's rapid transformation into the leading metropolis of the United States was linked inextricably to improvements in the transportation infrastructure that overcame a challenging geography. An urban archipelago, New York capitalized in the early 19th century on an unusually good system of rivers and bays to grow from a settlement of 60,000 clustered in southern Manhattan to a booming port city of almost 3.5 million by 1900, when it was second in the world only to London.

Establishing itself as the nation's leading financial center and a magnet for business and employment, New York faced a troubling paradox. The most congested and populous city was attracting ever-increasing numbers of immigrants. Yet at the same time, the waterways that had spurred the city's initial success had become the most serious impediment to sustained

*(Photo above:)* Subway train prepares to leave Times Square 42nd Street station, October 27, 2004—the 100th anniversary of the system's opening.



PARSONS BRINCKERHOFF

Traffic, transit, and pedestrians on the Bowery, in Manhattan's Lower East Side, circa 1899.

growth by severely limiting the areas where people could live within a practical commute to jobs.

To serve the booming population, early forms of rapid transit emerged in the 19th century. Many of these transit modes—including horse cars, cable cars, electric trolley cars, and elevated steam trains—began to change conventional notions of commuting distance and time. The opening of the Brooklyn and Williamsburg Bridges to transit operations also facilitated these changes.

But no change would be as radical and quick as that

introduced by the underground, electrically powered subway system, which began operating in 1904. The first subway, however, was severely overcrowded from the day it opened and was too limited in geographical coverage to relieve the city's population congestion.

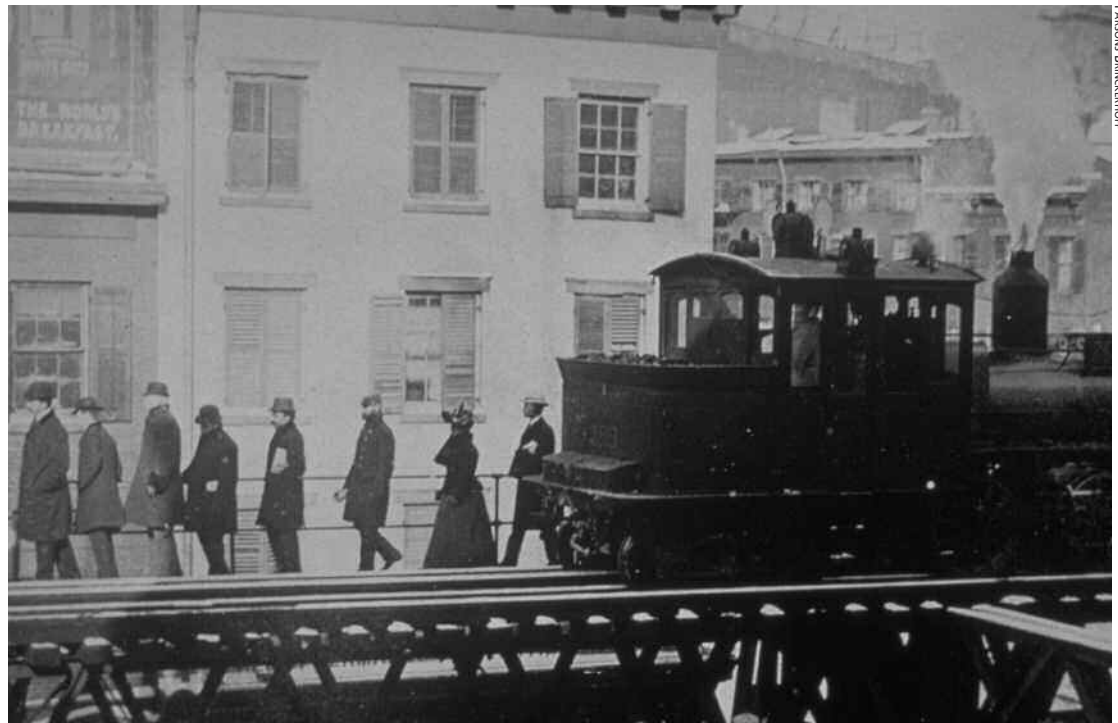
Visionary municipal leaders saw that New York's continued economic success and prosperity could lead to its downfall without managed growth. These leaders promoted construction of a more extensive city-wide subway network to serve as an instrument of modern city planning efforts to rationalize urban development. The plan benefited New York City to a far greater extent than could have been imagined.

The subway influenced New York City's growth and development by improving the quality of life for a range of citizens, by spurring commercial development and the creation of the skyscraper skyline, and by increasing real estate values and broadening the city's tax base.

### Catalyst for Residential Development

Between 1900 and 1910, most of New York City's population was concentrated in older, severely overcrowded tenement districts. The largest, Manhattan's Lower East Side, was within walking distance of the thread-and-needle trades and light industries and had the highest population density in the world.

Other tenement districts had been built along the old 19th century elevated steam railways and the first subway in such areas as Harlem, Hell's Kitchen, the



PARSONS BRINCKERHOFF

Sixth Avenue elevated train breaks down, circa 1901.

South Bronx, and Brooklyn's Williamsburg and Bushwick neighborhoods. New immigrants, many from southern and eastern Europe, continued to crowd into a limited supply of low-quality tenement buildings in these districts.

The tenements lacked natural light and fresh air flow, and the cramped apartments did not have hot running water or private bathrooms. Contagious diseases and a variety of criminal activities proliferated. This bleak situation persisted despite the availability of vast expanses of open or underdeveloped land in other parts of Greater New York.

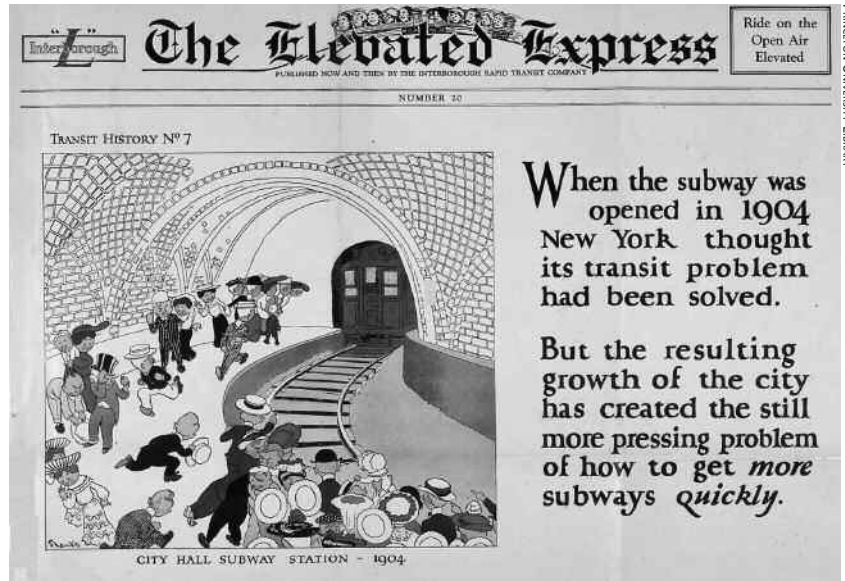
Manhattan's average population density in 1910 was 189 residents per acre (RPA), compared with Brooklyn (45 RPA), the Bronx (21 RPA), and Queens (5 RPA). These less crowded sections composed nearly three-quarters of Greater New York's land area but housed less than 20 percent of its population, because the daily commuting time and cost to and from Manhattan's employment districts were not practical.

The threats from population congestion to the wider society spurred the massive expansion of New York's subway system between 1913 and 1940. During this era, the city built 180 route-miles of subway lines—including 12 bridge and subaqueous tunnel crossings—effectively overcoming the river barriers to integrate Manhattan geographically with Brooklyn, Queens, and the Bronx.

As a result, a greater amount of land was opened for development than at any other time in the city's history. Developers followed the new subway lines and extensions to construct decent, affordable, low-density housing for middle-class and working-class families. The bucolic, rural landscape of the city's outlying areas was quickly replaced by long rows of tree-shaded streets with a mix of apartment houses, private single- and two-family homes, and open recreational spaces.

The expanded subway's low-cost five-cent fare, devalued by significant inflation during World War I, was within the reach of even the poorest person in the city. This was the primary catalyst for the development of new residential neighborhoods in the outer boroughs, allowing dispersal of the city's growing population.

Most of the city's net population growth from 1910 to 1940 occurred within the new transit-oriented developments, as the population density outside of Manhattan increased with the construction of new subway lines (Figure 1). The city's population rose steadily until about 1930, when the Interborough Rapid Transit (IRT) and Brooklyn-Manhattan Transit (BMT) subway lines were largely completed. Growth continued at a slower rate until 1940, as the Independent (IND) subway lines were built.



When the subway was opened in 1904 New York thought its transit problem had been solved.

But the resulting growth of the city has created the still more pressing problem of how to get more subways quickly.

The IRT and BMT lines reached into undeveloped areas; the IND reinforced many lines already in service. By 1940, nearly 90 percent of the city's population of 7.5 million lived within one-half mile of a subway or an elevated rapid transit line.

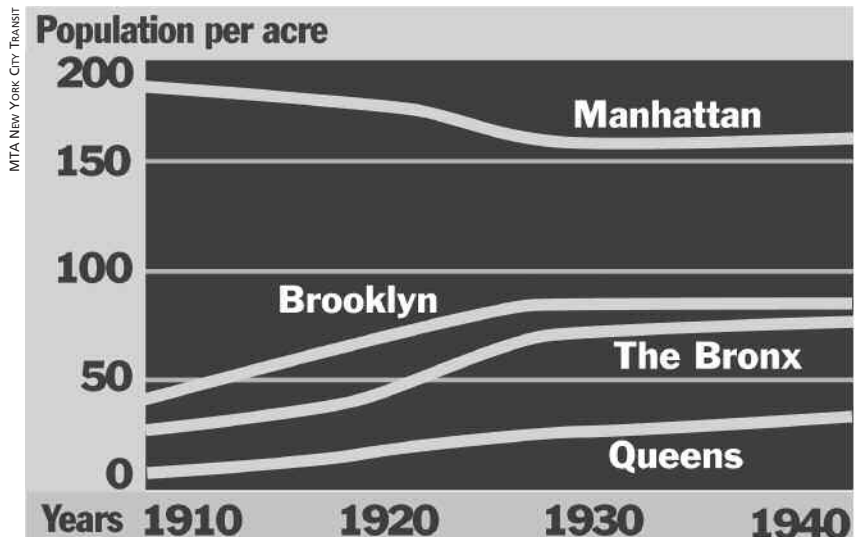
By reducing the early 20th century problems of population congestion, the subway improved the quality of life for New Yorkers—an enduring legacy.

1925 transit information poster published by the Interborough Rapid Transit Company, placed the 1904 opening of New York's first subway in its proper historical context.

### Building a Vertical City

Four technological innovations of the late 19th century enabled the skyscraper—the “ultimate architecture of capitalism” and the symbol of New York's financial preeminence—to dominate Manhattan's skyline. These were the passenger elevator; metal-skeleton construction, which replaced load-bearing masonry walls with cast iron and later with structural steel; electric power and light; and rapid transit.

FIGURE 1 Population follows transportation: the opening of new subway lines relieved overcrowding by shifting population density and growth to the outer boroughs.





The extension of the Flushing Line along Queens Boulevard, shown at Rawson Street in 1917, completely changed the rural landscape of Queens, spurring intense residential, commercial, and industrial development.

Pivotal in spreading out the city's residential areas geographically, the subway also played a role in New York's development into a vertical city of skyscrapers. The subway made possible an extraordinary density of daytime worker populations in Manhattan's central business districts—the subway's capacity, speed, and affordability enabled hundreds of thousands of people to commute to jobs in Manhattan; moreover, the subway provided Manhattan-based businesses with access to labor, influencing continued growth.

When the subway opened in 1904, Lower Manhattan already was the world's largest office building district, served by earlier forms of rapid transit, including the Manhattan elevated steam railways and the Brooklyn Bridge's elevated cable railway. With the construction of additional subway lines in Lower Manhattan, more and taller office buildings were built to meet the demand for office space in prime locations.

With the completion of the IRT and BMT lines, subway station entrances were near every concentration of employment. Without this accessibility, traffic congestion would have stunted New York's economic growth and development.

Midtown Manhattan's transformation from a fashionable 19th century residential area into a leading retail district began before the first subway opened. In 1902, Macy's Department Store relocated from 14th Street and Sixth Avenue to Herald Square, one block from the planned construction of the Pennsylvania Railroad Station, and other department stores and specialty shops soon followed. The subsequent construc-

tion of the IRT and BMT lines, together with the reconstruction and improvement of Grand Central Terminal, added impetus to the northward movement of development.

Throughout the 1920s, although the financial district remained the focus of new office building development, the Midtown area evolved into Manhattan's second central business district. By 1935, the 60 million square feet of office space in Midtown surpassed the 55 million in Lower Manhattan.

Manhattan's signature art deco skyscrapers, the Chrysler and Empire State Buildings, were constructed close to Midtown subway lines. Times Square, at the nexus of several subway lines, quickly developed into the city's premier hotel, theater, and entertainment district and became known as the "crossroads of the world."

The subways brought huge crowds to the skyscrapers and theaters. This type and density of development, in turn, made the need for subways acute.

## Broadening the Tax Base

As the subways brought the previously wooded and farmland areas of Brooklyn, Queens, and the Bronx within a reasonable and inexpensive commute to Manhattan's central business districts, the demand for—and value of—the land increased. The accessibility that the subways provided was a primary facilitator, along with a strong regional economy, the market demand for new development, and proactive public policy support.

The greatest rise in values occurred in the previously undeveloped areas of the outer boroughs, as the population followed the construction of new subway lines. By 1935, the average value of land in Brooklyn, Queens, and the Bronx within one-half mile of a subway line was seven times that of land farther away.

In Manhattan, as land became more expensive, new office building developments grew denser and taller to sustain profitability. This necessitated more subways, increasing the land values of commercial development sites adjacent to the new subway stations.

The subway's construction had a redistributive effect on land values in Manhattan. The building of subways after 1913 accelerated Midtown growth, until it outpaced Lower Manhattan in size and importance. New Midtown office developments filled up at the expense of Lower Manhattan's older buildings. Consequently, as more subways were built through each business district, land values increased in Midtown but remained stable in Lower Manhattan.

The construction of the IRT and BMT subway lines provided the accessibility necessary for opening up all parts of the city to development. New York experienced a 160 percent increase in land values during



The subways encouraged Manhattan's dense commercial growth. The city's iconic skyscrapers would have been impractical without the capacity, speed, and affordability of subway service for Manhattan's hundreds of thousands of workers.

the 25-year span from 1905 to 1929. The increased real estate tax revenues financed many other municipal infrastructure improvements, including the construction of the IND subway lines during the 1930s.

### Coming Full Circle

When the subway system was largely completed in 1940, the city's growth had reached a maturation point, with a population of 7.5 million and 2.9 million workers—not much different from today's 8.1 million residents and 3.6 million workers. The subway continues to be New York's lifeline, sustaining its economic and physical vitality. Without the subway, it is unlikely that New York would have remained a great city, the world's leading city in finance, commerce, and culture for much of the past century.

At the beginning of the 1980s, New Yorkers experienced life without a safe and reliable subway when the system nearly collapsed after many years of neglect. The Metropolitan Transit Authority (MTA) then embarked on one of the biggest public works rebuilding efforts in American history—a series of capital programs worth more than \$40 billion in current dollars—to restore and reinvigorate the infrastructure. The programs began in 1982, and after nearly a quarter of a century of continuous investment, the results of the MTA capital programs are apparent. The dramatically improved subway system has regained passengers in record numbers, making it a primary factor in New York City's resurgence.

In the 21st century, the subway remains crucial to the city in keeping and attracting business, holding and creating jobs, and strengthening the tax base. Continuing the current levels of capital investment is critically important in the capital program for 2005 to 2009 and beyond, to maintain progress and momentum to bring the entire subway system into a state of good repair, helping to ensure safe, reliable, and efficient service. The capital program will make strategic investments in new subway infrastructure to relieve congestion and to open up new areas of the city for development—as was done 100 years ago.

### Resources

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