



# CTBUH Research Paper

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**Title:** **Mass Transit: The Key to Urban Development, Urban Renewal, and Sustainable Cities**

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**Porie Saikia-Eapen, AIA**  
MTA-NYC Transit

Porie Saikia-Eapen is the chief architect for MTA New York City Transit. At NYC Transit, Ms. Saikia-Eapen leads a team of in-house architects and oversees the design effort by both in-house and consulting architects. She is involved in the NYC Transit-related projects in lower Manhattan, including the new Fulton Street Transit Center, the new Second Avenue line, and all NYCT capital program management projects.

Ms. Saikia-Eapen has been a part of the New York City design and construction industry for the past 20 years. She has worked on architectural design, project development, program management, and construction management of public facilities from both public and private sectors.

In addition to being a special guest speaker at the 1st Seoul CM Forum at the 4th International Construction Project Management Union Conference in Seoul, Korea, and keynote speaker at the Society of Women Engineers Regional Conference in South Bend, Ind., Ms. Saikia-Eapen is a frequently invited speaker at the New York Building Congress; American Institute of Architects NY forum on architecture, transportation design, Lower Manhattan redevelopment, and post-9/11 transit-related projects; and other design and construction forums.

On the educational front, Ms. Saikia-Eapen is a long-standing mentor for the NYC ACE Mentor Program and NYU Alumni Career Advisement Program, and is an advisor at the NY Architectural Foundation. She has lectured at the University of Notre Dame, New York University, University of Seoul, and Hanyang University.

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## **Mass Transit: The Key to Urban Development, Urban Renewal, and Sustainable Cities**

This presentation, a combination of theory and practice, will enumerate how emerging and important design philosophies can be applied to a system that is more than 100 years old and has the scale of one of the largest businesses in NYC.

**Urban Growth and Development:** The NYC subway, more than any other public works program or municipal plan, has been responsible for shaping the City's growth and sustaining its global leadership for 100 years. The electrically powered subway that opened in October 1904 altered commuting radically for New Yorkers, increasing population density outside Manhattan, which related directly to the subway construction.

**Urban Renewal:** Today, 4.7 million riders use the subway every day; nearly half go to the small area of Manhattan south of 60th Street. In a pedestrian city, NYC's sidewalks also play the role that urban streets do in non-transit cities. Transit and infrastructure projects have complex objectives such as meeting the needs of the modern customer and keeping the aging system in good repair while building new under the umbrella of sustainability, public security, and urban design.

**Sustainable City:** Mass transit in NYC vastly contributes to a greener NYC. Without a mass transit system, the environmental impact of 8 million workers in the region, commuting by car everyday, would cripple the city. The city would be inhaling 94 million pounds (42,637 tonnes) of carbon monoxide, 14 million pounds (6,350 tonnes) of Hydrocarbons, and 1.5 million pounds (680 tonnes) of soot a year. NYC Transit's vision is to reduce the environmental footprint by designing, constructing, and operating in a "Green Environment."



**Robert E. Paaswell, FASCE, P.E., Ph.D.**  
City College of New York

Robert Paaswell currently serves as director of the federally supported University Transportation Research Center at the City College of New York. A consortium of 12 major U.S. academic institutions, the Center conducts research and projects on surface transportation, carries out training and educational programs, and actively disseminates the results of its work. It is one of the few such Centers in the United States with a concentration in public transportation operations, policy, and management.

Dr. Paaswell has been named director of the City University Institute for Urban Systems, a major university-wide initiative to examine the intersection of new technology, changing institutional structure, and innovative finance on the provision of infrastructure in the 21st century. He also serves as a distinguished professor of civil engineering — the highest super-rank within the university system. Previously, he served as executive director and CEO of the Chicago Transit Authority, the nation's second largest transit company.

Extremely active in public transportation issues and consulting, Dr. Paaswell has reported on governance structures for U.S. transit organizations, public/private issues in New York and Chicago, labor union/management issues, and training for new technologies. He is currently working on transit investment strategies and innovative transit system design. He served as chairman of the board of the Transit Standards Consortium, and member of the Transportation Research Board and the board of the Transit Cooperative Research Program. He is widely published.

Dr. Paaswell is a fellow of the American Society of Civil Engineers and a recipient of the USDOT Secretary's Medal for Superior Service.

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## **MASS TRANSIT:**

**Key To: Urban Development, Urban Renewal and Sustainable Cities**

By

Porie Saikia-Eapen AIA, Chief Architect, MTA-New York City Transit

Robert E. Paaswell, PhD, PE, Director, University Transportation Research Center, City College of New York

### **Urban Growth & Development:**

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### **Urban Renewal:**

Today, 4.7 million riders use the subway every day; nearly half go to the small area of Manhattan South of 60<sup>th</sup> Street. As a pedestrian city, NYC's sidewalks also play the role that urban streets do in non transit cities. Transit and infrastructure projects have complex objectives such as keeping the aging system in good repair, while building new under the umbrella of sustainability, public security, urban design and meeting the needs of the modern customer

### **Sustainable City:**

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*The presentation, a combination of theory and practice enumerate how emerging and important design philosophies can be applied to a system that is over 100 years old and has the scale of one of the largest businesses in NYC.*

(Sources: "The Subway's Impact on New York City's Growth and Development" article by Thomas R. Jablonski; [www.mta.info](http://www.mta.info); [www.nycsubway.org](http://www.nycsubway.org); Travel in NY-NJ Met area: NYMTC 2000)

## MASS TRANSIT:

**Key To: Urban Development, Urban Renewal and Sustainable Cities**

## NEW YORK CITY: A CASE STUDY ON MASS TRANSIT:

The Global access to New York City is unmatched with any other city in the world. New York City is both a global city and a local city.

# New York City: Global Access



**Global City** – a world capital of finance, technology, media, entertainment & entrepreneurship.

**Local City** – to those who live here, a place to work, socialize, go to school, lead daily lives.

Therefore, in NYC, transportation must maintain the global while sustaining the local.

New York's vertical skyline is perhaps one of the world's most identifiable icons. It should have the most efficient transportation system and environmentally effective. It must sustain the trend to continue densification – even after 9/11.

**Life in New York City** today, as always has been, is a life of

- Face to face
- Entrepreneurship
- 24 hours
- Unmatched diversity of skills
- Opportunity

### **New York is an Entrepreneurial City**

- New York City, the world financial capital is noted for its entrepreneurialism
- Following closely are London, Shanghai, Tokyo
- Entrepreneurialism demands agglomeration economies and diverse, but synergistic economic sectors (high tech, finance, law, banking, real estate, etc ~ accompanied by all of the supporting and proximate services). This leads to high density.

### **The simple equation of Supply And Demand:**

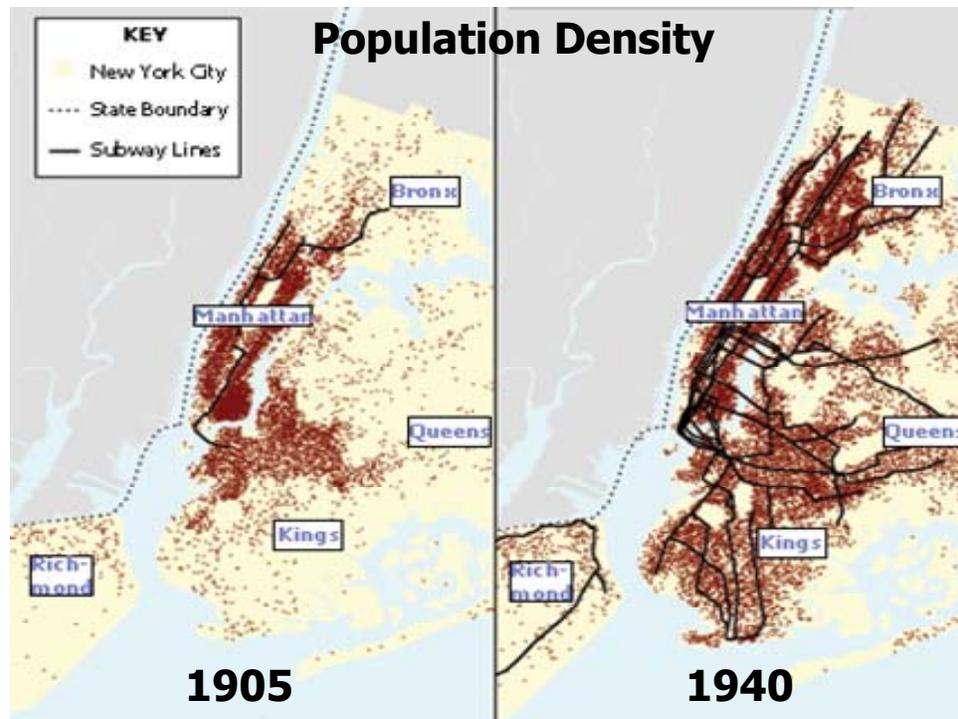
- Rail transit is highest capacity travel mode
- Allows urban densities of much greater than 10,000 persons per sq. mi.
- NYC, London, Tokyo, Paris all have daytime densities of approximately 10,000 persons per square mile where as NYC has a daytime density of 75,000+ per square mile.
- This horizontal travel must be met by vertical accommodation
- In addition, Manhattan "imports" 1.4 million workers per day

To maintain all of the above, there is one (of many) solutions: Mass Transit. Mass Transit Adds:

- Efficiency: shrinks personal map of region
- Costs: travel times are measured in \$\$\$
- Environment: effective land uses
- Sustains uniqueness of our densest cities

## MASS TRANSIT:

### Key To: Urban Development, Urban Renewal and Sustainable Cities



#### How the Subways Shaped New York City

New York City today has grown up around the subway lines. Visionary municipal leadership saw that New York's continued economic success and prosperity could ultimately lead to its downfall if its growth was not well managed, and thus proceeded to promote the construction of a more extensive city-wide Subway network as an instrument of modern city planning efforts to rationalize urban development. Doing so, they set in motion a plan that benefited New York City to a far greater extent than could have likely been imagined.

Overall, the Subway's impact on New York City's growth and development can be seen in three areas: how it helped (1) improve the quality of life for a vast range of New Yorkers, (2) spur commercial development, and (3) increase real estate values and broaden the City's tax base.

**Improved quality of life:** As the new subway lines and extensions opened, developers soon followed with the construction of decent, affordable and low-density housing for both middle-class and working-class families. The formerly bucolic, rural landscape of the City's outlying areas was quickly replaced by long lines of tree-shaded streets containing a mix of apartment houses, private single- and two-family homes, and open recreational spaces.

**Spurred commercial development:** The subway has allowed there to be extraordinarily dense daytime populations of workers in Manhattan's central business districts. Without the capacity, speed, and affordability of Subway service, hundreds of thousands of people would have no other practical means of commuting to and from their jobs in Manhattan. Additionally, by spurring the development of many new residential neighborhoods in the outer boroughs, the Subway has provided Manhattan-based businesses with ready access to labor pools that have influenced their continued growth.

**Increased real estate values:** As the Subways brought the previously wooded and farmland areas of Brooklyn, Queens and The Bronx to within a reasonable commuting time and cost of Manhattan's central business districts, the demand for, and value of the land for new residential development increased significantly. The construction of the Subways was not by itself directly responsible for increased land values, but the accessibility that the Subways provided was certainly a factor. By 1935, the average valuation of land in Brooklyn, Queens and The Bronx located within a half-mile of the Subway lines was seven times that of the land located further away from the Subway.

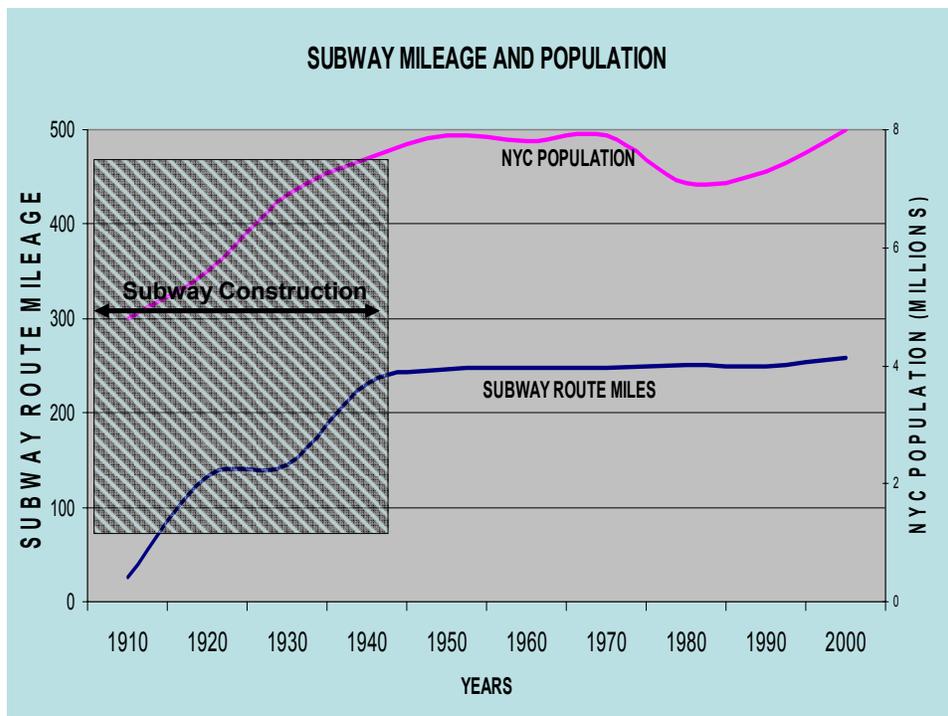
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While the Subway's continued construction contributed to increases in land values for the outer boroughs, its effect on Manhattan land values was more redistributive. The building of additional Subways after 1913 accelerated Midtown's growth rate, helping it to eventually outpace Lower Manhattan in relative size and importance. As more Subways were built through each business district, land values increased in Midtown as Lower Manhattan remained stable. Thanks in large part to the construction of its IRT and BMT Subway lines, which provided the accessibility needed to open up all parts of the City to development, New York experienced an overall 160% increase in land values during the quarter century span from 1905 to 1929. The resulting increased real estate tax revenues helped finance many other municipal infrastructure improvements including the construction of the IND Subway lines during the 1930s. Since then, the Subway has continued 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, indeed the ultimate city in world finance, commerce and culture for much of this past century. As New York City enters the 21st century, the Subway remains a crucial element in keeping and attracting business, holding and creating jobs, and strengthening the tax base.

### Development of the Subway in NYC

- From the first day in 1904, the subway ran 24 hours per day, seven days a week.
- Both express and local service was available from the start. (In fact, an important element of the New York City subway system has been and still is the four-track design on many lines that allows local and express service and also provides the flexibility required to operate around service problems.)
- First day ridership approached 150,000. New-York Tribune, October 28, 1904 reported "Local and Express Trains Carry 125,000 in Five Hours." New York Times, October 28, 1904 wrote "Traffic on the new subway from 7pm to midnight - figures gathered by Times reporters at Midnight: 127,381. Service started at 2:35pm. Those who rode on the first trains were 15,000 invited guests and their friends. The general public was not admitted until 7pm, and its curiosity was whetted all the afternoon by the unfamiliar appearance of crowds emerging from the earth."
- The front page of the October 28, 1904 edition of the New-York Tribune also announced in its headline: "Subway Travel on with Rush." The schedule listed at the start of the article announced that during rush hours, train service was provided every 4 minutes. (And, rush hour service is still as frequent today!)
- Initially the system had 3 lines and a 5-cent fare.



## MASS TRANSIT:

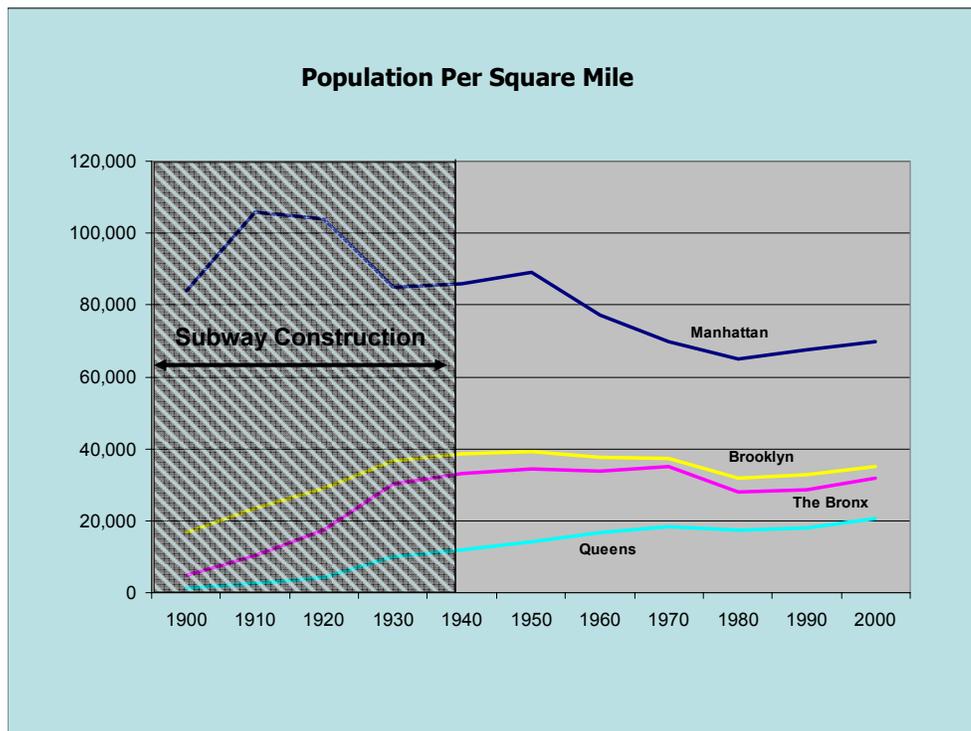
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#### NYC Subway System Expansion

The first Subway was severely overcrowded from the day it opened and was too limited in its scope of geographical coverage to relieve many of the City's population congestion problems. Between 1910 and 1920, the City, along with the IRT and BRT companies, undertook a massive construction project known as the Dual Contracts. These contracts provided for the expansion of the subway and elevated networks to open up areas of the city without transit service. The construction of the citywide Subway network opened more land to development in the "outer reaches" of Manhattan and also in the "outer boroughs". 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 relatively commensurate with the construction of new Subway lines. The City's population climbed steadily up until about 1930, by which time virtually all of the Interborough Rapid Transit (IRT) and Brooklyn-Manhattan Transit (BMT) Subway lines were completed. Growth continued, albeit at a lesser rate, up until 1940 as the Independent (IND) Subway lines were built. Whereas the construction of the IRT and BMT Subway lines were specifically planned to reach many undeveloped areas, the IND was instead planned to largely parallel and reinforce many existing lines. The result was that by 1940, nearly 90% of the City's total population of 7.5 million was living within a half-mile of either a subway or elevated rapid transit line.

After the construction of the 3 separate subway systems, they were eventually united into 1 single system.

- IRT – 1904 (IRT = Interborough Rapid Transit)
- BMT – 1915 (BMT = Brooklyn Manhattan Transit; the BMT was initially the BRT, or Brooklyn Rapid Transit)
- IND – created 1932, opened 1940 (IND = Independent)
- Since 1940, the three systems have been joined as a common operation (though through architecture and operation they have managed to retain much of their individual personalities).
- MTA – 1953



## **MASS TRANSIT:**

### **Key To: Urban Development, Urban Renewal and Sustainable Cities**

#### **Manhattan south of 60th Street: the demand today.**

The core of New York City has an agglomeration of key economic sectors, fire, fashion, advertising, entertainment and media that need proximity. And!! It is ready to pay the salaries in the core, and the availability of basic and support jobs are magnets as well.

Manhattan imports workers from the four boroughs of NYC and from Westchester, Long Island and New Jersey.

New York City, London, Chicago and now Shanghai – have all developed as densely and as rapidly as the technology of transport allows. People want to get to work in about 30 minutes. Rail allows the dispersion of population, and permits wide choices in housing. The core of Manhattan attracts both the corporate CEO, and the building service worker, because transit permits all to have low cost access.

### **MASS TRANSIT AS A KEY ELEMENT TO A SUSTAINABLE NEW YORK CITY**

There are currently 2.1 Billion riders per year. With automobile only, the environmental impact of this scenario would cripple NYC. It would produce 94 million lbs. carbon monoxide, 14 million lbs. Hydrocarbons and 1.5 million lbs. of soot. MTA NYCT is committed to building a sustainable mass transit system where our needs are met without compromising the **needs of future generations**. NYCT is designing to uphold and exemplify sustained ecological, economic and social value. Design for the Environment (DfE) at NYCT is striving to uphold sustainability and influence the public to invest and embrace green design. In the 21st C. we couldn't talk about development without talking about sustainability – environmental sensitivity. New York, London, Chicago, Shanghai are cities that are cities of transit and tall buildings.

!

At NYCT, Sustainable Design / Design for the Environment Guidelines were issued in August 2000. The pilot projects identified were Grand Avenue Bus Depot, Stillwell Ave Terminal Station, Roosevelt Ave Inter-modal Station Rehabilitation, Corona Maintenance Facility, Lower Manhattan Transportation Improvement Projects: Fulton St. Transit Center & South Ferry Terminal Project and the new Second Avenue Subway.



Recently completed NYTC's Stillwell Terminal in Coney Island, Brooklyn with PV roofing that generates electricity for the station's needs.