PART I: NEW YORK TODAY

THE TRANSPORTATION CHALLENGE:

As New York prepares to meet the challenges of the 21st century, the issue of transportation looms large. For the past hundred years, New York City's transportation networks have dictated our centers of population growth, guided our industries and businesses and shaped our city. Shipping built early New York. Turn of the century ferry service along the Hudson and East Rivers fed and was fed by development in Downtown Brooklyn, Lower Manhattan and New Jersey. In the early 1900's, subway construction spurred residential development in the farmlands of the Bronx, Queens and Brooklyn.

Evening rush at the Broadway Junction Station, a key transfer point in eastern Brooklyn. Image source: NYC Dept. City Planning

Our region's railroads, subways, parkways, thruways, expressways and highways were all built to facilitate movement of people and goods into, around, and through the city. Our patterns of development have always been shaped by our ability to get there.

However, until recently, underinvestment in transportation expansion and innovation, and insufficient maintenance and repair of roads, tracks, highways and bridges has meant that we have been unable to keep our transportation networks growing to match our city's changing demographics. The last major bridge built in New York City was the Verrazano Narrows Bridge in 1964. The last limited-access highway segment in New York City to open was the northern portion of the West Shore Expressway in 1976. It has only been in the last decade, as more and more of the subway system has returned to a state of good repair as a result of the Metropolitan Transportation Authority's (MTA) 1982 Capital Program, that the city and MTA have been able to seriously pursue network expansion. Prior to the most recent 2nd Avenue Subway groundbreaking in 2007, the last significant system expansion was the extension of A Line service to Ozone Park and the Rockaways in 1956. The express tracks and the 57th Street station along the 6th Avenue Line were completed in 1968.

The city's financial crisis in the 1970's accelerated the decline of our transportation infrastructure. In 1973, a cement truck fell through the West Side Highway at Gansevoort Street, causing the closure of the entire highway, dramatically illustrating the extent of the city's infrastructure problems. In order to stem this tide of decay, many of the agencies and authorities responsible for New York's transportation networks focused solely on repairing the damage done throughout the 1960's and 1970's. In 1981, the MTA "halted all new transit expansion until the existing system could be restored."[1] Two projects, the Archer Avenue Extension and the 63rd Street Tunnel were well underway by 1981 and

1 Office of the Mayor of the City of New York, "2030 PlaNYC Transportation Technical Report;" The City of New York, Presented 22 April, 2007, p.75

Morning rush hour at Union Square, a major Manhattan transfer point.
NYC Dept. City Planning

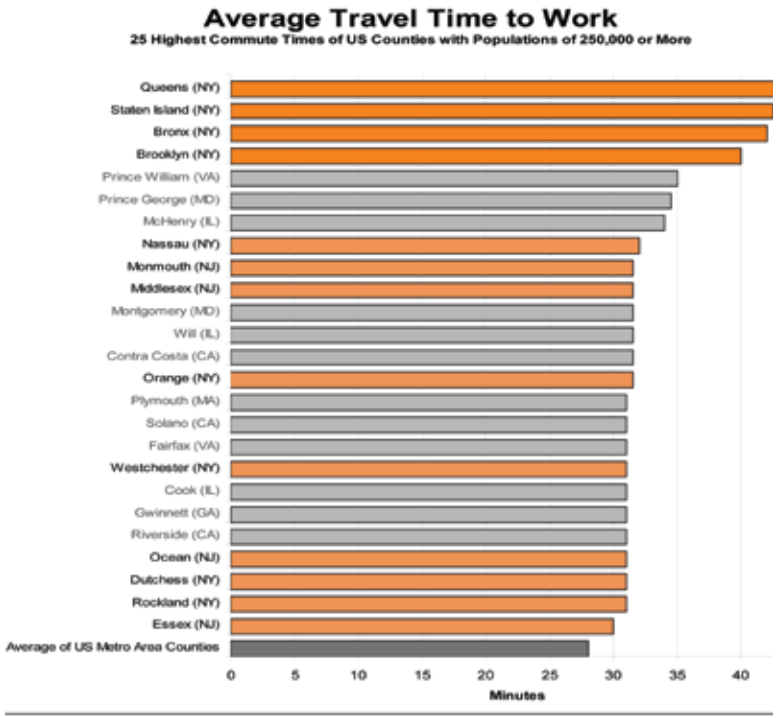
were allowed to continue. In 1988, an emergency closing of the Williamsburg Bridge convinced then-Mayor Koch to embark on a major infrastructure rehabilitation program, one that has been funded by every administration since.[2]

Today the city's and MTA's attention to maintenance and repair work is paying off. New Yorkers who have access to mass transit systems tend to use them. Ridership rates are higher than they have been in half a century. While a full "State of Good Repair," including new track signals and renovated stations is still $15 billion away, the condition of New York City's roads, rails, highways and bridges has improved dramatically. But, New York City's rapidly growing population poses a new set of challenges. New options are necessary to meet the city's growing needs.

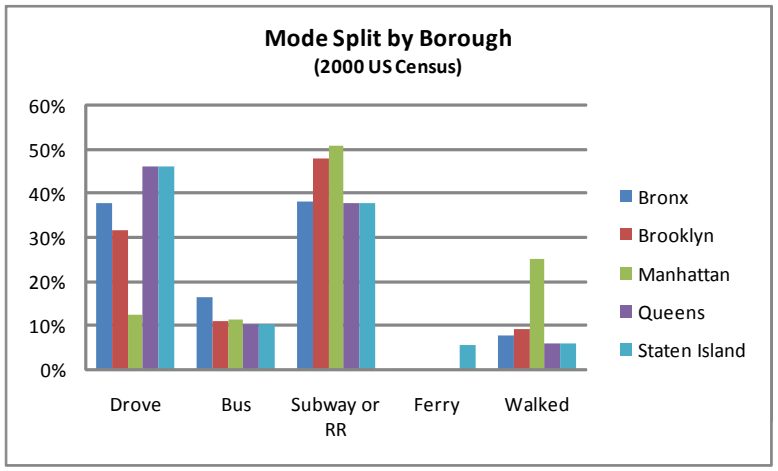
The Congestion Challenge:

Traffic and transit congestion are nothing new to New York City. Concerns about congestion and its impacts on the city's economic health have been ongoing since the Second World War. Many everyday features of the street landscape—parking meters, municipal parking lots, one-way streets, and "progressively" timed traffic signals—were introduced to New York City as early as the 1960's in attempts to reduce congestion.[3] In the early 1960's, the Daily News arranged a contest to test congestion levels in midtown Manhattan by pitting a bus, a taxi and a pedestrian against each other, going crosstown in rush hour traffic, a race which, "the pedestrian won hands down."[4]

Today, the people of New York and the surrounding counties face longer commute times than much of the rest of the country. The residents of Queens County have, on average, the longest commute times of residents of any of the 231 counties in the US with populations over 250,000 people. Richmond County/Staten



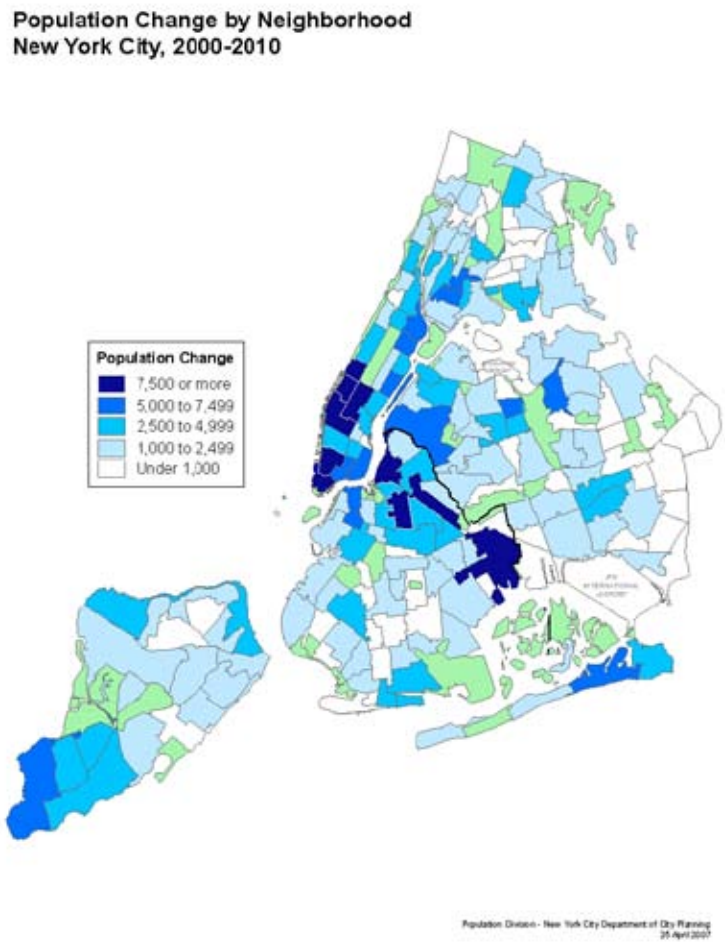
The four counties with the highest commute times in the nation are Queens, Staten Island, the Bronx and Brooklyn. These boroughs are are home to 6.6 million New Yorkers or 80% of New York City's population. Data is from the 2000 US Census.



2 Buettner, Russ & Sewell, Chan, "In Ways Large and Small, Many Bridges Meet the Definition of Deficient;" The New York Times, 3 August, 2007

3 Stern, Robert, et al., New York 1960: Architecture and Urbanism between the Second World War and the Bicentenial; The Monacelli Press, 1997, p.21

4 ibid., p.24



Significant population growth is projected for all five boroughs. Particularly in Brooklyn, Queens and Staten Island, existing transportation infrastructure is insufficient to meet the upcoming demand. NYC Department of City Planning, Population Division.

Island (ranked #2), Bronx County (ranked #3) and Kings/ Brooklyn County (ranked #4) are just slightly better. New York City's nearby suburban counties, Nassau (ranked # 8), Orange (ranked #9), Rockland (ranked #15), Dutchess (ranked #16) and Westchester (ranked #21) also have commute times among the worst in the nation. In neighboring New Jersey, Middlesex (ranked #13), Monmouth (ranked #14), Ocean (ranked #17) and Essex (ranked #25) also fall into the top 25 worst commute times nationwide. All told, 13 of the 25 counties with the worst commute times in the country are in or around New York City.[5]

New York's increasing population means that our fight against congestion is about to get tougher. New York City stands to gain almost 1 million people in the next 20 years. This projected population growth will increase the strain on transportation services many of which are already at or nearing capacity.

Our ability to increase capacity on our transportation systems is limited by the space available and the trades-offs inherent in the allocation of that space. The elevated or depressed highways built throughout the 1940's, 1950's and 1960's to increase the city's transportation capacity often isolated communities. Many of these highways cut off access to city's waterways reducing options for water-transportation. In a 2007 Rudin Center conference on freight and mobility, Astrid Glynn, the New York State Department of Transportation (NYSDOT) Commissioner likened available right-of-ways with capacity to spare to "endangered species;" not many left and going fast.[6]

Nor is building new rights-of-way an easy option. Transportation projects, like all infrastructure projects, are costly and complicated. In New York, most transportation infrastructure projects would run through areas where people live. Much of the city is already extremely densely developed. Excluding Staten Island, New York's overall population density is just shy of 48,000 people per square mile. The city is spread over four distinct land masses, separated by significant waterways, which limits options to build new roads at grade or lay new track for trains and subways. Tunnel and bridge construction for new subways, additional lanes for freight or bus service, all require trade-offs with other uses.

5 Office of the Mayor of the City of New York, "2030 PlaNYC;" The City of New York, Presented 22 April, 2007

6 Glynn, Astrid. NYSDOT Commissioner and Keynote Speaker at "Delivering the Goods: The Freight Needs of a Growing Population;" Symposium hosted by the Wagner Rudin Center (6 May 2007)

Lastly, transportation planning in New York City happens in a rich and complex environment of inter-connected jurisdictions. Transportation planners and advocates work within or alongside a bureaucratic structure that encompasses multiple agencies, city, state and federal regulations, and requires communication across state boundaries. Nor is New York City's best interest always clear. For example, commuters from New Jersey or Long Island or Connecticut are important and positive contributors to both the city and regional economy but also add to New York City's traffic congestion. These overlapping jurisdictions, competing priorities and complex authority structures mean that change can be difficult to negotiate.

Subway Congestion:
Subway congestion affects many New Yorkers. The city's subways run at 85% capacity during their busiest hour, which causes delays on all lines.[7] Subway lines serving neighborhoods with recent population booms are often the most congested. For example, population booms in the Bronx and along Manhattan's east side have increased ridership on the 4, 5 and 6 trains, which are already some of the most congested lines in the city. According to recent MTA figures, the 2, 3, 4, and 5 lines all operate at 100% capacity during peak hours and most of those cars run at more than 100% capacity during their busiest hour.

To meet these challenges, the MTA is exploring extending the length of train platforms to accommodate longer trains, and expanding a computerized signal system that would allow them to run more trains closer together.[8] A pilot bus-rapid-transit system (BRT), called "Select Bus Service," is also being implemented along certain routes in each of the five boroughs.[9]

7 Naanes, Marlene; "Subway Sandwich: With some lines ready to burst, TA looks into easing overcrowding," AM New York, 26, June 2007, p.3
8 Neuman, William, "Some Subways Found Packed Past Capacity;" The New York Times, 26 June 2007
9 MTA/NYCT Website, "What is BRT?" (http://www.mta.info/mta/planning/brt/whatis.htm); Accessed 11/09/07

Almost all of Manhattan is within a ½ mile of a subway station, however, large swathes of the other four boroughs are not served by the subway system. NYC Dept. City Planning.

While some of these congestion reducing measures, such as Select Bus Service can be implemented relatively quickly, others like platform extension, new subway line construction and implementation of computerized signals are costly and time consuming. The first phase of the 2nd Avenue Subway, which is expected to reduce some crowding on the 4, 5 and 6 lines, is estimated at $3.9 billion. This phase, which will run from 96th Street to 63rd Street, is slated for completion by 2015.[10]

Traffic Congestion:
New York's growing population also means increased congestion on our city's roads and highways. As with subway congestion, the costs of traffic congestion link our economy, our environment

10 MTA/NYCT Website (http://www.mta.info/capconstr/sas/index.html); Accessed 11/09/07

and our health. A 2002 Urban Mobility Report by the Texas Transportation Institute (TTI) found that nationally, drivers in the United States wasted 658 million gallons of fuel in 2000 just by sitting in traffic.[11] According to TTI, the yearly financial cost of that congestion comes to $78 billion in lost productivity and wasted fuel.[12]

Traffic congestion limits the ability of distributors and retailers to bring goods into New York which can harm the city's overall economic competitiveness of the city in the region, country and world. Delays caused by congestion can cost freight operators between $144 and $192 per hour per truck.[13] These costs are passed onto consumers in the form of higher prices and reduced options. As New York's population grows, so too will demands on goods and services. As the capacity of New York's rail infrastructure is largely fixed, increased goods demand will further increase congestion. Data also indicates that the volume of goods movement has been growing at a faster rate than population, meaning that our consumption rate and related traffic congestion may be growing even faster than our rapidly increasing population.[14]

Data from the NYC Department of Transportation (NYCDOT) shows that the number of hours of heavy congestion on the city's bridges and tunnels has almost doubled since 1990. In addition, the rush hour "peaks" have expanded dramatically. In 1990, the hours of "heavy" congestion were between 7am and 9am and again between 3pm and 7pm. In contrast, today heavy congestion during rush hour starts at 6am and goes until 10am and starts back up again at 2pm and goes until 8pm.[15]

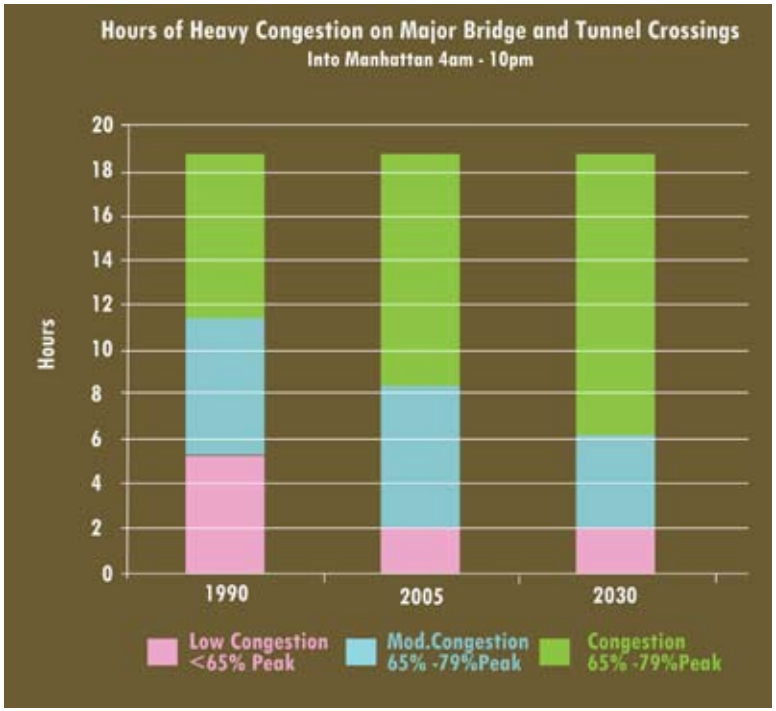
11 Astrid Glynn, NYSDOT Commissioner, keynote speaker at the NYU Wagner Rudin Center freight symposium, "Delivering the Goods: The Freight Needs of a Growing Population." May 6th 2007

12 Shrank, David & Tim Lomax, "2007 Urban Mobility Report," Texas Transportation Institute, September 2007, p.5

13 Office of the Mayor of the City of New York, "2030 PlaNYC Transportation Technical Report;" The City of New York, Presented 22 April, 2007, p.22

14 "Panel 2: Challenges and Next Steps," NYU Wagner Rudin Center freight symposium, "Delivering the Goods: The Freight Needs of a Growing Population." May 6th 2007

15 Office of the Mayor of the City of New York, "2030 PlaNYC;" The City of New York, Presented 22 April, 2007; Congestion p.7



Transportation and population projections indicate that, without intervention, New York City's traffic congestion will get worse over the next 20 years. Data is taken from 2030 PlaNYC Transportation report.

Traffic congestion also contributes to poor air quality and reduced health outcomes in our city's neighborhoods. According to PlaNYC 2030, in 2005, vehicles driven in New York City produced 11% of the city's locally-generated soot (PM 2.5), 52% of its nitrogen oxide (NOx) and 32% of its volatile organic compounds (VOC) emissions, all of which have been found to produce smog and contribute to asthma rates.[16] In 2000, children in New York City were twice as likely as children elsewhere in the country to be hospitalized for asthma.[17]

16 Office of the Mayor of the City of New York, "2030 PlaNYC: Air Quality;" The City of New York, Presented 22 April, 2007; p.122

17 Garg, Renu, et al., "Asthma Facts: 2nd Edition;" NYC Department of Health and Mental Hygiene, 2003, p.7

Our elected officials, the MTA/NYCT and NYCDOT recognize their roles in meeting these challenges. PlaNYC 2030 proposed innovative solutions to New York's congestion issues. City and state agencies and authorities are putting these proposals into action. New York City Transit (NYCT) and the MTA are introducing hybrid buses to their joint bus fleet. In addition, NYCT plans to put an additional 850 hybrid buses on the road over the next two years, bringing the total number of hybrid city buses to around 1,000.[18] The Select Bus Service system will increase the speed and capacity of buses on some of the city's most congested routes.[19] Working with the Mayor, the Taxi and Limousine Commission recently passed legislation requiring all black car vehicles to have in-city driving efficiency of at least 30mpg.[20] Other options, such as cleaner fuels, progressively priced parking, and alternative energy sources are also under consideration to meet the rest of New York City's passenger and freight transportation needs.

The Flooding Challenge:

The city's congestion problems are exacerbated in bad weather. Road flooding slows traffic and increases the risk of accidents. Standing water on streets erodes road surfaces and can cause potholes to form. In the winter, standing water can freeze and create hazardous driving conditions. Especially at intersections, flooding makes crossing streets difficult for pedestrians and bicyclists. Although often considered the purview of the Department of Environmental Protection (DEP) or the Department of Sanitation (DSNY), these water management issues are also transportation issues because they limit people's ability to move about the city. As a result, implementing practices that better manage rainwater is a crucial part of transportation planning and an important component of PlaNYC.

18 Staff, "Manhattan: More Hybrid City Buses;" The New York Times, 25 October 2007

19 NYCDOT Website;" Select Bus Services;" (http://www.nyc.gov/html/dot/html/ferrybus/selectbusservice.shtml); Accessed 9/308

20 NYC Taxi and Limousine Commission Website, "TLC Unanimously Approves Regulations Leading to a Cleaner, Greener New York City Black Car Fleet;" (http://www.nyc.gov/html/tlc/html/home/home.shtml); Accessed 9/3/08

Street flooding and ponding happen when rain from storms overwhelms drainage systems, either because the volume of water is too great, or because drains are clogged by debris. Rainstorms that drop significant amounts of rain over small time periods will overwhelm the city's sewers unless mechanisms are in place to detain the water and release it slowly at rates that the sewers can absorb. Impervious surfaces (for example, roads, buildings, parking lots or even highly compacted lawns) exacerbate the chance of roadway flooding by reducing opportunties for the water to seep into the ground. Water that cannot seep into the ground is channeled into the city's sewer system increasing the amount of water any given drain must handle.[21]

Heavy rains and poor water management practices cause flooding and traffic delays on New York City's roads and highways, as well as interrupting subway service. Image used with permission of NYC Office of Emergency Management.

To address these issues, city agencies such as the NYC Department of City Planning (NYCDCP), NYCDOT, and DEP have worked closely to develop new standards and regulations.

21 NYC Department of Design and Construction and Design Trust for Public Space, "High Performance Infrastructure Guidelines," New York City Department of Design and Construction, October 2005, P.12

Recent amendments to the city's Zoning Resolution regarding landscaping and maneuverability requirements for commercial and community facility parking lots, paving and planting in residential front yards and encouraging tree planting are designed to increase pervious surface cover.[22]

Global warming and climate change mean that rain storms may become more common in New York. Customized projections performed for DEP by the Columbia University Center for Climate Systems Research and the NASA Goddard Institute for Space Studies indicate that the city is likely to see a 7.5% to 10.0% increase in precipitation by 2080.[23]

Annecdotal evidence from the past year underscores the seriousness of those projections. The April 2007 Nor'Easter closed down New York's highways, delayed subway and railroad service and flooded local roads throughout the city.[24] Four months later, on August 8th, 2007, another storm dropped 1.7 inches of rain on the city over the course of an hour shortly before rush hour.[25] The resultant flooding disrupted all commuter rail services, flooded major streets like Queens Boulevard and Flatbush Avenue and shut down every subway line in the city.[26] A MTA sign reported upon by *The New York Times* read, "No trains at this time: 1, 2, 3, 4, 5, 6, N, R, S, Q, W, V, F, L, J, 7 to Queens."[27]

Differences in topography make flooding a more serious problem for certain areas of the city. In particular, low lying portions of southern Staten Island, southeastern Queens and southern Brooklyn are particularly hard hit by flooding after storms.[28]

22 NYC Department City Planning, "Green Initiatives;" (http://www.nyc.gov/html/dcp/html/green_initiatives/index.shtml); Accessed 8/8/08

23 NYC Dept. Environmental Protection, "PRESS RELEASE: NYC DEP Releases its Climate Change Assessemnt and Action Plan;" New York City Department of Evironmental Protection, 6 May, 2008

24 Staff, "Worst Expected to Be Over After April Nor'Easter Pounds the City;" New York 1, 15 April, 2007

25 Barron, James, "A Sudden Storm Brings New York City to Its Knees," The New York Times, 9 August, 2007

26 ibid.

27 ibid.

28 Street flooding also poses severe environmental problems such as excess storm runoff triggering the city's 460 combined sewer outfalls (CSOs). In the "Sustainable New York" Report released in 2006 by the Design Trust for Public Space, "combined sewer outfalls in New York City flood during half of all rainstorms, discharging approximately 27 billion gallons of wastewater in an average rainfall year." The water that is released into New York's waterways after storm events is contaminated by oil, chemicals, pesticides, and chemical fertilizers from roadways as well as raw sewage from the city's households and businesses (human wastewater) which contains bacteria and viruses. According to Riverkeeper, "on average CSO events occur about once per week (and as often as 70 times per year at some outfalls) and the average weekly polluted discharge is about 500 million gallons Citywide." Exploration of best management practices and the creation of a Best Practices Task Force to deal with water quality issues are included in 2030 PlaNYC.

The Information Challenge:

The impacts of congestion, weather and delays are made worse when drivers, riders and mass transit users lack information about road conditions and mass transit services. Insufficient communications systems exacerbate service interruptions because emergency service outage and re-route information cannot be communicated to riders or employees. To provide routine information, the MTA website provides weekly updates about service changes. Emergency text message service alerts have recently been introduced. However, many forms of subway information, such as in-station announcements or paper signs, are still only available once users are already in the system, making it difficult to plan alternative routes that avoid delays or congestion.

Increasing the quality of transit information, as well as the introduction of new communication technologies into the city's transit system, is hampered by a number of physical and financial constraints. These include the system's aging subway signal infrastructure, limited capital funds, and the sheer size of the transportation system. Improvements have been slowed as a result of a struggle to balance priorities. For example, an MTA plan to upgrade the subways' public address systems by 2009 stalled in 2005 during budget revisions.[29] Instead, priority was given to an equally important project that would install computer systems to track the location of all trains and their arrival times at stations.[30]

29 Smerd, Jeremy, "Inaudible Announcments in Subways Are Endangering Riders, Critics Say;" The New York Sun, 21 September, 2005

30 ibid.

Ripped service announcement signs at 125th Street A/C/D/B platform. NYC Dept. City Planning

Overall, the clarity of subway announcements has improved dramatically over the past decade. In 1998 the Straphangers Campaign found that "in 78% of the delays and service disruptions experienced by surveyors, there was either no announcement or an inaudible, garbled or useless one."[31] Today, the most recent 2006 Straphangers report found that on average, 90% of all subway announcements were accurate and clear.[32] In the subways, the use of pre-recorded announcements which identify upcoming stations and transfer opportunities may be responsible for the improvement.

31 NYPRIG Straphangers Campaign Website, "Say What? A Summary of Subway Car Announcements;" (http://www.straphangers.org/announcements/summaryano.html); Accessed 11/09/07

32 NYPRIG Straphangers Campaign, "State of the Subways Report Card 2007," New York Public Interest Research Group Fund, Inc., Summer 2007

Further enhancements in public address and information systems are however still needed, especially in the case of unexpected service changes and emergencies where pre-recorded messages are not applicable. Real-time information technology, which is widely used in other parts of the country, such as Washington DC, Denver, and San Francisco and other cities in the world, such as Shanghai, London, Berlin, and Paris, has recently been introduced in New York to help address these issues. Accurate real-time information systems, such as variable message boards (VMBs), web-based or wireless-based service alerts or schedule information, or informational television screens such as those recently installed by LIRR in Penn Station, are powerful tools because they offer riders current information about wait times and delays, and unlike announcements, cannot be garbled or misheard. The information provided differs from pre-recorded messages because it is specific and time sensitive.[33]

VMBs are currently in use on the L line to widespread approval, and are being introduced on other lines in the city. The MTA recently announced plans to install VMB displays at eleven Manhattan bus stops, including those served by the M15 bus, the city's busiest route.[34] Under the new program, buses will communicate their locations via satellite to an information center in Brooklyn, which in turn will transmit a radio signal to the VMBs at the bus-stops.

33 Belson, Ken, "BlackBerry as Weapon In the Fight To Commute," The New York Times, 8 October, 2007

34 Neuman, William, "The Next Bus Will Arrive In Exactly..." The New York Times, 4, October, 2007

A passenger consults the new "Time-to-Next-Train" display at Union Square. NYC Dept. City Planning

Interactive web and wireless based route information services are an increasing part of the transportation information offerings in other cities and can increase transit use. For example, planners in Duluth, Minnesota, saw a 12% increase in bus ridership, and a related decrease in car use, after a Google trip-planner for buses was added to the transit authority website.[35]

The Infrastructure Challenge:

Infrastructure enhancements are typically thought of as large-scale construction of new roads, bridges, tunnels and track. However, relatively small changes to existing physical infrastructure and policies can produce significant transportation gains. In New York City, space for new transportation systems is at a premium. Infrastructure enhancements that boost the capacity of existing systems, for example by making it easier for transit users to move between modes, are particularly important.

35 Dolmetsch, Chris & Ari Levy, "Google May Start New York Transit Guide to Boost Ads (Update2)," Bloomberg.com, (http://www.bloomberg.com/apps/news?pid=email_en&refer=&sid=aSJjKd6PoqZg); Accessed 8/27/07

As New Yorkers already know, connectivity is the key to the sucess of our transit system. In July 1997, the introduction of the free transfer "gold" MetroCards unified the city's subway and bus systems and dramatically increased ridership. The free transfer MetroCard produced a 17% increase in bus ridership (over July 1996) and a 4% revenue increase.[36] This ridership increase came as a welcome change to 25 years of consistent declines in bus ridership (dropping from 781 million in 1970 to 436 million in 1996) and encouraged the MTA to purchase hundreds of new buses and hire new drivers.[37] In addition, many riders cited the free transfer option as their prime reason for switching from tokens to the MetroCard which, prior to then had been highly criticized and was not widely used.[38]

The New York City subway is already one of the most connected systems in the world. Other large systems, such as Beijing, Boston, London, Moscow, or San Francisco, have fewer lines and transfer points and the walk between stations can easily be over a mile. Increasing that connectivity, especially in the outer boroughs is particularly important, as current transportation trend research indicates that most New Yorkers work in the borough where they reside.[39] Developing exisiting connections to other modes of transportation such as ferries, buses and bicycles, is one of the city's primary infrastructure challenges.

Access to the city's waterways, which are largely untapped potential transportation resources, is particularly challenging. For years, planning practice turned away from New York's rivers, separating them from the city with highways and train tracks. Today, as a result, potentially congestion-reducing transportation systems like ferries are difficult to realize because the waterfront is remote and hard to reach. Most of the city's

36 Newman, Andy, "Free Transfers in Bus Ridership Rise;" The New York Times, 19 September, 1997

37 McFadden, Robert, "As Ridership Increases, Officials Seek More Buses;" The New York Times, 11 October, 1997

38 Pierre-Pierre, Garry, "Swipes Gain on Plunks as MetroCard Takes Off;" The New York Times, 30 June 1997

39 NYC Department of City Planning, "Peripheral Travel Assessment," New York City Department of City Planning, 2008

ferry operators provide private bus services to their landings in order to encourage use.

Creating more safe bicycle routes and options secure bicycle parking are also ways to extend the reach of the city's existing transit network. NYCDOT has been particularly agressive on this front building over 60 miles of bike lane in 2007 alone and testing out new protected bike lane models to increase safety. In partnership with MTA/NYCT, NYCDOT is also looking to install more bike racks at major transit stations to encourage multi-modal commuting and has released designs for new city bike racks. Efforts from private sector to build secure bicycle parking facilities also play a role, increasing transportation options for all New Yorkers.

NYCDOT's new protected bike lane on 9th Avenue in Manhattan. NYCDOT

A second infrastructure challenge is increasing carrying capacity and speed of existing transit systems like subways and buses. Current track and signal upgrades are intended to increase the number of trains that serve a given station over the course of day but will not be completed for many years. Recent MTA proposals to remove seats and modify the interiors of rush hour subway cars are an attempt to address these issues now.

For the city's buses, increasing speed is a primary issue. Buses are particularly important because they often serve to connect subway lines, and are the prime mode of public transit in many neighborhoods that lack subway service. But buses tend to get stuck in traffic or bunch together, dramatically reducing their appeal and viability as real transit options. In 2005, bus ridership fell by 0.55% or close to 4 million riders, despite overall ridership increases across the system.[40] NYCDOT's Select Bus Service is designed to address these issues.

Access to and travel within the subway system itself is a third infrastructure challenge. The 2005 American Community Survey (ACS) indicates that about 673,000 New Yorkers (9% of the total population) have a physical disability that could impair movement.[41] At present, 53 New York City subway stations are wheelchair accessible; that number will increase to 100 by 2020. The number of wheelchair accessible stations limits access in many areas. For example, for Brooklyn residents, there are no wheelchair accessible stations on the L train between 14th Street/ Union Square and the end of the line at Canarsie/Rockaway Parkway.

In December 2007, the MTA announced a proposal to invest $1.3 million to develop an automatic monitoring system which would send a message to a central dispatch location for elevator and escalator mechanics.[42] A pilot program that monitors 44 elevators is currently in place.

40 Metropolitan Transit Authority, "2005 Annual Report," Metropolitan Transit Authority, p.10
41 American Community Survey, 2002 & 2005
42 Neuman, William; "MTA Rapid Response Plan for Elevators and Escalators," The New York Times, 17 December 2007

Looking Outward, Looking Ahead:

New York today faces the challenges of growth: housing supply and affordability, health, environmental protection and economic development. Our ability to meet the demands of our growing population depends in many ways on the state and future of our transportation systems, for our transportation infrastructure links our city. Transportation brings people, services and goods into our neighborhoods, connects workers to jobs and residences, offers residents and visitors alike access to stores, restaurants, theatres, cultural institutions, parks and public amenities.

The challenges we face are not unique to New York City. Population growth, globalization, rising oil and gas prices, and climate change all force the issue of ensuring safe, efficient, accessible and environmentally friendly transportation systems to the front and center of public debate in cities across the globe. Today, planners, policy makers, citizens and entrepreneurs from every nation are working to meet these challenges. While every city has different economic, political and physical constraints, the lessons learned in Shanghai, in Bogota, in Portland, and throughout Europe can shed light on transportation opportunities in New York.

This report looks outward and forward, beyond the boundaries of our five boroughs to harness that energy and gather together case study examples of ways other cities have approached their transportation challenges. Working within the vision laid out in the Mayor's PlaNYC 2030 report, this World Cities Best Practices in Transportation report can help prepare New York for the challenges and opportunities the future holds.

CONNECTIONS AND CAPACITY:

THE INTEGRATED MOBILITY FRAMEWORK

Reducing traffic and transit congestion and developing our transportation networks to meet the demands of our growing population are New York City's two largest transportation challenges. Our ability to meet these challenges is constrained by limited space and insufficient funds. Large scale subway upgrades, like the 2nd Avenue line or signal upgrades (to allow for increased headways or platform information systems) are immensely expensive, and their completion dates are far in the future. Other new subway proposals which could increase transit access in the Bronx, Brooklyn, Queens and Staten Island would require extensive land acquisition and potential residential relocation.

Integrated mobility is a transportation framework that provides a different approach to New York's twin congestion and growth challenges. It posits that, in conjunction with buiding new infrastructure, coordinating existing systems can help to increase transportation capacity in the short term. Cities like Hong Kong, Bremen and Toronto have created overlapping networks of transportation modes (subways, buses, streetcars, bike-shares, car-shares, etc.) linked by easily accessible real-time information systems. These integrated mobility efforts have substantially improved transportation networks and increased capacity and ridership.[43]

Integrated mobility strategies encourage cities to focus resources on coordinating existing systems and introducing new infrastructure in ways that can increase connectivity, and thus the capacity, of the system as a whole. For a city like New York, which already has tremendous amounts of transportation infrastructure in place, an emphasis on integration may help direct us toward congestion reduction

43 Much of the literature about integrated mobility has been gathered by Moving the Economy, a partnership between the city of The City of Toronto, Transportation Options and the Federal Government of Canada. Their website is: http://www.movingtheeconomy.ca/content/mte_about.html

The Hiawatha Line (Route 55) station map in Minneapolis also indicates bus transfer and park-and-ride points along the route. This simple feature encourages public transit use by ensuring that users know their transit options. NYC Dept. City Planning

solutions that are relatively quick to implement, cost-effective and do not interfere with other long term infrastructure improvements.

The increased connectivity made possible by integrated mobility strategies can help cities like New York hone and maintain their competitive edge in the world economy. As Susan Zielinski, an integrated mobility advocate, argues, increased transportation connectivity means that people can to do more in a 24 hour day, increasing economic productivity as well as personal happiness and well-being. In an article for the National Academy of Engineering's journal, *The Bridge*, Zielinski says, "on a typical day in Los Angeles, you may drive long distances at high speeds to fit in three meetings. In Bremen, Germany, a more accessible place, you may be able to fit in five meetings and a leisurely lunch, covering only half the distance at half the speed and for half the price."[44]

44 Zielinski, Susan, "New Mobility: The Next Generation of Sustainable Urban Transportation," The Bridge: Linking Engineering and Society, National Academy of Engineering, Volume 36, Number 4, Winter 2006, p. 36

An advertisement for Bremen's "Eierlegendewollmilchsau," the multi-purpose transportation card. Image used with permission of Michael Glotz-Richter, City of Bremen

In some cases, increasing the connectivity of a city is simple. Increasing or modifying signage to reflect the full range of transportation options transit users have at their disposal, promoting bicycle- or car-sharing or providing secure bicycle parking at public transit stations can all increase transit use. Minneapolis, for example, increased the connectivity and ridership throughout the city by making multi-modal transfers easy; signage on the new Hiawatha Line (Route 55) streetcar lists connecting bus options and parking facilities available at each stop. In other places, increasing connectivity may require more investment, building new stations or new transit lines to physically connect existing modes.

One of the simplest and earliest examples of integrated mobility is Hong Kong's OctopusCard which linked a variety of public transportation services and fare systems with a single smart card.[45] The system was adapted in the 1990's to Bremen, Germany and more recently to Toronto, Canada. In Bremen, new *Mobile.Punkte* centers create a hub of services (traffic and route information, bike-shares and car-shares, taxis, bus stops

45 Zielinski, Susan, "New Mobility: The Next Generation of Sustainable Urban Transportation," The Bridge: Linking Engineering and Society, National Academy of Engineering, Volume 36, Number 4, Winter 2006, p. 33

and streetcar stations) making transfers between modes almost seamless.[46] As in Hong Kong, these transportation modes are tied together by a single electronic card that is a combination bank card, fare-card and key for car-sharing programs. The card is marketed as an "eierlegendewollmilchsau" or "egg-laying-wool-milk-sow." Its name is meant to convey the idea that the card allows you to do essentially everything.[47]

Moving the Economy, a partnership between the City of Toronto, Transportation Options (a non-governmental organization) and the Federal Government of Canada, describes an integrated mobility scenario like this:

> "If you were living in Bremen, Germany, you might be hankering for an espresso right around now. So you call your friend Hans across town and you're on for a cup in half an hour. No need to deal with congestion or parking - you have the city at your doorstep with the most seamlessly connected transportation choices you could ask for.
>
> Since Hans needs to borrow your heavy duty floor sander, your best bet for getting there is a car-share vehicle. You book it on your cell phone as you saunter along the tree-lined, traffic-calmed street to the "Mobil Point" at the local church yard. That's where the car-share cars are parked. You wave your electronic smart card over the reader to get in, swing by home to pick up the sander, and off you go, headed for a similar Mobil Point near the café.
>
> To get home Hans has the sander now, so you don't need the car anymore. You head back to the Mobil Point, where cabs, bike parking, and frequent transit service are all waiting, and real-time traveler information tells you a tram is coming in three minutes that will deliver you practically to your doorstep."[48]

Transit data shows that Bremen's integrated mobility experiment has been a success. Bremen's integrated mobility efforts have maximized users' abilities to transfer within the system, further encouraging use. While driving is becoming increasingly popular throughout Germany as a whole, in Bremen transit usage has also steadily increased, rising from 114 million passengers/year in the greater Bremen region in 1997 to 121 million passengers/year in 2003.[49] In contrast to other areas in Germany, mode share in Bremen and the surrounding areas has remained stable. Overall, integrated mobility programs tend to grow quickly. Bremen's car-sharing program began in 1990 with 30 members. By 2004, the car-share program had 3,100 members.[50]

In 2004, Moving the Economy received grants from Government of Canada, the City of Toronto and other partnership organizations to develop Mobility HUBS in Toronto.[51] The first Toronto HUB, which opened in 2006, piloted an number of mobility features including bicycle storage facilities, a BikeShare station, a car share facility (called AutoShare), a taxi hotline, wireless hotspot, and bicycle and transit route maps.[52]

Overall, the Mobility HUB has been met with widespread customer approval. 88% of respondents in a Moving the Economy poll wanted to see the Mobility HUBS expanded around Toronto, citing the benefits of the system ranging from the "integration of fares between transit systems, easier connections and shorter waiting times, easy to find and read schedules...[easily accessible or on-site] bank machines, internet connectivity... [and the] availability of Bikeshare and AutoShare vehicles."[53] As in Bremen, the strength of Toronto's HUB system comes from its connectivity. Surveys found that Toronto transit users liked each individual aspect of the HUB system, but rated the combined benefits of the integrated, multi-modal system even higher than any of its parts.

46 Moving the Economy Website, "Bremen Case Study: Bremen's Integrated Mobility;" (http://www.movingtheeconomy.com/); Accessed 11/09/07
47 Glotz-Richter, Michael, "Moving the Economy: A Guided Tour of the Transport Integration Strategy of Bremen, Germany," Bremen Dept. of Building and the Environment, 2003(http://www.movingtheeconomy.com/); Accessed 11/09/07
48 Moving the Economy Website, (http://www.movingtheeconomy.com/); Accessed 11/09/07
49 Moving the Economy Website, "Bremen Case Study: Bremen's Integrated Mobility;" (http://www.movingtheeconomy.com/); Accessed 11/09/07
50 ibid.
51 Moving the Economy Website, (http://www.movingtheeconomy.com/); Accessed 11/09/07
52 ibid.
53 ibid.