5.0 Regional Analysis

This section discusses the level of congestion forecast for the entire NYMTC planning area in 2014 and 2040. Congestion levels in the New York metropolitan region are first benchmarked against congestion in other peer regions. Section 5.3 discusses performance measures derived from the forecasts. Section 5.4 presents the top congested corridors in New York City, suburban Long Island and the lower Hudson Valley. Finally potential mitigation strategies and access to regional airports are both considered.

5.1 Comparisons of Congestion

The NYMTC planning area is second only to the greater Los Angeles region (Los Angeles, Long Beach, Santa Ana) in terms of total population, but far exceeds the population density of any other metropolitan region in the country. Among the large peer regions shown in Table 5.1, the NYMTC planning area has the third lowest daily VMT per capita due mainly to high population density and high proportion of transit use.

Table 5.1 Comparison of Daily VMT per Capita and Travel Time Index

Metropolitan Area	2011 Population (million)	2011 Daily VMT/Capita (Freeway + Arterial)	2011 Travel Time Index
NYMTC Planning Area	12.4	15.7 (2014)	1.3 (2014)
Chicago	8.6	13.3	1.25
Philadelphia	5.4	14.9	1.26
Baltimore	2.5	17.9	1.23
Boston	4.3	17.9	1.28
Seattle	3.3	18.6	1.26
Los Angeles, Long Beach, Santa Ana	13.2	19.3	1.37
Washington D.C.	4.6	19.5	1.32
San Francisco Bay Area	4.1	20.1	1.22
Dallas-Fort Worth	5.3	20.3	1.26
Atlanta	4.4	21.3	1.24
Houston	4.1	23.1	1.26

Source: Texas A&M Transportation Institute, *2012 Urban Mobility Report* (all regions except NYMTC).

NYMTC's peer regions evaluate mobility and congestion performance measures as part of their federally-required CMPs; however, comparative performance measurement across regions is difficult given the many different measures and methodologies used to evaluate congestion. As a result, data from the Texas A&M Transportation Institute's Urban Mobility Report, an annual publication that assesses congestion in 101 urban areas across the country, was reviewed to provide a comparison of congestion to New York. Because congestion in the urban mobility report is estimated based on nationally available data, the comparison does not take into account any unique features of New York that do not show up in these data. Also, because the Urban Mobility report is calculated for metropolitan statistical areas (MSAs), the comparisons shown here include northern New Jersey and southwestern Connecticut.

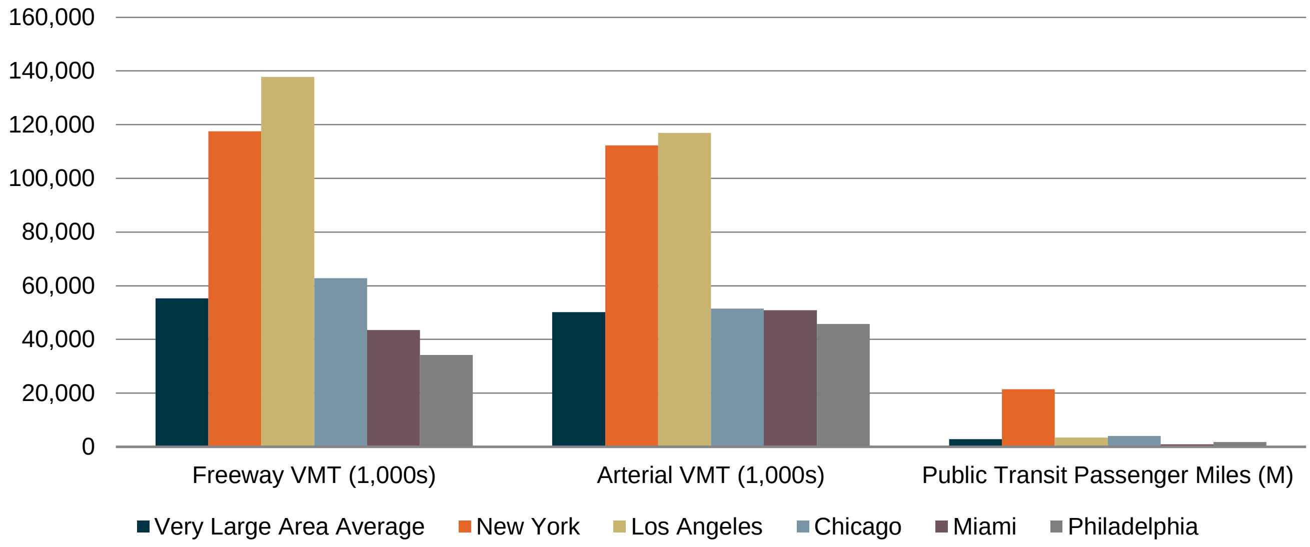
The comparisons are illuminating. The Urban Mobility Report provides estimates of travel, several metrics of overall congestion, plus specific analyses of the impacts of system operations and public transportation on congestion.

For the purposes of this analysis, we compared the New York metro area to other metropolitan areas in the 'very large' category, which includes MSAs with over 3 million residents. In 2011, there were 15 metro areas with over 3 million residents. All comparisons are for 2011.

Travel Estimates

In terms of total travel, only Los Angeles metro area exceeds the volume of travel experienced in New York and no other metro area comes close. The New York metro area has over 10 times the amount of public transit utilization as the average and more than 5 times the next closest, Chicago. Figure 5.1 presents the travel on freeways, arterials, and public transportation for the average of the very large areas and the top 5 travel markets.

Figure 5.1. Travel Volumes in New York and Comparable Metro Areas



Note: Very Large Area refers to a metropolitan statistical area with over three million residents.

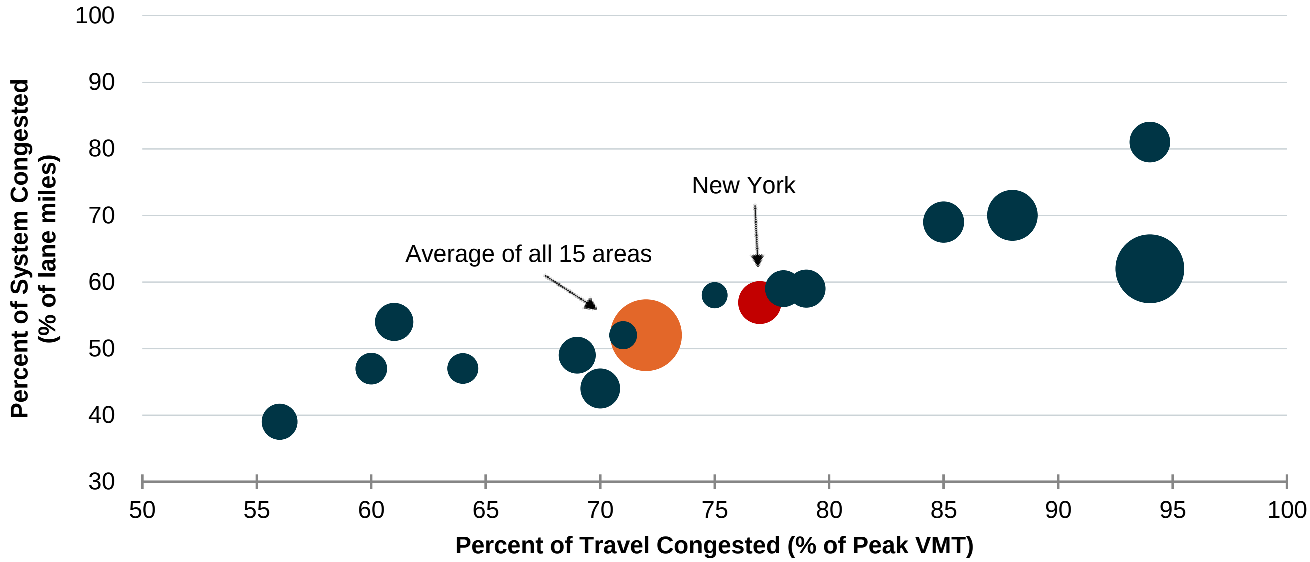
System Congestion

Figure 5.2 presents three indicators of total congestion for the 15 very large metropolitan areas:

- The percent of travel that is in congested conditions (x-axis);
- The percent of the system that is congested (y-axis); and
- Total delay (bubbles are sized based on total delay).

New York is shown in red and the average of all 15 areas is shown in orange. By percent of travel or system, New York is not the most congested area. However, because of the amount of travel, New York travelers experience the most delay (over 500 million hours per year), with only travelers in Los Angeles experiencing anything close to the level of delay.

Figure 5.2 Measures of Systemwide Congestion



Note: Bubbles are sized to total delay. New York is shown in red and the average of all 15 areas is shown in orange.

While total congestion is relevant for the overall economic and social impact that it has, travel time measured on a per person basis controls for the size and scale of the region. On a per person basis, commuters in the New York metropolitan region experience the fourth highest level of travel time per year according to the Urban Mobility Report data, with Washington, D.C., Los Angeles, and San Francisco metropolitan areas exceeding New York levels (Figure 5.3).

The extensive public transportation system in the New York metropolitan region is illustrated by the comparison of travel time index (TTI) and planning time index (PTI) (Figure 5.4). Where TTI is the ratio of travel time in the peak period to travel time at free-flow conditions. A Travel Time Index of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak period. The Planning Time Index is the ratio of travel time on the worst day of the month to travel time at free-flow conditions. A Planning Time Index of 1.80 indicates a traveler should plan for 36 minutes for a trip that takes 20 minutes in free-flow conditions (20 minutes x 1.80 = 36 minutes). The Planning Time Index is only computed for freeways only; it does not include arterial roadways. When a PTI is followed by a number, the number indicates a percentage of on-time arrival. PTI80, translates to the additional time required to ensure an on-time arrival 80 percent or 4 out of 5 times.

Figure 5.3 Per Capita Travel Time

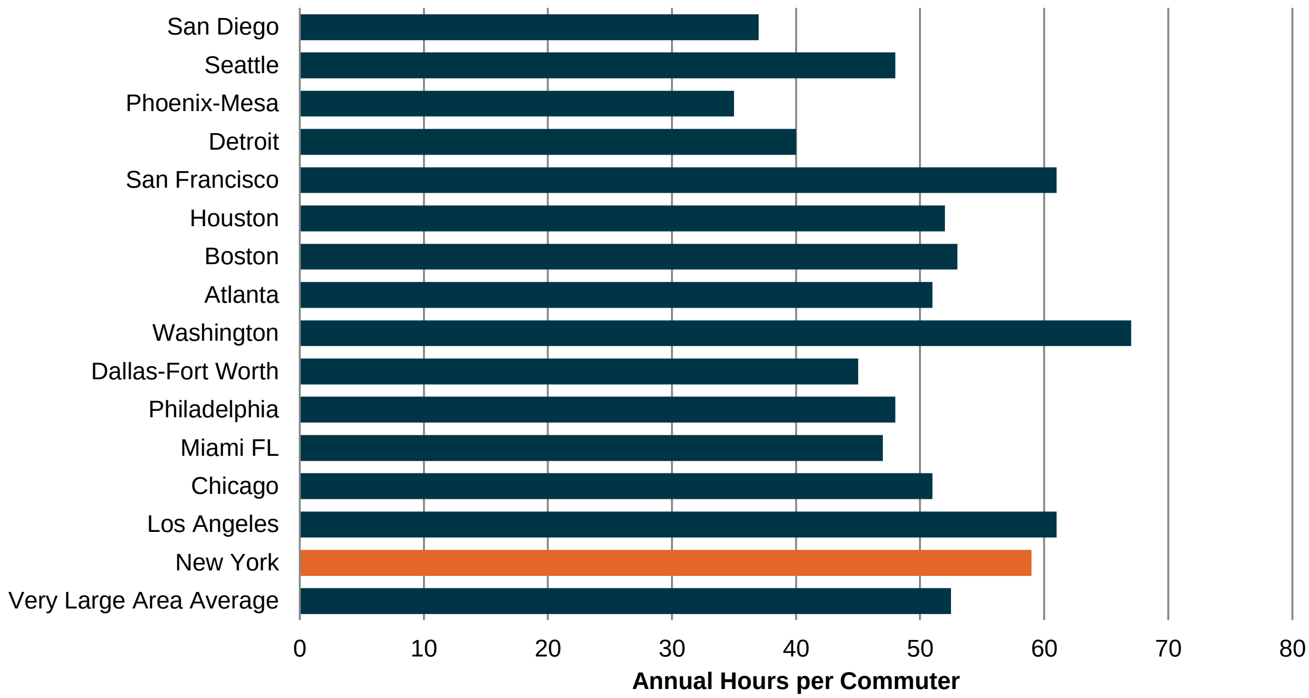
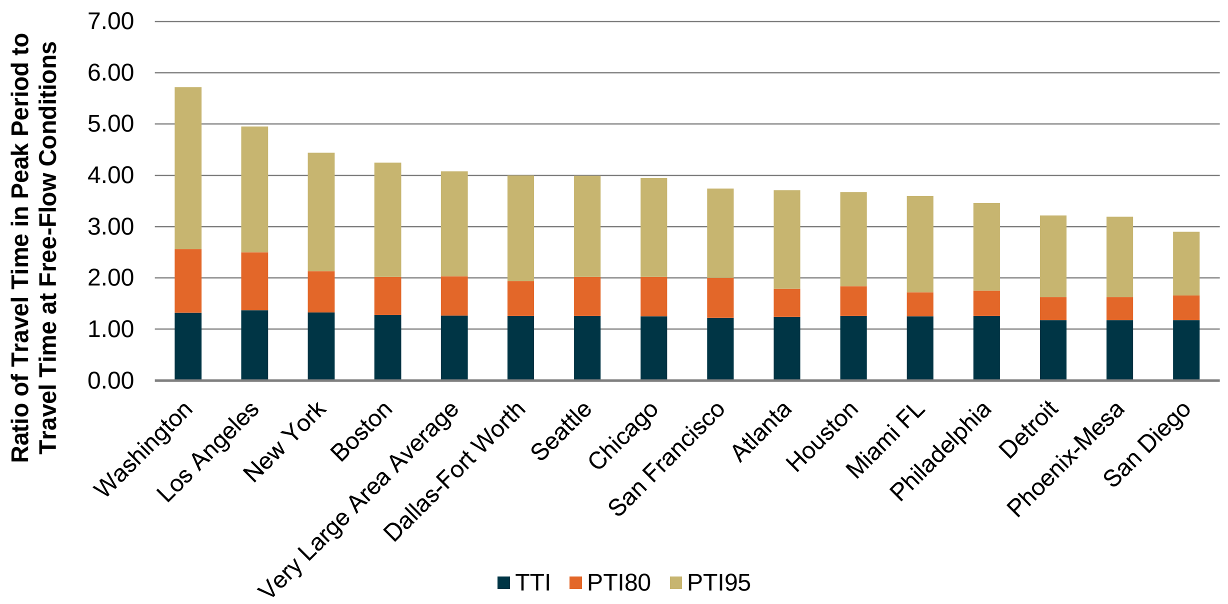


Figure 5.4 Comparison of Travel Time Indices Across U.S. Cities



Note: TTI is the ratio of travel time in the peak period to travel time at free-flow conditions. PTI is the ratio of travel time on the worst day of the month to travel time at free-flow conditions;

PTI80 translates to the additional time required to ensure an on-time arrival 80 percent or 4 out of 5 times. PTI95 translates to the additional time required to ensure an on-time arrival 95 percent.

5.2 Performance Measures

Tables 5.2 and 5.3 provide regional performance measures in the NYMTC planning area, by county, for the years 2014 and 2040. Table 5.4 provides a percentage difference of the two. The first two tables provide estimates by county and time period for the following measures:

- Lane miles of congestion (LMC);
- The travel time index (TTI);
- Daily vehicle miles traveled (VMT);
- Vehicle hours of delay (VHD);
- Person hours of delay (PHD);
- Vehicle hours of delay per one thousand miles traveled; and
- Daily person hours of delay per capita.

Lane miles of congestion appear to be consistently higher in the AM peak compared to the PM peak, across counties. This could be an indication of a sharp peak in the AM (e.g., significant traffic volumes in a single hour) compared to the PM, when volumes are spread more evenly across several hours. TTI estimates reflect the same pattern. The 2012 Urban Mobility Report provides some guidance for interpreting the values of the TTI. In the case of Very Large urban areas (greater than three million residents), , the minimum TTI value for a portion of an hour to be considered congested is 1.12. The average commuter suffered 6 hours of congested road conditions on the average weekday. Queens has amongst the highest vehicle and highway person hours of delay, followed by Manhattan and Brooklyn. Queens' high estimate for LMC is likely due to several very congested roadways that pass through the borough, including the LIE, the BQE, the Van Wyck Expressway, and the Grand Central Parkway. However, the Long Island counties exhibit the highest levels of VMT.

Across counties, VHD per one thousand miles traveled increase marginally between 2014 and 2040, as does daily person hours of delay per capita. Putnam County, however, is forecast to double both measures between 2014 and 2040, likely a result of the large growth compared to the relatively small base.

Figures 5.5 through 5.7 represent modeled VHD, PHD, and VMT, at a county level, for years 2014 and 2040.

Table 5.2 2014 Regional Performance Measures

	LMC		TTI (Weighted by VMT)		VHD	VMT	PHD	Vehicle Hours of Delay per 1,000 Miles	Daily Person Hours of Delay per Capita	Daily VMT/ Capita
Facility Type	**AM**	**PM**	**AM**	**PM**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**
New York City Boroughs										
Bronx	360	60	1.4	1.1	219,060	10,636,250	324,210	20.6	0.23	7.63
Brooklyn	810	470	1.5	1.3	732,080	14,960,260	1,083,480	48.9	0.4	5.9
Manhattan	530	440	1.9	1.3	875,580	9,470,560	1,295,850	92.5	0.8	5.9
Queens	1,320	320	1.7	1.1	1,264,240	26,356,540	1,871,070	48.0	0.8	11.6
Staten Island	60	20	1.1	1.0	61,550	5,581,650	91,100	11.0	0.2	11.7
Suburban Counties										
Nassau	580	330	1.2	1.1	510,440	32,784,990	893,280	15.6	0.7	24.3
Suffolk	140	320	1.1	1.1	251,060	39,731,990	439,350	6.3	0.3	26.0
Putnam	60	20	1.0	1.0	23,290	6,026,010	33,530	3.9	0.3	58.3
Rockland	80	20	1.2	1.0	258,290	8,067,290	371,930	32.0	1.2	25.4
Westchester	190	150	1.1	1.1	200,080	23,328,850	288,120	8.6	0.3	24.1
Region										
NYMTC Planning Area	4,130	2,140	1.3	1.10	4,395,660	176,944,390	6,691,910	24.8	0.6	15.7

D/C = Demand to Capacity; LMC = Lane Miles of Congestion; TTI = Travel Time Index; ATS = Average Travel Speed; VHD = Vehicle Hours of Delay; PHD = Person Hours of Delay; VMT = Vehicle Miles Traveled

Note: D/C = average Demand to Capacity for the particular facility type and period. The "0.8<=DC<=1" and "D/C>1" are the percent of travel that occurs in various conditions (somewhat congested and very congested).

Table 5.3 2040 Regional Performance Measures

	LMC		TTI (Weighted by VMT)		VHD	VMT	PHD	Vehicle Hours of Delay per 1,000 Miles	Daily Person Hours of Delay per Capita	Daily VMT/ Capita
Facility Type	**AM**	**PM**	**AM**	**PM**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**
New York City Boroughs										
Bronx	414	84	1.4	1.1	281,219	11,397,786	416,203.8	24.7	0.3	7.6
Brooklyn	1,006	536	1.7	1.3	959,497	16,225,594	1,420,056	59.1	0.5	5.8
Manhattan	594	587	2.1	1.4	1,164,879	10,702,575	1,724,021	108.8	0.9	5.8
Queens	1,498	393	1.8	1.1	1,670,197	28,011,559	2,471,892	59.6	0.9	10.6
Staten Island	91	54	1.1	1.1	126,574	6,319,429	187,330	20.0	0.3	11.4
Suburban Counties										
Nassau	747	441	1.2	1.1	697,930	34,553,560	1,221,378	20.2	0.8	22.7
Suffolk	255	460	1.1	1.1	374,847	45,453,222	655,982	8.2	0.4	25.4
Putnam	167	34	1.1	1.0	67,415	8,198,783	97,078	8.2	0.7	62.1
Rockland	195	68	1.3	1.1	454,119	10,055,092	653,931	45.2	1.8	27.7
Westchester	331	363	1.1	1.1	317,228	27,840,339	456,809	11.4	0.4	24.6
Region										
NYMTC Region	5,299	3,021	1.3	1.12	6,113,906	198,757,939	9,304,681	30.8	0.7	15.9

D/C = Demand to Capacity; LMC = Lane Miles of Congestion; TTI = Travel Time Index; ATS = Average Travel Speed; VHD = Vehicle Hours of Delay; PHD = Person Hours of Delay; VMT = Vehicle Miles Traveled

Note: D/C = average Demand to Capacity for the particular facility type and period. The “0.8<=DC<=1” and “D/C>1” are the percent of travel that occurs in various conditions (somewhat congested and very congested).

Table 5.4 Percentage Difference between 2040 and 2014 Regional Performance Measures

	LMC		TTI (Weighted by VMT)		VHD	VMT	PHD	Vehicle Hours of Delay per 1,000 Miles	Daily Person Hours of Delay per Capita	Daily VMT/ Capita
Facility Type	**AM**	**PM**	**AM**	**PM**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**
New York City Boroughs										
Bronx	13.9%	33.3%	4.4%	0.7%	28.4%	7.2%	28.4%	19.8%	18.9%	-0.7%
Brooklyn	24.7%	14.9%	7.1%	3.0%	31.1%	8.5%	31.1%	20.8%	18.1%	-2.2%
Manhattan	11.3%	34.1%	11.1%	2.5%	33.0%	13.0%	33.0%	17.7%	16.1%	-1.3%
Queens	13.6%	21.9%	6.9%	2.0%	32.1%	6.3%	32.1%	24.3%	13.7%	-8.5%
Staten Island	50.0%	150.0%	2.7%	3.0%	105.6%	13.2%	105.6%	81.6%	77.9%	-2.0%
Suburban Counties										
Nassau	29.3%	33.3%	3.8%	2.9%	36.7%	5.4%	36.7%	29.7%	21.1%	-6.6%
Suffolk	85.7%	43.8%	1.0%	0.7%	49.3%	14.4%	49.3%	30.5%	27.7%	-2.2%
Putnam	183.3%	50.0%	6.0%	0.4%	189.5%	36.1%	189.5%	112.8%	126.8%	6.6%
Rockland	150.0%	250.0%	7.9%	1.7%	75.8%	24.6%	75.8%	41.1%	53.8%	9.1%
Westchester	73.7%	140.0%	2.6%	2.7%	58.6%	19.3%	58.5%	32.9%	35.2%	1.7%
Region										
NYMTC Region	28.3%	41.1%	4.4%	1.8%	39.1%	12.3%	39.0%	23.8%	25.5%	1.4%

D/C = Demand to Capacity; LMC = Lane Miles of Congestion; TTI = Travel Time Index; ATS = Average Travel Speed; VHD = Vehicle Hours of Delay; PHD = Person Hours of Delay; VMT = Vehicle Miles Traveled

Note: D/C = average Demand to Capacity for the particular facility type and period. The "0.8<=DC<=1" and "D/C>1" are the percent of travel that occurs in various conditions (somewhat congested and very congested).

Figure 5.5 NYMTC Planning Area Daily Vehicle Hours of Delay by County

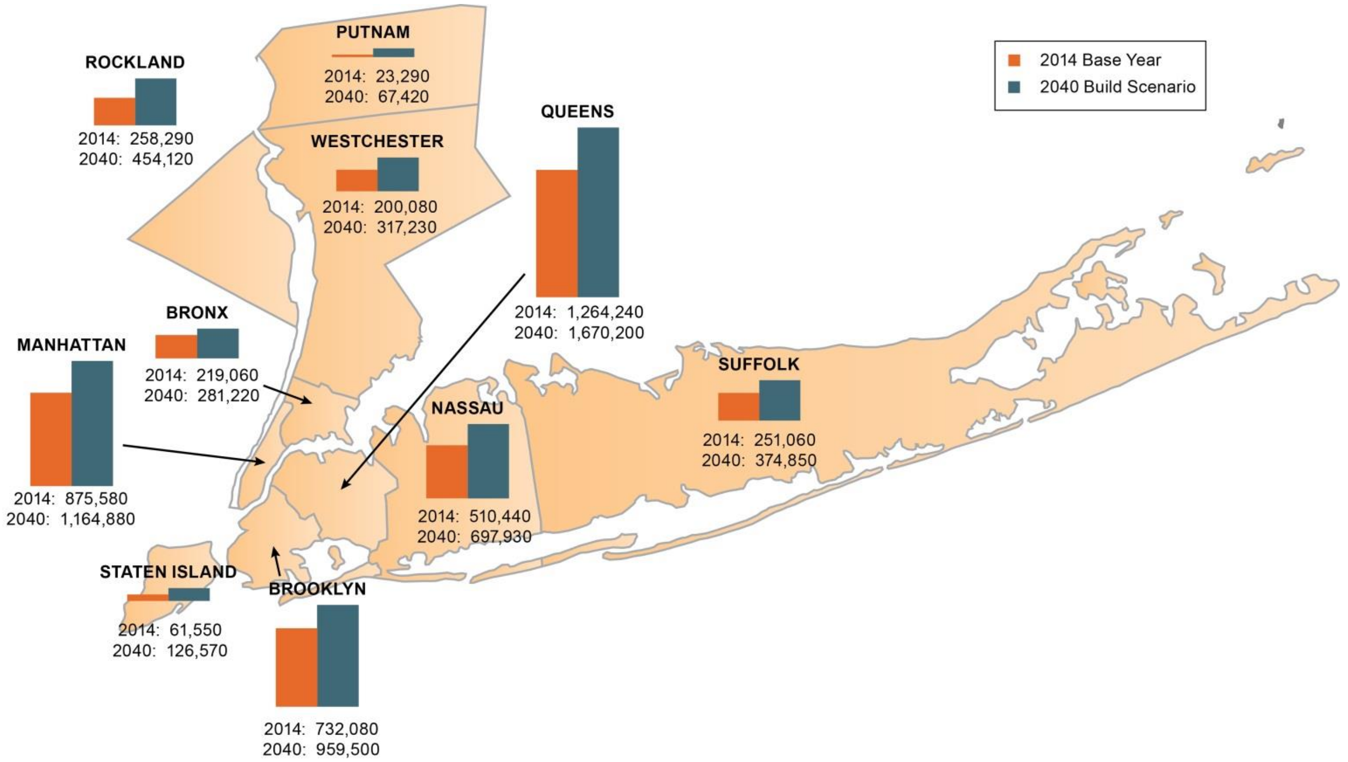


Figure 5.6 NYMTC Planning Area Daily Person Hours of Delay by County

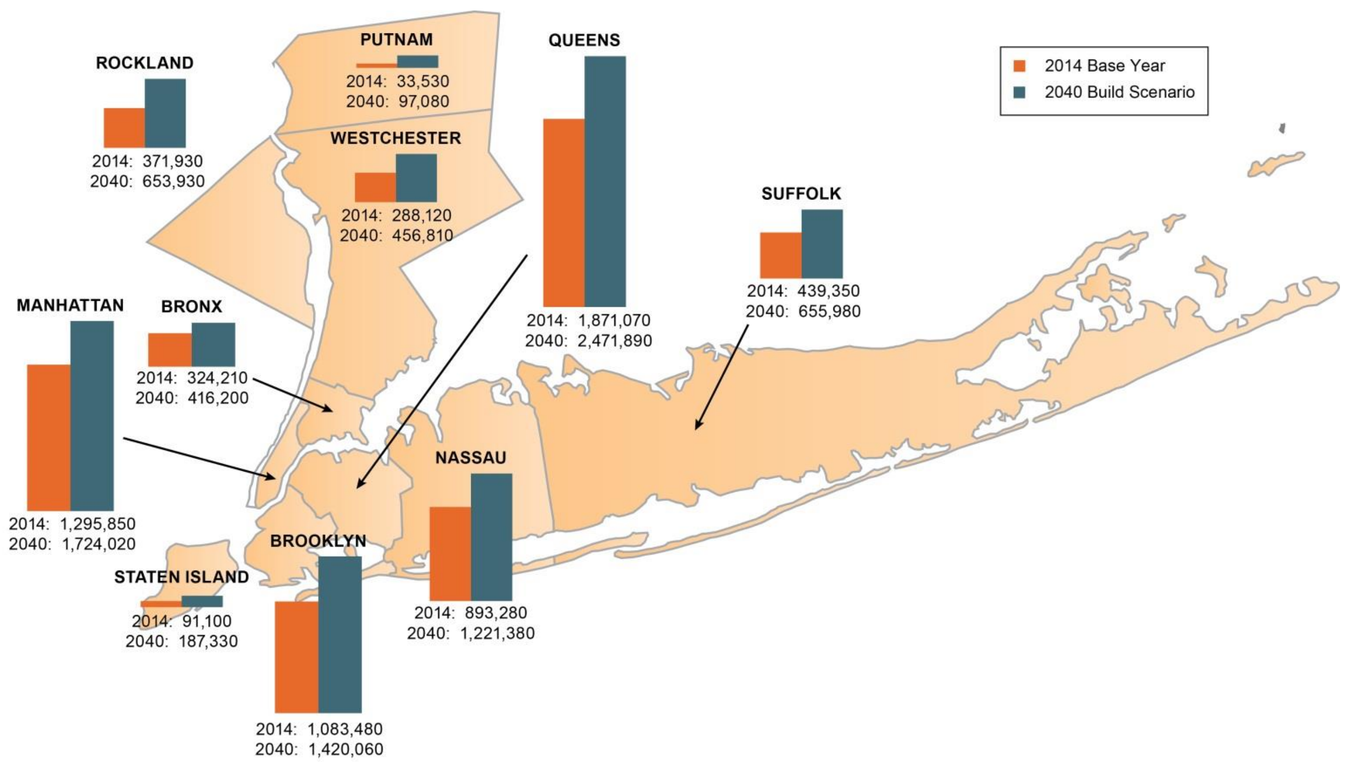
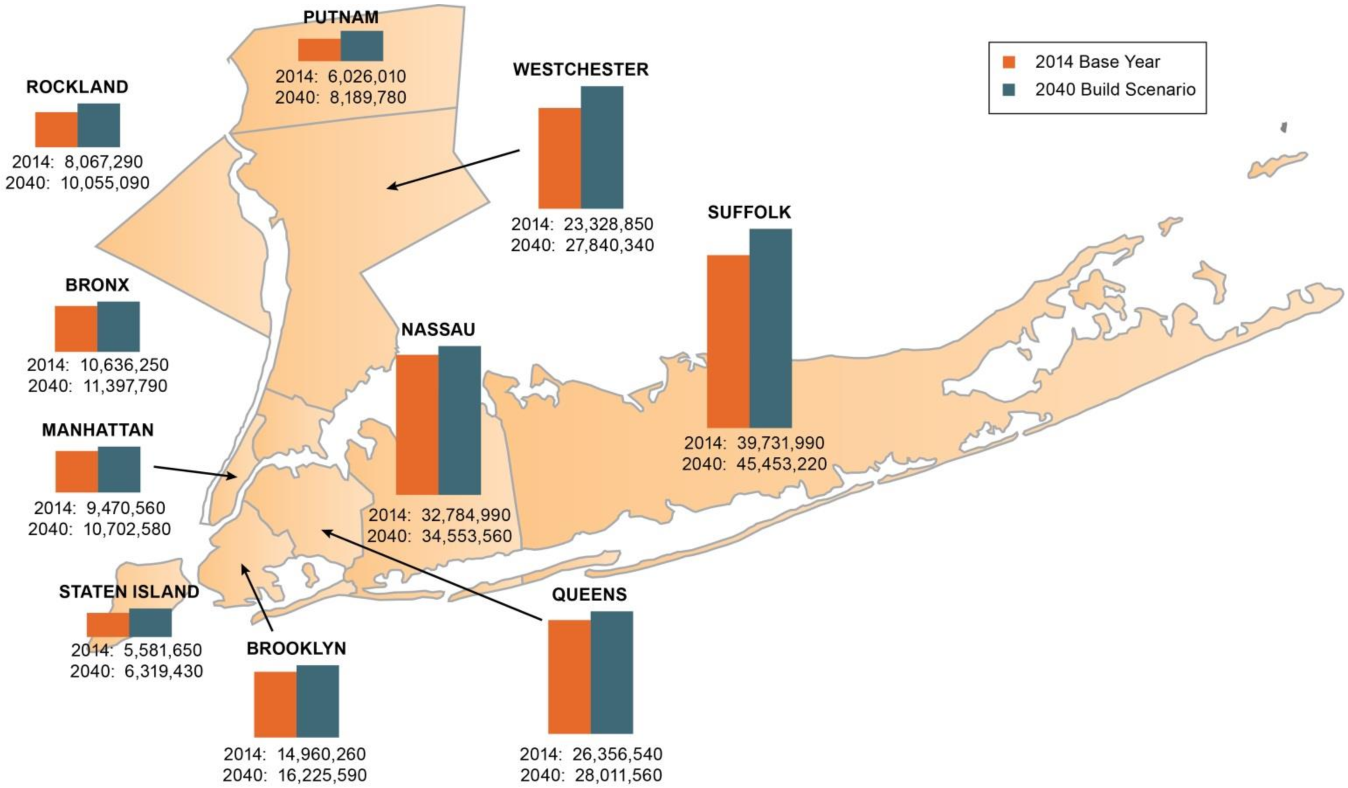


Figure 5.7 NYMTC Planning Area Daily Vehicle Miles Traveled by County



Reliability

Increasingly, transportation agencies are looking to travel time reliability as a measure to capture system performance. Travel time reliability typically refers to the variability of travel times that travelers experience from one day, season, or year to the next. The focus on reliability comes from the recognition that congestion is a function of several root causes, including crashes and other incidents, special events, weather, and normal fluctuations in demand in addition to limited capacity.

A variety of performance measures have been developed to measure reliability, but all of them draw from the distribution of travel times on a given segment, corridor, or system. Common reliability measures in use today include:[5]

- The planning time index (PTI) and other variants of the travel time index. These measures capture the multiple of free flow time (travel time under uncongested conditions) required to complete a given percentage of trips 'on time.' The PTI typically considers the 95th percentile of travel time (i.e., a PTI of 3 means that a traveler must allow for a trip that is three times as long as free flow time to be on time 95 percent of the time). The PTI is a special instance of the TTI measure, which typically considers the relationship between average travel time and free flow time. The 95th percentile can be thought of as one day a month. Several agencies also consider the 80th percentile which might be thought of as the travel time that a system user may expect once a week.

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[5] The SHRP 2 Reliability program has developed several measures of reliability through a range of projects. SHRP 2 L03, *Analytical Procedures for Determining the Impacts of Reliability Mitigation Strategies*, has the most current published version and can be found at: http://www.trb.org/Main/Blurbs/166935.aspx.

- The semi variance is a one-sided variance that looks at the relative variation of the entire travel time distribution (i.e., the sum of the difference of each observed travel time from free flow, calculated only in one direction).[6]
- The buffer index is similar to the planning time index, except that it compares the 95th percentile of travel time to average travel time.
- Failure measures capture the percent of trips that occur on a segment or corridors above some threshold (e.g., 2.5 times free flow speed).

As one of the largest metropolitan areas in the U.S., the NYMTC region experiences significant unreliability on its road network. A recent study by the Texas A&M Transportation Institute of the most congested highway corridors in the U.S., identified 28 congested highway corridors in the NYMTC region. The TTI data are drawn from continuous travel time data that, to date, has been most effectively collected on limited access facilities. This analysis does not address the reliability of the arterial network, which is of equal concern.

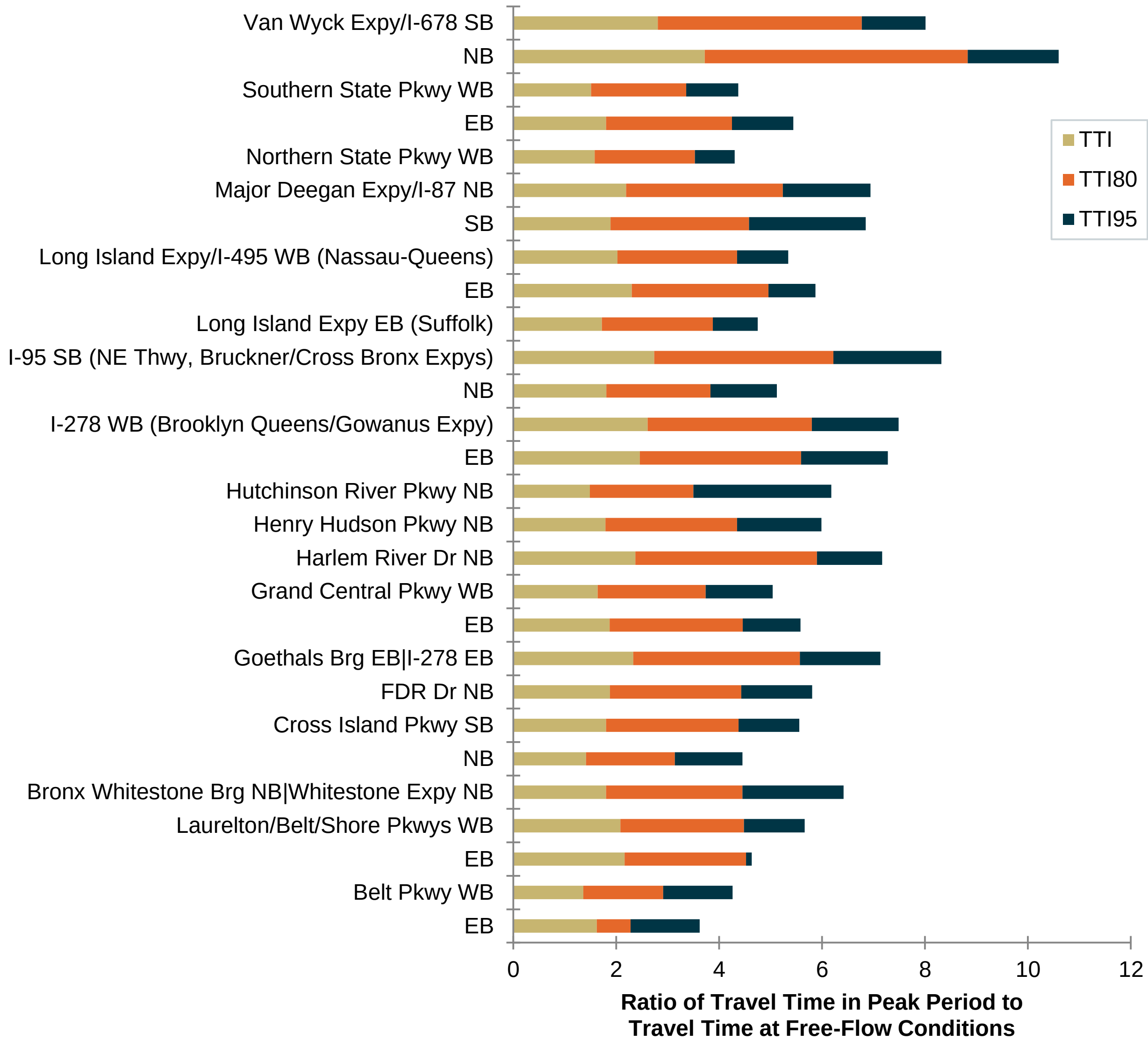
Figure 5.8 presents reliability performance measures drawn from the TTI report for the corridors in the NYMTC region. Three measures are shown:

- TTI – the ratio of average travel time to free flow travel time
- TTI_{80} – the ratio of the 80th percentile of travel time (the 80th worst travel time) to free flow time – this measure captures how unreliable travel is on a corridor roughly once a week
- TTI95 – the ratio of the 95th percentile of travel time to free flow time – this measure captures how unreliable travel is on a corridor roughly once per month.

Nearly all of the corridors identified in this analysis face unreliable conditions. Even average travel times on these corridors takes twice as long as free flow. Put another way, travel on these corridors occurs at best at half the posted speed. At least one day a week (TTI_{80}), travel times on many of these facilities are 3.5 to 4 times longer than free flow or twice again average conditions. Notable exceptions include the Belt Parkway (which has substantially more reliable conditions than the other corridors (while still generally unreliable), I-95 and Harlem River Drive (both of which have a TTI_{80} value of close to 6.0), and the Van Wyck, which experiences severe congestion (TTI_{80} of over 8 in the Northbound direction, meaning that it takes 8 times as long as free flow time to traverse this corridor roughly once a week).

[6] The semi-variance measure was developed by SHRP 2 L02, *Establishing Monitoring Programs for Travel Time Reliability*, http://www.trb.org/Main/Blurbs/168765.aspx.

Figure 5.8 Reliability on Select Highway Corridors in the NYMTC Region



Source: Texas A&M Transportation Institute Congested Corridors Report, 2011. http://mobility.tamu.edu/corridors/.
Note: The indices shown are not additive, but layered one on top of the other for each corridor, illustrating the relative difference amongst the three travel time indices- TTI, TT80 and TTI95.
TTI – the ratio of average travel time to free flow travel time
TTI80 – the ratio of the 80th percentile of travel time (the 80th worst travel time) to free flow time
TTI95 – the ratio of the 95th percentile of travel time to free flow time

Accessibility

Accessibility (or just access) refers to the ease of reaching goods, services, activities and destinations, which together are called opportunities. It can be defined as the potential for interaction and exchange (Hansen 1959; Engwicht 1993). Accessibility can be thought of as having two components- attractiveness and impedance. The attractiveness component is usually measured as the number of opportunities at destinations. For example, when measuring accessibility to jobs, the attraction value can be the number of jobs at the various potential destinations, while for shopping centers this can be the number of shops in the center. The impedance function decreases the probability of being attracted to such destinations based on distance or travel time.[7]

There is no single method to evaluate accessibility. For example, accessibility can be measured by the travel times between two points, the availability of jobs within a certain travel time, the availability of transit options, and so on.

Figures 5.9 and 5.10 illustrate one common measure of accessibility – the availability of jobs from a given zone within 45 minutes in 2014 and 2040, respectively. The region represented by dark red represents traffic analysis zones with access to over 4 million jobs within 45 minutes. The blues and greens represent the other end of the spectrum with access to considerably fewer jobs. In 2040, more of the TAZs turn from green to blue and red to yellows, indicating fewer jobs within 45 minutes. This is a sign of an increasingly congested transportation system, however, the difference does not appear to be dramatic. One reason for this could be that the 2040 alternative contains committed projects planned to alleviate current traffic congestion. One region that could potentially see an accessibility improvement in the future (as measured by access to jobs) is part of Long Island and Queens, partially attributable to the presence of the East Side Access project, linking Long Island and Queens to Grand Central Terminal.

[7] Access to Destinations: Development of Accessibility Measures, Ahmed M. El-Geneidy, David M. Levinson, University of Minnesota.

Figure 5.9 2014 Jobs Accessible Within a 45 Minute Drive During a Morning Peak Commute

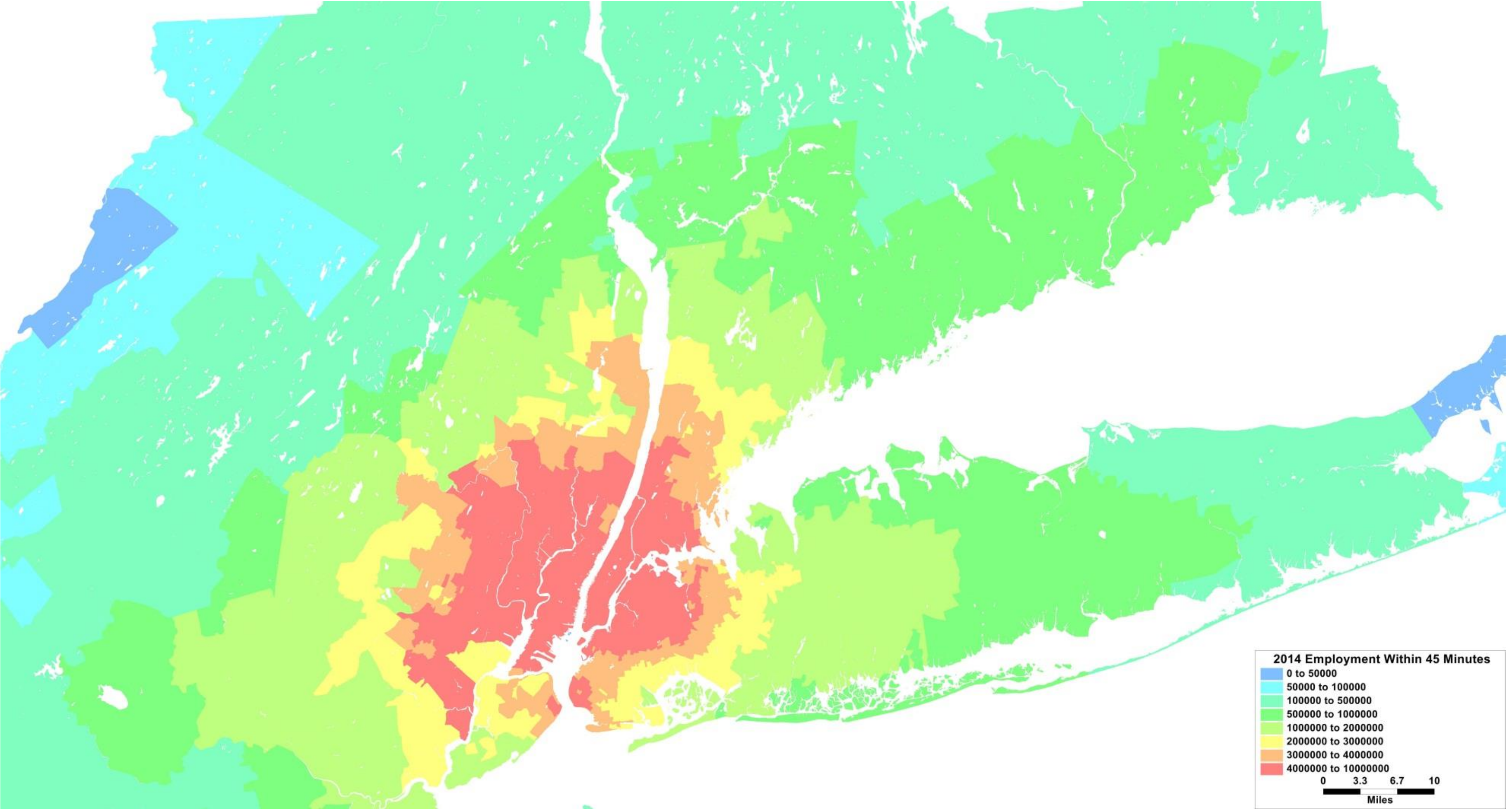
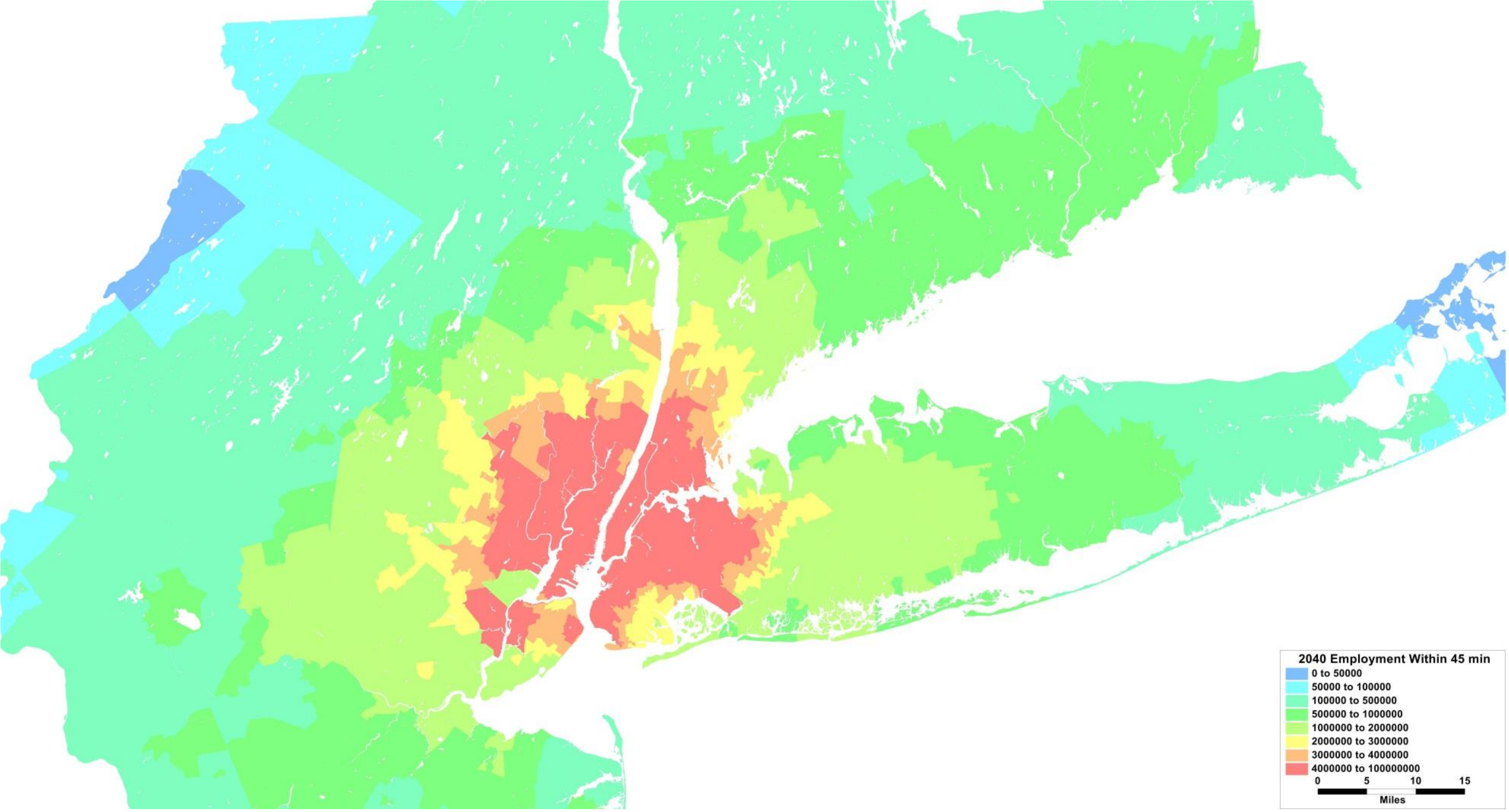


Figure 5.10 2040 Jobs Accessible Within a 45 Minute Drive During a Morning Peak Commute



5.3 Critically Congested Roadway Corridors in 2040

Figures 5.11 through 5.13 present the top congested corridors in the three subareas of NYMTC's planning area based on the most significantly congested corridors. The methodology adopted to identify these corridors is described in Section 4.0 based on four factors - importance, magnitude, intensity, and consistency.

Figure 5.11 Top Congested Corridors

New York City

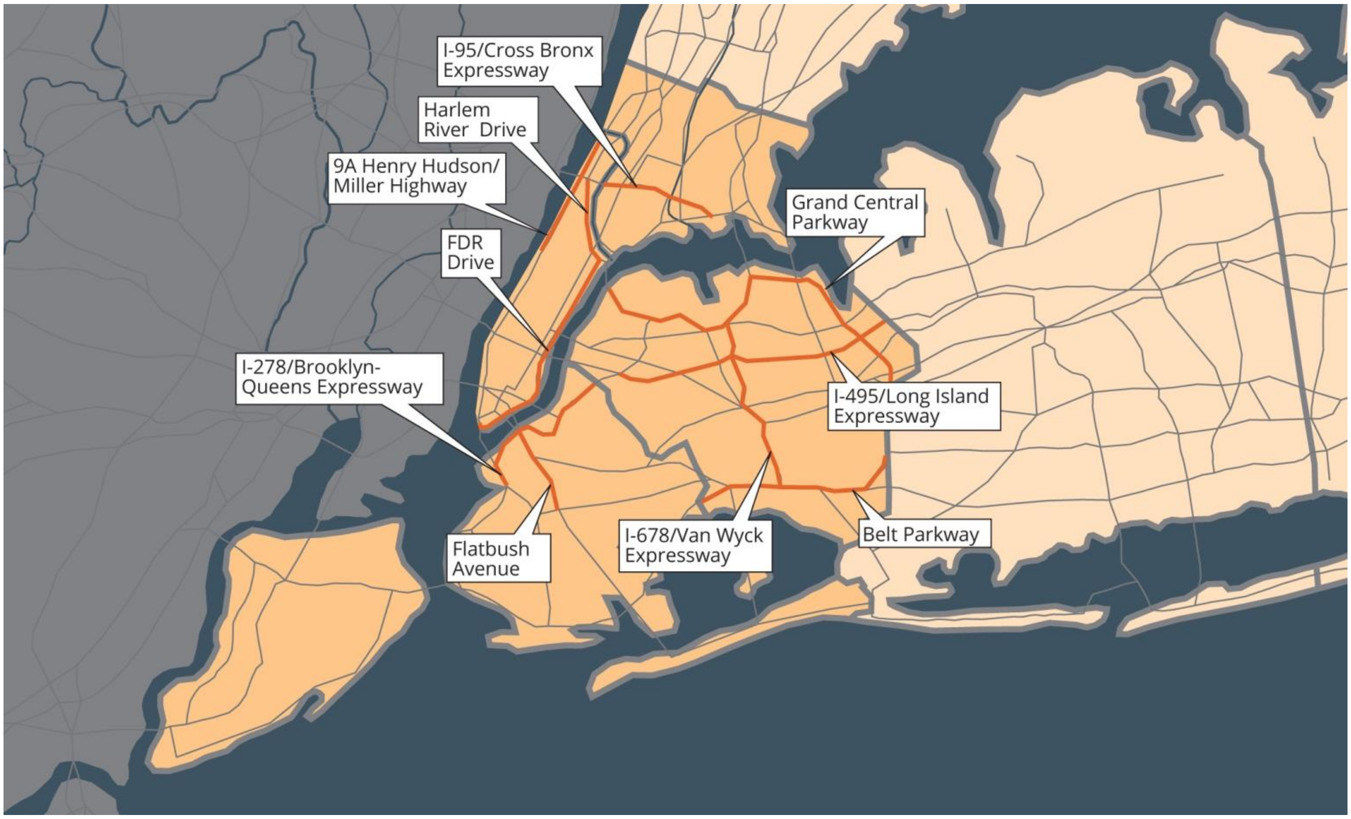
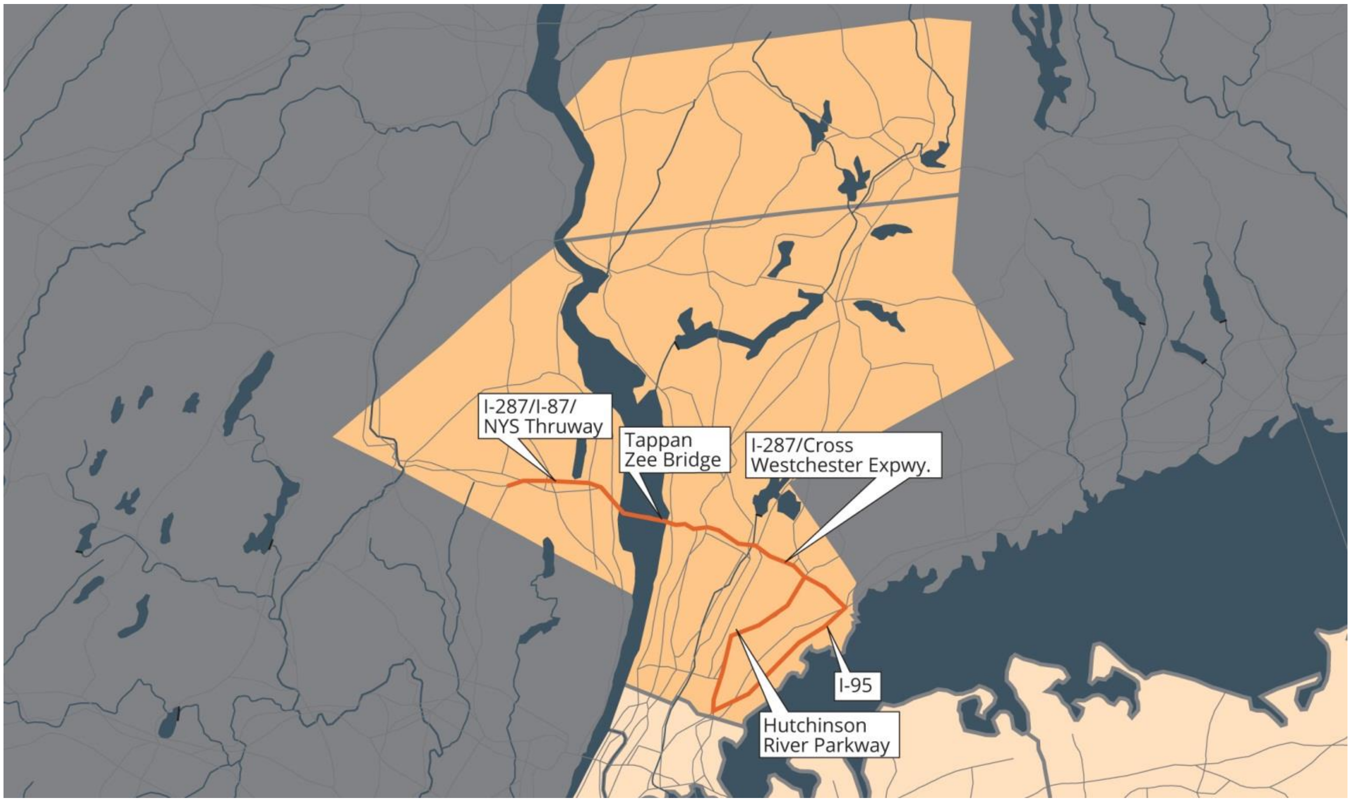


Figure 5.12 Top Congested Corridors
Long Island

Figure 5.13 Top Congested Corridors
Lower Hudson Valley



5.4 Access to Regional Facilities – Airports

The New York Metropolitan is primarily served by three large hub airports – John F. Kennedy International (JFK), LaGuardia (LGA), and Newark Liberty International (EWR). Other airports that offer commercial service to residents of the NYMTC region include Westchester County, (HPN) and Long Island-MacArthur (ISP). Stewart International Airport (SWF), while located just outside the NYMTC region, also serves the NYMTC region (Figure 5.14). This section of the report discusses access to the three major airports – JFK, LaGuardia, and Newark Liberty. Appendix C contains estimated travel times between representative locations throughout the NYMTC region and the six airports mentioned above.

Figure 5.14 Airports in the NYMTC Region

EWR and JFK each offer 33 percent of the flights from the region, LGA offers 29 percent, with the remaining 5 percent of flights are split between the three smaller airports. In terms of available seat miles, a measure of capacity and average flight length, JFK offers 61 percent, Newark Liberty offers 28 percent, and LaGuardia offers 10 percent. The large airports each serve a different mix of markets:

- With a limited number of exceptions, flights to and from LaGuardia Airport are restricted to a perimeter of 1,500 miles from the airport. At the same time, LaGuardia is the closest airport to the region's main population and employment centers. Therefore, airlines at LaGuardia tend to offer frequent services to major hubs and business destinations, focusing on higher-value origin-destination traffic. More than 90 percent of LaGuardia's origin-destination passengers come from the NYMTC region, and the average travel party size is 1.8 (heavily weighted towards solo business travelers, relative to other area airports). Of the total enplanements at LaGuardia, 8 percent of passengers are connecting to another flight and do not use the NYMTC region's ground transportation system.
- JFK has a history of being the main gateway to New York City for international flights. Because of the perimeter rule at LaGuardia, JFK offers the majority of the transcontinental and international seats from the region. In addition, domestic airlines at JFK tend to offer connecting flights from JFK to cities across the U.S. to improve the utilization of capacity on their international flights and improve the viability of

services to certain markets, to the extent seats cannot be filled with local passengers. Finally, extra capacity available at JFK, particularly outside peak hours for international flights, is used by domestic carriers for flights to leisure destinations. About 19 percent of JFK's passengers are connecting to another flight and do not use the NYMTC region's ground transportation system, Of those who have a local origin, two thirds come from the NYMTC region. The average travel party size at JFK is 2.7, influenced by families traveling together on leisure trips to and from the region.

- EWR is also a major international gateway, and it serves as a major connecting hub for United Airlines for both domestic and international flights (27 percent of all passengers at EWR are connecting passengers). While close to 50 percent of EWR's origin-destination passengers are from New Jersey, nearly one third come from the NYMTC region. The average travel party size is 2.3.

The three smaller airports concentrate on service to airline hubs and leisure destinations.[8,9]

John F. Kennedy International (JFK)

John F. Kennedy International Airport is the busiest airport in New York, with over 47 million annual travelers passing through the airports seven airline terminals and over 1.3 million tons of air cargo in 2011. The airport has over 125 aircraft gates for the more than 100 airlines that arrive and depart from the airport. Roughly 36,000 people are employed at the airport, which operates 24 hours per day.

JFK is one of the world's leading international air cargo centers. The airport offers nearly 4 million square feet of modern, state-of-the-art cargo warehouse and office space. The entire air cargo area is designated as a Foreign-Trade Zone. JFK services the world's key air cargo markets though a strong mix of long-haul, direct, and nonstop all-cargo aircraft and wide-body passenger aircraft flights.

The airport offers customers over 5,000 customer parking spaces in a variety of places, including: multilevel parking garages, surface spaces in the Central Terminal Area, a long-term parking, and cell phone lot. A reservation system was introduced in 2011.

The AirTrain service connecting JFK with the Long Island Rail Road (LIRR) and New York City subway and bus lines, was opened in 2003. At the airport, AirTrain provides fast, free connections between terminals, rental car facilities, hotel shuttle areas, and parking lots. In 2011, 5.5 million passengers used AirTrain JFK. Recent improvements include: digital signage; expanded closed-circuit televisions; track, switch, and third-rail heaters to improve reliability in cold weather; and a digital audio recording system for monitoring critical communications in real time.

The I-678/Van Wyck Expressway and the Belt Parkway are the only limited-access highways connecting JFK Airport. The Van Wyck Expressway connects the airport (including its substantial air cargo facilities) and southern Queens/southwestern Nassau County with central Queens – where it connects with I-495, the Grand Central Parkway, Queens Boulevard, Union Turnpike, and the Jackie Robinson Parkway. This portion of I-678 and its northbound Service Road experience severe congestion during many hours of the day due to insufficient mainline capacity, frequent merges and weaves, and heavy truck usage.

The Belt Parkway is the only east-west limited-access highway in southern Queens, primarily serving traffic to/from JFK Airport as well as through trips between Brooklyn and southern Nassau County. The Cross Island Parkway connects to the Belt Parkway just east of JFK and is the only continuous north-south limited-access highway in eastern Queens. The entire length of the Belt Parkway in Queens experiences severe congestion mostly (but not exclusively) during peak commuting periods, due to insufficient mainline capacity, and frequent merges and weaves. The eastbound Belt Parkway in southern Queens and southbound Cross Island Parkway in

8 http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy10_primary_enplanements_prelim.pdf.

9 West of Hudson Regional Transit Access Study – Air Passenger Forecasting Report, March 2010.

eastern Queens experience the heaviest congestion in evening peaks. The westbound direction in southern Queens and northbound direction in eastern Queens are heaviest in morning peaks. Trucks are not permitted on these parkways due to low overhead clearances and narrow lanes.

JFK airport is also served by local buses, and premium shuttle bus service from the Port Authority Bus Terminal and Grand Central Terminal. While the airport is accessible by transit, a one seat ride to JFK at present time is limited to private cars, taxis and limousine, and shuttle vans. The transit mode share in 2007 was approximately 19 percent.[10]

LaGuardia (LGA)

LaGuardia Airport is located in the borough of Queens, New York City, bordering on Flushing Bay and Bowery Bay. The airport is 8 miles from midtown Manhattan. The airport has four main terminals with a total of 71 aircraft gates. LaGuardia Airport employs about 10,000 people.

The airport provides more than 6,900 public parking spaces, including a 2,900 space, five-level parking garage; E-ZPass Plus in all parking lots; Express Pay machines in Lots 2, 4, and 5; and a 55-space metered lot. A reservation system was introduced in 2011. In 2011, the airport catered to approximately 24 million passengers The Grand Central Parkway provides direct access to LGA. Just west of LGA, the Grand Central Parkway connects to the Robert F. Kennedy Triboro Bridge (which in turn provides access to upper Manhattan, the Bronx, the George Washington Bridge, and Westchester County) and the Brooklyn-Queens Expressway (BQE) (which provides access to midtown and lower Manhattan, Brooklyn, and the Verrazano Narrows Bridge to Staten Island). To the east, the Grand Central Parkway connects to the Whitestone Expressway (which in turn feeds into the Whitestone Bridge to the Bronx, eastern Westchester County, and Connecticut), the Van Wyck Expressway (to southeastern Queens and JFK Airport), and the Long Island Expressway and Northern State Parkway (to Eastern Long Island).

The airport is also accessible via several MTA New York City Transit buses, which provide service to Manhattan and Queens, with connections to New York City subways, Long Island Rail Road, and Metro-North Railroad for destinations beyond. Private shuttle bus services connect LGA to the Port Authority Bus Terminal and Grand Central Terminal. Based on statistics reported in the ACRP Report 4, eight percent of total LGA passengers use transit. A significant share of LGA employees also use transit to commute to their jobs. The majority of passengers drive and park at the airport. The remainder access LGA either via rentals, drop-offs, or shared rides. A recent joint planning effort involving New York City Department of Transportation, MTA New York City Transit, and the Port Authority of New York & New Jersey resulted in plans to improve LGA bus connections, including rail from Queens rail transit nodes at Jackson Heights and Woodside.

Newark Liberty International (EWR)

Opening in 1928, Newark Liberty Airport (EWR) is the nation’s oldest airfield and home to the nation’s first commercial airline terminal. Located partly in Newark and partly in Elizabeth, Newark is located only 14 miles from Manhattan, serving a critical role for the New York-New Jersey metropolitan area. Approximately 21,000 people are employed at the airport. Newark Liberty has three major terminals and just over 100 gates.

Newark Liberty is the overnight small package center for the New York-New Jersey region, offering a full range of short-, medium-, and long-haul services to domestic and international destinations. The airport expanded its cargo capacity in 2004 with the opening of a 142,000 square-foot facility, which combined with United and Continental’s cargo buildings, increases cargo space at the airport to 1.3 million square feet. In 2011, 34 million passengers and 812 thousand tons of cargo passed through EWR.[11]

[10] ACRP, Report 4, Ground Access to Major Airports by Public Transportation.

[11] Port Authority of New York and New Jersey, http://www.panynj.gov/airports/ewr-facts-info.html.

Opened in 2001, AirTrain Newark offers service to the Newark Liberty International Airport train station, where passengers can connect to New Jersey Transit and Amtrak rail links for connections between the airport and New York City, Philadelphia, points across New Jersey, and destinations beyond. Thousands of daily riders also use AirTrain Newark to travel between passenger terminals and to connect to parking lots and rental car areas. In 2011, about two million paid riders used the system to connect to the airport at the Northeast Corridor station. East-west access to EWR is via I-78. The New Jersey Turnpike provides north-south access to the airport. From within New Jersey, EWR can also be reached via U.S. 1 and 9. Transit options include New Jersey Transit buses and trains, and the Port Authority of New York and New Jersey PATH trains, which require transfers either to a bus or New Jersey Transit trains at Newark Penn Station.

Airport Accessibility

Tables 5.5 through 5.8 represent 2014 and 2040 auto travel times to the six regional airports. Tables 5.9 and 5.10 show the modeled differences between the 2014 and 2040 travel times from across the NYMTC region to the six airports in the AM and PM peak periods, based on results from the NYBPM. As indicated in Tables 5.9 and 5.10, auto travel times increase over the 26 year period at different rates, except in select Manhattan markets to JFK and Islip (MacArthur), likely the impact of the Eastside Access Rail project, which could cause a mode shift from auto to rail, improving travel on the access roadways marginally.

Table 5.5 Estimated 2014 Travel Times to Six Regional Airports
AM Peak Period

		Airports					
County	**Location**	**JFK**	**LGA**	**EWR**	**ISP**	**SWF**	**HPN**
Manhattan	Downtown	44	28	46	86	106	62
Manhattan	Midtown	44	25	43	84	93	49
Manhattan	Uptown	27	9	50	71	85	41
Brooklyn	Park Slope	33	29	58	84	115	73
Queens	Jamaica	12	17	82	64	107	46
Staten Island	Staten Island College	46	49	30	104	120	94
Bronx	Botanical Garden	36	22	57	71	86	31
Westchester	White Plains	51	40	76	87	71	15
Rockland	Spring Valley	61	44	66	98	58	40
Nassau	Hempstead	31	48	95	47	130	69
Suffolk	Brentwood	66	71	118	19	152	93
Putnam	Carmel	83	75	114	120	53	45

JFK	John F. Kennedy International Airport
LGA	LaGuardia Airport
EWR	Newark Liberty International Airport
ISP	Long Island MacArthur Airport
SWF	Stewart International Airport
HPN	Westchester County Airport

Table 5.6 Estimated 2040 Travel Times to Six Regional Airports
AM Peak Period

		Airports					
County	Location	JFK	LGA	EWR	ISP	SWF	HPN
Manhattan	Downtown	43	30	55	86	117	62
Manhattan	Midtown	34	30	57	78	106	49
Manhattan	Uptown	28	10	62	78	97	40
Brooklyn	Park Slope	35	32	67	88	129	74
Queens	Jamaica	12	20	83	70	122	47
Staten Island	Staten Island College	49	54	25	110	121	82
Bronx	Botanical Garden	38	24	69	80	92	32
Westchester	White Plains	57	44	91	99	78	15
Rockland	Spring Valley	69	51	80	112	64	44
Nassau	Hempstead	33	51	112	52	147	71
Suffolk	Brentwood	73	80	139	22	176	100
Putnam	Carmel	94	86	133	136	56	50

Table 5.7 Estimated 2014 Travel Times to Six Regional Airports
PM Peak Period

		Airports					
County	Location	JFK	LGA	EWR	ISP	SWF	HPN
Manhattan	Downtown	60	38	37	123	128	70
Manhattan	Midtown	57	34	29	110	114	54
Manhattan	Uptown	33	11	39	96	101	43
Brooklyn	Park Slope	42	36	45	114	136	78
Queens	Jamaica	12	16	63	82	122	44
Staten Island	Staten Island College	50	51	20	130	131	96
Bronx	Botanical Garden	38	21	42	92	94	31
Westchester	White Plains	54	39	61	110	81	14
Rockland	Spring Valley	69	45	54	122	67	34
Nassau	Hempstead	30	46	93	59	144	67
Suffolk	Brentwood	62	67	113	23	163	87
Putnam	Carmel	82	72	95	138	54	42

Table 5.8 Estimated 2040 Travel Times to Six Regional Airports
PM Peak Period

		Airports					
County	Location	JFK	LGA	EWR	ISP	SWF	HPN
Manhattan	Downtown	63	39	39	130	145	77
Manhattan	Midtown	50	37	33	117	130	59
Manhattan	Uptown	34	12	42	103	116	48
Brooklyn	Park Slope	47	40	49	125	154	86
Queens	Jamaica	12	17	66	89	138	49
Staten Island	Staten Island College	61	61	21	147	153	111
Bronx	Botanical Garden	39	23	45	100	112	35
Westchester	White Plains	57	40	65	118	101	15
Rockland	Spring Valley	73	50	59	133	81	38
Nassau	Hempstead	30	47	97	65	160	72
Suffolk	Brentwood	65	73	121	27	185	97
Putnam	Carmel	83	72	97	144	63	42

Table 5.9 Percentage Change between 2014 and 2040 Travel Times to Six Regional Airports
AM Peak Period

		Airports					
County	Location	JFK	LGA	EWR	ISP	SWF	HPN
Manhattan	Downtown	-4%	6%	20%	0%	11%	1%
Manhattan	Midtown	-23%	18%	32%	-7%	13%	1%
Manhattan	Uptown	5%	11%	24%	10%	14%	-2%
Brooklyn	Park Slope	8%	8%	17%	5%	11%	1%
Queens	Jamaica	5%	13%	1%	10%	14%	2%
Staten Island	Staten Island College	7%	12%	-15%	6%	0%	-13%
Bronx	Botanical Garden	7%	8%	22%	12%	8%	1%
Westchester	White Plains	13%	10%	20%	13%	9%	4%
Rockland	Spring Valley	11%	15%	22%	15%	11%	11%
Nassau	Hempstead	6%	5%	18%	11%	13%	3%
Suffolk	Brentwood	10%	11%	18%	15%	15%	8%
Putnam	Carmel	13%	14%	16%	14%	7%	11%

Table 5.10 Percentage Change between 2014 and 2040 Travel Times to Six Regional Airports

PM Peak Period

		Airports					
County	Location	JFK	LGA	EWR	ISP	SWF	HPN
Manhattan	Downtown	6%	2%	6%	5%	14%	9%
Manhattan	Midtown	-14%	8%	15%	7%	14%	11%
Manhattan	Uptown	3%	12%	8%	7%	15%	12%
Brooklyn	Park Slope	11%	10%	8%	10%	13%	11%
Queens	Jamaica	2%	8%	6%	9%	14%	12%
Staten Island	Staten Island College	22%	19%	7%	13%	17%	15%
Bronx	Botanical Garden	3%	10%	6%	8%	19%	14%
Westchester	White Plains	6%	3%	5%	8%	25%	9%
Rockland	Spring Valley	6%	11%	8%	9%	22%	11%
Nassau	Hempstead	0%	3%	4%	10%	12%	7%
Suffolk	Brentwood	6%	9%	8%	16%	13%	11%
Putnam	Carmel	0%	0%	2%	4%	17%	0%