



The Untapped Potential of Commuter Rail in New York City

Jonah Gottlieb

Abstract

THE CITY OF NEW YORK is host to three major commuter rail systems that move hundreds of thousands of people a day. The Long Island Rail Road, Metro North, and New Jersey Transit have ramped up the pace of capital projects and long-overdue improvements. Despite that, the media often chooses to focus on the terminal where all railroads lead: Penn Station. Many argue that without major improvements to the station infrastructure at Penn and a unified regional commuter rail system under one operator, there is nothing we can do to improve our commuter rail. However, there are more practical solutions that leverage the commuter rail we already have to improve service: We can increase speeds and reach more customers who already live in NYC, and best of all, we can do that without even beginning to fix Penn Station. We can make better use of our infrastructure with maintenance and upgrades, lighter trains, and better planning. In doing so, we can also prepare our commuter rail for the possibility of a unified system, and learn from the mistakes of other cities who have attempted to unify their commuter rail.

Local Commuter Rail

In New York City, almost everyone relies on the subway. It is often considered a linchpin of both the city of New York and the larger tri-state region. It is so important to the region that the Metropolitan Transportation Authority tends to do everything in its power to run 100% service as consistently as possible. Without the subway, the city collapses. Places as dense as Manhattan, Brooklyn, the Bronx, and Queens need high-capacity transit so that the local economy can keep moving. However, the subways are not the only high-capacity transportation mode serving New York City. The Long Island Rail Road (LIRR), Metro North Railroad (MNR), and New Jersey Transit Rail Operations (NJT) operate commuter rail services in and out of Manhattan, traveling great distances to bring suburban residents into the city. Every weekday, the big three move about 680,000 passengers in and out of the city of New York. That's nearly the entire population of Denver entering and exiting New York every day. The commuter rail services serving New York have extensive networks and frequent services, sometimes as often as every four minutes during rush hours. Unfortunately, these services cater to suburbanites who are commuting in and out of Manhattan. But what about the people already in New York? Do they have access to this incredible option of high-capacity transportation? Does it serve their needs and commute patterns?

Unfortunately, the answer is no. Commuters already within the city of New York are faced with poor frequency, high fares, and slow service. Inbound trains skip stops in Queens and the Bronx to save suburbanites mere minutes on their hour-long commute. Outer borough residents are forced to take overcrowded buses and subways, even if they live just blocks from a commuter rail station. The reasoning for this is that we compartmentalize our transit, and how we think about it. In the minds of planners and residents alike, the commuter lines serve the suburbs, while the subways and buses serve the city. The reality, though, is that commuter rail has a history of serving the city as well.

The Blurry Line between Rapid Transit and Commuter Rail in New York City

In the 19th century, railroads opened up to bring Brooklyn residents south to Coney Island. However, by extending northward to the Brooklyn waterfront, the railroads became commuter lines. Passengers would take the train from their residences in Borough Park and Flatbush to the ferry docks, where they would change to a boat to Manhattan. Nowadays, these former “commuter” railroads are subway lines - the B and Q trains run on a right-of-way originally built to bring passengers to Coney Island.

In the Bronx, a company called the New York, Westchester & Boston Railway (NYW&B) built a commuter rail line ending at the Harlem River and connecting to what is now the New Haven Line. However, the NYW&B abandoned the line in 1937, and sold it to the City of New York three years later. In 1957, after operating as a disconnected shuttle service, the line was extended and connected to the IRT line above White Plains Road. The Dyre Avenue Line, as it’s known, is the northern end of the 5 train.

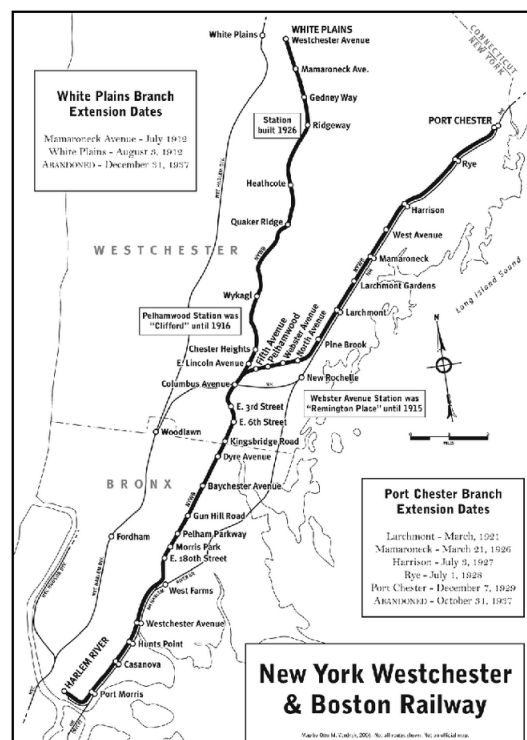


Fig. 1: Map of the New York, Westchester & Boston Railway at its greatest extent. The line between East 180th Street and Dyre Avenue is presently served by the 5 train. Credit: Forgotten Railroads Through Westchester County, nybwry.com/forgotten.

These examples illustrate that the line between “commuter rail” and “rapid transit” was not quite as distinct as it is today. In many cities around the world, “commuter rail” stops far more often and is more analogous to express subways in New York. For example, in Berlin, rapid transit is divided into the “local” U-Bahn and the “express” S-Bahn. Similarly, in Philadelphia, the B and L act as “local” rapid transit services, while the Center City Commuter tunnel acts as an “express” service. “Commuter rail” can



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serve the city *and* the suburbs, as the NYW&B once did. Many cities around the world blur the line between commuter rail and rapid transit further; in London, one can transfer from commuter trains to the tube with a single fare.^{1,2} So why has New York chosen to divide its commuter rail from its subways?

Subways For The City, Commuter Rail For The Suburbs

In New York, the commuter railroads have long catered to suburban commuters since state ownership began in the late 1960s. After suburban growth and white flight influenced a sharp decline of ridership within the city, the LIRR chose to shutter many of its stations in New York City proper. The Port Washington Branch, in particular, had stations in the Corona and Elmhurst neighborhoods, both of which are considered transit deserts today. This preference for suburbanites is also illustrated in the weekday timetable for the Port Washington Branch.

Monday through Friday except Holidays, Effective March 3 - May 18, 2025																											
Westbound To Penn Station, Grand Central Woodside & Flushing	For explanation, see "Reference Notes."	Peak																									
		AM		AM		AM		AM		AM		AM		AM		AM		AM		AM		AM		AM		AM	
		AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM
PORT WASHINGTON		12:38	2:11	3:40	5:08	5:29	5:50	6:15	.....	6:47	.....	7:14	7:19	.....	7:53	.....	8:14	8:28	8:33	9:08	.....	9:40	10:10	.....	.....	.....	.....
Plandome		12:43	2:16	3:45	5:13	5:34	5:55	6:20	.....	6:52	.....	7:19	7:24	.....	7:58	.....	8:19	8:33	8:38	9:13	.....	9:45	10:15	.....	.....	.....	.....
Manhasset		12:45	2:18	3:47	5:15	5:36	5:57	6:22	.....	6:54	.....	7:21	7:26	.....	8:00	.....	8:21	8:35	8:40	9:15	.....	9:47	10:17	.....	.....	.....	.....
Great Neck		12:48	2:21	3:50	5:18	5:39	6:00	6:25	6:28	6:57	7:02	7:24	7:29	7:35	7:53	8:03	8:17	8:24	8:38	8:43	9:18	9:28	9:50	10:20	.....	.....	.....
Little Neck		12:51	2:24	3:53	5:21	5:42	6:03	6:28	.....	7:00	7:05	.....	7:32	7:38	7:56	.....	8:20	8:27	.....	8:46	9:21	.....	9:53	10:23	.....	.....	.....
Douglaston		12:53	2:26	3:55	5:23	5:44	6:05	6:30	.....	7:02	7:07	.....	7:34	7:40	7:58	.....	8:22	8:29	.....	8:48	9:23	.....	9:55	10:25	.....	.....	.....
Bayside		12:55	2:28	3:57	5:25	5:46	6:07	6:32	6:35	7:04	7:09	.....	7:37	7:42	8:00	8:08	8:24	8:31	.....	8:50	9:25	9:34	9:57	10:27	.....	.....	.....
Auburndale		12:58	2:31	4:00	5:28	5:49	6:10	.....	6:38	.....	7:12	.....	7:45	.....	8:27	.....	8:53	.....	9:37	10:00	10:30	.....	.....	.....	.....	.....	.....
Broadway		1:00	2:33	4:02	5:30	5:51	6:12	.....	6:40	.....	7:14	.....	7:47	.....	8:29	.....	8:55	.....	9:39	10:02	10:32	.....	.....	.....	.....	.....	.....
Murray Hill		1:02	2:35	4:04	5:32	5:53	6:14	.....	6:42	.....	7:16	.....	7:49	.....	8:31	.....	8:57	.....	9:41	10:04	10:34	.....	.....	.....	.....	.....	.....
Flushing Main Street		1:04	2:37	4:06	5:34	5:55	6:16	.....	6:44	.....	7:18	.....	7:51	.....	8:33	.....	8:59	.....	9:43	10:06	10:36	.....	.....	.....	.....	.....	.....
Mets-Willets Point		1:06	2:39	4:08	5:36	5:57	6:18	6:40	6:46	7:11	7:20	.....	.....	.....	.....	.....	.....	.....	9:45	10:08	10:38	.....	.....	.....	.....	.....	.....
Woodside		1:14	2:47	4:16	5:44	6:06	6:26	6:48	6:54	7:19	7:28	.....	7:49	8:01	8:12	.....	8:43	8:46	.....	9:09	9:40	9:53	10:16	10:46	.....	.....	.....
GRAND CENTRAL					5:55	.....	6:37	.....	7:05	7:30	.....	8:00	.....	8:24	.....	8:57	.....	9:20	.....	.....	.....	.....	.....	.....	.....	.....	.....
PENN STATION		1:25	2:58	4:27	.....	6:17	.....	6:59	.....	7:40	7:49	.....	8:13	.....	8:31	8:55	.....	9:07	.....	9:51	10:04	.....	10:57	.....	.....	.....	.....
Train #		303	305	307	405	311	411	313	1413	415	1315	317	419	1319	1421	321	1323	423	325	425	327	1327	427	329	.....	.....	.....

Fig. 2: LIRR Port Washington Branch timetable. Credit: Long Island Rail Road

One immediately notices that there are several gaps, particularly between Auburndale and Flushing. These indicate that a given train is skipping stops, or running express. This allows a rider who boards at Port Washington to save time, but this also comes at a significant disadvantage to riders in the city. During peak hours (5AM-9AM), passengers are subject to only 7 rush hour departures at stations within Flushing (Main Street, Murray Hill, Broadway, and Auburndale). If these trains were perfectly evenly spaced (which they aren't) that would equal 1.5 trains per hour, or one train every 40 minutes. Despite this, there are sometimes four trains *passing* those stations an hour.

Unfortunately, the Port Washington Branch isn't the only line where this happens. On the Metro North Harlem Line, there are several stations in the Bronx that stand to serve areas of the city otherwise considered transit deserts—places where there is little to no passenger rail access. Coincidentally, within the Bronx, the Bx41 parallels the Harlem Line, and is one of the more crowded buses in the city. Yet, the vast majority of Harlem trains to Grand Central skip all but a few stops in the Bronx. Why doesn't the train simply stop to serve passengers in the Bronx, who otherwise have to rely on the packed local buses? Why don't more trains from Port Washington simply make local stops in Flushing to help reduce

¹ "London Overground," [tfl.gov](https://tfl.gov.uk/modes/london-overground/), <https://tfl.gov.uk/modes/london-overground/>

² "Tube," [tfl.gov](https://tfl.gov.uk/modes/tube/), <https://tfl.gov.uk/modes/tube/>



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crowding at one of the busiest stations in the entire subway system?

The answer is journey times. The LIRR and MNR provide service mostly for suburban commuters, and only recently have they begun considering providing service for the outer boroughs with both the CityTicket program and the Penn Station Access infrastructure project.^{3,4} As such, they provide frequent, consistent express service for suburbanites when they could be serving the city. However, with the right improvements, they could add local service while minimizing the increase to suburban journey times.

Reducing Journey Times and Increasing Local Train Frequency

We owe the suburbanites, who make up the majority of commuter rail ridership, as little increase to their journey time as possible. At the same time, we owe the boroughs of Queens and the Bronx, which lack adequate transit in many areas, more commuter rail service. Thankfully, there are many ways we can add more stops and make changes to maintain (or even improve) journey times to make up for the added stops. First, we can focus our efforts on increasing speeds in places where it's extremely low. Many of the large stations in our commuter rail system are heavily used and very old, and as such, the speeds within them are very slow. While many would love to see commuter trains running at 90 or even 100 miles per hour in the suburbs, increasing the slowest speeds improves journey times far more than increasing top speed. This issue has made itself very clear in Grand Central Terminal, where Metro North trains are limited to 10 mph between Grand Central and 59th Street. This is because the entire station is very old, and has lots of complex switches. By upgrading switches to handle higher speeds and replacing aging tracks and structures, we can increase speeds considerably.

CURRENT SPEEDS	Distance (mi)	Speed	Travel time
Grand Central Train Shed (44th St-59th)	0.71	10	04:16
Park Ave Tunnel and Viaduct (60th-125th)	3.3	60	03:18
Penn Station East (LIRR/AMTK, 6th Ave to 9th Ave)	0.51	15	02:02
Penn Station West (NJT/AMTK, 10th Ave to 7th Ave)	0.51	15	02:02
WITH IMPROVEMENTS	Distance (mi)	Improved Speed	New travel time
Grand Central Train Shed (44th St-59th)	0.71	30	01:25
Park Ave Tunnel and Viaduct (60th-125th)	3.3	79	02:30
Penn Station East (LIRR/AMTK, 6th Ave to 9th Ave)	0.51	30	01:01
Penn Station West (NJT/AMTK, 10th Ave to 7th Ave)	0.51	30	01:01
TIME SAVED WITH IMPROVEMENTS	Time Saved		
Grand Central Train Shed (44th St-59th)	02:50		
Park Ave Tunnel and Viaduct (60th-125th)	00:48		
Penn Station East (LIRR/AMTK, 6th Ave to 9th Ave)	01:01		
Penn Station West (NJT/AMTK, 10th Ave to 7th Ave)	01:01		

Fig. 3: A table estimating journey times for several key sections of the New York City commuter rail system. Speed data gathered from openrailwaymap.org

³ "Penn Station Access," mta.info, <https://www.mta.info/project/penn-station-access>

⁴ "CityTicket for travel within NYC on Metro North and LIRR," mta.info, <https://www.mta.info/fares-tolls/lirr-metro-north/cityticket>

The table above demonstrates that we should be prioritizing increasing speeds on the slowest parts of our commuter rail network. The Park Avenue Tunnel and Viaduct, the Metro North line that links to Grand Central, currently operates at 60 miles per hour. Given that it's a perfectly straight railroad for much of its length, increasing its speed to the maximum allowed under MNR's rules, 79 miles per hour, is not out of the question. However, doing so would only save 48 seconds of journey time for passengers.

TRAIN SHED STRUCTURAL DEFICIENCIES

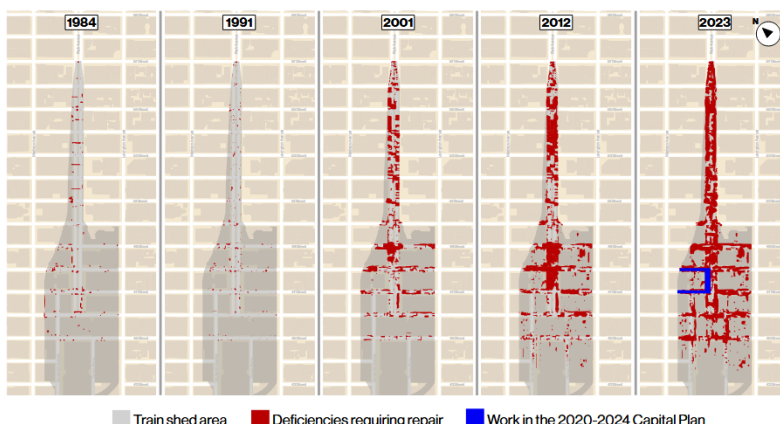


Fig. 4: Deficiencies related to aging infrastructure at Grand Central. Credit: MTA

Contrast this with improving the train shed, the vast array of switches where trains move in and out of Grand Central's many platforms and storage tracks. Improving speeds in this section to just 30 miles per hour results in time savings of nearly 3 minutes. That sort of improvement has immense value, especially when one considers that nearly every train in Westchester County would have a meaningfully shorter travel time. By decreasing travel times by 3 minutes, or even more if possible, we can make additional local stops without severely increasing suburban commute times. With enough reductions in journey time, it makes sense to change the timetable and add more local trains to the Harlem Line and Port Washington Branch. Doing so would create another frequent transit option for passengers who, for a long time, have had to rely on some of the most crowded buses and subways in New York City. Increasing speed is not just a mechanism to make suburbanites happier; it is also a way to enhance local transit without spending billions of dollars on building brand new subways.

The Need For Modern EMUs

Once we fix the tracks, how else can we improve speeds? If we chose to run lighter trains on our commuter rail lines, we could see better service by taking advantage of faster acceleration and more efficient energy usage. There are many ways to go about doing this, but the LIRR and MNR, all things considered, actually do a pretty good job with choosing energy-efficient trains. Much of New York's commuter services are operated on electrified lines - rather than using diesel-powered trains, they use electric ones that can accelerate faster, and are more environmentally sustainable. However, there is a further step that can be taken to improve acceleration, and that is abandoning locomotives altogether.



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While most trains do not have motors in the cars passengers sit in, electric multiple unit (EMU) trains have motors along the whole length of the train, not just at the front or back. Because of this, EMUs have better distribution of power, which means better acceleration—not unlike having all-wheel drive in a car. EMUs are commonly used on services with lots of stops, like subways or commuter rail, since without that high acceleration, trains would never be able to hit their top speed between stops. Credit where it's due, the LIRR and MNR use EMU train sets for much of their services. However, the EMUs in use across the tri-state area are far from optimal, and in fact, their shortcomings hamper the capabilities of our commuter rail network.

Historically, American transit agencies were required to use heavier trains because of some archaic Federal Railroad Administration (FRA) rules about passenger safety in the event of a crash.⁵ As a result of these rules, LIRR and MNR purchased *extremely* heavy trains. However, recent changes allow for lighter trains, provided they have adequate Crash Energy Management (CEM) capabilities. Prior to these changes, the MNR had ordered M8s, which are nearly 140,000 pounds each. The LIRR M9 railcars are 130,000 pounds each, when trains built for similar purposes in the EU are lighter. An eight car train of M9s weighs 1,040,000 pounds and is 680 feet long. In comparison, British Rail Class 345 Aventura train sets used on the Elizabeth Line in London weigh far less and are only six feet shorter.⁶

A direct European comparison to the M8 and M9 is hard to find, since it's more common to use longer EMU trainsets, such as the new Swiss trains bought for Caltrain in San Francisco.⁷ The M8 and M9 are “married-pair” EMUs, meaning that cars are grouped into sets of 2 cars.⁸ The main advantage of using married-pair EMUs is operational flexibility; you can run longer or shorter trains as needed and do so easily. However, within each married pair, you need to include all the equipment to operate the train independently—the controls, communications equipment, and whatnot. This equipment takes up a lot of space that could be used for passengers.

When the time comes to replace the M7 railcars, the LIRR and MNR must consider replacing their cars with a more modern EMU setup. I mention the M7 railcars specifically because they are an older generation of cars, entering service about 20 years ago, but are not currently scheduled for replacement. Unfortunately, the oldest cars in the LIRR fleet are already being replaced with another married-pair EMU design.⁹ For lines where ridership is high, like the New Haven Line, there's no longer a need for trains to be broken down into 2-car sets. A larger EMU train set will be lighter, accelerate faster, cause less strain on the rails, use less energy, and operate more quietly. Additionally, they will reduce operational costs, increase capacity per train, and make for a more comfortable passenger experience.

⁵ David Edmondson, “Reducing Passenger Train Procurement Costs,”

<https://cei.org/wp-content/uploads/2013/06/David-Edmondson-Reducing-Passenger-Train-Procurement-Costs.pdf>

⁶ “Class 345 Rolling Stock | Crossrail/Elizabeth Line,” *Transport for London*,

<https://foi.tfl.gov.uk/FOI-0416-2223/Class%20345%20Data%20Sheet%20ver%203.pdf>

⁷ “Caltrain to increase Stadler EMU order,” *International Railway Journal*,

<https://www.railjournal.com/regions/north-america/caltrain-increases-stadler-emu-order/>

⁸ “How many multiples in a multiple unit?” *The LIRR Today*,

<https://www.thelirrtoday.com/2019/11/how-many-multiples-in-multiple-unit.html>

⁹ Alfonso A. Castillo, “LIRR’s \$6B plan: Bridge repairs, accessible stations, and Yaphank electrification study,” *Newsday*, <https://www.newsday.com/long-island/transportation/mta-lirr-budget-q0e88m6m>

With a modern EMU, part of the improved passenger experience manifests in railcar design choices incorporated to reduce dwell time. Dwell time is how long a train spends in a station waiting for passengers to board and exit. The more time a train spends in a station, the less time it can spend moving. This leads to delays, increases costs, and makes for a far more unpleasant passenger experience. Anyone who has boarded an NJT train at Penn Station knows of the unpleasant experience I'm talking about - the mad dash for the platform, the cramped walk down the aisle looking for a seat, the airplane-like boarding lines. All of that increases dwell time. Several factors influence dwell time, but there are many "treatments" that have been developed in recent years that are proven to reduce dwell time and move



trains more efficiently.



Philadelphia Case Study: Reducing Dwell Time

In the 1980s, University of Pennsylvania professor Vukan R. Vuchic developed a remarkably comprehensive report to help improve the commuter rail system operated by the Southeastern Pennsylvania Transportation Authority (SEPTA).¹⁰ While many of his recommendations have yet to see the light of day, Vuchic developed a model which demonstrated that the positioning of doors on railcars was incredibly important. Rather than placing doors at each end of the car (like the Silverliner IV, top left), Vuchic recommended that wider, subway-style doors be placed at 3-quarter intervals instead. In the years since this plan was released, many operators in the US and abroad have shifted towards 3-quarter doors in an effort to reduce dwell time.

¹⁰ Vukan R. Vuchic, "A Plan for SEPTA's Regional Metrorail System," *University of Pennsylvania*, https://www.researchgate.net/profile/Eric-Bruun/publication/331651602_Plan_for_SEPTA_Regional_Metrorail_System/links/5c868a7e299bf16918f85185/Plan-for-SEPTA-Regional-Metrorail-System.pdf



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Philadelphia Case Study: Through-Running With No Benefits

In the 1980s, the Reading and Pennsylvania commuter rail systems were connected via a new tunnel underneath City Hall. It was a huge undertaking, but by building it, the city enabled cross-regional transit in a way no other city in America offered. What Philadelphia's tunnel allows is called "through-running." Rather than ending at a terminal in the city center, like Grand Central, trains continue *through* the city center and towards another destination. Much of the New York City Subway does this - The D train, for example, runs from the Bronx, through Manhattan, and ultimately ending at Coney Island in Brooklyn.

Despite building a crucial connection in their rail system, Philadelphia still managed to fall into the same traps as every disconnected, segmented commuter rail system in the United States. They did the largest necessary improvement to the regional rail network, and then didn't do any of the small things. There are many junctions on both the Reading and Pennsylvania sides, and they needed to be upgraded in order to handle more frequency. There are connections that seem obvious, such as the two branches adjacent to the Northeast Corridor, but they are entirely missing. Many stations lack high platforms, making the passenger experience uncomfortable, and making using the system with a walker/wheelchair/stroller a nightmare for conductors and passengers alike. As for the through-running tunnel scheme, it doesn't really serve its original purpose. The vast majority of passengers get off at Center City, and the lines that do through-run do not provide any new or useful trips. Philadelphia learned a lesson that New York think tanks don't want to accept: *A downtown connection is only as useful as the network it already serves.*

Lessons from Philadelphia: Through-Running Is Not A Silver Bullet

Philadelphia's commuter rail has many deficiencies that prevent it from reaching its full potential, and many of these deficiencies existed before the Center City tunnel was built. The lines built by the Reading Company were not built to a high standard, and lacked the necessary infrastructure to handle higher frequencies. Many of the former Reading lines are single-tracked in some portions, and are bottlenecked by large junctions that haven't been rebuilt or reconfigured in years. Without upgrades beyond the Center City tunnel, the benefits of through-running are largely lost in Philadelphia. Even the most frequent service in the network, the Paoli-Thorndale Line, runs only 4 to 5 trains per hour during peak periods, as you can see in the timetable below.



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Mondays through Fridays (Except Major Holidays)																						
TO CENTER CITY	Fare Zone	Services			Stations	Train Number	514	516	5300	5302	9590	512	9510	9592	5304	5210	5318	9540	5322	9544	9546	5216
						AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM
	4	✓	✓	✓	Thorndale	4:37	5:13	6:13	—	6:38	—	—	—	7:18	—	—	—	8:22	—	9:34	—	—
	4	✓	✓	✓	Downingtown	4:41	5:17	6:17	—	6:42	—	—	—	7:22	—	—	—	8:26	—	9:38	—	—
	4	✓	✓	✓	Whitford	4:48	5:24	6:24	—	6:49	—	—	—	7:29	—	—	—	8:33	—	9:45	—	—
	4	✓	✓	✓	Exton	4:50	5:26	6:26	—	6:52	—	—	—	7:32	—	—	—	8:35	—	9:47	—	—
	4	✓	✓	✓	Malvern	4:56	5:32	6:32	6:52	6:59	—	7:22	7:39	—	7:49	8:22	8:42	9:22	9:54	10:22	10:54	
	4	✓	✓	✓	Paoli (Rt 204, 206)	4:59	5:35	6:35	6:55	7:03	—	7:26	7:43	—	7:52	8:26	8:45	9:26	9:58	10:26	10:58	
	3	✓	✓	✓	Daylesford	5:02	5:38	6:38	6:58	7:06	—	7:29	7:46	—	7:55	8:29	8:48	9:29	10:01	10:29	11:01	
	3	✓	✓	✓	Berwyn	5:05	5:41	6:41	7:01	7:09	—	7:32	7:49	—	7:58	8:31	8:50	9:31	10:03	10:31	11:03	
	3	✓	✓	✓	Devon	5:07	5:43	6:43	7:03	7:12	—	7:35	7:52	—	8:00	8:33	8:52	9:33	10:05	10:33	11:05	
	3	✓	✓	✓	Strafford	5:10	5:46	6:46	7:06	7:15	—	7:38	7:55	—	8:03	8:35	8:55	9:35	10:07	10:35	11:07	
	3	✓	✓	✓	Wayne	5:13	5:49	6:49	7:09	7:18	7:24	7:41	7:58	—	8:06	8:38	8:57	9:38	10:09	10:38	11:09	
	3	✓	✓	✓	St. Davids	5:15	5:51	6:51	7:11	—	7:26	7:43	—	—	8:08	8:40	8:59	9:40	10:11	10:40	11:11	
	3	✓	✓	✓	Radnor	5:17	5:53	6:53	7:13	—	7:28	7:45	—	—	8:10	8:42	9:01	9:42	10:13	10:42	11:13	
	3	✓	✓	✓	Villanova	5:19	5:55	6:55	7:15	—	7:31	7:47	—	—	8:12	8:44	9:03	9:44	10:15	10:44	11:15	
	3	✓	✓	✓	Rosemont	5:22	5:58	6:58	7:18	—	7:33	7:50	—	—	8:15	8:46	9:06	9:46	10:17	10:46	11:17	
	3	✓	✓	✓	Bryn Mawr	5:24	6:00	7:00	7:20	—	7:36	7:53	—	7:58	8:17	8:49	9:09	9:49	10:20	10:49	11:20	
	2	✓	✓	✓	Haverford	5:26	6:02	7:02	7:22	—	7:39	—	—	8:00	8:19	8:52	9:12	9:52	10:23	10:52	11:23	
	2	✓	✓	✓	Ardmore	5:28	6:04	7:04	7:24	—	7:41	—	—	8:03	8:21	8:54	9:14	9:54	10:25	10:54	11:25	
	2	✓	✓	✓	Wynnewood	5:30	6:06	7:06	7:26	—	7:44	—	—	8:06	8:23	8:57	9:17	9:57	10:27	10:57	11:27	
	2	✓	✓	✓	Narberth	5:32	6:08	7:08	7:28	—	7:46	—	—	8:08	8:25	8:59	9:19	9:59	10:29	10:59	11:29	
2	✓	✓	✓	Merion	5:34	6:10	7:10	7:30	—	7:48	—	—	8:10	8:27	9:01	9:22	10:01	10:31	11:01	11:31		
1	✓	✓	✓	Overbrook	5:37	6:13	7:13	7:33	—	7:50	—	—	8:13	8:30	9:03	9:25	10:03	10:34	11:03	11:34		
C	✓	✓	✓	Gray 30th St Station	5:49	6:25	7:25	7:43	D7:39	8:02	D8:12	D8:19	8:25	8:42	9:15	D9:37	10:15	D10:46	D11:15	11:46		
C	✓	✓	✓	Suburban Station	5:54	6:30	7:30	7:48	D7:44	8:07	D8:17	D8:24	8:30	8:47	9:20	D9:42	10:20	D10:51	D11:20	11:51		
C	✓	✓	✓	Jefferson Station	5:59	6:35	7:35	7:53	D7:49	8:12	D8:22	D8:29	8:35	8:52	9:25	D9:47	10:25	D10:56	D11:25	11:56		
C	✓	✓	✓	Temple University	6:03	6:39	7:39	7:57	7:54	8:17	8:27	8:34	8:40	8:56	9:30	9:51	10:30	11:01	11:30	12:00		

A weekday morning timetable for the SEPTA Paoli-Thorndale Line. Credit: Southeastern Pennsylvania Transportation Authority.

Before the tunnel, Reading's capacity issues didn't affect the Pennsylvania Railroad commuters; they had their own system that was built to handle higher frequencies. However, after the tunnel unified the two systems, SEPTA chose to create a system where most services ran on one former Reading line and one former Pennsylvania line. They run according to the maximum capacity of the Reading lines, which is lower than that of the Pennsylvania. SEPTA is unable to take advantage of the capacity that the Center City tunnel can provide, because the network they inherited is unable to handle it. One of the benefits of through-running is that it can increase capacity, meaning passengers can get more frequent service.

Case Study: Berlin North-South Tunnel

Oftentimes, American transit advocates like to point at London and Paris and ask why New York can't just be like them when it comes to building through-running transit. For one, these advocates don't appear to know what they actually want; they often write about wanting a system like the Paris RER, but then create maps and proposals that are more analogous to [Philadelphia](#).¹¹ Additionally, there are other cities in Europe than Paris, despite what many Americans seem to think. One such city, Berlin, developed two incredibly elegant solutions to reducing rail traffic that New York planners need to investigate further.

At the tail end of the 19th century, Berlin had built several railway terminals to connect to destinations around what was then the kingdom of Prussia. However, these terminals had created a problem: passengers needed to take carriages between the various terminals in order to change trains. There was an orbital route encircling Berlin known as the Ringbahn, but by its very definition, the Ringbahn did not serve the busiest parts of Berlin. Additionally, it was very well-trafficked, primarily by freight trains. The Stadtbahn's opening allowed trains to serve several terminals across much of central Berlin, and by doing so, reduced congestion on the rail lines.

¹¹ "Trans-Regional Express (T-REX)," *Regional Plan Association*, <https://rpa.org/work/reports/trans-regional-express-t-rex>

However, the Stadtbahn is not the only rail link through Berlin. There is also the North-South tunnel, which was built in 2006. It parallels a rapid transit tunnel built for the S-Bahn, an urban railway network that serves a similar purpose to the express trains in New York. The 21st century tunnel was not built to serve rapid transit; it instead serves intercity and commuter trains. This connection is incredibly important, and brought considerably more capacity to the center of Berlin. A similar situation may have arisen in Berlin, if not for some good regional planning choices.

While the Stadtbahn connected many former railway terminals, one very important station it did not connect to was Anhalter Bahnhof. Originally it served as the Berlin end of the Berlin-Halle railway from its opening in the 19th century until it was destroyed in the bombings in 1945. After a period of neglect in occupied Berlin, the station was eventually closed in 1952 and all trains were rerouted to stations on the Ringbahn. During the time of the Berlin Wall, rebuilding Anhalter on its former site was impractical, as the wall blocked off much of the central district the station was originally meant to serve.



A map of commuter and intercity rail (light red), U-Bahn (black), and S-Bahn (dark red) services in Berlin, circa 1910. Note the disconnected terminal stations at Potsdamer and Lehrter.

When Germany was reunified in the 1990s, it would have been very easy to simply rebuild the station. Doing so might have been hailed as a return to glory, and a signal to Europe that Germany was back on the map. However, Berlin chose not to do this, because if the terminal had been rebuilt, passengers coming from the south would have transferred to the nearby U-Bahn or S-Bahn in order to continue their trip into the city. This was not ideal because the U-Bahn in question (now the U2 line) was an older *Kleinprofil* subway. *Kleinprofil*, literally “small profile,” is a type of older U-Bahn line in Germany that was built at a smaller size to reduce costs, similar to the former IRT lines in New York City. These smaller trains fill up much quicker, so it is far easier to hit capacity limits.

To avoid overloading the U2, Berlin built the Potsdamer Platz station as part of the North-South Tunnel. The business district of the same name has grown around it, and developed as a walkable and pedestrian-friendly area, with new high-rises springing up around the station including Deutsche Bahn’s own Bahntower. By choosing a new right-of-way instead of expanding an old one, trains could return to



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the center of Berlin without overloading the Ringbahn or Stadtbahn, and the now-reunified Mitte district could begin to grow again. Additionally, trains can run through from Potsdamer Platz to the Stadtbahn, meaning that passengers didn't have to transfer to the U-Bahn or S-Bahn to reach the city center.

Prior to the tunnel, the only passenger line through Berlin was the Stadtbahn. Expanding a century-old viaduct in the city center simply wasn't an option - a long-term shutdown of Berlin's iconic elevated railway would have crippled the S-Bahn and the intercity rail system. Adding more tracks was out of the question; there were already four on the viaduct and the need for property acquisitions in the central business district made such an expansion far too costly. In addition to all these challenges, the situation in Berlin had changed considerably. A reformed, unified Berlin was the capital of a reformed and unified Germany. Enhancing regional connectivity was more than just good urban planning - it was now good politics. A reformed and unified Germany had to be capable of reforming and unifying the railway network, and using that network to launch the German economy to new heights.

The result of such thinking was Berlin Hauptbahnhof - a massive multimodal station located at the intersection of the new North-South tunnel and the Stadtbahn. This allows connections between two different main lines, not unlike Secaucus Junction in New Jersey. The North-South tunnel, however, drastically increased capacity for intercity trains and allowed them to get even closer to the central business district. Rather than limiting intercity, regional, and new ICE high-speed trains to just two tracks in central Berlin, the North-South tunnel gave these trains six tracks. The Hauptbahnhof project ended up being immensely successful, and for all of Deutsche Bahn's faults, the network DB uses to connect Berlin to itself and the states surrounding it is far more efficient than it used to be.

Lessons From Berlin: Regional Planning, Politics, and Penn Station

New York would do well to take advantage of the politics of transportation, as Berlin did. Infrastructure is one of the many ways in which a government, and its politicians, can prove to the world that they mean business. The reunification of Germany provided an opportunity to better connect Berlin to the country, and it also meant that far more Westerners were traveling to and from the capital. If Berlin was to be the thriving capital of a thriving Germany, it had to be able to handle all the people who wanted to be there.

Berlin's tunnel provides a lesson in the power of regional planning that New York should pay attention to. A project like the North-South tunnel requires cooperation, and without proper scheduling of regional and intercity trains, the tunnel would not be used effectively. Additionally, it requires coordination with rail services from other countries; some trains running through the North-South tunnel come from Austria, Hungary, or Czechia. New York's commuter rail has a similar issue stemming from jurisdictional divides, but unlike Berlin, New York's lack of cooperation has resulted in poorer service for many passengers.

The New Haven Line, Connecticut's busiest passenger railroad has Metro North and Amtrak services, is owned by the Connecticut Department of Transportation (CTDOT), who works with Metro North to operate the New Haven Line. However, because of scheduling conflicts, a lack of cooperation, and deferred track improvements, the CTDOT-owned portion of the Northeast Corridor is the slowest section of the Acela high-speed rail service. At the end of the day, they all have the same objective: provide high-quality rail service to the states of New York and Connecticut. Cooperation between Metro North



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and Amtrak can create good results for everyone involved, and improve service for the entire region.

New York should also learn to consider the movement of people, not the movement of trains. It would have been very easy to consider the surface-level problem of train congestion on the Stadtbahn, and address it by building a tunnel parallel to the Stadtbahn. However, by creating a line that served a new direction of travel while still serving the central business district, Berlin added capacity and improved their network. Instead of asking, “How can we reduce congestion and increase capacity at this transportation node?” Berlin asked, “*Why* is there congestion at this transportation node?”

Oftentimes, when we answer the question of why, transportation planners arrive at an entirely different conclusion than simply adding more capacity to existing transportation options. New York, thankfully, is beginning to ask the right questions in transportation planning. Grand Central Madison, the new Long Island Rail Road terminal in Midtown Manhattan, is one such example of this. Prior to its construction, most LIRR trains terminated at Penn Station, which has been the most-used transit hub in the western hemisphere for a long time.¹² By asking why instead of how, planners arrived at the conclusion that Penn is not congested by any fault of its own; it is congested because *it is the only option*. The genius of Grand Central Madison is that, rather than improving Penn Station, it opens up a new destination for LIRR passengers. Simultaneously, GCM added two tracks underneath the East River, doubling the system’s overall capacity in Manhattan. The LIRR was able to increase Manhattan service by about 50%, and in doing so, brought Long Island commuters closer to their final destination.¹³ It remains a rare example of people-first transportation policy in the region, and the philosophy that led the MTA to East Side Access is one we must embrace at a larger scale. Doing so will not only create better transportation in the region, but also afford us the opportunity to fix Penn Station.

The Penn Station discussion is incredibly complicated, and several things about it are characteristic of New York. Like many things in this godforsaken city, the debate around Penn boils down to bureaucratic spaghetti, quid pro quo deals made ages ago, real estate, construction delays, and cost overruns. The station has never truly closed, because doing so would create a traffic nightmare. This means that renovations have to continue without majorly disrupting service, resulting in disjointed, tacked-on expansions and concourse modifications. Additionally, when Penn was first built, there was not an arena sitting on top of it. Now, any modifications to the underground concourse have to hold up the foundations of a massive stadium, as opposed to a building built exclusively to serve as a transit center. We will need to improve Penn Station if we wish to enable through-running service, and given the difficult political decisions related to making major changes to the station (and, by extension, Madison Square Garden), our money is far better spent on improving the existing network.

New Use of Old Infrastructure: Priority Investments to Prepare For A Through-Running System

If New York were to adopt through-running tomorrow, we’d be in a similar situation as Philadelphia—using cobbled-together infrastructure that was built for different types of services by

¹² “The Most Awful Transit Center in America Could Get Unimaginably Worse,” *Bloomberg*, <https://www.bloomberg.com/news/features/2018-01-10/the-most-awful-transit-center-in-america-could-get-unimaginably-worse>

¹³ “East Side Access,” *mta.info*, <https://www.mta.info/project/east-side-access>



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different companies, without adapting said infrastructure to best suit its new purpose. Penn Station was built as an intercity terminal for New Jersey passengers; it was never originally meant to serve commuters from Long Island. Originally, the Long Island Rail Road funneled passengers to terminal stations in Long Island City and Downtown Brooklyn, and left passengers to cross the East River via ferry. Many of New Jersey Transit's lines were never meant to connect to Penn Station; they were built to connect passengers to Manhattan-bound ferries at various terminals along the Hudson, including Hoboken Terminal. Work done by NJT in the 1990s allowed most of their services to terminate at Penn Station, and as a result, NJT rail traffic has quadrupled over the past 50 years.^{14,15}

¹⁴ Robert Hanley, "New Jersey to Add Trains to Midtown," *New York Times*, <https://www.nytimes.com/1991/05/01/nyregion/new-jersey-to-add-trains-to-midtown.html>

¹⁵ "Gateway Project (2011)," *Amtrak*, <https://web.archive.org/web/20130517075834/http://www.lautenberg.senate.gov/assets/Gateway.pdf>



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Such is the nature of the New York commuter rail system. It is old, and it was built for a different time period. It can be turned into a through-running system, but it is imperative that, before we create a through-running system, we adapt the network first. We need to make sure it can handle as much capacity as necessary, and we need to ensure its resiliency for the future. Our tunnels have sustained damage from hundreds of trains per day for over 100 years. Our bridges have been gradually turning to rust since the fall of the Qing Dynasty (yes, they're that old). The infrastructure we have is not equipped to handle the load it already has. Our network can, with the right upgrades, handle through-running. But without those upgrades, we will have a commuter rail system only marginally better than what's already here - and it won't create any new trips or commute patterns.

Consider what opportunities can be opened by through-running. New Jersey commuters could travel to Queens without changing trains. That creates a whole new trip, and enhances connectivity. However, where in Queens would they be going? Unless their destination is near Woodside, Forest Hills, Kew Gardens, or Jamaica, they won't need or want to take the train. They'll either change to the subway or they'll drive. New Jersey passengers won't be able to access Long Island City, Astoria, or Jackson Heights, and they won't be able to access Brooklyn at all. These are the gaps a through-running network must overcome. If we do not actually do the work to create meaningful routes and build more stations, there will be no point to the infrastructure investments that a through-running system requires.

For the most part, there's no real value to through-running in New York *yet*. There are investments to make meaningful connections within the city that are needed, including (but not limited to) more infill stations, more capacity, and better junctions. It's more worthwhile to simply improve what we can and make sure that we spend the money to fix other problems on the network. Through-running can bring immense benefits, but it's more worthwhile to spend money making sure the services we already have operate the best they can. Through-running should remain the dream we work towards, but if it is all we focus on, the network will not do well.

Philadelphia had to learn the hard way that a through-running tunnel is only as good as the networks it connects. In the case of New York, our networks simply aren't up to the challenge of handling the traffic through-running demands. As such, through-running will not help in Penn Station until the completion of the Hudson Tunnel Project. That is expected to happen in 2038, at which time there will be four fully operational tracks on the East and West sides of Penn Station. Having four tracks is crucial for creating a more resilient and consistent network, and NYC will be able to hit the theoretical maximum capacity on the Northeast Corridor more easily.

Coincidentally, by the time 2038 rolls around, several key infrastructure projects in the tri-state area will be completed. Important junctions and bridges will be replaced and rehabilitated, and speeds will increase in areas where upgrades are desperately needed.^{16,17,18} If every one of these projects are funded, fully built, and operational by 2038, through-running would become a desirable option. Without these projects, the network is too fragile to unify. The network would be reduced to a single point of failure: Penn Station's

¹⁶ "Sawtooth Bridges Replacement," *Amtrak*, <https://amtraknewera.com/gateway/sawtooth/>

¹⁷ "Dock Bridge Rehabilitation," *Amtrak*, <https://amtraknewera.com/gateway/dock/>

¹⁸ "Connecticut River Bridge Project," *Amtrak*, <https://amtraknewera.com/crb/>



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two tracks. One minor issue on one train could stop 700,000 people from getting to work on time. That is unacceptable. There are 18 different services feeding into Penn Station, two of which (Amtrak) are already through-running.¹⁹ If we were to create a system where every non-Amtrak train continued past Penn, we'd still have between six and ten different services, all funneling into two tracks. Changing service patterns can increase capacity, but if we try to run 6-10 different services through just two 100+ year old tracks, things will go poorly. With four tracks and a resilient, reliable network, through-running is a great solution. It should be the end goal for Penn Station and the New York commuter rail system. Until then, we can use commuter rail to connect the region to itself and better serve every part of the tri-state area with transit, and connect passengers to opportunities they otherwise do not have.

In order to prepare our network for through-running, we must improve its resiliency and reliability across the region. Adding capacity by quad-tracking the New Jersey approach to Penn Station is crucial, as is improving speeds within terminal districts. Lighter trains will improve journey times across the network and allow for frequent local service to the boroughs of Queens and the Bronx, setting the stage for new and more meaningful cross-regional trips. Better collaboration between agencies will enable Metro North, New Jersey Transit, Long Island Rail Road, and Amtrak to work together and optimize existing services, reducing journey times and improving on-time performance and reliability for all passengers. Even without through-running, a more reliable and resilient terminal-based rail system would enhance the tri-state area for generations to come.

¹⁹ Those 18 services are: Six NJT services, nine LIRR services, one Metro-North service (in the future), and two Amtrak services. It's worth noting that not all Amtrak trains through-run— many turn around in New York.