

CHAPTER 7

Mid-Atlantic North

Harrisburg

Middletown

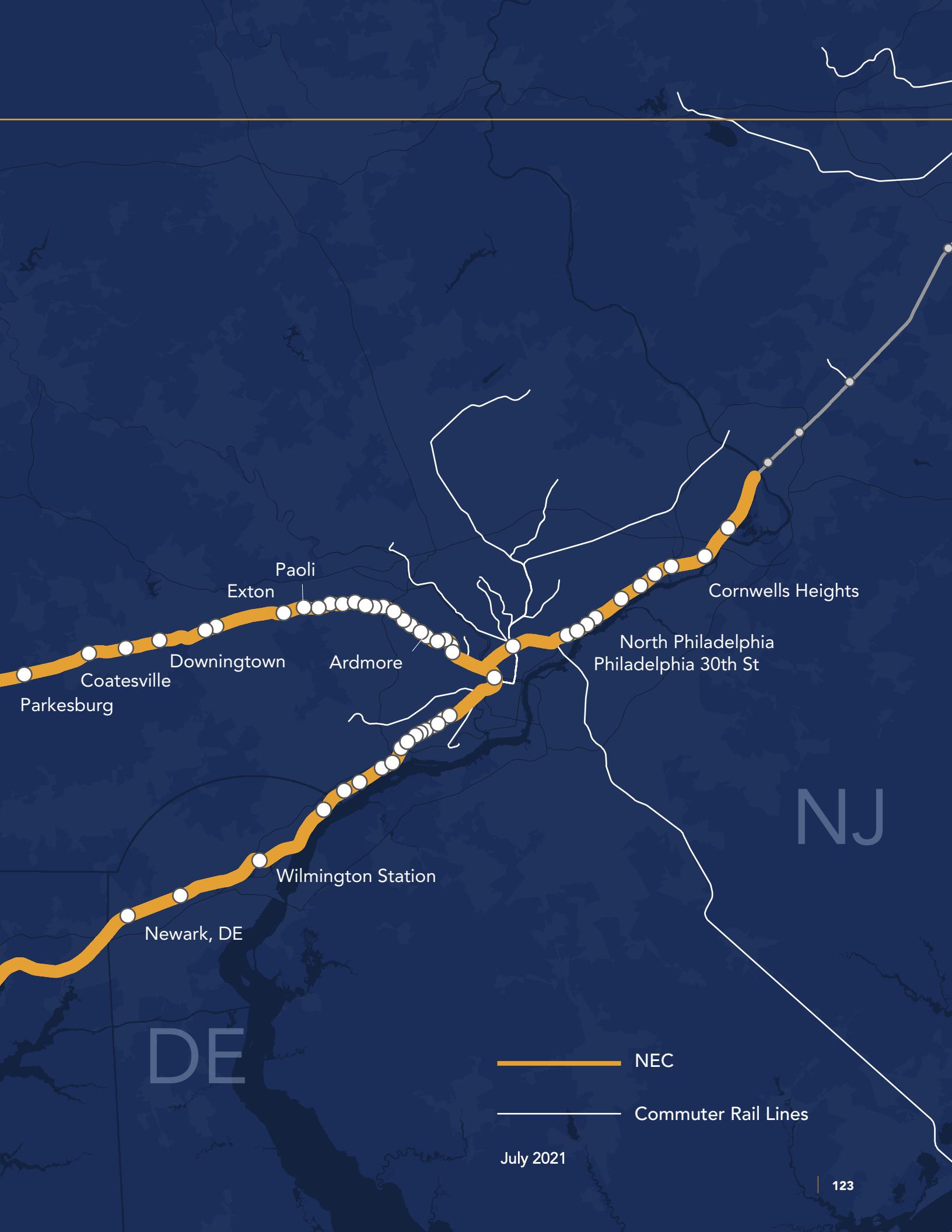
Elizabethtown

Mount Joy

Lancaster

PA

MD





Passengers boarding a SEPTA train at 30th Street Station (PA)

Overview

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The Mid-Atlantic North (MAN) territory extends from Perryville, MD to Morris Interlocking in Pennsylvania, which is just south of Trenton, NJ. It also includes the Harrisburg Line from Harrisburg, PA to Philadelphia. Philadelphia's 30th Street Station is the third busiest station after PSNY and Washington Union Station, serving over 30,000 trips per day.⁷⁶ It is poised for growth with a new district plan that will further catalyze development around the major transportation hub. The station is served by Amtrak, SEPTA, and NJ TRANSIT. The Harrisburg line is served by Amtrak and SEPTA. Amtrak owns and manages the right-of-way in MAN and coordinates projects with DelDOT, PennDOT, and SEPTA.

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Amtrak Northeast Regional train at Newark Regional Transit Center (DE)

MAN faces challenges in replacing its aging infrastructure while meeting the service goals of the providers in the territory. MAN has the most undergraduate bridges of any NEC territory, and the greatest overall capital renewal need. Services in the MAN territory are affected by bottlenecks, high train volumes during peak times competing for track and station access, and operational constraints due to a limited number of interlockings and sidings (meaning there are few opportunities for turning back trains and limited flexibility to respond to incidents).

The implementation of the C35 plan in MAN will enable expanded commuter rail service on the three SEPTA lines and one NJ TRANSIT line that operate in the territory, improve intercity travel times, and increase intercity service frequency. The NJ TRANSIT Atlantic City Line will see hourly service, representing 67 percent growth versus today. SEPTA's future service on the Paoli/Thorndale Line will see Exton trains extended to Malvern while Thorndale trains could be extended to Coatesville. SEPTA's Wilmington/Newark Line will see DelDOT-funded service extensions from Marcus Hook to Wilmington and on to the Newark Transportation Center. SEPTA's Trenton Line will see new trains serving Cornwells Heights, providing 30-minute frequencies all day long on the inner portion of the line. The addition of new trains originating at Cornwells Heights will allow the conversion of some existing local trains from Trenton to express service.



Amtrak Acela south of Philadelphia 30th Street Station (PA)

MAN Project Highlights

With over 500,000 residents and over 300,000 jobs in the Harrisburg-Carlisle area, the MAN territory facilitates connections between the NEC mainline and points west along the Harrisburg Line.⁷⁷ The Philadelphia-Camden-Wilmington area has 6.1 million residents and 2.8 million jobs.⁷⁸ Though the area underwent de-industrialization in the mid- to late-20th century, the territory now enjoys a robust business services, education, healthcare, retail and hospitality, and financial services economy. The territory also supports a large tourism economy, with over 46 million trips to the Greater Philadelphia region alone in 2019.⁷⁹

MAN Special Project Highlights

- **Harrisburg Line Interlocking Improvement Projects:** This includes interlocking improvements for Amtrak's Keystone Corridor and SEPTA's Paoli-Thorndale Line, replacing or reconfiguring outdated interlockings that present a challenge to reliability. The interlocking improvements support existing and future ridership growth and support flexible operations.
- **Harrisburg Line Catenary and Signal Projects:** This includes catenary and signal improvements for Amtrak's Keystone Corridor and SEPTA's Paoli-Thorndale Line. The projects will replace outdated signal systems to allow bi-directional train movements and support flexible and more efficient operations than are currently possible. Overhead catenary will be replaced and upgraded to improve system reliability.
- **New Interlocking and Turnback Track between Cornwells Heights and Eddington:** This project will allow growth in Trenton Line service by allowing some trains to turn back to Philadelphia at Cornwells Heights, reducing the amount of operational activity by SEPTA in the delay-prone southern approach to Trenton.
- **Ragan Turnback Track:** Allows select SEPTA Wilmington Line trains to use multiple tracks at Wilmington Station, using a turnback track past the station to allow for more reliable and more frequent SEPTA service and saving an estimated 4 to 7 minutes for southbound trips ending at Wilmington Station.
- **Holly-Bell-Landlith Improvement Project:** This project eliminates a bottleneck north of Wilmington by adding a third track in this location, offering Amtrak and SEPTA greater flexibility and schedule reliability.
- **Harrisburg Line: Station Accessibility Program – SEPTA-led stations (Villanova, Malvern, Devon, and Wynnewood):** The project will make the stations fully ADA accessible with high-level platforms, improve the customer experience, and bring the stations into a state of good repair.
- **Morrisville Yard:** This project will provide additional train storage and capacity at Trenton Transit Center by providing a new SEPTA facility at Morrisville Yard adjacent to NJ TRANSIT's facility.

Figure 7-1: MAN Special Project Groups and Benefits



MAN Special Project Groups

(See Appendix for full list of projects)

1 Morrisville	9 Coatesville
2 Bristol	10 PennDOT ADA
3 Philadelphia	11 Potts
4 Hook	12 Bryn Mawr
5 Claymont	13 Zoo
6 Wilmington	
7 Ragan	
8 Royaltown	

MAN 2035 Benefits



More frequent service

- More service on all three SEPTA lines
- Amtrak service increase 48% on the NEC and Harrisburg Line
- NJ TRANSIT service increase 67% on Atlantic City Line



Extensions of Service

- SEPTA trains terminating at Marcus Hook extended to Wilmington and Newark, DE
- SEPTA Thorndale trains potential extension to Coatesville



Accessibility and Resilient Design

- All Harrisburg Line stations fully ADA accessible
- Wilmington station ADA accessible

Source: C35 Analysis, 2021

MAN Capital Renewal Highlights

Capital renewal in the MAN territory includes upgrades to nearly 100 percent of the communications, signals, and power supply assets (including signal bridges, catenary hardware and wire, transmission wire, ABS, and interlockings). Work also renews the 237 culverts in the territory. There are approximately 440 undergrade bridges within MAN, the greatest number of any territory. C35 will make significant progress in bringing these critical infrastructure elements to a state of good repair, with approximately 14 percent programmed for replacement.

Figure 7-2: MAN Estimated Assets Replaced in Territory

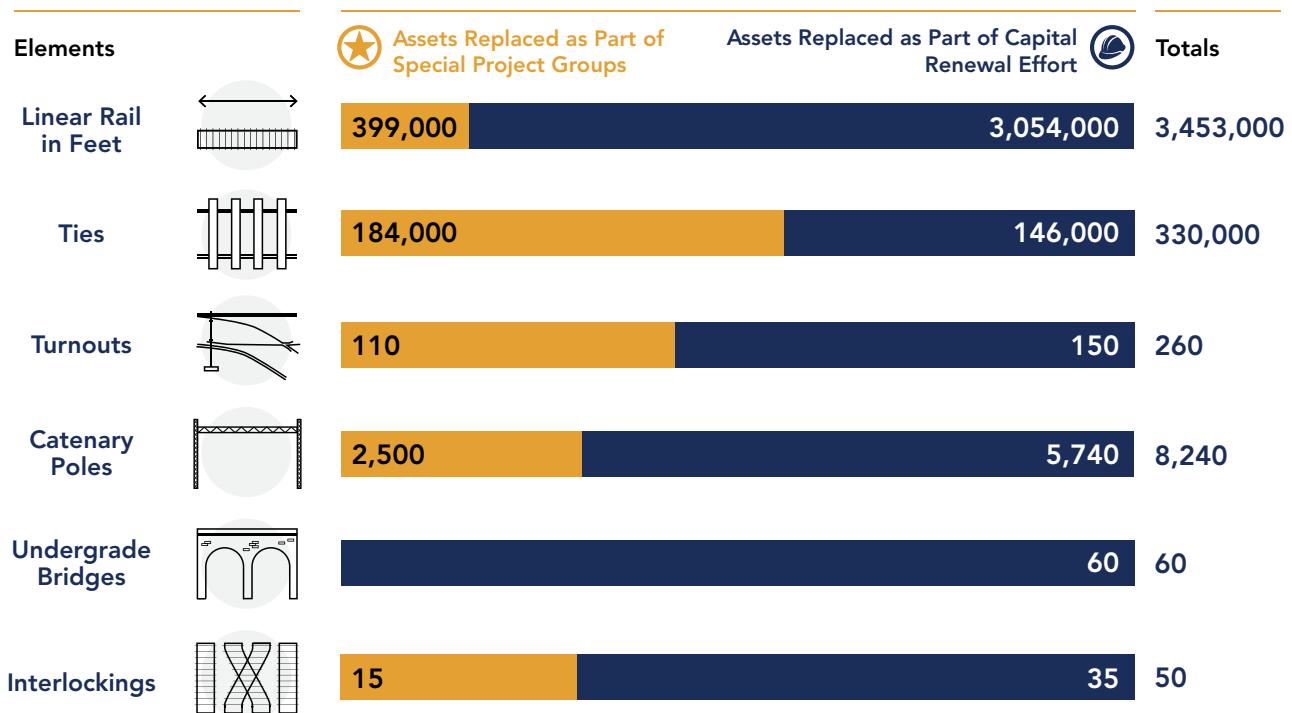


Figure notes:

1. Number in center of circle represents total assets
2. Numbers rounded

Source: C35 Analysis, 2021

Figure 7-3: MAN Estimated Assets Replaced in Special Project Groups and Capital Renewal Programs



Source: C35 Analysis, 2021

Schedule of Investments

The C35 plan sequenced 13 special project groups and 32 capital renewal programs in MAN, and evaluated temporary construction-related service adjustments and permanent service benefits. Special projects and capital renewal, such as the Harrisburg Line Paoli Interlocking Improvements and Paoli to Thorndale Catenary Replacement, were analyzed collectively and sequenced to maximize productivity of track outages, minimize service disruption, and create overall project delivery efficiencies in MAN. The C35 plan does require some peak-period service reductions for SEPTA, NJ TRANSIT, and Amtrak to allow for necessary track outages longer than a midday, overnight, or weekend period.

The roadmap for future project delivery provides an initial schedule timeline for efficient construction of special projects and capital renewal over the 15-year period.

Figure 7-4: MAN Estimated Initial Timeline Capital Renewal and Special Project Groups

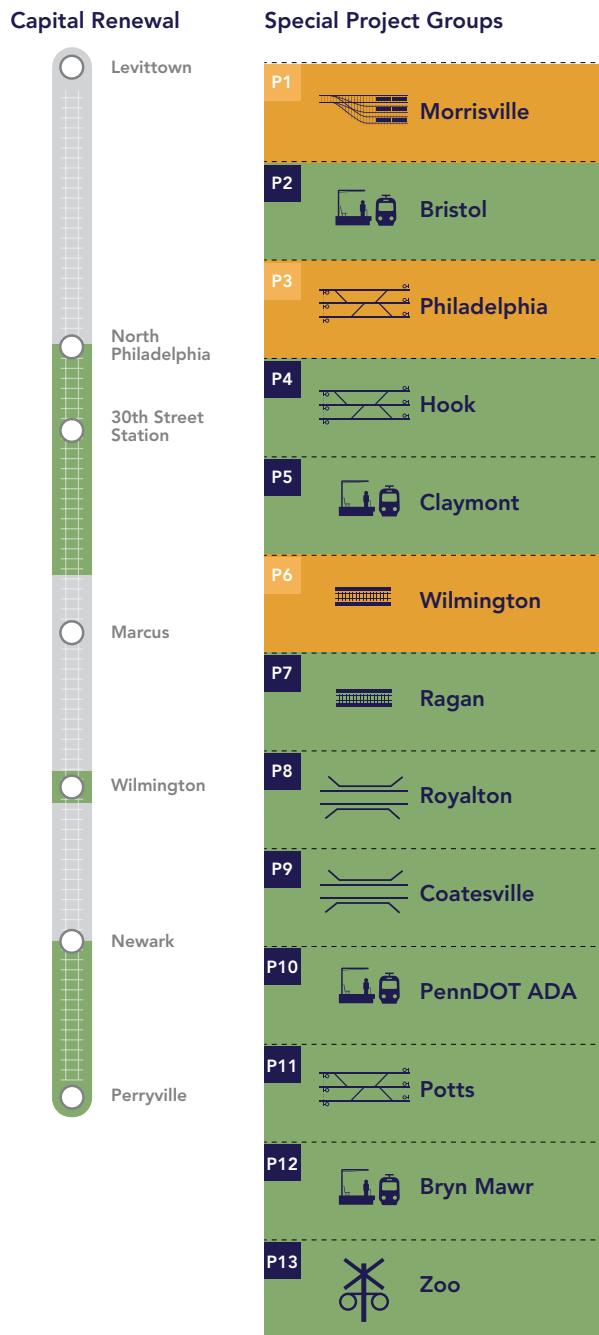


Initial analysis results to be updated in C37

Source: C35 Analysis, 2021

Capital Renewal	Special Project Groups
	P1
	P1
	P1

2030



2035

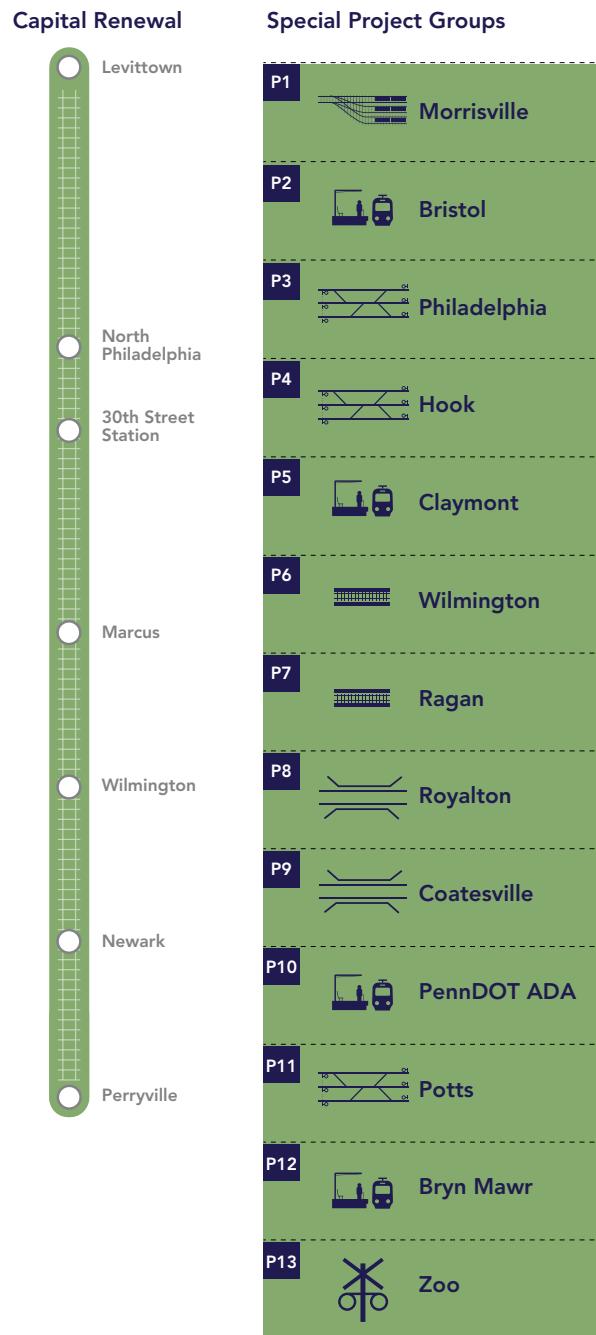
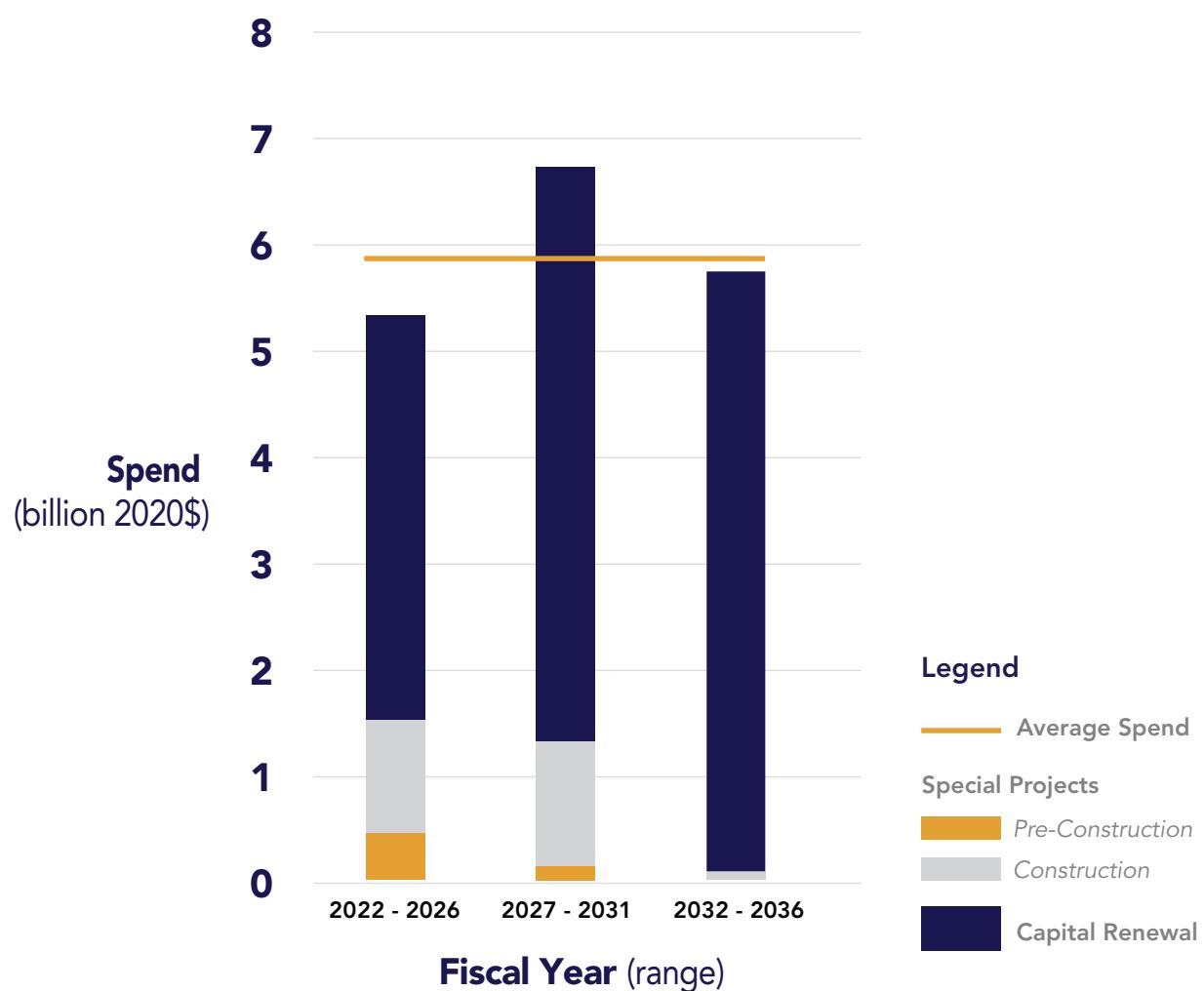
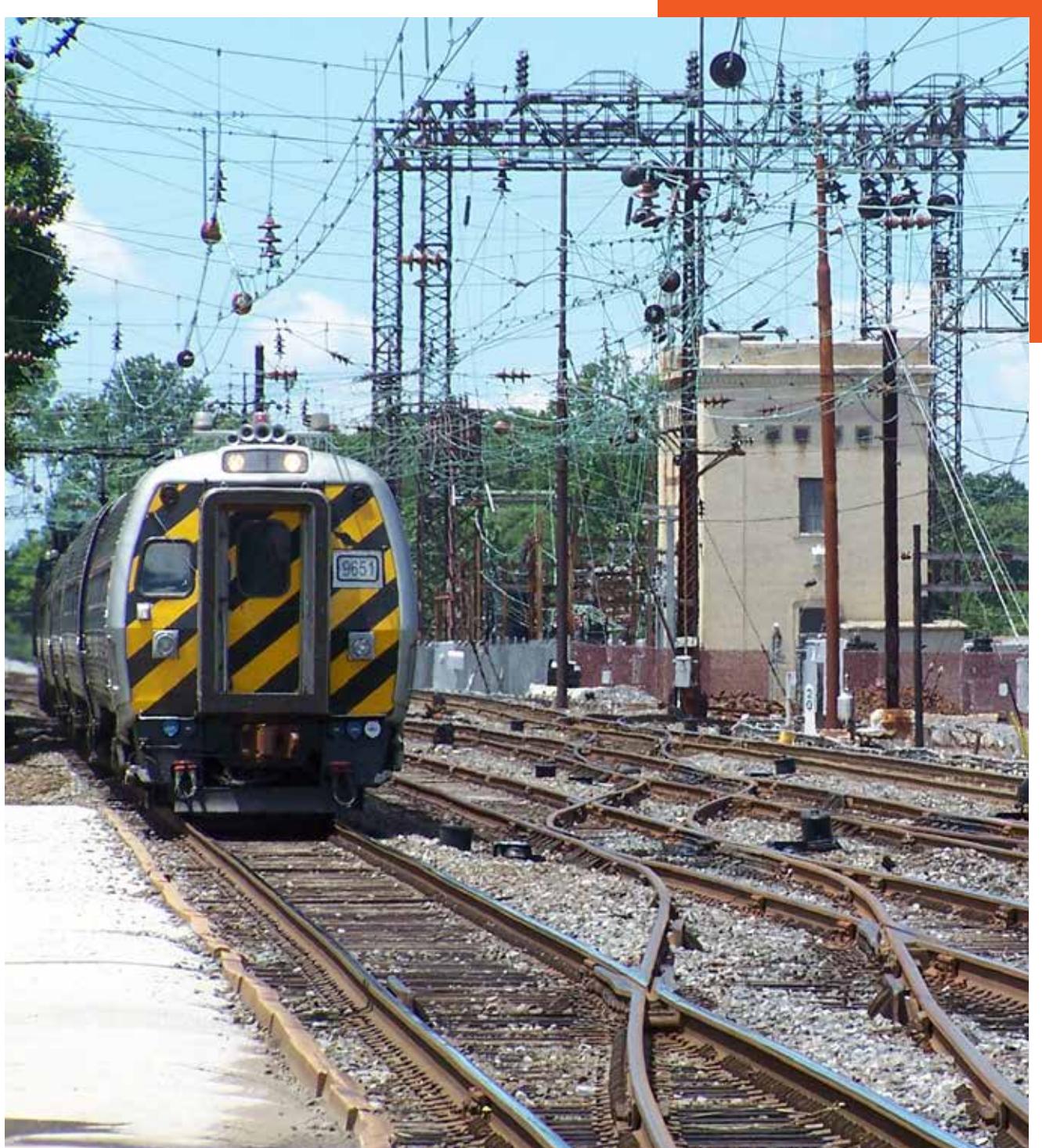


Figure 7-5: MAN Estimated Total Capital Costs – 5 Year Increments

If the C35 project delivery sequence is followed, investment in this territory will be as much as \$18 billion total over 15 years.



Source: C35 Analysis, 2021



Harrisburg Line interlocking (PA)

Improve Mobility and Connections

Reliable Service

In FY2019 SEPTA trains were delayed over 2,600 hours and 13 percent of trains were late.⁸⁰ By bringing the territory to a state of good repair, risks of unexpected delay due to infrastructure and systems limitations will be dramatically reduced.



The C35 analysis of Amtrak 2019 dispatch data identified seven key locations that contributed to Amtrak and SEPTA train delay. Congestion and resulting delays occur in the MAN territory due to two-track operations in some segments, few interlockings that allow trains to shift between local and express tracks, and a limited number of turnback tracks where service can be originated/terminated without delaying other through trains. As a result, congestion occurs from operations associated with turning trains, switching tracks, or serving stations. The C35 plan will unlock these key capacity chokepoints by advancing several congestion relief projects. The new Cornwells Heights Interlocking and Turnback is an example of a C35 project that allows trains to turn without affecting mainline operations. Similarly, a plan by DelDOT and SEPTA to eliminate all Marcus Hook train turns (which can cause delays to Amtrak and other SEPTA trains) and operate through to Wilmington on a new/upgraded dedicated third track will reduce congestion. The Holly-Bell-Landlith Improvement project will reduce sources of delay at this location by about 25 percent by limiting the need to hold southbound SEPTA trains at Holly Interlocking or northbound trains at Wilmington due to mainline traffic.

Figure 7-6: MAN Estimated Delay Relief Improvements

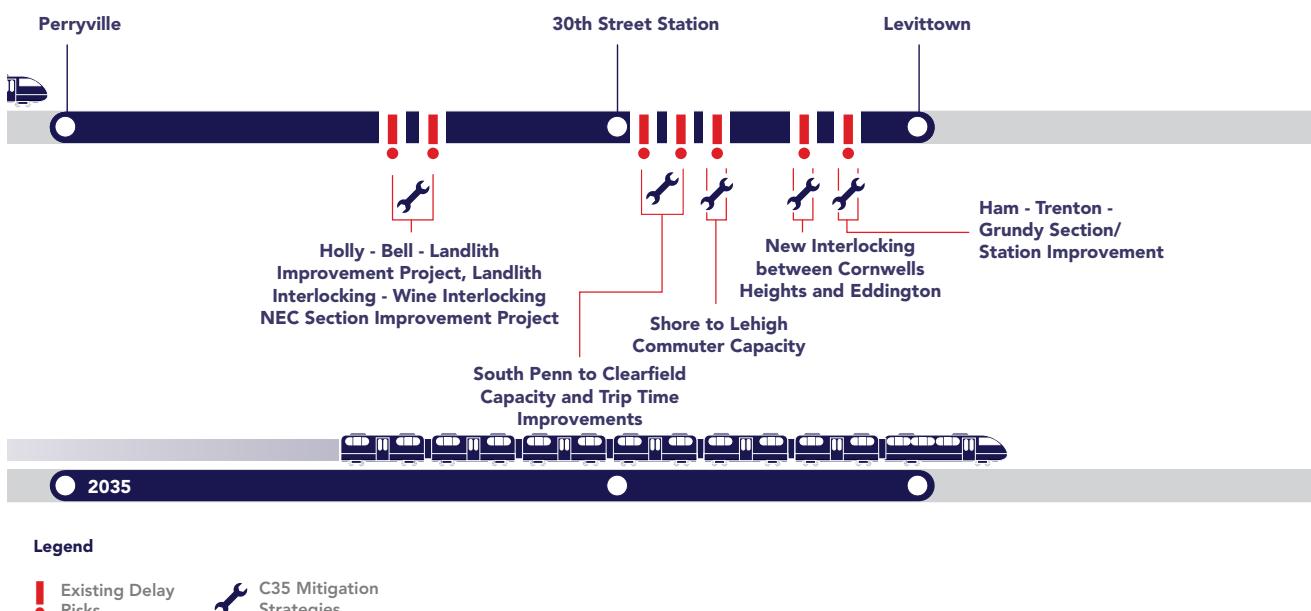


Figure note: Connecting corridors not included

Source: C35 Analysis, 2021

New Services

C35 improvements lay the foundation for advancing possible SEPTA service extensions on the Harrisburg Line from Thorndale (the last SEPTA station) to Amtrak's Coatesville Station, allowing for the possibility of an additional extension to Parkesburg in the future. The existing SEPTA Wilmington Line trains that terminate at Marcus Hook Station will be extended to Wilmington or Newark, DE in the 2035 plan.

Frequent Service

C35 special projects and capital renewal enable more frequent service across MAN. Maximum time between trains for SEPTA passengers traveling from Philadelphia on all lines will be reduced overall from 20 to 17 minutes in the reverse direction morning peak period (averaged for all NEC stations).

C35 will add tracks and interlockings, and upgrade communications and signals in the MAN territory to enable more frequent service across the territory. This includes enhanced Acela frequencies from Philadelphia, PA south to Washington, DC and north to New York via expansion of the NEC from two tracks to three between Marcus Hook and Wilmington. Under C35, Amtrak service, including the NEC mainline and Harrisburg line, will grow from 52 to 77 daily revenue round trips (48 percent increase). All three SEPTA lines (Trenton, Wilmington-Newark, and Paoli-Thorndale) will have increased frequencies after C35 projects are implemented and NJ TRANSIT Atlantic City Line service will expand to all-day hourly service. SEPTA service will increase 10 percent, growing from 107 to 118 trains per day (with additional service expansion by extending existing trains to Wilmington and Newark, DE), and NJ TRANSIT Atlantic City Line service will increase from 12 to 20 trains per day (67 percent).

The Harrisburg Line will also be improved, with upgrades to interlockings, track, and the signal system, including replacement of some of the last unidirectional signaling on the NEC with bidirectional signaling. These improvements support additional SEPTA peak-hour service and enhanced Amtrak Keystone service that will operate hourly off-peak, and twice hourly in the peak.

Figure 7-7: MAN Estimated AM Reverse-Peak Maximum Time Between Trains Averaged Across All NEC Stations (minutes)



Figure note: Actual times will vary by destination.

Source: C35 Analysis, 2021

Figure 7-8: MAN Estimated Daily Revenue Round Trips

26% increase in daily revenue round trips
across the MAN network by 2035

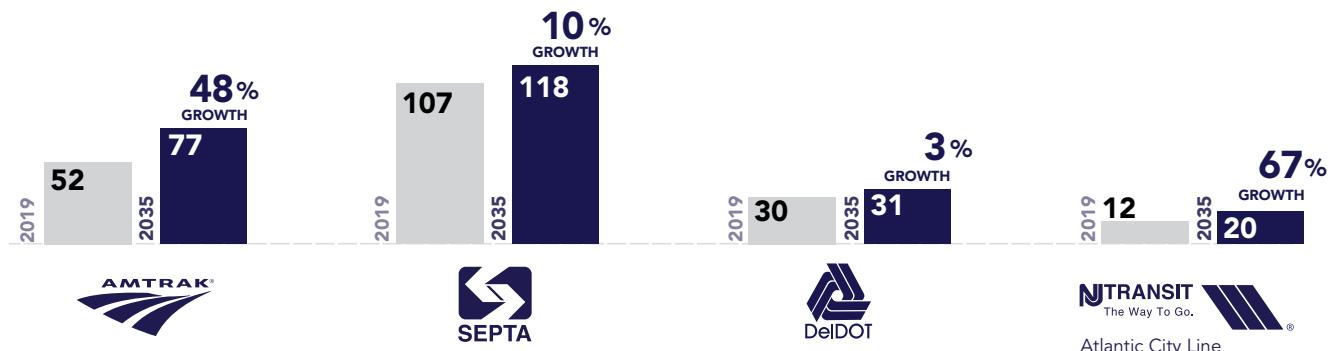


Figure Note: SEPTA included in DelDOT, DelDOT included in SEPTA

Source: C35 Analysis, 2021

Service Growth between Cornwells Heights and Trenton

The flexibility provided by C35 improvements would allow for southbound trains from Trenton, NJ every 20 minutes in the morning rush hour, every hour at other times, and every 30 minutes from Cornwells Heights throughout the day and evening. Some existing local SEPTA trains from Trenton will become new express service in C35, skipping inner zone stations to be served instead by the new trains originating at Cornwells Heights.



Amtrak Keystone Service departing Paoili Station (PA)

Faster Service

As a result of C35 improvements, Acela service will be approximately 15 minutes faster between New York City and Philadelphia, PA and 11 minutes faster between Philadelphia, PA and Washington, DC. Acela service will benefit from curve speed improvements as well as a new constant tension catenary system that allow for speeds greater than the current maximum 135 mph in the MAN territory. Overall, Amtrak Acela service will experience travel time savings of seven minutes in the MAN territory.

The C35 analysis shows that improvements at Landlith Interlocking (Holly-Bell-Landlith) that reconfigure crossovers and add a third track to the NEC could play a role in providing travel time savings and better on-time-performance. These improvements will eliminate or mitigate delays that currently hold each SEPTA and Amtrak train an average of 3.25 minutes at this location, which totals over roughly 35 train hours of delay each year. Overall, C35 improvements in MAN territory could mitigate or eliminate delays that currently total over 1,152 train hours of total annual delay and allows schedules to be adjusted accordingly to speed service.

If the C35 plan is implemented, MAN will benefit from a more reliable railroad with fewer service disruptions and delays. This can translate to even faster commuter travel times, and schedules could be modified to eliminate extra time built in to recover from recurring or typical delays. The C35 analysis did not yet incorporate this improvement and future analyses will revisit commuter operating schedules and potential travel time savings.

Station Improvements

All Harrisburg Line stations will be fully ADA accessible with high-level platforms for step-free boarding. Wilmington Station improvements will include ADA accessibility improvements, high-level platforms, platform extensions, and track geometry improvements to improve the customer experience and allow for greater flexibility of operations at the station.

Figure 7-9: Travel Time Improvements (PHL-DC and PHL-NYC)

Amtrak Acela Philadelphia 30th Street to Washington Union Station



Amtrak Acela New York Penn Station to Philadelphia 30th Street



Source: C35 Analysis, 2021

Create Economic Opportunity

Job Creation

The C35 investment will generate nearly 173,000 total new jobs (direct construction-related, indirect [non-construction] and induced) in MAN territory over the 15-year plan or an average of over 11,500 jobs per year. These jobs will in turn generate over \$10.5 billion in earnings throughout the territory over the 15-year period.

Delivering the C35 plan will require an estimated average of 1,600 specialized railroad construction jobs each year, well in excess of current staffing levels. Workforce development initiatives are necessary to make sure opportunity is afforded to residents within the MAN territory to fill the skilled workforce needs of the C35 plan.



Equity and Access

The NEC serves diverse populations in MAN. While C35 will improve rail for higher income Acela riders with speedier intercity service, an estimated 75 percent of riders in MAN use SEPTA services which create access to economic opportunity for a variety of high, medium, and lower income communities.

The MAN territory has some of the highest concentrations of poverty and lower income communities along the NEC. Twenty-three percent of residents within three miles of an NEC or connecting corridor station in the MAN territory are low-income (defined as household income less than 150 percent of the federal poverty rate), and almost 50 percent are minorities.⁸¹ Living within a three-mile radius of an NEC station provides an opportunity to link residents with economic and learning opportunities along the corridor.

These demographics are reflected in SEPTA regional rail ridership through the territory. Fifty-four percent of SEPTA riders are low-income (household income less than \$50,000 per year) and 46 percent of riders are from minority groups. Service improvements will offer more access to opportunities for these communities.⁸²

The station accessibility program for the Harrisburg Line will make four more stations along SEPTA's Paoli/Thorndale line ADA accessible (Villanova, Malvern, Devon, and Wynnewood). The line is the busiest in the SEPTA regional rail network, serving over 20,000 weekday passengers in 2018.⁸³



Exterior of Wilmington Station (DE)

Supporting Wilmington's Economy

Wilmington is the largest city in Delaware - a smaller city with economic influence regionally and nationally. Within walking distance of Wilmington Station are 16,000 jobs, 32 percent of which are in the financial services and insurance sectors.⁸⁴ Downtown Wilmington is home to 25 nationally recognized firms in these sectors that are closely integrated into the wider Northeast Corridor economy.⁸⁵ Key factors for financial services firms locating in Wilmington include access to the cluster of specialized financial services talent and convenient access to New York City and to Washington, DC via Amtrak.

Amtrak offers frequent regional and Acela service to Wilmington. Face-to-face meetings remain essential for financial services companies making large-scale decisions where it is weighing risks and alternatives.⁸⁶ Enhanced Acela frequencies and an overall 26 minutes of travel time savings between New York, Wilmington, and Washington, DC enabled by C35 improvements will support the continued growth of financial services and other knowledge economy industries in Wilmington.

Combat Climate Change

Reduced Carbon Footprint

C35 improvements support many of the environmental goals in the MAN territory. The Pennsylvania Climate Change Act of 2008 required an inventory of GHG emissions updated annually and a Climate Change Action Plan updated every three years.⁸⁷ The Pennsylvania Climate Action Plan released in 2018 identifies GHG reduction goals of 26 percent reduction in GHG emissions by 2025, and 80 percent reduction in GHG emissions by 2050. The plan also identifies strategies for adapting to climate change impacts and reducing pollution, including reducing vehicle miles traveled for single-occupancy vehicles.⁸⁸ In Delaware, the Cabinet Committee on Climate and Resiliency implements and carries out the 2013 Executive Order Preparing Delaware for Emerging Climate Impacts and Seizing Economic Opportunities from Reducing Emissions. The committee identified a GHG reduction goal for Delaware of 30 percent reduction by 2030 and developed a climate action plan to achieve that goal.⁸⁹ Improvements to the rail infrastructure in this territory will support more reliable travel and less disruptions in service, resulting in more resilient rail system. These factors aim to attract more commuters to rail that will ultimately support efforts to combat climate change.



Resilient Infrastructure

The replacement of crucial infrastructure in the MAN territory will reduce disruptions to service and preserve the reliability and resiliency of the system for years to come. C35 provides an opportunity to address areas subject to inundation through hardened and more resilient infrastructure. The Claymont Regional Transportation Center project replaces the existing Claymont, DE train station. The existing station does not meet current accessibility standards and suffers from a pedestrian tunnel that is subject to flooding because of the high water table. The new station will increase passenger safety and provide a more resilient facility for rail passengers.

Support Desirable Cities and Communities

Station Area Development

The Trenton Transit Center, the twelfth busiest station in the NJ TRANSIT system, provides a key link between Amtrak, NJ TRANSIT, and SEPTA. Governor Phil Murphy emphasized this, noting that it is a 'critical component of our transit system...while also serving as a gateway between the New York City and Philadelphia, PA metropolitan areas.⁹⁰ The city of Trenton, NJ has recognized the importance of this key connection, designating the area around the station as a Downtown Transit Village neighborhood, a focus area for redevelopment and increased density.⁹¹ A 2018 Strategic Action Blueprint from 2018 provides guidance and strategies for ensuring that development around the station is of high-quality design and is walkable, mixed-use, and welcoming to pedestrians and cyclists.⁹²

In Wilmington, DE, an effort to revitalize the city's riverfront has enhanced the city while creating new job opportunities. Originally a busy industrial zone, activity at Wilmington's riverfront slowed by the 1980s and many businesses vacated the area. In the 1990s, a decision was made to redevelop the riverfront, which is directly adjacent to Wilmington Station, into an economic and tourism hub. Now home to new residences, and retail, cultural, and recreational destinations, the redeveloped riverfront has successfully attracted new businesses and corporate headquarters. Between 2011 and 2017, employment on the riverfront increased by almost 1,750 jobs. Additionally, the average salary of riverfront employees grew from \$31,800 in 1997 to \$82,000 in 2017, primarily thanks to new high-skill, high-wage jobs at financial and insurance service companies.⁹³ Similar place-based planning efforts can leverage the benefits afforded by C35 to revitalize other cities in the MAN that have experienced population or job loss in recent years.



Philadelphia's 30th Street Station is the nexus of several major developments that connect downtown Philadelphia with the Schuylkill riverfront and University City. Amtrak's 30th Street District Plan envisions that the area surrounding the station will have 8.1 million square feet of residential development, 6.3 million square feet of office space, and 3.9 million square feet of hotel and retail space.⁹⁵



Rendering from 30th Street District Plan (PA)

One of the projects adjacent to 30th Street Station is Schuylkill Yards, a mixed-use community currently under development. The site covers 14 acres and when completed will include housing, office space, retail, and community amenities. This project, estimated to take 20 years to complete at an estimated \$3.5 billion, promotes NEC access at 30th Street Station as a major benefit of the development.⁹⁴

Innovation Districts

The cornerstone industries of the MAN territory, including healthcare, finance, education, management, arts, and entertainment, will benefit from the service enhancements that C35 will bring. There is already a strong relationship between medical and research institutions in Philadelphia and Delaware. The University of Delaware's Science Technology and Advanced Research (STAR) Campus is a 272-acre campus focused on fostering collaboration between researchers at the University and private-sector and governmental partners. It is located directly adjacent to

the Newark Amtrak and SEPTA regional rail station. The University also has partnerships with Thomas Jefferson University Hospital in Philadelphia and Maryland's Aberdeen Proving Grounds, and considers rail service a critical part of its strategy to attract corporate partners based in Baltimore, Philadelphia, and elsewhere.⁹⁶ C35 will increase frequencies and add express service between Philadelphia and Newark, DE, providing better access to the STAR Campus and helping facilitate the increased exchange of knowledge among researchers, businesses, and other partners.

The amenities, office space, and lab space in the new developments surrounding 30th Street Station will attract businesses in the science and technology industries, providing new job opportunities for graduates of nearby Drexel University and University of Pennsylvania. Proximity to the NEC will provide the science and technology companies who choose to locate here with direct linkages to other science and technology hubs throughout the Northeast.



University of Delaware STAR Campus Building (DE)