ANALYSIS OF OPTIONS FOR SCRANTON – NEW YORK AMTRAK PASSENGER RAIL SERVICE

Preliminary Service Plan and Financial Analysis

Prepared for:
Pennsylvania Northeast Regional Railroad Authority (PNRRA)

Prepared by:
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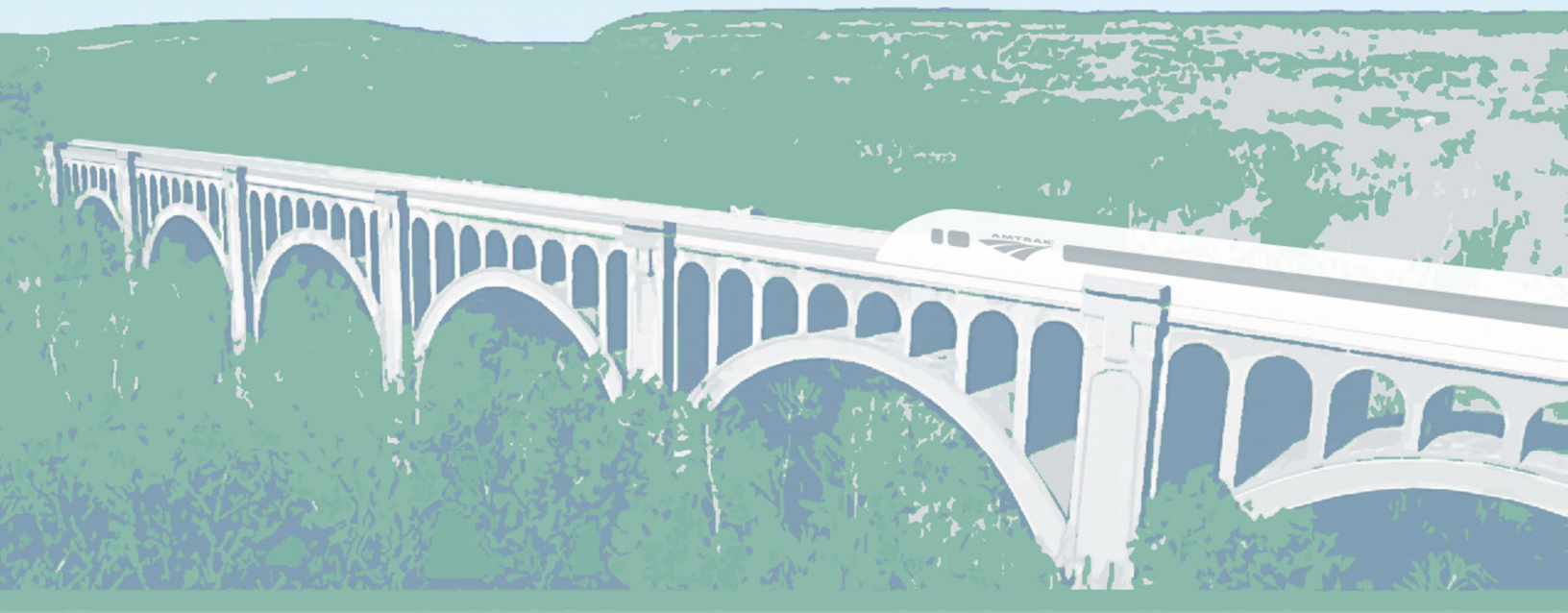

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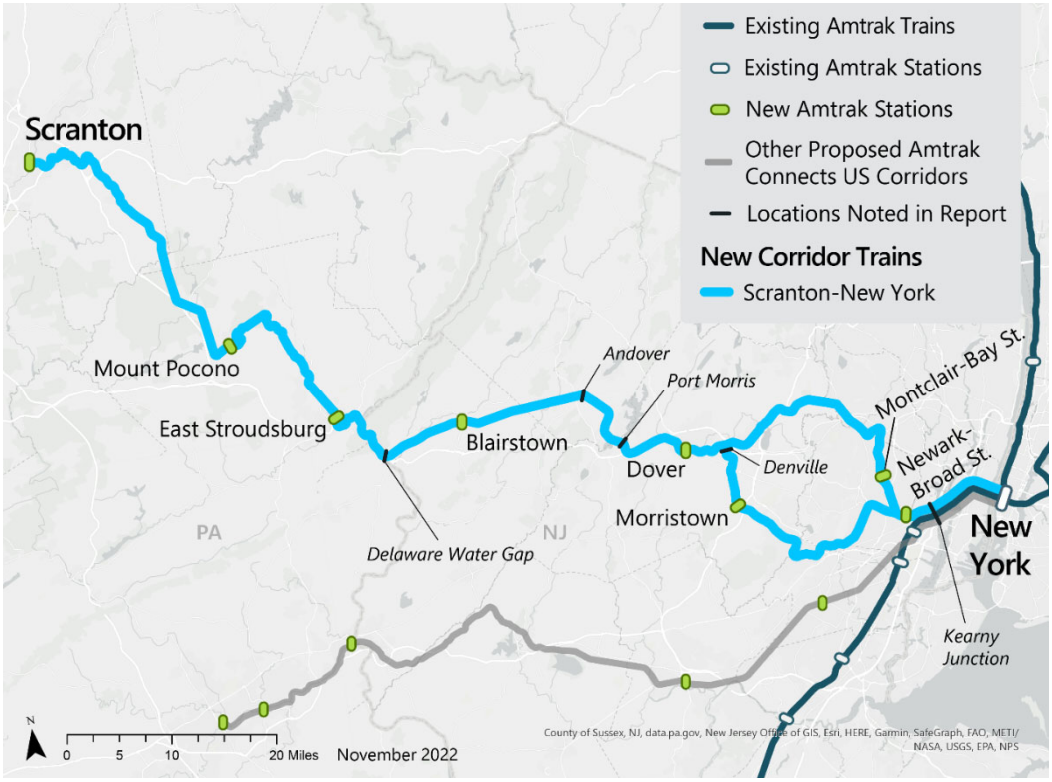
Executive Summary

In July 2021, the Pennsylvania Northeast Regional Railroad Authority (PNRRA) contracted Amtrak to study establishing and operating passenger rail service between Scranton and New York City along the Lackawanna Cut-Off route. The proposed service aims to improve access across the region and promote economic development by linking New York to Scranton and northwest New Jersey, an area lacking in public transportation options. The work scope includes:

- Conceptual schedules for three daily inter-city roundtrip trains.
- Ridership and revenue estimates for those trains.
- Estimated operating cost and financial support required.
- Recommendations for infrastructure improvements to active trackage owned by PNRRA.
- Conceptual locations for a train layover facility in Scranton.
- Capital cost estimates are *only* for PNRRA track improvements and purchase of new trainsets; Amtrak estimates that this report's higher track improvement and train set costs are 30-45% of all project capital costs necessary to initiate a starter inter-city passenger rail service.
- Next steps including additional analysis, federal grant opportunities, and timelines.

The infrastructure assessment and capital cost analysis *excludes* estimates for new stations, terminal facilities, New Jersey infrastructure improvements, and reconstructing approximately twenty miles of the Lackawanna Cut-Off; these items, particularly the Lackawanna Cut-Off rebuild, represent much of the overall initial build project cost. The route from Scranton to Port Morris was previously analyzed in the 2008 *New Jersey – Pennsylvania Lackawanna Cut-Off Passenger Rail Service Restoration Project Environmental Assessment* and parts were updated in the engineering study *Lackawanna Cut-Off Restoration – Commuter Rail Study* done in December 2019 by Greenman-Pedersen, Inc.

Map of the New York Scranton Rail Corridor



Amtrak's estimates of annual ridership, revenue, and cost are summarized below (in 2022 dollars):

Riders 473,500

Operating Revenue (Tickets, Food and Beverage, Misc.) $13.3M

Operating Expense $19.1M

Operating Funding Required $5.8M

Pennsylvania Track Improvement Cost – Minimum Program $99M

Pennsylvania Track Improvement Cost – Suggested Program $176M

New Train Equipment Purchase Cost (for two trainsets) ..... $70M to $90M

Although the study did not analyze infrastructure needs and costs on the New Jersey portion of the route, future train speeds were estimated for the entire route based on infrastructure analysis. To achieve a travel time of three hours or less between New York and Scranton the tracks on the route would need to be rebuilt or upgraded to allow for faster passenger speeds between Scranton and Andover, New Jersey. Maximum operating speed on the Lackawanna Cut-Off portion of the route, which is straighter than other route segments, would be 110 miles per hour (mph). Speeds on the existing PNNRA and NJ TRANSIT rail segments with more speed-limiting curvature would be constrained to 80 mph or less.

Simulation of Train Schedules

Four train schedule variations were simulated using Rail Traffic Controller (RTC) software to test compatibility with NJ TRANSIT train service. A schedule variant proposed by NJ TRANSIT (Option D in this report) avoids conflicts with commuter train operations. Based on the simulation results, the other schedule alternatives have various train conflicts which make those schedules infeasible, require additional rail infrastructure, or would require changes to commuter train schedules.

Economic Benefits

Amtrak used an economic benefit model provided by Steer to estimate that the Scranton rail corridor could generate as much as $84 million annually in economic activity including tourism. Annual corridor benefits include as much as $20 million in user benefits from saved passenger travel time, improved productivity of traveler time, and the quality, safety, and reliability of the rail transportation compared to alternatives. The societal annual benefits of $7 million comes from increased public safety due to reduced roadway travel and reduced public health costs from less air pollution; train travel emits less than half the greenhouse gases of a single occupancy car.

Federal Funding

Under the 2021 Infrastructure Investment and Jobs Act (IIJA) state or local governments can apply for matching federal funds to advance planning, engineering, construction, and operation of new Amtrak intercity rail corridors. The Federal Government can provide up to 80 percent of project funding for capital costs and a portion of the operating cost, with Amtrak as operating partner, for up to six years of operation. The remaining capital and operating funding are required to come from non-federal sources.

Potential Next Steps

If PNRRA and the Commonwealth of Pennsylvania move forward with developing a new Scranton-New York City route, the following steps may apply:

- Apply to the Federal Corridor Identification and Development Program (Corridor ID) for enhancing or establishing new inter-city passenger rail service. The application period opened December 20, 2022, with a close date of March 27, 2023. If accepted into the program, the Federal Government may provide initial seed funding and thereafter a maximum of up to 80 percent of overall required funding for development of the corridor.
    - Complete a Service Development Plan (SDP) for the route, part of Corridor ID. This Amtrak study document serves as a potential foundation for the FRA SDP by providing initial schedules, ridership, revenue, and operating cost estimates, as well as an engineering concept for PNRRA infrastructure.
    - Also, in Corridor ID, complete preliminary engineering and environmental clearances required by the National Environmental Policy Act (NEPA) and federal regulations. This corridor previously received a Finding of No Significant Impact (FONSI) from the Federal Transit Administration in 2009, however, that environmental assessment needs revisiting. Preliminary engineering will provide additional detail of the required infrastructure, including refined cost estimates and project management plans.
    - Complete partnership agreements among major stakeholders including Amtrak, PNRRA, Commonwealth of Pennsylvania, NJ TRANSIT, National Park Service, and other project partners to develop the corridor for operation. Agreements among Pennsylvania Department of Transportation, PNRRA, Amtrak, New Jersey Department of Transportation, and NJ TRANSIT are needed for the construction and governance of tracks between Andover and the Delaware Water Gap. Amtrak may be able to aid in this process.
- Upon completing the Corridor ID process, apply for final design, construction, and operating funding through the Federal – State Partnership program or similar federal grant opportunities. These programs may provide up to 80% federal funding to match a non-federal 20% contribution.
- Complete final design, acquire necessary property rights, and construct infrastructure improvements (stations, track, rehabilitation of bridges and tunnels, train layover facilities, etc.) Amtrak may be able to assist in these tasks.
- Hire, train, and qualify Amtrak train crews to operate the service which can require approximately 12 to 18 months to complete.
- Amtrak will need to acquire train equipment to operate the service. Amtrak has options to order new dual-mode intercity trainsets (*Airo* trains) suitable for operating this route, but equipment must be ordered years in advance.
- Execute an Amtrak operating agreement and commence service. The federal government may provide partial operating funding support for up to six years through a competitive grant program.

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Photo: Delaware River Viaduct, Slateford, PA, near the Delaware Water Gap.
Source: Wikimedia Commons, Author Jag9889

Overview

Study Scope

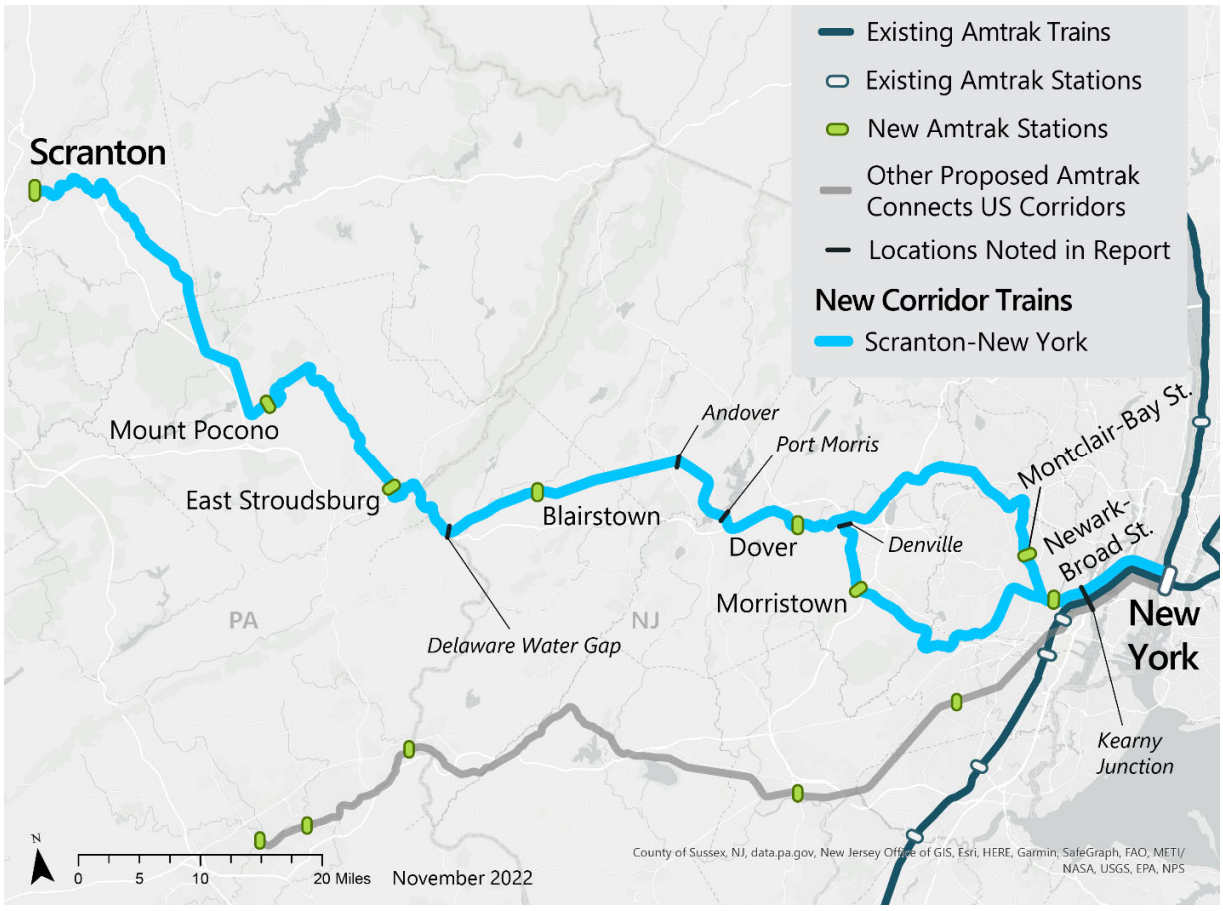
Amtrak has prepared this study for the Pennsylvania Northeast Regional Railroad Authority (PNRRA) to evaluate providing Amtrak passenger rail service between Scranton and New York City using the "Lackawanna Cut-Off" route, the former Delaware, Lackawanna and Western Railroad and successor Erie Lackawanna Railroad main line between Port Morris, NJ, and Delaware Water Gap, PA. The Lackawanna Cut-Off is co-owned by PNRRA and the State of New Jersey, purchased in 2002 for passenger rail restoration.

In this report, Amtrak provides:

- Conceptual train schedules.
- Ridership and revenue estimates.
- Estimates of required train equipment.
- Estimated funding support requirements.
- Conceptual cost estimates for upgrading PNRRA track (the full capital cost of this corridor is not included in this report).
- A "roadmap" for implementation.

This report does not include costs for infrastructure in New Jersey, stations, or train layover facilities; such costs represent most of the project costs to implement a starter inter-city rail passenger service.

Figure 1: Scranton – New York Route Map via the "Lackawanna Cut-Off"



The *Amtrak Connects_US* vision for an expanded national passenger rail network identified Scranton – New York because of high forecasted ridership. The proposed route connects with existing and proposed Amtrak routes in New York City as well as NJ TRANSIT and MTA-Long Island Rail Road commuter rail routes. These connections create a large passenger rail network with hundreds of destinations, that improves mobility for underserved communities and provides reliable, efficient transportation to numerous education and employment centers. Rail service to Scranton and northwestern New Jersey will provide economic benefits from riders and employees who live, work, and visit the area.

PNRRA and Amtrak agreed that the initial operating plan would include three daily round trips between Scranton and New York. Amtrak proposes improving speeds on the existing PNRRA track to support speeds up to 80 mph and rebuilding the Lackawanna Cut-Off track between Delaware Water Gap and Andover to support speeds up to 110 mph. The remainder of the route between Andover and New York Penn Station is planned to use the current maximum speeds of NJ TRANSIT and Amtrak. Based on this track design, Amtrak estimates trains can travel between New York and Scranton in three hours or less.

Operations and Financial Analysis Summary

Four schedule variations with different departure times from New York and Scranton were analyzed. Two schedule options were determined to be operationally infeasible due to conflicts with commuter trains. The remaining two schedule options (Options B and D) were advanced for financial analysis for comparative purposes with Option D recommended due to NJ TRANSIT operational compatibility.

Amtrak's financial analysis uses the methodology established under Section 209 of the Passenger Rail Investment and Improvement Act (PRIIA) which governs funding agreements between Amtrak and passenger rail sponsors for routes that are less than 750 miles long. Amtrak estimates that this corridor will require sponsor funding of $5.6 million for Option B and $5.8 million for Option D (see Table 1), expressed in 2022 dollars. Definitions of cost categories and additional information about the revenue and cost forecast is provided in the Financial Analysis section of this report. Capital investments may also be necessary and are subject to partnership and agreement between Amtrak and the sponsor.

Table 1: Financial Operating Analysis Summary (section *Operating Costs* has definitions)

	Option B	Option D
Total Passenger & Other Revenue	**$12,681,412**	**$13,285,112**
Subtotal: Third Party Costs	$5,521,681	$5,521,681
Subtotal: Route Costs	$10,122,603	$10,741,695
Subtotal: Additives	$2,651,762	$2,861,144
Total Expenses	**$18,296,046**	**$19,124,520**
Estimated Operating Payment or (Credit)	**$5,614,634**	**$5,839,408**
Ridership	451,800	473,500
Passenger Miles on State Corridor	50,953,000	53,325,000
Train-Miles	297,183	297,183
Seat Miles	99,259,122	99,259,122
Average Load Factor	51.3%	53.7%
Cost Recovery Ratio	69.3%	69.5%

Federal funding assistance may be available for initial construction capital costs and up to six years of operation though Sec. 22304 of the Infrastructure Investment and Jobs Act (IIJA) Restoration and Enhancement Grants program. A non-federal match is required for federal funding. Federal operating support tapers off over a six-year period.

Study Description and Assumptions

The service concept has the following key assumptions for the route, passenger service schedules, operating equipment (fleet), stations, crew requirements, and other service characteristics.

Route Description

The route between Scranton and New York is approximately 136 miles long (see Figure 1). This report does not include analysis of required infrastructure in New Jersey.

The track is entirely owned by public agencies including PNRRA, National Park Service Steamtown (NPS), NJ TRANSIT, and Amtrak. Within Pennsylvania, the route uses approximately 60 miles between Scranton and the Delaware Water Gap owned by PNRRA (NPS owns a short section in Scranton). At the Delaware Water Gap, the route proceeds for 20 miles to Andover, NJ, along the "Lackawanna Cut-Off," a railroad right of way owned by PNRRA and the State of New Jersey which currently has no tracks. At Andover, the route connects to NJ TRANSIT's mostly electrified Morris & Essex (M&E) lines to Newark and then connects to Amtrak's Northeast Corridor (NEC) for eight miles to reach New York Penn Station.

Nine stations are served in the conceptual schedules: Scranton, Mount Pocono, East Stroudsburg, Blairstown, Dover, Morristown, Montclair, Newark Broad Street, and New York Penn Station. Morristown and Montclair are alternatively served with various trains. Future analysis could consider other station stopping patterns.

The route has four distinct segments (from west to east):

1. *Scranton – Delaware Water Gap*: This 60-mile segment is mostly owned by PNRRA with approximately a mile owned by NPS in Scranton. The infrastructure is presently Class 2 track (25 mph maximum freight speed/30 mph maximum passenger speed) without signaling and operated by the short-line railroad Delaware-Lackawanna (D-L), under contract with PNRRA. Track would be upgraded to Federal Railroad Administration (FRA) track classes 3 and 4 to increase speeds, and signals and a Positive Train Control (PTC) system would be installed.

2. *Delaware Water Gap – Andover*: This 20-mile segment is owned by PNRRA and the State of New Jersey and currently has no track. New track is proposed to be constructed to FRA Class 4 or 6 (which allow maximum passenger train speeds of 80 or 110 mph respectively); this segment has very long sections of tangent track that support higher speeds and could be constructed to meet the 110 mph Class 6 track standard. Signals and a PTC system would be installed.

3. *Andover – Swift*: This 48-mile segment, known as the M&E Line, is owned and operated by NJ TRANSIT and is a track Class 4 (80 mph passenger maximum speed; due to curvature, most speeds are under 60 mph) with extensive commuter operations. Although no track, speed, and capacity upgrades were evaluated in this study, targeted capacity improvements may benefit both intercity passenger rail and commuter operations. The Andover – Port Morris segment is currently under construction by NJ TRANSIT. Electrification exists for 35.5 miles between Dover and Swift via the Morristown route.

4. *Swift/Kearny Junction – New York Penn Station*: This 8-mile electrified segment is owned and operated by Amtrak. Amtrak and its partners are advancing plans to add additional train capacity

in this segment under the Gateway Program which adds new tracks, bridges, and tunnels approaching New York City. No other track changes are contemplated in this segment.

Schedule Options

PNRRA provided an initial conceptual schedule to Amtrak at the start of the study process. From that schedule, Amtrak developed three schedule variations (Options A, B, and C) focusing on operational compatibility with NJ TRANSIT service, tested using Rail Traffic Controller (RTC) simulation. Using RTC simulation, NJ TRANSIT then developed a fourth schedule that avoids commuter train conflicts (Option D). See Appendix A: Train Schedules Simulated for additional details.

Based on the results of simulation, Options B and D were carried forward for financial evaluation. Option B has earlier arrival times to both New York and Scranton but may have a commuter train conflict that remains unresolved. Option D has later departure times from New York and Scranton and has no commuter train conflicts identified. Both schedules are shown below. Option D resulted in a higher ridership estimate but slightly greater operating costs. A full description of the schedule development and testing process is provided in Appendix A.

Figure 2: Option B Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MTC - 4	SCR via MOR - 2		Routing		SCR via MOR - 1	SCR via MOR - 3	SCR via MTC - 1
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
6:07 AM	11:51 AM	**5:44 PM**		Scranton, PA		10:28 AM	**4:39 PM**	**11:00 PM**
6:45 AM	**12:28 PM**	**6:21 PM**		Mt. Pocono, PA		9:50 AM	**4:01 PM**	**10:22 PM**
7:08 AM	**12:51 PM**	**6:44 PM**		East Stroudsburg, PA		9:23 AM	**3:34 PM**	**9:55 PM**
7:28 AM	**1:11 PM**	**7:04 PM**		Blairstown, NJ		9:04 AM	**3:15 PM**	**9:36 PM**
7:58 AM	**1:39 PM**	**7:32 PM**		Dover, NJ		8:40 AM	**2:51 PM**	**9:12 PM**
		7:48 PM		Morristown, NJ		8:22 AM	**2:33 PM**	
8:37 AM	**2:14 PM**			Montclair - Bay Street, NJ				**8:36 PM**
8:49 AM	**2:25 PM**	**8:18 PM**		Newark Broad Street, NJ		7:52 AM	**2:06 PM**	**8:25 PM**
9:07 AM	**2:44 PM**	**8:38 PM**		New York, NY		7:37 AM	**1:50 PM**	**8:09 PM**

Figure 3: Option D Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MTC - 4	SCR via MOR - 6		Routing		SCR via MOR - 1	SCR via MTC - 3	SCR via MOR - 5
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
7:00 AM	**12:58 PM**	**6:57 PM**		Scranton, PA		**12:09 PM**	**5:38 PM**	**11:01 PM**
7:38 AM	**1:35 PM**	**7:34 PM**		Mt. Pocono, PA		11:30 AM	**5:00 PM**	**10:23 PM**
8:01 AM	**1:58 PM**	**7:57 PM**		East Stroudsburg, PA		11:04 AM	**4:34 PM**	**9:56 PM**
8:21 AM	**2:18 PM**	**8:17 PM**		Blairstown, NJ		10:45 AM	**4:15 PM**	**9:37 PM**
8:48 AM	**2:44 PM**	**8:44 PM**		Dover, NJ		10:20 AM	**3:50 PM**	**9:13 PM**
		9:00 PM		Morristown, NJ		10:03 AM		**8:55 PM**
9:23 AM	**3:19 PM**			Montclair - Bay Street, NJ			**3:15 PM**	
9:35 AM	**3:31 PM**	**9:29 PM**		Newark Broad Street, NJ		9:35 AM	**3:04 PM**	**8:27 PM**
9:53 AM	**3:50 PM**	**9:47 PM**		New York, NY		9:18 AM	**2:48 PM**	**8:11 PM**

Equipment Assumptions

The Scranton passenger rail service would require a minimum of two trainsets for daily operation. Spare (sometimes called "protect") equipment would also be required, most likely from the Northeast Corridor

(NEC) equipment pool. The equipment used in the service would be maintained at Amtrak operations and maintenance facilities along the NEC. One trainset will overnight in Scranton at a layover facility for servicing and cleaning (S&C).

Trains using New York Penn Station must use electric traction due to operation through long tunnels. This study does not contemplate new electrification beyond NJ TRANSIT territory; therefore, trains will need to be "dual mode" and operate with diesel power in unelectrified territory and with electric traction power in electric territory. Bi-directional operating capability is required to eliminate turning the train around in Scranton because the proposed daytime turn times are too short.

Amtrak has options to order new intercity trainsets (ICT) known as *Airo* that include a locomotive with six cars that provide coach seating, business class seating, and food service. The *Airo* trains will be dual mode (diesel and electric power) and will be equipped for bidirectional push-pull operation. This report's financial analysis assumes *Airo* six-car trainsets (called a "B1" trainset) which has 334 seats. If ridership demand exceeds that capacity, Amtrak also has larger eight-car *Airo* trainset designs with up to 478 seats. The *Airo* has onboard wheelchair lifts for low-level platforms, modern passenger amenities such as power outlets at every seat, and two bicycle racks in each coach. Amtrak will need to order at least two of these trainsets to operate this service.

If *Airo* trains are not available for a 2028 Scranton service startup, then the service will have to use existing Amtrak equipment at startup. The availability of existing equipment for use in the new service depends on the timing of upcoming new equipment deliveries, reactivation of stored cars, other expansion route requirements, and locomotive assignments. Amtrak's current fleet includes coaches, locomotives, and non-powered cab units which are necessary for the planned push-pull operation. Amtrak does not currently have available dual-mode locomotives that are necessary for this route; potential solutions include having both an electric and a diesel locomotive on each train or acquiring dual-mode locomotives from another entity, if any such locomotives are available. A detailed equipment plan for necessary fleet expansion to support this new service is needed, preferably three or more years in advance of startup to provide lead time to identify and secure equipment, execute necessary agreements, modify equipment, and potentially commission the equipment and facilities.

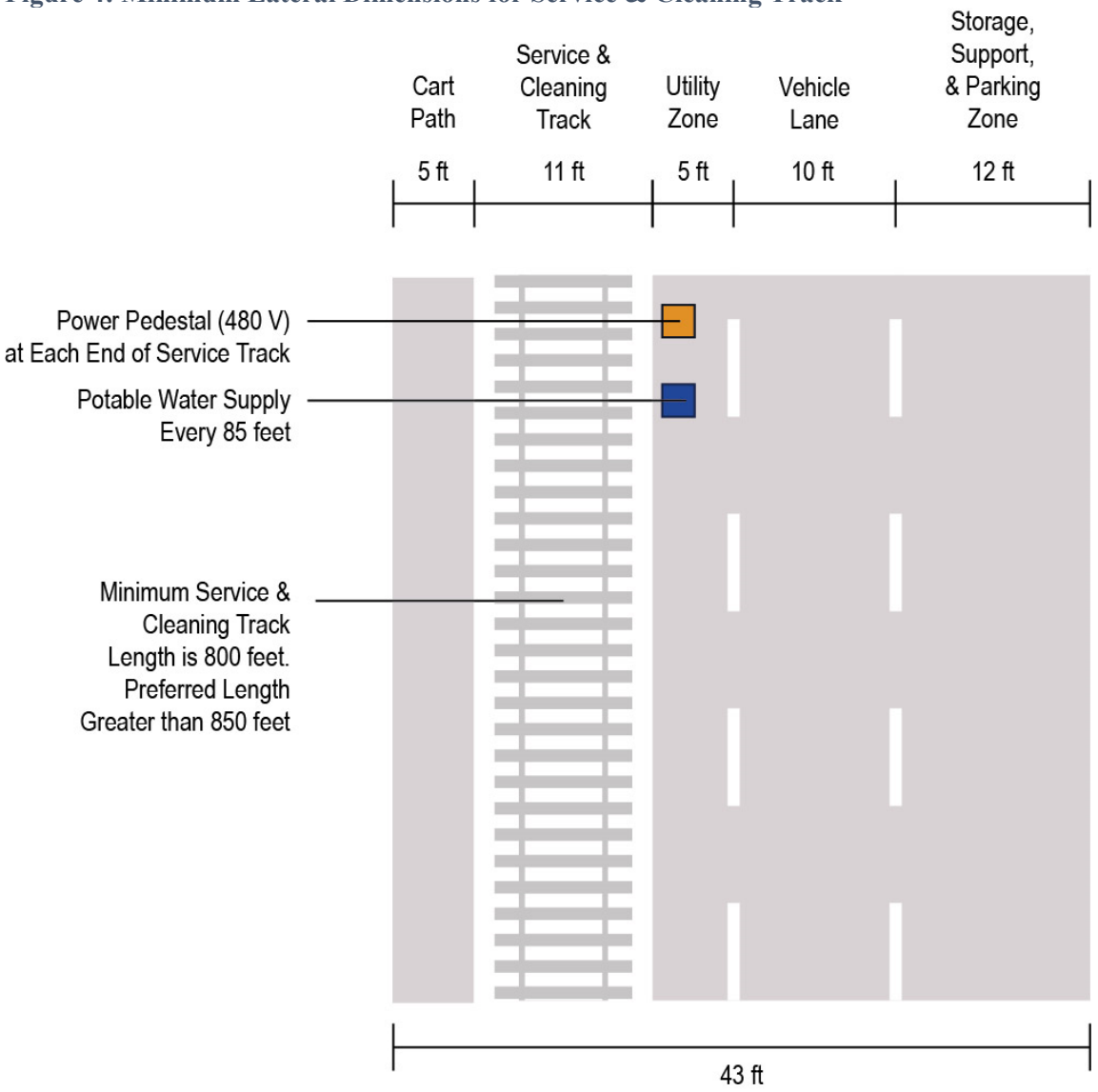
Train Layover Facility Assumptions

Based on the proposed Scranton operations plan, a Service & Cleaning (S&C) Track in Scranton will be required. The S&C Track will serve as an overnight layover location for *Airo* equipment and facilitate routine servicing and cleaning activities including the following:

- Fueling
- Watering
- Daily inspection / tests
- Cab signal tests
- Waste dumping
- Minor repairs
- Interior cleaning

The S&C area requires a service track (that is a minimum of 800 feet long) as well as support infrastructure including ground power, water hydrants, site lighting, a mechanical office, four storage containers for parts and supplies, a train-side service road for trucks, staff working space to access both sides of the train, employee parking, and fencing for security and to protect the trainset from vandalism. Trucks will be need to able to maneuver and not have back-up moves. An inspection pit is not required because trains can receive a pit inspection in New York.

Figure 4: Minimum Lateral Dimensions for Service & Cleaning Track



On the cart path side of the track, the potential for additional width and/or fencing will be determined on a case-by-case basis depending on worker hazard exposure beyond the path. For example, if trains operate on a nearby track, more width or a barrier may be necessary to assure worker safety.

The 12 feet depicted for the storage, support, & parking zone is needed for four storage containers typically 10' x 40', at least five vehicle parking spaces for workers, a fixed or modular office space with a minimum 10' x 36' space requirement, and a secure material delivery box up to a 10' x 10' space. While the storage, support, and parking zone should be next to the track work area, the shape can vary to fit the specific site. A vehicle turnaround is needed if the road does not connect to streets on both ends.

Within the Jacobs report *Scranton – New York City Intercity Passenger Rail Analysis Infrastructure Assessment*, Appendix B (Jacobs), a generic rudimentary canopy cover for trains is presented in Figure 1-15. While a canopy is a desirable feature, Amtrak does not require it. The lateral canopy dimension in Figure 1-15 is 42 feet, slightly less than 43 feet in the layout in the above Figure 4.

Maintenance of *Airo* trains is planned for a rolling ten-day cycle as shown in Table 2 below.

Table 2: *Airo* 10 Day Maintenance Cycle

Day	Activity
1	Daily Service & Cleaning
2	Daily Service & Cleaning
3	Daily Service & Cleaning
4	Daily Service & Cleaning
5	Daily Service & Cleaning + Pit Inspection
6	Daily Service & Cleaning
7	Daily Service & Cleaning
8	Daily Service & Cleaning
9	Daily Service & Cleaning
10	Maintenance + Pit Inspection

Amtrak identified (on a conceptual basis) four possible sites for a new S&C facility for the Scranton intercity passenger rail service. Early in the study, PNRRA and the National Park Service (NPS) Steamtown National Historic Site suggested locating the S&C facility on NPS land that is currently used for railroad operation and storage. Thus, Amtrak looked within NPS to produce alternatives that are only conceptual in nature. Further evaluation is required to assess feasibility as no engineering analysis has been conducted. Jacobs Engineering also includes conceptual sites in its report within and outside NPS to provide multiple samples of capital track cost estimates (see Appendix B).

The alternatives presented in this study are intended to support one trainset laying over each night in Scranton. Additional frequencies with multiple morning departures from Scranton would likely require an S&C facility for two or more trainsets which would require multiple S&C tracks. Site Option A is the largest site and could potentially store two trains simultaneously to support expanded Scranton operations as shown in Figure 6 below.

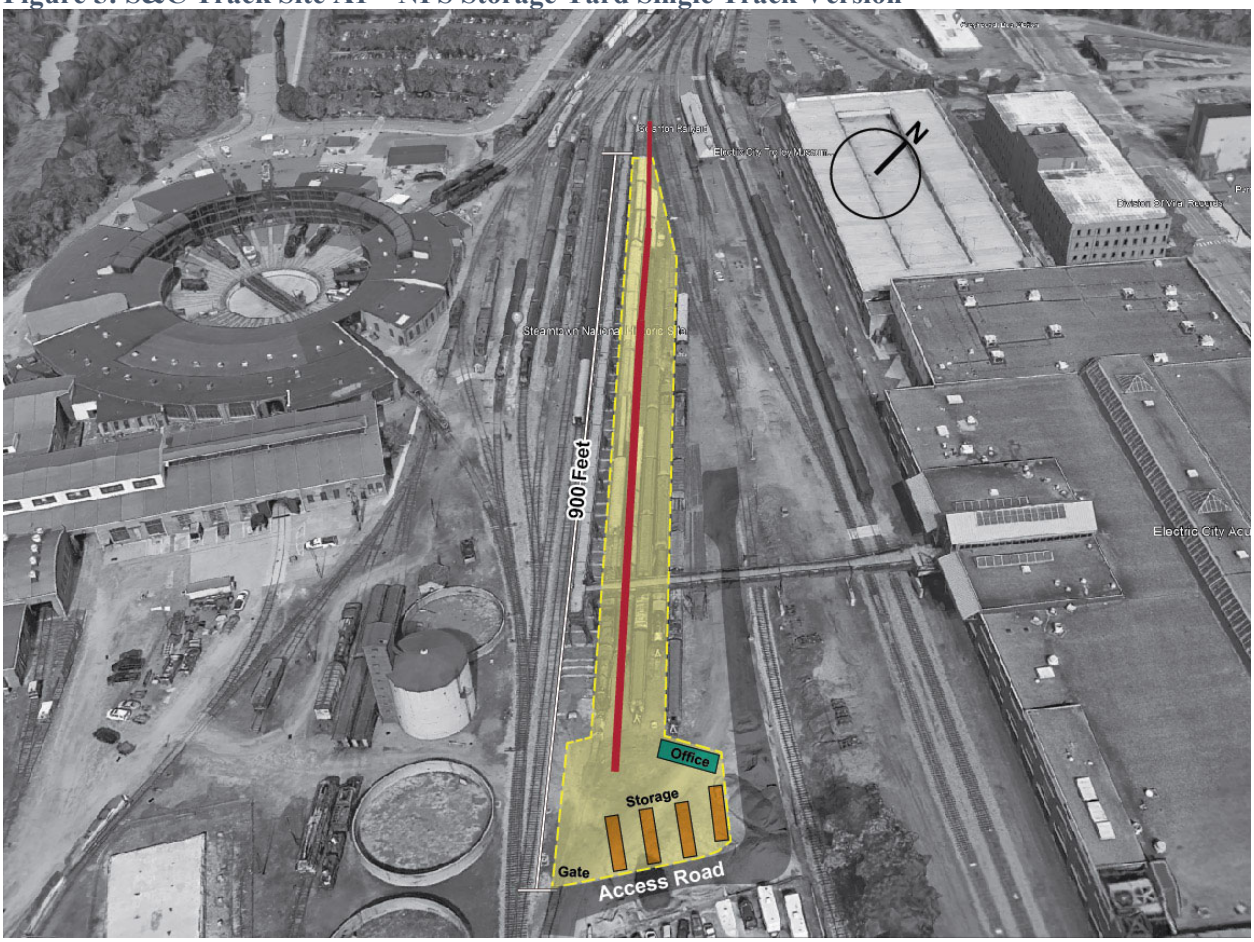
The S&C Track is preferred to be on level ground; however, sites B and C have track gradients due to site topography. Further analysis is required to assess whether a track on a sloping gradient can be used as an S&C track.

The site options are described on the following pages. Figure 1-16 in Appendix B shows potential S&C sites near downtown Scranton and the proximity to the proposed Scranton station. Figure 1-16 only shows two of the four sites that are presented below; the figure's prospective Layover Sites "A" and "B" correspond the following sites "B" and "C" respectively and the following sites "A" and "D" are in proximity of figure's prospective layover site label "B".

Site A – Existing NPS Storage Yard

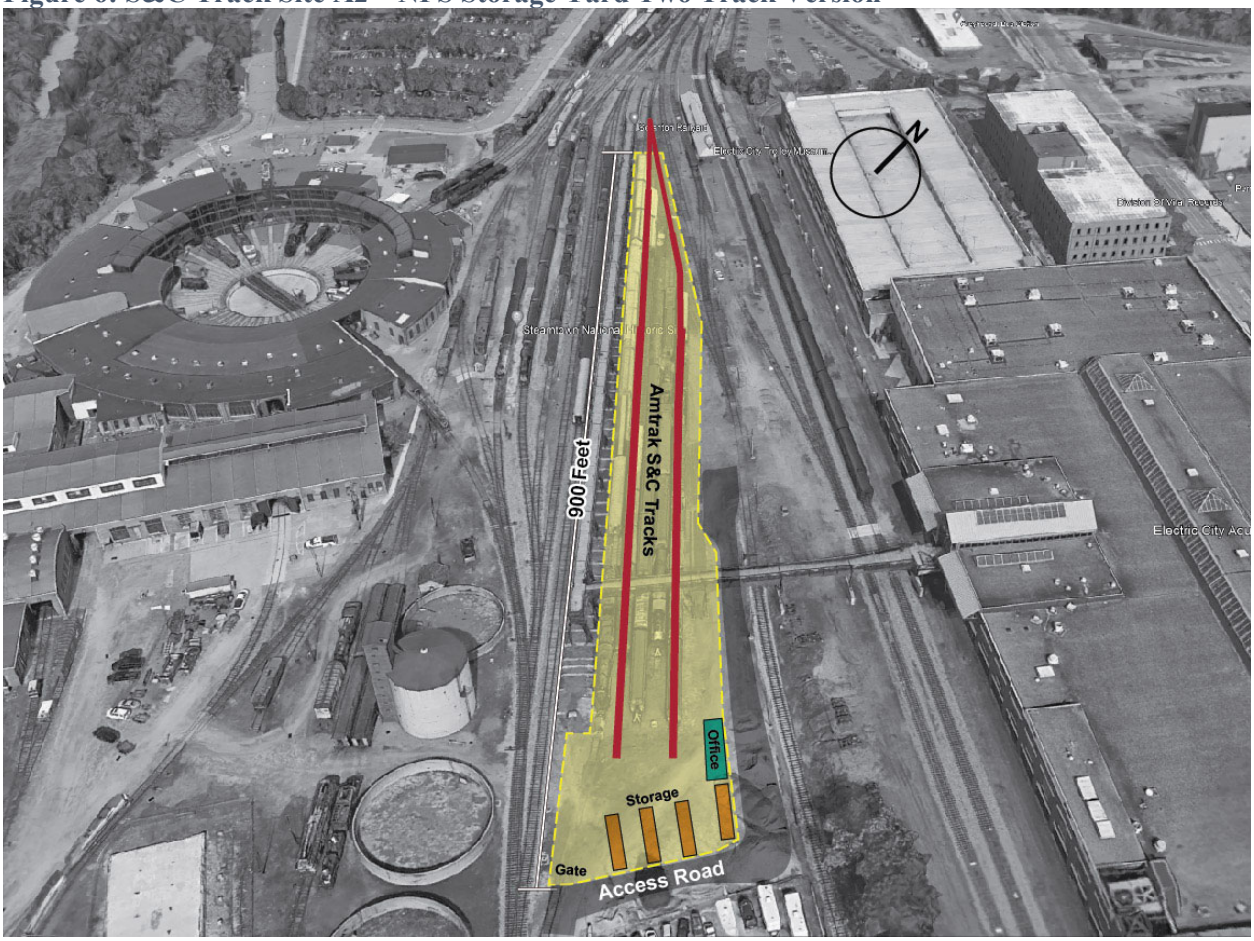
S&C Track Site A (Figures 5 and 6) uses four or five existing yard tracks within NPS's storage yard. This site is presumed to be roughly level based on publicly available aerial analysis. Trucks would access the location via a service road on the east end of the site. Rail equipment currently stored on these yard tracks could potentially be relocated to PNRRA tracks near Washington Avenue or new storage spurs built within the NPS site. The existing yard track could be evaluated for reuse in place.

Figure 5: S&C Track Site A1 – NPS Storage Yard Single Track Version



Site A could be enlarged to support two S&C Tracks to support expanded passenger rail service by using five of the existing storage yard tracks as shown in Figure 6.

Figure 6: S&C Track Site A2 – NPS Storage Yard Two Track Version

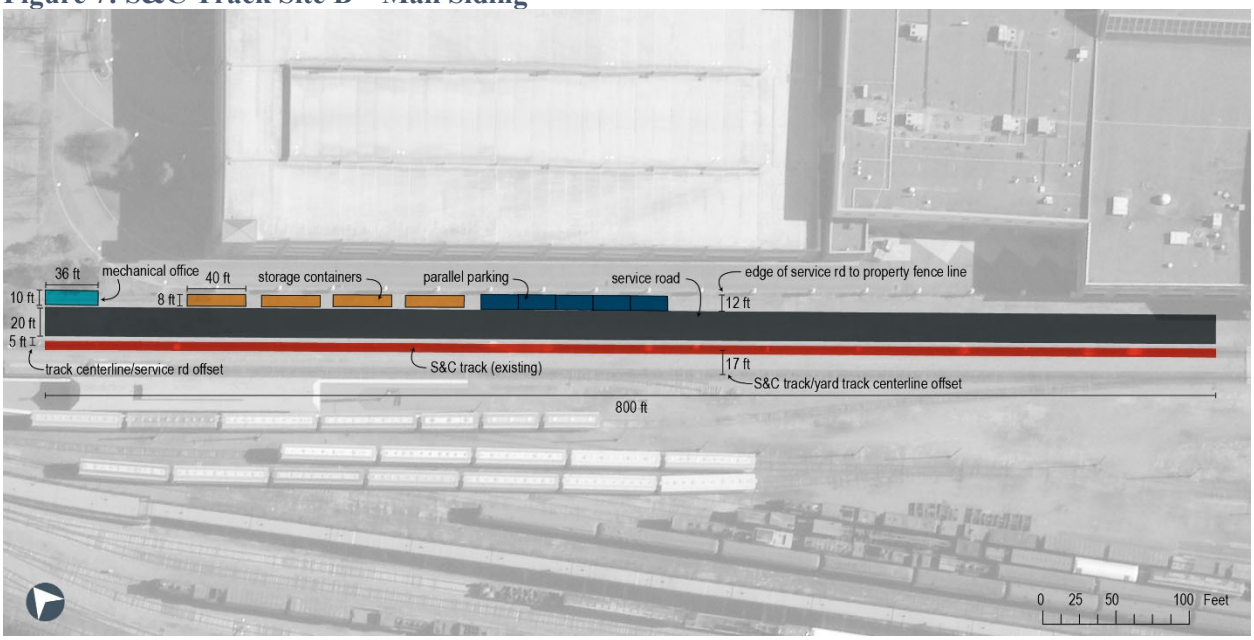


Site B – Mall Siding

Site B, depicted in Figure 7, is closest to the proposed Scranton station and located on the northern track adjacent to the Marketplace at Steamtown mall. This alternative uses an existing mainline track as an S&C track which would require the track to be fenced (with movable gates at each end) and inactive while *Airo* trains are using the facility, which would primarily be overnight.

The service road is accessed from the existing parking lot behind the Lackawanna Transit Center and is immediately adjacent to the loading dock service road for the Marketplace at Steamtown. While much of the site appears to be level, the southeast portion of the site (on the right side of Figure 7) features an approximate 1.5 percent grade ascending towards the east.

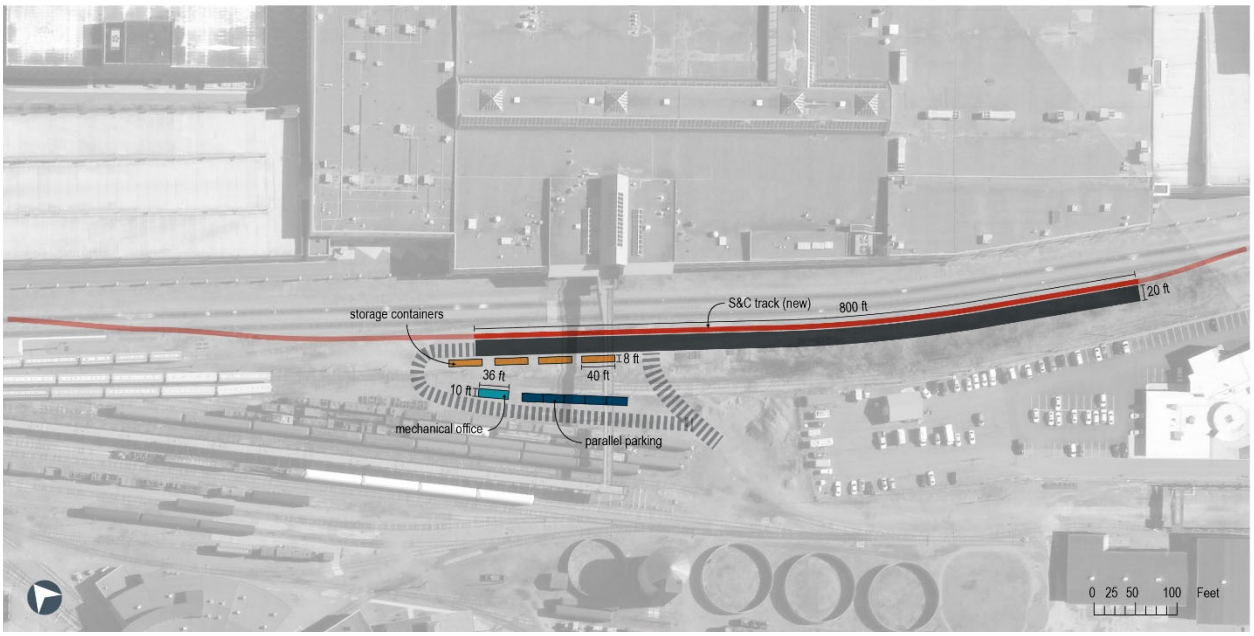
Figure 7: S&C Track Site B – Mall Siding



Site C – Siding on Southside of Mainline

S&C Track Site C, depicted in Figure 8, is located south of the Marketplace at Steamtown complex on the yard-side of the NPS site. This alternative includes a new track parallel with the mainline, accessed via a turnout on the east end (and possibly also the west end). This site has an approximately 1.5 percent grade ascending east. Fill may be required to widen the working area of the site. The service road is accessed from an existing NPS service road.

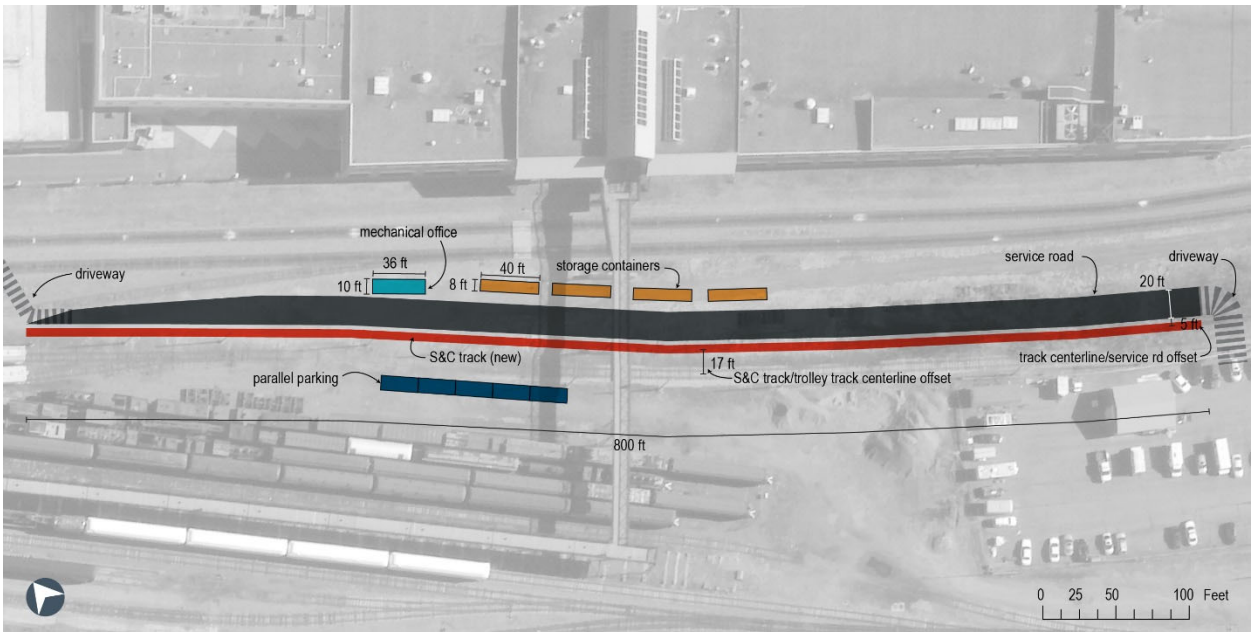
Figure 8: S&C Track Site C – Siding on Southside of Mainline



Site D – Laurel Line

S&C Track Site D, depicted in Figure 9, is located just south of Site C but is parallel to the existing PNRRA Laurel Line that also is the Electric City Trolley Museum tracks on the NPS site. This alternative includes a new stub-end track that diverges from a yard track near the NPS platform and parallels the trolley/Laurel Line track. This site is presumed to be roughly level; however, earthwork may be required to terrace the site. The service road is accessed via the Scranton Police Department parking lot and a potential driveway from the parking lot and area behind the Lackawanna Transit Center.

Figure 9: S&C Track Site D – Laurel Line



Station Assumptions

Amtrak's operating plan and ridership estimates modeled station stops at Scranton, Mount Pocono, East Stroudsburg, Blairstown, Dover, Morristown, Montclair, Newark Broad Street, and New York Penn Station. Morristown and Montclair are served only by selected train schedules. Conceptual station locations in Pennsylvania can be found in Appendix B, including Figure 1.12 for Scranton (Lackawanna Transit Center), Figure 1.43 for Mount Pocono, and Figures 1.51-1.52 for East Stroudsburg.

For this study, the annual operating cost assumes the Scranton station will have a daily Amtrak ticket agent for eight hours beginning in the morning. Eighty percent of Amtrak tickets are sold through internet channels (web and mobile, including aggregator web), and fewer than ten percent of tickets are sold at stations, therefore only the busiest Amtrak stations have staffed ticket counters. The remainder of the stations on the route would not have Amtrak staff except New York Penn Station (see Table 3). For example, at Newark Broad Street Station, Amtrak may be able to contract with NJ TRANSIT to sell tickets from its counter. All stations would include Passenger Information Display Systems (PIDS) providing passengers with real-time train status and information. Passengers would be allowed to carry-on up to four bags. Checked baggage service (where additional bags are transported in a specialized baggage car separated from passengers) would not be offered.

Table 3: Station Staffing Assumptions

Station	Existing or New Station Stop	Staffing Assumption
New York, NY	Existing Amtrak Route – Shared Station	Amtrak Staffed – no new staff.
Newark Broad Street, NJ	New Station Stop (Current NJT Station)	Unstaffed
Montclair - Bay Street, NJ	New Station Stop (Current NJT Station)	Unstaffed
Morristown, NJ	New Station Stop (Current NJT Station)	Unstaffed
Dover, NJ	New Station Stop (Current NJT Station)	Unstaffed
Blairstown, NJ	New Station Stop	Unstaffed
East Stroudsburg, PA	New Station Stop	Unstaffed
Mt. Pocono, PA	New Station Stop	Unstaffed
Scranton, PA	New Station Stop	One new Amtrak Station agent.

Train Crew Assumptions

Train and Engine crews (T&E) for all trains would be comprised of an Engineer, a Conductor, and an Assistant Conductor. Amtrak evaluated crew schedule options using Amtrak's crew optimizer tool. Based on that analysis, the most efficient scenario for Option B would staff crews out of the current Amtrak New York crew base. Option D would use both the current Amtrak New York crew case and a new Scranton crew base.

Food and beverage service on the train would be served by an Amtrak Lead Service Attendant (LSA).

Other Service Assumptions

No connecting motor coach service is included in this analysis, but Amtrak recommends that such service be evaluated in future service planning. For example, motorcoaches could connect to Wilkes-Barre, Binghamton, and other destinations, potentially through a partnership with existing intercity bus lines.

Financial Analysis

Methodology

Amtrak's financial analysis forecasts ridership, revenue, and operating costs. Amtrak's Market Research & Analysis group forecasted the ridership and ticket revenue using Amtrak's travel demand model that considers schedules, running time, and population served. Amtrak's Finance Department provided estimates of operating expenses using internal cost estimation models which are calibrated based on Amtrak's existing network operation. Jacobs Engineering provides conceptual capital cost estimates for improvements of trackage owned by PNRRA, detailed in Appendix B.

Under the PRIIA Section 209 Pricing Policy, the service sponsor pays the difference between revenue and operating expenses and a share of any applicable capital investments. Under the Infrastructure Investment and Jobs Act (IIJA), this service is eligible for federal operating funding assistance during the first six years of operation; see the section *Funding Assistance for Corridor Development* for more information. Potential federal funding is not included in the calculations but would be expected to significantly reduce the required sponsor funding for capital and the first six years of operating expenses.

Amtrak prepared financial analyses for two options: Option B, which roughly matched the schedule originally suggested by PNRRA, and Option D developed by NJ TRANSIT that avoided commuter train conflicts.

Table 5 shows the summary annual operating financial results for the two options that were evaluated. All the economic analyses for this report are stated in constant fiscal year 2022 dollars. Actual revenue and expenses will be subjected to inflation during the period before operation begins.

Ongoing capital charges, such as for equipment renewal, are not included in this analysis.

Ridership and Revenue Estimate

Amtrak's Market Research & Analysis group forecasted the ticket revenue, passengers carried, and passenger miles (see Table 4) using an internal computerized travel model. The model is calibrated from the existing Amtrak network with variables that include:

- Average fares.
- Population and employment within a specified distance to the station.
- Station locations.
- Travel time between stations.
- Station time-of-day for arrivals and departures.
- Availability of connecting Amtrak services.

Table 4: Demand Forecast for FY 2028-FY2030

	Ridership			Ticket Revenue			Passenger Miles		
	FY 2028	FY 2029	FY 2030	FY 2028	FY 2029	FY 2030	FY 2028	FY 2029	FY 2030
Option B	288,200	402,800	451,800	$7,798,000	$10,901,000	$12,228,000	32,504,000	45,430,000	50,953,000
Option D	302,100	422,200	473,500	$8,170,000	$11,420,000	$12,810,000	34,017,000	47,544,000	53,325,000

To minimize Scranton annual sponsor funding requirements, typical fares were calibrated from existing Amtrak routes with revenue management. Revenue management varies ticket fares depending on several factors such as demand on particular days and times.

Service was modeled to begin operation in fiscal year 2028. Ridership is expected to increase during the first two years of operation. First year ridership is estimated to be 65% of full ridership, the second year is estimated at 90%, with the third year of operation (e.g., 2030) achieving full ridership. Ridership thereafter would be expected to increase at Amtrak system average rates.

Option D is estimated to attract approximately five percent (5%) more riders than Option B due to more favorable departure times at New York; however, it also has higher operating costs. Option D is the recommended schedule since it avoids conflicts with NJ TRANSIT projected commuter schedules.

Food and beverage proceeds are in the total revenue forecasts for each option using a typical rate for corridor trains in Table 5.

Operating Costs

The cost-sharing methodology that Amtrak and state partners developed in accordance with PRIIA 209 includes the following three categories of operating costs:

- Third-Party Costs: These costs include fuel and power as well as payments to other railroads for the maintenance they perform on tracks that Amtrak uses or for meeting on-time performance targets.
- Route Costs: Costs for train crew labor, stations, food service, and train maintenance associated with the route. Some costs, such as route advertising, are negotiable with the sponsor depending on how much they would like Amtrak to spend on local or regional advertising.
- Additives: These service fees help fund the regional and national functions that support the sponsored routes such as human resources, accounting, digital technology, and similar corporate functions.

Table 5: PRIIA 209 P&L Forecast for Options B and D – Forecast Year 2030 (2022 dollars), provides the revenue, operating costs, and estimated sponsor payment for schedule Options B and D. Forecasts and pro forma estimates are subject to economic volatility and operational risk; therefore, the actual results may differ from the forecast. All financial information is expressed in FY 2022 dollars and is provided for conceptual planning. Refined forecasts would be prepared before service implementation.

As shown below, Third Party Costs are the same for both options because train miles and trainsets are the same for both options. Route Costs and Additives are greater for Option D because those costs are proportional to higher ridership and reflect slightly greater labor costs to support a crew base in Scranton which is not required in Option B.

The financial performance estimates in Table 5 are for the third year of operation after the ridership "ramp up" period. The forecast annual sponsor payment is $5.6 million for Option B and $5.8 million for Option D (although federal funding assistance could cover most of this cost during initial years of operation). Both options have a farebox recovery ratio of 69% which is comparable to the performance of similar Amtrak services in FY2019.

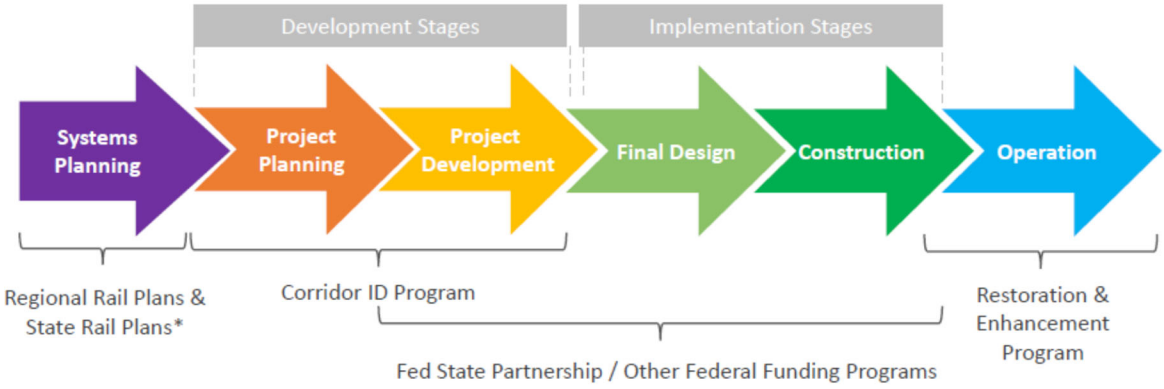
Table 5: PRIIA 209 P&L Forecast for Options B and D – Forecast Year 2030 (2022 dollars)

	Option B	Option D
Total Passenger & Other Revenue	**$12,681,412**	**$13,285,112**
Subtotal: Third Party Costs	$5,521,681	$5,521,681
Subtotal: Route Costs	$10,122,603	$10,741,695
Subtotal: Additives	$2,651,762	$2,861,144
Total Expenses	**$18,296,046**	**$19,124,520**
Estimated Operating Payment or (Credit)	**$5,614,634**	**$5,839,408**
Ridership	451,800	473,500
Passenger Miles on State Corridor	50,953,000	53,325,000
Train-Miles	297,183	297,183
Seat Miles	99,259,122	99,259,122
Average Load Factor	51.3%	53.7%
Cost Recovery Ratio	69.3%	69.5%

Federal Funding Assistance for Corridor Development

Federal funding assistance may also be available for the project for development, implementation, and during the initial years of operation. The graphic below (Figure 10) highlights the FRA funding programs that corresponds to the lifecycle stages of this project. During the development stage, the Corridor ID inter-city rail program supports planning and engineering steps. The Federal State Partnership grants and other Federal funding programs are also available during both the development and implementation stages. The IIJA funds competitive Restoration and Enhancement Grants, which can provide operating funding for a period up to six years, which may include maximum funding amounts as shown in Table 6.

Figure 10: FRA Project Lifecycle Stages – Corresponding FRA Funding Programs



*Regional Rail Planning and State Rail Plans may be funded through other FRA funding programs.

Table 6: Potential Federal Operating Funding Support in the Restoration & Enhancement Program for New or Expanded Service

Expense Type	Time Period	Federal Share	Sponsor Share
Operating	**Year 1**	up to 90%	remainder of costs after Federal Share
	Year 2	up to 80%	remainder of costs after Federal Share
	Year 3	up to 70%	remainder of costs after Federal Share
	Year 4	up to 60%	remainder of costs after Federal Share
	Year 5	up to 50%	remainder of costs after Federal Share
	Year 6	up to 30%	remainder of costs after Federal Share
	Year 7 & after	as allocated pursuant to Section 209 of PRIIA	

Note: Table based on FRA Corridor Identification and Development Program – Solicitation Preview presentation (October 12, 2022).

Economic Impact

Passenger rail services create benefits such as:

- Increased direct, indirect, and induced economic activity from operations and maintenance.
- A safe form of transportation, including for persons who cannot drive or have difficulty driving.
- Transportation capacity as relief for other modes of travel.
- Ability to work productively while traveling.
- Reduced emissions for trips shifted from automobiles or airplanes to trains.
- Access to jobs and educational opportunities.

Amtrak's consultant, Steer, prepared an economic impact analysis for the proposed Scranton Service as part of the *Amtrak Connects_US* vision document which has been updated in this report. The categories of economic impacts assessed include expenditure impacts, user benefits, and external benefits.

Expenditure Impacts are calculated based on employment, wages, and output generated throughout the economy from the spending associated with operating the new service. Transportation investment/spending generates incremental income and employment increases in a region's economy. The methodology for calculating expenditure impacts is well established, resting on the application of input-output models. The expenditure impacts include the direct, indirect, and induced expenditures tied to these activities as explained below:

- *Direct* expenditures include spending attributable to operation and maintenance (including the wages of Amtrak employees), as well as the various capital investments undertaken by Amtrak.
- *Indirect* expenditures include increased sales to firms supplying materials and services to Amtrak.
- *Induced* expenditures refer to the effects of increased earnings for households (whether working for Amtrak or supplying firms) being spent and recirculated in the economy.

User benefits include passenger travel time saved and the quality, safety, and reliability of the rail transportation compared to alternatives. Passengers on trains also gain "productive time" that is not available when driving an automobile, such as the ability to work on a computer.

External benefits include increased public safety from reduced roadway travel and reduced public health costs due to reduced air pollution.

The projected annual economic benefits and sponsor subsidies are shown in Table 7 below. Amtrak forecasts annual expenditure impacts of $80 million for Option B or $84 million for Option D. User benefits are projected to be $19 million for Option B and $20 million for Option D. External benefits are projected to be about $7 million for both Options B and D. In comparison, the estimated annual operating subsidy is projected to be $5.6 million for Option B and $5.8 million for Option D.

Table 7: Annual Economic Benefits and Sponsor Subsidies – FY2022 Dollars

Performance Measure	Option B	Option D
Expenditure Impacts[1]	$80 M	$84 M
User Benefits	$19 M	$20 M
External Benefits	$7 M	$7 M
Estimated Annual Operating Subsidy	$5.6 M	$5.8 M

[1] Includes annual economic activity and tourism

Start-up and Mobilization Costs

Start-up and mobilization costs include expenses incurred by Amtrak to initiate the new service, such as qualification and training for crews to operate over new territory, host railroad charges, equipment usage, advertising, or other applicable expenses.

Training and qualifying new engineers for service can take approximately 12 to 18 months to complete. This includes time required to advertise and hire new employees, classroom training, location training, and time spent qualifying on the route. For new routes, an Amtrak engineer or road foreman will need to qualify in advance to help qualify other engineers.

New conductors require approximately seven to eight months for training and qualification. New hires who begin work as an assistant conductor can require an additional six to twelve months to become a full conductor. Amtrak may be able to expedite the timeline by using a simulator for route training purposes.

Prior to implementation, Amtrak will develop a Route Qualification Plan for training Locomotive Engineers and Conductors. The training plan will be submitted to the System General Road Foreman for review and approval before commencing operations over the route. The plan needs FRA approval as part of the overall route safety case.

A minimum of 20 employees are needed to provide train crews for the operation. Of those, fifteen employees will work regular shifts and a minimum of five crew members will be required as "extra board" employees to cover unplanned crew absences, vacations, and unusual circumstances. For Option B, all positions would be based in the New York crew base; for Option D positions would be based in both New York and Scranton crew bases.

Other start-up mobilization costs include costs for equipment, fuel, T&E "pilots" who qualify other crew members, advertising, and other host railroad charges. The final service plan and details of the Route Qualification Plan will determine the actual costs for mobilization.

Capital Costs

This section highlights the capital costs and infrastructure improvements necessary to support the proposed service. This includes the general approach to track design, which involves maximizing passenger train speeds through curves and strengthening the existing track structure through selective rehabilitation. This section also summarizes the assessment of track, structures, signals and positive train control systems, warning devices at grade crossings, the need for sidings and additional tracks, and the

levels of investment and rehabilitation required. In addition, this section discusses train equipment, stations, and layover facilities needed for service.

Infrastructure Improvements in Pennsylvania: Amtrak retained Jacobs Engineering Group (Jacobs) to prepare an order of magnitude estimate of costs necessary to increase train speeds on the 60 miles of PNRRA track between MP 74.3 at the Delaware Water Gap and MP 133.8 in Scranton. The objective is train service that is competitive with highway travel times between New York and Scranton of under three hours, with a project scope conforming to a prior Environmental Assessment that received an FTA FONSI in 2009. This scope of work conforms to the provision for a categorial exclusion under the National Environmental Policy Act (NEPA), which waives certain review processes when the construction and future operations are within an existing right-of-way.

Jacobs provided cost estimates for bringing the PNRRA route to passenger train standards:

1. Upgrading the existing track structure for passenger train speeds.
2. Repairing, where necessary, bridges, culverts, tunnels, etc.
3. Installation of a Centralized Train Control (CTC) system, including Positive Train Control (PTC).
4. Improvements to highway grade crossing warning systems to increase safety to motorists.
5. Building additional track capacity to mitigate conflicts among passenger services (including excursion trains) and freight trains.

Appendix B is the complete Jacobs report with a description of the assessment methodology along with the results in detail.

Proposed track improvements are comprised of two elements:

1. Strengthening, surfacing, and aligning the existing track structure through selective rehabilitation to increase allowable passenger train speeds up to 80 miles per hour (mph).

2. Maximizing passenger train speeds through curves by increasing superelevation (banking of the rails) up to Amtrak's design value of 5.5 inches for passenger routes with freight trains as well as improving the curve approach "spirals" that smooth the transition from straight and level track to banked, curved track. The Jacobs analysis has an average of 4.5 inches of superelevation.

General Approach to Track Design. The track assessment began with analyzing existing track maps to inventory the curves. With this curve data, Jacobs re-designed each curve's alignment within the width of the roadbed and the maximum super-elevation to calculate the maximum passenger train speed that could be achieved with an equipment curving unbalance[1] with most unbalance calculations less than 5.0 inches.

Even with increased superelevation, the curves on the PNRRA line will limit train speeds regardless of the track quality. Based on the analysis of track curvature, trains can only sustain speeds above 60 mph on approximately 28 miles out of 60 miles of PNRRA track, thus only these 28 miles have proposed track standards for 80 mph (FRA Class 4). The remainder of the mileage is assumed track maintenance standards for 60 mph (FRA Class 3), creating an economical track improvements and maintenance program (see Figure 1-2 graphic in Appendix B). To validate the 60-80 mph maximum speed approach, Amtrak tested the operating effects of uniformly improving all PNRRA track to 110 mph; the simulation

[1] Banking curves by using superelevation (raising the outside rail higher than the inside rail of the curve) reduces the passengers' sensations of being pushed outward in curves (often referred to as "centrifugal force"). The term "unbalance" refers to how many inches of additional superelevation (or banking) would be required to neutralize all sensation of outward force when traveling through a given curve. Amtrak trains generally operates up to five inches of unbalance to maximize passenger comfort.

calculated that the travel time would only be one minute less than the lower blended speeds due to curve speeds. Therefore, Amtrak and Jacobs recommend a design mix of 60 and 80 mph track standards.

Integrated Track Rehabilitation and Selective Renewal. An integrated track rehabilitation program can improve the track for speed and simultaneously reconfigure the curves. The proposed rehabilitation method for improving PNRRA track is "selective renewal" wherein only the worn-out materials are replaced, and the rest of the existing track materials are left in place. For example, wooden railroad ties typically have a service life of 30 years. The PNRRA track has wood ties that have been selectively replaced for over 100 years, resulting in a mixture of new, mid-age, and worn-out ties. In the selective renewal process, a track inspector walking the track identifies the life-expired ties. Then a group of workers and machines exchange the individually identified life-expired ties with new ones. Using this method, the ties with remaining useful life are kept in service. The same methodology is used for other track components, such as rails, fastenings, ballast, etc.

To increase track stability to support higher speeds, ballast will be added where required, and machines will "surface" the track—straightening and smoothing the track to meet the FRA track class standards for higher speeds. During this process, the machines can also bank and align the track through the curves to allow for higher curve speed. Thus, renewal and realignment are done in an integrated program.

Jacobs reviewed PNRRA and Delaware-Lackawanna Railroad (D-L) records of track inspection, maintenance, and selective component replacements. Visual sampling in the field verified conditions. With this information, Jacobs produced a selective track component renewal plan and cost estimates.

Assessment of Structures. Jacobs and the Delaware-Lackawanna Railroad structures engineer inspected the route's structures, noting the overall condition of each structure as well as the condition of its individual components. From this inspection Jacobs developed a list of improvements to structures and estimated costs for rehabilitation to support passenger rail operations of 60 to 80 mph, depending on the track segment.

Signals and Positive Train Control System. The PNRRA route does not have a signaling system that governs train movements. Instead, for most of the route, Delaware-Lackawanna currently uses the Northeast Operating Rules Advisory Committee (NORAC) rulebook's Form D Control System (DCS) that uses radio communication to send instructions from the dispatcher to train crews who transcribe the instructions. Introducing Amtrak service as contemplated in this report will require installation of a Centralized Traffic Control (CTC) signal system and Positive Train Control (PTC), an electronic system that helps enforce train speed limits and signal indications.

NJ TRANSIT and AMTRAK PTC technology is ACSES (Advanced Civil Speed Enforcement System) on their systems; I-ETMS is the most common PTC technology on the freight rail network and could be used on the PNRRA segment. The contemplated PTC systems are I-ETMS in Pennsylvania and ACSES in New Jersey. Many Amtrak trains have both systems and switch between them while moving.

Future route planning and design work can assess the merits of each technology to choose the PTC technology on the PNRRA segment. I-ETMS can be installed without cab signals, potentially resulting in modestly less PTC installation costs along the PNRRA route offset with costs of installing intermediate wayside signals.

Other rail operators on PNRRA will need PTC on their locomotives. I-ETMS installation on locomotives is currently estimated to cost less than $100,000 per unit, whereas ACSES is more than $150,000.

Warning Devices at Grade Crossings. At highway grade crossings, automatic warning systems alert motorists of train traffic using flashing red lights, gates, and bells. Automated warning systems can be

tied into the train control systems since both systems detect train occupancy on a track. Most of the highway grade crossings on the PNRRA line currently have automatic warning systems, however some improvements are necessary to increase motorist safety. For example, automated warning devices will be adjusted for higher train speeds with optimized activation timing. Jacobs inventoried each crossing to provide cost estimates incorporating appropriate warning fixture upgrades, recommending additional warning lights for most crossings, and signal system compatibility.

Sidings and Additional Tracks. Delaware-Lackawanna freight trains and NPS excursion trains are expected to continue using the PNRRA line after Amtrak begins service. To minimize delays and operating conflicts, new sidings and tracks are recommended in certain locations. These new tracks are intended to allow various trains to operate on the line without delaying the Amtrak service. Specific concepts are included in the Jacobs report attached as Appendix B.

Levels of Investment and Rehabilitation. Jacobs provides two cost estimates for rehabilitating and improving the PNRRA line. The "Suggested Program" is the recommended program to support Amtrak operation with a capital program that addresses all infrastructure deficiencies including work that reduces ongoing maintenance needs and incorporates near-term capital programs. A "Minimum Program" estimate contains strictly necessary projects to begin service, resulting in higher maintenance costs and the need to pursue additional capital infrastructure projects within 10 years. The following table summarizes what is included in each estimate:

Table 8: Minimum Program and Suggested Program Cost Estimates for the PNRRA segment

Infrastructure Item	Minimum Program		Suggested Program	
Track structure upgrade	Replace only life-expired components. Improve curve speeds.	$38M	Replace life-expired components and components with ten or fewer years of remaining service life. Improve curve speeds.	$92M
Structures upgrades	Replace only life-expired and safety critical elements.	$17M	Replace life-expired elements and upgrade or replace structures in need of work within the next ten years	$30M
Train Control/PTC	Install PTC that includes cab signals, no wayside signals.	$19M	Install PTC and wayside signals.	$21M
PTC equip 12 D-L and NPS locomotives	ACSES	$2M	I-ETMS	$1M
Highway Warning Systems	Upgrade required crossings for higher speed operation.	$4M	Upgrade required crossings for higher speed operation (same as "minimum."	$4M
New Sidings and Auxiliary Tracks	Build the minimum amount of sidetrack necessary.	$19M	Full build of all sidetracks identified in the Jacobs report.	$28M
TOTAL		**$99M**		**$176M**

The estimated cost for these track improvements ranges between $99M and $176M depending on how many exclusive "Suggested Program" items are included in the estimate. Jacobs produced cost estimates broken down in sufficient detail that the project sponsors and stakeholders can prioritize expenditures, plan, program capital investments, and pursue grant opportunities for items not in the Minimum Program.

Train Equipment. Amtrak will need at least two, six-car, 334-seat *Airo* trains ("B1" Trainsets) to operate this service. The preliminary estimated cost for two new trainsets is approximately $70M to $90M (costs may need to include some spare equipment and parts).

Stations and Layover Facilities. Capital costs for stations and layover facilities are not included in this report. The report from Jacobs includes costs for the assumed track and signal configurations for the three station locations in Pennsylvania with concept sketches (see Appendix B, Figure 1.12 for Scranton, Figure 1.43 for Mount Pocono, and Figures 1.51-1.52 for East Stroudsburg).

Ongoing Capital Expenses. Equipment Capital Charges and Fixed Asset Charges may apply under PRIIA Section 209 for ongoing capital investment but are not included in this report.

Capital Costs for the Lackawanna Cut-Off. This report does not provide capital costs for restoration of about a mile of PNRRA's abandoned right-of-way leading to the Delaware River viaduct[2], the Delaware River viaduct, and all assets in New Jersey. Separate from this study, PNRRA commissioned a report by Greenman-Pedersen, Inc. dated December 2019, which approximates, from comparing other railroad construction projects, a capital cost to rebuild the Lackawanna Cut-Off between Andover and the Delaware Water Gap. The remainder of the route between Andover and New York Penn Station uses existing or planned passenger rail infrastructure without further improvements.

Roadmap for Project Implementation

Based on the required planning, design, and construction work, Amtrak estimates service could begin no sooner than 2028. Funding will be required for infrastructure, equipment, and operation. Key project steps are described below.

Project Sponsorship

A key first step is to establish the project sponsor. Under federal law, eligible sponsors include (among others) PNRRA, Pennsylvania Department of Transportation (PennDOT), NJ TRANSIT/NJ DOT, or Amtrak acting in accord with the intent of state or local government. The project sponsor coordinates with the Federal Railroad Administration (FRA) to enter into agreements with the Federal Government, draw up Statements of Work and Requests for Proposals for steps including the Service Development Plan (SDP) and overall implementation. As a project progresses, the project sponsor may be changed to a different entity due to changes in preferred project governance. Amtrak can assist and facilitate the planning process including providing technical/financial analysis and other guidance or support.

Corridor Identification and Development Program (Corridor ID)

The IIJA legislation directs the FRA to establish a Corridor ID Program to direct federal financial support and technical assistance for new or improved intercity passenger rail development.

Historically, PNRRA, NJ TRANSIT, and other agencies have sponsored or coordinated planning, design, and environmental analysis studies for Scranton – New York City rail passenger service. The prior work–along with this report–should assist PNRRA and PennDOT to expedite this project through the proposed Corridor ID Development Stages.

[2] This segment also needs the restoration of a road bridge over the right-of-way that was filled in after rail service ceased over the Lackawanna Cut-Off; capital cost for the bridge restoration is in the 2019 Greenman-Pedersen report.

Figure 11 below describes the steps of the Corridor ID program that position potential projects for federal planning/design, construction, and implementation funding. PNRRA and PennDOT have already entered the first stage by submitting an Expression of Interest (EOI) to develop the Scranton corridor.

Figure 11: Corridor ID Inter-City Passenger Rail Funding – Development Stages

	Expression of Interest	Submission of Corridor Proposal	Development Stages		
			Project Planning Step 1: SDP Scoping & Program Initiation	**Project Planning Step 2: Service Development Planning**	**Project Development Step 3**
Key Activities	• Submit expression of interest to federal docket	• Submit corridor proposal by 3/27/2023 under the FRA Corridor ID program.	• Sponsor creates the capacity to undertake the service planning. • Sponsor develops scope, schedule, and budget for planning effort.	• Sponsor, in collaboration with FRA, prepares service development plan for corridor.	*For a Phase of Implementing Corridor* • Sponsor completes environmental review • Sponsor completes PE
Prerequisites	None	None	• Selection of Corridor	• Completion of Step 1	• Completion of Step 2 • Phase likely to be implemented • Phase likely to benefit IPR Service
Binding Commitment	None	None	Delivery of scope and cost estimate for SDP	Completion of SDP, approved by FRA	Completion of PE and NEPA work
Funding	None	None	~$500k "seed money" 0% local match *Unspent funds carry forward*	$XX determined through scoping effort, 10% local match	$XX determined through SDP, 20% local match

Note: Table based on FRA Corridor Identification and Development Program – Solicitation Preview presentation (October 12, 2022).

The FRA formally issued a solicitation of proposals for the Corridor ID program on December 20, 2022. Applicants have until March 27, 2023, to respond with a proposal. FRA will then conduct an eligibility review to determine if the project sponsor and proposal meets the program eligibility requirements. If eligible, the proposal will be evaluated by the FRA based on criteria which may include the demonstrated level of commitment and capability of project submitters, as well as the overall potential for the corridor to host successful passenger rail services. The evaluation would result in selection of corridors to be included in the Corridor ID program.

- **Corridor ID program:**
  - **Step 1: Selection and Agreement**. If selected, applicants would then enter into a cooperative agreement with the FRA for developing that corridor. FRA will provide up to $500,000 in initial funding with no non-federal match required. Federal grant funding is provided on a reimbursable basis to the applicant.

  - **Step 2: Service Development Plan**. The next step would be to prepare a Service Development Plan (SDP) that meets FRA requirements. Amtrak can assist with the preparation of the SDP. At this step, a ten percent non-federal funding match is required for accessing federal funding required. The current Amtrak study is a preliminary foundation for a Service Development Plan, which would include continued dialogue with stakeholders and refinement of planning details.

- **Step 3: Project Development: Preliminary Engineering, National Environmental Policy Act (NEPA) compliance**. Infrastructure projects identified in the SDP would then advance to Preliminary Engineering (PE) and any clearances necessary under the NEPA or other regulations. Preliminary Engineering tasks will develop the list of construction projects required to implement the service. This step requires a 20 percent non-federal funding match. At this stage, the project sponsor will need to contract for engineering, planning, and design services to complete preliminary engineering and NEPA compliance work. This concludes the project development phase, after which the project can move to construction funding.

  Note that projects accepted into Corridor ID can move directly to the next subsequent step; there are not new competitive grant cycles to progress from Step 1 through Step 3.

- **Federal-State Funding National Partnership.** Projects that are identified and fully developed through the Corridor ID program (completion of Step 3), will benefit from a selection preference for future Federal-State Partnership National funding opportunities, ensuring that investments yield benefits for communities impacted by new intercity passenger rail projects. The Federal-State Partnership program funds final design, infrastructure construction, and other asset purchases. Within the IIJA's $12 billion national network federal-state partnership appropriation, projects are eligible for up to 80 percent federal funding with a 20 percent non-federal match required. The project sponsor may apply to FRA for project funding during the annual cycle to construct the required projects for the service. During final design, agreements among stakeholders ranging from host railroads, municipalities, regional governments, impacted agencies, etc. will need to be identified and executed.

- **Restoration and Enhancement Grants.** The Federal Government may provide funding to cover a portion of operating expenses for the first six years of operation through the Restoration and Enhancement Grant program, which is competitive and may have a limited number of grant recipients in any given period and is applicable to Amtrak operated services.

- **Amtrak Agreements.** To establish a new Amtrak route, agreements will be needed between the project sponsor and Amtrak. The agreements will define Amtrak's obligations and commitments, and the financial terms. For project startup, an Implementation Agreement would cover initial activities prior to commencement of service. An Operating Agreement would cover passenger operations. Amtrak will also need an agreement with NJ TRANSIT for use of its tracks and stations and with New Jersey Department of Transportation for use of the Lackawanna Cut-Off. Final operating plans and cost estimates would be completed prior to execution of these agreements.

Amtrak and Partner Service Planning and Implementation

As the project progresses, the service plan will become more refined with increasing levels of detail and accuracy regarding financial projections.

Appendix A – Train Schedules Simulated

Amtrak coordinated with PNRRA and NJ TRANSIT to develop and evaluate four schedule options for simulation and modeling. Each option provides three daily round trips, spaced in time throughout the day. Travel time between New York and Scranton would be approximately three hours, which is competitive with other travel modes. Amtrak and NJ TRANSIT tested the schedules with simulation software (Rail Traffic Controller, "RTC") to evaluate the potential to integrate the proposed Amtrak service with the other planned commuter and intercity passenger rail operations on the route. Based on the results of simulations, Amtrak advanced two options (B and D) for detailed ridership and operating expense analysis.

To develop the schedules, Amtrak used a train performance calculator to estimate running times over the railroad. Amtrak modeled upgraded tracks that maximize passenger train speeds while staying within the existing railroad right-of-way. A maximum of 110 mph would be reached on some segments of the Lackawanna Cut-Off, with most of the remainder of the route operating between 60 and 80 mph. Line curvature generally caps the train speed to 80 mph or less.

Amtrak modeled 2028 train schedules received from NJ TRANSIT. For the simulation, Amtrak and NJ TRANSIT assumed no major infrastructure would be made to existing NJ TRANSIT commuter rail tracks, although such improvements could be included in future analysis. The schedules were designed so that Amtrak trains would pass each other on the M&E, which is double-tracked and has two routes.

In Scranton, arriving trains would change ends and return to New York after approximately 50 minutes. At New York, trains would continue through New York Penn Station to Sunnyside Yard for servicing before returning to Scranton approximately three hours later. The train simulation did not incorporate freight or excursion train operations, however the conceptual track design prepared by Jacobs Engineering includes sidings and freight tracks to minimize operating conflicts with those trains.

Amtrak developed Options A, B, and C sequentially, testing for potential train schedule conflicts. NJ TRANSIT reviewed Amtrak's three schedules and proposed a fourth schedule, Option D, to avoid a potential operating conflict with NJ TRANSIT on the M&E.

Some frequencies would travel via the Morristown Line and others via the Montclair-Boonton Line. To minimize interference with commuter trains, peak-direction Amtrak trains would use the Montclair Branch with a stop at Bay Street in downtown Montclair while reverse peak trains use the Morristown Line with a stop in Morristown. All trains were modeled to stop at Newark Broad Street Station, Dover, Blairstown, East Stroudsburg, and Mt Pocono.

All schedule options would use the same equipment, station, and infrastructure which are described in subsequent sections. The options vary in departure times and routing. Different schedules require different crew operating plans which affects the operating costs.

Option A – Initial Schedule Tested:

Option A was based on the PNRRA schedule for three daily round trip schedules with schedule times adjusted to avoid peak-period train conflicts near New York Penn Station. This schedule takes advantage of a half-hour gap in westbound reverse peak local service on the inner M&E to get the first train to Scranton in time to turn for a late-morning second departure from Scranton to New York.

The first eastbound train arrives in New York at 9:52 AM, which is after the busy morning peak period. The afternoon train schedules do not operate in the afternoon peak period at New York.

Simulation revealed that the first trains in each direction are unable to meet at Dover because NJ TRANSIT non-revenue trains occupy one of the main tracks, thus there is no track available for Amtrak trains to pass one another.

The schedule thus attempts to sequence the times of the two Scranton trains on a single main track, however a train meet so close to the single-track line west of Port Morris could be a risk for reliability. Meeting trains anywhere in the crowded section around Dover, particularly between Denville and Port Morris, is difficult and could cause delays.

Table A-1: Option A Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MTC - 4	SCR via MOR - 2		Routing		SCR via MOR - 1	SCR via MOR - 3	SCR via MTC - 1
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
6:57 AM	11:51 AM	**5:44 PM**	↓	Scranton, PA	↑	10:28 AM	**4:39 PM**	**11:00 PM**
7:35 AM	**12:28 PM**	**6:21 PM**	↓	Mt. Pocono, PA	↑	9:50 AM	**4:01 PM**	**10:22 PM**
7:59 AM	**12:51 PM**	**6:44 PM**	↓	East Stroudsburg, PA	↑	9:23 AM	**3:34 PM**	**9:55 PM**
8:20 AM	**1:11 PM**	**7:04 PM**	↓	Blairstown, NJ	↑	9:04 AM	**3:15 PM**	**9:36 PM**
8:48 AM	**1:39 PM**	**7:32 PM**	↓	Dover, NJ	↑	8:40 AM	**2:51 PM**	**9:12 PM**
		7:48 PM	↓	Morristown, NJ	↑	8:22 AM	**2:33 PM**	
9:23 AM	**2:14 PM**		↓	Montclair - Bay Street, NJ	↑			**8:36 PM**
9:35 AM	**2:25 PM**	**8:18 PM**	↓	Newark Broad Street, NJ	↑	7:52 AM	**2:06 PM**	**8:25 PM**
9:52 AM	**2:44 PM**	**8:38 PM**	↓	New York, NY	↑	7:37 AM	**1:50 PM**	**8:09 PM**

Option B – Second Schedule Tested – Relocated Train Meets:

The second option tested (Option B) has the first eastbound train leave Scranton earlier to move the morning Amtrak train meet east of Dover. The earlier train would arrive to New York Penn Station during the morning peak, which poses challenges to operation. Trains encounter more congestion that is reflected in longer run time. NJ TRANSIT later identified an unresolved train conflict with a non-revenue commuter train in this option which would require additional infrastructure or changes to schedules to resolve.

Table A-2: Option B Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MTC - 4	SCR via MOR - 2		Routing		SCR via MOR - 1	SCR via MOR - 3	SCR via MTC - 1
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
6:07 AM	11:51 AM	**5:44 PM**	↓	Scranton, PA	↑	10:28 AM	**4:39 PM**	**11:00 PM**
6:45 AM	**12:28 PM**	**6:21 PM**	↓	Mt. Pocono, PA	↑	9:50 AM	**4:01 PM**	**10:22 PM**
7:08 AM	**12:51 PM**	**6:44 PM**	↓	East Stroudsburg, PA	↑	9:23 AM	**3:34 PM**	**9:55 PM**
7:28 AM	**1:11 PM**	**7:04 PM**	↓	Blairstown, NJ	↑	9:04 AM	**3:15 PM**	**9:36 PM**
7:58 AM	**1:39 PM**	**7:32 PM**	↓	Dover, NJ	↑	8:40 AM	**2:51 PM**	**9:12 PM**
		7:48 PM	↓	Morristown, NJ	↑	8:22 AM	**2:33 PM**	
8:37 AM	**2:14 PM**		↓	Montclair - Bay Street, NJ	↑			**8:36 PM**
8:49 AM	**2:25 PM**	**8:18 PM**	↓	Newark Broad Street, NJ	↑	7:52 AM	**2:06 PM**	**8:25 PM**
9:07 AM	**2:44 PM**	**8:38 PM**	↓	New York, NY	↑	7:37 AM	**1:50 PM**	**8:09 PM**

Option C – Third Concept Avoids Morning New York Penn Station Peak Period:

Option C avoids the morning peak at New York Penn Station in both directions. The eastbound train arrives at 9:51 AM and the westbound departs at 9:31 AM. While New York is less congested at these

times, the midday eastbound train operates in the early reverse-peak period on the Morristown Line, resulting in having to follow a local commuter train for a portion of its journey, thus increasing travel time. Option C was not analyzed further due to the first arrival to Scranton being so much later than the initial PNRRA schedule.

Table A-3: Option C Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MOR - 2	SCR via MOR - 4		Routing		SCR via MTC - 1	SCR via MTC - 3	SCR via MTC - 5
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
6:56 AM	**1:12 PM**	**6:32 PM**	↓	Scranton, PA	↑	**12:22 PM**	**5:39 PM**	**11:00 PM**
7:34 AM	**1:49 PM**	**7:09 PM**	↓	Mt. Pocono, PA	↑	11:44 AM	**5:01 PM**	**10:22 PM**
7:57 AM	**2:12 PM**	**7:32 PM**	↓	East Stroudsburg, PA	↑	11:17 AM	**4:34 PM**	**9:55 PM**
8:17 AM	**2:32 PM**	**7:52 PM**	↓	Blairstown, NJ	↑	10:58 AM	**4:15 PM**	**9:36 PM**
8:44 AM	**3:01 PM**	**8:19 PM**	↓	Dover, NJ	↑	10:34 AM	**3:51 PM**	**9:12 PM**
	3:18 PM	**8:35 PM**	↓	Morristown, NJ	↑			
9:20 AM			↓	Montclair - Bay Street, NJ	↑	9:58 AM	**3:15 PM**	**8:36 PM**
9:33 AM	**3:51 PM**	**9:04 PM**	↓	Newark Broad Street, NJ	↑	9:47 AM	**3:04 PM**	**8:25 PM**
9:51 AM	**4:12 PM**	**9:26 PM**	↓	New York, NY	↑	9:31 AM	**2:48 PM**	**8:09 PM**

Option D – NJ TRANSIT's Suggested Schedule

The fourth option was developed by NJ TRANSIT train simulation staff. This schedule avoids a congestion point they identified in Amtrak's schedule options. The major difference is that westbound trains operate on a later schedule which then leads to later eastbound departures for the trains later in the day.

Table A-4: Option D Train Schedules

Eastbound						Westbound		
SCR2	**SCR4**	**SCR6**		Train Number		**SCR1**	**SCR3**	**SCR5**
SCR via MTC - 2	SCR via MTC - 4	SCR via MOR - 6		Routing		SCR via MOR - 1	SCR via MTC - 3	SCR via MOR - 5
Daily	Daily	Daily		Normal Days of Operation		Daily	Daily	Daily
				Station				
7:00 AM	**12:58 PM**	**6:57 PM**	↓	Scranton, PA	↑	**12:09 PM**	**5:38 PM**	**11:01 PM**
7:38 AM	**1:35 PM**	**7:34 PM**	↓	Mt. Pocono, PA	↑	11:30 AM	**5:00 PM**	**10:23 PM**
8:01 AM	**1:58 PM**	**7:57 PM**	↓	East Stroudsburg, PA	↑	11:04 AM	**4:34 PM**	**9:56 PM**
8:21 AM	**2:18 PM**	**8:17 PM**	↓	Blairstown, NJ	↑	10:45 AM	**4:15 PM**	**9:37 PM**
8:48 AM	**2:44 PM**	**8:44 PM**	↓	Dover, NJ	↑	10:20 AM	**3:50 PM**	**9:13 PM**
		9:00 PM	↓	Morristown, NJ	↑	10:03 AM		**8:55 PM**
9:23 AM	**3:19 PM**		↓	Montclair - Bay Street, NJ	↑		**3:15 PM**	
9:35 AM	**3:31 PM**	**9:29 PM**	↓	Newark Broad Street, NJ	↑	9:35 AM	**3:04 PM**	**8:27 PM**
9:53 AM	**3:50 PM**	**9:47 PM**	↓	New York, NY	↑	9:18 AM	**2:48 PM**	**8:11 PM**

Appendix B – Technical Reports Prepared by Jacobs Engineering

Scranton-New York City Intercity Passenger Rail Analysis Infrastructure Assessment

Scranton-Delaware Water Gap Segment

Technical Reports

March 2023

Prepared by: Jacobs Engineering