

Overbrook Intermodal Center



FEBRUARY 2023



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Contents

Executive Summary	1
Chapter 1: Introduction	3
Chapter 2: Existing Conditions	7
Chapter 3: Technical Constraints and Opportunities	17
Chapter 4: Design Proposal	21
Chapter 5: Phasing	37
Appendix: Overbrook Intermodal Center Ridership Forecast	43

List of Figures and Tables

<i>Figure 1:</i> Concept design for Overbrook Intermodal Center.	1
<i>Figure 2:</i> Documents from SEPTA’s Trolley Modernization, Bus Revolution, and Reimagining Regional Rail programs.	4
<i>Figure 3:</i> Project study area.	7
<i>Figure 4:</i> Overbrook Station, aerial view and parcel ownership.	8
<i>Figure 5:</i> Overbrook Multimodal Access Analysis.	9
<i>Figure 6:</i> Bus and trolley routes serving the Overbrook neighborhood.	10
<i>Figure 7:</i> Route G layover maneuver by Drexel Road and City Avenue.	11
<i>Figure 8:</i> Two Route G buses in the stop and layover area at Overbrook Station.	11
<i>Figure 9:</i> 63rd Street and Malvern Avenue Trolley and Bus Loop during Route 10 bus substitution.	11
<i>Figure 10:</i> Mini-high platforms allow for level boarding.	12
<i>Figure 11:</i> Low-level platforms at Overbrook Station.	12
<i>Figure 12:</i> Underpass connecting Regional Rail platforms has stairs on both ends.	12
<i>Figure 13:</i> DVRPC Bicycle LTS & Connectivity Analysis.	13
<i>Figure 14:</i> DVRPC Park & Ride Passenger Origins tool.	14
<i>Figure 15:</i> 6100 City Avenue apartments.	15
<i>Figure 16:</i> 2134 North 63rd Street, west of Overbrook Station.	15
<i>Figure 17:</i> Overbrook Station area zoning map.	16
<i>Figure 18:</i> The steep slope on the inbound side of Overbrook Station with existing stairs and ramp.	18
<i>Figure 19:</i> Station buildings and City Avenue Bridge.	18
<i>Figure 20:</i> Levittown Station Overpass.	19
<i>Figure 21:</i> Overbrook Station’s existing inbound (west) side.	19
<i>Figure 22:</i> The northern portion of Overbrook Station’s existing outbound (east) parking lot.	20
<i>Figure 23:</i> The southern portion of Overbrook Station’s existing outbound (east) parking lot.	20
<i>Figure 24:</i> Full site concept design.	22
<i>Figure 25:</i> Platforms under the historic buildings.	24
<i>Figure 26:</i> Site plan detail: Regional Rail.	25
<i>Figure 27:</i> Site plan detail: Trolley Terminal.	27
<i>Figure 28:</i> Trolley terminal alternative configuration.	28
<i>Figure 29:</i> Turn template created with AutoTURN, northbound bus terminal entry.	29
<i>Figure 30:</i> Turn template created with AutoTURN, southbound bus terminal entry.	29
<i>Figure 31:</i> Battery-electric bus charging station from the Société de transport de Montréal.	30
<i>Figure 32:</i> Site plan detail: Bus Terminal.	31
<i>Figure 33:</i> Brown University Campus Shuttle.	32
<i>Figure 34:</i> Site plan detail: Micromobility Hub.	33
<i>Figure 35:</i> Reserved car share parking with clear signage and bicycle racks.	34

<i>Figure 36:</i> Boston GoHubs! pilot multimodal plaza options.	35
<i>Figure 37:</i> Stormwater tree trench diagram.	38
<i>Figure 38:</i> Business at 2135 North 63rd Street.	39
<i>Figure 39:</i> Business at 2125 North 63rd Street.	39
<i>Figure 40:</i> Phasing strategy site plan.	41

Appendix

<i>Figure A-1:</i> Travel Demand Model Flow Chart (DVRPC, 2023)	46
<i>Figure A-2:</i> Screenshots of the regional models (DVRPC, 2023)	47
<i>Table A-1:</i> Scenario Description	46
<i>Table A-2:</i> Modeling Parameters for Overbrook Regional Rail Station	47
<i>Table A-3:</i> Daily Ridership Results (Boardings Only). (DVRPC, 2023)	48

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Figure 1: Concept design for Overbrook Intermodal Center. (DVRPC, Nearmap 2021)

Executive Summary

Overbrook Station is a Southeastern Pennsylvania Transportation Authority (SEPTA) Regional Rail station serving residential, institutional, and commercial areas in Philadelphia’s Overbrook neighborhood. As part of SEPTA Forward and its associated strategic planning initiatives, SEPTA is planning significant modifications to its bus and trolley service. Redesigning Overbrook Station would allow the facility to accommodate new end-of-line locations for nearby bus and trolley routes, improving intermodal connectivity for transit riders. Station improvements would support the goals of increasing access, improving connectivity, and growing ridership.

This study presents a concept design for Overbrook Intermodal Center (Figure 1) developed by a project team from the Delaware Valley Regional Planning Commission (DVRPC). The design includes changes to station facilities that would:

- › Extend Trolley Route 10 to the west (inbound) parking area at Overbrook Station.

- › Achieve complete Americans with Disabilities Act (ADA) compliance and full accessibility by constructing high-level Regional Rail platforms and an accessible track crossing.
- › Improve bus operations and increase bus layover space by relocating primary bus stop facilities to the west (inbound) parking area.
- › Improve last-mile and intermodal connections by developing a micromobility hub concept in the east (outbound) parking lot.
- › Deprioritize parking for private vehicles to accommodate station access by different modes of transportation and grow ridership arriving by those modes.
- › Phase improvements to provide maximum connectivity while avoiding project completion delays.

If implemented, the new station design and accompanying service changes are expected to contribute to accelerated growth in transit ridership. Ridership projections have been provided to SEPTA in a separate memorandum.

Design Elements	
1	Regional Rail Station High-level platforms, pedestrian overpass, and preserved station buildings
2	Trolley Terminal Station, switching, and layover space for Trolley Route 10
3	Bus Terminal Turnaround, boarding, and layover space for Route G, fast-charging infrastructure
4	Micromobility Hub Bicycle parking, shuttle loop/kiss-and-ride, car parking, private vehicle parking



Chapter 1: Introduction

Project Background

Overbrook Station is a SEPTA Regional Rail station in the Overbrook neighborhood of Philadelphia, on the border with Lower Merion Township, Montgomery County. Established in 1858, the station provided a 10- to 15-minute trip to Center City Philadelphia, sparking early suburban development. By 2019, Overbrook Station served over 1,500 passenger trips per day—both “traditional” commute trips to Center City and “reverse commute” trips to the Overbrook area’s large employers and to destinations on the region’s Main Line.

The Overbrook neighborhood is also served by SEPTA’s Trolley Route 10, a streetcar that terminates approximately half a mile south of Overbrook Station. Route 10 connects West Philadelphia to Center City via subway. Like all of SEPTA’s eight-line trolley system, Route 10 is slated to be upgraded through SEPTA’s Trolley Modernization program. Trolley Modernization is a once-in-a-generation opportunity to transform one of the nation’s largest trolley networks, delivering benefits across the region. Trolley Modernization planning includes:

- › new, longer vehicles that hold more passengers and feature low floors and ramps; wider pathways; audio and visual messaging systems; and designated open space for people with wheelchairs, walkers, strollers, and shopping carts;
- › new on-street stations that will be well marked, safe, and fully accessible and rebuilt existing stations that will be fully accessible with improved amenities;
- › infrastructure and operational improvements to facilities, signals, and stations to make service faster and more reliable; and
- › proposed line extensions that will make it easier for riders to reach more destinations and connect to more SEPTA services, improve operations, and provide for passenger and operator amenities.

The Overbrook Intermodal Center study proposes one such end-of-line option: extending Route 10 to Overbrook Station. The study also identifies improvements at Overbrook Station and the surrounding area with the goals

of increasing access, improving connectivity, and increasing ridership.

This report includes:

- › a review of existing conditions;
- › a review of technical feasibility that relies on subject matter expert (SME) interviews; and
- › a proposed station concept plan with phasing recommendations.

Other Relevant SEPTA Projects

SEPTA Forward, SEPTA's 2021–2026 strategic plan, creates a unified vision for the transit agency to pursue and implement projects that advance safe, reliable, and accessible mobility choices in the region. Four of these are particularly relevant to the Overbrook Intermodal Center study: Trolley Modernization, Reimagining Regional Rail, Bus Revolution, and Transit Supportive Community Development.

Trolley Modernization (Figure 2) will not only replace SEPTA's 40-year-old fleet with accessible vehicles; it will also include new on-street stations, operational improvements, and more predictable and consistent service. Targeted extensions of trolley service, such as the one considered in this report, further Trolley Modernization's goals of creating an accessible, fast, and easy to use system.

Reimagining Regional Rail (Figure 2) seeks to change the Regional Rail system to create a "lifestyle transit network" of all-day, all-week frequent service to destinations across the region. This will include major changes to both schedule and fare policy. It will also necessitate physical changes to Regional Rail stations across the region, such as high-level platforms and other accessibility improvements. The understanding that better Regional Rail service includes more accessible Regional Rail stations is a key assumption of this proposed station concept.

Bus Revolution (Figure 2) is an ongoing project seeking to overhaul the existing bus network to improve reliability, simplify service, do more to meet existing

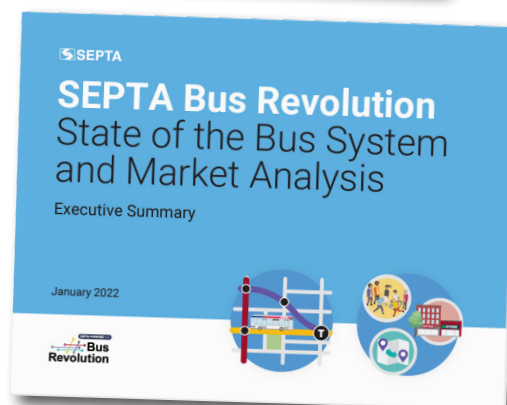
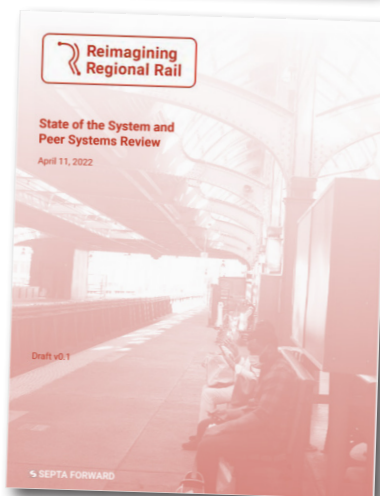
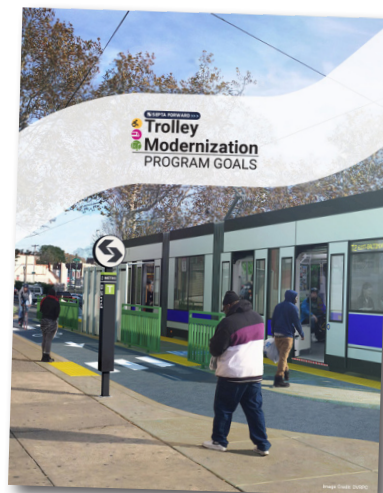


Figure 2: Documents from SEPTA's Trolley Modernization, Bus Revolution, and Reimagining Regional Rail programs. (DVRPC and SEPTA, 2022)

demand, and better balance service throughout the day and week. Bus Revolution changes may affect the number of buses that Overbrook Station will need to accommodate and the routes these buses serve. Based on existing demand, Overbrook Station is likely to be a critical destination and transfer location under any Bus Revolution outcome. As a result, accommodating bus service and layover space is a critical element of this report's concept plan.

Transit Supportive Community Development is a project designed to increase transit ridership, quality of life, equity, agency financial stability, mobility, and accessibility by focusing on the uses of the areas at and around SEPTA stations. SEPTA is focused on encouraging and supporting mixed-use and mixed-income development on transit-adjacent properties, leveraging its own real estate assets, and working with community partners.

Project Coordination

On August 18, 2021, the Overbrook Intermodal Center steering committee met to identify goals for this project and to help the DVRPC project team develop a high-level vision for a station design concept. Representatives from SEPTA, the Montgomery County Planning Commission, Lower Merion Township, Amtrak, the City Avenue Special Services District, the Philadelphia City Planning Commission, and the City of Philadelphia Office of Transportation, Infrastructure, and Sustainability (OTIS) participated.

At this kickoff meeting, the committee shared key needs for the station location and, with the project team, developed three goals as site design guidance:

Access:

Overbrook Station should be easily accessible via a variety of modes of transportation to people of any mobility level and should fully comply with the ADA.

Connectivity:

As a key location connecting Greater Philadelphia's urban core to its suburbs, service at Overbrook Station should enable maximum connectivity between modes of transportation.

Ridership Growth:

Proposed improvements at Overbrook Station should encourage more people to ride several modes of public transportation.

To develop a concept design for the Overbrook Intermodal Center that aligns with these goals, the project team engaged SMEs on various design elements. SMEs helped the project team determine the best way to meet these goals and identify key feasibility requirements. These included determining what was possible at Overbrook Station from an engineering perspective, assessing how project elements could be phased to ensure timely project completion, and identifying other agencies with a role to play in project development.

SME interviews were held in March and April 2022 in four sessions. Each SME participated in one of four group interviews, which took place in March and April 2022. They were grouped according to their roles, as listed below.

Planning:

- › SEPTA Strategic Planning and Analysis
- › SEPTA Service Planning
- › SEPTA Operations

Engineering:

- › SEPTA Engineering, Maintenance, and Construction
- › SEPTA Bridges and Buildings
- › SEPTA Track
- › SEPTA Power

Rail:

- › Amtrak Infrastructure Planning
- › SEPTA Strategic Planning and Analysis

Street:

- › City of Philadelphia Department of Streets
- › City of Philadelphia Office of Transportation, Infrastructure, and Sustainability (OTIS)
- › Pennsylvania Department of Transportation (PennDOT) Highway Safety Improvement Program
- › PennDOT District 6 Traffic Unit

The project team then developed draft designs that incorporated input from the SMEs. Following a technical review, the draft designs were shared with the full steering committee. Revised designs were then reviewed by SEPTA staff, adjusted to incorporate operational needs, and finalized for this report.

Chapter 2: Existing Conditions

Overbrook Station

Overbrook is a station on SEPTA's Paoli/Thorndale Regional Rail line located near the intersection of City Avenue and North 63rd Street in Philadelphia, on the city's boundary with Montgomery County (Figure 3). The station spans both sides of a four-track rail right-of-way and includes platforms, station buildings, and parking lots.

The right-of-way and station property are owned by Amtrak, which runs the Keystone Service between Harrisburg, Pennsylvania, and New York City but does not stop at Overbrook Station. The Keystone Service is a state-supported Amtrak service, primarily funded by PennDOT. The station is served only by SEPTA, and the station facilities are used and maintained by SEPTA pursuant to a lease agreement. One portion of the station area, a parcel that makes up the west driveway to the site, is privately owned and accessible by easement (see Figure 4).

Surrounding the station is a small hub of mid-rise housing and neighborhood commercial destinations. The tracks, platform, and station buildings are set somewhat lower in elevation than the surrounding street network, which limits pedestrian access to the station.

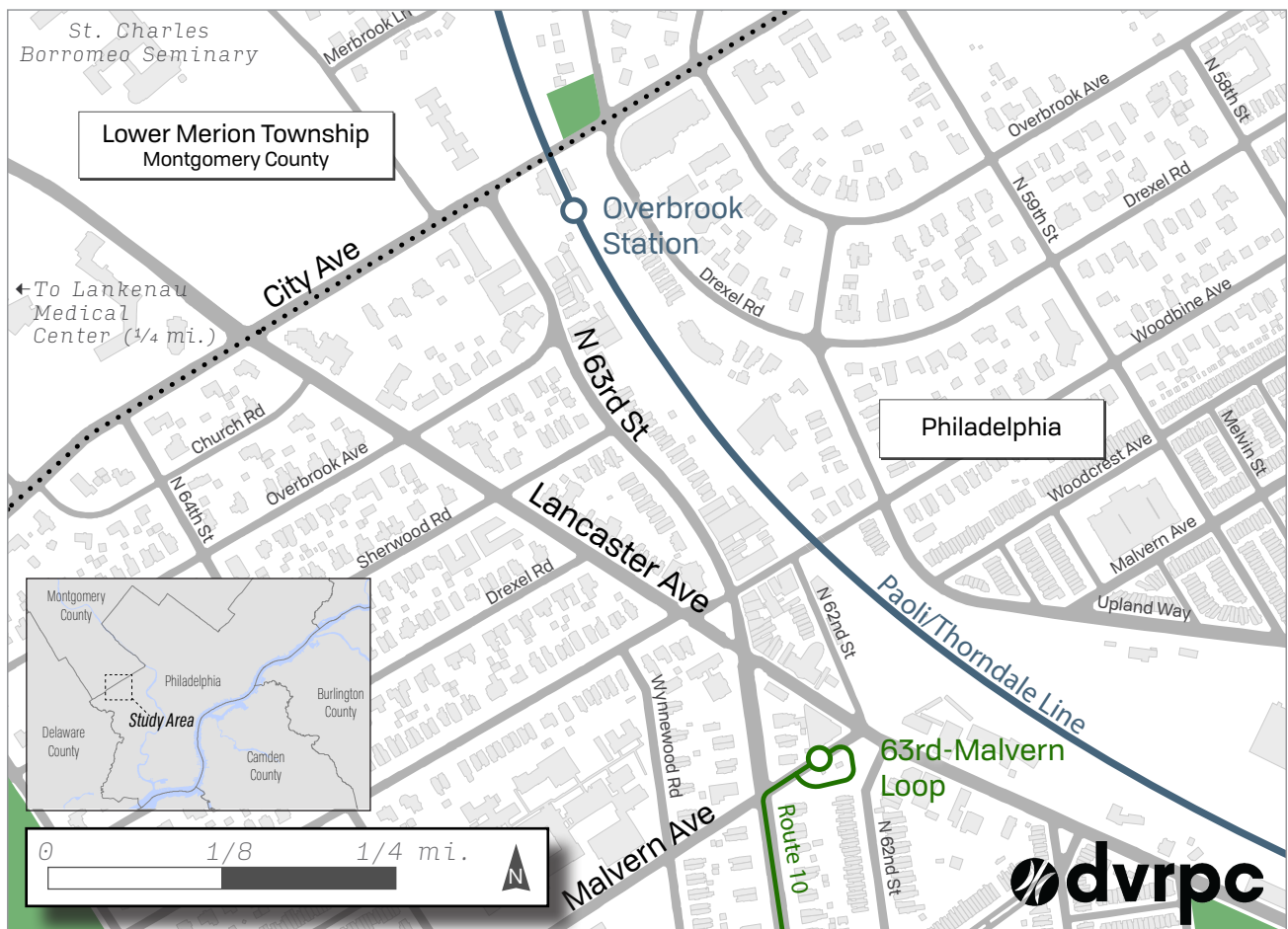


Figure 3: Project study area. (DVRPC, 2022)

The inbound platform features a ticket office, and both platforms include sheltered waiting areas. The station buildings date back to 1866 and are listed on municipal and federal historic preservation registers. The Philadelphia Register of Historic Places is an inventory of properties that have been designated as historic by the Philadelphia Historical Commission. This designation creates restrictions on any work that would alter or demolish the building. Prior to any work, a permit must be obtained from the Department of Licenses and Inspections. During the application process, the Historical Commission has the power to review the proposed work and to deny, postpone, or set conditions for approval of the permit as defined in § 14-1005(6)(c) of The Philadelphia Code.

The station is located within the Overbrook Farms Historic District on the National Register of Historic Places, a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archaeological resources. This title is mostly honorific and does not impose restrictions on construction, alteration, or demolition of the buildings or the property, except on projects using federal funds. The designation provides property owners with tax incentives, access to grants, and assistance with preservation.

The station is also within the Overbrook Farms Neighborhood Conservation Overlay District of the City of Philadelphia. This zoning overlay mandates that all existing buildings be repaired or replaced with materials or details similar to the original materials and that new buildings meet the building standards, which include maintaining massing, articulation, and building materials that are consistent with the neighborhood character.

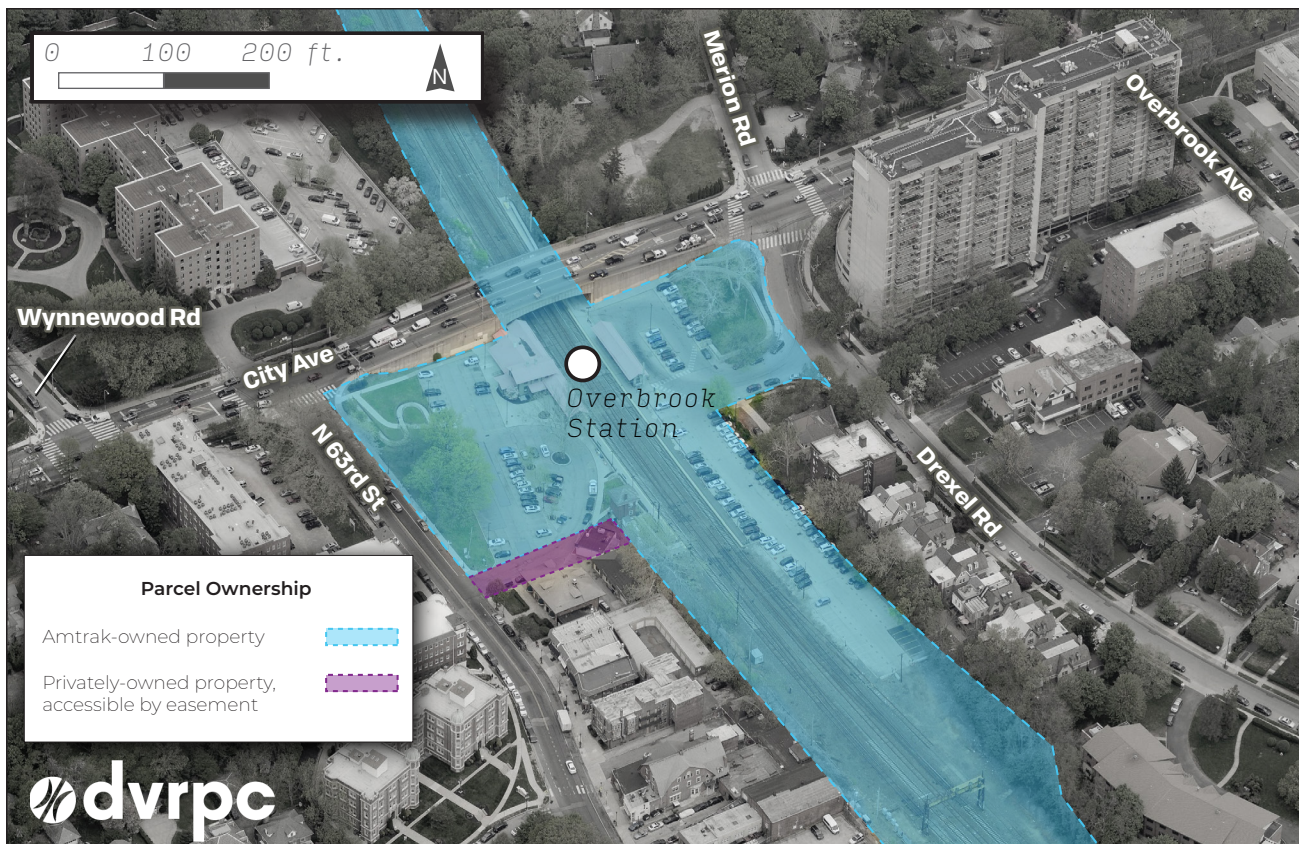


Figure 4: Overbrook Station, aerial view and parcel ownership. (DVRPC and City of Philadelphia, 2018)

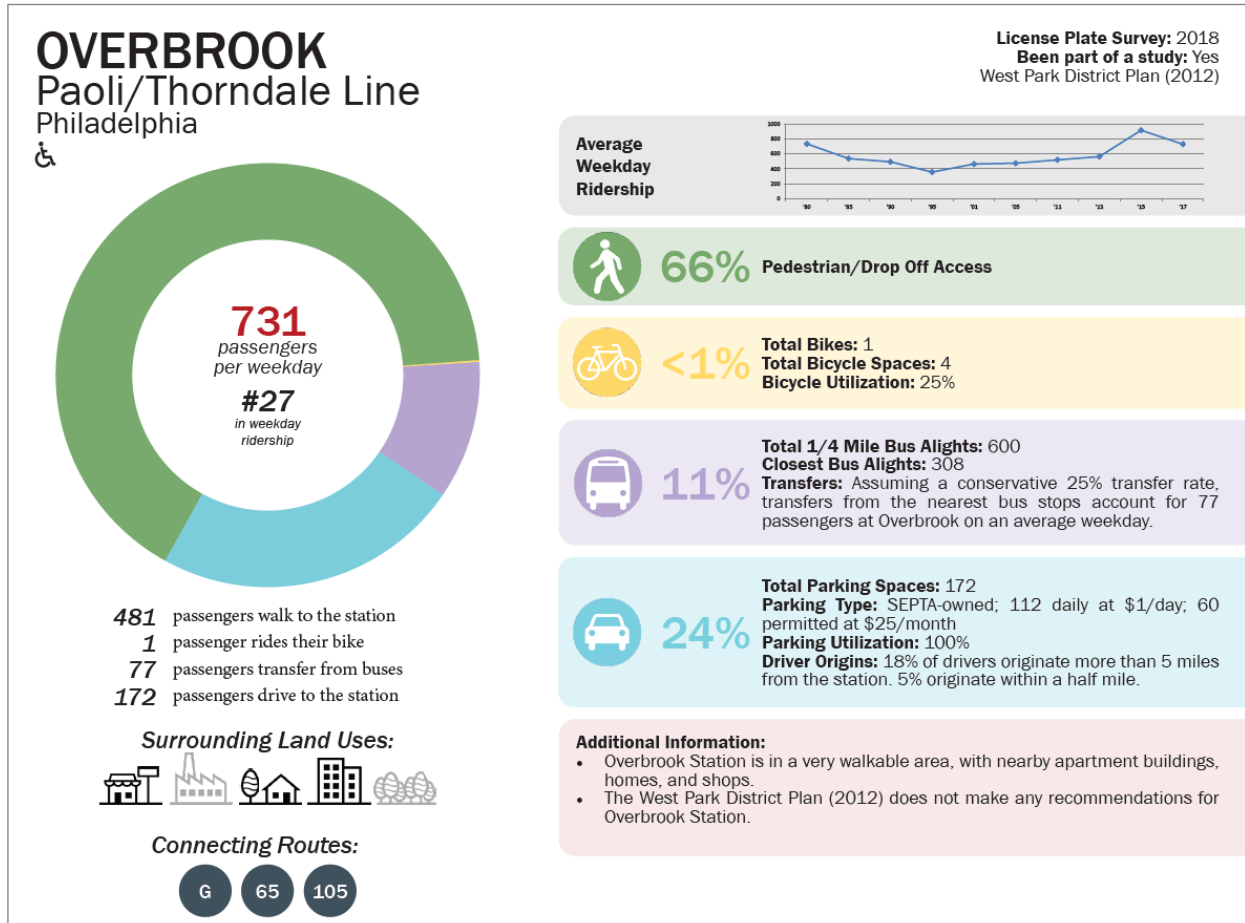


Figure 5: Overbrook Multimodal Access Analysis. (SEPTA, 2018)

Public Transit Service: Rail

Overbrook Station is served by the Paoli/Thorndale line, the line with the highest ridership in the SEPTA Regional Rail system. In a pre-Coronavirus Disease 2019 (COVID-19) survey (Figure 5), SEPTA found Overbrook Station to be among the higher-ridership stations in the Regional Rail system, ranking 27th out of 155 stations. Less than one-quarter of passengers drove to Overbrook Station; most of the station's Regional Rail passengers rely on other modes, including pedestrian or drop-off access (66 percent) and bus transfers (11 percent). The Overbrook Station area is also a common reverse commute origin (toward employers on the Main Line) and destination (toward large local institutions like Lankenau Medical Center and Saint Joseph's University).

Overbrook Station lies in fare Zone 2, offering a \$4.75 ride to Center City during peak periods using SEPTA's Travel Wallet (as of September 2022). The station is served by most Paoli/Thorndale trains, outside of select peak express trips. As of September 2022, Overbrook Station has hourly off-peak service, with service every 14–30 minutes during morning and afternoon peak periods. Weekend service is hourly in the peak direction and bi-hourly otherwise. Overbrook Station is a 10-minute ride to 30th Street Station, the next inbound stop. Amtrak's Keystone service from Harrisburg to Philadelphia and New York bypasses the station.



Figure 6: Bus and trolley routes serving the Overbrook neighborhood. Regional Rail is not pictured. Line colors represent mode and frequency. The Route 10 Trolley is shown in green. Bus service with headways of 10 minutes or less is shown in red, between 15 and 30 minutes in teal, and between 30 and 60 minutes in gray. (DVRPC and SEPTA, 2022)

Public Transit Service: Bus

Figure 6 shows the bus and trolley lines that provide local service in Overbrook. Two bus routes provide direct service to Overbrook Station:

- › Bus Route 65 serves 69th Street Transportation Center, Wissahickon Transportation Center, and Northwest Philadelphia. Buses stop at 63rd Street and City Avenue and at City Avenue and Drexel Road.
- › Bus Route G serves South, Southwest, and West Philadelphia. Route G terminates in the parking lot attached to the outbound platform at Overbrook Station.

Bus Route G is the only route to enter station property (Figure 6). Due to space constraints in the outbound station parking lot, bus operators are forced to execute a multipoint turn in order to reach the stop and layover area (Figure 7). A section of the parking lot has been extended into the outbound station platform area to facilitate this maneuver. The limited space and high frequency of Bus Route G (every 15 minutes or better during daytime service) leads to one to three buses laying over at Overbrook Station at once (Figure 8). Due to the space constraints of the loop, buses are not able to pass a bus that is laying over.

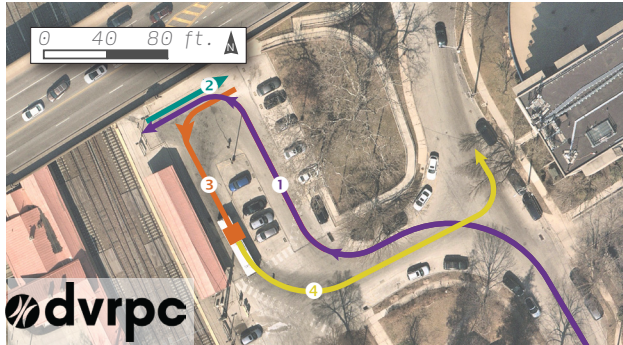


Figure 7: Route G layover maneuver by Drexel Road and City Avenue. The numbered stages correlate with the four-step K-turn that a bus must take to enter and exit the bus loop. (DVRPC, Nearmap 2021)



Figure 8: Two Route G buses in the stop and layover area at Overbrook Station. (DVRPC, 2022)



Figure 9: 63rd Street and Malvern Avenue Trolley and Bus Loop during Route 10 bus substitution. (DVRPC, 2022)

An alternate Bus Route G pattern ends at Lankenau Medical Center, two-thirds of a mile west of Overbrook Station. These trips do not pull into the station but stop near the parking lot entrance on Drexel Road.

Bus Route G’s many route patterns and overall route length also illustrate some of the challenges being addressed by SEPTA’s ongoing Bus Revolution project. The project has three goals, all of which are likely to impact the future development of Overbrook Station:

- › Put the rider experience first.
- › Increase access to opportunity.
- › Build trust with reliable service.

Final route and stop changes to the bus network are not complete at the time of this study. This report’s recommendations are designed to offer SEPTA as much flexibility in the Overbrook Station area as possible in meeting Bus Revolution’s goals.

63rd Street and Malvern Avenue Trolley and Bus Loop

Less than half a mile away from Overbrook Station is SEPTA’s 63rd and Malvern Loop (Figure 9), the terminal for Trolley Route 10, serving West Philadelphia and Center City via the trolley tunnel and Bus Route 46, serving West Philadelphia. Bus Route 65, from Germantown to 69th Street Transportation Center, and Bus Route 105, serving Ardmore and other eastern Main Line communities, also stop at the 63rd and Malvern Loop. Bus Route G also provides limited service from the 63rd and Malvern Loop.

During previous studies, SEPTA identified several space constraints for the Route 10 end-of-line facility at the 63rd and Malvern Loop that could hinder Trolley Modernization’s implementation. The existing loop would require significant renovation to create enough straight track to serve both trolley and bus passenger needs and to ensure enough layover space for trolleys and buses. Therefore, as a part of this study, SEPTA asked the DVRPC project team to look into

the feasibility of an end-of-line for Trolley Route 10 at Overbrook Station.

Bicycle and Pedestrian Access

At Overbrook Station, features like mini-high platforms for level boarding and ramps to each Regional Rail platform make the station accessible to riders who use mobility devices or who cannot climb stairs. Figures 10 and 11 show the contrast between mini-high and low-level platforms. However, crossing between platforms remains a challenge. There is an underpass between the inbound and outbound platform that is not ADA-compliant (Figure 12). To cross between these platforms, pedestrians who cannot use the stairs must use the sidewalk on City Avenue as it bridges over the tracks. Stairs and winding, ADA-compliant sidewalks provide pedestrian access on the steep grade from City Avenue. The outbound platform is also accessible by foot via a concrete and grass path through Merion Gateway Park, along Merion Avenue just north of City Avenue.

The pedestrian network around Overbrook Station is generally well connected. Most nearby streets in the City of Philadelphia feature sidewalks on both sides. North of City Avenue, most of Lower Merion's main roads and many of its residential streets include sidewalks. Some low-volume residential streets in Lower Merion have no sidewalks, and some major roads and connector streets, such as Lancaster Avenue, include sidewalks on only one side of the street. There are also pedestrian routes that connect Merion Road to the outbound platform and Wynnewood Road with the inbound platform at Overbrook Station; the latter was under construction as of summer 2022.

Despite the sidewalks on major roads near Overbrook Station, the area remains dangerous for pedestrians and other road users. Within the study area, all of City Avenue and portions of North 63rd Street near the 63rd and Malvern Loop are on the City of Philadelphia's High Injury Network, corridors with the highest rates of crash fatalities and serious injuries per mile. These corridors are the focus of Philadelphia's Vision Zero efforts, a strategy that treats all traffic deaths as preventable incidents that can be systematically addressed. As a key



Figure 10: Mini-high platforms allow for level boarding. (DVRPC, 2022)



Figure 11: Low-level platforms at Overbrook Station. (DVRPC, 2022)



Figure 12: Underpass connecting Regional Rail platforms has stairs on both ends. (DVRPC, 2022)

commercial corridor and high auto traffic roadway, City Avenue is a critical barrier to safe access to Overbrook Station for all users and especially for cyclists.

Bicycle racks that can accommodate four bicycles are present on the outbound side of the station. While there are painted, unprotected bike lanes on nearby Lancaster Avenue and Upland Way, these nearby bike lanes do not provide connections to the station.

Safety and comfort also limit station access by bicycle. The DVRPC Bicycle Level of Traffic Stress (LTS) analysis (Figure 13) evaluates how friendly each road is for bicycles. LTS scores range from 1 to 4, with 1 representing a road segment that is comfortable for most people and 4 representing a road segment with high traffic stress that would deter all but the most confident cyclists.

High LTS ratings at City Avenue and North 63rd Street make it difficult for bicyclists to comfortably access the west side of the station. East of the station, a combination of low-stress streets and bicycle facilities allow for largely comfortable travel between Overbrook Station and Saint Joseph’s University. However, Lankenau Medical Center can only be accessed from Lancaster Avenue, a high-stress road without bicycle infrastructure north of City Avenue, or lower-stress parallel routes.

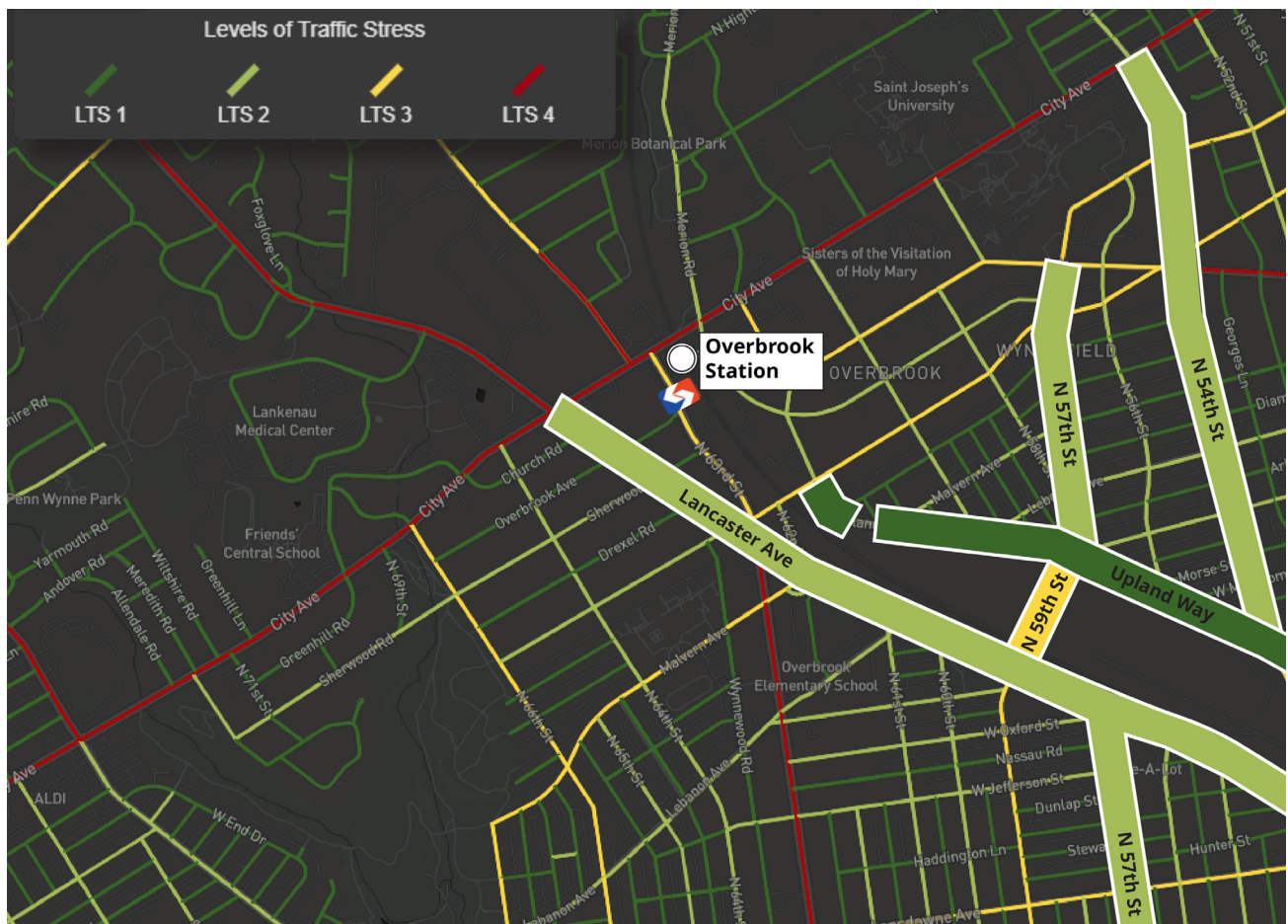


Figure 13: DVRPC Bicycle LTS & Connectivity Analysis. Thicker lines are used to represent existing conventional bike lanes on North 57th Street, North 59th Street, North 54th Street, Upland Way, and Lancaster Avenue. (DVRPC, 2022, <https://www.dvrpc.org/webmaps/bike-lts/>)

Auto and Vehicle Access

Existing parking accommodates less than 25 percent of Regional Rail passengers who board at Overbrook Station, indicating that private vehicle parking is not critical to accommodate most existing riders. As evidenced by studies by SEPTA and DVRPC, a significant percentage of passengers who currently drive to and park at the station live within a reasonable walk or bike distance of the station:

- › According to 2018 SEPTA parking utilization data, 77 percent of drivers originated from between one and five miles from the station and less than 5 percent of drivers originated within a half mile. Despite full usage of Overbrook’s parking facilities, the station’s parking capacity is significantly lower than its average daily ridership—172 spaces compared to 755 Regional Rail boards per day.
- › DVRPC compiles data for its Park and Ride Passenger Origins tool by recording license plate numbers for all vehicles parked at transit stations. Those numbers are then sent to PennDOT, where they are anonymized and

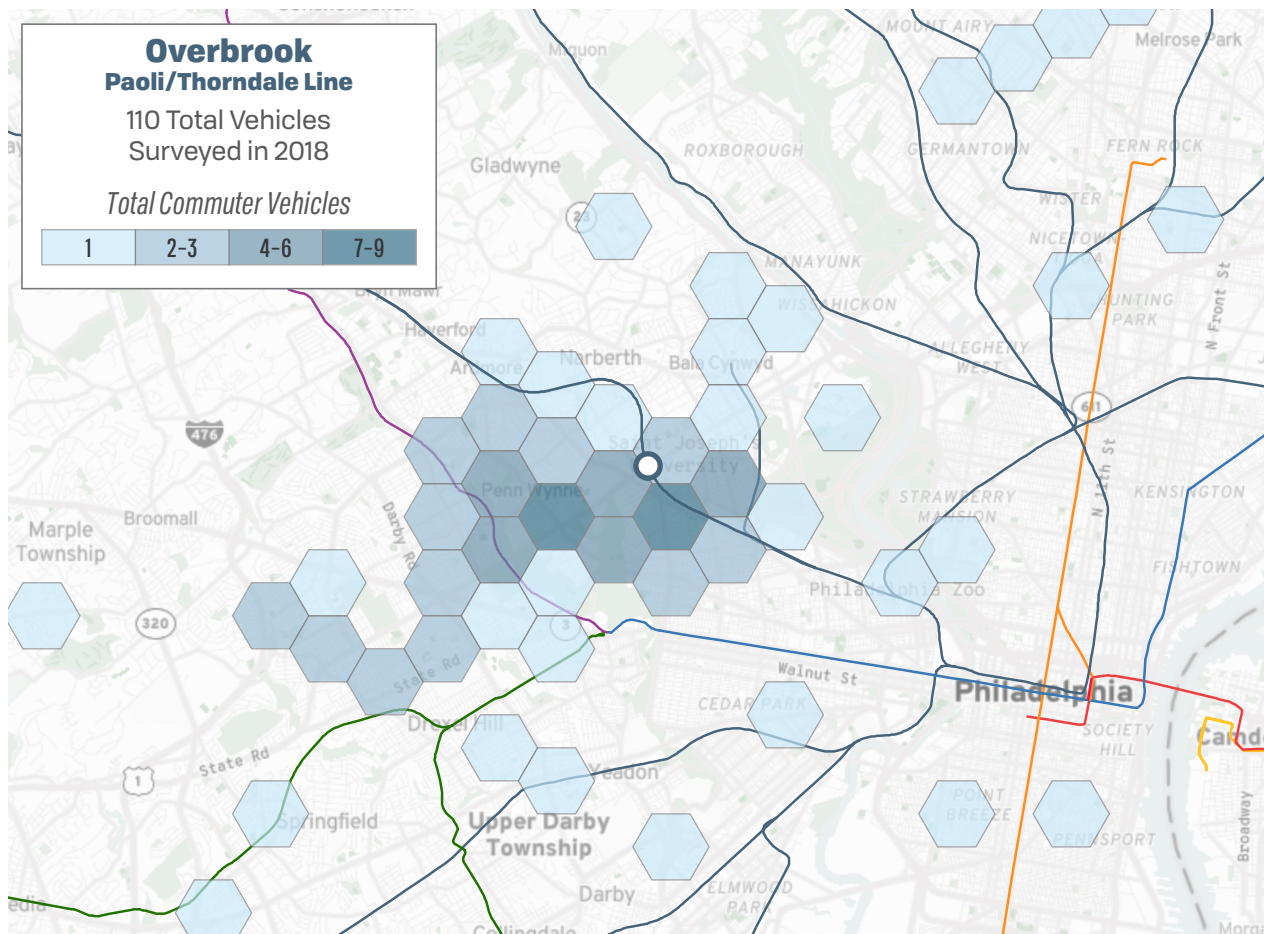


Figure 14: DVRPC Park & Ride Passenger Origins tool. 2018 license plate survey. (DVRPC, 2018, <https://www.dvrpc.org/webmaps/parkride/>)

the registration locations associated with those license plates are compiled. In the most recent license plate survey, collected in 2018 (Figure 14), DVRPC staff recorded license plate numbers from 110 vehicles. Of those 110, many parked vehicles are registered to addresses within 2 miles of the station. With improved transit, bicycle, and pedestrian infrastructure, some portion of those who previously arrived at Overbrook Station by car could be expected to arrive by other means.

Vehicles enter the station via driveways just south of City Avenue on North 63rd Street and Drexel Road. There are parking lots on each side of the station with 172 combined spots: 112 daily spots (a one dollar per day fee on a first-come, first-serve basis) and 60 permit spots (a \$25 per month fee for a reserved spot). Parking fees were suspended during the COVID-19 pandemic and SEPTA has not yet resumed pre-pandemic pricing. There is a kiss-and-ride area on the inbound side of the station. The outbound parking and bus layover areas also function as a kiss-and-ride area, but space constraints limit their functionality for drivers.

Privately operated shuttles connect Overbrook Station users with local establishments, including Green Hill Condominiums (1001 City Avenue) and Friends Central School (1101 City Avenue).

Land Use

The immediate station area, along North 63rd Street and City Avenue, includes mid-rise apartment buildings (Figure 15 and Figure 16) and single-family attached homes. This section of North 63rd Street also has some neighborhood commercial mixed-use districts, designed to encourage pedestrian-friendly retail commercial corridors. In the blocks beyond the immediate station area, land use is mostly single-family detached homes.

There are several large institutions nearby that function as both employment and residential hubs, including Lankenau Medical Center near City and Lancaster avenues; St. Joseph’s University, northeast of the station along City Avenue; and Saint Charles Borromeo Seminary, also at City and Lancaster avenues. These institutions are likely drivers of future land use changes. For example, the seminary relocated and sold its property to Main Line Health in 2019, the health system that owns the adjacent Lankenau Medical Center. That redevelopment will likely bring new health industry jobs closer to Overbrook Station. About two miles east of the station on City Avenue at Belmont Avenue, the 61-acre Bala Plaza properties are slated for a phased redevelopment with plans for hundreds of new housing units, more commercial development, and public amenities.



Figure 15: 6100 City Avenue apartments. (DVRPC, 2022)



Figure 16: 2134 North 63rd Street, west of Overbrook Station. (DVRPC, 2022)

Zoning

Overbrook Station is located at the border between the City of Philadelphia and Lower Merion Township, which have different zoning codes (Figure 17). Station-area zoning in Philadelphia permits commercial and multifamily development along North 63rd Street and City Avenue. Apart from these two mixed-use corridors, Philadelphia zoning districts near the station are for single-family residential uses. In Lower Merion Township, the station area is primarily zoned for residential use interspersed with large institutional districts and neighborhood commercial districts.

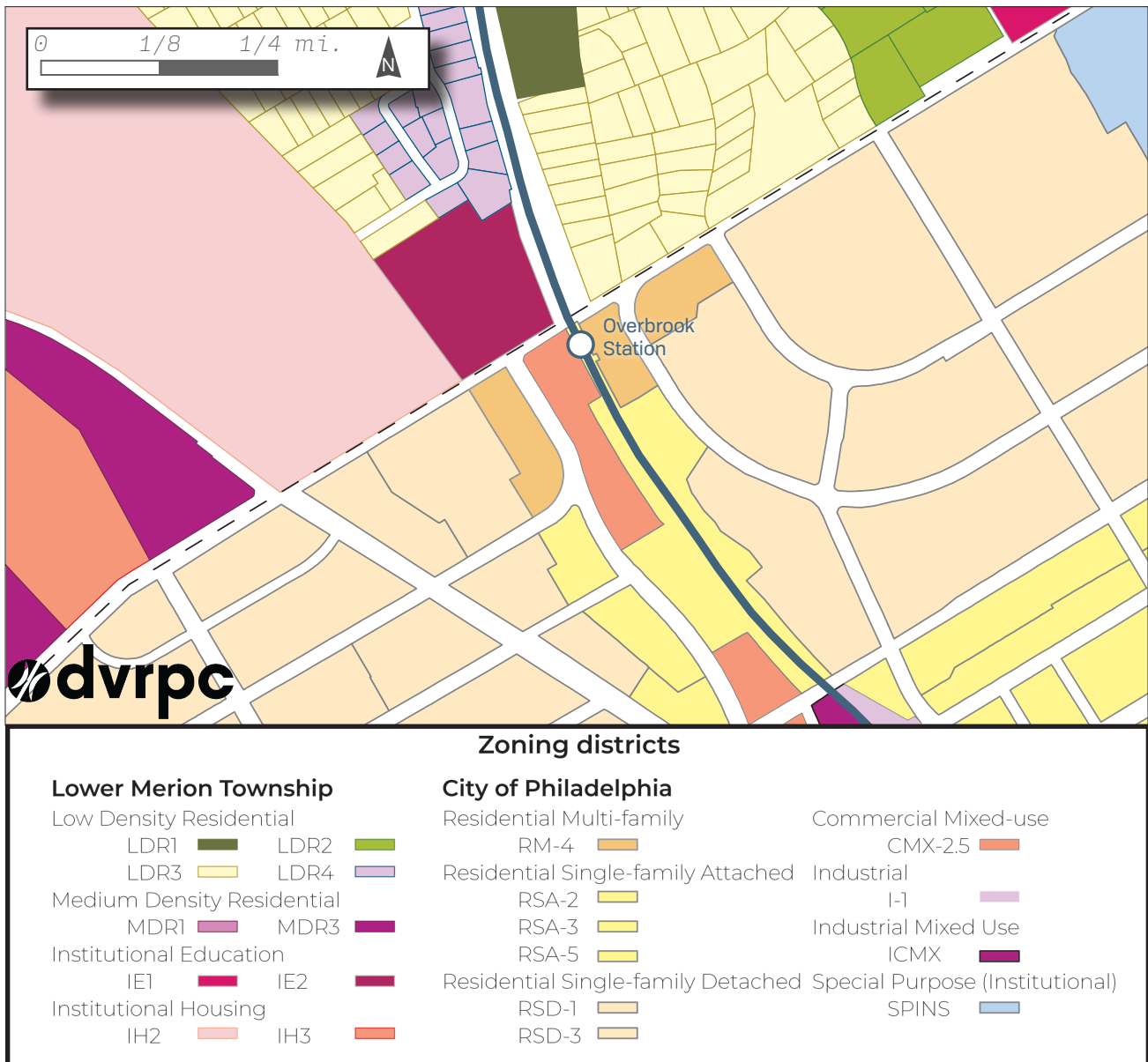


Figure 17: Overbrook Station area zoning map. (DVRPC, City of Philadelphia, and Lower Merion Township 2022)

Chapter 3: Technical Constraints and Opportunities

Background

In March and April 2022, the DVRPC project team met with SMEs from SEPTA; Amtrak; PennDOT; and the City of Philadelphia's Streets Department and OTIS to review technical issues and constraints of consolidated transit service at Overbrook Station. Throughout several interviews with staff members from each organization, DVRPC gained information on matters including station design, track layout, operations, phasing, and coordination in order to develop a concept design for Overbrook Intermodal Center and recommendations for phasing and coordination.

This report's Existing Conditions section details many of the physical constraints on this conceptual design, including tight turning radiuses, steep grades, and barriers to multimodal station access. The project team relied on SMEs to understand how the administrative and engineering issues at play in designing Overbrook Intermodal Center should impact the concept design.

Project Strategies

SMEs reinforced this study's goals of accessibility, connectivity, and ridership growth. SMEs identified the following strategies to create an Overbrook Intermodal Center as desirable and broadly feasible within existing constraints:

- › Extend Trolley Route 10 to the west (inbound) parking area at Overbrook Station.
- › Achieve complete ADA compliance and full accessibility by constructing high-level Regional Rail platforms and an accessible track crossing.
- › Improve bus operations and increase layover space by relocating primary bus stop facilities to the west (inbound) parking area.
- › Improve last-mile and intermodal connections by developing a micromobility hub concept in the east (outbound) parking lot.
- › Deprioritize parking for private vehicles to accommodate station access by different modes of transportation and grow ridership arriving by those modes.
- › Phase improvements to provide maximum connectivity while avoiding project completion delays.

Trolley Route 10 Extension

SMEs interviewed for this project agreed that extending Trolley Route 10 from its current terminus at North 63rd Street and Malvern Avenue is possible and would improve connectivity for passengers. The sole direct route to Overbrook Station is via North 63rd Street. Several on-street configurations are technically feasible along North 63rd Street, including a trolley running entirely in mixed traffic or a trolley running in an exclusive right-of-way for a portion of the extension. Based on SEPTA's station spacing standards for Trolley Modernization, this extension would require one new stop in either direction between Malvern Avenue and Overbrook Station.

A stub-end trolley terminal is feasible at Overbrook Station in spite of significant space constraints. This terminal facility would include platform and station facilities, along with enough space for switches and other track work that would allow trolleys to enter and use the terminal. Although there is enough space to accommodate all of this station infrastructure, SMEs noted three key constraints that will require further study beyond this report:

- › Steep slopes along 63rd Street mean that a retaining wall is needed to ensure enough level ground for a trolley terminal (Figure 18).



Figure 18: The steep slope on the inbound side of Overbrook Station with existing stairs and ramp. (DVRPC, 2022)

- › Leaving space for switches and other special track work is essential to ensure trolleys can enter and exit the terminal predictably. The need for switching space will affect the final location of trolley platforms.
- › A special traffic signal on 63rd Street where trolleys would enter the terminal is likely needed. Further study is needed to determine how this signal would affect nearby intersection capacity.

An Accessible Overbrook Station

SMEs identified several features needed to make Overbrook not only ADA-compliant but also fully accessible, including high-level platforms, an accessible track crossing, and consolidated station facilities that minimize walk times for transferring passengers.

High-level platforms are feasible at this site, despite some constraints. SEPTA and Amtrak staff identified a location just south of the existing station buildings as the most promising location for these platforms because it would allow new platforms without major changes to the historically designated Overbrook Station buildings and the City Avenue bridge.

SMEs also discussed the best way to facilitate passenger access across the rail right-of-way. The most feasible



Figure 19: Station buildings and City Avenue Bridge. A pedestrian bridge could be added south of the station buildings (foreground) or attached or adjacent to the City Avenue Bridge (background). (DVRPC, 2022)

option discussed, although potentially the most expensive option, is a new pedestrian bridge with elevators located just south of the existing station buildings (Figure 19). An example is shown in Figure 20. Another option discussed by the SMEs was elevators either attached to the City Avenue bridge or along a pedestrian bridge adjacent to the City Avenue Bridge. These options may be feasible but with some drawbacks, including the need for further coordination with PennDOT, the bridge’s owner, on altering the bridge structure; proximity to the historic Overbrook Station buildings; and space constraints due to the proposed trolley terminal.

In addition to platform facilities, some of Overbrook’s existing ADA-compliant access ramps may need reconfiguration based on new trolley, bus, and Regional Rail facilities.

Bus Facilities at Overbrook Station

The current on-site bus stop for Route G at Overbrook is in the east (outbound) parking lot, which does not offer enough space for safe bus turns and leaves minimal space for buses as they lay over. Based on SME input, the project team determined that, even with major changes to that parking area, there would not be enough space to accommodate a bus turnaround with adequate layover space. Therefore, the bus stop should be relocated to the existing inbound (west) parking lot (Figure 21).

Shifting bus facilities from the outbound (east) to inbound (west) side of the station would increase the transfer distance from bus to outbound Regional Rail trains. However, it would shorten the transfer distance to the inbound Regional Rail platform and extended Trolley Route 10 service. Although the east side of Overbrook Station is currently more easily accessible from City Avenue for people with mobility-related disabilities than the west side, upgrades to pedestrian infrastructure proposed in the concept design will ensure people using mobility devices can more efficiently reach the west side of the station.



Figure 20: Levittown Station Overpass. Constructed in 2019 over quadtracked Amtrak right-of-way. (Wikimedia Commons, 2019)



Figure 21: Overbrook Station’s existing inbound (west) side. The inbound side has sufficient space to accommodate the new trolley terminal and bus turnaround and layover space. (DVRPC, 2022)

Micromobility Hub

To facilitate first- and last-mile connections, SMEs discussed co-locating several mobility services on the Overbrook Station property. These services include bike parking and bike share, space for existing and future private shuttles, ride-hailing pick-up and drop-off locations, and passenger amenities like wayfinding and information kiosks.

There is space to accommodate these elements in the current portion of the east (outbound) parking lot where Route G buses currently end their routes (Figure 22).

Parking

The remaining portion of the east (outbound) parking lot, south of the driveway entrance from Drexel Road, was reviewed for additional use. SMEs from SEPTA and Amtrak noted the need to preserve maintenance access to the right-of-way via the driveway at the south end of this parking lot (Figure 23).

With this feedback in mind, the project team investigated this location for potential on-site transit-oriented development opportunities or other station amenities. There does not appear to be enough space in this location to accommodate maintenance access and residential or commercial buildings. If additional needs for this station

arise, such as a new electrical substation, for example, this parking lot would be the appropriate location for those elements.

Phasing

All SMEs noted the importance of interagency coordination on any of the station elements described here. The station property and right-of-way are owned by Amtrak, and SEPTA operates at the station pursuant to a lease agreement. Amtrak SMEs shared that the agency has no upcoming plans for this location that would conflict with new SEPTA facilities.

However, SMEs from both Amtrak and SEPTA noted that coordinating permitting and construction between the two agencies can be time consuming and difficult. To do any construction work near Amtrak's right-of-way would require Amtrak flaggers to ensure safety and would be scheduled primarily around Amtrak's needs. As a result, the project team recommends a phasing strategy, detailed in the final chapter of this report, that would minimize impact on Amtrak's right-of-way. Station elements that would not require as much participation from Amtrak workers likely include the trolley terminal, bus loop, and micromobility hub. Once those elements are constructed, the pedestrian overpass and high-level platforms could be built with Amtrak's participation.



Figure 22: The northern portion of Overbrook Station's existing outbound (east) parking lot. The lot is the current Bus Route G terminal, requiring complex turnaround movements. (DVRPC, 2022)



Figure 23: The southern portion of Overbrook Station's existing outbound (east) parking lot. The lot provides right-of-way access and private vehicle parking. (DVRPC, 2022)

Chapter 4: Design Proposal

The project team’s design proposal for the Overbrook Intermodal Center synthesizes SEPTA guidelines, feedback from the SME interviews, and independent research. Ridership projections were prepared for SEPTA and summarized in a separate memorandum. This chapter includes site plan details, design elements, and associated concepts for each functional area of the proposed concept design:

› Full Site Plan	22
› Regional Rail	24
› Trolley Terminal	26
› Bus Terminal	29
› Micromobility Hub	32



Figure 24: Full site concept design. (DVRPC and Nemap, 2021)

Full Site Plan

The elements of the full site plan for the Overbrook Intermodal Center (Figure 24) are designed to work together to achieve the project’s goals of increasing access, approving connectivity, and growing SEPTA ridership. The site plan is designed to accommodate direct service and operational improvements via an extended Route 10 Trolley and additional bus layover and turnaround space. Features throughout the site will increase accessibility for passengers with disabilities. Additionally, the site reallocates limited space to accommodate a range of mobility options for passengers without private vehicles.

Design Elements	
1	Regional Rail Station High-level platforms, pedestrian overpass, and preserved station buildings
2	Trolley Terminal Station, switching, and layover space for Trolley Route 10
3	Bus Terminal Turnaround, boarding, and layover space for Route G, fast-charging infrastructure
4	Micromobility Hub Bicycle parking, shuttle loop/kiss-and-ride, car parking, private vehicle parking

Regional Rail

The project objectives for Regional Rail at Overbrook Station (Figure 26) are to improve accessibility and ADA compliance, increase pedestrian access, and accommodate frequency and capacity changes predicted during the implementation of SEPTA's Reimagining Regional Rail project.

Key Constraints

Amtrak Right-of-Way and Property Ownership

Any construction near the right-of-way is dependent on support from Amtrak crews, while changes to the structures on the parcel itself require permission from Amtrak management.

Low-Level Platforms

The lack of level boarding increases boarding and alighting times while limiting ADA access to the Regional Rail. Level boarding is only provided by mini-high platforms at each end of the station platforms.

Platform Transfers

An underpass only accessible by stairs is the main transfer point between inbound and outbound platforms. ADA-accessible transfers are only possible via City Avenue, creating a significantly longer transfer time for individuals unable to use the underpass.

Station Buildings

The historic designation of the Overbrook Station buildings would necessitate additional approvals for any modification to the station buildings. The buildings' close location to the tracks impacts the installation of high-level platforms (Figure 25), while location and size of the inbound building limits the space for the trolley and bus terminals.

Pedestrian Connections

Access to the Regional Rail station from Lower Merion Township requires pedestrians to cross City Avenue. As a high-traffic road on the High Injury Network, City Avenue may not be equipped to meet the capacity and safety needs of additional pedestrian crossings.

Design Elements

1 High-Level Platforms

Full-length high-level platforms are placed south of the station buildings to avoid interference and additional costs of construction near the historic buildings.

2 ADA-Compliant Overpass

An overpass with elevators and stairs allows for quicker transitions between platforms for individuals unable to use the underpass. The existing underpass will be maintained.

3 City Avenue Underpass Improvements and Additions

Recent upgrades to the outbound underpass from Merion Road and reinstating a defunct path on the inbound side of the station allow pedestrians and cyclists to avoid crossing City Avenue.



Figure 25: Platforms under the historic buildings. Limited height does not allow for high-level platforms. (DVRPC, 2022)



Figure 26: Site plan detail: Regional Rail. Full-length high-level platforms are located south of the station buildings. (DVRPC and Nearmap, 2021)

Trolley Terminal

Extending Trolley Route 10 to Overbrook Intermodal Center is a key component of this report's proposal. The project team's objectives in designing the trolley terminal were to make transfers between modes of transit as seamless as possible, to preserve the high-frequency service that Trolley Route 10 already provides (five-minute-or-less headways at its most frequent), and to make station facilities fully accessible. The proposed design (Figure 27) balances those objectives against the constraints listed at right.

The preferred alternative for the Overbrook Intermodal Center trolley terminal is a primary center platform and an auxiliary track to offer operational flexibility as a trolley storage area.

The design is presented at a concept level and may be modified based upon factors identified in the preliminary engineering process. The auxiliary trolley storage area is depicted on the west side of the tracks, but preliminary engineering could also consider the benefits of locating the trolley storage area on the eastern side. The east side alternative expedites removing trolleys from service by allowing a planned out-of-service trolley to immediately pull into the auxiliary storage area without taking up space on the main platform.

Key Constraints

Slopes and Vegetation

The western edge of the station property slopes up toward the intersection of City Avenue and North 63rd Street, and includes several mature trees. Changes to this area could require altering the existing ADA-compliant pedestrian ramps, removing trees, constructing retaining walls, and managing stormwater.

Space

The west (inbound) parking lot is relatively small (about 330 feet at its longest point) for a trolley terminal that must include platforms, track switches, and appropriate space to enter or exit the terminal. Any space dedicated to a trolley terminal limits space available for bus, Regional Rail, pedestrian, or bicycle infrastructure.

Track Entrance

North 63rd Street includes two-way vehicular traffic that would likely remain in place with an extension of Route 10 to Overbrook Intermodal Center. To enter or exit the station property, trolleys would need appropriate traffic control to prevent conflicts with private vehicles, buses, bicyclists, and pedestrians.

Stub-End Terminal

The proposed trolley terminal has insufficient space for a loop terminal. Transitioning from a terminal loop to stub-end terminal may slow the trolleys' approach, impacting headways. This effect will be most acute if SEPTA installs a surface signaling system for the trolley that would require slow approach speeds.



Figure 27: Site plan detail: Trolley Terminal. (DVRPC and Nearmap, 2021)

Design Elements

1 Center Platform

The primary platform would be accessible for boarding and alighting from two trolley berths. Passengers would access the platform from a single ramp at the north end of the platform.

2 New Sidewalks

Sidewalk segments would connect the trolley platforms to North 63rd Street.

3 Auxiliary Storage Track

A trolley storage location would allow additional trolley capacity. Trolleys would access this track by first pulling into the western berth at the primary platform, then reversing to reach the auxiliary track.

4 Switches

This switch configuration allows entry to and exit from the primary platform while also allowing exit from the auxiliary platform.

5 Signal

A special signal with transit-only phases allows trolleys to enter or exit the terminal and buses to enter the adjacent bus loop. Timing for this signal requires further study and coordination by PennDOT, Philadelphia Department of Streets, and others to ensure effective operations on North 63rd Street, and at the North 63rd Street/City Avenue/Wynnwood Avenue intersection.

6 ADA-Compliant Ramp

A reconfigured pedestrian ramp would meet ADA slope guidelines. Space between legs of the ramp provides room for vegetation to replace trees lost to construction.

7 Retaining Wall

A retaining wall would both support the new ADA-compliant ramp and provide the level ground for the trolley tracks.

Trolley Terminal Alternative

An alternative configuration for the trolley terminal is a two-track end-of-line with side platforms (Figure 28). If preliminary engineering identifies constraints that prohibit the preferred alternative, a simple, two-track end-of-line with a diamond switch and side platforms may serve as a viable approach that requires less space to implement.

This alternative shares many constraints and features from the preferred concept design but introduces several new design elements.

Design Elements

1 Side Platforms

Side platforms should be 8.5 feet wide, at minimum. With appropriate grading, these platforms could be made barrier free and level with the surrounding pavement. Dynamic signage or other guidance is needed with side platforms to inform passengers from which platform trolleys would leave.

2 Planter and Buffer Stop

A planter or other feature acts as a stop for trolleys to protect people and the City Avenue bridge structure.

3 Switch

A diamond switch allows trolleys to enter the terminal, switch tracks, and exit the terminal.

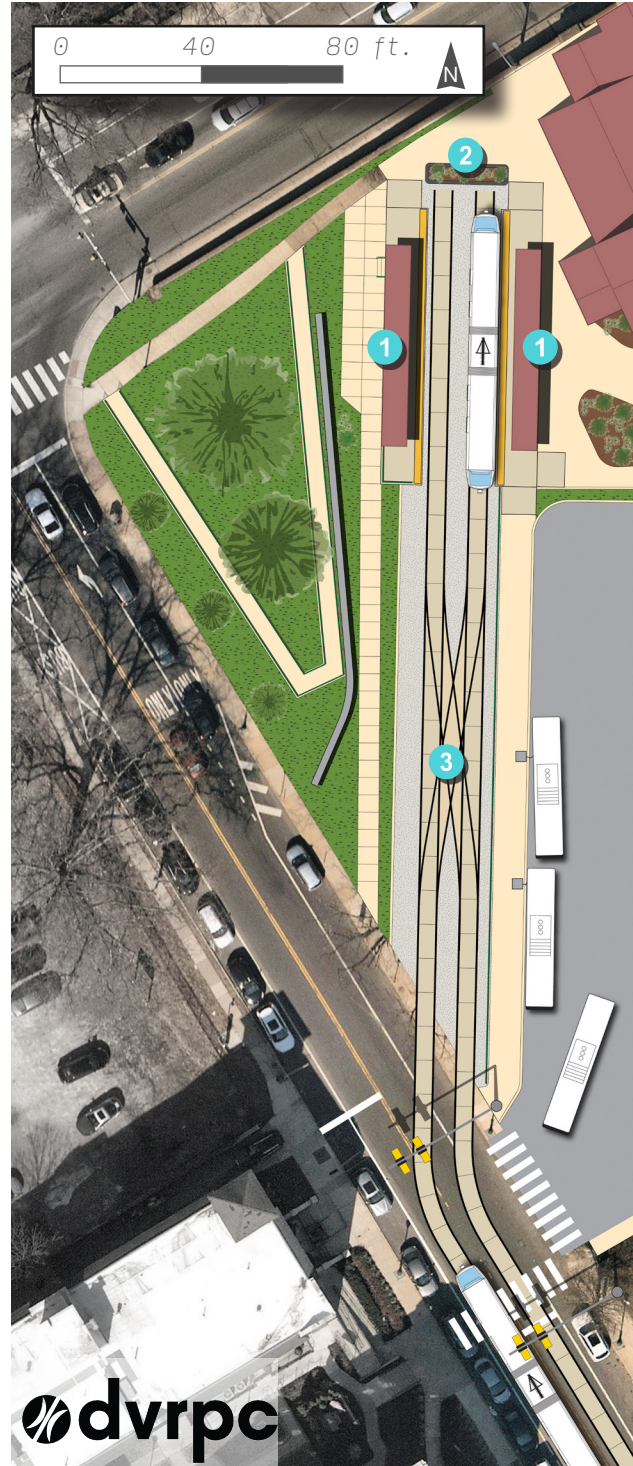


Figure 28: Trolley terminal alternative configuration. (DVRPC and Nearmap, 2021)

Bus Terminal

The project team's key objectives in designing the bus terminal (Figure 32) were increasing capacity for boardings and layovers and providing space for zero-emission fleet infrastructure. The key constraints largely involved the lack of space at the existing terminal. Any options for expansion on the inbound side of the station did not provide the necessary space to accommodate the bus-turn radius, additional boarding platforms, and layover stations. The proposed design recommends relocating the terminal to the inbound parking lot, thereby addressing the key constraints while allowing for a more seamless transition between modes. The space left over in the west (inbound) parking lot after constructing a trolley terminal could accommodate at least four buses, including curbside stop facilities, layover space, and enough room for buses to make a turn and return to North 63rd Street. The project team used turn

movement analysis software to assess the feasibility of the bus terminal concept for SEPTA buses. This software uses "turn templates" for specific vehicles that include the vehicle's dimensions, turn radius, wheel position, and other characteristics. The American Association of State Highway and Transportation Officials 2018 (US) CITY-BUS template was selected to mimic the 40-foot-long buses typical of SEPTA's fleet, in general, and typical of those on Route G, specifically. The images below illustrate feasible entry, stop, layover, and exit paths for northbound (Figure 29) and southbound (Figure 30) buses.

Should SEPTA transition toward battery-electric buses in the future, this location could also accommodate fast-charging infrastructure. The project team successfully simulated a bus passing buses stopped at the boarding and layover areas using the turning movement analysis software.

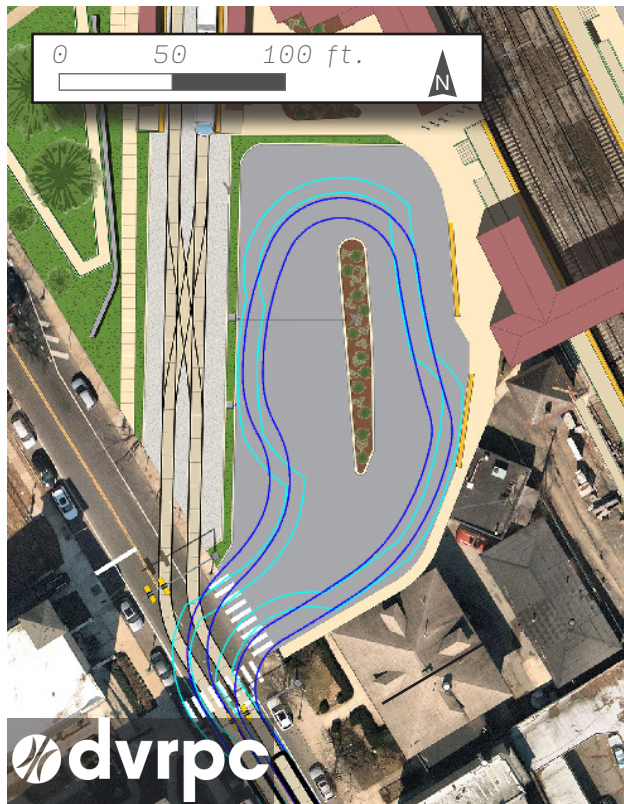


Figure 29: Illustrative turn template created with AutoTURN, northbound bus terminal entry. (DVRPC and Nearmap, 2021)



Figure 30: Illustrative turn template created with AutoTURN, southbound bus terminal entry. (DVRPC and Nearmap, 2021)

Key Constraints

Space

The limited space at the existing bus loop cannot accommodate more than three buses at a time, which caps layover capacity. The tight space also requires buses to make a three-point turn that limits turnover times.

Zero-emission fleet infrastructure

The existing bus loop has minimal space for infrastructure, such as battery-electric bus charging stations (Figure 31) that can accommodate the replacement of SEPTA's bus fleet with a zero-emission fleet.

Driveway access

Providing sufficient space for bus movements within a terminal on the west of the station requires restricting private vehicle access to the driveway SEPTA does not own. This may require significant engagement and negotiations with nearby property owners to ensure adequate access for pick-ups, deliveries, and use of the connected alleyway.

Design Elements

1 Boarding/Alighting area

The new location will allow for two boarding/alighting areas that allow buses to easily pass each other, thereby increasing capacity and efficiency.

2 Layover space

Two layover spots will provide enough space for future zero-emission fleet infrastructure. Future designs should evaluate if there is sufficient room for such infrastructure, as well as an ADA-compliant sidewalk between the bus and trolley terminals.

3 Stormwater Infiltration Plantings

Placing green stormwater infrastructure, such as stormwater planters between the layover and boarding areas, can help offset the stormwater and urban heat island effects of removing existing station landscaping.

4 Signage

In addition to the signal on North 63rd Street, signage should be added at the bus loop entrance to prevent private vehicle use of the bus station with the exception of local deliveries and owner access to the driveway behind 2125 North 63rd Street.

5 Crosswalk

With the addition of a signal, a new crosswalk can be added across North 63rd Street to allow for more direct pedestrian connections to the station entrance.

6 Signal

A special signal with transit-only phases allows buses to enter and exit the adjacent bus loop.



Figure 31: Battery-electric bus charging station from the Société de transport de Montréal. This overhead electric charging station in Montreal acts as one of many options to charge battery-electric buses. (Wikimedia Commons, 2017)

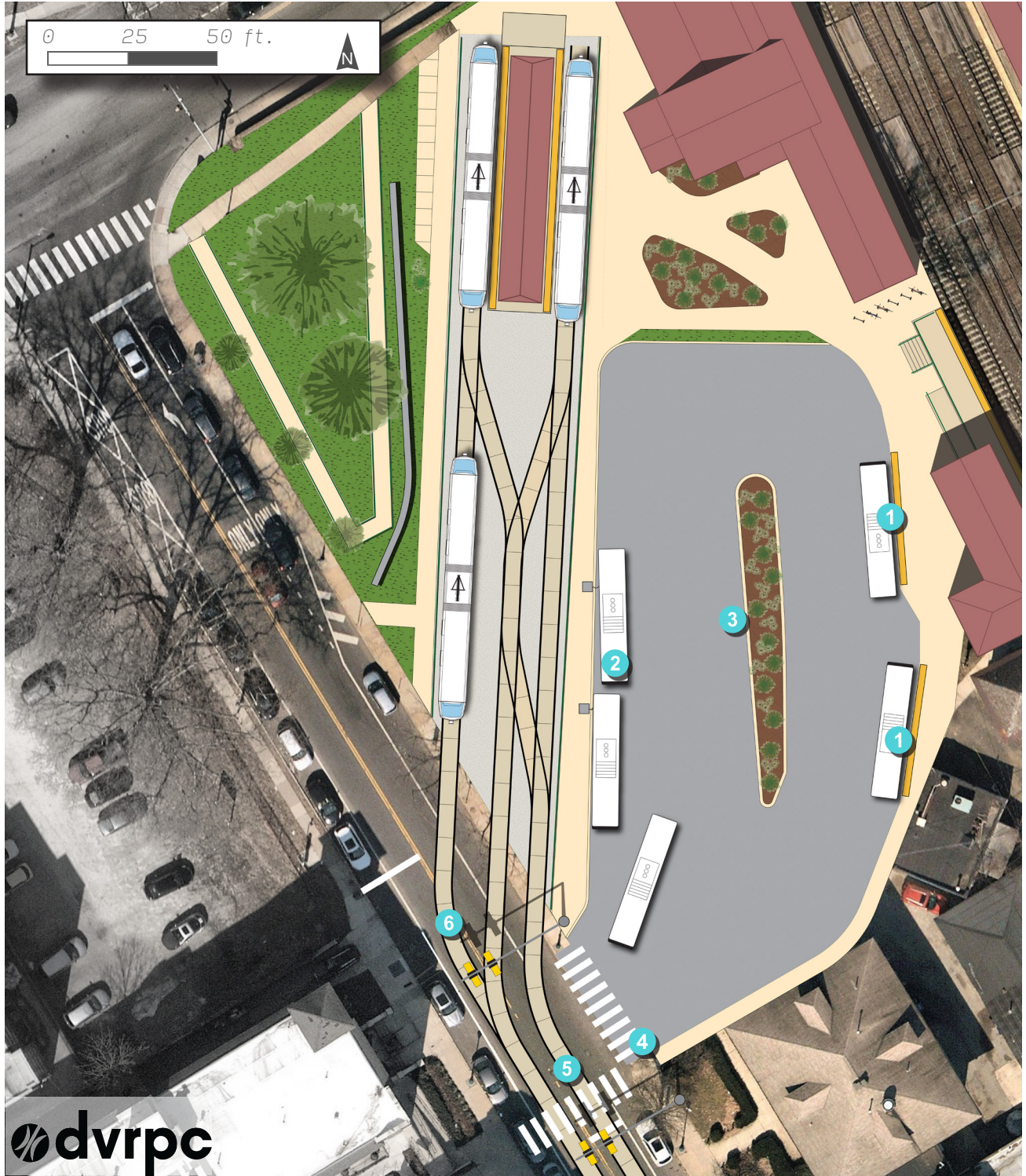


Figure 32: Site plan detail: Bus Terminal. (DVRPC and Nearmap, 2021)

Micromobility Hub

Moving the bus terminal creates space for a micromobility hub (Figure 34). The key goals of the micromobility hub are to increase options for station access and provide more transportation options for residents and commuters. Recommendations for the hub were informed by case studies of U.S. and European models (pages 34 and 35). The micromobility hub provides additional transportation alternatives that add direct connections to nearby institutions and job centers and last-mile connections, enabling new, transit-connecting trips that were previously only possible using a private vehicle.

Key Constraints

Indego Expansion

There are several factors that go into the Indego expansion process, such as equity, community support, and connectivity. Although there are no current plans to expand Indego into the Overbrook area within the next five years, this could possibly change given the factors listed above.

Lack of Connecting Bicycle Routes

The surrounding area lacks a thoroughly connected bicycle network. Key connecting roads are unsafe for bicycles, thereby limiting potential bicycle connections to and from the station.

Turning Radius for Longer Private Shuttles

Limited space is a key reason for moving the SEPTA Route G bus layover space to the other side of the station. Although mini-buses (Figure 33) would have sufficient room to turn in one movement, longer shuttles would be forced to make a multipoint turn.



Figure 33: Brown University Campus Shuttle. An example of a compact transport to shuttle staff and students between Overbrook Intermodal Center and nearby institutions and employment centers. (Wikimedia Commons)

Design Elements

1 Bicycle Parking/Future Bike Share Station

Updates to connecting bicycle routes promote additional bicycle ridership. Space on the outbound (east) side of the station would be reserved for personal bicycle parking and could accommodate a bike share station in the future.

2 Kiss-and-Ride/Shuttle Area

This area acts as the main hub for ride share connections and shuttles to nearby institutions like Lankenau Medical Center and Saint Joseph's University.

3 Pedestrian Outbound Walk-Up Improvements

Upgraded curb cuts and a new crosswalk arrangement provide a more accessible and safer station area for pedestrians.

4 Additional Bicycle Parking Racks

More secure, long-term bicycle parking will meet Philadelphia bicycle parking guidelines. Updates to connecting bicycle routes promote additional bicycle ridership.

5 Reserved Car Share Parking

Reserving parking spots for car share vehicles provides alternatives to personal car ownership.

6 Parking

Given the limited drive-up ridership and the addition of several other transportation options, removing 75 parking spaces for private vehicles should still meet the current demand for parking.



Figure 34: Site plan detail: Micromobility Hub. (DVRPC and Nearmap, 2021)

Micromobility Case Studies

Transit-connected micromobility options help increase transit ridership and provide connections to transit customers' destinations using alternatives with lower environmental impact than private vehicle ownership. The mobil.punkt car share stations in Bremen and the GoHubs! in Boston are potential examples of how a micromobility hub concept could be integrated into the Overbrook Intermodal Center.

Mobil.punkt in Bremen, Germany, is a mobility hub that integrates the city's car share program with transit and bicycle locking facilities. This program started in 2003 as part of an effort to reduce city traffic and emissions while increasing the mobility options of people who do not own private vehicles. In 2020, the program saw nearly 20,000 users in a city with almost 600,000 residents. Each shared vehicle takes an estimated 16 private vehicles off the road, even prompting some residents to sell their private vehicles and use the car share for specific trips or tasks that cannot be accomplished by walking, cycling, or public transit. Additionally, bicycle parking facilities and transit access allow people who do not own vehicles to easily access car share locations (Figure 35). This proven model has seen enough success over nearly two decades for other European cities, such as Nurnberg, Leipzig, and Bergen, Norway, to adopt it.



Figure 35: Reserved car share parking with clear signage and bicycle racks. (Wikimedia Commons, 2001)

A similar and more expansive project is being piloted in Boston, Massachusetts. GoHubs! is a micromobility project that aims to tie transportation options to information and placemaking elements in order to create neighborhood mobility hubs (Figure 36). This program operates as part of the City of Boston's Go Boston 2030 plan, which aims to create better and more equitable travel choices while mitigating transportation's contributions toward climate change. The mobility hubs can include a combination of bike share stations, placemaking and seasonal parklet installations, wayfinding, car share parking, electric vehicle charging, bicycle parking, transit stops, and



Figure 36: Boston GoHubs! pilot multimodal plaza options. (Boston.gov, 2022)

information stations with free public wifi. GoHubs! are created by the City of Boston in collaboration with the Boston Transportation Department and Massachusetts Department of Transportation (MassDOT). The bike share is run through Bluebikes, managed by a collaborative effort between several municipalities in the Greater Boston region and MassDOT, with operations being coordinated through the ride sharing service Lyft. Car share services are provided through the Car Share Boston program, which leases public parking spaces in municipal lots and on city streets to car share operators Zipcar and Getaround. In addition to paying a fee for leasing the spaces, car share companies are also tasked with the maintenance and upkeep of parking spaces.

These two examples provide models of micromobility integration and partnership between transit, government, and private-sector actors to expand mobility options for residents. These two models could be adopted in a similar fashion if implemented in collaboration with the City of Philadelphia, Lower Merion Township, Indego bike share, and existing car share companies like Zipcar and Getaround.

Overbrook Intermodal Center will be best served by a design that can accommodate different mobility options—both options that are available in the near term and those that may become possible with increased connectivity. Although Overbrook is not included in existing plans for Indego’s expansion through 2030, the construction of Overbrook Intermodal Center may make bike share more viable as Indego continues to expand outward from Philadelphia’s dense core. Successful integration of any bike share and cycling in the station area in general requires maximizing connectivity of the bicycle network through additions and upgrades to nearby infrastructure. Achieving this goal requires the inclusion of key stakeholders like PennDOT, OTIS, and Lower Merion Township.

SEPTA could adapt Boston’s contract model for use on SEPTA-owned parking lots, including the requirement for maintenance and upkeep of spaces.

Chapter 5: Phasing

Creating Overbrook Intermodal Center requires a coordinated effort of all stakeholders throughout planning and construction to achieve an efficient implementation schedule and an effective design. Key stakeholders include SEPTA, Amtrak, PennDOT, the City of Philadelphia, and the residents and local business owners adjacent to Overbrook Station and along North 63rd Street between Malvern Avenue and City Avenue. Other stakeholders include SEPTA transit riders, local commuters, the residents and businesses in the Overbrook neighborhood, Lower Merion Township, Montgomery County, and nearby major employers and institutions like Lankenau Medical Center and Saint Joseph's University.

Property Ownership and Coordination with Amtrak

Amtrak owns the Overbrook Station property and the rail right-of-way. SEPTA leases the station parcel from Amtrak. Under the terms of their lease agreement, major changes to the station require permission from Amtrak, including design approval of proposed station improvements, which can slow the final design process. SMEs from Amtrak indicated that Amtrak is generally amenable to SEPTA station improvements that do not constrain its ability to provide its own service.

Amtrak highlighted coordination as a key factor in designing and constructing new SEPTA facilities. During the construction phase, coordination with Amtrak over work schedules and use of Amtrak flagging crews to ensure work happens safely is also required. This coordination typically slows the design and construction process in locations where SEPTA builds on Amtrak property.

Amtrak SMEs also noted several upcoming projects that are relevant to Overbrook. Amtrak plans signal upgrades to the line between 2025 and 2026, which may enable better coordination and higher frequencies of both Amtrak and SEPTA rail service. Additionally, Amtrak is planning on moving the interlocking switches located at Overbrook Station, which allow trains to switch between tracks, several hundred feet to the south. This would make it less complicated to build high-level platforms at Overbrook Station and should be completed prior to station construction. If Keystone Line catenary replacement results in suspended Keystone service later in the 2020s, it may present another opportunity for constructing the high-level platforms without impacting Amtrak service.

One way to accelerate construction would be for SEPTA to acquire the station property from Amtrak. Amtrak does not use the station for passenger service and has no plans to do so in the future. Therefore, purchasing the land seems favorable for both parties. This purchase could be accomplished either through a fee-simple transaction or through a land swap, with SEPTA offering an equivalently valued parcel in another location that may be useful to Amtrak. The purchase of the property would not change Amtrak's ownership of the track right-of-way, and all work within or near the tracks would still require Amtrak's permission and labor force participation. It would, however, allow construction farther away from the rail right-of-way to happen with fewer coordination-related delays.

Coordination with PennDOT

Extending Trolley Route 10 to Overbrook Station is vital to the connectivity improvements envisioned in this study. North 63rd Street, the only direct route between the current end-of-line and Overbrook Station, is owned by PennDOT. As part of its PennDOT Connects initiative, PennDOT is leading an effort to redesign North 63rd Street for safety and multimodal access. PennDOT has coordinated with SEPTA, the City of Philadelphia, and other stakeholders to identify

a safe design for existing trolley service on 63rd Street that will also be compatible with Trolley Modernization. Further coordination with PennDOT is required to establish appropriate signal timing for the proposed new signal at the station entrance and the signal at the intersection of North 63rd Street, City Avenue, and Wynnewood Road.

SEPTA Internal Coordination Strategy

SEPTA’s planners and engineers have stated a desire to retain the 63rd and Malvern Loop. This loop must remain in place until all new trolley vehicles are operational. After Trolley Modernization is fully implemented, this would also allow SEPTA to use it as a detour or backup in the case of service or access issues north of the 63rd and Malvern Loop for local buses or trolleys. Additionally, it

can be used as a potential location for charging stations if SEPTA procures battery- electric buses in the future.

Changes to SEPTA’s bus routes and schedules through its Bus Revolution project are scheduled to begin in 2023. These coming changes require a re-evaluation of frequencies and layover schedules at Overbrook Station. Implementation of the bus operation changes stemming from the Bus Revolution should take priority, and any plans for design and implementation must be consistent with the new schedules and routes implemented in 2023. As of fall 2022, the preferred Bus Revolution draft network would have one bus scheduled to leave Overbrook Station every 10 minutes or less from 6:00 AM through 9:00 PM on weekdays, a five- minute frequency increase for off-peak hours and in line with existing peak-hour service frequency.

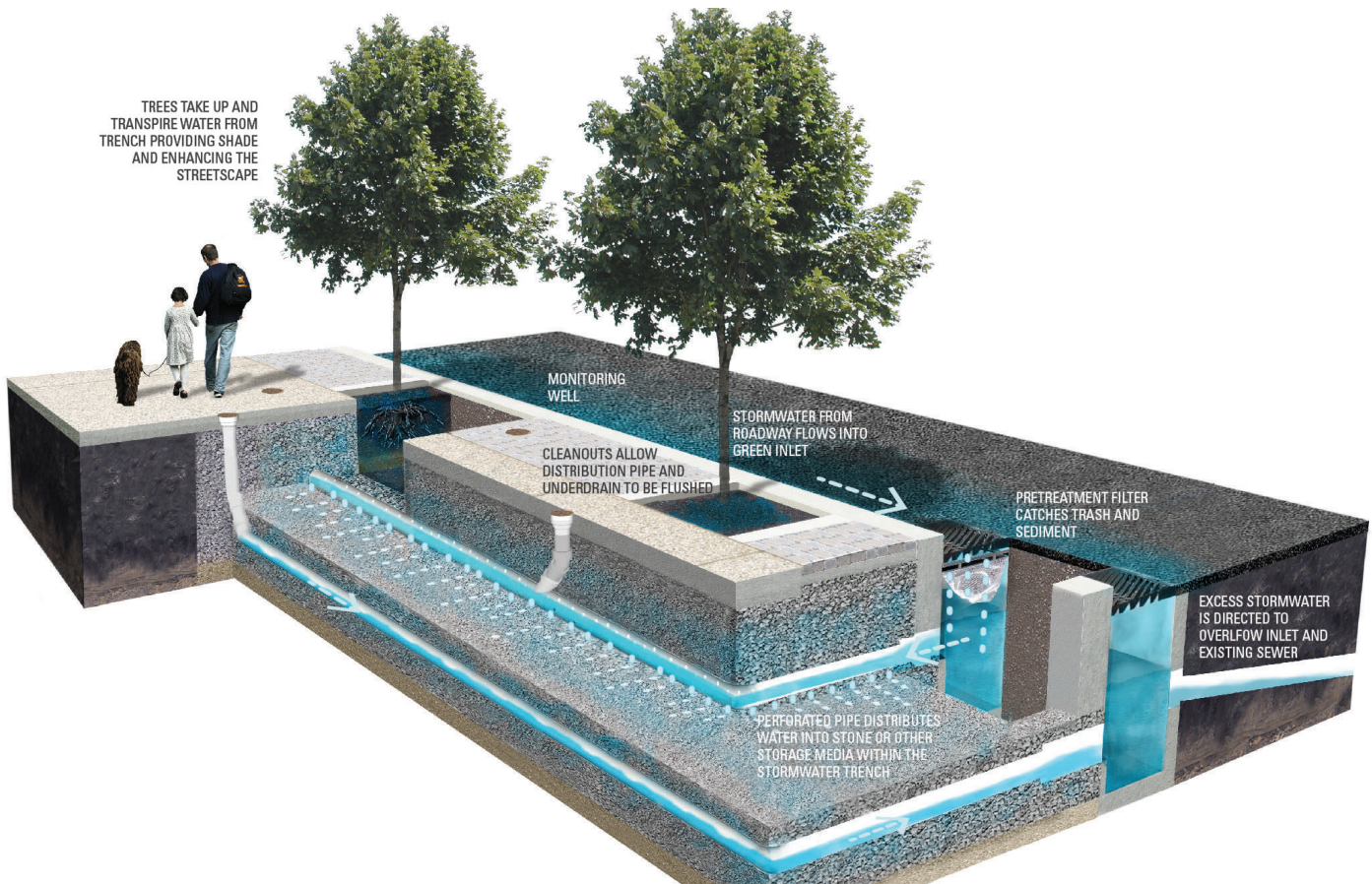


Figure 37: Stormwater tree trench diagram. Graphic copyright Philadelphia Water Department. (Philadelphia Water Department, 2022)

Local Stakeholder Engagement and Planning

Stormwater infrastructure design and incorporation into Overbrook Intermodal Center provides opportunities for positive engagement with the local community and the Philadelphia Water Department. The integration of the trolley station and the bus loop at Overbrook Intermodal Center may require the removal of some of the existing tree canopy and landscaping on both inbound and outbound sides. Green space carries many aesthetic, environmental, utility, and monetary benefits. Vegetation can reduce heat, greenhouse gases, and noise; absorb and retain stormwater runoff, and provide a more pleasant aesthetic quality to the environment. Removing greenery increases the risk of flash flooding and exposes transit users to the elements. Reconstruction of the station provides SEPTA with the opportunity to integrate green stormwater infrastructure and other methods of stormwater control at the station. Subsurface storage trenches and stormwater tree trenches (Figure 37) are common stormwater tools that may be appropriate for Overbrook Intermodal Center.

Planning, design, and construction must also be coordinated with local residents, transit riders, and businesses. Implementing Overbrook Intermodal Center can complement the historic character of its neighborhood and address residents' needs regarding potential impacts like traffic safety and noise. The west-side station driveway acts as the only access point for a small, family-owned restaurant located adjacent to the existing parking lot (2135 North 63rd Street, Figure 38) and driveway access for another take-out restaurant (2125 North 63rd Street, Figure 39). The parcel that the driveway is located on is privately owned, but an easement allows access to SEPTA facilities. Restricting access for private vehicles or delivery vehicles will require careful coordination with business owners to mitigate any negative impacts on their businesses both during and after construction. Additionally, simply widening the existing driveway will require coordination with the property owner. Communication with nearby businesses should be considered throughout the process to allow for minimal disruption to the local economy and to enact a mutually beneficial plan for transit-supportive access with this parcel's owners and other local property owners.

The historic status of the neighborhood will also present coordination challenges for SEPTA. Overbrook residents value the neighborhood's historic character, and as such, SEPTA's ongoing public engagement process should encourage local residents and businesses to voice their opinions and advice regarding the station's design and implementation. New structures may be reviewed by the Philadelphia Historical Commission and Overbrook Farms Club to assess their appropriateness and potential impact on the local context.

The project would also benefit from coordination with organizations like the City Avenue Special Services District, which is pursuing a vision for City Avenue that includes streetscape improvements and travel demand management. Large local employers should also be consulted during the planning process as SEPTA considers how to best accommodate private shuttles and other initiatives that are expected to increase ridership at Overbrook Intermodal Center.



Figure 38: Business at 2135 North 63rd Street. (DVRPC, 2022)



Figure 39: Business at 2125 North 63rd Street. (DVRPC, 2022)

Phasing Strategy

The project team recommends three phases for the construction of the Overbrook Intermodal Center (Figure 40). The order of implementation requires SEPTA to consider tradeoffs related to administrative processes and logistics. Constructing the trolley terminal (Phase 1) as the first phase may help reduce delay in beginning project implementation. However, the construction of the Regional Rail platforms and pedestrian overpass (Phase 3), which requires extensive coordination with Amtrak for work schedules and safety measures, will require heavy machinery. If Phase 3 is completed last, that heavy machinery has the potential to damage Phase 1 and Phase 2 construction. SEPTA should determine the order of the phases based on further internal and external consultation.

Design Elements

1 Inbound

Starting with the construction of the trolley terminal, bus terminal, and associated enhancements allows SEPTA to maintain bus operations on the outbound bus terminal during construction. This strategy best aligns with the timelines of the Trolley Modernization and Bus Revolution projects.

During this phase, SEPTA must coordinate with the businesses at 2125 and 2135 North 63rd Street to allow for delivery and pedestrian access. Track construction on North 63rd Street will require ongoing coordination with PennDOT, the City of Philadelphia, and local residents and businesses that may be impacted. Potential closures on North 63rd Street during track construction may also impact Bus Route 65 running along North 63rd Street and Bus Route 105, which crosses North 63rd Street at Lancaster Avenue. Trolley Route 10 may also be impacted during restriping on North 63rd Street and while connecting the track extension to the existing tracks at Malvern Avenue. Planned bus reroutes and traffic diversions, in addition to public outreach to residents, commuters, and transit users, will be required during the process.

2 Outbound

Phase 2 opens up additional multimodal connectivity complementing the Trolley and Bus terminals. This phase includes the construction of the Micromobility Hub, pedestrian walk-up and accessibility improvements, drop-off areas, and a reduced parking lot. The addition of micromobility services, including shuttles to nearby institutions, bike share stations, and reserved car share parking, requires collaboration with the associated private and public institutions. Modifications to Indego's expansion plans will require discussion with the City of Philadelphia, which owns the bike share service. If the Boston model for contracting reserved car share spaces to private car share companies is chosen, first-time contracts or concession agreements with these companies would need to be drafted.

3 Regional Rail Platforms and Overpass

The final phase includes the installation of high-level platforms for the Regional Rail station and the ADA-compliant overpass. Amtrak crews must oversee construction in and adjacent to the rail right-of-way to ensure communication between train operators and roadway crews. Leaving this project as the final phase for construction allows more time to coordinate with Amtrak. Additionally, this phase may require adjustments to operations and scheduling for Amtrak, SEPTA, and rail freight companies to accommodate construction. With only parts of the existing platform available during construction, adjustments to vehicle boarding and alighting may need to be made. This includes accommodations to keep the inbound platform ADA compliant as the mini-high platform may not be accessible throughout the entirety of the construction phase. A similar project was completed at Levittown Station in 2018 and can act as an approximate guide to the timeline, cost, and potential complications during this phase.

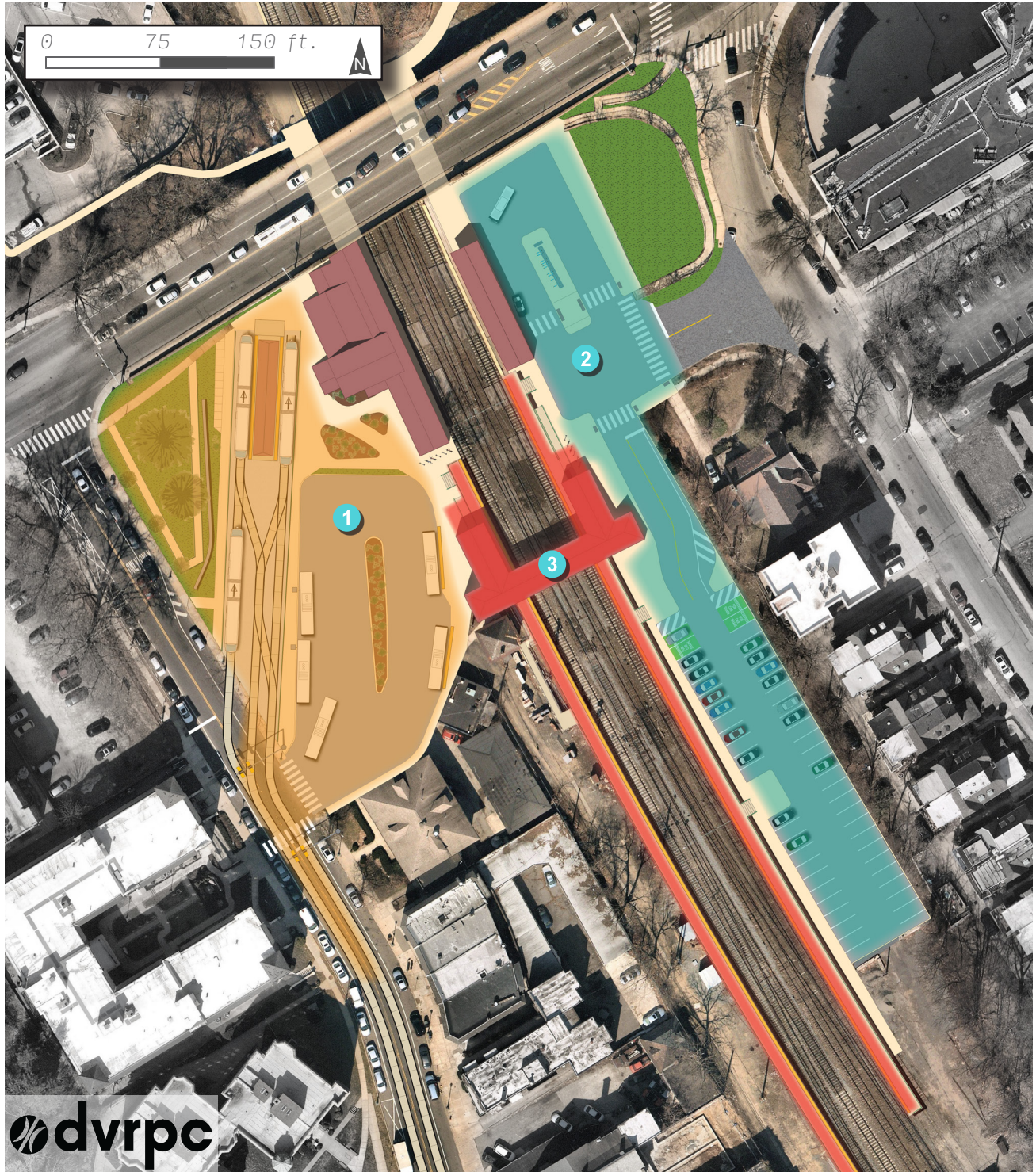


Figure 40: Phasing strategy site plan. (DVRPC and Nearmap, 2021)

Appendix: Ridership Forecast Memorandum



190 N INDEPENDENCE MALL WEST
8TH FLOOR
PHILADELPHIA, PA 19106-1520
P: 215-592-1800
F: 215-592-9125
www.dvrpc.org

memorandum

DATE: May 2023

TO: Southeastern Pennsylvania Transportation Authority

FROM: DVRPC Office of Transportation Studies

SUBJECT: Overbrook Intermodal Center Ridership Forecast

Introduction

This memo describes the process of the ridership forecast model for the proposed Route 10 extension as part of the Overbrook Intermodal Center project. Route 10 is currently operated by the Southeastern Pennsylvania Transportation Authority (SEPTA) and runs between West Philadelphia and Center City. The proposed extension would relocate its current terminal at the 63rd Street and Malvern Avenue Loop farther north to Overbrook Regional Rail Station. The purpose of this modeling exercise is to estimate the ridership potential for the trolley route extension under various scenarios so that SEPTA can make well-informed decisions.

Forecast Methodology

DVRPC's most recent Transportation Improvement Model version 2.4 (TIM 2.4) was used to estimate the future ridership for the service extension. TIM 2.4 is a traditional four-step, trip-based model built on PTV's VISUM 18.0 software platform. It follows the steps of trip generation, trip distribution, mode split, and traffic assignment as Figure 1 shows.

The model includes representations of the highway and public transit systems in DVRPC's nine-county area, plus an extended area of 16 counties in Pennsylvania, New Jersey, Delaware, and Maryland, immediately surrounding the DVRPC region. The highway network was built using Open Street Map. The transit network was developed by importing data from the General Transit Feed Specification (GTFS). It represents the operational characteristics of the transit system, including route alignment, stop locations, service schedules, and fare information.

Key inputs for the model, such as population and employment forecasts, were developed in partnership with local officials and were approved by the DVRPC Board. Regionally significant transportation projects that are listed as funded in the Long-Range Plan are also incorporated in the model to reflect the future-year condition. For this project, the 2045 travel demand model was used to estimate transit ridership.

Five scenarios (Table 1) were modeled to evaluate the impact of a potential Route 10 extension on ridership. It should be noted that the future-year scenarios do not consider any permanent changes in behavior due to Coronavirus Disease 2019. The model was calibrated by using 2019 ridership data. SEPTA's Trolley Modernization program is a significant investment of over \$1.8 billion in the country's largest trolley system. SEPTA is examining all of its trolley ends-of-line to ensure that each route ends at an accessible location with important destinations and transit connections. End-of-line extensions, like the one considered here, would leverage that investment to build and maintain a strong ridership base.

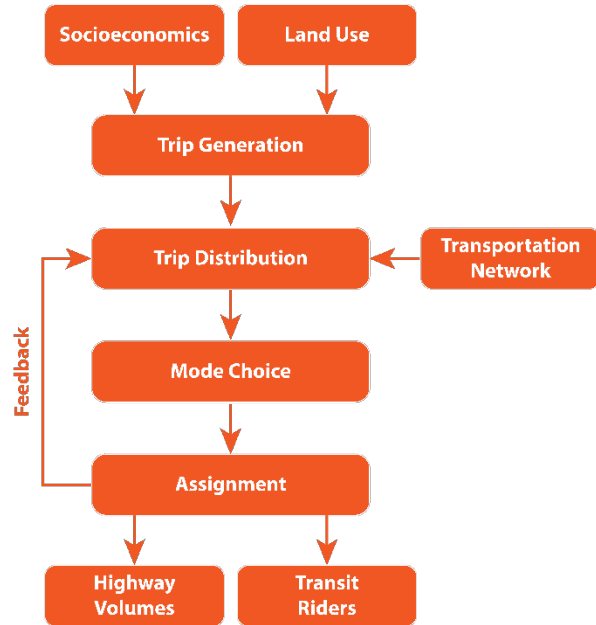


Figure A-1: Travel Demand Model Flow Chart (DVRPC, 2023)

The No Build Scenario assumes no changes to Route 10 or Regional Rail. It serves as a baseline for future-year ridership in 2045. Scenario 0 would extend the existing Route 10 terminal to Overbrook Station. In support of SEPTA's Reimagining Regional Rail effort, three additional scenarios were evaluated as well.

Reimagining Regional Rail envisions Regional Rail as part of a lifestyle network of frequent, all-day, and all-week services that connects people to a range of destinations across the region. SEPTA provided detailed modeling assumptions for these scenarios. Scenario 1 (Regional Coverage) features 30-minute service at all Regional Rail stations. Scenario 2 (Metro Frequency) features 15-minute service at stations with the highest demand, including Overbrook Station. Scenario 3 (All Day Speed) features combined express service by SEPTA and Amtrak to enhance service integration between providers but would result in less frequent service at Overbrook Station.

	No Build	Scenario 0	Scenario 1	Scenario 2	Scenario 3
2045 Population and Employment	✓	✓	✓	✓	✓
Route 10 Extension		✓	✓	✓	✓
Reimagining Regional Rail Changes			Regional Coverage	Metro Frequency	All Day Speed

Table A-1: Scenario Description

Specific Regional Rail modeling parameters for Overbrook Station are listed in Table 2. Service frequency to other stations can be found at the Reimagining Regional Rail website. GTFS files that contain the updated timetables were supplied by the Reimagining Regional Rail planning team. In addition to the timetable changes, fares and fare zones were restructured for these scenarios. Transfer penalties were eliminated for Regional Rail trips transferring to other SEPTA bus and transit network. There were also adjustments to parking costs.

	Fare Zone	Fare to Center City	Parking Fee	Service Frequency to Overbrook
No Build	2	\$4.75	\$1.00	Every 30 Minutes (Day Time) Every 60 Minutes (Night Time)
Scenario 0	2	\$4.75	\$1.00	Every 30 Minutes (Day Time) Every 60 Minutes (Night Time)
Scenario 1	1	\$2.00	\$2.50	Every 30 Minutes (All Day)
Scenario 2	1	\$2.00	\$2.50	Every 15 Minutes (All Day)
Scenario 3	1	\$2.00	\$2.50	Every 60 Minutes (All Day)

Table A-2: Modeling Parameters for Overbrook Regional Rail Station

To reflect the extension, a new trolley station was created next to Overbrook Regional Rail Station. Station information was entered into the model. The alignment of the trolley line was adjusted (Figure 2). Connectors were added so that the new station could be accessed. Timetables were updated accordingly.



Figure A-2: Screenshots of the regional models (DVRPC, 2023)

In fall 2022, SEPTA completed the draft bus network for its Bus Revolution project, which aims to deliver a more dependable, convenient, and user-friendly bus network. Evaluating the impact of the final Bus Revolution network is outside the scope of this project, but changes to bus routes and service patterns could also impact trolley ridership.

Modeling Results

Table 3 summarizes the forecasted ridership for the proposed Route 10 extension. Based on model inputs described in the previous section, the extension alone (Scenario 0) has the potential to attract nearly 800 daily riders to the new Overbrook trolley station. Ridership at the existing Overbrook Regional Rail Station would decrease by about 100, meaning that some Regional Rail riders would likely switch to trolley service. These are mostly commuters traveling to University City, who would benefit from more frequent service at lower cost. Switching to Route 10 would eliminate the need for transfer, making their daily commute more convenient.

The ridership of Routes 65 and G is projected to decrease slightly by about 1 percent. Some previous Route 65 riders might find it more convenient to switch to Route 10, as it would provide a direct connection to their destination without the need for a transfer to the Market Frankford Line (MFL) at 69th Street Transportation Center. Likewise, for some of the previous Route G riders, Route 10 may become a more attractive option due to the easy access to the new Overbrook Intermodal Center, eliminating the need to take the circuitous Route G.

	No Build	Scenario 0	Scenario 1	Scenario 2	Scenario 3
Overbrook Regional Rail Station	786	694	2,578	3,635	1,504
Overbrook Trolley Station	N/A	790	535	780	626
Route 10	16,295	17,034	15,736	15,659	16,370
Route 65	8,029	7,924	7,353	7,176	7,483
Route G	13,747	13,658	12,750	12,393	12,936
Paoli-Thorndale Line	16,057	16,047	19,887	25,302	18,585

Table A-3: Daily Ridership Results (Boardings Only). (DVRPC, 2023)

For three Reimagining Regional Rail scenarios, the proposed Route 10 extension is expected to attract between 500 to 800 daily riders to the new trolley station. With overall increased service frequency and decreased fares for the Regional Rail system, the Paoli/Thorndale Line is expected to experience a significant increase in ridership. Conversely, the ridership of Routes 10, 65, and G are expected to decrease by 3 to 11 percent, except for Route 10 in Scenario 3, which is projected to increase by 0.5 percent.

The decrease in Route 10 ridership in Scenarios 1 and 2 is expected to occur mainly because of passengers traveling to Center City stations, specifically at the 15th, 19th, and 22nd streets trolley stations, choosing more frequent and less expensive Regional Rail service. In Scenario 3, Regional Rail service at Overbrook Station operates every hour, making it less convenient for commuters. As a result, Route 10 would experience an increase of approximately 0.5 percent over the No Build Scenario.

The ridership reduction on Route 65 is expected to be associated with improved Regional Rail service, specifically at stations where nearby Regional Rail stations are located, including Wissahickon Station of the Manayunk/Norristown Line, Germantown Station of the Chestnut Hill East Line, and Tulpehocken Station of the Chestnut Hill West Line.

Similarly, the decrease in Route G ridership is expected to take place in the vicinity of Regional Rail stations, such as Overbrook Station of the Paoli/Thorndale Line and Angora Station of the Media/Wawa Line. There would also be ridership reduction at Market Street and 56th Street Station, where the existing Route G passengers could transfer to the MFL to reach their Center City destinations.

It is worth noting that for the Route 10 extension alone, the majority of passengers boarding the trolley originate from Overbrook Station. In Scenarios 1 and 2, improved Regional Rail service is expected to make Overbrook Station a transfer point for passengers to board Regional Rail. Scenario 2 proposes more frequent service, leading to a higher number of passengers transferring at Overbrook Station, which explains why this scenario estimates higher ridership at the station than in the other Reimagining Regional Rail scenarios. In Scenario 3, Regional Rail service to Overbrook Station becomes less frequent and less attractive, so riders would switch to trolley service.

Conclusion

The Route 10 extension by itself would attract about 790 daily riders. The initial projections for Reimagining Regional Rail scenarios indicate that the new trolley station would attract 500 to 800 daily riders, depending on different scenarios. The ridership for the Paoli/Thorndale Line and other Regional Rail lines would experience a significant increase due to proposed Reimagining Regional Rail interventions. Conversely, the ridership for Routes 10, 65, and G would decline by 3 to 11 percent under these scenarios, except for Route 10 in Scenario 3.

Regional Rail provides express service between Overbrook and Center City, while the trolley covers more local stops at a lower cost. Riders at the new Overbrook Intermodal Center, especially those traveling to University City, would have the option to choose between Regional Rail and trolley based on service frequency, transit fare, trip duration (including travel time to and from the station and transfer waiting time), and number of transfers required. With the proposed reduction in Regional Rail fares for service at Overbrook Station and a slight increase in the parking fee under the three Reimagining Regional Rail scenarios, the overall cost becomes comparable to that of the trolley service. As a result, the frequency of service would become the key variable in these scenarios. If the frequency of Regional Rail increases, Overbrook Station would serve more as a Regional Rail transfer point for passengers currently traveling by other modes. Conversely, if the frequency decreases, passengers may switch to the trolley service instead and other modes would retain a higher percentage of passengers.

In the absence of changes to Regional Rail service, extending Route 10 is expected to attract new riders to trolley service at Overbrook and make the Route 10 trolley the preferred alternative for some Regional Rail passengers who begin their journey from Overbrook.

Modeling results show that Regional Rail Scenario 1 is expected to increase Regional Rail boards at Overbrook Station, with fewer passengers choosing the trolley than in Scenario 0. This is likely due to the reduced fares and increased service frequency proposed on Regional Rail under Scenario 1, along with Regional Rail's ability to provide express service to Center City.

Increased Regional Rail service frequency under Scenario 2 would increase SEPTA ridership not only at Overbrook Station but also in the network overall. The high frequency and low fares of Regional Rail service proposed in Scenario 2 would make Regional Rail an attractive alternative for many existing bus and trolley passengers. The expected impact would be reduced ridership on Routes 10, 65, and G that would be more than offset by increases in ridership on the Paoli/Thorndale Line.

Scenario 3 includes a decrease in peak service frequency on Regional Rail at Overbrook Station. However, with the proposed decrease in fares, this scenario would still be expected to result in an increase in Regional Rail passengers boarding at Overbrook Station. This demonstrates that while reduced fares are likely to attract more Regional Rail riders, service frequency is also important, and the Route 10 trolley would retain ridership consistent with Scenario 0.

Overbrook Intermodal Center

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Geographic Areas Covered	City of Philadelphia, Lower Merion Township, Montgomery County
Key Words	Accessibility, Transit Operations, Trolley Modernization

Abstract This study considers changes to station facilities that would be required to extend Trolley Route 10 from its current terminal to Overbrook Station and provide sufficient layover space for current and future bus needs. The concept design presented in this report includes improvements to station accessibility for riders with disabilities and recommendations for increased bicycle and pedestrian facilities. If implemented, the new station design and accompanying service changes are expected to contribute to accelerated growth in transit ridership at Overbrook Station.

Project Team Logan Axelson, Manager, Multimodal Program Development (Former)
Joanna Hecht, Transportation Planner
Jonas Bruggemann, Intern, Office of Transit, Bicycle, and Pedestrian Planning (Former)
Porter Crumpton, Intern, Office of Transit, Bicycle, and Pedestrian Planning (Former)
Reuben MacMartin, Senior Transportation Planner (Former)

Staff Contact Joanna Hecht
Transportation Planner
(215) 238-2840
jhecht@dvrpc.org

Delaware Valley Regional Planning Commission
190 N Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520
Phone: (215) 592-1800
Web: www.dvrpc.org



190 N Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520
Phone: (215) 592-1800
www.dvrpc.org

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