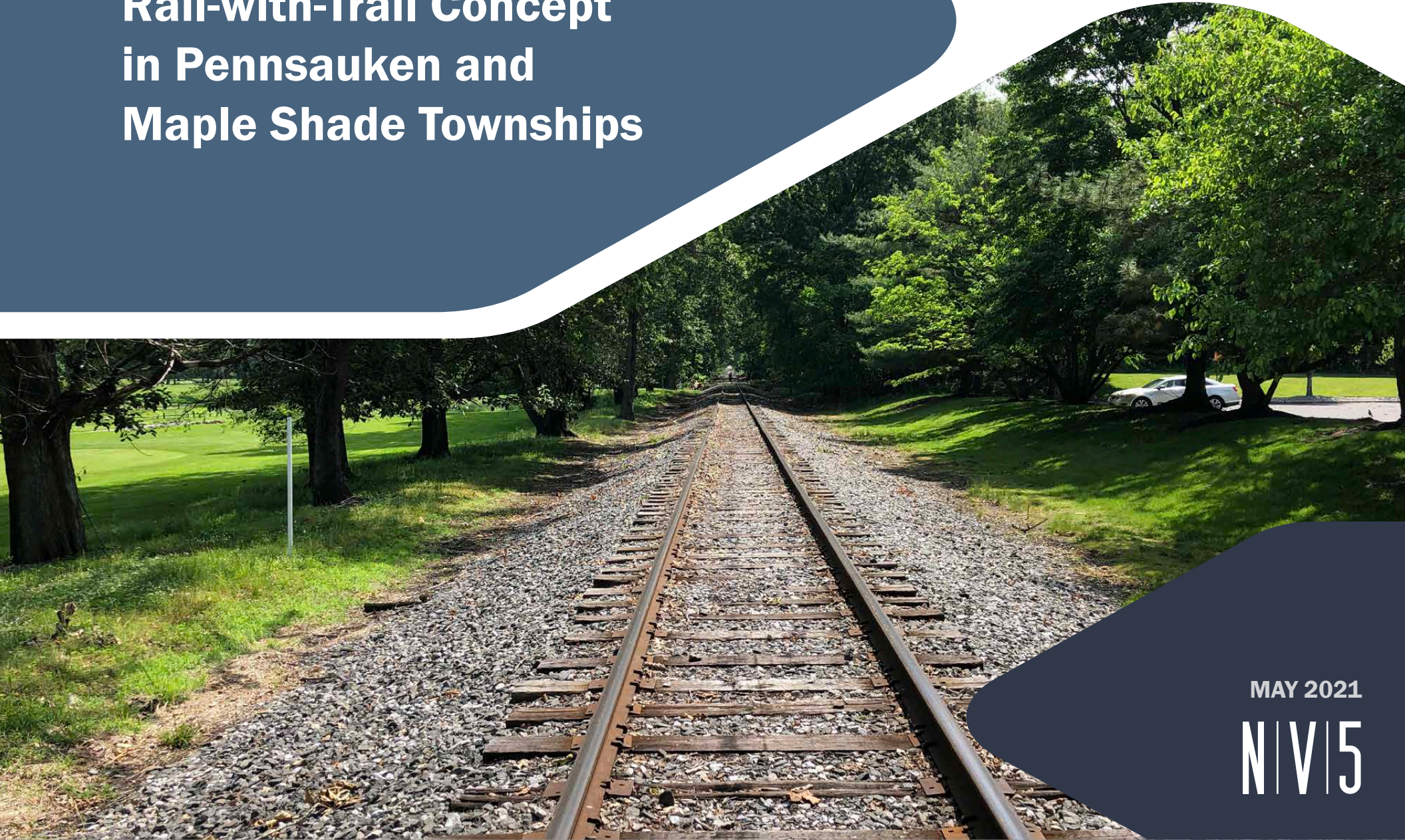


Planning Study for the
Burlington-Camden Connector:

Rail-with-Trail Concept in Pennsauken and Maple Shade Townships

NJDOT Local
Technical Assistance



MAY 2021

NIV|5

Acknowledgments

The project team would like to recognize and express appreciation to the numerous individuals who contributed information, attended the online meeting, or sent in a comment.

Special thanks to the **Study Advisory Committee** and to representatives from **Pennsauken Township** and **Maple Shade Township** for their time in developing this study and their ongoing commitment to safe, accessible, and enjoyable trails in Burlington and Camden Counties.

Project Team

The Office of Bicycle and Pedestrian Programs, New Jersey Department of Transportation, Pennsauken Township, and Maple Shade Township

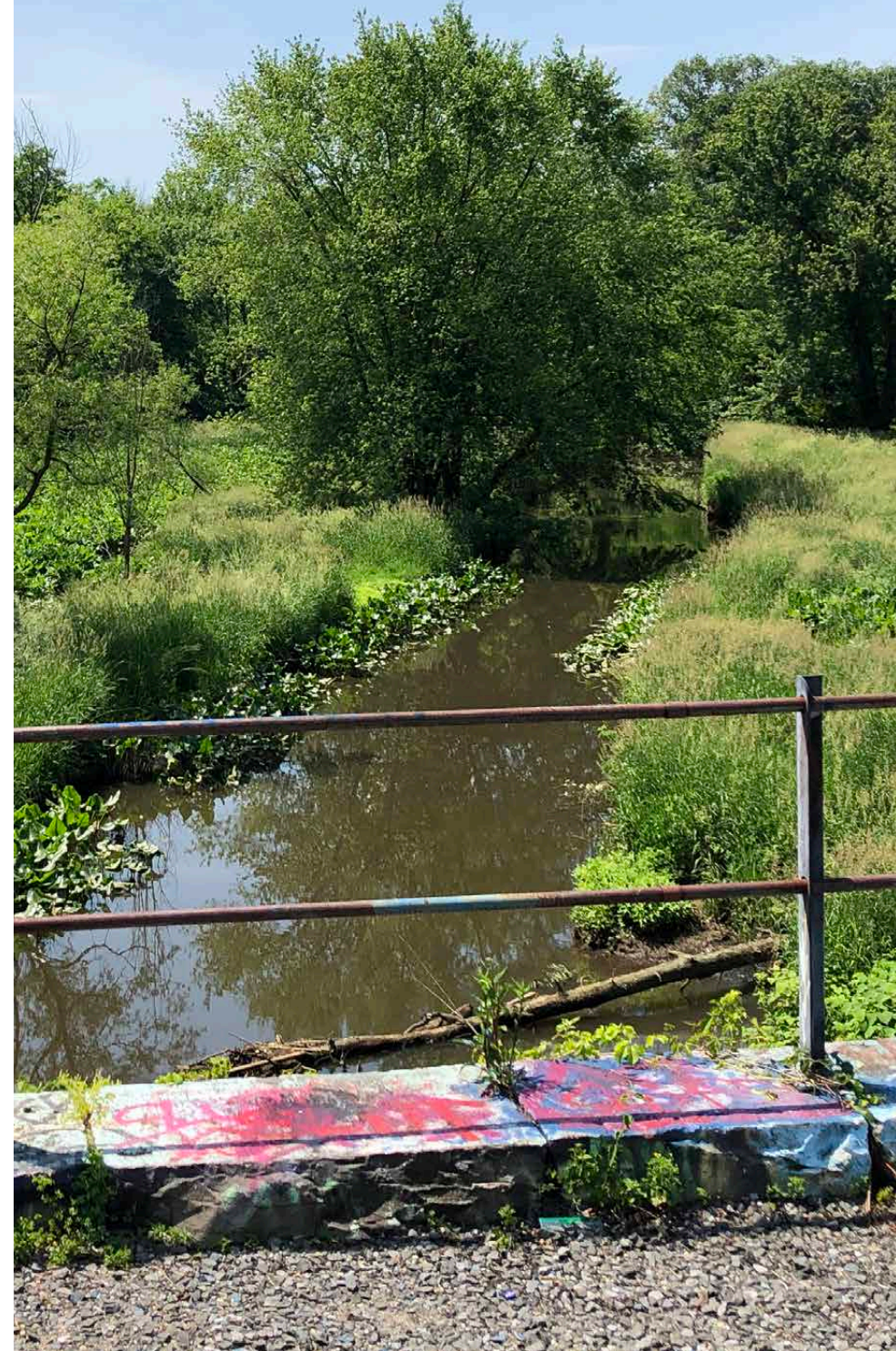


With



Disclaimer:

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Contents

| | |
|---|-----------|
| Introduction | 4 |
| Background..... | 4 |
| Purpose of this Study | 4 |
| Rail-with-Trail Overview | 6 |
| Rail-with-Trail Resources | 6 |
| Planning Process..... | 7 |
| Existing Conditions Overview | 9 |
| Trail Context | 10 |
| Nearby Community Assets | 10 |
| Access to Transit | 11 |
| Zoning..... | 11 |
| Study Area Photo Log | 12 |
| Active Railroad..... | 16 |
| Utilities | 17 |
| Environmental Considerations | 18 |
| Parcel Ownership | 21 |
| Rail-with-Trail Concept | 23 |
| Overview | 24 |
| Alternatives to Rail-With-Trail | 27 |
| Segment 1: Rail-with-Trail in Pennsauken Township | 28 |
| Segment 2: Rail-with-Trail Elevated Structure | 30 |
| Prefabricated Bridges | 32 |
| Segment 3: Rail-with-Trail in Maple Shade Township..... | 36 |
| Road Crossing Concepts..... | 40 |
| Rail-with-Trail Road Crossing, Type A | 42 |
| Rail-with-Trail Road Crossing, Type B | 43 |
| Rail-with-Trail Road Crossing, Type C | 44 |
| Order-of-Magnitude Cost Estimate | 46 |
| Appendix: Community Outreach Summary..... | 52 |

Introduction

Background

The Burlington-Camden Connector is a vision for a 10-mile continuous shared use trail to connect Burlington and Camden Counties and provide access to the Camden Waterfront, Benjamin Franklin Bridge, and other routes in the system of existing and proposed trails in the Delaware Valley Regional Planning Commission (DVRPC) region known as the [The Circuit](#).

A vision for the [Burlington-Camden Connector](#) was first described by the Rails-to-Trail Conservancy in a pamphlet in 2017. Building on that vision for the trail, the Townships of Pennsauken and Maple Shade applied to the NJDOT Office of Bicycle & Pedestrian Programs for technical planning assistance to further evaluate the potential of the trail.

The overall envisioned route for the Burlington-Camden Connector as described by the Rails-to-Trails Conservancy is represented on Map 1 within the blue ellipse. The current study analyzes a particular 2.2-mile portion as shown within the red ellipse in Map 1.



Cover of the 4-page pamphlet by the Rails-to-Trails Conservancy describing the vision for the Burlington-Camden Connector in 2017. (https://www.railstotrails.org/media/496451/burlington_camden-vision.pdf)

Purpose of this Study

The purpose of this study is to evaluate the potential to develop a shared use trail for pedestrians and bicyclists along a 2.2-mile portion of the Pemberton Industrial Track railroad, connecting Pennsauken Township (in Camden County) and Maple Shade Township (in Burlington County). Because the Pemberton Industrial Track is an active freight railroad, the shared use trail being evaluated is a “rail-with-trail” configuration, with the goal of maintaining rail operations while adding a trail facility to the railroad right-of-way.

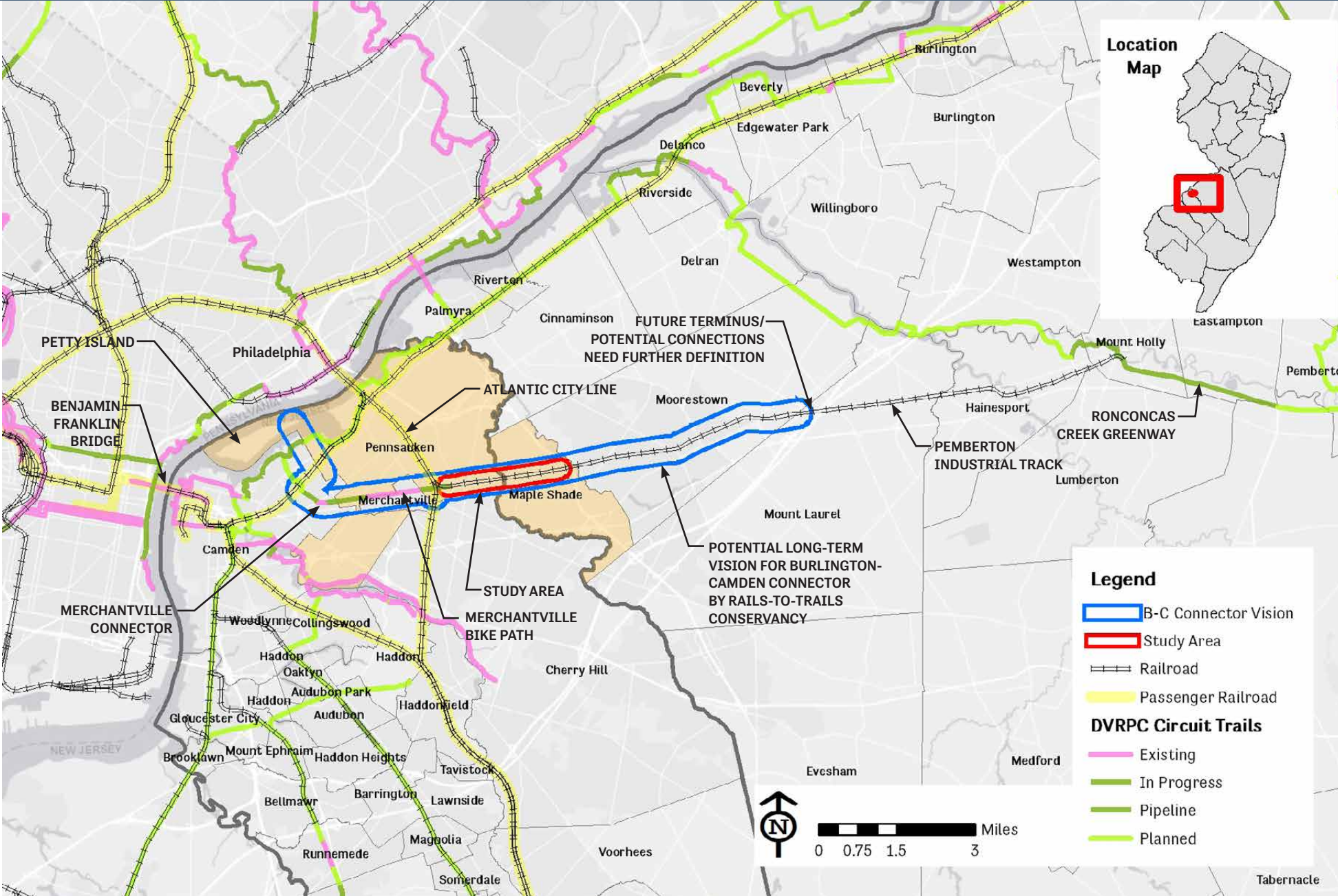
This study provides a GIS-based evaluation of existing conditions, supplemented by field observations, to envision how a rail-with-trail may be constructed within the right-of-way. It further provides concept-level designs for a trail facility and supporting infrastructure, such as road crossings and bridges, along with an order-of-magnitude cost estimate.

This study does not provide a direct comparison between the rail-with-trail concept and potential alternatives, such as on-road routing.

It is anticipated that this study will be used by local stakeholders to inform:

- Future decisions about trail routing in the area and comparison to potential alternatives,
- Coordination with the railroad owner and regulatory agencies to shape project development, and
- Additional public and stakeholder outreach.

Map 1: Context of the Potential Burlington-Camden Connector Trail



Rail-with-Trail Overview

A rail-with-trail is a shared use path or bicycle and pedestrian trail that is located within, or directly adjacent to, and along a railroad right-of-way. The benefits of this configuration include:

- Preservation of railroad use,
- Improved mobility for people on foot or bicycle, and
- Highest and best use of linear railroad properties that connect communities and support economic development.

According to the FHWA report [Rails with Trails Best Practices and Lessons Learned](#), development of rails-with-trails has been growing in the 21st Century:

| | 2002 | 2018 | Increase |
|--|------|------|----------|
| Rail-with-trail facilities, nationally | 65 | 343 | 430% |
| Miles of rail-with-trail facilities | 279 | 917 | 230% |
| States with rail-with-trail | 30 | 47 | 56% |

This growth represents positive trends on the part of railroad property owners, government, trails advocates, and the public, who have found ways to co-develop rail-with-trail facilities that respect railroad operations, are safe, and create interesting places to walk, bicycle, move, and recreate.

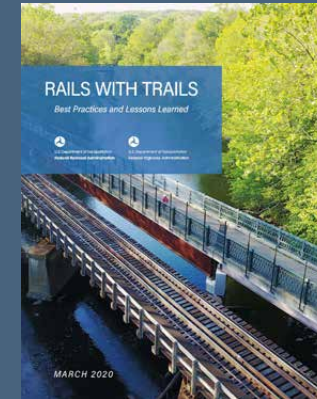
Planning and development of rail-with-trail facilities is a complex process that must satisfy a broad range of stakeholders and regulatory requirements. A few primary considerations include:

- Integrity/safety of railroad use;
- Safety of trail users;
- Separation and setback distance among railroad, trail, and adjacent land uses;
- At-grade and grade-separated crossings;
- Environmental impacts/permitting; and
- Right-of-way access, easements, acquisition, and indemnification agreements.

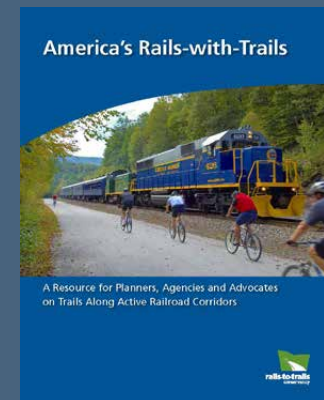
In the current state of practice, there is not an authoritative source of national design guidelines for rail-with-trail facilities. For the concepts presented in this study, the FHWA report [Rails with Trails Best Practices and Lessons Learned](#) (2020) was referred to as a resource for generally accepted design considerations, along with the [AASHTO Guide for the Development of Bicycle Facilities](#) (2012, Fourth Edition, Chapter 5).

The intention of this study is to provide a reasonable starting point for the extensive coordination, planning, and outreach that would be required to bring the Burlington-Camden Connector to fruition as a rail-with-trail, as well as to inform any future comparison with potential alternative routes in the region.

Rail-with-Trail Resources



[Rails with Trails Best Practices and Lessons Learned](#), FHWA, 2020



[America's Rails-with-Trails Report](#), Rails-to-Trails Conservancy, 2013

[America's Rails-with-Trails: Rail-with-Trail List](#), Rails-to-Trails Conservancy, Updated January 2021

Planning Process

This planning study was developed in four main steps:

1. Assessment of existing conditions using GIS data and field observation
2. Development of draft rail-with-trail and road crossing concepts
3. Online Community Workshop
4. Refinement of concepts and development of an order-of-magnitude cost estimate

The purpose of this planning study is to provide a resource to inform local officials, stakeholders, the general public, and others

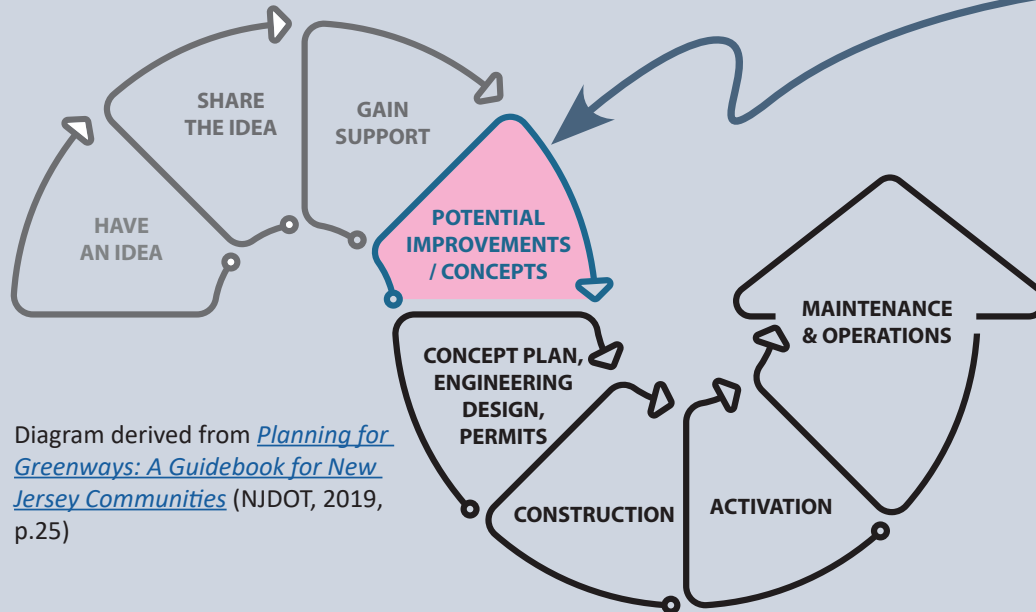
of the potential to develop a rail-with-trail facility along the Pemberton Industrial Track right-of-way in Pennsauken and Maple Shade Townships. The study describes conceptual trail configuration in relation to existing conditions, opportunities, constraints, and potential costs.

The study provides the necessary visual and informational collateral for local champions to advance the potential trail initiative and conduct meaningful discussions with the railroad right-of-way owner and regulatory agencies (such as NJDEP). This study may also serve as a working foundation from which

to apply for funding for future phases of work (such as detailed conceptual planning and public input, working with land owners, engineering studies, etc.).

In terms of the overall planning and project development process, the Burlington-Camden Trail is still in the early stages. It will require a dedicated effort and agreement among many parties to advance through the next steps that are necessary to bring the potential rail-with-trail to fruition.

Typical Trail Planning Process:



Current Planning Study Outcomes

- Existing Conditions Analysis
- Rail-with-Trail Concepts & Order-of-Magnitude Cost Estimate

Next Steps

- Coordination with railroad right-of-way owner
- Coordination with regulatory agencies (NJDEP, Burlington and Camden Counties) and Delaware Valley Regional Planning Commission
- Additional public input and concept development/refinement
- Comparison to alternative routing solutions
- Application for federal or state funding
- Site survey, engineering design development, and permitting
- Construction and activation of trail improvements



Existing Conditions Overview

The following descriptions of Existing Conditions present a baseline understanding of the current conditions, derived from GIS data and field observation, along the Pemberton Industrial Track in Pennsauken and Maple Shade Townships. The purpose of this information is to conceptualize the existing available space, land cover, terrain, watercourses, and surrounding land uses to inform the development of design concepts for a potential rail-with-trail.

Trail Context

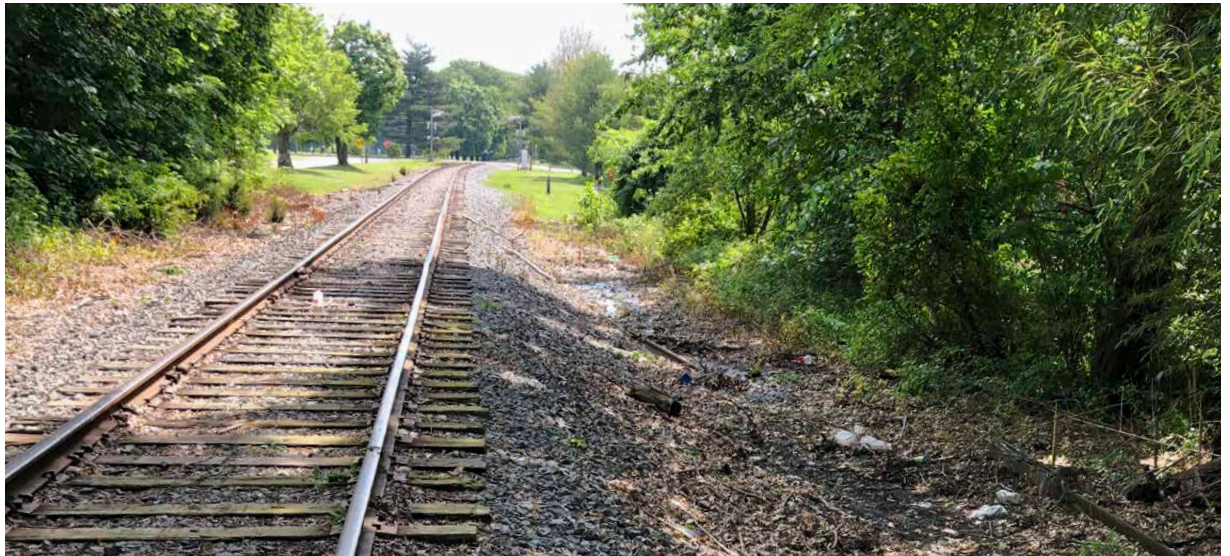
The Burlington-Camden Connector has potential to serve as an east-west spoke to the growing network of Circuit Trails in and around Camden and Burlington Counties, enabling bicycle and pedestrian access to the Camden Waterfront and the Benjamin Franklin Bridge (with a recently completed ramp access to support bicycle and pedestrian connectivity to Philadelphia).

The trail study area extends from Pennsauken Youth Athletic Activities (P.Y.A.A.) Park in Pennsauken Township (western limit) to Pine Road/N. Pine Avenue in Maple Shade Township (eastern limit), a distance of 2.2 miles, along an active freight railroad right-of-way known as the Pemberton Industrial Track. This study area has independent utility and logical endpoints, connecting the communities of Pennsauken and Maple Shade, providing transportation and recreation resource, and providing connections to parks, businesses, and transit.

Immediately west of the study area, the Atlantic City Line railroad in Pennsauken marks an important point of distinction for the potential Burlington-Camden Connector. West of the Atlantic City Line, portions of the former railroad have already been converted to trails, including the 1.0-mile Merchantville Bike Path in Merchantville, and another 0.7-mile shared use path in Camden connecting Dudley Grange Park with Ball Park. A separate planning effort is under way to determine the connection

between the terminus of the Merchantville Bike Path at Cove Road and the western extent of the current study area near P.Y.A.A. Park, over a distance of 0.5 miles.

Beyond the eastern limit of the current study area, the Burlington-Camden Connector will require further investigation and definition. The [Rails-to-Trails Conservancy vision pamphlet](#) identifies the trail terminus at Centerton Road near the municipal border of Moorestown and Mount Laurel. However, about 6.4 miles further east, the Ronconcas Creek Greenway in Mount Holly is in varying stages of development, and could potentially serve as a long-term goal for connecting trails in the region.



Typical conditions along the study area rail corridor: railroad ties and tracks raised on ballast as immediate surroundings change among woods/vegetation, private residential and business properties, environmentally sensitive areas, parks, and frontage roads.

Nearby Community Assets

Within a short walking distance of the study area right-of-way (half to three-quarters of a mile), there are 8 schools/daycares and various parks that offer amenities ranging from athletic facilities and playgrounds to wooded areas and access to the South Branch Pennsauken Creek. Two schools and two parks directly abut the right-of-way. The Pennsauken County Club, a private golf course, also abuts the northern edge of the right-of-way at the eastern end of Pennsauken.

Roughly 0.15 miles to the south, the CR-537 corridor (Maple Avenue in Pennsauken to Main Street in Maple Shade) runs parallel

to the study area. The corridor includes pedestrian-friendly areas with restaurants, retail, and office space intermixed with residential dwellings. Portions of the CR-537 corridor include bicycle lanes.

Access to Transit

NJ TRANSIT bus stops are located along the Maple Avenue (Pennsauken) to Main Street (Maple Shade) corridor, as well as along Haddonfield Road, which crosses the study area in Pennsauken.

The NJ TRANSIT Bus Stop on Haddonfield Road presents the opportunity for a direct, inter-modal trail-to-transit connection.

Zoning

In Pennsauken Township, the study area is located in the Residential Zone:

- R-3 (§ 141-78) zone west of Haddonfield Road
- R-1 (§ 141-76) zone east of Haddonfield Road

According to the local ordinance, noncommercial parks and other recreational uses are not permitted within the R-3 or R-1 zones. Such uses are permitted in the T-1 zone (§ 141-76.1).

In Maple Shade Township, the study area is located in the Residence District (Article III, § 205-12):

- R-1 (Article IV, § 205-16) district west of N. Coles Avenue
- R-2 (Article V, § 205-20) district from N. Coles Avenue to the eastern end of the study area

According to local ordinance, municipal parks or municipally operated recreation areas are permitted within the Residence Districts.

In the future, should the potential rail-with-trail concept be advanced, the issue of ensuring compliance with municipal zoning regulations would be handled locally.



View of the 1.0-mile Merchantville Bike Path, a rail-to-trail conversion.



View west of the 0.7-mile 'Merchantville Connector' rail-to-trail conversion at Dudley Grange Park in Camden, 2.4 miles west of the study area.



Businesses and sidewalk along Main Street/CR-537 in Maple Shade.

Study Area Photo Log

Map 2, Panel A: Study Area Overview in Pennsauken



Photos Keyed to Map 2.A



1 Existing informal path between P.Y.A.A. Park/Brey Memorial Field and the study area rail corridor at the western end of the study area (view east).



3 View north to Fine Elementary School near Haddonfield Road in Pennsauken.



5 Large culvert at South Branch Pennsauken Creek Tributary in Pennsauken (view west).



2 Vegetated buffers bordering residential areas between Union Avenue and Haddonfield Road in Pennsauken (view east).



4 The study area rail corridor abuts Pennsauken County Club east of Haddonfield Road (view east).



6 Homeowner fencing along residential areas on Bryn Mawr Avenue in Pennsauken (view southeast).

Map 2, Panel B: Study Area Overview in Maple Shade



Photos Keyed to Map 2.B

7



The study area rail corridor crosses South Branch Pennsauken Creek (border of Pennsauken and Maple Shade) over a large double arch culvert structure (view east).

9



Typical open frontage in Maple Shade east of N. Coles Avenue to eastern end of study area (view east).

11



Aces Field in Maple shade (view northeast).

8



Significant ballasting west of N. Coles Avenue in Maple Shade.

10



Maple Shade Station at N. Forklandng Road (view east).

12



Steinhauer Elementary School in Maple Shade (view south).

Active Railroad

According to the Federal Railroad Administration [Safety Map](#), the study area is an active Main Line freight railroad. The railroad owner is listed as CSAO (Conrail Shared Assets Operations) with track rights to CSX Transportation and Norfolk Southern Railway. This study does not include engagement with the current railroad owner/operator; it is limited to assessing the physical conditions of the railroad as they will inform future trail planning and design decisions.

The railroad is in use by low-speed freight rail traffic and recent repairs and upgrades were also observed in the field. According to Federal Railroad Administration Crossing Inventory Reports, railroad traffic within the study area travels at a speed under 10 MPH with a frequency of less than one train per week.

Crossing Inventory Forms can be downloaded from <https://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/crossing.aspx> for the crossings within the study area, as listed:

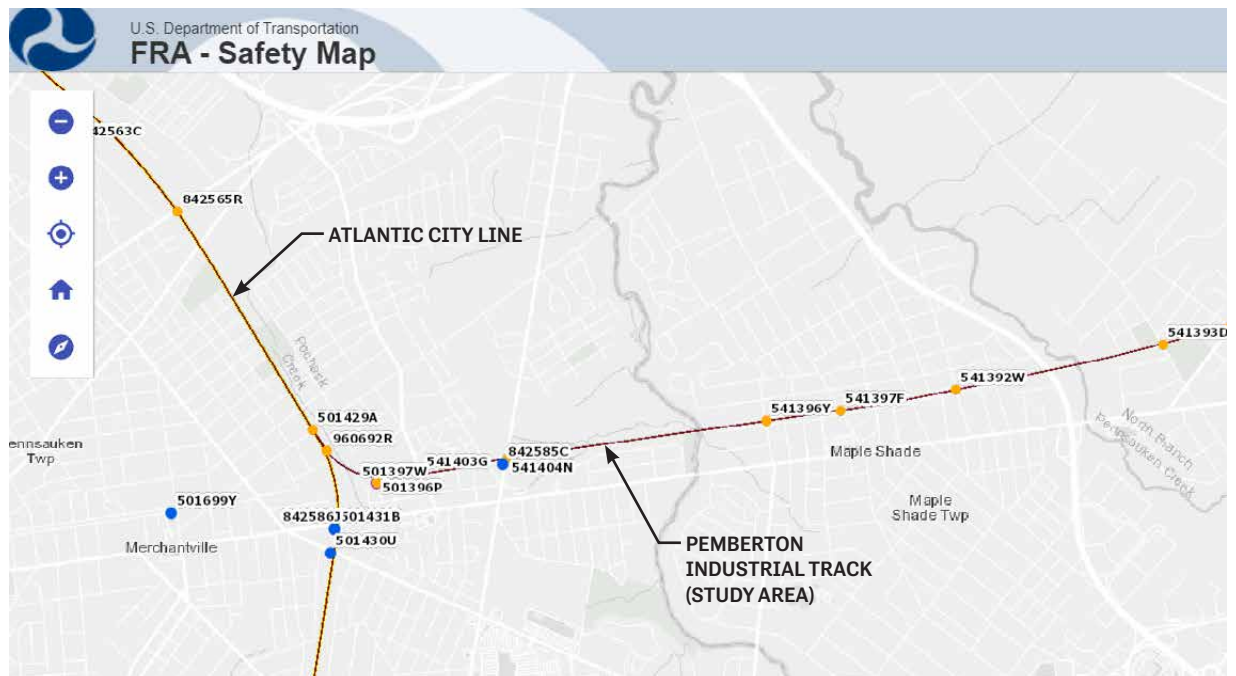
| Road | Location | US DOT Inventory # |
|--------------------|-------------|--------------------|
| Haddonfield Rd. | Pennsauken | 541404N |
| Union Ave. | Pennsauken | 541403G |
| N. Coles Ave. | Maple Shade | 541396Y |
| N. Forklanding Rd. | Maple Shade | 541397F |
| Stiles Ave. | Maple Shade | 541392W |



Orange markings surround an area where two railroad ties (indicated in yellow) were recently replaced.



Recent upgrades at Stiles Avenue include new crossbucks with flashing lights along with a new control box.



Screenshot of the Federal Railroad Administration Safety Map (<https://fragis.fra.dot.gov/GISFRASafety/>), which lists the Pemberton Industrial Track as active main line rail and provides access to U.S. DOT Crossing Inventory Forms along the corridor.

Utilities

Buried cable warning signs are present along the study area right-of-way.

Overhead cables were observed along the right-of-way in Maple Shade. Without survey, it is unclear whether the utility posts are located within the roadway or the railroad right-of-way.

As a component of future trail design, a thorough review of the right-of-way should be conducted to determine all utility impacts. Utility owners should be coordinated with during future planning and design phases.



Buried fiber optic cable marker examples.



Utility poles along Broadway (northern edge of right-of-way) in Maple Shade.

Environmental Considerations

The purpose of this brief summary of environmental considerations is to identify any significant issues, using GIS data, that could adversely affect trail development considerations for the potential Burlington-Camden Connector.

Planning Context

According to *New Jersey State Development and Redevelopment Plan State Planning Areas*, the study area is located within the Metropolitan Planning Area (PA 1), but forest, waterways, and wetlands traverse the site and are located within 200 feet of the potential trail alignment. The proximity of these features increases the potential for environmental impacts and the need for associated environmental permits.

Watercourses/Wetlands

The study area intersects the South Branch Pennsauken Creek and a corresponding tributary. Pennsauken Creek has an NJDEP Surface Water Quality Standard classification, per N.J.A.C. 7:9B, of FW2-NT, which indicates a non-trout freshwater waterway. The South Branch Pennsauken Creek drains to Pennsauken Creek in Cinnaminson to the north, which in turn drains to the Delaware River and may therefore be subject to the Delaware River Basin Water Code.

Based on NJDEP Land Use Land Cover Data (see Map 3, Panel A), the study area intersects mapped freshwater wetlands at two locations

associated with the South Branch Pennsauken Creek and tributary. NJDEP Freshwater Wetlands Permits (N.J.A.C. 7:7A) are required for impacts to freshwater wetlands and/or associated transition areas, as well as State Open Waters. Transition areas vary from 0 feet for state open waters/ordinary resource value wetlands, to 150 feet for exceptional value wetlands. Further study of wetland impacts will need to be conducted to determine the exact size and locations of wetland impacts and transition areas. Coordination with NJDEP will be required to ensure that any potential future trail project protects or improves water quality and complies with applicable permitting requirements.

When pursuing the NJDEP Freshwater Wetlands Permit, (N.J.A.C. 7:7A), the project will be required to:

- Show minimization of impacts
- Coordinate with study/findings for Threatened and Endangered (T&E) species
- Address wetland mitigation (on-site, off-site, or via banking)

Stormwater Management

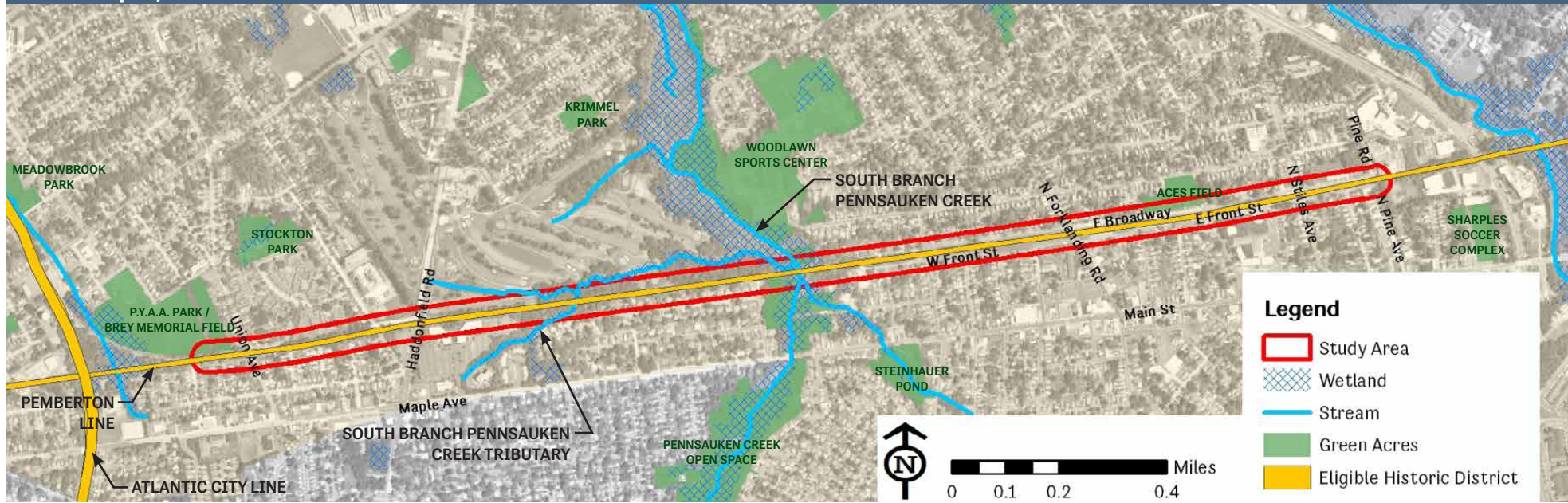
The project would be considered a “Major Development” because it will exceed one acre of disturbance, thus compliance with stormwater management rules (NJAC 7:8) will be required.

Should the proposed trail surface be constructed with an impervious material, such as asphalt, the design of the trail would need to address groundwater recharge and stormwater runoff quantity rules. A typical

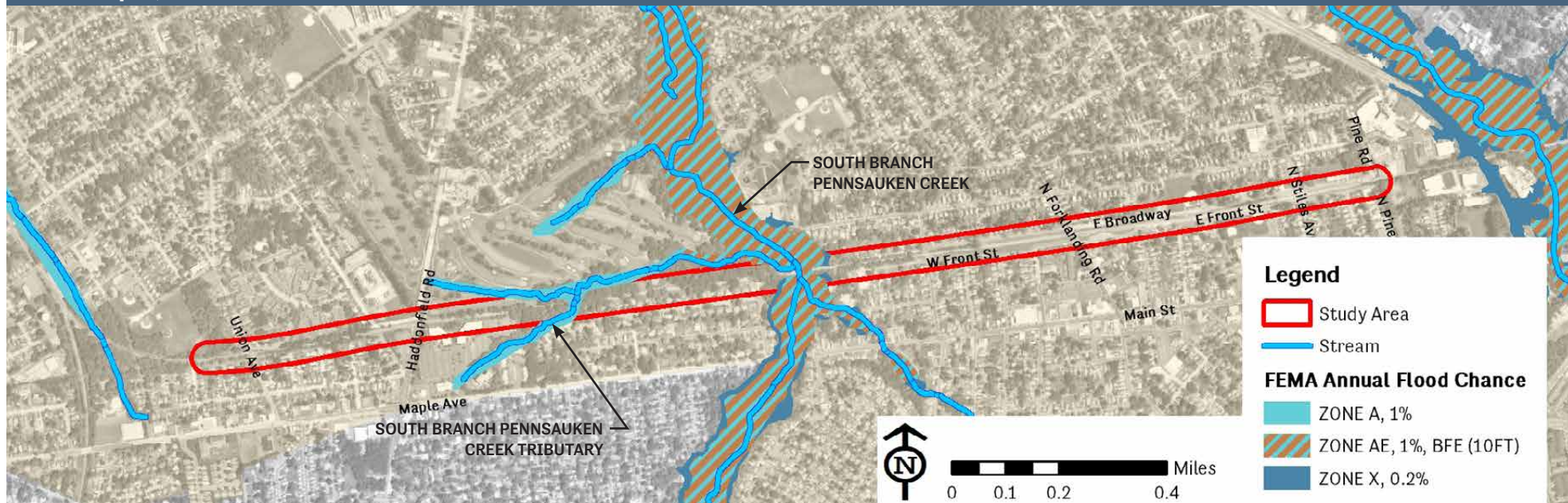
solution is to construct a linear infiltration system adjacent to or below the trail. To determine the feasibility of an infiltration system, a geotechnical investigation (test pits and borings) including soils testing for permeability, will be required in compliance with Chapter 12 of the NJ Stormwater Best Management Practices Manual. The stormwater quality criteria does not apply to non-motorized vehicle surfaces and would not be required to be addressed as part of this project.

It should be noted that trails constructed of permeable materials, such as compacted stone or open graded asphalt, are exempt from the stormwater management rules for groundwater recharge and stormwater runoff. Additional benefits of an open graded asphalt trail surface include durability, reduced need for geotechnical investigation and testing, reduction in excavation and soil disposal costs associated with the a linear infiltration system, reduction of the urban heat island effect as compared to impervious asphalt, and a low possibility for the formation of icy surface conditions.

Map 3, Panel A: Environmental Considerations



Map 3, Panel B: FEMA Flood Hazard Areas



FEMA Floodplains

The study area intersects FEMA Flood Hazard Area Zone A (1% annual flood chance) and Zone AE (1% annual flood chance, base flood elevation of 10ft.)(see Map 3, Panel B). As a Major Development, an individual NJDEP Flood Hazard Area Permit (N.J.A.C. 7:13) is required. Riparian zones will vary from 50 feet to 150 feet, and an assessment of water dependent T&E species will be required to determine the actual riparian zone width.

When pursuing the NJDEP Flood Hazard Area Permit, (N.J.A.C. 7:13), trail improvements would be subject to the following requirements:

- No fill allowed within a flood hazard area
- Impacts to flood hazard areas must be evaluated to show no increase in off-site flood elevations
- If impacts to riparian zones exceed what is allowable, mitigation will be required (on-site, off-site or via banking)

Green Acres / Historic Preservation

The study area borders several tracts of open space acquired through the Green Acres Program (see Map 3, Panel A). Proposed changes to these or other such tracts may be subject to review and approval of the State of New Jersey Green Acres Program.

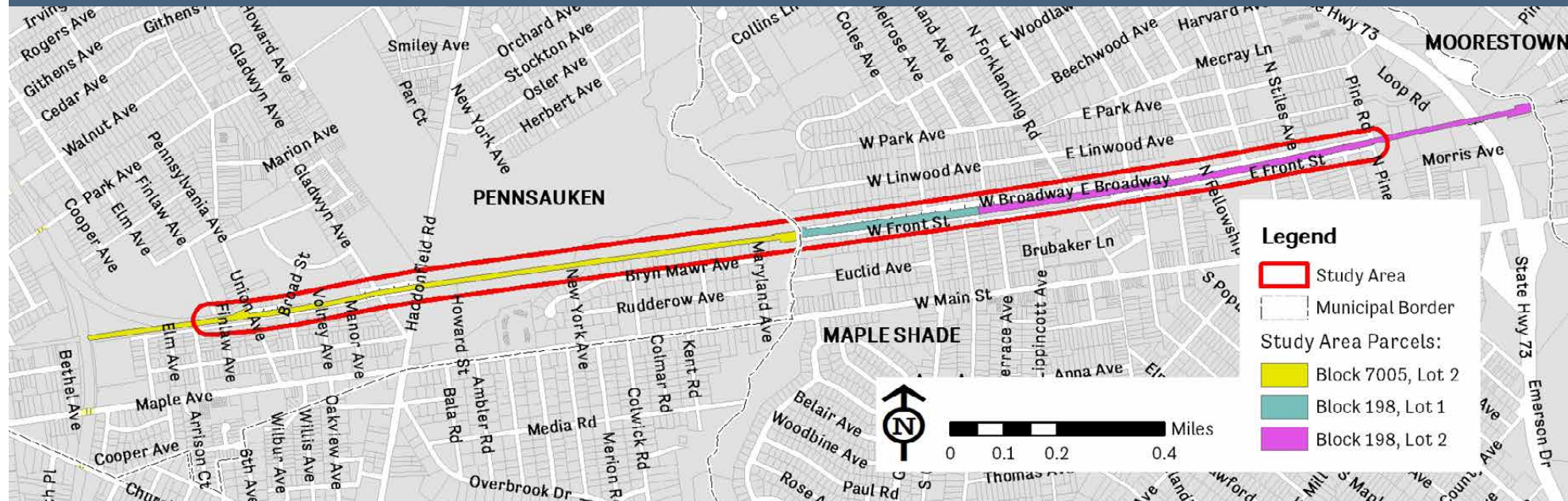
The railroad right-of-way is eligible for listing as a Historic District, under the name Camden and Burlington County Railroad (SHPO Opinion 2/22/2016, ID# 4588). A potential trail project would require review and approval through the NJDEP New Jersey Historic Preservation Office (N.J.A.C. 7:4).

Parcel Ownership

Map 4 and the associated table identify the owners of the study area parcels, according to cadastral data used in the New Jersey Department of Treasury MOD-IV system. Because railroad land ownership, easements, and access rights tend to be very complex, having evolved over the past 150+ years, a professional title search (beyond the scope of this study) should be conducted in order to arrive at a conclusive understanding of railroad property ownership and easements.

| Block | Lot | Owner | Location | Notes |
|-------|-----|--------------------------------------|-------------|--------------------|
| 7005 | 2 | Conrail Corp Prop Tax Dept | Pennsauken | |
| 198 | 1 | New Jersey Transit Corp PO Box 10009 | Maple Shade | |
| 198 | 2 | Not listed | Maple Shade | |
| 600 | 1 | Conrail | Moorestown | East of study area |
| 4206 | 1 | Conrail | Moorestown | East of study area |
| 4408 | 1 | Conrail | Moorestown | East of study area |
| 6107 | 30 | Conrail | Moorestown | East of study area |
| 6207 | 1 | Conrail | Moorestown | East of study area |

Map 4: Parcel Ownership





Rail-with-Trail Concept

The Pemberton Industrial Track is an active railroad and it is assumed that it will remain active into the future. Yet, there is interest locally in the idea that the railroad right-of-way may also be used to accommodate pedestrian and bicycle travel along a trail facility. Thus, to satisfy the desire as expressed by local advocates for a trail route to fulfill the vision of the Burlington-Camden Connector, connecting the Townships of Pennsauken and Maple Shade, this study explores the potential to design and construct a rail-with-trail facility—that is, a bicycle and pedestrian trail within the active railroad right-of-way.

Such a facility will require extensive coordination, planning, and outreach among a number of stakeholders, including at a minimum the railroad owner, regulatory agencies, local, county, and state government, the Delaware Valley Regional Planning Commission, and the public. This study provides a reasonable starting point for such coordination and outreach by envisioning a conceptual rail-with-trail design solution and estimating the costs to develop such a facility. It is anticipated that local project champions will use this study as a resource for trail development in the area, whether by advancing the rail-with-trail concept or developing reasonable alternatives.

Study Area Segments

Overview

The study area (a 2.2-mile portion of the Pemberton Industrial Track right-of-way in Pennsauken and Maple Shade Townships) varies in width and elevation in relation to surrounding grades. In order to conceptualize a rail-with-trail facility as it might be constructed within the existing conditions, the study area and rail-with-trail concept are broken down into three distinct segments—Segments 1, 2, and 3—as shown to the right and on Map 5.

The design considerations of each segment are explored in this study, at a planning level, to present and evaluate:

- A rail-with-trail configuration for each segment that has the potential to ‘fit’ within the available space in the right-of-way, referring to design guidance from FHWA report [Rails with Trails Best Practices and Lessons Learned](#) and [AASHTO standards](#) for a shared use path;
- Response to environmental constraints and needs for additional infrastructure, such as bridges or boardwalks;
- Potential rail-with-trail road crossing configurations where the study area intersects the road network; and
- The potential order-of-magnitude costs to construct a rail-with-trail facility spanning all three segments of the study area.

Existing Condition, Segment 1 (±5750 feet)

- ±50-foot-wide right-of-way
- Enclosed frontage (vegetated, abuts residential and business properties)
- Track centered in right-of-way on ballast 1-4 feet high



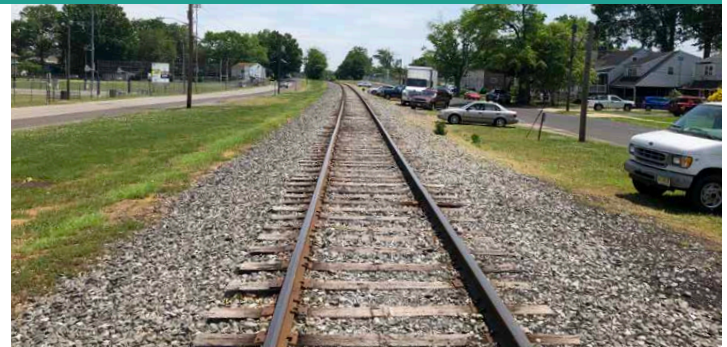
Existing Condition, Segment 2 (±1175 feet)

- ±80-foot-wide right-of-way
- Enclosed frontage (vegetated, abuts residential property and woodland open space)
- Track centered in right-of-way on ballasted embankment rough 12 feet high
- Environmentally sensitive areas

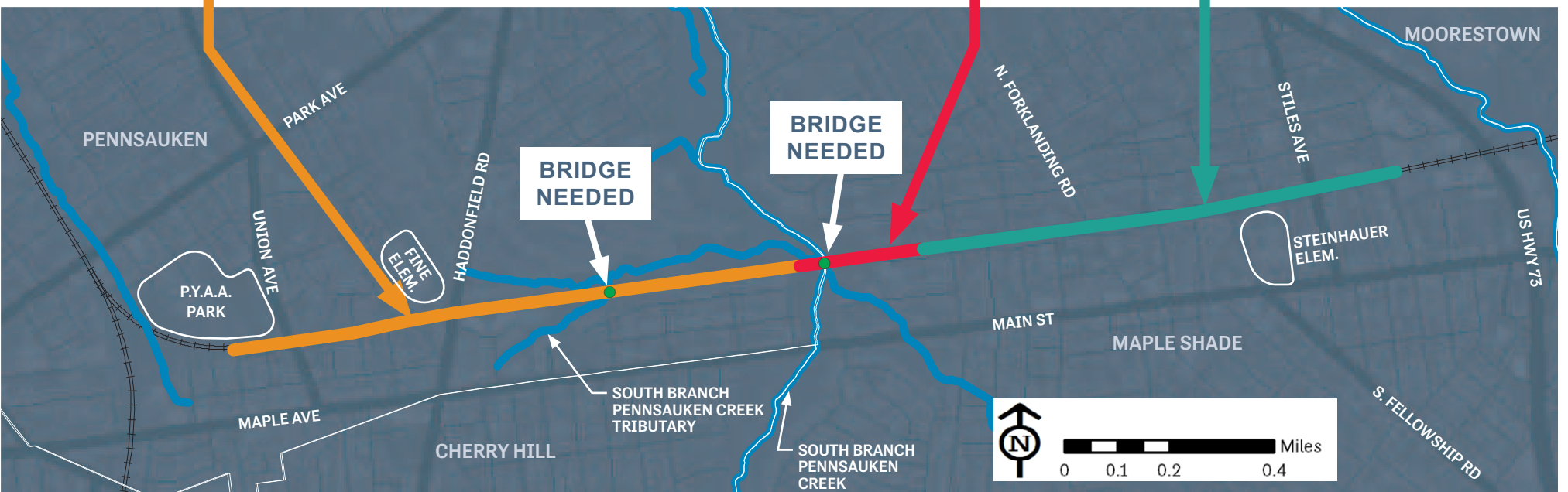
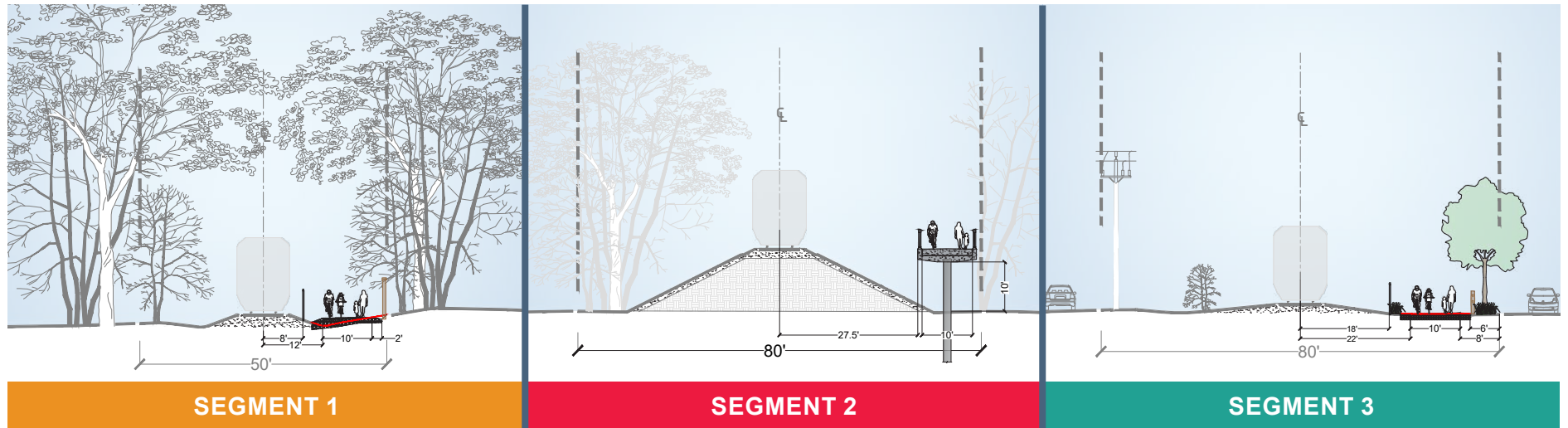


Existing Condition, Segment 3 (±4835 feet)

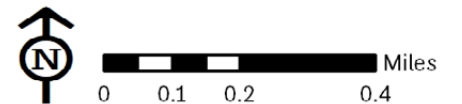
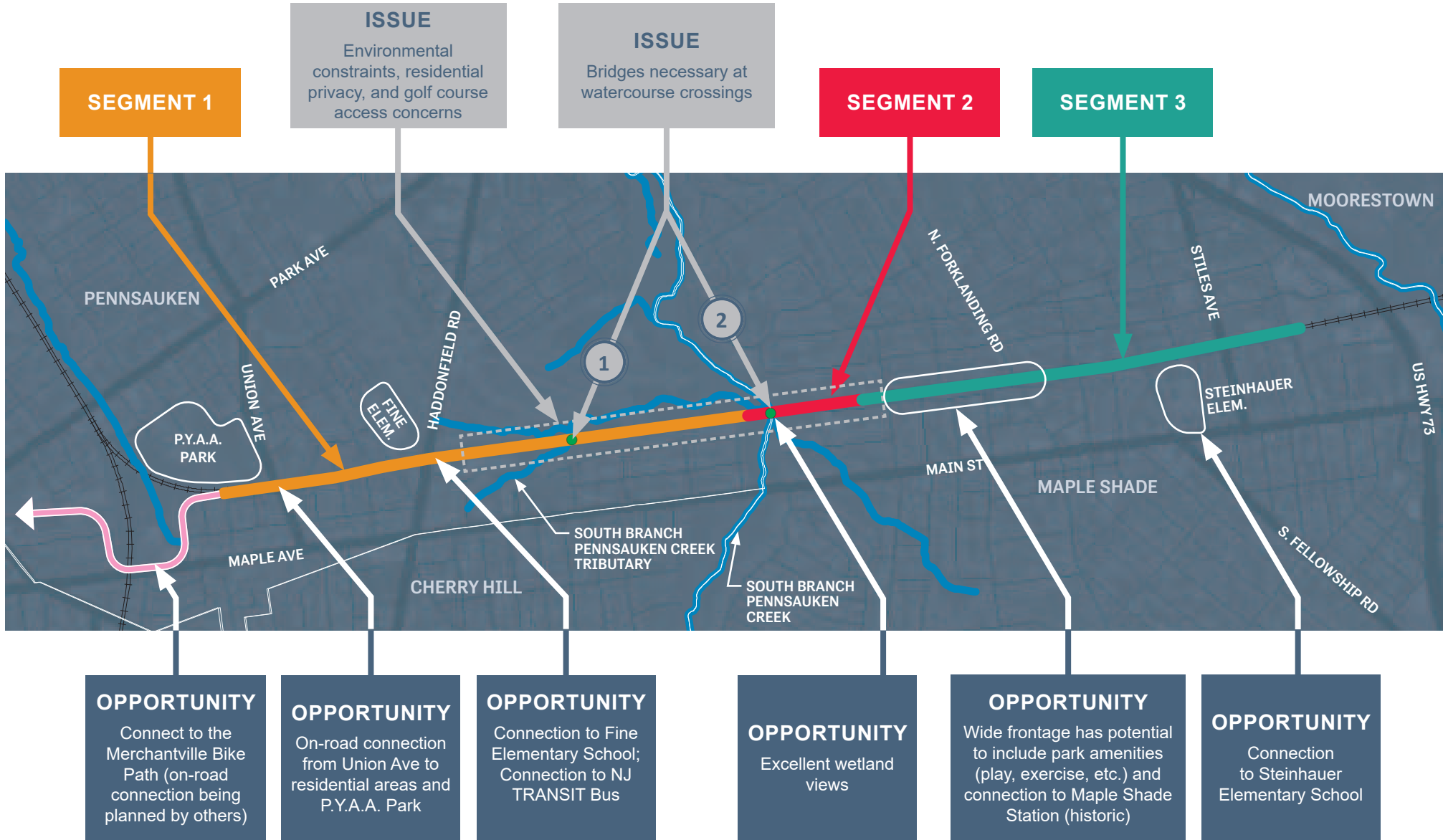
- ±80-foot-wide right-of-way
- Open frontage to parallel roads
- Track centered in right-of-way on ballast 1-2 feet high



Map 5: Rail-with-Trail Concept



Map 6: Conditions, Issues, and Opportunities



Alternatives to Rail-With-Trail

Although this study conceptualizes and estimates the costs to construct a rail-with-trail facility within the Pemberton Industrial Track right-of-way, the purpose of this study is not to advocate a particular trail routing or design solution.

Ultimately, the decision to pursue the coordination, planning, outreach, and design effort that would be necessary to advance a rail-with-trail concept would be the responsibility of local project champions in coordination with the appropriate stakeholders, land owners, the public, regulatory agencies, and other levels of government.

This study, however, can be used as a tool against which to evaluate potential trail alternatives that make sense for mobility and accomplish the non-motorized transportation goals in the region. In close proximity to the study area, two potential alternatives to a rail-with-trail include:

1. **On-road bicycle facility.** Roughly 0.15 miles south of the Pemberton Industrial Track, the CR-537 corridor (Maple Avenue in Pennsauken to Main Street in Maple Shade) runs parallel to the study area. The corridor includes pedestrian-friendly areas with restaurants, retail, and office space intermixed with residential dwellings. Portions on the corridor also include striped bicycle lanes.

The CR-537 corridor offers a potential alternative to a rail-with-trail facility, if it can be redesigned to include continuous, low-stress pedestrian and bicycle facilities that meet the mobility and non-motorized transportation goals in the region. The extent to which a redesigned CR-537 corridor might serve as an alternative to a rail-with-trail facility is undetermined at this time, and would require development of a study to determine the advantages/disadvantages as they relate to factors such as bicycle and pedestrian level of service, public preference, cost, traffic impacts, and environmental impacts.

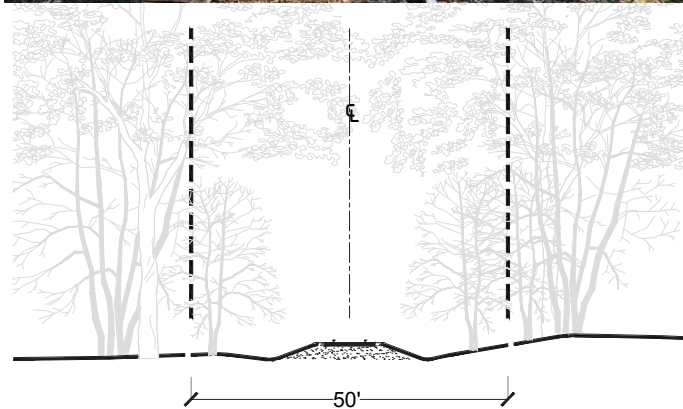
2. **Rail-to-trail conversion.** Although the Pemberton Industrial Track is an active freight railroad today, it is unknown how long the facility will remain in active service. If, in the future, there is potential for railroad abandonment proceedings, local project champions should consider pursuing a rail-to-trail conversion for the right-of-way. Rather than accommodate both rail and trail traffic, as in a rail-with-trail configuration, a rail-to-trail conversion would consider the needs only of a trail facility for pedestrians and bicyclists. Such a trail could potentially be constructed in place of the existing railroad, repurposing the existing structures, embankments, and culverts.

Rail-with-Trail in Pennsauken Township

Existing Conditions

- ±5750 feet of potential trail distance in Pennsauken Twp.
- ±50-foot-wide right-of-way
- Enclosed frontage (vegetated, abuts residential and business properties)
- Track centered in right-of-way on ballast 1-4 feet high

From P.Y.A.A. Park/Brey Memorial Field to the vicinity of South Branch Pennsauken Creek, the right-of-way is typically 50 feet wide. The track is in the center of the right-of-way and constructed on ballast approximately 1-4 feet high in relation to surrounding grades, with drainage swales visible on both sides. In general, the right-of-way is enclosed by surrounding residential and business land uses with varying borders consisting of trees, shrubs, and opaque fence.



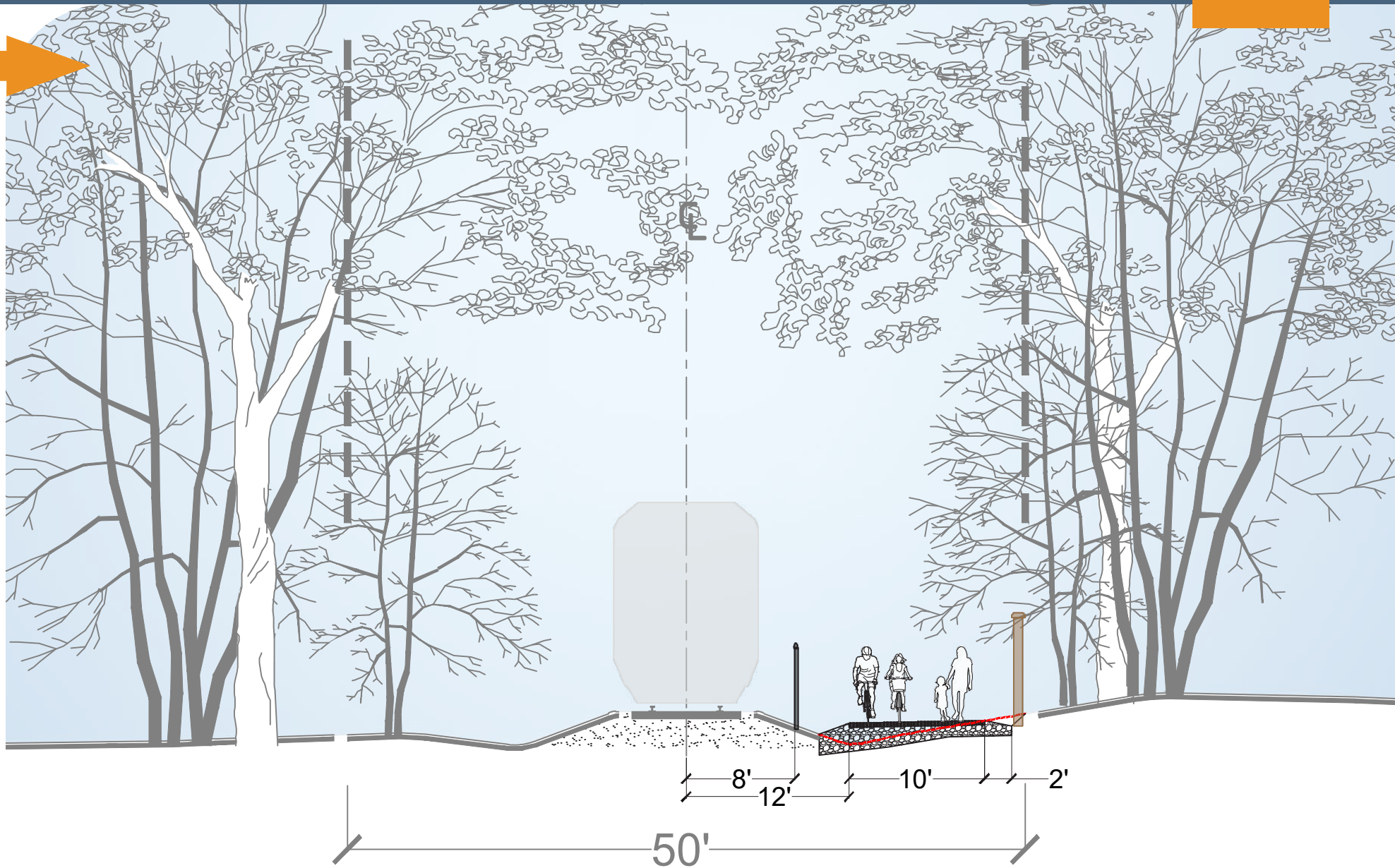
Potential Rail-with-Trail Cross Section, Segment 1

Description:

- At 50 feet wide, this portion of the study area right-of-way is the most narrow
- There is potential to provide a 10-foot-wide shared use path within the margin of the right-of-way, provided there is approval from the railroad owner and surrounding land owners (predominately residential, along with business and a private golf course)
- A setback distance of 12 feet from the centerline of the railroad to the edge of the shared use path can potentially be achieved
- A 6- to 8-foot high chain link fence may be considered between the railroad and the shared use path
- An 8- to 10-foot high privacy fence may be considered between the shared use path and adjacent properties
- This segment likely requires a prefabricated bicycle and pedestrian bridge to cross South Branch Pennsauken Creek Tributary

Considerations:

- Design development and eventual construction of the potential shared use path will require coordination and approval from the railroad owner/operator
- Privacy concerns from adjacent lawn owners will have to be considered and addressed
- Modification of drainage swales and removal of vegetation within the margin of the right-of-way will be factors in future design development

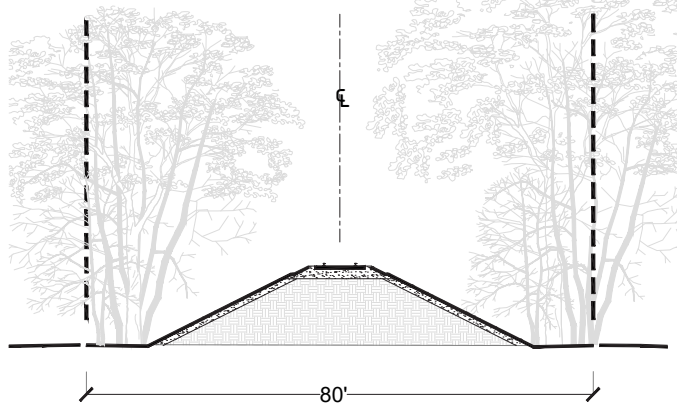
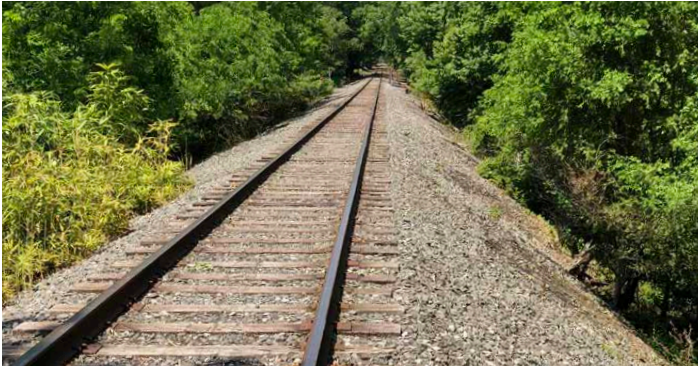


Rail-with-Trail Elevated Structure

Existing Conditions

- ±1175 feet of potential trail distance though environmentally sensitive areas between Pennsauken and Maple Shade Twps.
- ±80-foot-wide right-of-way
- Enclosed frontage (vegetated, abuts residential property and woodland open space)
- Track centered in right-of-way on ballasted embankment roughly 12 feet high

From the South Branch Pennsauken Creek approaching N. Coles Avenue, the right-of-way is typically 80 feet wide. The track is centered and constructed on a ballasted embankment reaching approximately 12 feet high in relation to surrounding grades. The right-of-way is densely enclosed by trees and vegetation continuing from the wetland areas around the creek.



Potential Rail-with-Trail Cross Section, Segment 2

Description:

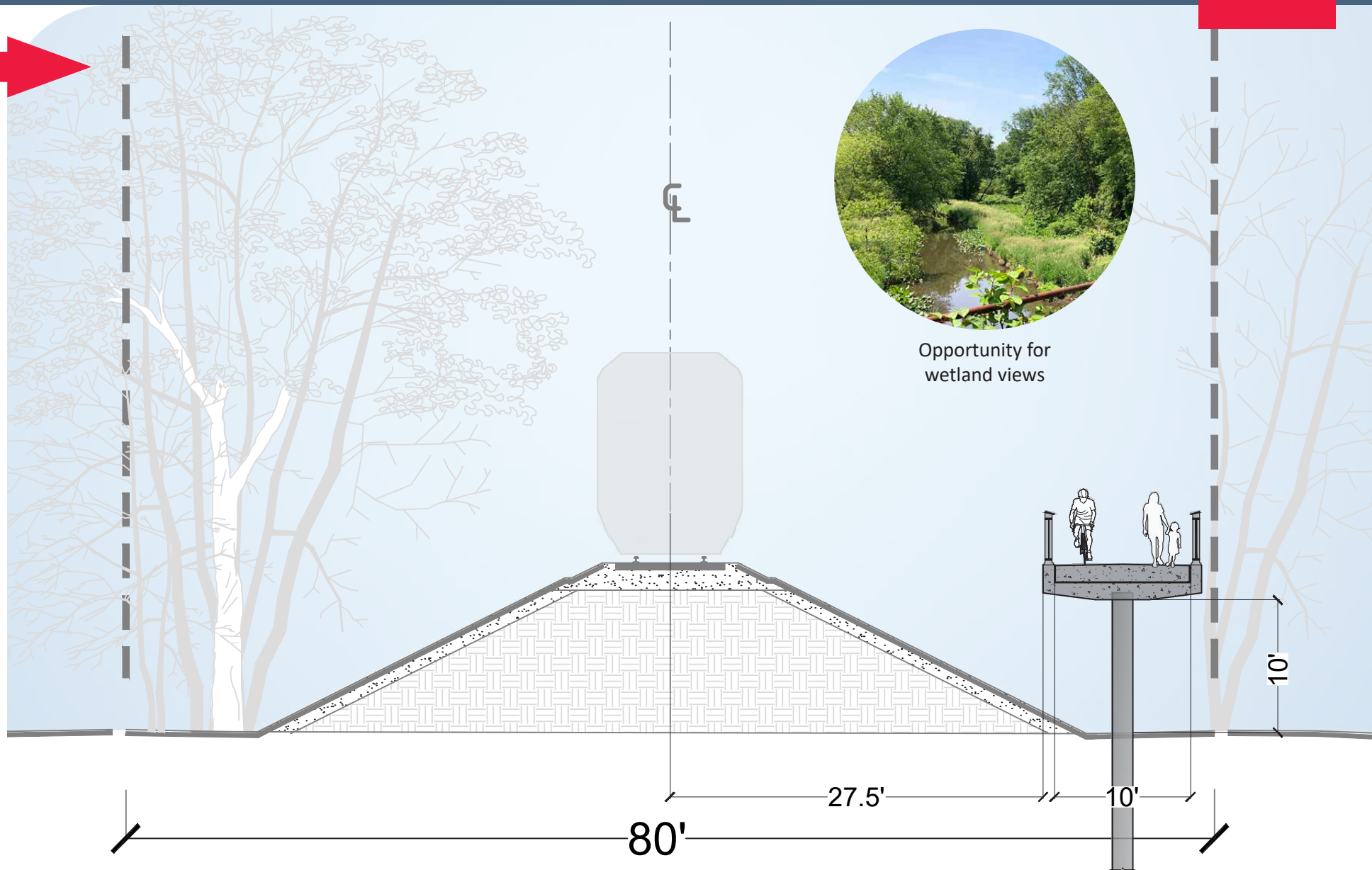
- This portion of the right-of-way is 80 feet wide; however, it is difficult to plan a traditional shared use path within that available space due to the high elevation of the railroad embankment in comparison to surrounding grades and environmentally sensitive conditions
- An elevated trail structure is a potential solution that will enable preservation of the railroad embankments and minimize environmental impacts
- The trail structure is envisioned as a reinforced concrete deck with 10 feet of clearance between protective guardrails along the edges
- The concrete deck is supported on a system of reinforced concrete piles (assume 18-inch diameter) with reinforced concrete pier caps spaced to support a 10-foot span of trail deck
- This segment likely requires a prefabricated bicycle and pedestrian bridge to cross South Branch Pennsauken Creek

Considerations:

- This is a very expensive trail solution and any potential on-road alternative routes should be studied to provide a cost/benefit comparison
- Design development and eventual construction of the potential structure will require coordination and approval from the railroad owner/operator
- Environmental impacts will be significant and require coordination with NJDEP and permits for construction within wetland and floodplain areas
- The potential depth and exposed height of the reinforced concrete piles will affect the overall cost and can only be roughly estimated at this time, without a geotechnical analysis



Opportunity for wetland views



Prefabricated Bridges

Existing Conditions

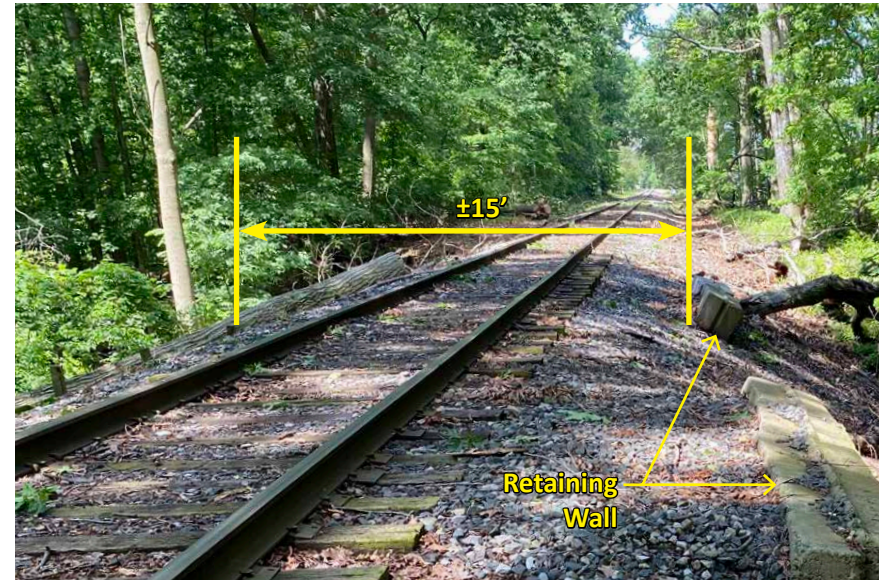
Two large culvert structures are present in the study area:

- ① South Branch Pennsauken Creek Tributary Culvert
- ② South Branch Pennsauken Creek Culvert

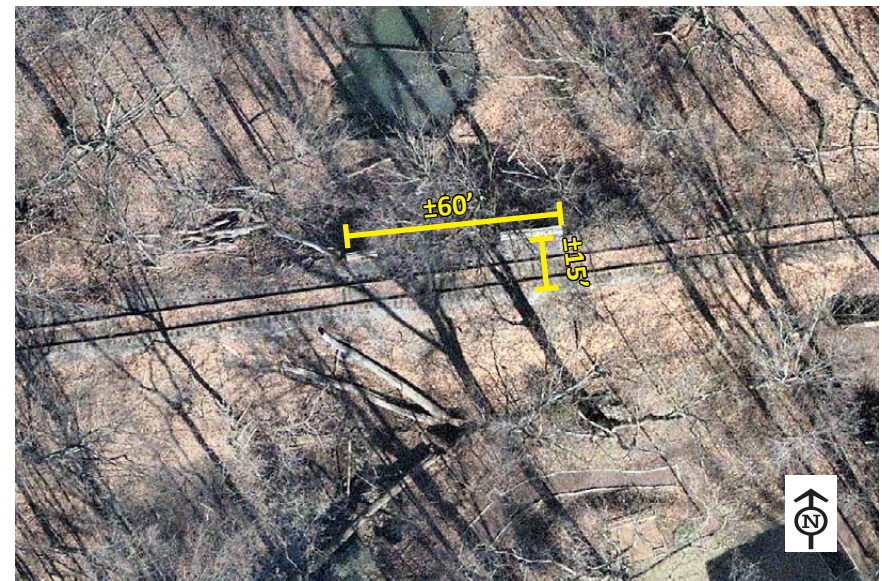
In order to provide a continuous rail-with-trail facility, it is likely that prefabricated bicycle and pedestrian bridges will be necessary to bridge the watercourses that flow through these two culverts. Since both culverts currently serve active rail traffic, it is assumed that there are no major structural deficiencies. A detailed structural assessment is recommended as a component of future design development.

1 South Branch Pennsauken Creek Tributary Culvert

- This culvert enables the South Branch Pennsauken Creek Tributary to pass beneath the study area railroad.
- The culvert pipe could not be observed directly in the field due to the hazard of descending the steep, ballasted slopes between the track grade and the invert grade.
- The railroad tracks are centered on the culvert with approximately 15 feet of clearance from edge to edge. Retaining walls (of unknown design/capacity) are visible on the northern edge, while remnants of a possible railing system are evident on the southern edge.
- The steep, ballasted slopes on both sides of the track extend roughly 60-100 feet along the length of the track.
- The limited ± 15 -foot passage width will likely necessitate the addition of a prefabricated bridge to accommodate bicycle/pedestrian travel.



South Branch Pennsauken Creek Tributary Culvert (view west)



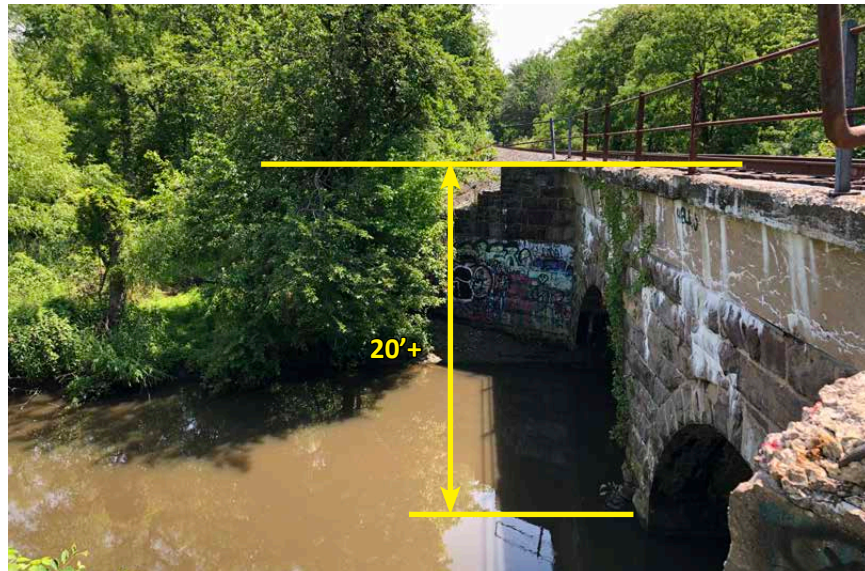
South Branch Pennsauken Creek Tributary Culvert (plan view)

2 South Branch Pennsauken Creek Culvert

- This double arch culvert enables the South Branch Pennsauken Creek to pass beneath the study area railroad tracks.
- The structure extends roughly 60 feet along the length of the tracks.
- There are steep, ballasted embankment slopes (10-20 feet high) on both sides of the track extending approximately 700 feet from the double arch culvert east into Maple Shade.
- The railroad tracks are aligned to the northern edge of the culvert, and there is a passage width of ± 22 feet between headwalls.
- Extensive ballasting and environmentally sensitive conditions will likely necessitate the addition of a prefabricated bridge to accommodate bicycle/pedestrian travel.
- Any potential trail conversion would require a guardrail system along both edges.



South Branch Pennsauken Creek Double Arch Culvert (view east)



South Branch Pennsauken Creek Double Arch Culvert (view east)



South Branch Pennsauken Creek Double Arch Culvert (plan view)

Prefabricated Bridges

For the Burlington-Camden Trail, there is potential need for two prefabricated bridge structures parallel to the railroad to provide crossing of the watercourses where there are existing culverts. The advantages of prefabricated bridges are:

- Potential to preserve the existing culverts and maintain separation from railroad operations
- Provide a continuous clear width of 10 feet for the shared use path, consistent with the potential elevated trail structure shown in Segment 2
- Provide a continuous experience between the elevated trail structure and the bridge

The bridges will impact environmentally sensitive areas and require permitting through NJDEP.

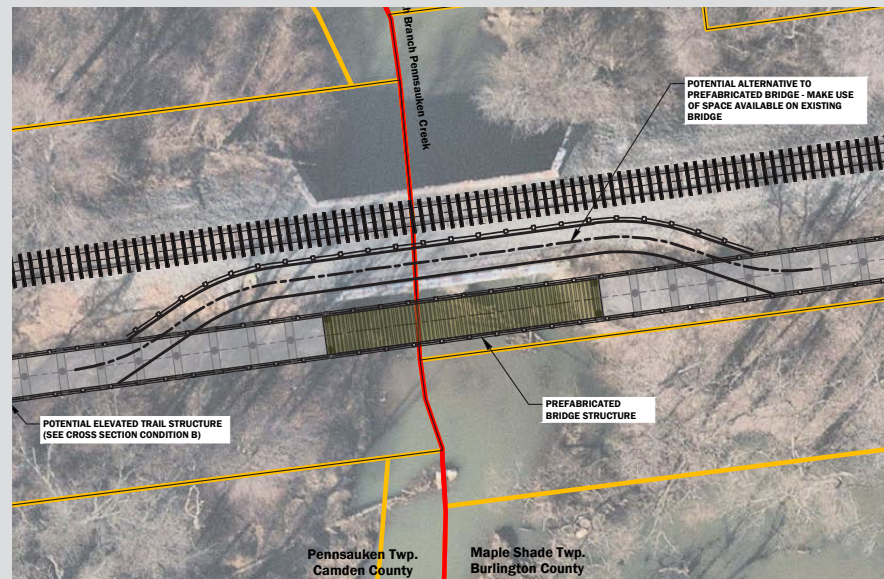


Example of a prefabricated bridge over the Whippany River, part of Patriots Path in Hanover Township, NJ (±75 foot span)

Bridge Alternatives

Construction of the bridges will be costly, and any potential alternatives should be evaluated during future design development, dependent upon funding availability for the trail, the views of the railroad operator, and coordination with NJDEP. Potential alternatives include:

- On-road alternative routes (cost/benefit comparison)
- Re-construct south headwall of Culvert #1 to create space for trail
- Integrate trail within space available on Culvert #2



Example of a rail-with-trail crossing a structure on Maybrook Trailway, part of the Empire State Trail in Dutchess and Putnam Counties, New York. Photo from the Metropolitan Transportation Authority of the State of New York flickr website.

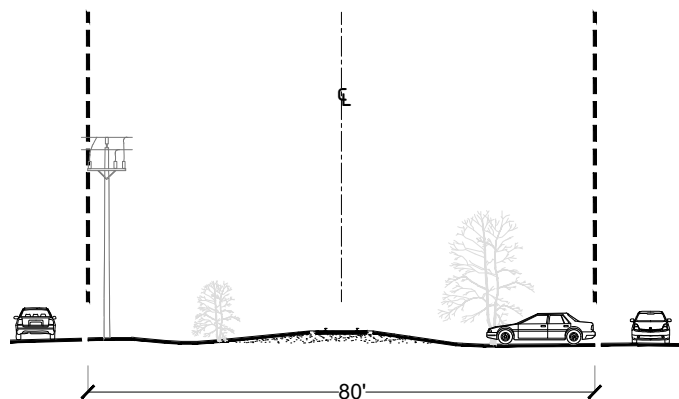
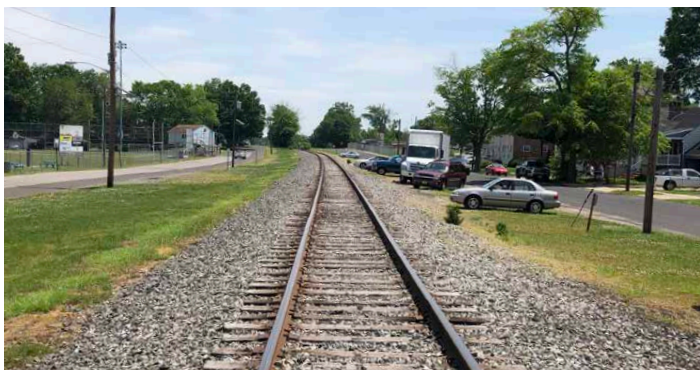
View of a potential prefabricated bridge crossing of South Branch Pennsauken Creek



Existing Conditions

- ±4835 feet of potential trail distance in Maple Shade Twp.
- ±80-foot-wide right-of-way
- Open frontage to parallel roads
- Track centered in right-of-way on ballast 1-2 feet high

From west of N. Coles Avenue to the eastern end of the study area, the right-of-way is typically 80 feet wide. The track is centered and constructed on ballast approximately 1-2 feet high in relation to surrounding grades. The right-of-way is open on both sides to parallel frontage roads (Broadway to the north, and Front Street to the south). Informal parking was observed on both sides of the right-of-way.



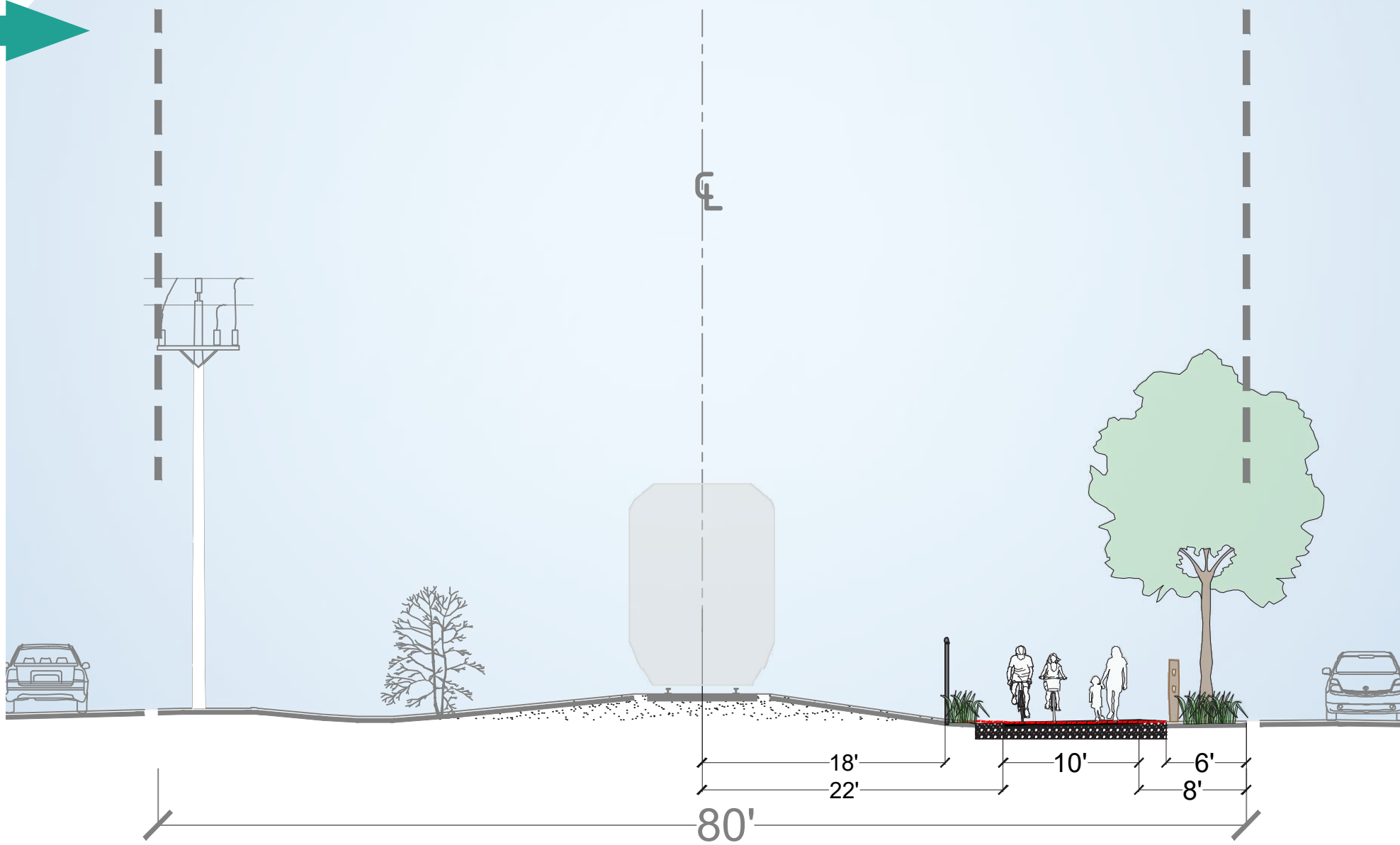
Potential Rail-with-Trail Cross Section, Segment 3

Description:

- At 80 feet wide with an open frontage and level grades, this portion of the study area right-of-way is generally conducive to including a shared use path
- There is potential to provide a 10-foot-wide shared use path within the margin of the right-of-way
- A setback distance of 22 feet from the centerline of the railroad to the edge of the shared use path can potentially be achieved
- A 6- to 8-foot chain link high fence may be considered between the railroad and the shared use path
- An 3- to 4-foot high wood rail fence and shade trees may be considered between the shared use path and the adjacent frontage road
- At the historic Maple Shade Station and west of N. Forklanding Road (where the right-of-way widens), there may be opportunities to develop park and public space enhancements

Considerations:

- Design development and eventual construction of the potential shared use path will require coordination and approval from the railroad owner/operator
- Positive drainage and minor removal of vegetation within the margin of the right-of-way will be factors in future design development
- Provided approval from appropriate land owners, there may be potential to develop park-like public spaces between N. Coles Avenue and N. Forklanding Road, and in the vicinity of the Maple Shade Train Station



Rail-with-Trail in Maple Shade Township

View of a potential rail-with-trail configuration in Maple Shade Township





Opportunity for public space enhancement around the historic Maple Shade Station



Opportunity for park amenities, such as play or exercise facilities, gardens, and/or public art displays to enhance the trail experience and celebrate local identity



Road Crossing Concepts

Existing Conditions

An important component of planning for a rail-with-trail is to conceptualize how existing railroad crossings of the road network can safely integrate bicycle and pedestrian movement. Within this study area, there are five at-grade crossings, as shown on Map 7.

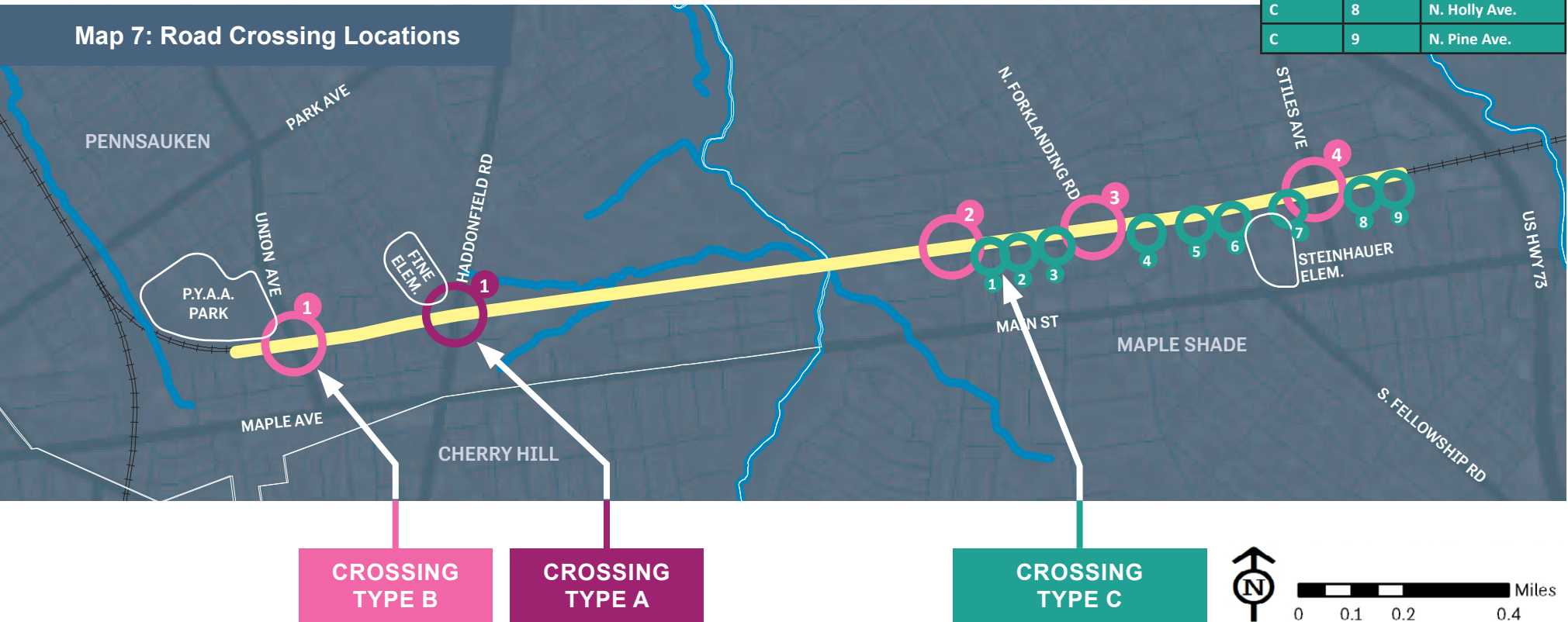
The crossing at Haddonfield Road has a high traffic volume, wide roadbed, and four motor vehicle lanes. **Crossing Type A** provides a potential crossing configuration for this location.

The crossings at Union Avenue, N. Coles Avenue, N. Forklanding Road, and Stiles Avenue are similar, with lower traffic volume and lower speed two-lane roads. **Crossing Type B** provides a potential crossing configuration applicable to these locations.

In Maple Shade Township, the open frontage of the right-of-way and the potential shared use path configuration (see Segment 3) will attract trail users from undefined points along the length of the trail to access the trail by crossing Front Street. **Crossing Type C** provides a potential crossing configuration for this scenario.

| Crossing Type | Position | Location |
|---------------|----------|--------------------|
| A | 1 | Haddonfield Rd. |
| B | 1 | Union Ave. |
| B | 2 | N. Coles Ave. |
| B | 3 | N. Forklanding Rd. |
| B | 4 | Stiles Ave. |
| C | 1 | N. Clinton Ave. |
| C | 2 | N. Terrace Ave. |
| C | 3 | N. Lippincott Ave. |
| C | 4 | N. Maple Ave. |
| C | 5 | N. Poplar Ave. |
| C | 6 | N. Fellowship Rd. |
| C | 7 | N. Chestnut Ave. |
| C | 8 | N. Holly Ave. |
| C | 9 | N. Pine Ave. |

Map 7: Road Crossing Locations



A.1 Haddonfield Road \ CR-644



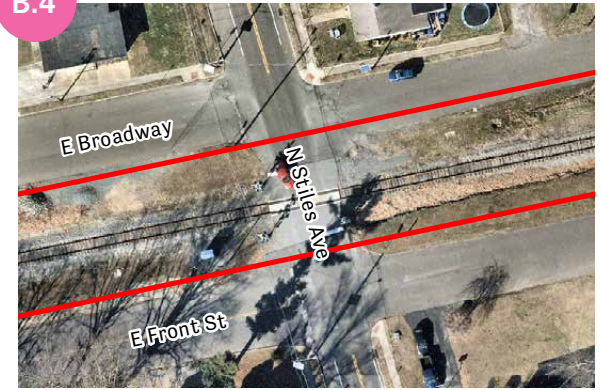
| | |
|----------------|--|
| Jurisdiction | Camden County |
| Lanes | 4 |
| Speed Limit | 45 MPH |
| Traffic Volume | 18,579 (as per 2016 NJDOT Straight Line Diagram) |

B.2 N. Coles Avenue



| | |
|----------------|---|
| Jurisdiction | Maple Shade Township |
| Lanes | 2 |
| Speed Limit | 25 MPH |
| Traffic Volume | 1584 (as per U.S. DOT Crossing Inventory, 12/16/19) |

B.4 N. Stiles Avenue \ CR-609



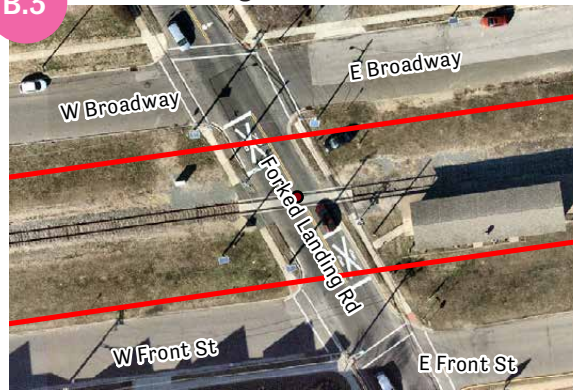
| | |
|----------------|---|
| Jurisdiction | Burlington County |
| Lanes | 2 |
| Speed Limit | 25 MPH |
| Traffic Volume | 4608 (as per U.S. DOT Crossing Inventory, 12/16/19) |

B.1 Union Avenue \ CR-615

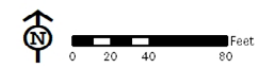


| | |
|----------------|---|
| Jurisdiction | Camden County |
| Lanes | 2 |
| Speed Limit | 25 MPH |
| Traffic Volume | 3,943 (as per 2017 NJDOT Straight Line Diagram) |

B.3 N. Forklanding Road



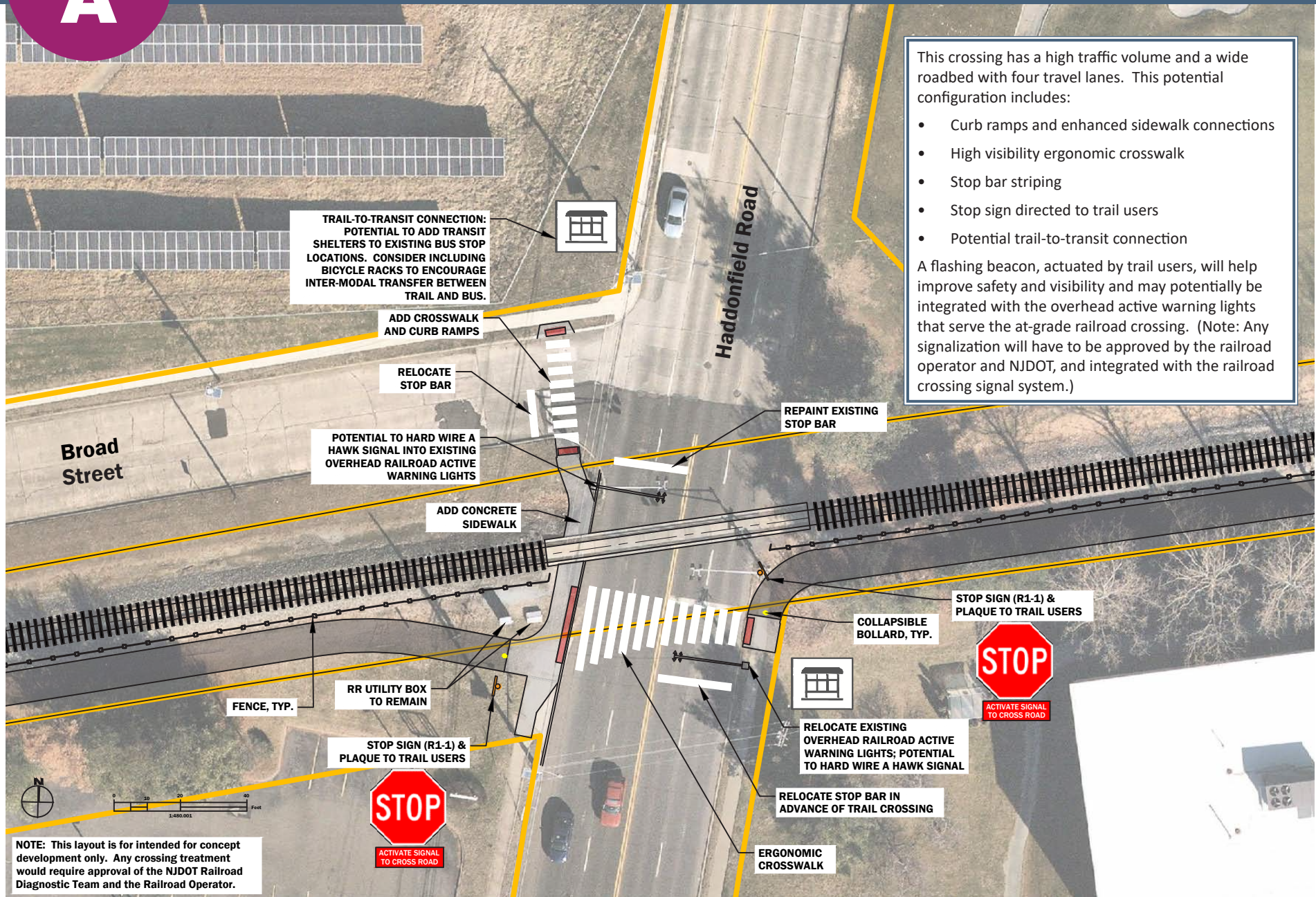
| | |
|----------------|---|
| Jurisdiction | Maple Shade Township |
| Lanes | 2 |
| Speed Limit | 25 MPH |
| Traffic Volume | 7722 (as per U.S. DOT Crossing Inventory, 12/16/19) |



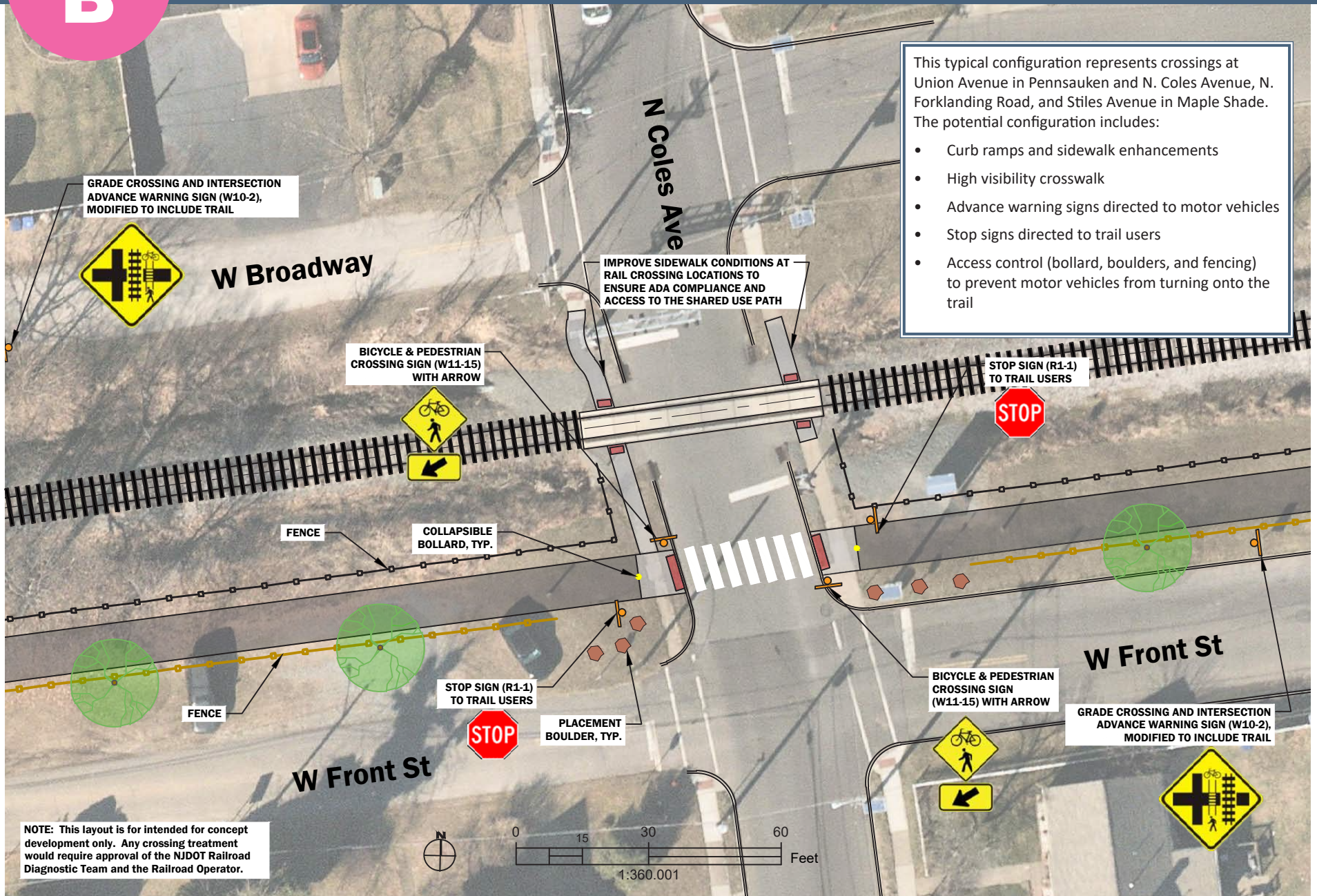
Legend

 Railroad Right-of-Way

Rail-with-Trail Road Crossing, Type A



Rail-with-Trail Road Crossing, Type B



This typical configuration represents crossings at Union Avenue in Pennsauken and N. Coles Avenue, N. Forkland Road, and Stiles Avenue in Maple Shade. The potential configuration includes:

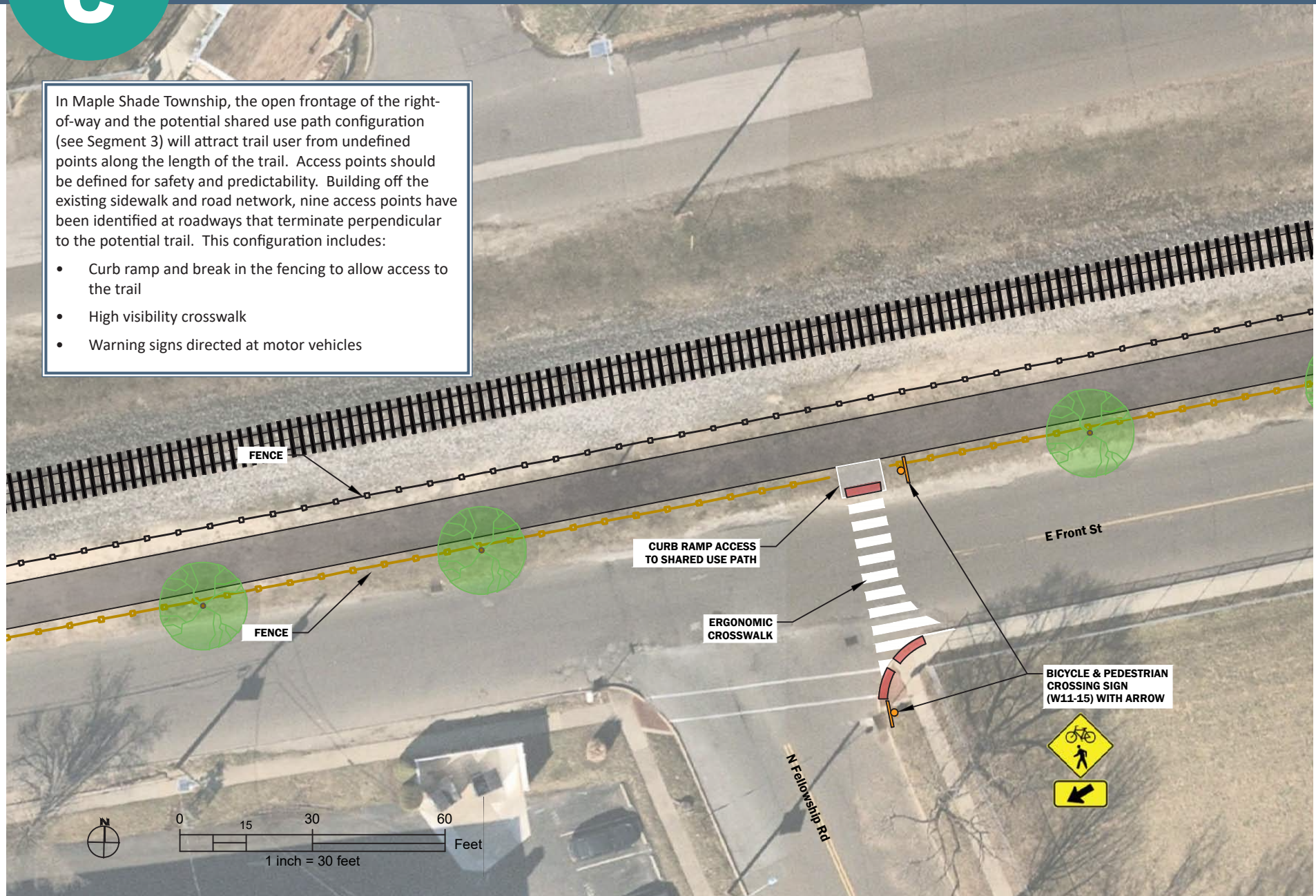
- Curb ramps and sidewalk enhancements
- High visibility crosswalk
- Advance warning signs directed to motor vehicles
- Stop signs directed to trail users
- Access control (bollard, boulders, and fencing) to prevent motor vehicles from turning onto the trail

NOTE: This layout is for intended for concept development only. Any crossing treatment would require approval of the NJDOT Railroad Diagnostic Team and the Railroad Operator.

Rail-with-Trail Road Crossing, Type C

In Maple Shade Township, the open frontage of the right-of-way and the potential shared use path configuration (see Segment 3) will attract trail user from undefined points along the length of the trail. Access points should be defined for safety and predictability. Building off the existing sidewalk and road network, nine access points have been identified at roadways that terminate perpendicular to the potential trail. This configuration includes:

- Curb ramp and break in the fencing to allow access to the trail
- High visibility crosswalk
- Warning signs directed at motor vehicles





Order-of-Magnitude Cost Estimate

| Line | Segment | Description | Order-of-Magnitude Cost Estimate |
|--|---------|---|----------------------------------|
| 0.1 | 1 | Rail-with-Trail in Pennsauken Township <ul style="list-style-type: none"> ±5750 Linear Feet 2 roadway crossings (1 Type A, 1 Type B) 1 Prefabricated trail bridge | \$2,850,000 (see line 1.15) |
| 0.2 | 2 | Rail-with-Trail Elevated Structure <ul style="list-style-type: none"> ±1175 Linear Feet 0 roadway crossings 1 Prefabricated trail bridge | \$4,000,000 (see line 2.6) |
| 0.3 | 3 | Rail-with-Trail in Maple Shade Township <ul style="list-style-type: none"> ±4835 Linear Feet 12 roadway crossings (3 Type B, 9 Type C) | \$2,290,000 (see line 3.14) |
| 0.4 | | Sub-Total | \$9,140,000 |
| 0.5 | | Contingencies, contractor mobilization, and bonding (assume 25%) | \$2,285,000 |
| 0.6 | | Estimated survey, design, and permitting fees (assume 20%) | \$1,830,000 |
| Total Order-of-Magnitude Cost Estimate: | | | \$13,255,000 |

Order-of-Magnitude Cost Estimate Assumptions and Exclusions:

- This order-of-magnitude cost estimate has been developed without field survey or detailed design. The purpose of this estimate is to identify rough costs related to trail improvements.
- Cost estimate excludes the following:
 - Maintenance & Protection of Traffic
 - Right-of-way and utility impacts or relocation
- Excavation of existing surface material may contain regulated or hazardous materials. Testing and potential additional cost for handling, removal, and treatment of material is not included, as it cannot be confirmed or estimated at this time. Material testing should be incorporated into future phases of this project. If contamination is found, there will be additional disposal costs for excavated material.
- Concepts are conservative for cost estimation and planning purposes.
- Bridges and elevated structure have been conceptualized without geotechnical analysis. Geotechnical analysis will be required to advance design. Conditions will affect size, depth, and cost of all structural members.

SEGMENT

1

Rail-with-Trail in Pennsauken Township

±5750 Linear Feet of Trail

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|---|-------------|----------|---------------|--------------------|
| 1.1 | Clearing site (Assume 16' wide X 5750' long, dense) | LUMP SUM | 1 | \$150,000 | \$150,000 |
| 1.2 | Excavation (18" depth) | CUBIC YARD | 4500 | \$35 | \$157,500 |
| 1.3 | Shared Use Path (6" asphalt, 12" stone base) | SQUARE YARD | 6400 | \$120 | \$768,000 |
| 1.4 | Drainage Allowance (10% of trail cost) | LUMP SUM | 1 | \$70,000 | \$70,000 |
| 1.5 | Lighting Allowance (Electrical service and pedestrian scale lighting, 12' high, 50' on center) | LUMP SUM | 1 | \$300,000 | \$300,000 |
| 1.6 | Site Furnishings Allowance (Benches, Trash, Kiosks, Misc. Amenities) | LUMP SUM | 1 | \$50,000 | \$50,000 |
| 1.7 | Landscape Restoration Allowance | LUMP SUM | 1 | \$65,000 | \$65,000 |
| 1.8 | Chain Link Fence (6' height along railroad, PVC-coated) | LINEAR FOOT | 5600 | \$45 | \$252,000 |
| 1.9 | Privacy Fence (along property boundary) | LINEAR FOOT | 4250 | \$90 | \$382,500 |
| 1.10 | Rail-with-Trail Road Crossing, Type A (Haddonfield Road) <i>(see line A.11)</i> | LUMP SUM | 1 | \$325,000 | \$325,000 |
| 1.11 | Rail-with-Trail Road Crossing, Type B (Union Avenue) <i>(see line B.8)</i> | LUMP SUM | 1 | \$26,500 | \$26,500 |
| 1.12 | Prefabricated bridge with deck, railing, and set in place | EACH | 1 | \$250,000 | \$250,000 |
| 1.13 | Concrete abutments and wing walls (15 CY x 2) | CUBIC YARD | 30 | \$1,200 | \$36,000 |
| 1.14 | | | | Total: | \$2,832,500 |
| 1.15 | | | | Say: | \$2,850,000 |

Order-of-Magnitude Cost Estimate

SEGMENT

2

Rail-with-Trail Elevated Structure

±1175 Linear Feet of Trail

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|--|-------------|----------|---------------|--------------------|
| 2.1 | 10' Elevated Trail Structure (10' wide clear deck with railing, supported on 18" diameter concrete piers (10' above grade, 25' deep) and 12' wide pier cap) | LINEAR FOOT | 1175 | \$3,100 | \$3,642,500 |
| 2.2 | Prefabricated bridge with deck, railing, and set in place | LUMP SUM | 1 | \$250,000 | \$250,000 |
| 2.3 | Concrete abutments and wing walls (15 CY x 2) | CUBIC YARD | 30 | \$1,200 | \$36,000 |
| 2.4 | Lighting allowance | LUMP SUM | 1 | \$50,000 | \$50,000 |
| 2.5 | | | | Total: | \$3,978,500 |
| 2.6 | | | | Say: | \$4,000,000 |

Rail-with-Trail in Maple Shade Township

±4835 Linear Feet of Trail

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|--|-------------|----------|---------------|--------------------|
| 3.1 | Clearing site (Assume 20' wide X 4835' long, sparse) | LUMP SUM | 1 | \$55,000 | \$55,000 |
| 3.2 | Excavation (18" depth) | CUBIC YARD | 3800 | \$35 | \$133,000 |
| 3.3 | Shared Use Path (6" asphalt, 12" stone base) | SQUARE YARD | 5400 | \$120 | \$648,000 |
| 3.4 | Drainage Allowance (10% of trail cost) | LUMP SUM | 1 | \$60,000 | \$60,000 |
| 3.5 | Lighting Allowance (Electrical service and pedestrian scale lighting (12' high, 50' on center)) | LUMP SUM | 1 | \$275,000 | \$275,000 |
| 3.6 | Park Enhancements Allowance (Wide frontage near N. Terrace Avenue and enhancements around Maple Shade Station) | LUMP SUM | 1 | \$500,000 | \$500,000 |
| 3.7 | Site Furnishings Allowance (Benches, Trash, Kiosks, Misc. Amenities) | LUMP SUM | 1 | \$50,000 | \$50,000 |
| 3.8 | Landscape Restoration Allowance | LUMP SUM | 1 | \$65,000 | \$65,000 |
| 3.9 | Chain Link Fence (6' height along railroad, PVC-coated) | LINEAR FOOT | 4700 | \$45 | \$211,500 |
| 3.10 | Split Rail Fence along road (4' high) | LINEAR FOOT | 4700 | \$30 | \$141,000 |
| 3.11 | Rail-with-Trail Road Crossing, Type B (N. Coles Avenue, N. Forklanding Road, N. Stiles Avenue) (see line B.8) | EACH | 3 | \$26,500 | \$79,500 |
| 3.12 | Rail-with-Trail Road Crossing, Type C (see line C.5) | EACH | 9 | \$8,000 | \$72,000 |
| 3.13 | | | | Total: | \$2,290,000 |
| 3.14 | | | | Say: | \$2,290,000 |

Order-of-Magnitude Cost Estimate



Rail-with-Trail Road Crossing, Type A

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|---|-------------|----------|---------------|------------------|
| A.1 | Add Traffic Signal System (in conjunction with Rail Signal and Gate) | LUMP SUM | 1 | \$250,000.00 | \$250,000 |
| A.2 | Concrete Sidewalk | SQUARE YARD | 80 | \$150.00 | \$12,000 |
| A.3 | Concrete Curb | LINEAR FOOT | 80 | \$35.00 | \$2,800 |
| A.4 | Curb Ramps with Detectable Warning Surface | EACH | 4 | \$3,000.00 | \$12,000 |
| A.5 | STOP bar striping, thermoplastic | SQUARE FOOT | 120 | \$3.20 | \$384 |
| A.6 | Continental style crosswalks, thermoplastic" | SQUARE FOOT | 480 | \$3.20 | \$1,536 |
| A.7 | Regulatory and Warning Signs (Advance Warning, Crossing, and STOP; Qty. (8) 3' x 3' signs and supplemental plaques) | SQUARE FOOT | 90 | \$50.00 | \$4,500 |
| A.8 | Collapsible Bollards | EACH | 2 | \$1,500.00 | \$3,000 |
| A.9 | Furnishings Allowance (Bench, bus shelter, bicycle rack, receptacle, etc.) | LUMP SUM | 1 | \$36,000.00 | \$36,000 |
| A.10 | | | | Total: | \$322,220 |
| A.11 | | | | Say: | \$325,000 |

Road Crossing Cost Estimate Assumptions and Exclusions:

1. Standard MUTCD signs and striping treatments may be installed by local DPW, with consultation and approval of County Engineering and NJDOT as necessary.
2. Future NJDOT Diagnostic Team meeting with railroad owner would have to be to be coordinated for all rail crossings, traffic signals, signs and striping treatments. All design decisions are contingent on this meeting.
3. Minor roadway crossings and connections (Type C) will require coordination with Burlington County and Maple Shade Township. Final design treatments are to be determined.



Rail-with-Trail Road Crossing, Type B

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|---|-------------|----------|------------|-----------------|
| B.1 | Concrete Sidewalk | SQUARE YARD | 50 | \$150.00 | \$7,500 |
| B.2 | Curb Ramps with detectable warning surface | EACH | 4 | \$3,000.00 | \$12,000 |
| B.3 | Additional Detectable Warning Surface | SQUARE YARD | 6 | \$125.00 | \$750 |
| B.4 | Continental style crosswalks, thermoplastic | SQUARE FOOT | 150 | \$3.20 | \$480 |
| B.5 | "Regulatory and Warning Signs (Advance Warning, Crossing, and STOP; (4) 3'x3' with supplemental plaques, and (2) 1.5'x1.5') | SQUARE FOOT | 50 | \$50.00 | \$2,500 |
| B.6 | Collapsible Bollards | EACH | 2 | \$1,500.00 | \$3,000 |
| B.7 | Total: | | | | \$26,230 |
| B.8 | Say: | | | | \$26,500 |



Rail-with-Trail Road Crossing, Type C

| Line | Description | Unit | Quantity | Unit Cost | Estimated Cost |
|------|---|-------------|----------|------------|----------------|
| C.1 | Warning Signs (2) | SQUARE FOOT | 20 | \$50.00 | \$1,000 |
| C.2 | Continental style crosswalks, thermoplastic | SQUARE FOOT | 175 | \$3.20 | \$560 |
| C.3 | Curb Ramp with detectable warning surface | EACH | 2 | \$3,000.00 | \$6,000 |
| C.4 | Total: | | | | \$7,560 |
| C.5 | Say: | | | | \$8,000 |

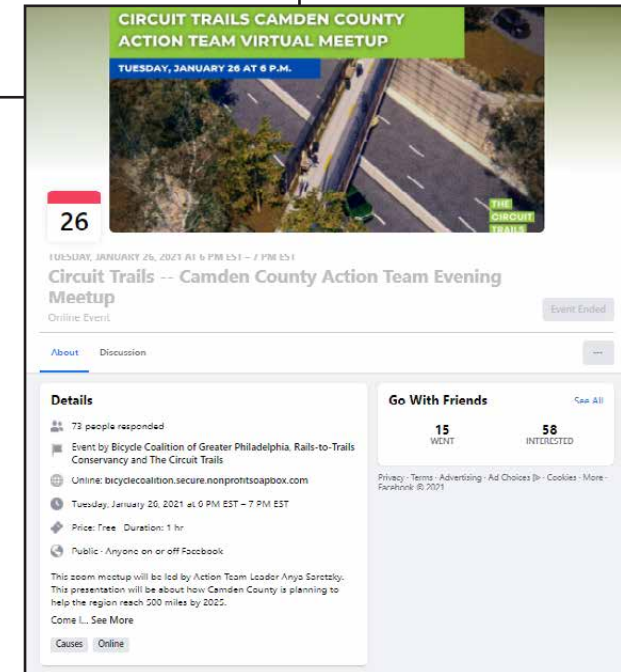
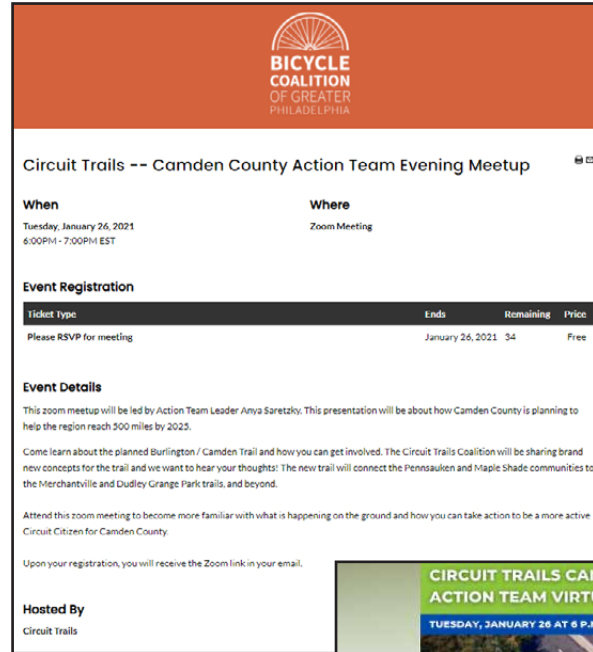
Appendix: Community Outreach Summary

An online community outreach workshop was conducted as a component of this study on the evening of January 26, 2021, from 6:00 - 7:00 PM. The workshop was held on that time and date to coincide with the Circuit Trails Camden County Action Team Evening Meetup, part of a series of working group meetings with a focus on trail planning in different areas of the DVRPC region.

The objective of the workshop was discuss existing conditions, opportunities, and constraints along the study area right-of-way; review conceptual rail-with-trail design options; and provide an opportunity for input from member of the community.

The workshop was advertised on Circuit Trails and Bicycle Coalition of Greater Philadelphia web pages and social media. The Rails-to-Trails Conservancy also distributed invitations at various public locations near the study area in the days leading up to the workshop. The workshop was hosted on the Zoom platform, which enabled community members to participate on computers, tablets, or smartphones. The workshop was attended virtually by 46 online logins, was recorded, and was [available to view on YouTube](#) after the event.

Public input that was heard through the workshop was used to inform and refine the conceptual design solutions that are included in the prior section of this report. It is anticipated that any future planning, design, and construction efforts will include additional public input.



Images of web pages used to advertise the Online Community Outreach Workshop.

Speaker #1, John Boyle, Bicycle Coalition of Greater Philadelphia

Introduced the trails that will connect nine counties with over 800 miles of trail. Currently, 340 miles exist. Thousands of people use the trails every year; they are a part of the fabric of our lives. People are flocking to the trails due to the pandemic (120% increase from 2019-2020). So, with this information, there is clearly a need create more trails.

The goal is to have 500 miles by 2025, but how do we get there? These plans take time – years, even decades. It is doable because there are a lot of projects in the pipeline already, but we need more people who love trails to help make it a reality. The goal is to increase the trails by 100 miles in PA and 60 miles in NJ – that is about 15-20 miles per county over the next 4-5 years.

Speaker #2, Anya Saretzky, Rails-to-Trails Conservancy

Storyboard presentation available here: <https://arcg.is/OqHeOP>

INTRO: The Burlington-Camden trail will be a 4.5-mile shared use path; some of this is completed, and some of this is planned. Cooper's Ferry Partnership is working to connect to the waterfront (Dudley Grange Park to the EC Greenway, etc.).

FUNDING: There is a lot of funding lined up already from the county, state, federal gov't, etc.

33RD TO EUCLID AVE.: This stretch is ¾ mile.

The unused rail bridge over Route 130 will provide a much-needed safe crossing. The Dudley Grange Park trail ends at 33rd St. From here, the unused rail corridor continues into Pennsauken.

THE MERCHANTVILLE MILE: Popular with residents year-round, it will be the longest section.

There is a temporary bike lane. They have secured funding to realign the crossing. It ends at the eastern border of Pennsauken.

COVE RD TO UNION AVE: Pennsauken has obtained \$755K to build the trail here. Preliminary design has been completed and funding was added in July 2020 for final design of the trail.

PENNSAUKEN TO MAPLE SHADE: Beginning at Union Ave, the BC Trail shares the ROW with Pemberton Industrial Track, an active rail line owned by an active rail line. A CD study is underway by NV5 that will provide planning options.

BE INVOLVED/ACTIVE: Become a Circuit Citizen; tell your friends, tell Pennsauken Council we appreciate their efforts via 'Gratitude Campaign'; go to the Facebook page/group; visit <https://circuittrails.org/Camden/>

Speaker #3, Mike Dannemiller, NV5

Provided brief overview of study area. What are the concepts we can do in this geography?

The trail development takes time, but we are working to develop concepts and cost estimates at this time; your input is welcomed. There are three segments – the Pennsauken portion, bridge area, and Maple Shade area.

Mike went on to describe the three rail-with-trail cross section concepts that are being considered along the right-of-way, responding to the opportunities, constraints, and conditions within each segment. Also discussed the concepts being considered for roadway crossings, as well as the bridge crossings.

Roadway crossings:

- Haddonfield Road has 4 lanes (two each way)
- There is an existing railroad crossing signal that will need to be modified to incorporate a red light for motorists when trail users want to cross the road
- The trail crossing will require a NJDOT Diagnostic Team review during the design phase to determine exact traffic signal and crossing requirements

Bridge:

- While there is a possibility of decreasing the separation between the proposed path and the active rail in order to utilize the existing bridge width, this study assumes that a new separate bridge over the Pennsauken Creek will be required
- A prefabricated bridge can be installed with minimal disruption, that would focus on the bridge abutment construction

Comments Log

Jeremiah: 06:21 PM

I signed up to become a Circuit Citizen, now what?

Sonia Szczesna (TSTC): 06:22 PM

See what's happening #onthecircuit in Camden County: <https://circuittrails.org/camden>

Jeremiah, please do the Gratitude Campaign!

Marc Covitz: 06:22 PM

Is there a potential to take the Camden-Burlington trail further east into Burlington County?

Sonia Szczesna (TSTC): 06:22 PM

Here's the Gratitude Campaign itself: <http://bicyclecoalition.nonprofitsoapbox.com/circuitgratitudecamden>

George: 06:22 PM

What are the obstacles that are holding up the Cove to Bethel trail if there is no RR bridge requiring NJ TRANSIT concessions?

John Boyle: 06:23 PM

This story map link - <https://arcg.is/0qHe0P>

Sonia Szczesna (TSTC): 06:23 PM

Stay up to date on the Burlington-Camden Trail by joining its Facebook group Connecting Trails: Pennsauken Connector/Burlington-Camden Trail | Facebook.

<https://www.facebook.com/groups/connectingtrails>

David Steinberg: 06:23 PM

Are you looking for other trails opportunities in Camden County? If so, who do I contact?

Sonia Szczesna (TSTC): 06:23 PM

This was the landing page just mentioned: <https://circuittrails.org/camden>

Mark K: 06:24 PM

Centre Street in Merchantville is a very busy crossing and thoughts of a light or safe crossing option?

Sonia Szczesna (TSTC): 06:24 PM

All great questions!! Please keep posting and I'll be sure to note them down, if we don't have time to answer on the call we'll follow up.

Ray Woods: 06:26 PM

The Borough is working on an elevated table at the intersection.

Karina Istvan: 06:28 PM

Is the trail into Maple Shade part of the 500 miles by 2025?

Sonia Szczesna (TSTC): 06:29 PM

There are other parts of the Circuit in Burlington County as well. You can check out this map to see those segments: <https://www.dvrpc.org/webmaps/thecircuit/>

To see the segments in each county that the campaign is focusing on, please read over this report, Moving the Circuit Forward to Reach 500 miles by 2025: https://circuittrails.org/sites/default/files/Moving_the_Circuit_Forward_To_Reach_500_miles_by_2025.pdf

George: 06:30 PM

If there's no hold-up regarding a bridge issue for the Cove-to-Bethel, what's holding it up?

Jeremiah: 06:42 PM

About the Haddonfield Road intersection, how will you control the speed of the traffic on Haddonfield Road? (the stop sign - ok)

dmstewart: 06:48 PM

Thanks, Mike D, that was very informative.

Sonia Szczesna (TSTC): 06:51 PM

Here's the link to the story map in case you want to take a closer look! <https://arcg.is/0qHe0P>

And more information on this: <https://circuittrails.org/camden>

Jeremiah: 06:51 PM

John, I do have something after you're done before we close, and Patrick, it is related to the e-mail from Amanda.

Sonia Szczesna (TSTC): 06:52 PM

Remember to sign up to be a Circuit Citizen-get involved! - <https://circuittrails.org/get-involved>
<https://circuittrails.org/Camden/>

The next County Meetup will be for the Gloucester County Action Team, which is scheduled for Wednesday, February 3, 2020, from 6 PM - 7 PM

Register Here: <https://bicyclecoalition.secure.nonprofitsoapbox.com/gloucestercounty>

Facebook groups to follow along in Pennsauken - <https://www.facebook.com/groups/connectingtrails>

Jeremiah: 06:52 PM

I have a question about Baird and the Greenway.

Sonia Szczesna (TSTC): 06:52 PM

Contact: john@bicyclecoalition.org

Nate Dorfman: 06:53 PM

When will the Burlington County Action Team meeting take place?

Sonia Szczesna (TSTC): 06:53 PM

The Burlington County Action Team meeting happened in December, but you can sign up to be a part of that team!

Sonia Szczesna (TSTC): 06:54 PM

Here's the Burlington County one - <https://circuittrails.org/burlington>

Daniel Paschall: 06:56 PM

1,000+ to fixing Baird Blvd!

Sonia Szczesna (TSTC): 07:05 PM

<https://delawareriverheritagetrail.org/>
Delaware River Heritage Trail

Patrick Monahan: 07:08 PM

This recording will be available on the Bicycle Coalition's YouTube if you want to see it again or share it.

N|V|5

Addendum to the May 2021
Planning Study for the
Burlington-Camden Connector:

Rail-with-Trail Concept in Pennsauken and Maple Shade Townships

**NJDOT Local
Technical Assistance**



DRAFT ADDENDUM: JULY 2022

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Contents

| | |
|---|---|
| Background..... | 2 |
| Purpose of this Addendum..... | 2 |
| Haddonfield Road (CR-644) Trail Crossing..... | 3 |
| Golf Ball Hazard Mitigation..... | 6 |
| Next Steps | 7 |

Background

In December 2019, the Townships of Pennsauken and Maple Shade applied to NJDOT Office of Bicycle & Pedestrian Programs for planning assistance to evaluate the potential to extend the Burlington-Camden Trail east of Union Avenue. The townships requested assistance with envisioning how a trail might fit into or adjacent to the existing active rail corridor known as the Pemberton Secondary.

NJDOT selected NV5 to develop a planning analysis for the 2.2-mile study corridor with six at-grade roadway crossings.

In May 2021, NV5 completed a highly graphical report and executive summary describing the general existing conditions and the potential for a rail-with-trail design intervention. The report also describes conceptual design solutions at existing road and bridge crossings.

The report and conceptual graphics provide a basis of planning information that can be used by local champions to advance the initiative and seek funding for future phases of work such as conceptual design, public outreach, coordination with land owners, engineering studies, design, permitting, construction, and activation.



Cover of the May 2021 *Planning Study for the Burlington-Camden Connector: Rail-with-Trail Concept in Pennsauken and Maple Shade Townships*

Purpose of this Addendum

In January 2022, Pennsauken Township requested additional clarity on the following subjects:

1. Consideration of a grade-separated rail-with-trail crossing of Haddonfield Road (CR-644), and
2. Potential measures to mitigate golf ball hazards from Pennsauken Country Club that may negatively affect future trail users.

This addendum has been developed to provide clarity and additional design solutions in support of a safe and comfortable rail-with-trail facility to meet the needs of the local townships. With the described solutions, it is anticipated that local champions can use this addendum in concert with the original planning study document to continue to advance the Burlington-Camden Trail initiative.

Haddonfield Road (CR-644) Trail Crossing

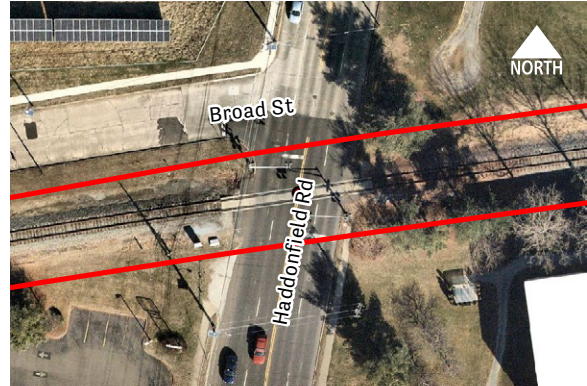
Previous Guidance

As described in the original planning study completed in May 2021, the crossing at Haddonfield Road has a high traffic volume, wide roadbed, and four motor vehicle lanes with no median.

The original planning study provided a conceptual crossing configuration that includes a flashing beacon or signal to be actuated by trail users, along with stop signs directed to trail users, and a high visibility ergonomic crosswalk.

The details of the flashing beacon or signal device could not be expounded in detail within the original planning study. Such detail would require coordination and engineering consensus/agreement from both the NJDOT Railroad Unit and the railroad owner, which typically would not take place until a more advanced phase of engineering design for the rail-with-trail is in process.

Haddonfield Road \ CR-644



| | |
|----------------|---|
| Jurisdiction | Camden County |
| Lanes | 4 |
| Speed Limit | 45 MPH |
| Traffic Volume | 18,579 (8/30/2016 - 9/1/2016) 17,726 (10/15/2019 - 10/17/2019) |
| Source | NJDOT Straight Line Diagram; NJDOT Traffic Monitoring System Map |



Pemberton Secondary crossing at Haddonfield Road (CR-644), view south.



Pemberton Secondary crossing at Haddonfield Road (CR-644), view north.

Grade Separated Crossing Option

Expanding on the previous guidance, it is reasonable at this early stage of planning to consider a grade-separated crossing option for the Burlington-Camden Trail at Haddonfield Road.

A grade separated crossing could be configured as either:

- A trail overpass, such as a bridge above the roadway, or
- A trail underpass, such as a tunnel beneath the roadway.

In order to maintain adequate vertical clearance, either above or beneath the roadway, a grade separated crossing would require significant runout space for ramp approaches. In compliance with Americans with Disabilities Act (ADA) Accessibility Standards, ramps are not to exceed a running slope of 1:12 with landings provided at each grade change of 30 inches.

A bridge structure crossing over the roadway would require 17 feet of vertical clearance between the roadway and the low chord of the bridge.¹ Assuming a superstructure depth of 3 feet, the grade of the surface of the trail would be about 20 feet above the roadway grade. This would equate to an approximately 280 foot long ramp on either end of the bridge structure. The bridge itself would be about 90 feet long, necessitating for a total overpass structure length of about 650 feet.

A trail underpass may require a less significant ramp runout, depending on the grades and clearances involved. Assuming a minimum of 4 feet of cover between top of culvert and top of roadway, and a 10-foot height clearance inside the culvert, ramps of about 200 feet would be required on either end of the bridge. Due to the proximity of the railroad tracks, retaining walls would be required. The clearance between the roadway and the culvert would also be subject to the location of existing utilities in and

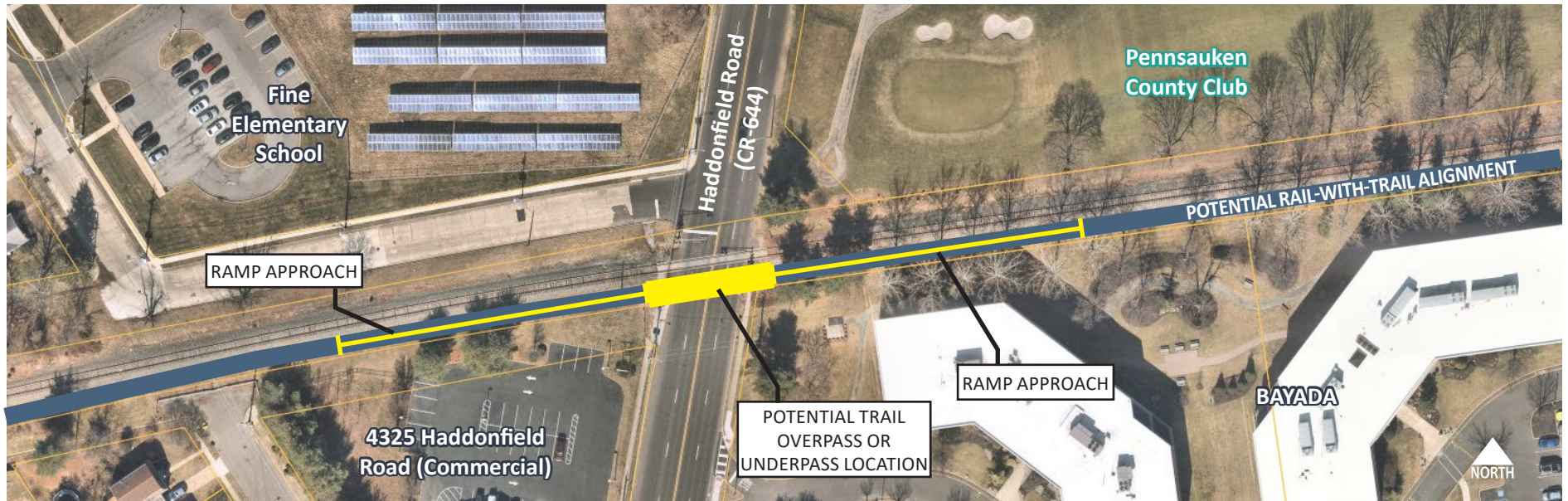
adjacent to the roadway. While this study did not examine the existing utility locations, it is clear from above ground evidence that gas, sewer and water lines are located within the roadway at this location.

The runout space for the ramp may take a straight approach, with the objective to maintain straight alignment with the trail within the right-of-way; or, alternatively, curved or switchback ramps may be devised if agreeable to adjacent land owners.

For any potential configurations, a feasibility study would be required to determine the most effective and cost-efficient solution agreeable among the stakeholders involved. The feasibility study would examine issues like user experience, utility locations, right-of-way needs, grade differentials, and coordination with Conrail, NJDOT Rail Unit, and Camden County.

Precedent examples are provided on the next page.

1 [NJDOT Design Manual for Bridges and Structures Sixth Edition](#), 2016, Table 2.3.3.2.



Example of a trail overpass at Delaware & Raritan Canal State Park, crossing US Route 1 in Lawrence Township, NJ.



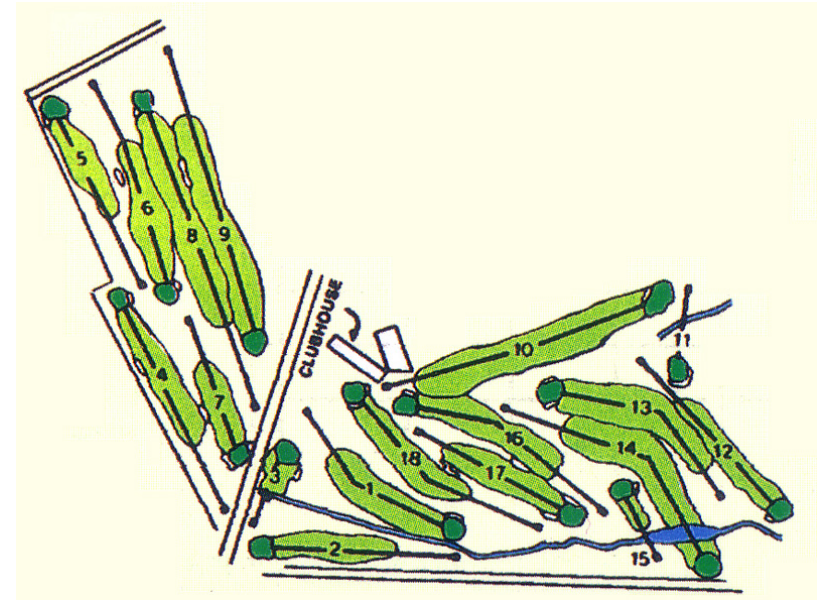
Example of a trail underpass tunnel at Delaware Canal State Park in Levittown, PA. Source: <https://levittownnow.com/2019/06/12/upgrades-to-state-park-improve-connection-between-falls-twp-morrisville/#>

Golf Ball Hazard Mitigation

Pennsauken Township has expressed interest in measures to mitigate potential golf ball hazards to trail users, since the potential rail-with-trail passes along the Pennsauken County Club property.

The diagram below identifies potential hazard areas associated with Hole #2 and Hole #14. Hole #2 presents ±1150 linear feet of hazard area along the fairway and green, where it could be possible for a struck golf ball to travel into the trail area. Hole #14 presents ±350 linear feet of hazard area along the backside of the green, where struck golf balls are directed.

Potential mitigations include installation of protective netting or fencing, as shown on the next page. At this early stage, a height of 20-25 feet can be anticipated for the protective netting or fencing. The final overall height and configuration should be determined in the future based on a study that considers potential trajectory of struck golf balls and existing grades in the area. Landscape buffers consisting of large evergreen trees are also a potential consideration; however, there is limited space available in these locations and there are desirable existing deciduous trees along the second fairway that should be preserved.



Pennsauken County Club Course Layout, source: <https://www.twp.pennsauken.nj.us/sites/default/files/svlayout.pdf>





Example of existing protective chain link fencing at Pennsauken County Club, on the backside of the 15th green, as seen from the potential rail-with-trail alignment.



Example of a golf hazard mitigation structure installed to protect trail users and preserve waterfront views along the Hudson River Waterfront Walkway at Liberty State Park in Jersey City, NJ.

Next Steps

The Burlington-Camden trail remains in the early stages of the planning and project development process. It will require a dedicated effort and agreement among many parties to advance through the next steps that are necessary to bring the potential rail-with-trail to fruition.

This addendum supplements planning guidance provided in the May 2021 *Planning Study for the Burlington-Camden Connector: Rail-with-Trail Concept in Pennsauken and Maple Shade Townships*.

Taken together, the planning study and addendum are intended to inform future planning and project development steps, including:

- Coordination with railroad right-of-way owner
- Coordination with regulatory agencies (NJDEP, Burlington and Camden Counties) and Delaware Valley Regional Planning Commission
- Additional public input and concept development/refinement
- Comparison to alternative routing solutions
- Application for federal or state funding
- Site survey, engineering design development, and permitting
- Construction and activation of trail improvements



Example of golf backstop netting on wood posts, source: <https://netsofamerica.com/product/golf-backstop-netting/>

N|V|5