Riverfront Access for Pedestrians and Bicyclists

FINAL 2014

Bound Brook Urban Design Plan Implementation Project

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Contents

Introduction

The Raritan River has played an integral role in the development and shaping of the Borough of Bound Brook – from its inception as an industrial river community in 1681 to the historic, multicultural community that it is today. The Borough of Bound Brook maintains a love/hate relationship with this incredible natural resource. On one hand, the river built this community and was its life blood. And on the other, it has caused devastating damage and setbacks. In any case, there is one thing that cannot be denied: the Raritan River has shaped this community's past and will continue to play a key role in shaping its future.

The "Riverfront Access for Pedestrians and Bicyclists" presents a strategy for celebrating this incredible asset while respecting the present context, goals and means of the Borough of Bound Brook. The foundation of this strategy is based largely on the "Regional Open Space Framework Plan" section of the "Bound Brook Downtown Urban Design Plan" prepared in December 2010 ('Urban Design Plan').

Bound Brook Downtown Urban Design Plan

The "Bound Brook Downtown Urban Design Plan" (the 'Urban Design Plan') envisions a "Regional Open Space" network that spans from Billian Legion Park on the east to the Tea Street Sports Complex on the west. The plan envisions the Raritan River waterfront, from Queens Bridge to Middle Brook, as a vibrant, linear greenway for use by residents and visitors. The plan envisions "Stone Bridge Park", a new +/- 5-acre highly programmed park anchoring the waterfront at the base of Queen's Bridge.

The Waterfront Today

While the downtown's intrinsic link to the waterfront remains, there is no real visual, physical or economic connection. The land along the waterfront is privately owned and in most cases it is vacant or unused. A series of informal dirt trails traverse these private properties and are used informally (without permission) by some residents or visitors for accessing the waterfront for hiking, fishing, hunting and riding off–road recreational vehicles (ORVs). These "desire lines" will become the foundation of the Bound Brook Riverfront Access Trails.

Two significant barriers separate the downtown from the waterfront:

The Green Brook Flood Control Levee: The US Army Corps of Engineers has worked diligently to complete the Green Brook Flood Control Project to protect downtown Bound Brook from river flooding. The levee creates a physical and visual barrier. Ownership, operations and public acces to the levee is complex. The levee is maintained by Somerset County who has indicated that public access is not permitted under a controlling utility easement. However, the Borough has stated that there is an ordinance in place that allows public access to the maintenance path that is on top of the levee.

Active Railroad: There are three active railroad lines that run between the downtown and the waterfront: (north to south) The NJ TRANSIT Raritan Valley Line, the Conrail Lehigh Line, and the CSX Port Reading Secondary. NJT has raised significant concerns on safety related to pedestrian activity at grade crossings and alongside active rail lines. Additional coordination will be necessary between the active frieght and passanger rail operators, the borough and others to address these concerns.

For more detail regarding the "Waterfront Today", refer to the "Existing Conditions" section of this report.

Purpose and Organization of this Plan

This plan bridges the goals and vision set forth in the Urban Design Plan with the opportunities and constraints facing the Borough of Bound Brook and the waterfront today. It is a plan that embodies the vision and goals of the Urban Design Plan while staying grounded in the current physical, environmental, financial, maintenance and operations constraints. The result is a realistic strategy to reconnect Downtown Bound Brook to the Raritan River. The report is divided into two sections:

The Implementation Plan: The strategy for reconnecting the river to the downtown

The Existing Conditions: An in depth look at the existing opportunities and constraints that informed the development of this strategy.

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Implementation Plan

This section outlines a system of on and off-road trails that together provide access from Downtown Bound Brook to the Raritan River. An overview of the major elements impacting trail implementation is provided including proposed condition, permits, property ownership, red flags and “order of magnitude” construction costs.

This section is divided into the three parts:

- Trail Description
- Property Ownership
- Permitting and Regulations

Trail Framework

Overview

The Bound Brook Riverfront Access Trail will offer residents and visitors a unique perspective into the Borough's long and varied relationship with the Raritan River. It will take them from points high above the river - to areas where they can touch the river; from areas that are developed and industrial - to natural areas teaming with wildlife; from historic structures like the Queen's Bridge and abandoned railroad trestles - to new engineering feats like the flood gates and levee structure. The Bound Brook Riverfront Access Trail is an 'up-close' opportunity to experience the history and ecology of the Borough of Bound Brook's waterfront.

Trail Users

The trail has been planned to accommodate bicycles and pedestrians whenever possible. There may be portions of the trail system that, due to topography and the environmental sensitivity of the water front, may not be able to provide sufficient width for bicycles. This will be determined as the trail moves further into the design phase.

Currently off-road vehicles (ORV) use areas of the waterfront and trails. This plan does not recommend allowing ORV use for several reasons. First, given the limited space, pedestrians, bicyclists and ORV's cannot safely share this trail system. Secondly, NJDEP approving a permit to construct trails for motorized vehicles within a regulated area would be unlikely. Refer to the Permitting and Regulations section of this chapter for more detail.

Trail Typologies

The Bound Brook Riverfront Trail System will be comprised of a series of on and off-road trails. While the system strives to accommodate both bicycles and pedestrians, the condition, width and materials may vary throughout based on the varying physical constraints and environmentally sensitive conditions.

There will be three trail typologies:

On-Road Trails: These segments will be within existing road rights-of-way in the form of sidewalks, bike lanes or other bicycle facilities and signage.

Off-Road Paved Multi-Use Path: These segments will be 8'-12' wide paths constructed of asphalt, compacted crushed stone or other suitable paved surfaces.

Off-Road Trails: These segments will be up to 6' wide and will be constructed of compacted soil, stone dust, mulch or other suitable trail surfaces.

Trail Alignment

The trail has been aligned to utilize previously existing worn or paved paths while highlighting key views and areas of interest such as the historic train trestles. Existing worn paths indicate user "desire lines". It is logical to follow these paths whenever feasible. In addition, utilizing previously disturbed areas and existing paths will minimize environmental impacts and may ease environmental permitting and reduce construction cost.

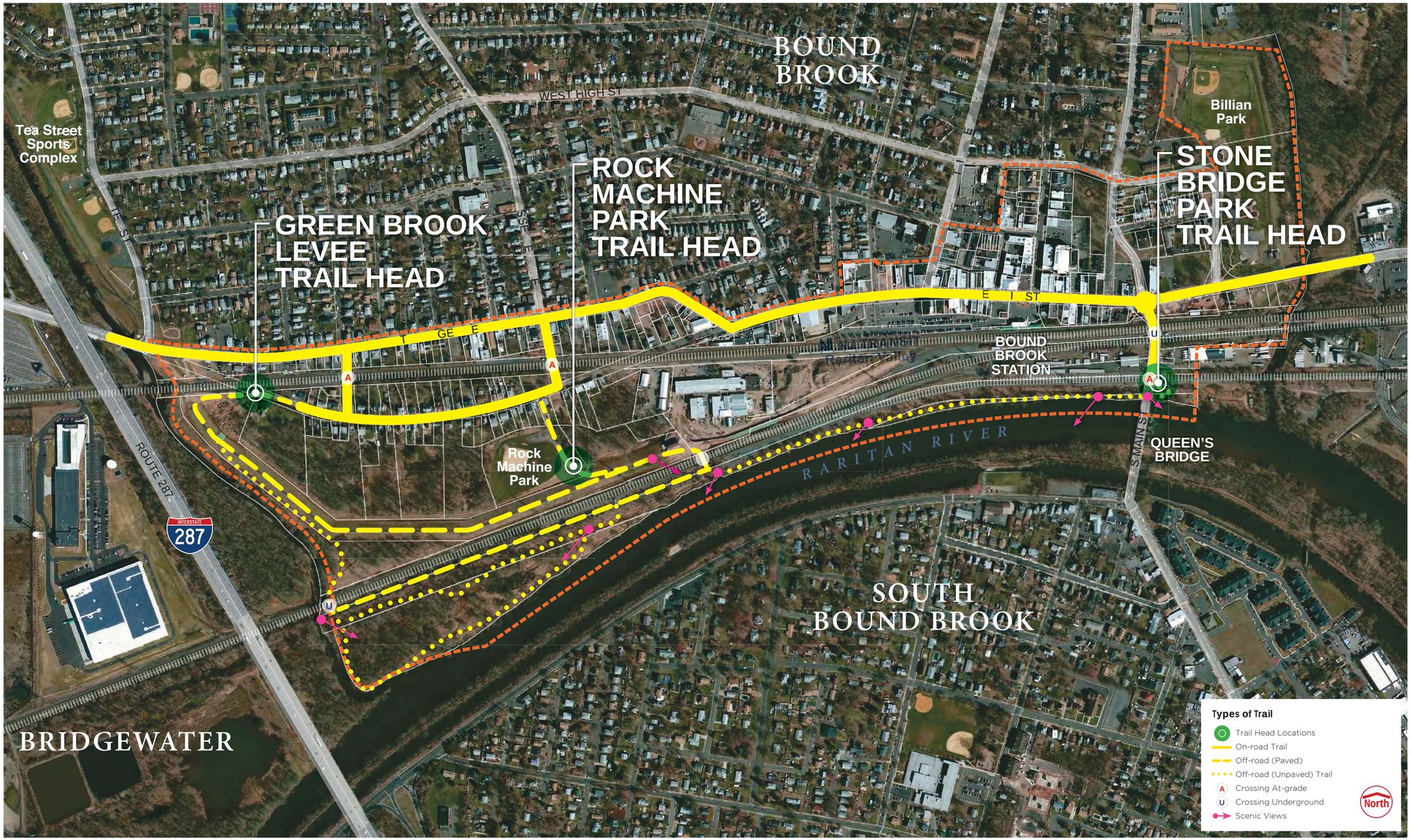

Fig 1. Implementation Plan Map

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Strengths, Weaknesses, Opportunities & Threats Analysis

Prior to developing the Trail Framework, a thorough Existing Conditions Analysis was performed and has been included at the end of this report. This analysis led to the identification of "Strengths, Weakness, Opportunities and Threats" (SWOT) that directly effect the implementation of this plan. Each bullet point below provides a summary of a particular topic. For more information, please refer to the section / page number identified in brackets.

Strengths

- Bound Brook is located at the center of several regional trail systems including the East Coast Greenway, River Road Bicycle Corridor and the High Point to Cape May Bicycle Route. ['Regional Trail System', pg. 52]
- Bound Brook has a historic link to the riverfront and a story that needs to be told.
- Existing industrial relics, including abandoned railroad trestles, juxtoposed against the ecological richness and natural beauty of the riparian areas create an interesting and varied hiking experience.
- Existing roadways throughout town have ample sidewalks and are walkable. In addition, there appears to be ample width to accomodate bicycles through the implementation of cost effective solutions such as pavement markings and signs. [Page 54]
- Two large, public parks, Billian Legion Park and Tea Street Park, flank the east and west sides of downtown respectively. ['Parks and Open Space', pg. 50]
- There are several, evenly distributed railroad crossings throughout the length of downtown. This includes an existing "grade separated" underpass on South Main Street just north of Queens Bridge. [See 'Railroad Crossing Points', pg. 64]
- There are existing worn hiking paths along the entire length of the riverfront that show existing use and desire lines and create a framework for the trail system. ['Existing and Proposed Off-Road Routes', pg. 60]

Weaknesses

- The entire riverfront is privately owned by 3 key property owners: Elizabethtown-American Water Co., Consolidated Rail Corp (Conrail), and American Cyanamide Co. (Pfizer). ['Property Ownership and Easements', pg. 40]
- The waterfront currently gets little use or interest from existing residents. This may be due to poor access and visibility created by the railroad and levee. Building community support for this project may be challenging.
- The roundabout located at the intersection of East Main Street and South Main Street is difficult for bicyclists and pedestrians to cross and has become a barrier. ['The Main Street Roundabout', pg. 57]
- The existing "grade separated" underpass on South Main Street just north of Queens Bridge is uninviting due to maintenance and lighting. ['Pedestrian Underpass', pg. 66]
- The Borough has limited means for operating and maintaining its existing streets, trails, parks and public spaces. The creation of new parks and trails will present a maintenance and operations challenge.

Opportunities

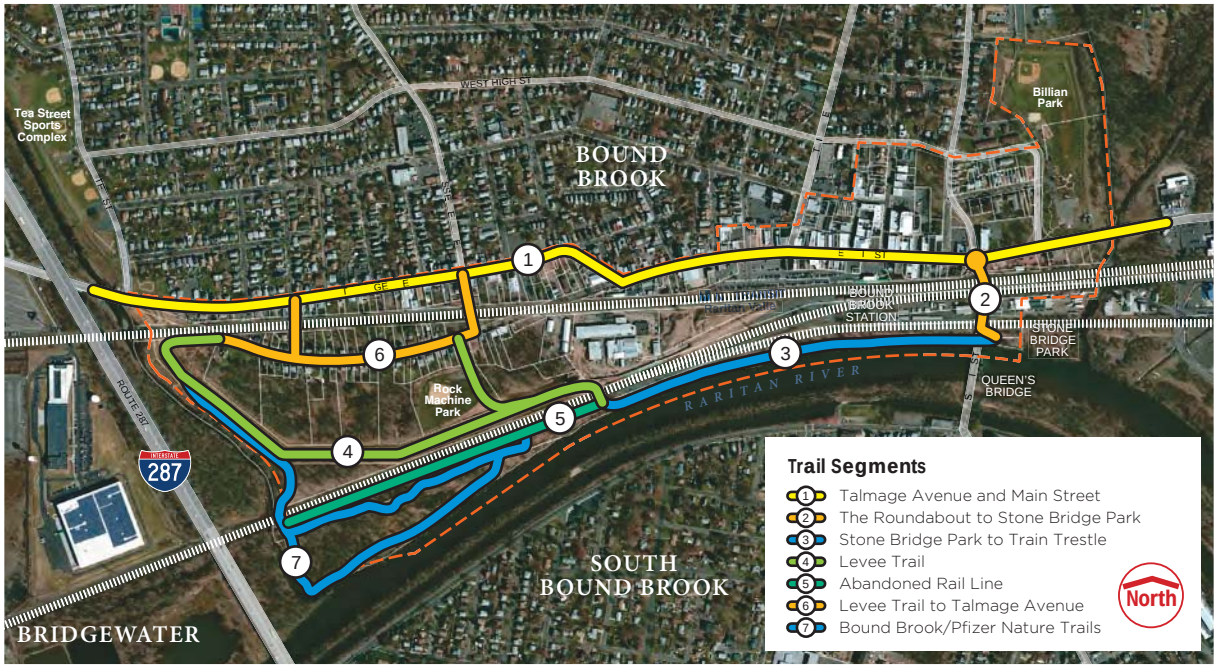
- The Green Brook Flood Protection Levee was constructed with an asphalt maintenance path along its top that is managed by Somerset County. If public access to this path can be granted, this would provide access to the riverfront. [See 'Levee Maintenance Path', pg. 63]
- D + R Canal State Park is a 70-mile linear park that is also a segment of the East Coast Greenway. This park is accessible from downtown via the Queens Bridge. [See 'Regional Trail System', pg. 52]
- River Road Bicycle Corridor was identified in the Middlesex County Transportation Plan and links downtown Bound Brook to Johnson Park, Rutgers Busch Campus and other key land uses with the Bound Brook Station. ['Regional Trail System', pg. 52]
- The High Point to Cape May Bicycle Route is routed through downtown along Main Street and Vosseller Avenue and connects downtown Bound Brook and the river front to a statewide bicycle route. [See 'Regional Trail System', pg. 52]
- The Bollmer Redevelopment Site, currently under construction, will infuse the downtown with increased pedestrian volumes and activity. Its location near Queen's Bridge may also increase the need to provide safe and legal access to the river front.
- A +/- 15-acre site on the waterfront is owned by American Cyanamid Co (now Pfizer). This parcel is part of a 575-acre superfund site that is being remediated by Pfizer. Pfizer has indicated that they would consider allowing public access to this site for hiking trails. ['Riverfront Trail - West, pg. 62] In addition, there may be an opportunity to utilize funds from a Natural Resources Damages Claim and/or work with Pfiizer to help fund portions of this project. [See 'Property Ownership and Easements', pg. 40]

Threats

- At the time of this report, Somerset County is responsible for the maintenance of the Green Brook Flood Protection Levee and the asphalt maintenance path. They indicated that the path is in a utility easement that does not permit public access. However, the Borough has indicated that it passed an ordinance allowing access and that this path is patrolled by Borough police for this reason. Any public access requires modification of the easement. [See 'Property Ownership and Easements', pg. 40]
- The Green Brook Flood Protection Levee is located on private residential land within easements owned by the Army Corps of Engineers. At the time of this report, it is understood that the easements will be transferred to the State of New Jersey but this has not yet occured. Ownership and operations of the levee is complex and involves several property owners. Establishing a public access easement may be challenging. [See 'Property Ownership and Easements', pg. 40]
- The Green Brook Flood Control Levee provides two of the three primary riverfront access points. If public access to the levee is not permitted then access points to the waterfront will be limited. [See 'Segment 4 Levee Trail, Pg. 26]
- The proximity of the railroad to the riverfront is a threat to the implementation of this trail system. Conrail right-of-way abuts approximately 2/3 of the riverfront and riparian areas in Bound Brook. Any recreational activity near an active railroad will require coordination with the railroad owners to address safety concerns. [See 'Property Ownership and Easements', pg. 40]

Trail Description

Fig 2. Trail Segment Key Map



The section provides a description of the trail intent and implementation. For purposes of this report, the trail has been divided into "segments". The segments were determined by logical "breaks" or transitions in the trail. Each segment comprises a complete connection or circuit within the system. The segments are as follows:

Segment 1: Talmage Avenue and Main Street

Fig 3. Talmage Avenue and Main Street

Talmage Avenue and Main Street comprise the primary on-road east-west connection through Downtown. This corridor connects key open spaces and parks, business and shopping districts, regional trail systems and the train station. This corridor should become both a connection as well as a destination for visitors of Bound Brook and the surrounding regional trail systems.

Summary of Recommended Improvements: This corridor should be upgraded to a "Complete Street" that accommodates cars, bicycles and pedestrians. Bicycle and pedestrian improvements to the roundabout are necessary. Street trees are desperately needed along this street – plant lots of them! In addition, "place making" improvements should be made that celebrate the unique history of Bound Brook and environmental and economic importance of the Raritan River.

OVERVIEW

Key Stats

- +/- 1.25 Miles in length
- 2-Lane downtown road
- Generally Fair/Good condition
- Somerset County Road

Red Flags

- Roundabout Improvements

Construction Cost

- TBD

Permitting

- Somerset County

Implementation Cost

- $$$$$ | $1m+

» Talmage Avenue

Fig 4. Proposed Talmage Avenue Improvements

A. Section

B. Plan

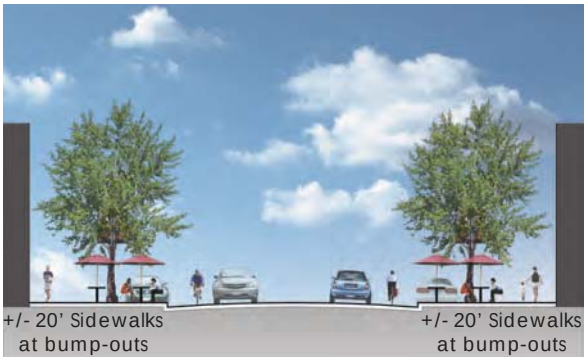
Proposed Improvements

- Storm water curb bump-outs
- ADA Compliant Ramps
- Enhanced Crosswalks
- Shared Road Markings (Sharrows)
- Wayfinding Signs + Banners
- Street Trees (one side)

» Main Street

Fig 5. Proposed Main Street Improvements

A. Section



B. Plan

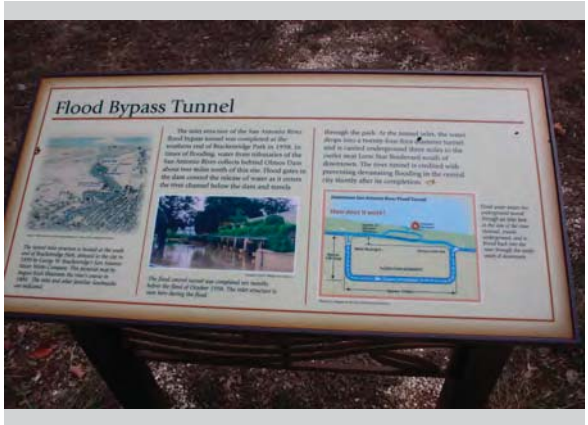
Proposed Improvements

- Hardscaped Curb bump-outs
- ADA Compliant Ramps
- Enhanced Crosswalks
- Shared Road Markings (Sharrows)
- Bicycle Parking
- Wayfinding Signs + Banners
- Street Trees (both sides)
- Seating Areas
- Educational signs

Curb Bump outs are simple extensions of the curb that calm traffic and reduce pedestrian crossing distance. They can be used to provide additional sidewalk width for outdoor dining etc (Red Bank, NJ - left) or they can be used as "flow through" planters for storm water management (right).

Share the road painted symbols (Sharrows) as well as signage will make drivers aware the bicyclists will be using this road (Montclair, NJ).

Intersections should be upgraded to include highly visible crosswalks and ADA compliant curb ramps (Montclair, NJ).



Educational and interpretive signs can be integrated into the downtown that celebrate the history of Bound Brook as well as the ecological and economic significance of the Raritan River (San Antonio, TX).

Wayfinding signs with walking times should be located throughout the downtown directing people to the various downtown destinations as well as to the Bound Brook Riverfront Access Trails (Montclair, NJ)

Segment 2: The Roundabout to Stone Bridge Park

Fig 6. The Roundabout to Stone Bridge Park

The segment of on-road trail connecting Main Street to Stone Bridge Park will bring trail users from E. Main Street, and destinations both east and west, to the river. As they cross the threshold that is the railroad underpass, they will be offered their first views of the river. If coming from the trail to downtown, crossing this threshold will instill their first impression of Bound Brook. For this reason, it is one of the most important connections of the trail system. It is also one of the most challenging. This short segment has four elements that present challenges to bicycle and pedestrian access. The elements are [Fig 7]:

1. The Roundabout
2. The Underpass
3. The Mid-Block and At-Grade Crossing
4. Access Point

OVERVIEW

Key Stats

- 0.10 mile in length
- Two lane road connecting to Queen's Bridge
- Fair condition

Ownership

- Roundabout: Somerset County
- South Main Street: Borough of Bound Brook
- Access Point: Conrail

Red Flags

- Traffic congestion in roundabout
- Access point on Conrail ROW

Permitting + Regulation

- Roundabout: Somerset County
- Underpass: NJ TRANSIT
- Rail crossing and Access: NJDOT

Implementation Cost

- $$$$$ | $150k - $200k

Fig 7. Enlargement of Segment 2 – Roundabout to Stone Bridge Park

Navigating these obstacles safely and comfortably will be a challenge. Pedestrians travelling from the west (Billian Park, Bolmer Development Site etc) will be encouraged to cross E. Main Street before the roundabout and walk along the east side of S. Main Street to the trail access point. Pedestrians travelling from the east (Train Station, downtown etc) will be encouraged to cross Main Street before the roundabout, travel along the west side of S. Main Street and then use the mid-block crosswalk [Fig 7]. A series of improvements will be required to make this connection comfortable and inviting for pedestrians.

Fig 8. Roundabout

Fig 9. Underpass

Fig 10. Mid-Block & At-Grade Crossing

» The Roundabout

The geometry of the roundabout was designed and constructed by Somerset County and appears to be in compliance with FHWA standards. For this reason, improvements to the roundabout should be geared towards educating pedestrians, cyclists and vehicles on how to co-exist safely and navigate the roundabout properly. Particular care must be taken as road widths are fairly limited and there is heavy traffic congestion around the roundabout during peak hours.

Pedestrian Wayfinding Signs: Locate pedestrian wayfinding signs at the crossing points indicating key destinations such as "River Access Trail"; "Downtown Shopping" and "Train Station."

"Bicycle Merge" Signs and Markings: Since cars slow down as they approach a roundabout, if traffic is moving at a normal pace, bicycles entering a roundabout are generally travelling at the same or similar speed as the cars. For this reason, FHWA recommends that bicycles should be encouraged to merge with cars when entering the roundabout. Signs and pavement markings should be provided to alert bicyclists and motorists of this merge.

"Bicycle Use Sidewalk" Signs: Another solution is to allow bicycles to "Dismount and Use Sidewalk" or "Share the Sidewalk" in lieu of navigating the roundabout. This is particularly appropriate given the high level of vehicular congestion around the roundabout during peak times.

Advanced Vehicular Warning Signs: Provide advanced warning signs alerting motorists to the presence of pedestrians crossing the roadway as well and cyclists within the roundabout.

Rectangular Rapid Flashing Beacons (RRFB): Flashing amber LEDs that supplement warning signs at unsignalized intersections (like a roundabout) or mid-block crosswalks. They can be either activated by pedestrians manually by a push button or passively by a pedestrian detection system. These could be located at each of the three crosswalks associated with the roundabout or prioritized at the crossings with the highest pedestrian volumes.

Fig 11. Rectangular Rapid Flashing Beacons at Trail Crossing

» The Underpass

The South Main Street Underpass currently acts as a barrier. This historic structure should be transformed into a gateway, welcoming visitors into Bound Brook – and then inviting them to the waterfront. Recommended improvements to South Main Street at the rail underpass are:

Eradication of Birds: This is a specialized service that may require the assistance of a professional. Generally, bird eradication can be accomplished through a variety of tools including:

- Habitat manipulation: Barring openings to the bridge structure. Netting is widely used to prevent bird access and is very effective.

- Visuals Deterrents: Replicas of hawks and owls, whirling devices, colored flags, and revolving lights, are low-cost and harmless ways to frighten birds.
- Anti-roosting devices or repellents: Porcupine wire, consisting of strips of flexible, rustproof base bars with spikes or needles, can be installed along ledges.

Cleaning and Maintenance Program: Crime Prevention through Environmental Design (CPTED) is a multi-faceted approach to deterring criminal and undesirable behavior through environmental design. CPTED strategies emphasize that maintenance is an expression of property ownership. And that a deterioration in indicates less control by the property owner and a greater tolerance for negative behavior. The better maintained a space is, the better the chance is that the surrounding areas will be respected. No where is this more important than beneath the underpass. For pedestrians, vehicles and bicyclists, this is the gateway into downtown Bound Brook and established their first impression of the borough. It is critical that this space is cleaned and well maintained and that litter and graffiti are not permitted to linger for any period of time.

Currently, maintenance beneath the bridge is shared by the County and the Borough. A more rigorous maintenance program should be coordinated with the county that keeps this space clean and inviting. Initially, in addition to standard cleaning this program should incorporate power washing and graffiti removal as needed.

Lighting improvements: Adequate lighting beneath an underpass or enclosed space instills a sense of safety ion the users and according to the American National Standards Institute (ANSI), underpasses require adequate lighting for security purposes. Facial recognition below bridge structures is a primary concern because of the limited options for retreat from a hostile individual. Underpasses or pedestrian tunnels may also have daytime lighting needs. The luminance recommendations for the pedestrian areas of the underpass are provided in the table below.

Recommended Values for the Pedestrian Portion of Pedestrian Vehicular Underpasses and Exclusive Pedestrian Underpasses

Maintained Illuminance Values for Walkways/Bikeways			
	E_H lux/fc	E_{Vmin} lux/fc	E_{avg}/E_{min}*
Day	100.0/10.0	50.0/5.0	3.0
Night	40.0/4.0	20.0/2.0	3.0

*Horizontal only
E_H = average horizontal illumination at walkway/bikeway
E_{Vmin} = minimum vertical illumination at 1.5 m (4.9 ft) above walkway/bikeway measured in both directions parallel to the main pedestrian flow

Light levels beneath the South Main Street Underpass need to be improved for pedestrians and cyclists using the sidewalks. South Main Street is a county route and is owned/maintained by Somerset County. Generally, like NJDOT, Somerset County does not involve itself in pedestrian lighting projects for pedestrian or bicycle activities that occur along a roadway. The county generally defers to NJDOT standards which are primarily concerned with lighting roadway intersections where pedestrian traffic is likely and multiple conflict points exist. Exceptions do exist, however. The Route 18 multi-use path, part of the planned Route 18 widening in New Brunswick, is one such example. In this case, the designers identified a need and NJDOT paid for the installation utilizing participating federal funds.

According to a study by the Rutgers Voorhees Transportation Center (Pedestrian Lighting in New Jersey: A Means to Improve Pedestrian Safety, January 2009), NJDOT's prevailing philosophy is that pedestrian safety is a shared responsibility of both the state and local government with respect to a state roadway. NJDOT focuses on lighting the vehicle and street, typically regarding sidewalk areas to be municipal responsibilities. However, NJDOT does take responsibility for pedestrian lighting at signalized intersections. Although specific warrants for lighting are only called out for signalized intersections, NJDOT will provide on a case-by-case basis pedestrian lighting at overhead pedestrian bridges, mid-block cross-walks, and considers areas which may need attention where there is heavy pedestrian traffic.

The recommended illuminance values vary between 5 and 10 footcandles during the day, and 2 and 4 footcandles during the night. (A footcandle is defined by the amount of light received by 1 square foot of a surface that is 1 foot from a point source of light.) Typical light levels range from 1,000 footcandles in full daylight to 0.1 footcandles under a full moon.

The District of Columbia Department of Transportation (DDOT) provides specific guidance for the design and installation of lighting below bridge structures. According to their Design and Engineering Manual:

Under-Deck Lighting

D.C. Department of Transportation – Design and Engineering Manual Section 41.7.6

Under-deck lighting is not installed to accent the highways beneath structures, but rather to provide the required level of illuminance to accent continuity of uniform lighting. Therefore, under-deck lighting shall only be required where this level of illuminance, due to structural limitations such as the width, skews, and minimum clearance cannot be accomplished by means of lighting standards.

Wall mounted under-deck luminaires shall be installed on pier faces and/or on abutments at a minimal mounting height of 15 ft. The pier faces or the abutment must be parallel to the highway and must be within 10 ft. from the curb or edge of the highway, otherwise the luminaires shall be fastened to adapter plates installed between the bridge girders. Wall mounted under-deck luminaires installed at a mounting height of more than 15 ft. shall yield better efficiency and uniformity.

Pendant type luminaires shall be mounted from the structural steel. The luminaires shall be located to facilitate maintenance and relamping. If the highway width permits, the luminaires shall be located over the shoulder. When a luminaire is suspended from a bridge structure over the traveling lane, the bottom of the luminaire shall not be lower than the bridge girder. A special detail may be necessary to detail the conduit layout under the structure. For calculation purposes, the following data shall be used:

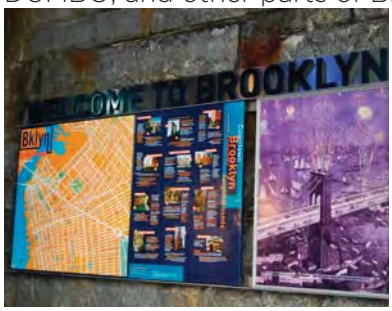
- Mounting Height - As required (15 ft. nominal).
- Luminaires - 150-watt wall mounted type and pendant mounted type high-pressure sodium luminaires as per the current industry standard.
- Uniformity Ratio - On highways, which are not illuminated, under-deck lighting shall be provided for underpasses having pedestrian traffic. The average maintained illuminance shall be .8 ft. candle.

Public Art Under the Bridge: Art can be used to enliven a space and convey the message that it is cared for. Art as a component of a bridge can take a variety of forms including lighting design or murals. Public art serves two primary functions: It provides a tool for economic revitalization and creates community identity. It helps shape the quality of life for people in a community by offering a form of expression that embodies a community's spirit. It represents a sense of community pride and brings people together. Moreover, public art attracts people to a community who bring a broad array of talents and experiences, further enriching it.

There are a number of opportunities to encorporate art into the underpass. The existing underpass is comprised of natural stone and is historic in nature. Any improvements of proposed art installations will need to be coordinated with NJ TRANSIT and meet their requirements for maintenance and poreservation.

Brooklyn Bridge Underpass – Brooklyn, NY

The areas under the Brooklyn Bridge glow a distinctive blue from new sidewalk lighting. The art installation works in concert with new signage to improve the experience of visitors and residents passing through this significant threshold between the Bridge and Manhattan, DUMBO, and other parts of Brooklyn.



Directory Map

Wayfinding Signage


Art Installation Under the Bridge

Race Street Underpass – Philadelphia, PA

Large cut letters affixed to a stainless steel mesh panel direct users to the "RIVER" or the "CITY" as they pass through. The letters are backlit at night providing additional interest.

Direction to "RIVER"

Direction to "CITY"

Peekskill Station – Peekskill, NY

The MTA used simple painted sheet aluminum to create an ornate façade along portions of the rail overpass.

Railroad Underpass – Chicago, IL

The rundown and rusty look of this underpass was in no way compatible with the young vibrant neighborhood that is Prairie District, Chicago. The Prairie District Neighborhood Alliance committed itself to the task of creating a mural on both sides of the underpass.

Vibrant Mural

Participation by Community

» Mid-Block Crossing

Due to the challenges associated with crossing the roundabout, trail users should be encouraged to cross at the mid-block location when travelling to or from downtown or the train station [Fig. 7, (3)]. Special improvements should be made to ensure that this crossing is safe. Recommended improvements include:

Pedestrian Wayfinding Signs: Locate pedestrian wayfinding signs at the crossing points indicating key destinations such as “River Access Trail”; Downtown Shopping, “Train Station” and Billian Park.

High Visibility Crosswalks with “Stop for Pedestrian” signs: High visibility crosswalk a minimum of 12’ wide should be located at this crossing to make vehicles aware that pedestrians and cyclists crossing the road have priority.

Advanced Warning Signs: Signs should be provided alerting vehicles approaching from both directions that a trail crossing is ahead and they should expect bicyclist and pedestrians on the road.

Rectangular Rapid Flashing Beacons (RRFB): RRFB’s are particularly important at mid-block crosswalks like this one to provide high visibility warnings to vehicles. Refer to Roundabout improvements (pg. 15) for detailed description of RRFB.

Segment 3: Stone Bridge Park to Train Trestle

Fig 12. Stone Bridge Park to Train Trestle

This segment provides the trail user with the most intimate connection to the river and riparian flaura and fauna. Beginning at "Stone Bridge Park", the trail meanders along the waterfront. It moves gently with the natural contours offering the user a variety of views and perspectives of the river. At times the trail is 6' or 8' above the water and at other times it nearly touches the water.

A significant portion of this segment will require public access/ambulatory easements in close proximity to an active rail rights-of-way. This will require coordination with Conrail.

OVERVIEW

Key Stats

- 0.5 miles in length
- Dirt/worn path
- 5' width along river
- 15' width on top of bank

Ownership

- Elizabethtown Water Co.
- Conrail

Red Flags

- Safety concerns due to proximity to active railroads

Permitting

- Freshwater Wetlands Protection Act General Permit
- Flood Hazard Area Permit-by-Rule
- NJDOT / NJ TRANSIT Rail Safety Review

Implementation Cost

- $$$$$ | $200k - $250k

Fig 13. Enlargement of Segment 3 – Stone Bridge Park to Train Trestle

Beginning to the east at the edge of Queens Bridge, pedestrian access will be provided at the current Conrail access driveway. It is unclear if this driveway is also used by Elizabethtown Water. In either case, an access easement will be required which could prove challenging. Pedestrian access down to the proposed Stone Bridge Park will likely be in the form of sloped "switchback" walkways in order to transition down the steep grade change. It is important that this access is ADA compliant (see Permitting and Regulations section). The access point and adjacent areas appear to be on Conrail ROW while the majority of the park will likely be within Elizabethtown Water property.

Once in Stone Bridge Park, trail users will continue west under the Queen's Bridge along the waterfront trail. The implementation of Stone Bridge Park may be a complex, long term undertaking (refer to page 51). For this reason, this Implementation Plan and the stated "Implementation Cost" is limited to construction of the trail and a waterfront "Parklet" or small pocket park (shade struc-ture, seating). It does not include the costs associated with the construction of Stone Bridge Park as described in the Urban Design Plan. Whenever possible the trail

Fig 14. View of Stone Bridge Park access

Bird's eye view of proposed Stone Bridge Park location

Fig 15. Queens Bridge Underpass

View looking west under Queens Bridge with Conrail access drive on right

should hug the shoreline and stay off of the Conrail property. This will simplify e easements, permitting and safety precautions.

Due to the environmental sensitivity of this area, topography and spatial constraints associated with the railroad, it is recommended that the trail be constructed at a 6' width. The trail should follow the shoreline and maintain as much distance from the railroad as possible.

There is a significant grade change and vegetative buffer between the trail location and the active rail. However, in some areas the trail may get within close proximity of the rail or access to the active railroad may become a concern. The Existing Conditions section specifically identifies one location where this is a concern but there may be others. In these areas, if access is permitted, substantial safety precautions will likely be required.

At the west end of this segment the trail is terminated by a small dry creek bed that branches off the river. At this point there are also two train trestles that allow the trains to pass over the inlet. The southernmost train trestle is abandoned and the other is active. The design will need to consider how the trail will cross in this area. Improvement will be needed if pedestrian activity is facilitated. Coordination with Conrail will be necessary to determine whether and how the site may be traversed, and to determine appropriate safety measures.

Fig 16. Rail Proximity

Close proximity of active railroad (left) to trail (right)

Fig 17. Decision making point

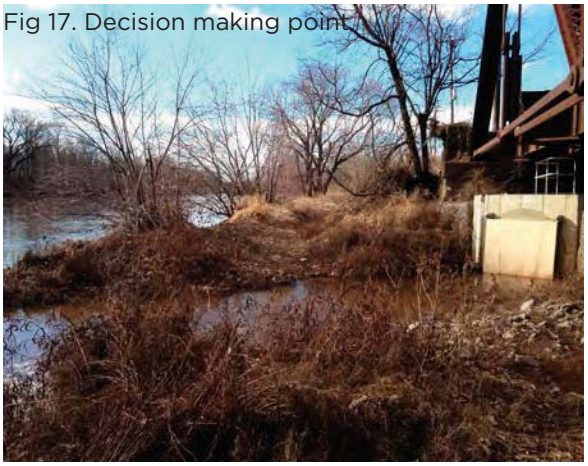


Fig 18. Dry Creek Bed

Segment 4: Levee Trail

Fig 19. Levee Trail

This segment of the trail provides the user with a very different and unique perspective of the river. The trail user transitions from a natural environment into a highly engineered man-made environment atop the Green Brook Flood Control Levee. Transitioning from the riverfront dirt trails to the engineered environment atop the levee offers the opportunity to tell the story of Bound Brook's transformation. From this perspective, we can juxtapose the river's natural beauty against an industrial back drop; and its seemingly passive nature against its strength and ability to cause destruction.

**Note: Clarification on ownership of the easement is needed. Any public access would require modification of the easement..*

OVERVIEW

Key Stats

- Length: 0.75 miles
- Condition: 8' width paved asphalt
- Ownership: Private Property (residential)
- Easement: Army Corp of Engineers*
- Maintenance: Somerset County

Permitting

- U.S. Army Corp of Engineers review
- Freshwater Wetlands Protection Act General Permit (under trestle)
- Flood Hazard Area Permit-by-Rule (under trestle)
- NJDOT / NJ TRANSIT Rail Safety Review (under trestle)

Implementation Cost

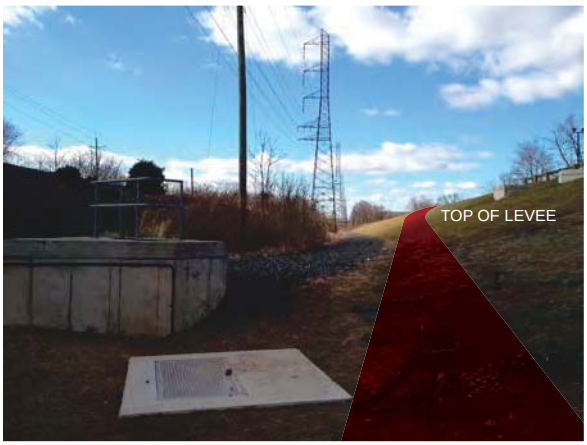
- $$$$$ | $100k - $150k

Fig 20. Enlargement of Segment 4 – Levee Trail

The existing asphalt maintenance path located at the top of the offers an opportunity for access to the riverfront. Establishing public access to this path would link the western end of Bound Brook to the waterfront and to Segment 3 – Riverfront Trail*. From Segment 3, an 8' width crushed gravel trail will bring users under the two train trestles and to the base of the levee. This viewpoint offers trail users a view of past and present engineering achievements in Bound Brook's history with the levee ahead of them and the historic train trestles with the river backdrop behind [Fig 21]. At this point a new path will climb the side of the levee. This trail can be designed to climb the levee in a similar way as the Rock Machine Park access path does. This should be coordinated with U.S. Army Corp of Engineers to ensure that any improvements do not compromise the structural integrity of the levee [Fig 22].

Fig 21. Bridge Underpass

Fig 22. Trail up the levee



**Note: At the time of this report, Somerset County maintains the levee and the asphalt maintenance path. They currently do not allow public access and have indicated that any current use of this maintenance path by the public constitutes tresspassing. However, the Borough has indicated that it passed an ordinance allowing access and that this path is patrolled by Borough police for this reason. Any public access would require modification of the easement.*

Once atop the levee trail users are offered panoramic views of the river and riparian areas. The maintenance path is in excellent condition but does not provide any pedestrian amenities. Additinally, the steep side slopes may warrant bicycle safety measures along the sides of the trail, the feasibility of which is unknown. A comprehensive sign system should extend along the top of the levee. Educational signs can be included that explain, for example, what a levee is and why it is here. They can also point out historic or environmental elements that can be seen in the distance. Wayfinding and mile markers can direct users to downtown destinations. Additional amenities may include seating, shade structures and lighting [Fig 23].

Fig 23. Levee Trail

The maintenance path can be accessed at two points from the street side. Both access points will need directional and informational signage. The signs should be inviting and inform users about the trail system, offer a wayfinding map and communicate the trail rules (No motorized vehicles, Hours of Operation etc). The main access point will be the western end of West Main Street and is generally in good condition. The secondary access point will be through Rock Machine Park. This access point needs better definition. An 8' wide designated non-motorized vehicle zone should be provided from the park entrance on West Main Street to the base of the access ramp. This can be a painted lane with signage. The parking area should also be repaved. Once public acces is established and both entrances are upgraded, it will complete a 1-mile closed "levee loop" trail.

Metrocenter Levee Trail – Nashville, TN

Trailhead Sign And Map

Shade Screen Tunnel

Shaded Seating Area

The Metrocenter Levee Trail is a 2.5 mile paved trail that connects downtown Nashville to and along the Cumberland River. The levee trail integrates a number of amenities including seating areas, gateway signage with maps and a shade screen tunnel.

Segment 5: Abandoned Rail Line

Fig 24. Abandoned Rail Line

At the end of Segment 3 – Riverfront Trail, trail users will have the option to climb a switchback up to the abandoned rail bed that has had the tracks removed. This is an interesting segment as users will cross over the historic train trestle. They will then continue along the 15' wide gravel path offering framed views of the river and low lying natural area rich with wildlife. This trail offers excellent opportunities for birding and wildlife viewing since it is elevated about 5' above the adjacent natural areas. There are a number of opportunities throughout the length of this trail to connect down to the Segment 7 – Bound Brook/Pfizer Nature Trails.

OVERVIEW

Key Stats

- Length: 0.5 Miles
- Condition: 15' wide compact dense grade aggregate (3/4" gravel)
- Ownership: Conrail
- Maintenance: Conrail

Red Flags

- Proximity to active railroad

Permitting

- Flood Hazard Area Permit-by-Rule
- NJDOT Rail Safety Review

Implementation Cost

- $$$$$$ | $50k - $100k

Fig 25. Enlargement of Segment 5 – Abandoned Rail Line

The east end of this segment begins when the trail user crosses over the existing abandoned train trestle. The trestle appears to be structurally sound but this should be confirmed by a qualified structural engineer or other qualified professional. Any improvements should celebrate the historic structure and not detract from it. The surface should be tightly spaced wood plank and appropriate guardrails and safety features should be provided [Fig 27 + 28]. Reference the US Access Board guidelines to ensure that the crossing is ADA compliant.

Fig 26. Existing Abandoned Train Trestle

Fig 27. Virginia Creeper Trail – Abington, VA

Fig 28. Skiatook Trail – Skiatook, OK

The trail itself is in excellent condition. Educational signs informing trail users of the flaura and fauna and other ecological conditions should be located throughout its length [Fig 30]. Connections down to the Bound Brook/Pfizer Nature Trails (Segment 7) should made more intentional and clearly marked.

Fig 29. Trail – Existing

Fig 30. Sample Educational Sign

» Railroad Safety

The greatest challenge of this segment will be in coordinating with Conrail and NJDOT regarding access and safety. This line, a segment of the Port Reading Secondary, has been abandoned since 1986. However, this trail is located roughly 50' from the edge of the active CSX Port Reading Secondary rail line. It is separated by a roughly 6' deep drainage ditch that is heavily vegetated. Coordination meeting with NJ TRANSIT and CSX will be essential to determine if access will be permitted and if additional safety measures will be required (fencing, signs, etc).

Segment 6: Levee Trail to Talmage Avenue

Fig 31. Levee Trail to Talmage Avenue

West Main Street provides the primary access to and from the Levee Trail access points. This is an isolated street with low traffic volumes ideal for bicycles and pedestrians. It is connected to Talmage Avenue by Lamonte Avenue and Vosseller Avenue.

West Main Street is in good condition since it was recently improved with new road surfacing, curbs and sidewalks. Wayfinding signs directing people to the trail entrances and traffic signs indicating "Bike Route" or "Share the Road" should be provided.

Vosseller Avenue and Lamonte Avenue both have at-grade crossings at the NJ TRANSIT railroad. Both streets require significant bicycle and pedestrian improvements including sidewalks, shoulder improvements and signage. In addition, the at-grade crossings need to be upgraded (refer to standards outlined in the following pages).

OVERVIEW

Key Stats

- Length: 0.4 miles
- Condition: Good to Poor (rail crossings)

Ownership

- Borough of Bound Brook (roads)
- NJ TRANSIT (rail crossings)

Permitting

- NJ TRANSIT (work within NJT ROW)

Implementation Cost

- $$\$\$\$\$$ | $50k - $100k

Fig 32. Enlargement of Segment 6 – Levee Trail to Talmage Avenue

Coordination with NJ TRANSIT will be required to address potential treatments that could be employed to improve pedestrian safety at rail crossings. These may include:

- Automatic gate arms placed specifically for pedestrians
- Additional automatic gate or flasher warning devices in off quadrants
- Additional audible warning devices
- Swing gates (used as either exit or entrance gates)
- Tactile strips (detectable warning)
- Pavement markings (messages, lines and hashing, color changes)
- Bollards
- Fencing (pipe rail, iron, and other vandal-resistant types)
- Warning signs (active or passive)
- Experimental devices: wayside horns, in-roadway lights, “Second train coming” signs

Fig 33 displays the use of pavement markings to guide pedestrians and bicyclists through and not around safety gates. Four gates (quad gate system) are used at this location including gates at "off quad" locations (facing departing traffic).

Fig 34 displays an exclusive pedestrian crossing that includes safety lights and gates.

Fig 35, from the Long Island Rail Road, shows the use of pavement markings to guide bicycles and pedestrians at the rail crossing. Separate pedestrian gates are used on both sides of the crossing to restrict crossings.

Fig 33. Pavement Markings

Fig 34. Pedestrian Crossing with Safety Lights And Gates

Fig 35. Pavement Markings With Separate Pedestrian Gates

The 2009 Edition of the Manual for Uniform Traffic Control Devices (MUTCD) provides guidance for at grade rail crossings. The manual stresses the need for design and engineering that is specific to each crossing and its conditions. That said, the MUTCD provides specific examples of pedestrian safety measures for crossings. A typical gate configuration is shown in Fig 36 and 37.

Fig 36. Example of a Shared Pedestrian/ Roadway Gate

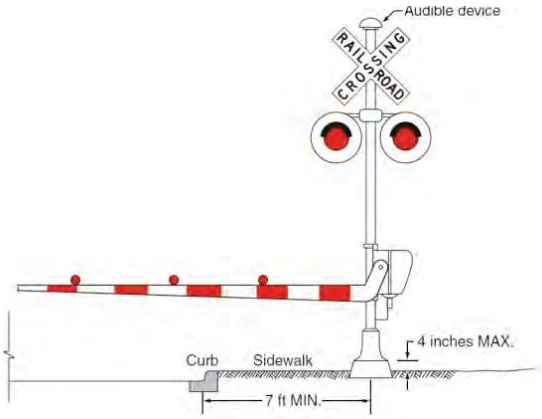
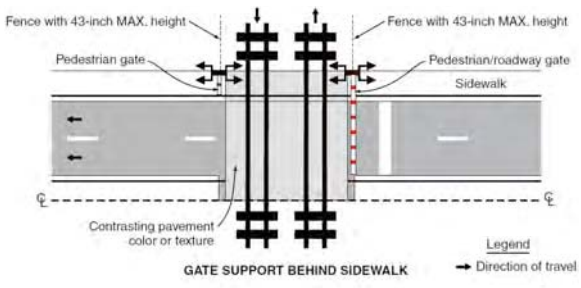


Fig 37. Examples of Placement of Pedestrian Gates



Segment 7: Bound Brook/Pfizer Nature Trails

Fig 38. Bound Brook/Pfizer Nature Trails

The Bound Brook/Pfizer Nature Trails offer trail users and residents of Bound Brook an opportunity to connect with river ecology. In this way, this area should be treated as a 'nature preserve' or 'nature reclamation'. From the levee trail access point, trail users will pass through a wooded meadow and meander along the Middle Brook until arriving at the active and abandoned train trestles. As they pass under the trestles, the large, and somewhat isolated location and environmentally sensitive nature of this trail lends itself to passive education trails. This area should be reserved for hiking, birding, fishing and learning about the natural flora and fauna and ecological systems.

**Note: Ownership of the land between the levee and Conrail Property needs to be clarified. [Pg. 40] If it is owned by the private residences that front on West Main Street then securing a public access easement to this land may be challenging. Other options may have to be pursued such as purchasing etc.*

OVERVIEW

Key Stats

- Length: 1.0 mile
- Dirt paths; ruts due to ORVs
- Fair condition

Property Ownership

- Private Property (Residential)*
- American Cyanamid (Pfizer)

Permitting

- U.S. Army Corp of Engineers review
- Freshwater Wetlands Protection Act General Permit
- Flood Hazard Area Permit-by-Rule
- NJDOT

Implementation Cost

- $$$$$ | $125K - $150K

Fig 39. Enlargement of Segment 7 – Bound Brook/Pfizer Nature Trails

Access to this area will be directly from the base of the Segment 4 – Levee Trail and at several locations along the Segment 5 – Abandoned Rail ROW. When traveling to or from the levee, trail users will walk along Middle Brook and pass under both the out-of-service and the active railroad trestles (similar to Segment 3) [Fig 40]. There is ample flat area and clear space beneath both trestles to accommodate the trail. However, there is limited head clearance (less than 7') beneath the out-of-service trestle [Fig 41]. As noted in the existing conditions analysis, a minimum of 8' clearance height is recommended by FHWA. Bicyclists will either have to dismount, or be directed up to the abandoned rail ROW just before reaching the abandoned trestle [Fig 42].

Fig 40. Path Under Trestles

Fig 41. Limited Head Clearance

Fig 42. Abandoned Trestle

Once trail users pass under the train trestle the trail opens up to a large natural area (American Cyanamid "Pfizer" property). Pfizer owns this property as well as the property immediatly to the west in Bridgewater. Pfizer has indicated that it plans to develop trails on the adjacent Bridgewater property. Efforts should be made to restore this area as a nature preserve and showcase for native plant restoration within a riparian zone. As such, this can become a destination for nature enthusiasts interested in birding, insects and butterflies, wildlife and native flowers/vegetation. In addition, Bound Brook and other regional school systems can utilize this space and incorporate it into their curriculum. Features to consider should include:

- Restore paths, tire ruts and other damage caused by Off-road recreational vehicles
- 6' Passive crushed stone paths meandering throughout
- Educational signs discussing river ecology, flooding, restoration, birding, wildlife and ecology
- Outdoor Classroom (small open space for gathering)

» Existing Users: Off Road Recreational Vehicles

Currently, this area is used by off-road recreational vehicles (ORVs). These users are not compatible, within the same trail system, as pedestrians and cyclists. ORV's are high liability users that require a different set of trail design requirements and safety features to be accommodated appropriately. In addition, the NJDEP does not have a General Permit for accommodating motorized vehicles which means that this would require an Individual Permit (refer to Permitting and Regulations section of this report). For these reasons, this report recommends discouraging or prohibiting the use of ORV's [Fig 43].

Fig 43. Path Used By Off Road Vehicles

Note: At the time of this report, the easements and property line locations associated with the Green Brook Levee and adjacent properties were not available. Therefore, the ownership shown on the "Property Ownership Map" [Fig 44] is approximate. In addition, this plan assumes that the Borough of Bound Brook owns the property between the levee and the railroad as noted in the Property Ownership section of this report. Before moving forward with this segment, clarity on property ownership is needed.

Cost Assumptions

"Implementation Cost" shown for each segment is an "order of magnitude" range for construction. There are many unknown conditions that may impact construction costs significantly including environmental, structural, soils site access etc. The"Implementation Cost" is intended to provide a range only and is not intended to be a construction cost estimate. The table below outlines some the cost assumptions that were made in deriving this range.

ITEM	UNIT	UNIT PRICE
Concrete Sidewalk, 4"	SY	$55.00
Crushed Stone Path, 6' width	LF	$21.00
Crushed Stone Path, 8' width	LF	$28.00
Bench	EA	$1,500.00
Bike Rack	EA	$500.00
Trash Receptacles	EA	$1,000.00
Regulatory Sign Post	EA	$1,000.00
Regulatory & Warning Signs (no post)	SF	$35.00
Traffic Markings, Lines, Thermoplastic (crosswalks & stop bars)	SF	$6.00
Trail Heads		$7,500.00
Educational Signs		$1,500.00
Regulatory Sign Post	EA	$1,100.00
Regulatory & Warning Signs (no post)	SF	$35.00
Rectangular Rapid Flashing Beacon	EA	$15,000.00

Key

EA=Each

LF=Linear Foot

SF=Square Foot

SY=Square Yard

Implementation and Funding Sources

There are a number of potential external funding sources that can support a project of this type. Below is a brief description of a few specific sources that apply directly to this project. This is not intended to be an exhaustive list, but rather a description key sources specific to this project.

New Jersey Recreational Trails Program (RTP)

The Moving Ahead for Progress in the 21st Century Act (MAP-21) is a funding and authorization bill to govern United States federal surface transportation spending. This act replaced the previous "SAFETEA-LU" Act when it was signed by President Barack Obama in July 2012. MAP-21 established the new "Transportation Alternatives Program" (TAP) which provides funding for a variety of alternative transportation projects. The TAP provides funding for programs and projects defined as transportation alternatives, including two project types applicable to Bound Brook: On- and Off-road Pedestrian and Bicycle Facilities; and Recreational Trails projects.

MAP-21 requires each State to set aside a portion of its TAP funds for projects relating to recreational trails through the "Recreational Trails Program" (RTP). In New Jersey, this funding is administered by the New Jersey Department of Environmental Protection through the "Recreation Trails Program Grants". While the general requirements may change, the following is a key overview of this grant as it relates to this project:

- Maximum award amount is $24,000
- Eligible projects include construction of new trails in existing parks or new right-of way
- The land on which the trail is proposed must be public land or private land with an easement for public recreational use
- There are several eligibility restrictions for projects constructed on land with railroad tracks.
- Trail feasibility studies are not eligible for funding.
- Deadline for submissions is generally mid-February annually

NJDOT Local Aid and Economic Development Funding

The New Jersey Department of Transportation offers several State Funded Programs that assist municipalities and counties improve their transportation infrastructure. Several of these programs are geared toward non-motorized transportation improvements including bicycle and pedestrian improvements but would likely apply more to improvements "on-road" rather then the off-raod trail system. Programs that may apply to this project include:

Municipal Aid: NJDOT has a goal to award upwards of 10% of all Municipal Aid funds to to projects such as pwedestrian safety improvements, bikeways and streetscapes.

Transit Village: As a designated Transit Village, Bound Brook is eligible for this grant that can be used for traditional and non-traditional transportation projects that enhance walking or biking within 1/2-mile of the train station

Bikeways: This program funds the creation of bicycle facilities and can be used for on-road bicycle facilities. This program may be most effective if used to enhance the regional trail

systems that cross through or near the downtown including the High Point to Cape May Bike Route and the East Coast Greenway.

Safe Streets to Transit: This program funds projects that construct safe and accessible pedestrian linkages to transit facilities, in order to increase transit usage by all segments of the population.

Natural Resource Damages Claim (NRDC)

When the actions of a particular party result in damage to the environment, wildlife, habitat, and other public natural resources, the responsibile party can be held accountable by the State of New Jersey for the "Natural Resource Damages". "Natural Resource Damage" is the dollar value of the restoration that is needed to return the affected resource to pre-damage condition and to compensate the citizens of the State of New Jersey for this damage. Often times, a cash settlement or off-site improvements are made when the extent of the damage is such that achieving "pre-damage conditions" is not feasible. Filing a Natural Resource Damages Claim (NRDC) is a complex process administered by the New Jersey Department of Environmental Protection - Office of Natural Resource Restoration (ONRR).

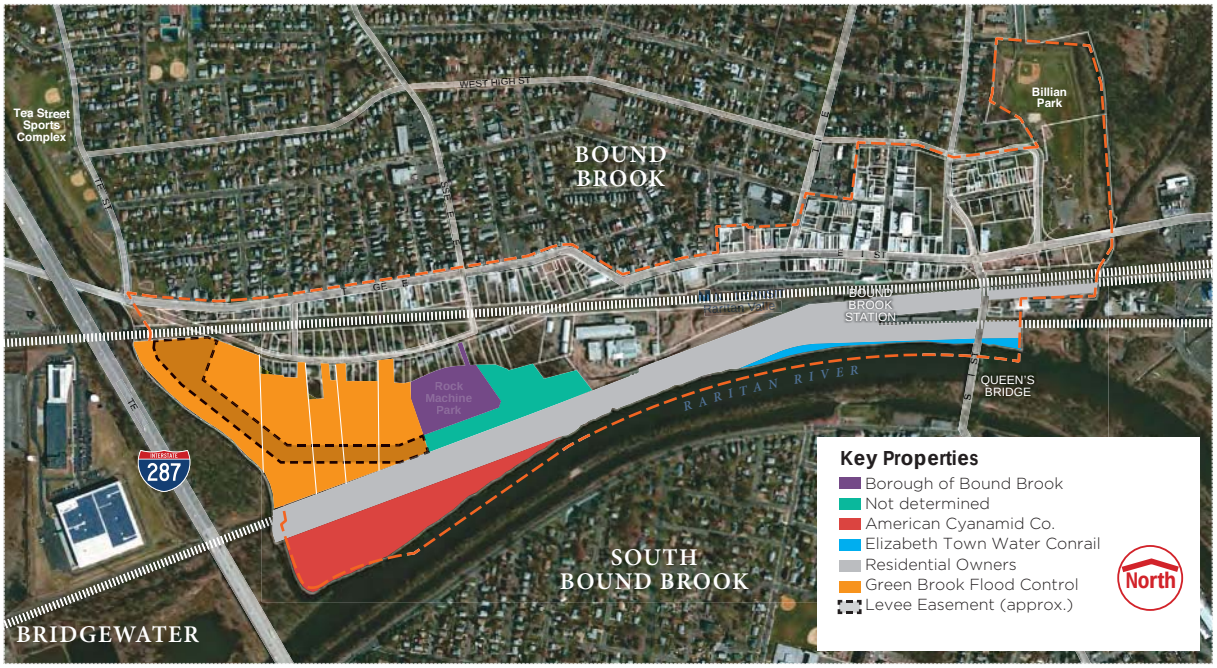
The American Cyanamid site is part of a 575-acre Superfund Site that is being remediated by Pfizer. At the time of this report, there had not been a NRDC filed. However, should an NRDC be pursued, there may be opportunity to utilize funds from this claim and/or work with Pfizer to help fund the implementation of this trail system. Should the Borough wish to pursue this route, investigation into the current status of the American Cyanimide site as it relates to Natural Resource Damages will be required. At the time of this report, a cursory review indicates that a Natural Resource Damages Claim is not being pursued by the State.

Guidance and reference material regarding the various funding sources can be found at:

- *NJ Recreational Trial Program – http://www.state.nj.us/dep/parksandforests/natural/trail_grants.htm*
- *NJDOT Local Aid – http://www.state.nj.us/transportation/business/localaid/stateaid.shtm*
- *Natural Resource Damages – http://www.nj.gov/dep/nrr/index.html*

Property Ownership and Easements

Fig 44. Property Ownership Map



As indicated in the Existing Conditions section of this report, a majority of the land along the riverfront is privately owned. For this reason, implementation of the riverfront trail will require easements or other similar access agreements with these property owners.

The most complex ownership arrangement appears to be associated with the Greenbrook Flood Control Levee Project. It is understood that portions of the levee were constructed within easements located on residential properties (as indicated above). The key property owners are:

Elizabethtown-American Water (Etown-American Water Co): Listed as owner of a key waterfront parcel at the west end of the trail system that provides direct access from Main Street to the waterfront. A portion of this parcel is designated as the future "Stone Bridge Park." This land is now controlled by NJ American Water Company since its acquisition of Elizabethtown Water in 2006.

Consolidated Rail Corp. (Conrail): Owner of an active and an abandoned rail right-of-way that runs parallel to waterfront. Portions of

Fig 45. Elizabethtown-American Water Property

the active rail right-of-way abut the riverfront. Establishing a trail easement through this area will be particularly challenging due to safety and liability concerns associated with allowing public access to an active rail ROW.

American Cyanamid Co.: Owner of a large, isolated +/- 15 acre parcel that is located along the eastern waterfront. This parcel is currently used by off-road vehicles and trail users as well as for hunting and fishing. After a series of mergers, Pfizer now owns and operates this land. Preliminary conversations have indicated that they would be amenable to allowing public use of this land and are constructing trails on an adjacent property to the west in Bridgewater.

Borough of Bound Brook: Owner of Rock Machine Park, one of the key access points to the Greenbrook Flood Control Levee maintenance path.

Residential Owners: Approximately 5 residential property owners own the land that a portion of the Green Brook Flood Control Levee was constructed on (within easements owned by ACOE).

Fig 46. Consolidated Rail Corp. Property

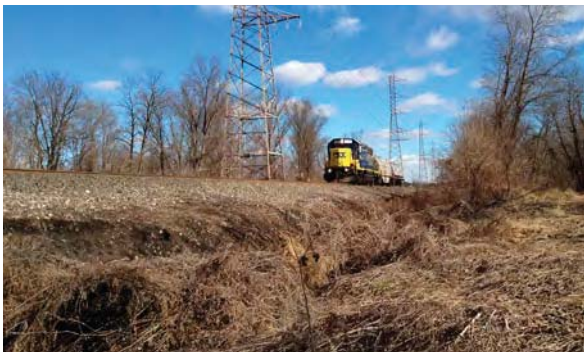


Fig 47. American Cyanamid Co. Property

Fig 48. Easement

Note: Clarification on the ownership, easement and operations associated with the levee is needed. The ownership description above was developed with the most current data available at the time of the report. However, there were several discrepencies in the data collected during the process. Specifically:

- *Ownership of the land south of the levee, between the levee and the Conrail Property, is indicated as 'residential' and the County has confirmed it as such. However, the Borough has indicated that this land was purchesed as part of the levee project and will be conveyed to the Borough as open space.*
- *The County stated that public access is not permitted on the levee maintenance path for hiking and bicycling. However, the Borough claims to have passed an ordinance allowing access and the Borough Police patrol it for this reason.*

Permitting and Regulations

The construction of the trail and related amenities will be regulated by a number of State and Federal agencies. Given the environmentally sensitive nature of the Raritan River and associated riparian areas, environmental permitting and the New Jersey Department of Environmental Protection (NJDEP) will likely be the most significant. While the permitting process can be time consuming and tedious, at the time of this report there are no major permitting or regulatory "red flags" anticipated. The outline below offers a summary of likely permits and regulations based on the current project understanding. This list is not intended to be all inclusive. Instead, it provides a loose overview of likely permits and the associated process that the borough can use as a basis for moving forward. Once the project moves further into design, a comprehensive list of required permits should be developed by the Borough and its consultants team to determine the timing, costs and likelihood of approval.

Freshwater Wetlands Protection Act Rules

It is likely that portions of the Bound Brook Riverfront Access Trail will be located within wetlands and/or wetland transition areas. Wetlands often times act as a transition between open waters, such as the Raritan River, and dry land but can also be isolated areas inland. These environmentally sensitive areas are regulated by the NJ DEP "Fresh Water Wetlands Protection Act."

Construction of trails within wetlands or wetland transition areas will require a "General Permit." There are three statewide General Permits (GP's) that may be required for the implementation of the Bound Brook Riverfront Access Trail System:

General Permit 17 (GP 17): This permit authorizes work in wetlands, open waters or wetland transition areas for construction of trails/boardwalks for pedestrians, bicycles or other non-motorized methods of transport. GP 17 does not authorize construction of a restroom, gazebo, rain shelter, or any covered or enclosed structure. Nor does it authorize construction of a roadway for use by automobiles, golf carts, motorcycles, motorized trail bikes, all-terrain vehicles, or other motor vehicles. There are a number of special conditions that must be adhered to. Two elements related to design and include:

Fig 49. Wetlands or Open Waters

- Trail shall be no wider than 6’
- The trail shall incorporate educational elements such as signs identifying plants, animals or other significant features.
- Trail shall be aligned to minimize impacts to wetlands, State Open Waters and wetland transition areas.
- This permit excludes any covered or enclosed structure (gazebo, rain shelter, restroom etc) as well as the use by motor vehicles of any kind including golf carts, quads, ATVs or motorized trail bikes.

General Permit 17A (GP 17A): This permit is similar to GP 17 but is intended for “multi-use paths” that will include “bicycles, skateboards, rollerblades and other non-motorized methods of transport.” There are a number of special conditions that must be adhered to. Two elements related to design include:

- Trail shall be designed in compliance with American Association of State Highway and Transportation Officials (AASHTO) “Guide for the Development of Bicycle Facilities”
- Trail shall be aligned to minimize impacts to wetlands, State Open Waters and wetland transition areas.
- This permit excludes any covered or enclosed structure (gazebo, rain shelter, restroom etc) as well as the use by motor vehicles of any kind including golf carts, quads, ATVs or motorized trail bikes.

Fig 50. Multi-use Paths

General Permit 19 (GP 19): This permit authorizes work within wetlands, open waters or wetland transition areas for construction of a dock or pier in order to obtain access to State Open Waters. This permit may be required to provide paddle boat, kayak, and/or canoe access at the proposed Stone Bridge Park (as outlined in the Urban Design Plan).

Individual Permit (IP): If the design does not comply with the Special Conditions of the GP then an Individual Permit (IP) would be required. NJDEP is unlikely to approve an Individual Permit for construction of a trail. For this reason, it is important that all elements of this trail system are designed in compliance with the appropriate GP and associated Special Conditions.

Flood Hazard Area Control Act Rules

According to NJDEP, the Flood Hazard Area is "the land, and the space above that land, which lies below the flood hazard area design flood elevation." Most, if not all of the area between the Green Brook Levee and the Raritan River is considered a "Flood Hazard Area." In addition, the land along the edges of a waterway is known as the "Riparian Zone." This zone and the associated vegetation perform many important ecological functions and are also regulated under the Flood Hazard Area Control Act. The "Riparian Zone" is 50 ', 150' or 300' from the edge of the waterway depending on the environmental sensitivity of the waterway. The construction of a trail or any other work within this area will require one of the following two Flood Hazard Area Permits:

Permit-by-Rule: This is the preferable option and it is likely that the activities associated with the construction of the trail system can be designed to comply with a PBR. According to NJDEP "A"PBR" is a permit whose terms and conditions are set forth in the Flood Hazard Area Control Act rules and for which no prior written approval from the Department is necessary in order to undertake the specified regulated activity, provided all conditions of the permit-by-rule are satisfied. The Department has determined that if the regulated activities are undertaken as prescribed in the respective permits-by-rule, the impact on flooding and the environment will be de minimis. " Based on a preliminary review, the construction of the trail system may comply with a PBR if all construction is situated at or below grade (i.e. the trail is not elevated and does not require fill).

Individual Permit: If the project doesn't comply with a PBR, it will require an Individual Permit (IP) . As long as the trail is designed in a way that does not require "fill" or raising the elevation, the primary issue will be disturbance to riparian zone vegetation. The primary requirements may include:

- Maximum of 1,000, 3,000 or 6,000 square feet of vegetation disturbance (depending on Riparian Zone buffer)
- Prove that there are no alternative locations for the trail outside of the riparian zone and that the alignment minimizes disturbance.

Fig 51. RIparian Zone

Stormwater Management Rules

Both the Freshwater Wetlands Protection Act Rules and the Flood Hazard Area Control Act Rules require compliance with the NJDEP "Stormwater Management Rule" if the project meets the definition of a "major development." Generally, a major development is defined as "a new development that will ultimately result in the disturbance of one or more acres of land, or increase impervious surfaces by one-quarter acre or more…" The Storm Water Management Rules emphasize the use of non-structural stormwater management techniques that will apply to the construction of this trail system including minimizing disturbance, minimizing impervious surfaces and preserving natural drainage features. The rules also set forth requirements for groundwater recharge, stormwater runoff quantity control, stormwater runoff quality control and a Special Water Resource Protection Area (SWRPA) or 300 foot buffer adjacent to Category One (C1) waters and their immediate tributaries.

» Exemption

The Stormwater Management Rule exempts "the construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material."

Soil Erosion and Sediment Control Plan Certification

Bound Brook is within the Somerset-Union Soil Conservation District. If the trail construction requires the disturbance of more than 5,000 square feet of land, which it likely will, then a Soil Erosion and Sediment Control Plan Certification will be required.

Delaware & Raritan Canal Commission Approval

The D+R Canal Commission administers a land use regulatory program for any developments that may have drainage, visual or other ecological impacts on the D+R Canal State Park. Since this project is on the opposite side of the river, it is unlikely that commission approval would be required. However, a courtesy review meeting may be justified if there will be a visual impact.

Americans with Disabilities Act and US Access Board

Promoting equality and providing access to the trail system and waterfront for people with disabilities is regulated by the United States Access Board. The Americans with Disabilities Act Accessibilities Guidelines (ADAAG) have long addressed access to buildings, recreational facilities and boating facilities. However, revisions (both approved and pending) will include new provisions that address access to trails, picnic areas and waterfront access routes. Additionally the board is in the process of developing new guidelines that will cover access to public-rights-of-way including sidewalks, off-road multi-use paths, intersections and street crossings.

The new guidelines are under development at the time of this report but may be adopted by the time this project is constructed. It is likely that the guidelines will address such issues as trail width, slope, materials, obstructions, trail marker/blaze and trail heads. Therefore, it is critical that the borough study and understand these regulations prior to proceeding with design.

NJ Department of Transportation / NJ TRANSIT

Pedestrian safety along rail lines is a priority for the NJ Department of Transportation (NJDOT) and NJ TRANSIT. In 2012, the agencies jointly released the "New Jersey Safety along Railroads Short-Term Action Plan." This guide outlines a series of short term engineering, enforcement and education actions that will improve public safety along rails. In addition, NJDOT's 'Railroad Engineering and Safety Unit' is responsible for all reviews and programs involving changes and improvements to all public rail crossings in New Jersey that are designed in compliance with Federal Railroad Administration guidelines. In addition to crossings, this unit reviews any project that is parallel to a railroad within 200'. Since a majority of the proposed Bound Brook Riverfront Access trail system is within 200' of active or abandoned rail rights-of-way, Conrail, NJDOT and NJ TRANSIT will require a review and may impose safety measures (such as barriers and fencing) or other restrictions. This is a particular concern in areas where the proposed trail is in close proximity to active rail rights-of-way, or proposes to utilize abandoned or inactive right-of-way.

It is recommended that a preliminary meeting be held with NJDOT and/or NJ TRANSIT to determine the extent of the safety requirements and potential concerns.

Guidance and reference material regarding the permits and regulations listed above can be found at:

- *NJ DEP (Trails, Boardwalks and Bike Paths) – http://www.nj.gov/dep/landuse/activity/trail.html*
- *Somerset-Union Soil Conservation District – http://www.co.somerset.nj.us/publicworks/soil/*
- *Delaware + Raritan Canal Commission – http://www.dandrcanal.com/drcc/regulatory.html*
- *United States Access Board – http://www.access-board.gov*
- *New Jersey Safety along Railroads Short-Term Action Plan – http://www.state.nj.us/transportation/commuter/pedsafety/pdf/NJSafetyalongRailroads_000.pdf*
- *NJDOT Rail Safety – http://www.state.nj.us/transportation/commuter/pedsafety/railroad.shtm*

Existing Conditions Analysis

This section provides an in-depth description of strengths, weaknesses, opportunities and threats associated with providing safe and efficient bicycle and pedestrian access to and along the riverfront. This analysis informed the development of the "Implementation Plan" section of this study.

This section is divided into the four key elements that will help create safe riverfront access for bicycles and pedestrians:

- Key Assets and Regional Attractors
- On-Road Bicycle and Pedestrian Routes
- Off-Road Bicycle and Pedestrian Routes
- Railroad Crossing Points

Key Attractors and Regional Connections

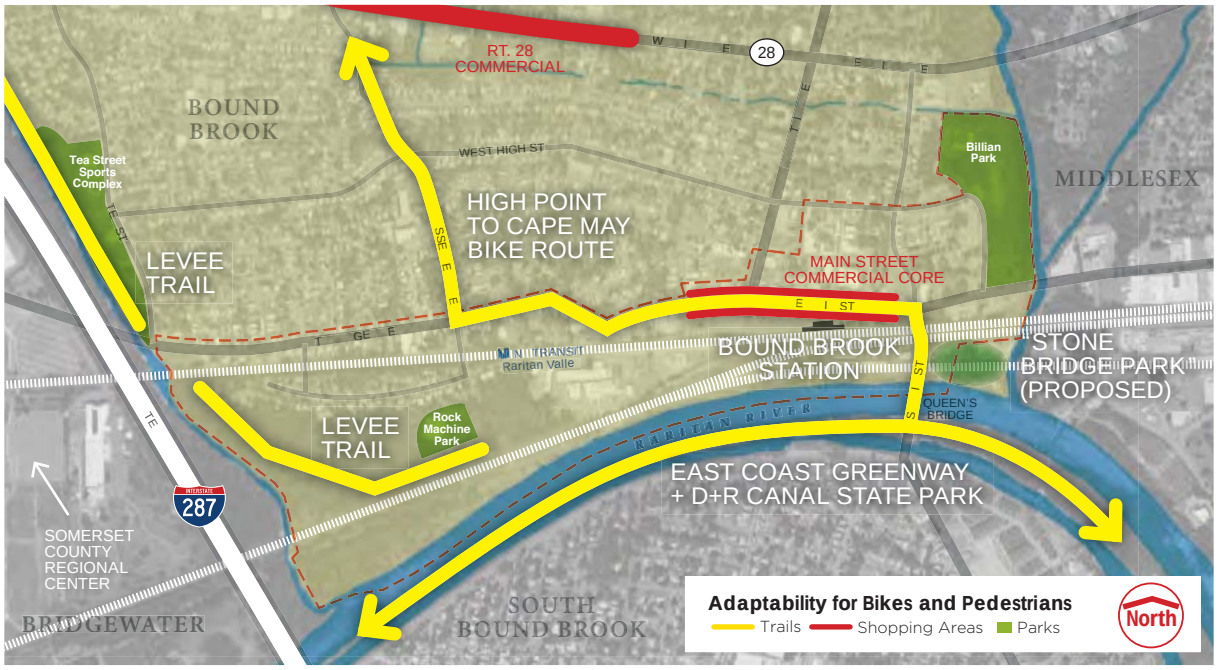
Overview

Downtown Bound Brook is surrounded by diverse land use, key destinations, regional trail systems and other attractions. A comprehensive bicycle and pedestrian network will connect the downtown and riverfront with these key local attractors/destinations. This memorandum identifies these destinations and groups them in broad categories as follows:

- Downtown and Commercial Areas
- Parks and Open Space
- Regional Trail Systems

The location of all key attractors and regional connections can be found in Fig 52.

Fig 52. Key Attractors and Connections Diagram



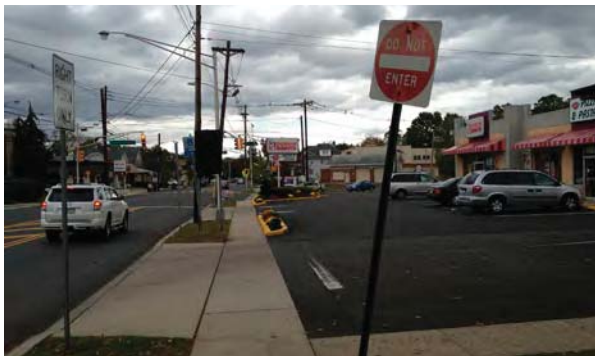
Downtown + Commercial Areas

Rt. 28 Commercial Areas: The western portion of Route 28 is lined with food and convenience retail strip stores that are primarily vehicular destinations. In most cases, the building is setback from the road and a large surface parking lot is provided in the front yard. Large, car oriented retail signs, overhead utilities with cobra head lighting and a lack of street trees or pedestrian amenities create an uncomfortable environment for bicycles and pedestrians [Fig 53].

Main Street Shopping/Dining Area: The character and uses along Main Street offer a much different experience than that along Rt 28. While the uses vary throughout its length, in general Main Street provides a pedestrian oriented retail experience. The primary shopping and dining area currently extends from East Street (at the roundabout) to Mountain Avenue [Fig 53]. This area maintains a consistent "street wall" and is lined with small shops and dining establishments. As you travel west from Mountain Avenue, the street wall gradually becomes less consistent and is interrupted by large surface parking lots, the largest of which is the NJ TRANSIT lot. This area is generally less comfortable for pedestrians and the uses are more vehicular oriented.

Bound Brook Train Station: The NJ TRANSIT commuter train station is a primary destination for residents and visitors including many commuters that walk or bike from South Bound Brook. The majority of commuters arrive by car but the bicycle racks also appear to be well used [Fig 54]. Pedestrians accessing the station walk across an expansive asphalt parking lot with no defined pedestrian area.

Fig 53. Downtown and Commercial Shopping Areas



Rt. 28 Commercial Area

Main Street Shopping and Dining

Fig 54. Bound Brook Train Station

Bound Brook Station Platform

Bike Parking at Bound Brook Station

Parks and Open Space

Billian Legion Park: A +/- 9-acre park comprised of primarily active uses including ball fields, soccer fields, children's playground and volleyball courts. This park hosts a variety of events throughout the year including the annual carnival. Billian Legion Park is somewhat isolated and disconnected from the downtown and surrounding neighborhoods. This is due in part to being bound by the levee to the north and east; and residential rear yards to the west. In addition, the round-about creates a physical barrier between downtown and the main park entrance. It has limited street frontage with a small segment of frontage along Main Street [Fig 55].

Rock Machine Park: A +/- 1-acre isolated ball park used as a practice field for local sports teams. This park is isolated due to its location between the rear yard of adjacent residential lots and the levee. The understated, almost hidden entry between two residential homes, and a lack of effective entry signage contribute to this.

Tea Street Sports Complex: An approximately 4-acre park located along the western edge of the borough. This park is comprised of several ball fields and is one of the more visible parks in town. A levee trail runs adjacent to the park along the Middle Brook, with access provided near the intersection of Tea Street and Talmage Avenue [Fig 55].

Green Brook Flood Control Levee: During the construction of the Green Brook Levee Flood Control Project, an earth levee was installed along the exposed edges of the borough. An asphalt maintenance path was constructed along the top of the levee located on the west and southwest edges of the borough and is used recreationally by cyclists. The levee is maintained by Somerset County. Somerset County states that the levee is controlled by a utility easement that does not permit public access. However, the Borough stated that an ordinance was passed allowing public access and that Borough police patrol the path for this reason. Any public access would require modification of the easement. [Fig 55].

Fig 55. Existing Parks and Open Space

Billian Legion Park

Rock Machine Park

Tea Street Sports Complex

Green Brook Flood Control Levee Maintenance Path

Proposed "Stone Bridge Park": The Urban Design Plan envisions a highly programmed waterfront park to celebrate the historic "Old Stone Arch Bridge" [Fig 56]. A key piece of this project is the rehabilitation of the bridge. The County has expressed interest in restarting these efforts. However, Somerset County envisions this as a challenging, long-term undertaking that requires outside funding sources, realignment and vacating of a portion of the Port Reading Rail ROW, and acquisition of a existing trucking facility adjacent to the bridge.

The Urban Design Plan calls for an ambitious strategy to establish a park that celebrates this bridge. The plan calls for collaborative work with Middlesex Borough (a portion of the designated site is in Middlesex) to include a Raritan River Museum, amphitheater, picnic area, open lawn, paddling and other water-based activities, and parking. The concept plan relies on the acquisition of several private properties as well as the vacating of this segment of the Port Reading Secondary Rail ROW. The primary property owners are G+P Properties and E-Town American Water.

A small portion of the area identified as "Stone Bridge Park" is currently used informally by residents and visitors to access the waterfront for fishing or relaxing [Fig 57]. It also appears that it may be used by maintenance vehicles or recreational off-road recreational vehicles traveling west along the riverfront. An informal access road just north of the bridge provides bicycle and pedestrian access to a cleared, level open space along the river. There are some maintenance and security concerns including litter ranging from basic trash and liquor bottles to home furnishings and televisions. With modest improvements, trash removal and an agreement with the current property owner (E-Town American Water), this space may provide short term riverfront access and open space. [Refer to Fig 56 and 57.]

Fig 56. "Stone Bridge Park" Plan

Existing Conditions Aerial Photograph

Urban Design Plan – "Stone Bridge Park" Concept

Fig 57. "Stone Bridge Park" Existing Conditions Photos

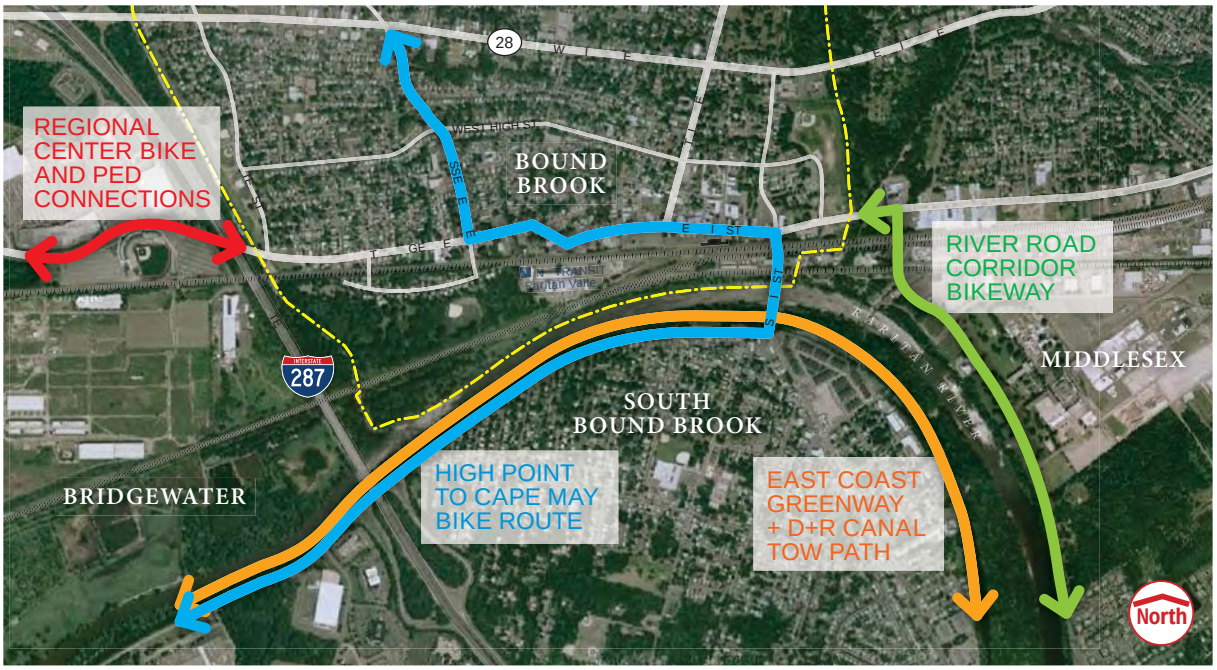

Gravel Access Road Sloping Down to Level Area


Cleared Level Area Along Riverfront

Regional Trail System

There are several regional trail systems that pass through or near-by Bound Brook. These trails present opportunities for linking downtown Bound Brook to regional attractors including Rutgers University, Johnson Park, D+R Canal State Park, TD Bank Ballpark and downtown Somerville [Fig 58]. The Regional Trails include:

Fig 58. Key Attractors and Connections Diagram



The D+R Canal State Park: A 70-mile recreational corridor used for canoeing, hiking, bicycling, fishing and horseback riding [Fig 59]. Bound Brook has a direct bicycle and pedestrian connection to the D+R Canal Tow Path via the Queen's Bridge.

East Coast Greenway: A 3000-mile, publicly-owned trail system that runs from Maine to Florida. The greenway passes directly adjacent to Bound Brook on the south side of the Raritan River utilizing the D+R Canal State Park. In addition, an on-road segment can be accessed approximately 5-miles east of Bound Brook via the River Road Corridor Bikeway.

Fig 59. D+R canal State Park and East Coast Greenway Images

Crushed Stone Trail

East Coast Greenway Marker

High Point to Cape May Bike Route: A 238-mile on-road bike route that traverses the center of New Jersey and provides users with a unique way to experience New Jersey's varied landscape. The route enters Bound Brook from the north along Vosseller Avenue, travels east along Talmage Avenue and Main Street where it eventually crosses the Queen's Bridge into South Bound Brook.

River Road Corridor Bikeway: The draft Middlesex County Transportation Plan supports proposed bicycle facilities that would extend the Johnson Park Bikeway along River Road in Middlesex County into downtown Bound Brook. As described in the plan, this new bikeway would connect "regional land uses" to a "major transportation facility" at the Bound Brook Train Station.

"Somerset County Regional Center Pedestrian, Bicycle and Greenway Systems Connection Plan": Somerset County established a strategy to improve pedestrian and bicycle access within the Regional Center. The study recommends improved connectivity to Bound Brook via pedestrian improvements and bicycle lanes linking to Talmage Avenue.

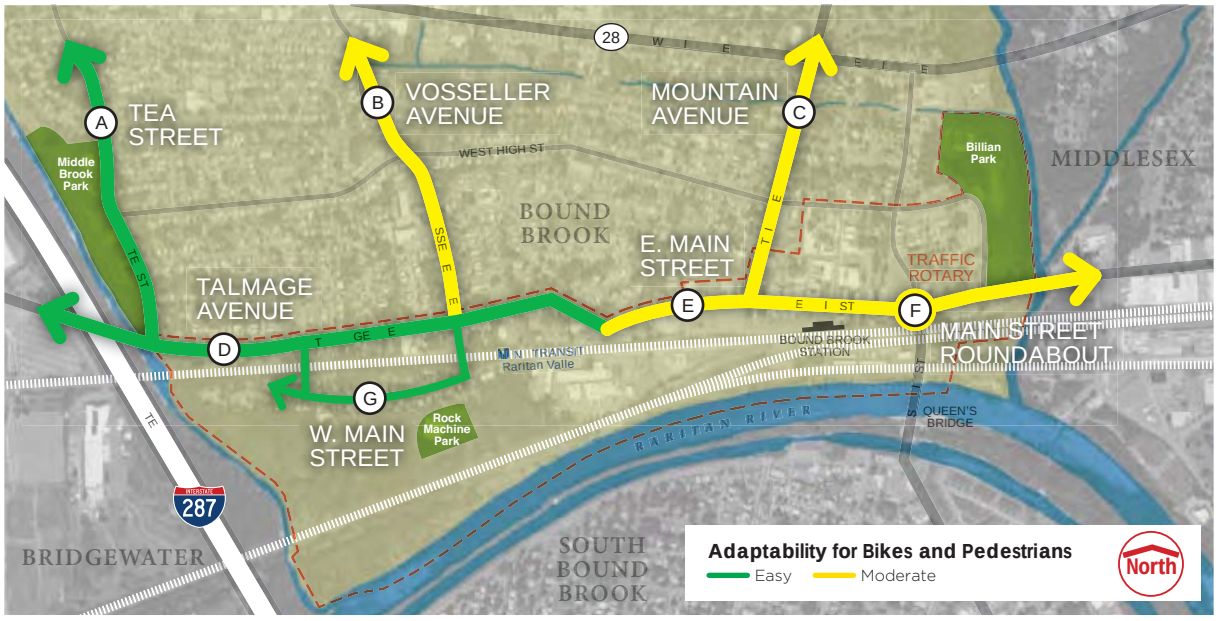
On-Road Bicycle and Pedestrian Routes

Overview

The first step in reconnecting residents of Bound Brook with the waterfront is strengthening the bicycle and pedestrian connections to and within the downtown. A majority of the existing streets throughout Bound Brook are already pedestrian friendly and walkable although bicycle facilities are absent. Roughly half of the borough (geographically) is within a 10 minute (1/2 mile) walk of the downtown and the entire borough is within a comfortable 5 or 10-minute bicycle ride (1 mile). Applying a Complete Streets strategy to the existing street network will help make safe, easy connection for these residents. Bicycle facilities, on the other hand, are absent.

A successful Complete Streets strategy also relies on a comprehensive education and advocacy program to make drivers, cyclists and pedestrians aware of the "rules of the road." This is particularly important in diverse communities like Bound Brook, where cultural differences regarding bicycling and walking may create safety issues and conflicts. Recent studies suggest that a disproportionate amount of persons killed or injured in traffic crashes are Hispanic immigrants (USDOT FHWA, 'Promoting Pedestrian and Bicyclist Safety to Hispanic Audiences). In response to the growing Hispanic population, Bound Brook should initiate a marketing and education program that promotes bicycle and pedestrian safety amongst this population. The Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA) initiated a project to develop appropriate outreach materials and a plan for distributing them to these audiences (http://safety.fhwa.dot.gov/ped_bike/hispanic/). In addition to FHWA's efforts on pedestrian education, NJTPA is also launching a Pedestrian Safety Education Campaign focusing on the educational and enforcement

Fig 60. On-Road Bicycle and Pedestrian Routes Diagram



components of the four “E’s” (Engineering, Education, Enforcement, and Emergency services) of traffic safety.

Fig 60 is a diagram of the key north-south and east-west connectors that link the Waterfront to the rest of Bound Brook and surrounding communities. It can be used to identify the location of elements discussed in the following text.

North – South Connectors

There are three primary north/south corridors that offer an opportunity to link the outlying residential neighborhoods with the downtown and waterfront: Tea Street, Vosseller Avenue and Mountain Avenue. In all cases, these streets also act as primary vehicular connections and are dominated by cars. Upgrading these streets to “Complete Streets,” or identifying parallel streets that safely accommodate bicyclists, pedestrians will strengthen downtown and waterfront connections for all users. The three primary corridors are:

Tea Street [Fig 60 (A)]: Runs adjacent to Tea Street Park and passes through several distinct zones including a residential neighborhood and a commercial zone with strip mall and large surface parking lot. Sidewalk location, consistency and condition varies as it passes through these zones with some stretches having no sidewalks at all. No bicycle facilities are provided but oversized drive lanes and road shoulders offer an opportunity bicycle lanes.

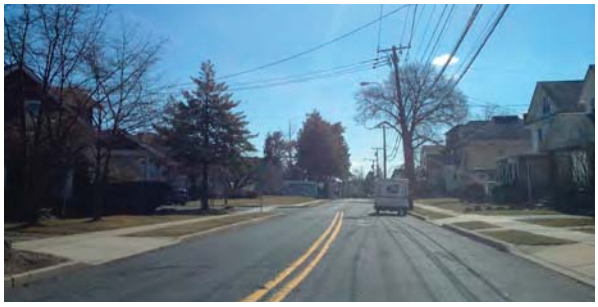
Vosseller Avenue [Fig 60 (B)]: A centrally located county road that begins at W. Main Street and extends into Martinsville. This street traverses many commercial and residential zones. Sidewalk is consistent on both sides of the streets but bicycles are not accommodated. Road width is somewhat constrained and there are high traffic volumes observed. Vosseller Avenue, from Main Street to Route 22, is particularly important because it is a designated street for the NJDOT High Point to Cape May Bike Route (refer to page 8 for additional detail).

Mountain Avenue [Fig 60 (C)]: A primary vehicular connector from Rt. 28 / Union Avenue to Main Street. It is a low density street lined primarily with residential and low density

Fig 61. North - South Connector Photos

Tea Street (near Wheatland Avenue)

Tea Street (near Verona Place)



Vosseller Avenue (near Grove Avenue)

Mountain Avenue

professional office/commercial space as it approaches downtown. Sidewalks are consistent on both sides of the street. Road width is constrained with moderate to high traffic volumes observed.

East – West Connectors

Talmage Avenue and East Main Street comprise the primary east-west connectors that bring pedestrians and cyclists to the waterfront access points. This corridor links the waterfront access points, the train station and downtown destinations to local and regional attractors including the bridge to South Bound Brook, D+R Canal State Park, Billian Legion Park and the River Road Corridor Bikeway. Creating a safe and inviting bicycle and pedestrian corridor will be critical to the success of the downtown and waterfront connectivity.

Talmage Avenue [Fig 60 (D)]: This two lane roadway begins at the western border of Bound Brook at the intersection of Tea Street and extends east for approximately 1-mile where it bends and transitions into Main Street. Talmage Avenue is lined with an eclectic mix of residential, commercial and surface parking lots. The sidewalks are consistent on both sides of the street but have narrow widths with little or no buffer from the roadway. The street has little or no street trees or plant material and is not a comfortable street for pedestrians. In addition, there are no bicycle accommodations and moderate vehicular and truck traffic volumes [Fig 62].

East Main Street [Fig 60 (E)]: This two-lane road is Bound Brook's historic downtown and commercial corridor. It is lined with commercial uses, on-street parking and ample pedestrian accommodations. Street trees and landscape is provided in many areas. Bicycle accommodations are not provided although many bicyclists were observed using this street and riding both in the street and on the sidewalk. Generally, Main Street is comfortable for pedestrians and cyclists and can be made "Complete" with modest improvements. This is also an important regional connection for bicyclists and pedestrians. They are identified as key

Fig 62. North - South Connector Photos

Talmage Avenue lacks pedestrian scale.

Main Street provides a comfortable ped. environment

bicycle and pedestrian connectors in many of the regional plans including Middlesex County Transportation Master Plan - River Road Corridor Bikeway; Somerset County Regional Center Greenway; and the High Point to Cape May Bike Route. However, the recently published NJDOT "New Jersey Bicycle Map and Resource Guide" identifies this corridor as "Least Suitable" for bicycling [Fig 62].

The Main Street Roundabout [Fig 60 (F)]: The intersection of E. Main Street and S. Main Street is a critical node for cars, pedestrians and cyclists. In 2006, Somerset County realigned this intersection and constructed a roundabout in an effort to reduce vehicular conflicts and allow vehicular access to downtown from S. Main Street / Queen's Bridge. However, the roundabout has presented several issues impacting bicycle and pedestrian riverfront access and downtown connectivity.

- Congestion: At peak times there is significant vehicular traffic around the roundabout and extending in all directions. The county has indicated that this is due largely to the traffic signal in South Bound Brook and the Port Reading Secondary at-grade rail crossing just south of the roundabout.
- Bicycle and Pedestrian Crossing: The roundabout is difficult for pedestrians and bicyclists to cross or navigate. No pedestrian crossing is provided on the south side of the roundabout. It is understood that the adjacent developer of the Bollmer site is proposing pedestrian improvements to this area but they have not yet been defined. Improvements may include a fence to prevent pedestrian crossing on the south side of the roundabout.

Fig 63. Main Street Roundabout - Existing condition

Roundabout

Roundabout: Median in disrepair.

- Maintenance and Durability: The maintenance of the roundabout and associated medians is challenging [Fig 63]. This issue is exacerbated by the limited durability of the materials and construction methods as well as the large, maintenance intensive planting beds. Somerset County is responsible for the repair and upkeep of the roundabout and medians.

West Main Street [Fig 60 (G)]: In addition to the primary streets listed above, a small but important segment of W. Main Street extends onto the south side of the rail line. This quiet residential street provides access to Rock Machine Park and access to the levee maintenance path. Sidewalks are new and the low-traffic volume is ideal for bicyclists.

Fig 64. West Main Street

Levee maintenance path access from west end of W. Main Street

W. Main Street dead end residential street

Off-Road Bicycle and Pedestrian Routes

Overview

Providing access and connectivity from Downtown Bound Brook to the Raritan River is an important but challenging undertaking. Today, a system of make-shift off-road trails are used recreationally by hikers, fishermen, off-road recreational vehicles and others. These trails traverse private property (without formal permission) and are in a variety of conditions. In addition, in some cases the trails are located near or within active rail right-of-way which is an immediate safety concern. A system of formal, legal off-road trails is required to establish a safe connection to the riverfront.

Primary challenges facing the implementation of the off-road trail system include:

Property Ownership: The property located between Main Street and the Raritan River has a variety of ownerships, rights-of-way and easements. These include: NJ TRANSIT, Conrail, Somerset County and private property owners

State and Federal Regulations: Constructing within the flood zone and river buffers can be a challenging undertaking due to State and Federal regulations and setbacks. In addition, implementing any improvements that may impact the Green Brook Flood Control Levee will require coordination and approval from the U.S. Army Corps of Engineers, State of New Jersey and Someset County..

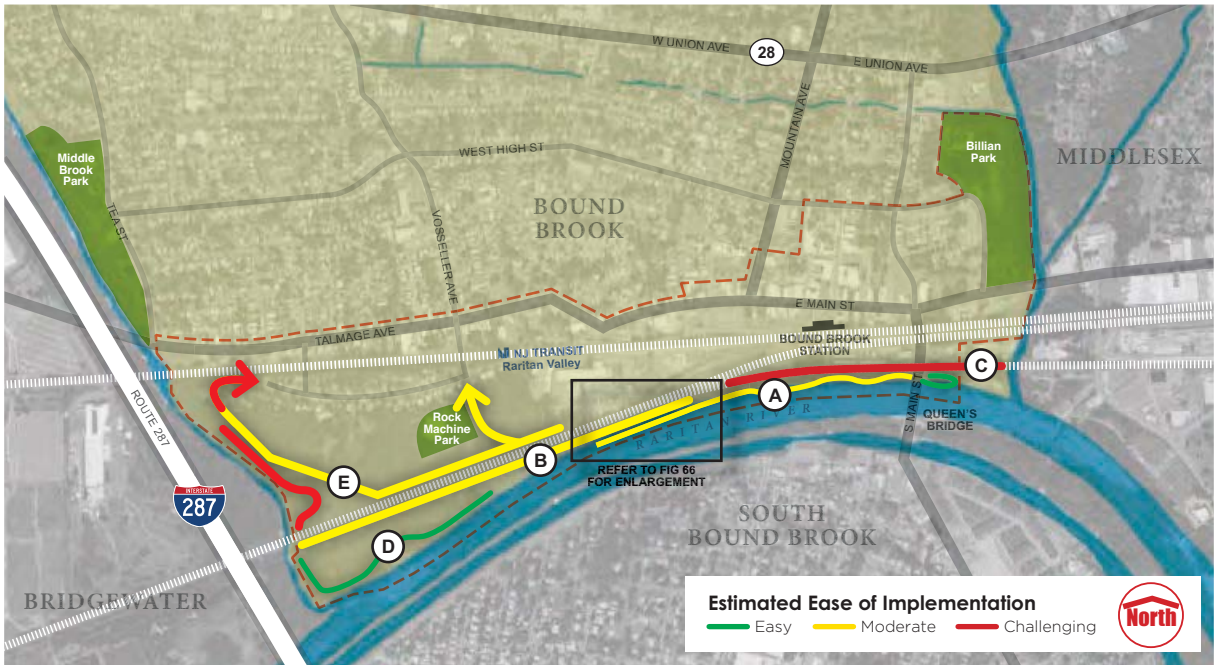
Operations and Maintenance: The long term sustainability and success of an off-road trail system relies heavily on the ability to operate and maintain it appropriately. This require's man-power and financial means. At the time of this study, the Borough and County resources are over committed maintaining the existing parks and infrastructure.

Security: In addition to operations and maintenance, an off-road trail system will require patrolling and/or security. Borough police currently patrol the levee maintenance path using ATVs and have been able to keep this area secure. However, due to limited resources, they have indicated that it would be difficult for them to expand their patrolling efforts at this time. Accessible areas of the waterfront that are not currently patrolled are being used for undesirable uses and gathering dumped trash, old furniture, alcohol containers and other litter.

Existing and Proposed Off-Road Routes

There are a number of existing off-road trails to and along the riverfront. In some cases the existing trails are constructed of stable materials and are of sufficient width and would need little more than minor upgrades and access agreements/easements. In other cases, more significant improvements would be required to make the trails safe and appropriate for public use.

Fig 65. Existing Off-road Bike+Ped. Routes Diagram



This section provides an inventory and analysis of these existing trails to determine the feasibility of converting them into a legal trail system for public use.

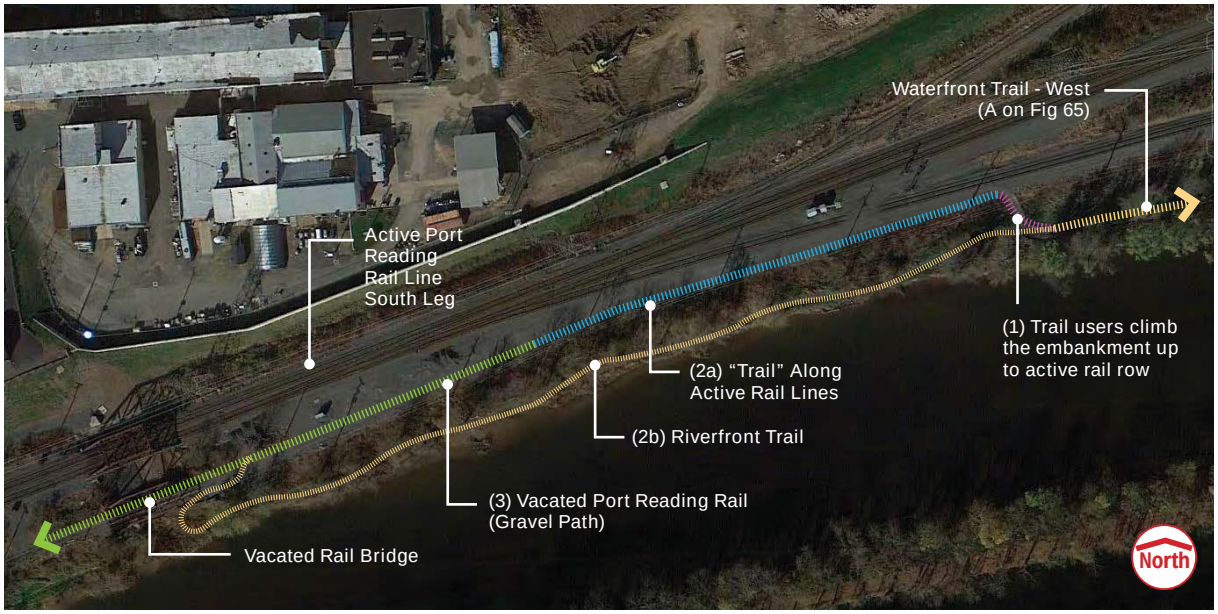
» Primary Riverfront Spine

Primary east-west access along the river front is provided informally via a combination of two trail segments:

Riverfront Trail - East [Fig 65 (A)]: Beginning at the borough's eastern border, a dirt trail meanders along the waterfront. This trail extends beneath the Queen's Bridge and continues approximately one-half of the length of the riverfront. The width and condition of the trail varies, but additional space is available along the waterfront to formalize these trails. The trail is located primarily within private property owned by E-Town Water Company, whose property line extends to the river. At or near the end of the E-Town Water Company property, the trail splits. It appears that some users, presumably primarily off-road recreational vehicles (based on observing tire tracks), transition up the embankment to the active Port Reading Secondary Rail ROW. This use of the active rail right-of-way presents a significant safety concern and is trespassing. Meanwhile, some hikers continue along a somewhat narrow but comfortable meandering dirt path along the river front.

Fig 66 shows how users transition from Riverfront Trail East to the Vacated Port Reading Rail ROW. First, trail users climb up to the active rail ROW (1). They walk or drive along the active rail lines for approximately 600 feet (2a). This section of the "trail" is particularly concerning because there is no buffer between the active train line and the "trail" users. After a short distance, trail users then transition onto the Vacated Port Reading Rail ROW (3).

Fig 66. Riverfront Trail Crossing Enlargement



Aerial Photo of current riverfront trail alignment

(1) Some trail users climb this embankment to the active rail ROW

(2a) At top of embankment, users travel along the active rail ROW

(2b) Hikers continue along the waterfront trail

(3) Trail then transitions to vacated Port Reading ROW

Abandoned Port Reading Rail ROW [Fig 65 (B)]: A portion of the Port Reading Secondary, directly adjacent to the active Port Reading Rail, has been vacated and relocated. The rails were removed and a 15-foot (approx.) wide gravel path exists in its place. This path continues over the vacated bridge to the western border of the borough.

Utilizing this existing path for recreational use is a cost effective method for providing access along the waterfront since the infrastructure exists and appears to be in excellent condition.

Rail to Trail Conversion [Fig 65 (C)]: The Urban Design Plan (UDP) discusses the potential to vacate a small portion of the Port Reading Secondary and convert the ROW into a rail trail and public park (Stone Bridge Park). If this segment is vacated, it would replace the Riverfront Trail - East [Fig 65 (A)] discussed above and eliminate the need to use private property (E-Town Water Company).

The UDP indicates that Somerset County has been investigating the viability of this since 2007. The county has indicated that this is a long term goal that will require strategic planning and outside funding.

» West End Trails

Riverfront Trail - West [Fig 65 (D)]: Informal trails have been created that provide access to the riverfront along Middle Brook. The first segment of these trails begin at the base of the levee and extend south to Railroad ROW. These dirt trails appear to cut through the rear yard of (large) private residential properties located between the levee and the railroad. The County has noted these parcels were not purchased as part of the levee construction and are owned by the residential property owners. However, the borough has indicated that this land is being conveyed to the Borough as open space. Clarification is needed.

Fig 67. Riverfront Trail - West

Gravel path at base of levee (looking SE)

Informal dirt trails through private property (looking N)

Trail beneath Middle Brook rail road bridge

View of American Cyanamid (Pfizer) parcel

The trail then passes beneath the Middle Brook railroad bridge onto a large triangular piece of property owned by American Cyanamid (Pfizer). Recreational trails circle around this property and are used by ATVs and other recreational vehicles.

Levee Maintenance Path [Fig 65 (E)]: There is an existing asphalt maintenance path along the top of the Green Brook Flood Control Levee that extends from roughly the area adjacent to "Rock Machine Park" north and west until it intersects with West Main Street. The path is being used informally by bicyclists and hikers. The path and levee are maintained by Somerset County. According to the County, public access is not permitted to the levee or maintenance path and any current public use of the path constitutes trespassing. However, the Borough claims to have passed an ordinace allowing access and Borough police patrol the path for this reason. Any public access would require modification of the easement.

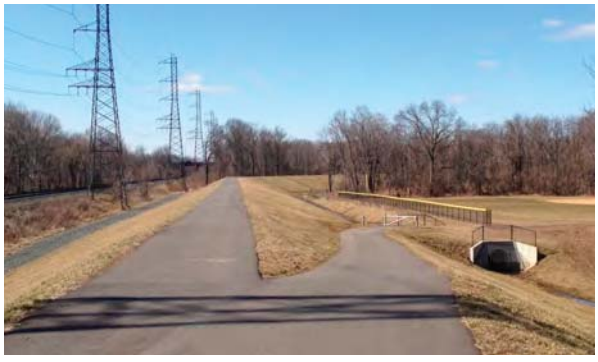
There are three existing access points to the maintanance path. The one located at the western end of West Main Street and the second located in Rock Machine Park appear to be suitable for recreational access if permitted. The third access point located in Brook Industrial Park is through private property and does not appear to be suitable for reacreational use.

If the maintenance path were to be opened for public use, it would require upgrades. The steep side slopes of the levee may necesitate design interventions and bicycle safety precautions the feasibility of which is unknown.

Fig 68. Levee Maintenance Path

Gate at W. Main Street access to maintenance path

Gate and bike desire tracks at Rock Machine Park access



View of trail and Rock Machine Park access path

View towards the terminus of the maintenance path

Railroad Crossing Points

Overview

The active rail lines are perhaps the most significant challenge to providing safe access to the waterfront. Railroads located near public open space, parks and schools tend to generate the most accidents. The high volume of crossings these uses generate, especially by children and young adults, contributes to most of the issues. Identifying the safest way to get users across the NJ TRANSIT railroad and the freight railroad is essential to both the success of the Urban Design Plan and to the safety of the community.

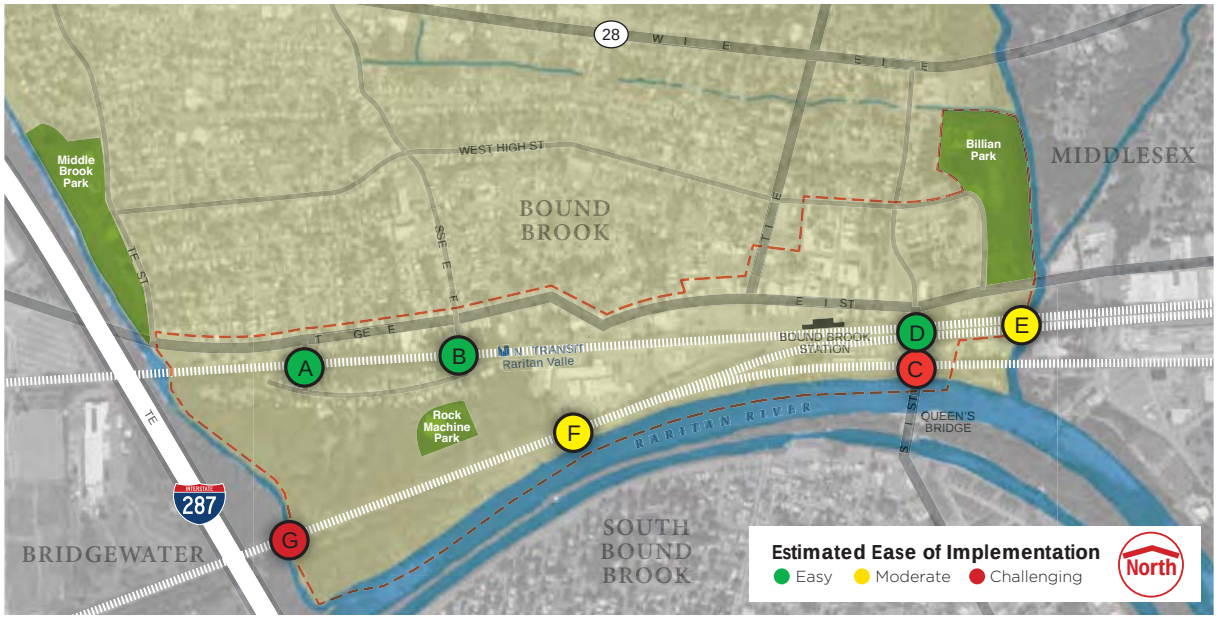
In 2012, NJ TRANSIT, in coordination with NJDOT, developed the New Jersey Safety Along Railroads manual. The manual emphasizes that railroad safety cannot be achieved by design and engineering alone. It also requires a comprehensive education and enforcement program to inform the community about the dangers associated with pedestrians and cyclists crossing and/or walking along railroads. This section outlines existing and potential rail crossing locations as well as existing concerns and efficiencies. Any physical improvements should be coupled by a coordinated "Rail Safety" outreach and education program.

The following is a discussion of existing Rail Crossings in Bound Brook. The location of crossings can be identified in Fig 69.

There are a number of opportunities for creating safe railroad crossings in Bound Brook. These crossings identified in the map below fall into 4 primary categories:

- At-Grade Crossings
- Pedestrian Underpass
- Pedestrian Overpass

Fig 69. On-Road Bicycle and Pedestrian Routes Diagram



Rail Crossing Types and Locations

» At-grade Crossings

This type of crossing is the simplest and most cost effective to implement. However, without the proper safety precautions it can also be the most dangerous. NJ TRANSIT, in coordination with NJTPA and NJDOT, has made efforts to make at-grade crossings safer. Any additional pedestrian activity will require appropriate pedestrian safety treatments. There are three (3) existing at-grade crossings that appear to be in varying condition. Each of them seems to function well for vehicles, but lacks any bicycle or pedestrian features or facilities. With minor upgrades these crossing could become acceptable rail crossing points. However, the safety program should not be limited to engineered solutions. As outlined in the NJ TRANSIT 2012 report titled "New Jersey Safety Along Railroads", engineering, education and enforcement must work together to improve railroad safety. Railroads that are located near parks and open space, such is the case in Bound Brook, tend to attract higher numbers of children and young adults and therefore require a more robust outreach and education program.

Lamonte Avenue Crossing [Fig 69 (A)]: This at-grade crossing appears to be in the best condition having recently been upgraded by NJ TRANSIT. There is a new grade platform provided between the rails. However no defined pedestrian or bicycle areas are provided.

Fig 70. Lamonte Avenue Crossing

Lamonte Avenue lacks sidewalks south of tracks

Lamonte Avenue new crossing surface

Vosseller Avenue Crossing [Fig 69 (B)]: This at-grade crossing lacks pedestrian and bike zones and the crossing surface has not yet been upgraded The paving surface between the tracks consists of crumbling asphalt with some small pot holes creating a hazard for bicycles and pedestrians

Fig 71. Vosseller Avenue Crossing

Vosseller Avenue edge condition and lack of sidewalks.

Vosseller Avenue rough asphalt surface between rails

Main Street crossing [Fig 69 (C)]: This at-grade crossing is located just south of the pedestrian underpass near Queen's Bridge. Similar to the Vosseller Avenue crossing, this location consists of crumbling asphalt and lacks designated pedestrian and bicycle zones. The Urban Design Plan envisions eliminating this crossing by consolidating this line with the north leg.

Proposed Mountain Avenue Crossing: In addition to the existing at-grade crossings, the Urban Design Plan envisions a "new at-grade crossing of the NJ TRANSIT tracks" as an extension of Mountain Avenue. The goal of this crossing would be to "provide direct access from the downtown to the Brook Industrial Park." Implementing an at-grade crossing at this location will have significant safety, engineering, and operational challenges that would have to be addressed.

» Pedestrian Underpass

A pedestrian underpass is a type of separated grade crossing that eliminates the risk of pedestrian/train conflicts by constructing a tunnel or grade separation beneath the train tracks. These underpasses are recommended to be 12'-14' in width to accommodate bicyclists and pedestrians with a minimum vertical clearance of 8' and 10' when emergency vehicles need access. New pedestrian underpasses are expensive to design and construct with costs ranging from $1 Million to upwards of $6 Million for a standard underpass. In Bound Brook, the cost would likely be on the higher end of this scale since special design requirements and safety features will be needed to maintain the structural integrity of the Green Brook Flood Control Levee System. Therefore, the construction of new pedestrian underpasses should be limited to high pedestrian volume or high risk areas where the cost-benefit is justified.

Main Street Underpass [Fig 69 (D)]: Downtown Bound Brook has an existing underpass located just north of the Queen's Bridge. The Main Street Underpass is currently used by pedestrians and bicyclists travelling to and from South Bound Brook. The underpass is comprised of two separate trestles that span a total of one hundred feet. Five foot wide sidewalks are located on both sides of the underpass, connecting Bound Brook to the Queen's Bridge.

Fig 72. Main Street Underpass

Vehicles are grade separated from pedestrians

Interesting stone walls and steel trusses

Approach to pedestrian underpass

Underpass is dark and littered with bird droppings

These sidewalks are elevated approximately four feet higher than the roadway, which aids in physical separation from traffic. The underpass is an undesirable and uninviting place to walk.

The primary issues are cleanliness and lack of adequate lighting. The underpass appears to be a bird roost as evidenced by abundant quantities of bird excrement on the sidewalks, walls, and railings. Additionally, the lighting quality under the bridge is poor, with no activated lights during the day time and only a few fixtures that are presumably lit at night. Currently the areas beneath the underpass are maintained by both the borough and the County, each providing staff that sweep the area. The issues affecting this underpass may be able to be addressed through minor interventions, but will require coordination with NJ TRANSIT, Conrail, and the County.

» Existing Train Bridges

There are three (3) existing train bridges along the water front that were constructed across creeks and low lying areas. These crossings offer an opportunity for pedestrians to cross beneath the tracks with minimal construction. The implementation feasibility of this type of crossing relies on easy and direct pedestrian access to the area beneath the bridge, sufficient space beneath the bridge for a trail, and sufficient head clearance below the bridge structure. American Association of State Highway and Transportation Officials (AASHTO) suggests a minimum width of 10' for a multi-use path and a minimum vertical clearance of 8' or 10' when emergency vehicles need access.

The three locations where train bridges offer this opportunity are:

Green Brook Crossing [Fig 69 (E)]: This potential crossing would create an off-road connection between Billian Legion Park and the waterfront. The area beneath the roadway appears to provide sufficient clearance. However, at the time of this study, the area beneath the railroad tracks was inaccessible preventing a full assessment. This connection would cross into Middlesex Borough and would require coordination.

Central Crossing [Fig 69 (F)]: At this central location, the train bridge crosses a dry flood/creek bed and connects directly to the end of the Green Brook Levee trail. The area beneath the bridge is accessible, appears to be suitable for a trail and has ample head clearance.

Middle Brook Crossing [Fig 69 (G)]: This location is at the western end of the borough and appears to get informal use as both an underpass and fishing spot. Worn paths indicate fairly heavy pedestrian use in this area. However, there is insufficient vertical clearance beneath the vacated bridge crossing. Vertical clearance averages roughly 7'. This underpass may be feasible for "pedestrians only."

Fig 73. Existing Train Bridges

Central crossing looking south from the levee

Limited clearance under Middle Brook Crossing

» Pedestrian Overpass

A pedestrian overpass is a type of grade separated crossing that eliminates the risk of pedestrian/train conflicts by constructing a bridge over the railroad. Due to the clearance requirements above the existing railroad, these bridges require significant stairs, ramps and elevators and are the least desirable option for pedestrians and cyclists. These structures can also negatively impact view sheds in scenic areas such as the Bound Brook water front. Design and Construction costs generally range from $2 million to upwards of $7 million. Currently, there are no pedestrian overpasses in the borough.

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