

SR 322/22 / Bike Route J: Safety Conflicts Design Study

PennDOT Bureau of Public Transportation Central Office - Multimodal

September 29, 2017



ACKNOWLEDGMENTS

This report is a collaborative effort by PennDOT District 8, PennDOT Bureau of Public Transportation Central Office - Multimodal, Middle Paxton Township, and stakeholders from the region and bicycle advocate groups. Below is a list of the Steering Committee members who participated in the project.

PennDOT:

Chris Drda D-8

Anthony Berger, D-8

David Holcombe, D-8

Roy Gothie, PennDOT Central Office - Multimodal

Angela Watson, PennDOT Central Office - Multimodal

Middle Paxton Township:

Julie Seeds

Jim Fisher

Wilbur Evans Jr.

Stakeholders:

Andrew Bomberger, Tri-County Regional Planning Commission

Marilyn Chastek, Bicycle South Central Pennsylvania

Ed Krebs, Lebanon Valley Bicycle Coalition

Dick Norford, Bicycle South Central Pennsylvania

Bill Hoffman, Pedestrian and Pedalcycle Advisory Committee

TABLE OF CONTENTS

1	Purpose and Goals of the Study	1
2	Existing Conditions Evaluation	1
	PROCESS	1
	EXISTING CONDITIONS	1
	STAKEHOLDER OUTREACH	3
	EXISTING ENVIRONMENTAL CONDITIONS	4
	OPPORTUNITIES & CONSTRAINTS	4
3	Development of Design Alternatives	7
4	Design Alternatives Summary Matrix	16
5	Appendices	19
	ENVIRONMENTAL SCREENING REPORT	
	STEERING COMMITTEE MEETING 1 SUMMARY	
	STEERING COMMITTEE MEETING 2 SUMMARY	

1 Purpose and Goals of the Study

Bike Route J is a 232-mile long Pennsylvania state-designated bicycle route that connects the north and south borders of the state between the towns of South Waverly and New Freedom. Bike Route J passes through Williamsport, Lewisburg, Harrisburg, and York, PA and is a key bicycle connection through Harrisburg. One of the main pinch points for riders on Bike Route J occurs in Dauphin Borough and Middle Paxton Township just north of Harrisburg where the route is located on the shoulder of Route 322. Route 322/22 in this area is severely constrained by the Susquehanna River on one side and the NS rail line and steep mountain topography on the other side. At the pinch point, the Route 322/22 roadway narrows underneath a Norfolk Southern (NS) owned freight rail bridge, causing dangerous conditions for cyclists both in terms of poor sight lines approaching the rail bridge and the close proximity of cyclists to high-speed vehicles under the bridge. Route 322/22 also experiences flooding of the roadway at the pinch point during heavy rain events due to the lowered elevation of the roadway required to pass under the rail bridge. Major flooding occurs infrequently, but the flood waters can take up to 4 days to recede in major rain events. This flooding cuts off Dauphin Borough and Middle Paxton Township from emergency services, which is of particular concern for those trying to travel south to hospitals in the Harrisburg area. A design solution is needed to allow cyclists to safely traverse this section of Bike Route J while also considering how to provide emergency vehicle access during times of flooding.

PennDOT Central Office - Multimodal led the effort with support from PennDOT District 8 (D-8) and Middle Paxton Township for a conceptual design study to investigate improved access for cyclists and emergency vehicles through Route 322/22 / Bike Route J in Dauphin Borough/Middle Paxton Township. The Study has developed several scenarios that would allow bicycles and in some cases pedestrians to avoid the pinch point through Dauphin Borough and Middle Paxton Township on Bike Route J. Each of the four options developed in the design alternatives takes into account the advantages, disadvantages, project costs, and maintenance responsibilities associated with the design. These options would create a safer environment for cyclists and improve trail connectivity throughout the area.

2 Existing Condition Evaluation

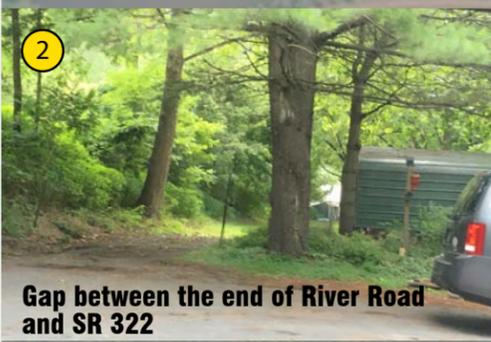
PROCESS

The Consultant team studied the area along SR 322/22 from the intersection of Allegheny Avenue and Delaware Street in Dauphin Borough to Fort Hunter Park in Susquehanna Township. The study area includes local streets in Dauphin Borough, Middle Paxton Township, and Susquehanna Township, private roads in Middle Paxton Township, and state owned Route 322/22 in all three municipalities. The Consultant team developed base maps that detail roadway and railroad centerlines, parcels, streams and LIDAR contours based on available AutoCAD, GIS, and PDF files obtained from the Tri-County Regional Planning Commission and DCNR.

EXISTING CONDITIONS

The existing Susquehanna Township Bicycle Path Connection, also known as PA Bike Route J, is currently segmented from Fishing Creek Valley Road (to the East) to Allegheny Street (to the West). The primary concern with the existing bicycle path connection is that it travels along Route 322/22 highway in the east and west bound lanes for this portion of the bike path, specifically under an existing Norfolk Southern railroad overpass. This results in narrow shoulders and creates a pinch point for bicyclists on State Route 322/22, a four-lane limited access highway. Within the study area, there is one full interchange (partial diamond and partial clover leaf) with Fishing Creek Valley Road, and one partial interchange at Allegheny Street (westbound exit). A study area map with existing conditions photos is shown on the following page.

STUDY AREA MAP WITH EXISTING CONDITIONS PHOTOS



Legend

- Existing Route J
- Municipal Boundaries
- 50-Foot Contours
- Municipal Parks
- Railroads

0 250 500 1,000 1,500 2,000 Feet

The current Average Daily Traffic (ADT) for Route 322/22 is as follows:

- Eastbound - 29,124 (12% truck traffic)
- Westbound - 27,459 (12% truck traffic)

These current traffic conditions are a safety concern for novice bicyclists as well as experienced bicyclists.

STAKEHOLDER OUTREACH

The consultant team facilitated a kick-off meeting on July 6, 2017, with members of BPT, District 8, the Tri-County Regional Planning Commission (TCRPC), and local bicycle advocates to review the project goals, scope, and schedule, as well as to obtain additional relevant background information. This meeting gave the consultant team an opportunity to obtain relevant information with regard to pinch points along SR 322, flooding issues, and regional impacts on the site to better understand the physical constraints and issues to be evaluated during the conceptual design study. The following issues and concerns were noted during the meeting:

- Issues related to the railroad structure across Route J/SR 322:
 - ◇ The curve in the road as it goes under the bridge leads to line-of sight issues, particularly on the southbound side.
 - ◇ The shoulders under the structure are very narrow and force cyclists to ride close to fast-moving vehicles.
 - ◇ The primary users of Route J are commuter or serious touring cyclists who are used to the sort of conditions on this route.
- Connectivity to other trail networks in the area, including the Capital Area Greenbelt, Stony Creek Trail and Lykens Valley Trail should be investigated.
- Flooding under the rail structure cuts off emergency access on SR 322/22, which will continue to be an issue as the population in the area experiences growth.
- Route J/SR 322/22 is impacted by regional travel issues, including people from northern areas heading south for vacation; the growth of the State College area; and the planning of state bike routes from Rochester, NY to Washington, DC.

Opportunities for Bike Route J identified during kickoff meeting include:

- Improving Cemetery Rd and the space to the east of the railroad tracks.
- Connecting River Road to the inbound side of Route J/SR 322/22.
- Building a cantilevered structure or floating bridge on the west side of SR 322/22.
- Constructing a fly-over above the railroad structure.
- Replacing the structure and raising the road.

Constraints for Bike Route J identified during kickoff meeting include:

- Opposition from Norfolk Southern regarding encroachment on their right-of-way at the terminus of Cemetery Road.
- Extensive impacts to the existing rail line (several miles) would be required with any vertical adjustments to the existing rail overpass.
- Narrow space between the railroad tracks and the face of the mountain.
- SR 322/22 is built on fill up to the edge of the river leaving little land to develop on the west side of the road.
- River Road is a narrow roadway, and there is at least one property that would require an easement between the existing road and SR 322/22.

- Vertical clearance is required for a fly-over of the NS rail line, which would require construction of a long ramp that will reach that clearance at a required slope.
- General constructibility constraints resulting from the active NS rail line, SR 322/22 corridor, and Susquehanna River.

The consultant team also conducted a site visit on July 11, 2017, led by local bicycle advocate Dick Norford. The team traveled along all sections of Route J within the study area, including sections of SR 322/22, Allegheny St, Front St, and Fishing Creek Valley Rd; as well as potential alternative routes, including Erie St, River Rd, Cemetery Rd, and Canal St. Based on the site visit the consultant team made additional observations about the conflict points along Route J/SR 322/22 as follows:

- A fly-over to Erie Street would require land acquisition and possibly air rights from the railroad as well as a resident.
- Front St between the SR 322/22 offramp and Fort Hunter Park has sufficient width to include bicycle facilities on both sides of the road in each direction, with the exception of the intersection with Fishing Creek Valley Rd, where islands are used to remove the shoulder and narrow the travel lanes.
- Cemetery Rd dead-ends at a residence, beyond which the slopes become too extreme to build on without significant excavation and retention; Norfolk Southern has gated the spot where residents formerly entered the railroad right-of-way to connect to Erie St; the gate is monitored by railroad security personnel.

EXISTING ENVIRONMENTAL CONDITIONS

A desktop environmental screening was completed for the project location and surrounding area. The project screening area consisted of an approximately two-mile long segment of the 322/22 corridor within Middle Paxton Township, Dauphin Borough, and Susquehanna Township. State Route 322/22 is a four-lane limited access highway that runs east/west across Pennsylvania. The area of focus for the screening, from Fort Hunter Park in the southeast to Delaware Street in Dauphin Borough to the northwest, captured existing conditions pertaining to the following environmental resources:

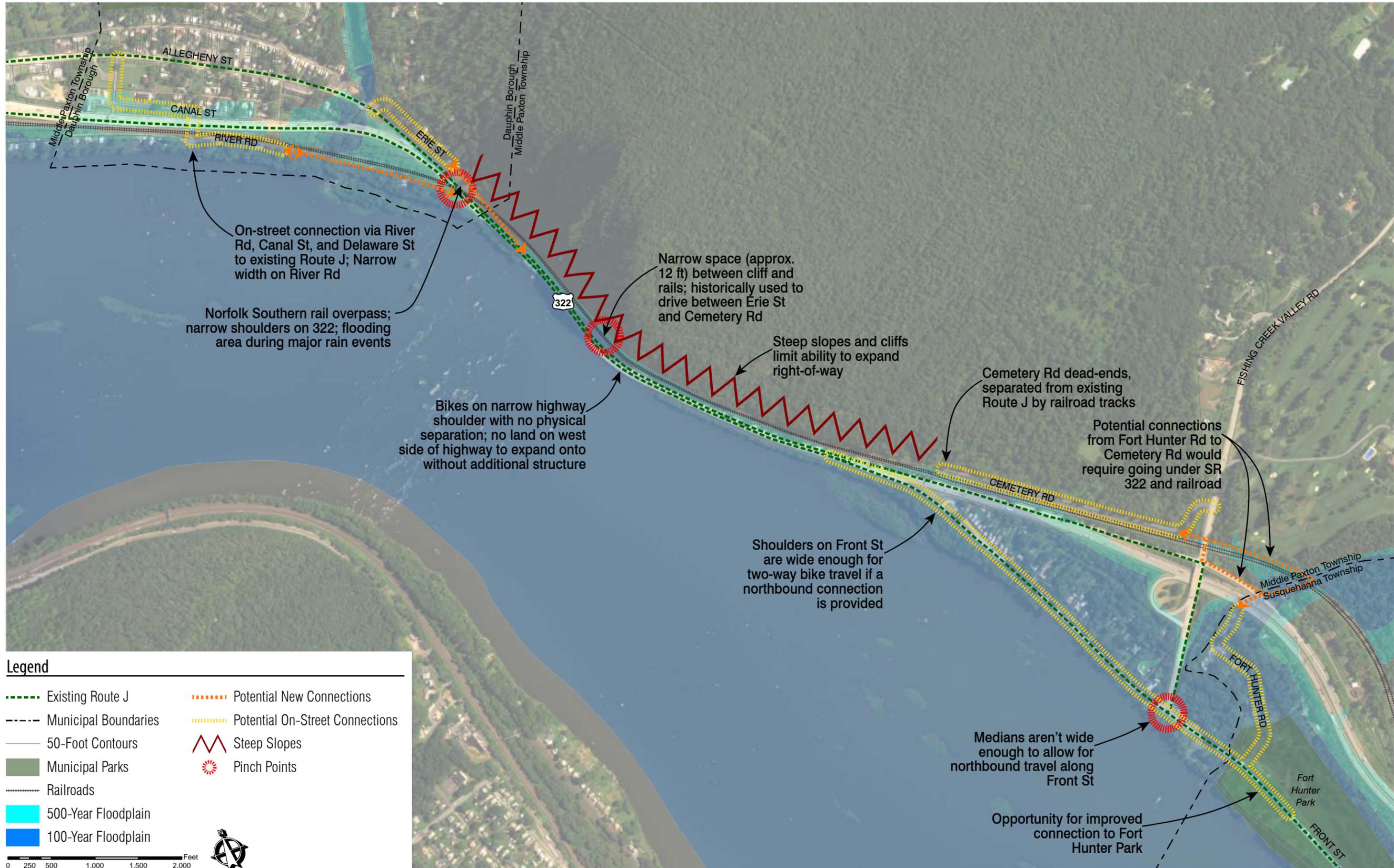
- Agricultural
- Aquatic
- Hazardous and Residual Waste
- Wildlife Habitat
- Cultural
- Parkland
- Socioeconomic
- Air Quality

The summary of the environmental screening is included in the Appendix of this Report.

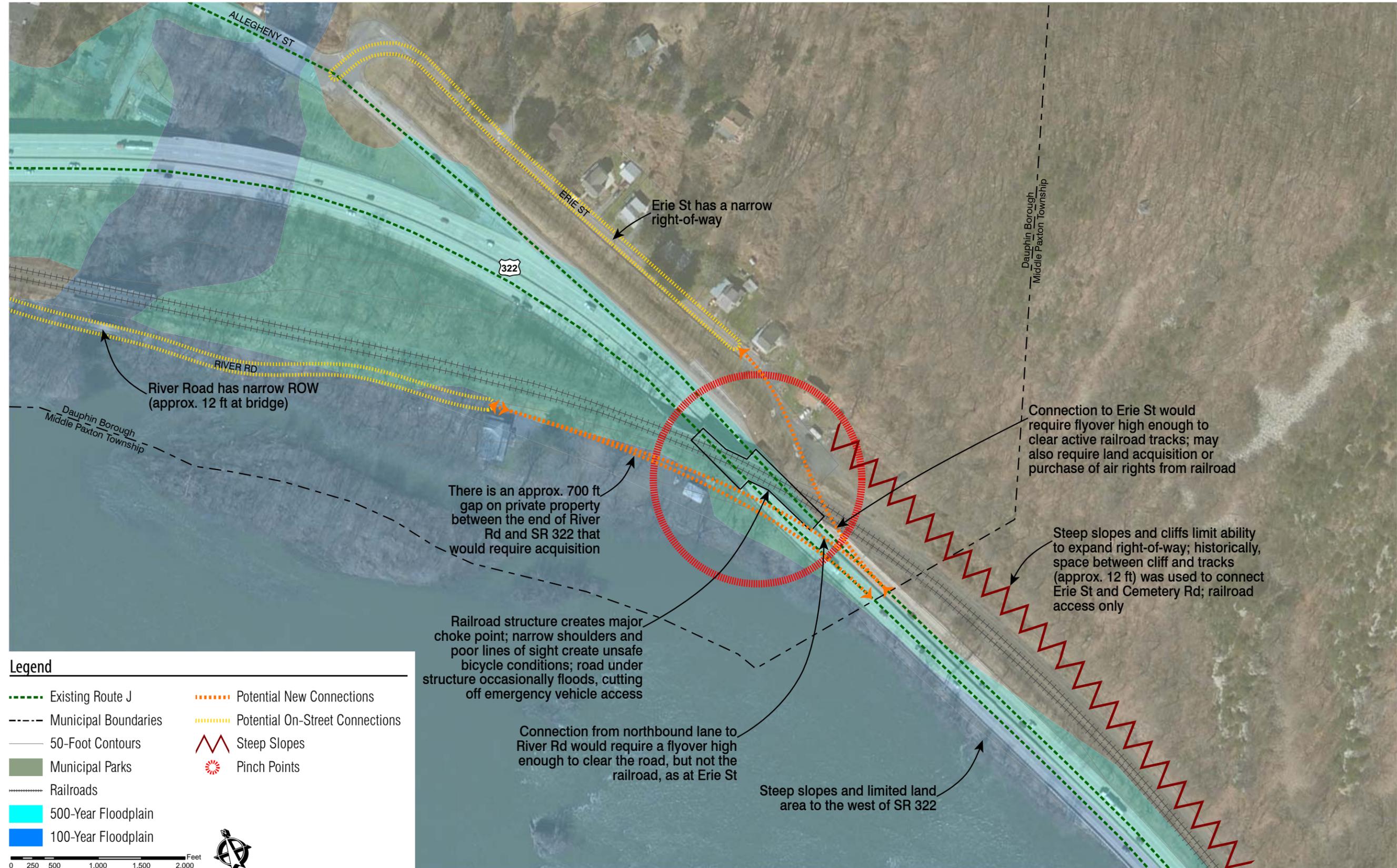
OPPORTUNITIES & CONSTRAINTS

Based on feedback from stakeholder outreach, existing conditions base mapping, and information from the environmental screening, the Consultant team developed a diagram of opportunities and constraints for the Bike Route J study area and for the main pinch point of Bike Route J; these diagrams are shown on the following pages.

BIKE ROUTE J OPPORTUNITIES & CONSTRAINTS DIAGRAM



BIKE ROUTE J OPPORTUNITIES & CONSTRAINTS DIAGRAM: Pinch Point Zoom-In



3 Development of Design Alternatives

Based on information gained from the stakeholder meeting, site tour, and base mapping, the Consultant team developed a series of 4 route alternatives for Bike Route J that are illustrated on the following pages. The alternatives show a range of options, from less-intensive one-way routes that utilize existing streets to more intensive two-way fly-over structures. The design alternatives include options that utilize private property (i.e. River Road), as well as non-private property options as a contingency in case agreements with property owners could not be obtained. The Consultant team looked into options for providing emergency vehicle access during times that Route 322/22 is closed due to flooding; however, because of site constraints related to Norfolk Southern, steep topography, and the proximity of the river to available roadways, it was determined that there is not a viable option that would make the route accessible to emergency vehicles.

The route alternatives were presented to the Steering Committee at a meeting on September 15, 2017. The Consultant team incorporated feedback from the Steering Committee into the route alternatives described below.

Option 1: Inbound-only Route Via River Road

- On-road facilities from Allegheny Street through Dauphin Borough to River Road
- On-road facilities on River Road
- New off-road one-way trail on private property between River Road and Route 322/22
- New Connection to the existing on-road Route J shoulder facilities on Route 322/22 southbound

Option 2: Two-Way Route Via Cantilever/Boardwalk

- On-road facilities between Allegheny Street and River Road through Dauphin Borough
- On-road facilities on River Road
- New off-road two-way trail on private and public property parallel to Route 322/22
- New two-way cantilever structure attached to Route 322/22 or a boardwalk structure in the river
- New off-road two-way trail on public property parallel to Route 322/22, the Route 322/22 exit ramp, and Front Street
- New two-way cycle track on the west side of Front Street
- Connections to the existing on-road Route J shoulder facilities on Front Street after Fishing Creek Valley Road

Option 3: Outbound-only Route Via Erie Street

- Existing on-road Route J shoulder facility on Route 322/22 northbound
- New one-way ramp structure from Route 322/22 northbound over Norfolk Southern rail line landing at Erie Street via switchback ramp
- On-road one-way facilities on Erie Street
- Connection to existing Allegheny Street shoulder bike lane

Option 4: Two-Way Route Via 322/22 Flyover

- Existing Allegheny Street shoulder bike lane (northbound) and new Allegheny Street shoulder bike lane (southbound)
- On-road two-way facilities on Erie Street
- New two-way ramp structure from Erie Street via switchback ramp over Norfolk Southern rail line and Route 322/22 down to land adjacent to the southbound side of Route 322/22
- New two-way cantilever structure attached to Route 322/22 or a boardwalk structure in the river
- New off-road two-way trail on public property parallel to Route 322/22, the Route 322/22 exit ramp, and Front Street
- New two-way cycle track on the west side of Front Street
- Connections to the existing on-road Route J shoulder facilities on Front Street after Fishing Creek Valley Road

OPTION 1: Inbound-Only Route Via River Road

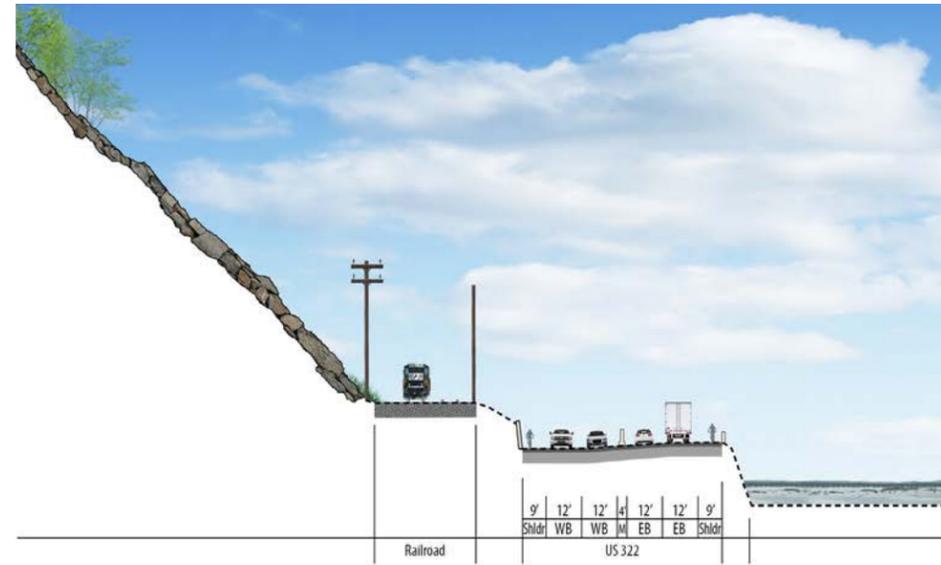
ROUTE MAP



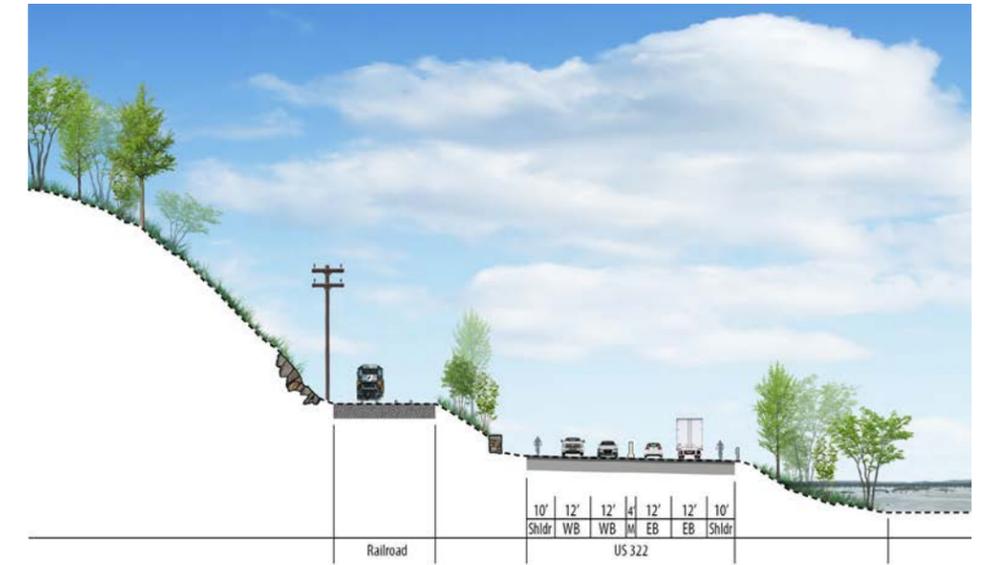
SECTION 1



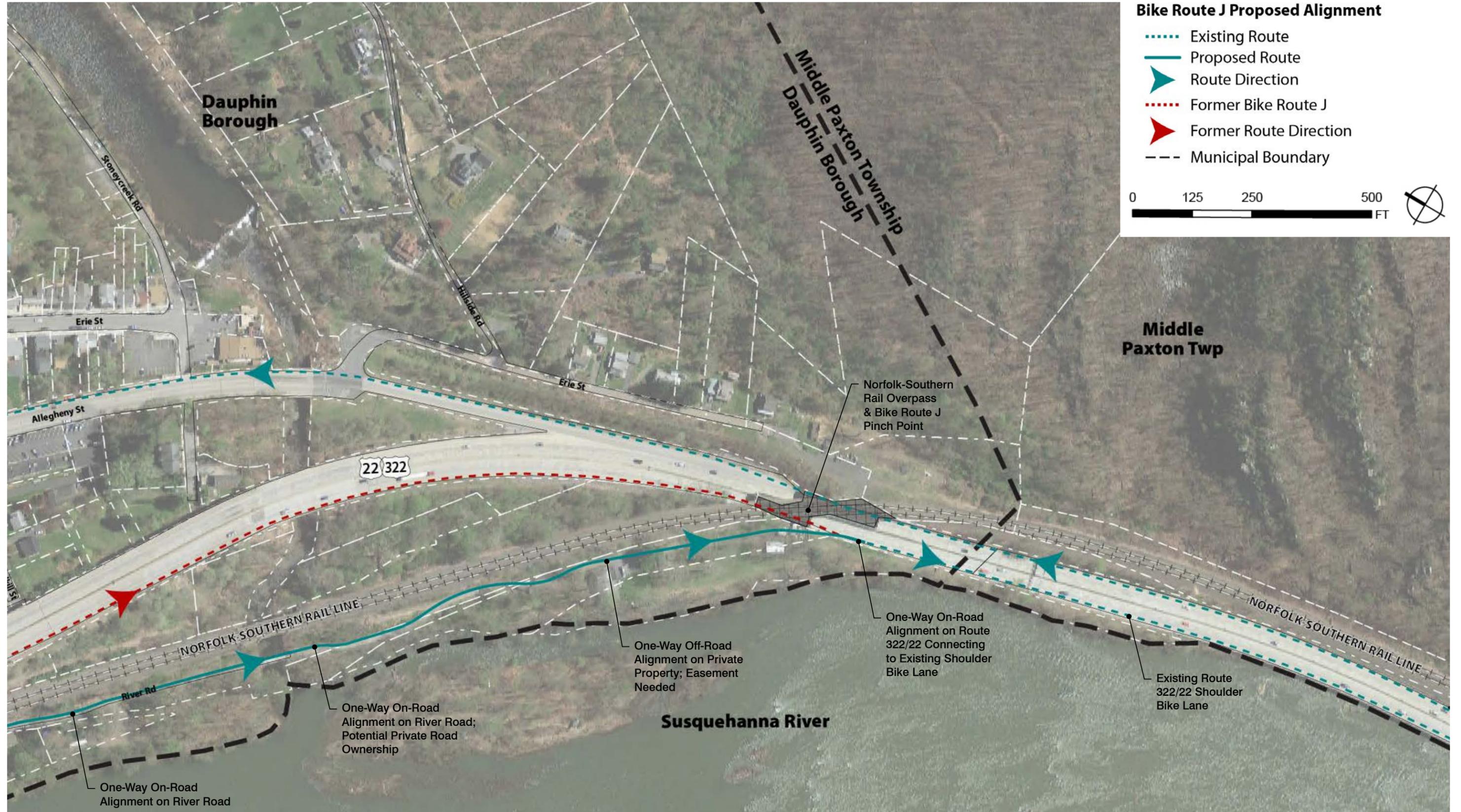
SECTION 2



SECTION 3



OPTION 1: Inbound-Only Route Via River Road Focus Area



OPTION 2: Two-Way Route Via Cantilever/Boardwalk

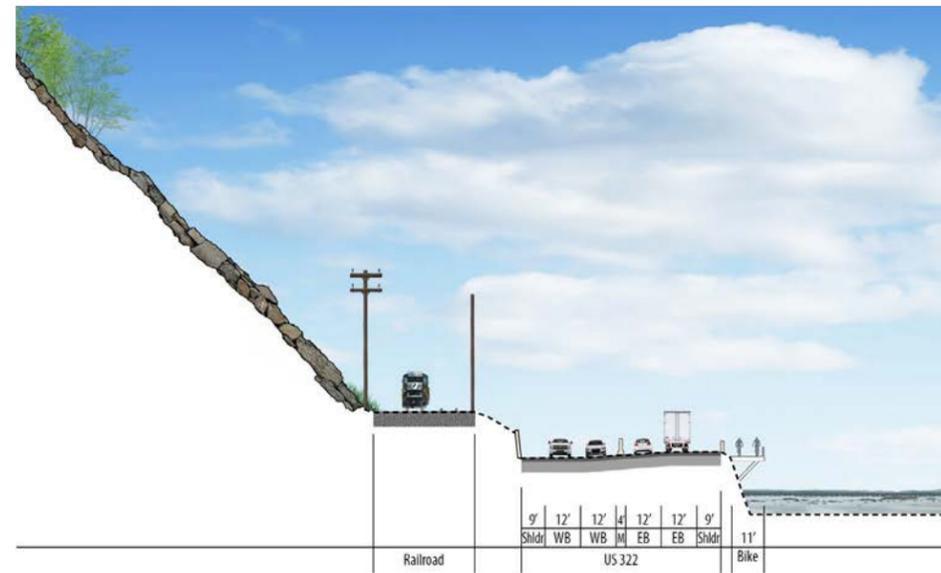
ROUTE MAP



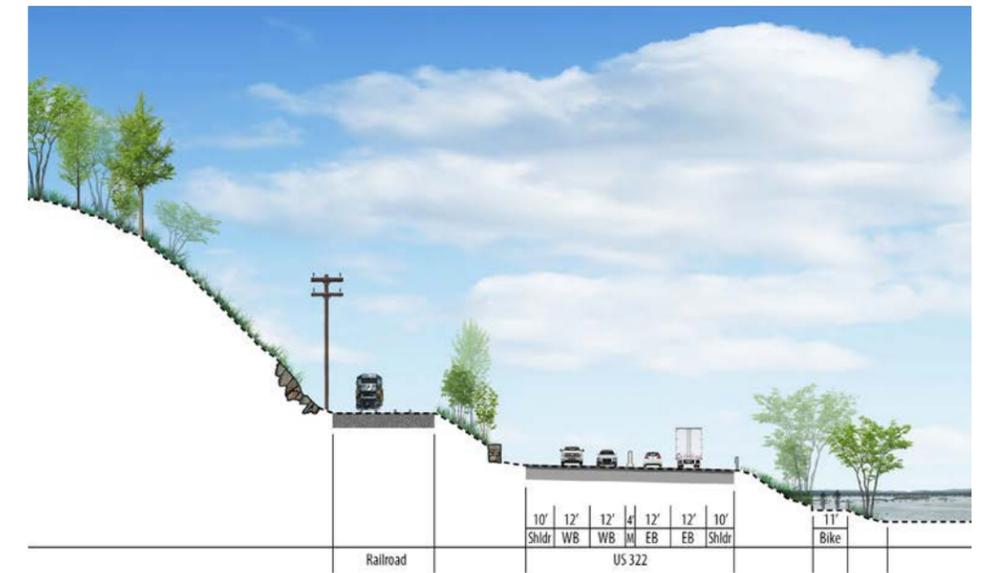
SECTION 1



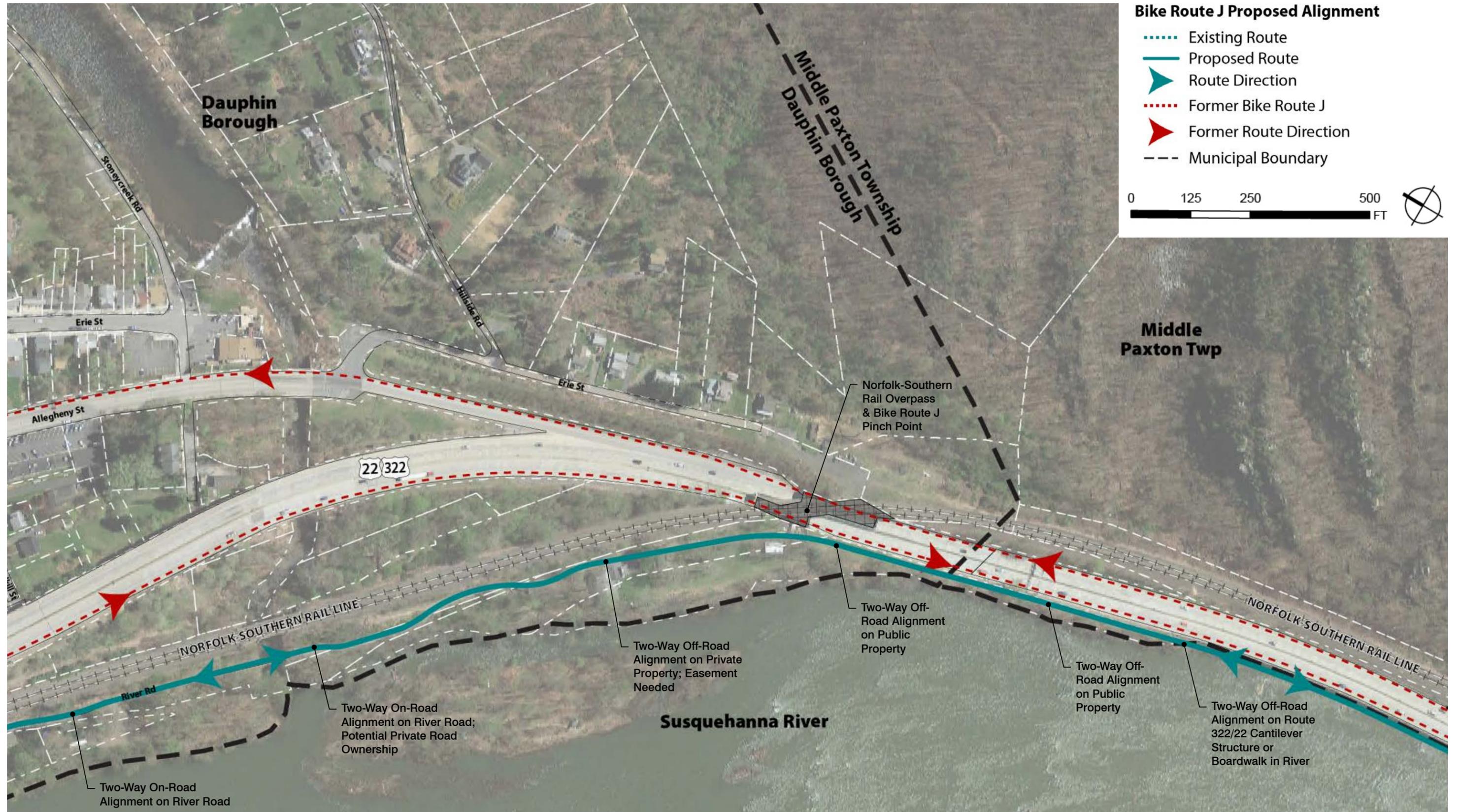
SECTION 2



SECTION 3



OPTION 2: Two-Way Route Via Cantilever/Boardwalk Focus Area

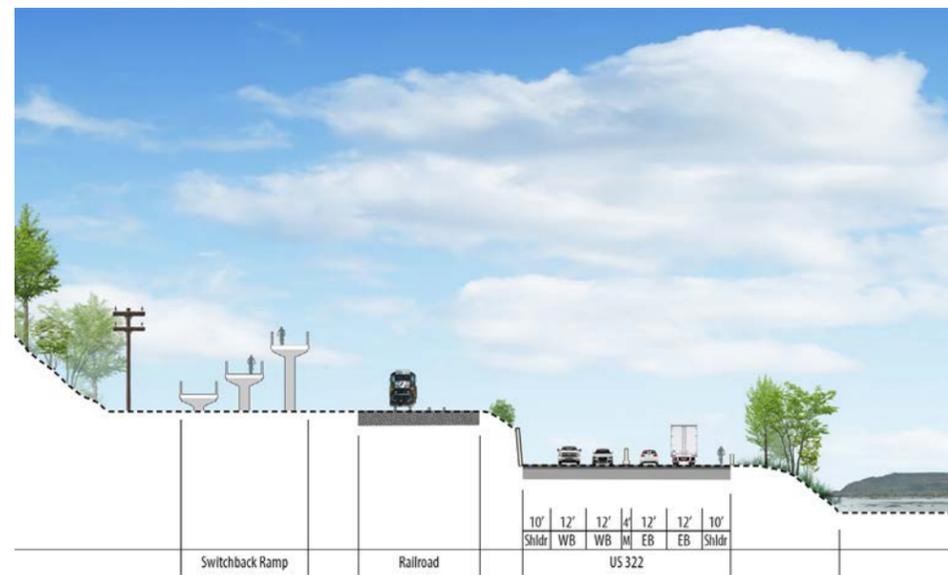


OPTION 3: Outbound-Only Route Via Erie Street

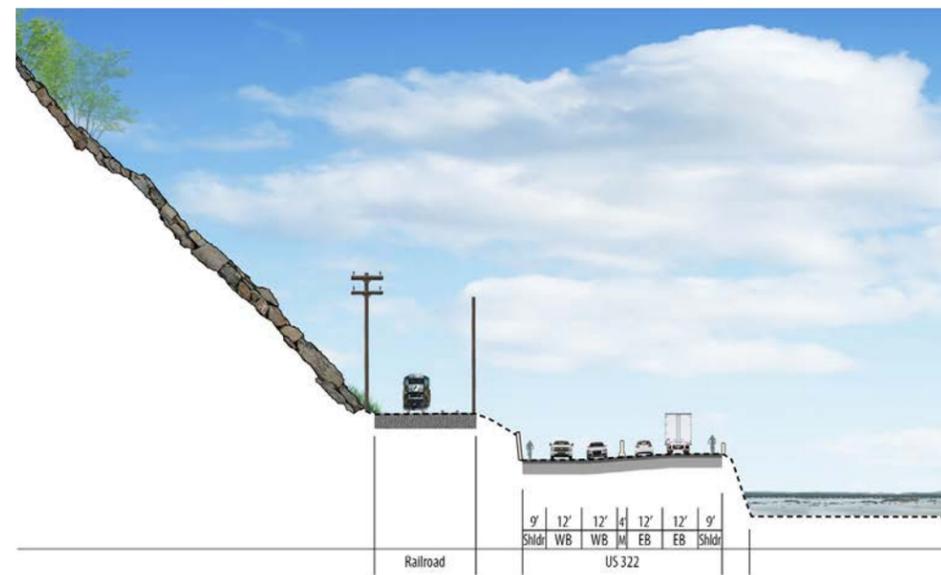
ROUTE MAP



SECTION 1



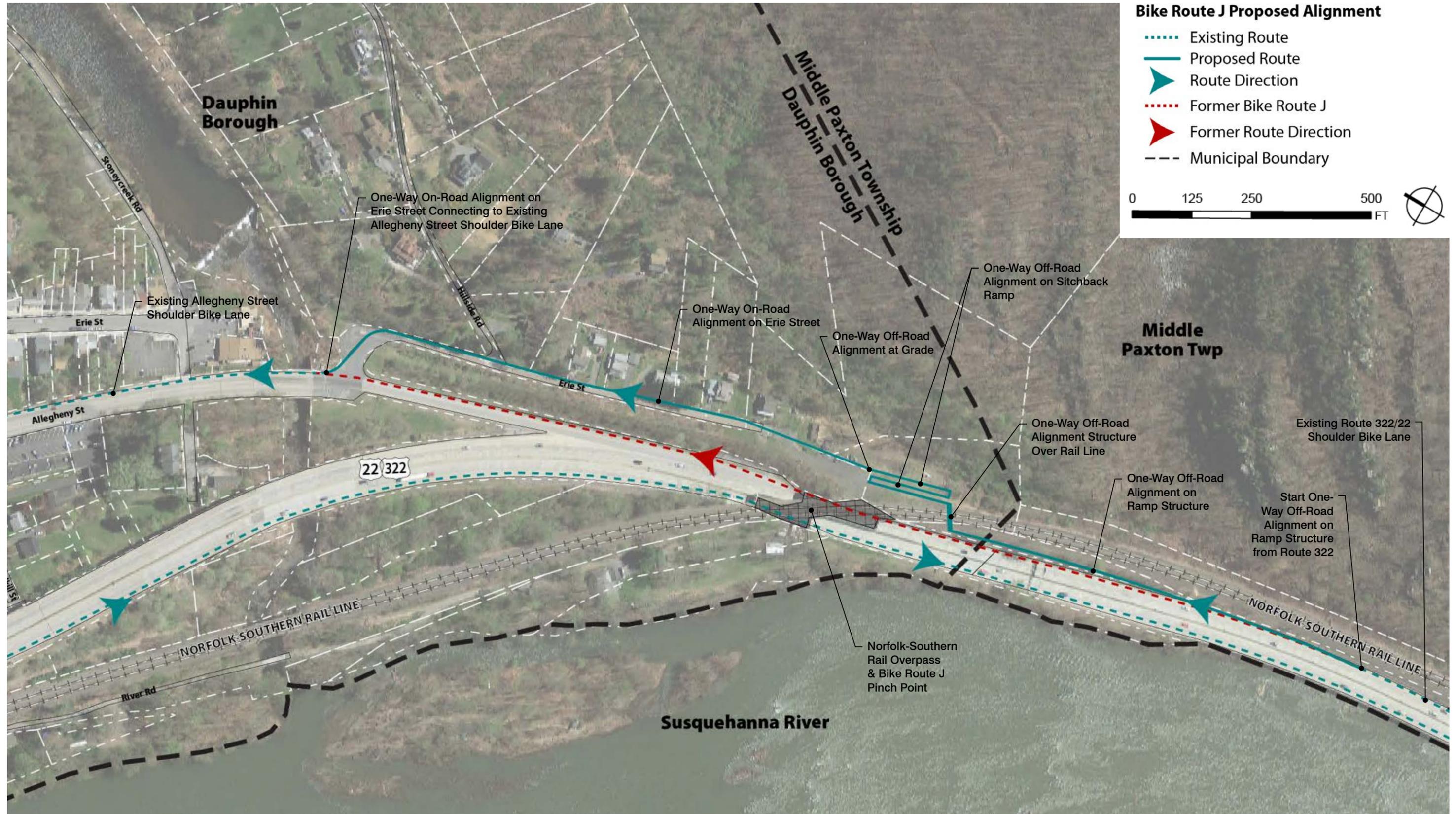
SECTION 2



SECTION 3



OPTION 3: Outbound-Only Route Via Erie Street Focus Area



OPTION 4: Two-Way Route Via Route 322/22 Flyover

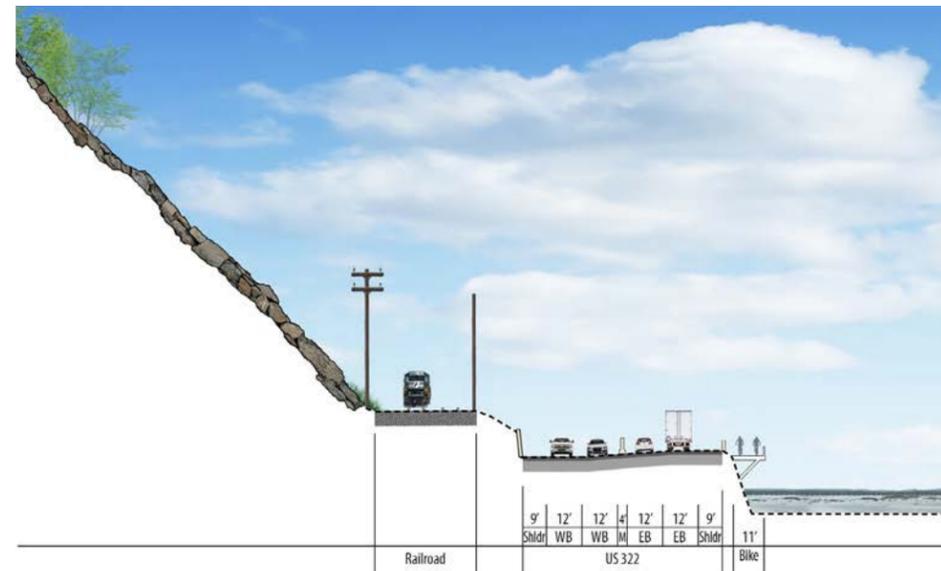
ROUTE MAP



SECTION 1



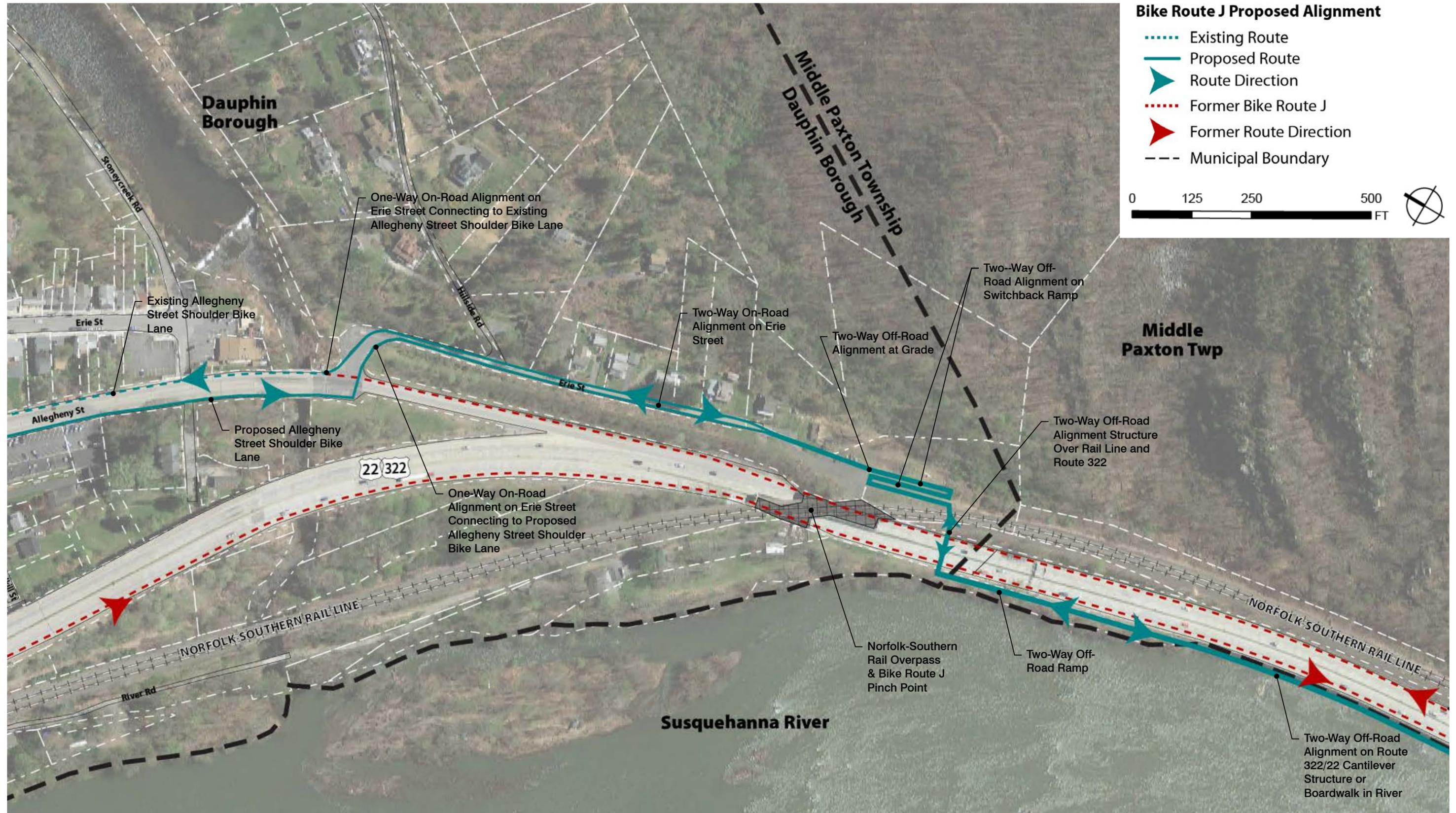
SECTION 2



SECTION 3



OPTION 4: Two-Way Route Via Route 322/22 Flyover Focus Area



4 Design Alternatives Summary Matrix

PURPOSE AND INTENT OF THE SUMMARY MATRIX

A summary matrix of the four design alternatives for Bike Route J was prepared to provide a “quick-look” comparison of the alternatives. For each of the options, the matrix includes a brief description of the proposed route, advantages and disadvantages of the route, project cost range, and a maintenance rating. The project cost range is a complete project development cost, including planning, design, permitting, construction and construction management/inspection. The maintenance rating is based upon the additional maintenance requirements that will be realized by D-8 and the local municipalities as a result of the proposed improvements. The Design Alternatives Summary Matrix is provided on the following pages.

CONCEPT DESIGN SUMMARY MATRIX

Alternate	Advantages	Disadvantages	Project Costs Range (millions)	Maintenance Requirements 5-Lowest Maintenance Requirements 1-Highest Maintenance Requirements
<p>Option 1: Inbound-only Route Via River Road</p> <ul style="list-style-type: none"> Inbound only option which shifts Bike Route J off of Eastbound Route 322/22 near the Park & Ride to avoid the Norfolk Southern Rail Overpass. On-road facility from Park & Ride through Dauphin Borough via Allegheny Street & Delaware/Canal Streets. <ul style="list-style-type: none"> Alternate Route would be Allegheny Street & Market Street. Includes shared lane facility along River Road (Private Road) in the eastbound (Inbound) direction. Includes an off-road segment required within private property beyond the east end of River Road. Off-road segment ties into Eastbound Route 322/22 shoulder (Ex. Bike Route J) east of the Norfolk Southern Rail Overpass. <ul style="list-style-type: none"> Bollards/barriers are required to prohibit vehicular traffic on this portion of the facility) Outbound route would not change from existing, however this option could be combined with Option 3 to address both the inbound and outbound routes. 	<ul style="list-style-type: none"> Eliminates approximately 1.2 miles of existing bike facility along Route 322 Eliminates pinch point through existing overpass in the inbound direction Eliminates key concern of limited sight-line of bicyclists along eastbound Route 322/22 @ the overpass pinch point. 	<ul style="list-style-type: none"> Bike facility along private property (River Road) Possible flooding along bicycle facility Bicyclist are still on Route 322 Defining who is responsible for ownership / maintenance. 	<p>TOTAL: \$0.6 to \$0.7</p> <p>Roadway/Trail – \$0.50 to \$0.55</p> <p>Drainage/E&S – \$0.02 to \$0.04</p> <p>Design/Permitting – \$0.05 to \$0.07</p> <p>CM/CI – \$0.03 to \$0.04</p>	<p>Rating: 5</p> <ul style="list-style-type: none"> Minimal additional roadway maintenance procedures required by PennDOT/Borough along Allegheny Street & other local streets. Agreement required along private road (River Road) for maintenance/snow removal. <ul style="list-style-type: none"> Key question – who is facility champion/owner who the agreement would be with?
<p>Option 2: Two-Way Route Via Cantilever/Boardwalk</p> <ul style="list-style-type: none"> Two-Way option which shifts Bike Route J off of Eastbound and Westbound Route 322/22 near the Park & Ride to avoid Norfolk Southern Rail Overpass. On road facility from Park & Ride through Dauphin Borough via Allegheny Street & Delaware/Canal Streets. <ul style="list-style-type: none"> Alternate Route would be Allegheny Street & Market Street. Includes shared lane facility along River Road (Private Road). Includes an off-road segment required within private property beyond the east end of River Road. Off-road segment continues as a cantilever/boardwalk structure which parallels Route 322/22 for approximately 2,500 feet. Off-road segment continues to the east, adjacent to Route 322/22 and transitions to a two way on-road (cycle-track) facility along Front Street until just east of the Fishing Creek Valley Road intersection, where the facility would transition back to the existing Bike Route J (shoulders of eastbound and westbound Front Street). 	<ul style="list-style-type: none"> Eliminates approximately 2.3 miles of existing bike facility along Route 322, including pinch points through existing overpass in both directions. Eliminates key concern of limited sight-line of bicyclists along Route 322/22 @ the overpass pinch point. Creates a pedestrian / bicycle facility which provides a safer link from Dauphin Borough / Middle Paxton Township to Fort Hunter Park and future connections to Capital Greenbelt. 	<ul style="list-style-type: none"> Bike facility along private property (River Road) Possible flooding along bicycle facility Cost of cantilever/boardwalk structure, as well as constructability challenges associated with the structure Defining who is responsible for ownership / maintenance. 	<p>TOTAL: \$8.5 to \$10.0</p> <p>Roadway/Trail – \$2.00 to \$2.50</p> <p>Cantilever – \$5.00 to \$5.80</p> <p>Drainage/E&S – \$0.05 to \$0.06</p> <p>Design/Permitting – \$0.95 to \$1.04</p> <p>CM/CI – \$0.50 to \$0.60</p>	<p>Rating: 2</p> <ul style="list-style-type: none"> Minimal additional roadway maintenance procedures required by PennDOT/Borough along Allegheny Street & other local streets. Unique roadway maintenance requirements associated with the two-way cycle track along Front Street. Agreement required along private road (River Road) for maintenance/snow removal. Requires routine inspection and maintenance of the cantilever / boardwalk structure.

CONCEPT DESIGN SUMMARY MATRIX

Alternate	Advantages	Disadvantages	Project Costs Range (millions)	Maintenance Requirements 5-Lowest Maintenance Requirements 1-Highest Maintenance Requirements
<p>Option 3: Outbound-Only Route Via Erie Street</p> <ul style="list-style-type: none"> Outbound only option which ramps up Bike Route J along the shoulder of westbound Route 322, approximately 1,000 feet east of the Norfolk Southern Rail Overpass. The ramp transitions to a pedestrian / bicycle bridge which crosses over the Norfolk Southern rail lines. From the bridge structure, the trail ramps down to Erie Street and continues as a shared lane facility along Erie Street and Allegheny Street through Dauphin Borough (along the existing outbound Route J). Inbound route would not change from existing, however this option could be combined with Option 1 to address both the inbound and outbound routes. 	<ul style="list-style-type: none"> Eliminates approximately 0.4 miles of existing bike facility along westbound Route 322 Eliminates pinch point through existing overpass in the outbound direction 	<ul style="list-style-type: none"> Bicycle facility still remains on a majority of Route 322/22 in eastbound and westbound directions Cost of pedestrian bridge and ramps, as well as constructability challenges associated with the structures. Impacts to vehicular traffic along 322/22 during construction. Requires coordination with Norfolk Southern and approvals by NS for construction within their right-of-way. Defining who is responsible for ownership / maintenance. 	<p>TOTAL: \$5.0 to \$6.0</p> <p>Roadway / Trail – \$0.10 to \$0.20</p> <p>Pedestrian Bridge – \$4.00 to \$4.75</p> <p>Drainage / E&S – \$0.05 to \$0.10</p> <p>Design/Permitting – \$0.55 to \$0.60</p> <p>CM/CI – \$0.30 to \$0.35</p>	<p>Rating: 2</p> <ul style="list-style-type: none"> Minimal additional roadway maintenance procedures required by PennDOT/Borough along Allegheny Street & other local streets. Will require routine inspection and maintenance of the pedestrian bridge and ramps. <ul style="list-style-type: none"> Coordination required with Norfolk Southern to conduct maintenance.
<p>Option 4: Two-Way Route Via 322/22 Flyover</p> <ul style="list-style-type: none"> Two-Way option which shifts Bike Route J off of eastbound and westbound Route 322/22 near the Park & Ride to avoid Norfolk Southern Rail Overpass. On-road facility from Park & Ride through Dauphin Borough via Allegheny Street and Erie Street. Two-Way off-road structure over Norfolk Southern Rail Overpass and Route 322/22 which ties into a Cantilever/Boardwalk bike facility. Off-road segment continues as a cantilever/boardwalk structure which parallels Route 322/22 for approximately 1,500 feet. Off-road segment continues to the east, adjacent to Route 322/22 and transitions to a two way on-road (cycle-track) facility along Front Street until just east of the Fishing Creek Valley Road intersection, where the facility would transition back to the existing Bike Route J (shoulders of eastbound and westbound Front Street). 	<ul style="list-style-type: none"> Eliminates approx. 2.3 miles of existing bike facility along Route 322, including pinch points through existing overpass in both directions. Eliminates key concern of limited sight-line of bicyclists along Route 322/22 @ the overpass pinch point. Creates a pedestrian/ bicycle facility which provides a safer link from Dauphin Borough / Middle Paxton Township to Fort Hunter Park and future connections to Capital Greenbelt. Minimal private property coordination required. 	<ul style="list-style-type: none"> Possible flooding along bicycle facility. Cost of pedestrian bridge, ramps, and cantilever/ boardwalk structure, as well as constructability challenges associated with the all structures. Impacts to vehicular traffic along 322/22 during construction. Requires coordination with Norfolk Southern and approvals by NS for construction within their right-of-way. Defining who is responsible for ownership / maintenance. 	<p>TOTAL: \$15.0 to \$17.0</p> <p>Roadway/Trail – \$2.00 to \$2.50</p> <p>Pedestrian Bridge – \$7.75 to \$8.50</p> <p>Cantilever – \$2.60 to \$3.10</p> <p>Drainage/E&S – \$0.05 to \$0.10</p> <p>Design/Permitting – \$1.70 to \$1.80</p> <p>CM/CI – \$0.90 to \$1.00</p>	<p>Rating: 1</p> <ul style="list-style-type: none"> Minimal additional roadway maintenance procedures required by PennDOT/Borough along Allegheny Street & other local streets. Unique roadway maintenance requirements associated with the two-way cycle track along Front Street. Will requires routine inspection and maintenance of the pedestrian bridge, ramps, and cantilever / boardwalk structures. <ul style="list-style-type: none"> Coordination required with Norfolk Southern to conduct maintenance.