

Finding of No Significant Impact

For

TOLL LOCATIONS 3, 4 & 6 through 13

CITIES/TOWNS OF WARWICK, PROVIDENCE, PAWTUCKET,
CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE,
LINCOLN AND NORTH SMITHFIELD
RHODE ISLAND

Rhode Island Department of Transportation

Federal Project Number TOLL002

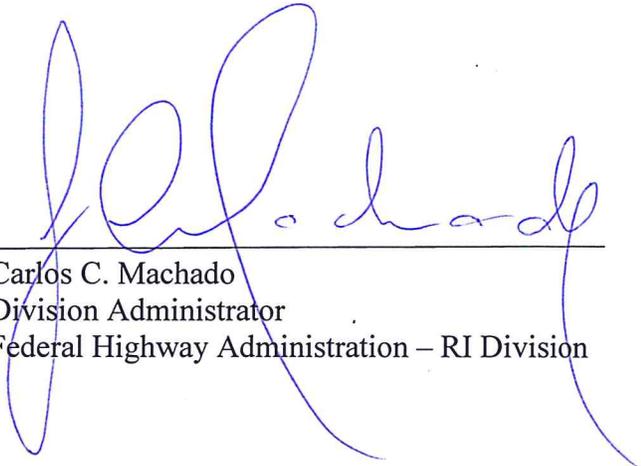
Finding of No Significant Impact

The FHWA has determined that the Preferred Alternative for this proposed project, consisting of the construction of toll systems and tolling operations on tractors or truck tractors as defined in 23 CFR 658.5, will have no significant impact on the human environment. This Finding of No Significant Impact (FONSI) is based on the attached Environmental Assessment, which has been independently evaluated by the FHWA and determined to adequately and accurately discuss the need, environmental issues, and impacts of the proposed project. The EA provides sufficient evidence and analysis for determining that an EIS is not required. The FHWA takes full responsibility for the accuracy, scope, and content of the attached EA.

Date

12/14/18

Carlos C. Machado
Division Administrator
Federal Highway Administration – RI Division



ENVIRONMENTAL ASSESSMENT

Toll Locations 3, 4 & 6 through 13

**Warwick, Providence, Pawtucket, Cranston, Johnston,
Cumberland, East Providence, Lincoln, North Smithfield,
Rhode Island**

December 14, 2018

**Environmental Assessment
VOLUME 1 of 4**



**U.S. Department of Transportation
Federal Highway Administration**

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Toll Locations 3, 4 & 6 through 13

**Warwick, Providence, Pawtucket, Cranston, Johnston, Cumberland, East Providence,
Lincoln, North Smithfield, Rhode Island**

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to 23 CFR 771.119(h) and 40 CFR 1501.4 (e) (2)

U.S. Department of Transportation
Federal Highway Administration
and the
Rhode Island Department of Transportation

11/7/18

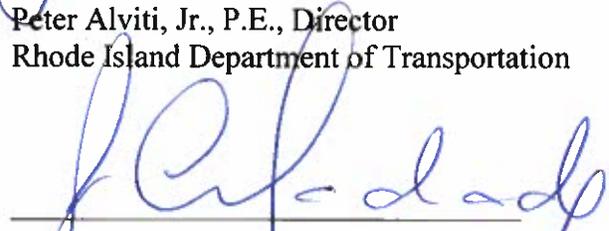
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Appendix E Public Involvement Plan
Appendix F Diversion Analysis Technical Memos
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Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
Act	RI Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016
ADT	Average Daily Traffic
AET	All Electronic Tolling
APE	Area of Potential Effect
CAA	Clean Air Act
CFR	Code of Federal Regulations
CFRP	Carbon Fiber-Reinforced Polymer
CFS	Compost Filter Socks
CO	Carbon Monoxide
CRMC	Coastal Resources Management Council
dBA	A-weighted Decibel
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HHS	Department of Health and Human Services
IPaC	Information for Planning and Consultation
LOD	Limit of Disturbance
LOS	Level of Service
LWCF	Land and Water Conservation Fund
MAP-21	Moving Ahead for Progress in the 21 st Century Act
MBTA	Migratory Bird Treaty Act
MOU	Memoranda of Understanding
MOVES	Motor Vehicle Emission Simulator
MPH	Miles Per Hour
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NB	Northbound
NHA	Natural Heritage Area
NHPA	National Historic Preservation Act
NHS	National Highway System

NLEB	Northern Long-eared Bat
NO _x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
OSRV	Obsolete Sufficiency Rating Value
PAL	Public Archaeology Laboratory, Inc.
PIP	Public Involvement Plan
PM	Particulate Matter
RFID	Radio-frequency Identification
RIDEM	Rhode Island Department of Environmental Management
RIDOA	Rhode Island Department of Administration
RIDOT	Rhode Island Department of Transportation
RIGIS	Rhode Island Geographic Information System
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
RISM	Rhode Island Statewide Model
RMS	Root-mean-square
ROW	Right-of-way
RPD	Request for Preliminary Determination
RRA	Request for Regulatory Applicability
Section 106	Section 106 of National Historic Preservation Act
SB	Southbound
SF	Square Feet
SIP	State Implementation Plan
SP	Stated Preference
STIP	State Transportation Improvement Program
THPO	Tribal Historic Preservation Officer
TNM	Traffic Noise Model
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
V/C	Volume to Capacity
VdB	Vibration Decibel
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
VOT	Value of Time
WTP	Willingness-to-Pay

Project Parties

The Rhode Island Department of Transportation is the applicant and project sponsor as defined under 23 Code of Federal Regulations (CFR) 771.107.

The Federal Highway Administration is the federal lead agency for the project as defined under 23 CFR 771.107.

Preparers

This Environmental Assessment was prepared by Jacobs Engineering Group, Inc. (Boston, Massachusetts and Providence, Rhode Island offices) with technical input from Public Archaeology Laboratory, Inc. of Pawtucket, Rhode Island; Steere Engineering, Inc. of Warwick, Rhode Island; and Cross-Spectrum Acoustics Inc. of Burlington, Massachusetts.

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Executive Summary

The Rhode Island Department of Transportation proposes to construct and operate toll systems at ten locations (Toll Locations 3, 4, and 6 through 13) along five major highway corridors (I-95, I-195, and I-295, US Route 6, and RI Route 146) in the state of Rhode Island (Proposed Action). Revenue from Toll Locations 3, 4, and 6 through 13 would be generated and used in accordance with *The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016*.

In accordance with the National Environmental Policy Act, this Environmental Assessment evaluates the impacts of construction and implementation of the toll systems at Toll Locations 3, 4, and 6 through 13. Each toll location functions independent of one another and is associated with the reconstruction or replacement of specific bridge(s). Toll Locations 1 and 2 were previously evaluated for impacts by the Rhode Island Department of Transportation and the Federal Highway Administration and results were presented in *Environmental Assessment for Toll Locations 1 and 2, Hopkinton, Richmond, and Exeter, Rhode Island* in November, 2017.

The Federal Highway Administration is the lead federal agency for this action and responsible for ensuring the Proposed Action meets the toll eligibility requirements of 23 United States Code § 129, providing assistance to the Rhode Island Department of Transportation in the development of the Environmental Assessment, independently reviewing the findings and conclusions of the Environmental Assessment and its supporting documentation, approving the Environmental Assessment for public dissemination, and ultimately making a National Environmental Policy Act determination (e.g., Finding of No Significant Impact or decision to proceed with an Environmental Impact Statement) following agency and public review.

The Draft EA was approved for publication by RIDOT and FHWA on July 6, 2018. Notice of availability and Public Hearing/Workshop notification was disseminated on July 12, 2018, and July 18, 2018 and published on the RIDOT website and in the *Providence Journal* (English and Spanish), *Westerly Sun*, *Valley Breeze* (English and Spanish), *Cranston Herald*, *the Warwick Beacon*, and *Attleboro Sun Chronicle*. A second notice was also published on August 2, 2018 and August 16, 2018.

Public Hearings/Workshops were held on July 27, 2018 at 6:00 PM and August 21, 2018 at 6:00 PM—at Toll Gate High School in Warwick, RI; Mount Pleasant High School in 434 Providence, RI; and Central Falls High School in Central Falls, RI. The Public comment period concluded on August 24, 2018. Documentation of the Notice of Availability, Comment Period, and Public Hearing/Workshop, along with the RIDOT responses is included in Appendix H.

Proposed Action

The proposed toll systems at Toll Locations 3, 4, and 6 through 13 would be used to collect toll revenue from a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers

travelling across select bridges associated with the toll locations (truck subject to tolls). Each toll system would be comprised of one or more gantries with communication and electrical connections, a roadside cabinet on a concrete pad, and additional safety guardrail. The area required for contractor's storage and staging would be located in maintained areas of the roadway right-of-way.

Although the Rhode Island Department of Transportation has not approved specific toll rates at this time, for the purposes of this analysis, individual toll rates used in the *Rhode Island Department of Transportation Investment-Grade Truck Tolling Study* (Louis Berger 2018) were assumed. In addition to the rates assigned to Toll Locations 3, 4, and 6 through 13, the following limits on the assessments of tolls upon the same truck with Radio-frequency Identification will apply.

- Tolls are limited to once per toll facility, per day in each direction;
- Tolls are limited to a \$20.00 total for a border-to-border through trip on I-95 from Connecticut to Massachusetts; and
- Tolls will not exceed \$40.00 per day.

Implementation of tolling on an existing roadway network can sometimes result in a shift of travel behavior wherein some drivers travel on a different route in order to avoid paying a toll. The potential shift of vehicles away from the tolled facilities is referred to as a "toll diversion." Fifteen such diversion routes have been identified as potential parallel routes that trucks may use to avoid tolls at Toll Locations 3, 4, and 6 through 13.

The direct, indirect, and cumulative impacts of the Proposed Action were analyzed. Due to the limited ground disturbance associated with construction of Toll Locations 3, 4, and 6 through 13, there are limited direct impacts caused by the Proposed Action to the human and natural environment. Indirect impacts resulting from truck diversion traffic on diversion routes were also considered and discussed in this Environmental Assessment. Given the small increase in truck volumes on diversion routes, these impacts were determined not to result in significant impacts, with most impacts being imperceptible or minor and comparable to existing conditions.

Chapter 1 Overview and Background

1.1 Project Summary

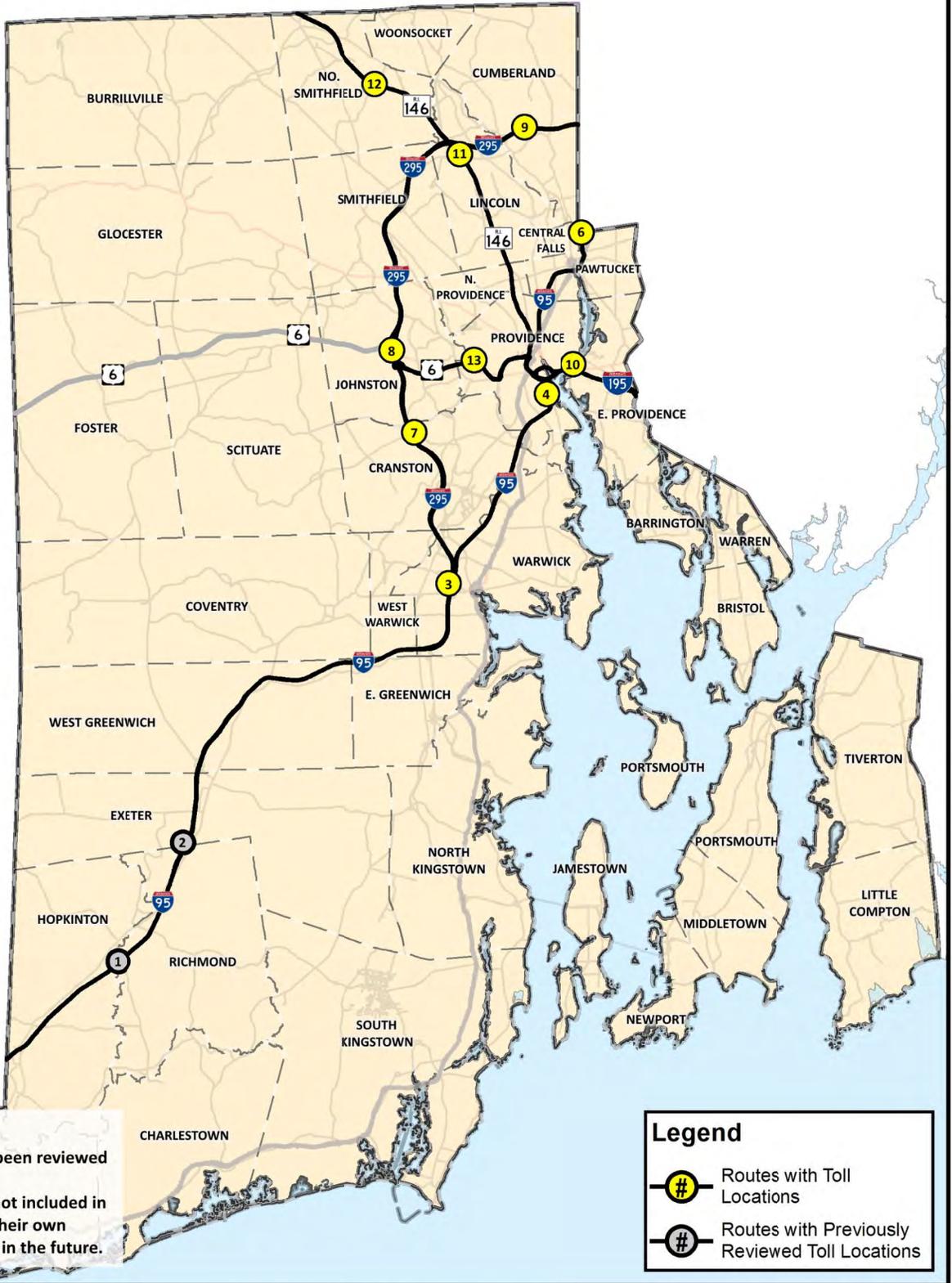
The Rhode Island Department of Transportation (RIDOT) proposes to construct and operate toll systems at Toll Locations 3, 4 & 6 through 13 along five major highway corridors (I-95, I-195, and I-295, US Route 6, and RI Route 146) in the state of Rhode Island (Proposed Action) (**Figure 1-1** and **Table 1-1**). Revenue from Toll Locations 3, 4 & 6 through 13 would be generated and used in accordance with *The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016*.

Table 1-1. Toll Locations

Toll Location ^{1,2}	Community	Roadway
3	Warwick	I-95
4	Providence	I-95
6	Pawtucket	I-95
7	Cranston	I-295
8	Johnston	I-295
9	Cumberland	I-295
10	Providence and East Providence	I-195
11	Lincoln	RI Rte. 146
12	North Smithfield	RI Rte. 146
13	Providence	US Rte. 6
<p>1. Toll Locations 1 and 2 on I-95, in Hopkinton, Richmond and Exeter have been reviewed under a previous Environmental Assessment.</p> <p>2. Toll Locations 5 and 14 are not included in this Environmental Assessment and will be subject to their own environmental review process in the future.</p>		

Through execution of Memoranda of Understanding (MOUs) with RIDOT, the Federal Highway Administration (FHWA) acknowledged in September 2016 that converting non-tolled bridges to toll bridges at Toll Locations 3, 4 & 6 through 13 (**Table 1-2**) meets the toll eligibility requirements of 23 United States Code (U.S.C.) § 129 (**Appendix A**).

According to 23 CFR 650.305, a Bridge is defined as *a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.* (23 CFR 650.305 Definitions)



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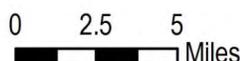
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TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI



PROJECT LOCATION

FIGURE 1-1

Table 1-2. Bridge Work Associated with Toll Locations

Bridge Name	Bridge Number	Toll Location	Community	Proposed Bridge Improvement
Toll Gate Bridge	068301	3	Warwick	Superstructure Replacement
Centerville Road Bridge	068401	3	Warwick	Replacement
Oxford Street Bridge	065301	4	Providence	Superstructure Replacement
Roosevelt Ave Bridges (NB & SB)	056201 NB/ 056221 SB	6	Pawtucket	Superstructure Replacement
East Street Bridges (NB & SB)	056101 NB/ 056121 SB	6	Pawtucket	Superstructure Replacement
Aqueduct Bridges (NB & SB)	073001 NB/ 073021 SB	7	Cranston	Superstructure Replacement
Plainfield Pike Bridges (NB & SB)	073201 NB/ 073221 SB	7	Cranston	Superstructure Replacement
Greenville Ave Bridges (NB & SB)	074001 NB/ 074021 SB	8	Johnston	Superstructure Replacement
Hartford Pike Bridges (NB & SB)	075701 NB/ 075721 SB	8	Johnston	Deck Replacement and Strengthen
US 6 Bridges (North & South)	073701 NB/ 073721 SB	8	Johnston	Superstructure Replacement
Scott Road Bridges (NB & SB)	075201 NB/ 075221 SB	9	Cumberland	Deck Replacement and Strengthen
Leigh Road Bridges (NB & SB)	075301 NB/ 075321 SB	9	Cumberland	Superstructure Replacement
Washington Bridge South Washington Bridge North	020001 700001	10	Providence and East Providence	Repair and Rehabilitate
Louisquisset Pike Bridge	027601	11	Lincoln	Bridge Replacement
Farnum Pike Bridges (NB & SB)	044101 NB/ 044121 SB	12	North Smithfield	Bridge Replacement
Woonasquatucket River Bridge	060401	13	Providence	Repair and Rehabilitate
<p>Note: Toll Locations 1 and 2 on I-95, in Hopkinton, Richmond and Exeter have been reviewed under a previous Environmental Assessment. Toll Locations 5 and 14 are not included in this Environmental Assessment and will be subject to their own environmental review process in the future.</p>				

In accordance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) evaluates the impacts of construction and implementation of the toll systems at Toll Locations 3, 4 & 6 through 13 (also referred to in this document as the Ten Toll Locations). Each toll location functions independently and is associated with the reconstruction or replacement of specific bridge(s). While each toll location functions independent of each other, this EA

evaluates the Ten Toll Locations together due to their proximity to each other and the likelihood of common diversion routes.

Toll Systems

The proposed toll systems at the Ten Toll Locations would be used to collect toll revenue from a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers travelling across select bridges associated with the toll locations (truck subject to tolls). Vehicles subject to tolls are discussed in greater detail in Chapter 3. The toll system at each toll location would be located within the existing highway right-of-way (ROW) and approximately 15–20 feet from the existing edge of pavement. Each toll system would be comprised of one or more gantries with communication and electrical connections, a roadside cabinet on a concrete pad, and additional safety guardrail. Cameras and detectors would be situated on the gantries themselves. Ground disturbance would be limited, as conduits would be installed either by direct bury methods or narrow trenching that would be back filled and seeded to match existing conditions. There would be a slight increase in impervious surface due to the concrete pad for the utility cabinets and the gantry foundations. Foundations for the gantries would be augured to minimize excavation and land disturbance, which would also minimize the potential for erosion. The area required for contractor’s storage and staging would be located in maintained areas of the roadway ROW.

Toll Diversions

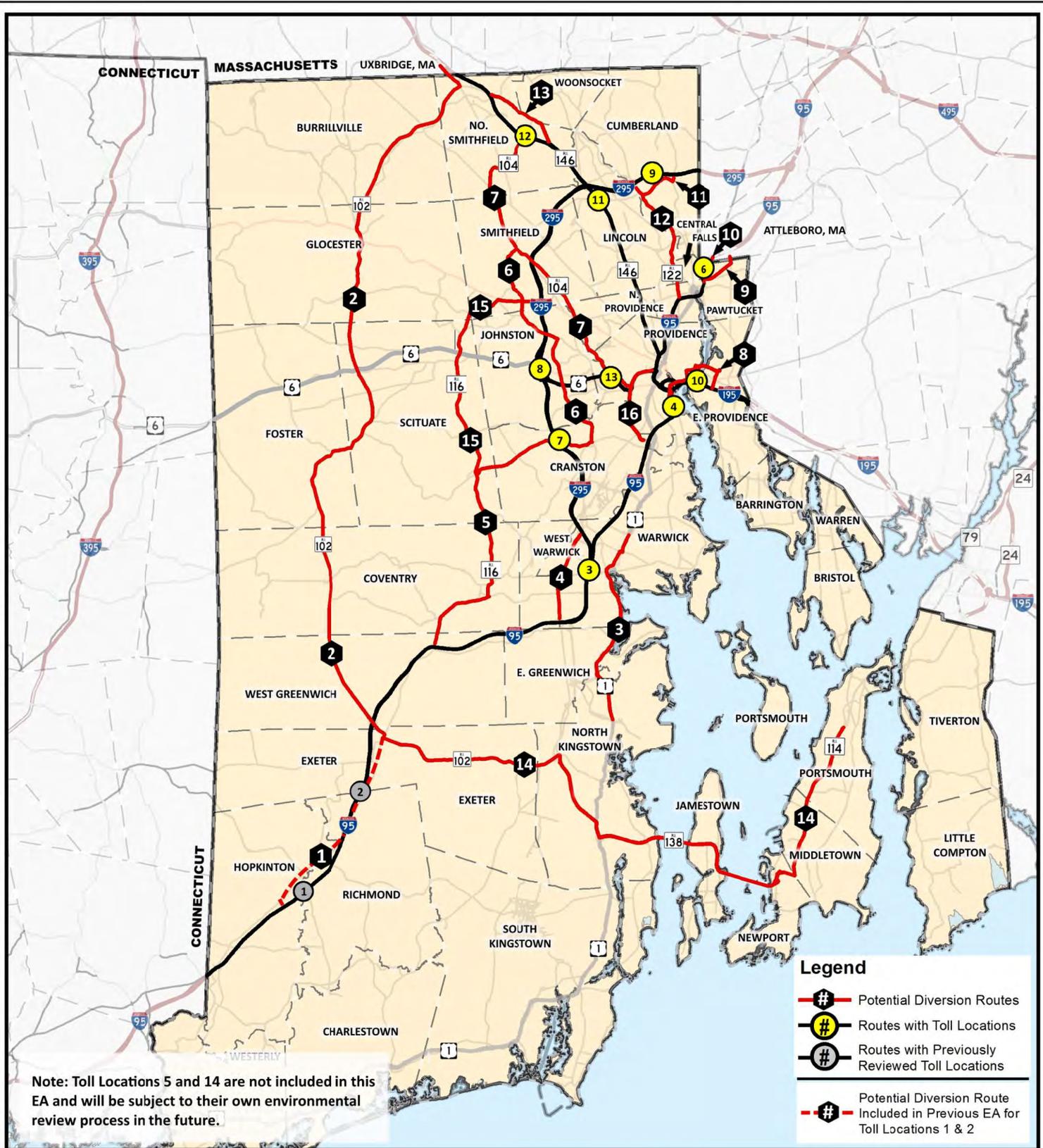
Implementation of tolling on an existing roadway network can sometimes result in a shift of travel behavior wherein some drivers travel on a different route in order to avoid paying a toll. The potential shift of vehicles away from the tolled facilities is referred to as a “toll diversion.” *Rhode Island Department of Transportation Investment-Grade Truck Tolling Study*, hereafter *Truck Tolling Study* (Louis Berger 2018) identified potential diversion routes for Toll Locations 3, 4 & 6 through 13. The Louis Berger Team defined primary diversion routes by first identifying roadway links that were projected to have their heavy truck volume increase by more than 150 vehicles on daily basis under the tolled scenario. Applying the hourly distribution of truck volumes to the 150 daily truck diversion threshold results in a peak hourly volume of approximately 10 vehicles per hour. Any increase in truck traffic below this cutoff was deemed to be negligible given the typical statistical noise of route choice models. A total of 16 primary diversion routes were identified for all proposed toll locations, with each individual route identified often covering diversions away from multiple toll locations. Diversion routes are listed in **Table 1-3**, shown in **Figure 1-2**. Diversion Route 1 was evaluated in the Toll Location 1 and 2 EA and is not included in the table. Diversion Route Identification Methodology and Truck Volume Increase Estimates are discussed further in Chapter 6. Detailed discussions of modeling assumptions, post-processing adjustments and methodology are included in the *Truck Tolling Study* provided in Appendix G.

Federal Highway Administration Involvement

FHWA is the lead federal agency and responsible for providing assistance to RIDOT in the development of the EA, independently reviewing the findings and conclusions of the EA and its supporting documentation, approving the EA for public dissemination, and ultimately making a NEPA determination (e.g., Finding of No Significant Impact or decision to proceed with an Environmental Impact Statement) following agency and public review.

Table 1-3. Potential Diversion Routes and Toll Locations Bypassed

Diversion Route	City/Town	Tolls Bypassed
2	West Greenwich, Coventry, Foster, Scituate, Glocester, Burrillville (Harrisville), No. Smithfield, Uxbridge, MA	3, 7, 8 and 12
3	West Warwick, Warwick, East Greenwich, No. Kingstown	3
4	West Warwick and Warwick	3
5	West Greenwich, Coventry, and Scituate	3, 7 and 8
6	Scituate, Cranston, Johnston, and Smithfield	3, 7 and 8
7	Providence, North Providence, Smithfield, and North Smithfield	11, 12 and 13
8	Providence, East Providence	4 and 10
9	Pawtucket, Rhode Island, and Attleboro, Massachusetts	6
10	Attleboro, Massachusetts and Pawtucket, Rhode Island	6
11	Cumberland	9
12	Pawtucket, Central Falls, Lincoln, and Cumberland	6
13	Woonsocket and North Smithfield	12
14	Exeter, North Kingstown, Jamestown, Newport, Middletown, and Portsmouth	3, 4 and 10
15	Scituate, Glocester, and Smithfield	3, 7 and 8
16	Cranston and Providence	4 and 10



Prepared For:



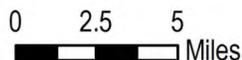
Prepared By:



TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
MassGIS, RIDOT, RIGIS, ESRI



POTENTIAL DIVERSION ROUTES

FIGURE 1-2

1.2 Project Background

Funding Gap to address Rhode Island's Infrastructure Needs

As documented in the *Rhode Island's Transportation Future: Reinvesting in Our Transportation System to Preserve it for Future Generations* (RI 2008), Rhode Island began evaluating sustainable transportation funding options in 2008. A Blue Ribbon Panel on Transportation Funding (Panel) was established in 2008 to assess Rhode Island's transportation needs and to identify options for potential funding sources. The mission of the Panel was to understand the state's transportation financing needs, assess funding options, and recommend funding mechanisms. The Panel's assessment of the funding scenarios studied was that the consequences of not changing the current funding mechanism in Rhode Island were untenable because of the impact to facilities now and in the future. RIDOT would need to double its investment in annual spending on infrastructure improvement just to bring the current network of roads and bridges to a state of good repair. FHWA defines a "state of good repair" as a "condition in which the existing physical assets, both individually and as a system (a) are functioning as designed within their useful service life, (b) are sustained through regular maintenance and replacement programs" (FHWA 2011).

The report out of the Panel led to the 2011 Special Senate Commission on Sustainable Transportation Funding and, later in 2013, the Special Legislative Commission to Study the Funding for East Bay Bridges. Studies out of both commissions clearly identified that the funding provided through both existing state and federal sources is insufficient to meet Rhode Island infrastructure needs and identified possible new revenue sources for consideration. The Rhode Island Transportation Improvement Program for Federal Fiscal Years (FFY) 2013 to 2016 reflected these findings and identified the need for a new funding stream to ensure funding of critically needed bridge repairs and/or replacements.

Toll Revenue Studied and Assumed in Planning Process

Tolling and non-tolling revenue source alternatives were studied and documented in the following plans:

- *The Economic Impact of RhodeWorks: An Accelerated Transportation Restoration Plan*, developed by the Rhode Island Department of Revenue, Office of Revenue Analysis, October 2015 (Judson 2015); and
- *State of Rhode Island Transportation Improvement Program FFY 2017-2025*, adopted by the State Planning Council September 2016, amended January 31, 2017 (RIDOA 2016).

Revenue from tolling has also been assumed as part of the financial forecasts in statewide planning processes and as the basis for meeting fiscal constraint requirements. The current *State of Rhode Island Transportation Improvement Program FFY 2017-2025* (STIP) is a fiscally constrained plan that includes tolling as a revenue source likely to be available to the state. This plan was adopted by the Rhode Island Department of Administration, Statewide Planning Program and State Planning Council. The State Planning Council (established through Rhode Island General Law [RI Gen L] § 42-11-10), is comprised of state, local, and public representatives and federal advisors, and serves as the single statewide Metropolitan Planning Organization for Rhode Island.

RIDOT Asset Management Approach

Consistent with FHWA's asset management requirements outlined in 23 CFR 515, RIDOT's RhodeWorks program implements an Asset Management approach to achieving state of good repair in a cost effective manner that accounts for lifecycle costs, including the future costs of allowing assets to further deteriorate. Pursuant to requirements in Moving Ahead for Progress in the 21st Century Act (MAP-21) and Fixing America's Surface Transportation Act (FAST Act), FHWA promulgated a rule in 2016 (23 CFR 515; 23 CFR 667) which "establishes the processes that a state transportation department must use to develop its asset management plan, as required under 23 U.S.C. (119)(e)(8)."

Moreover, in accordance with 23 CFR 490 Subpart D—National Performance Management Measures for Assessing Bridge Condition, FHWA requires that states maintain a structural sufficiency rate of at least 90 percent or face funding flexibility penalties.

- **23 CFR § 490.413 Penalties for not maintaining bridge condition.**
 - (a) *If FHWA determines for the 3-year period preceding the date of the determination, that more than 10.0 percent of the total deck area of bridges in the State on the National Highway System (NHS) is located on bridges that have been classified as Structurally Deficient, the following requirements will apply.*
 - (1) *During the fiscal year following the determination, the State DOT shall obligate and set aside in an amount equal to 50 percent of funds apportioned to such State for fiscal year 2009 to carry out 23 U.S.C. 144 (as in effect the day before enactment of MAP-21) from amounts apportioned to a State for a fiscal year under 23 U.S.C. 104(b)(1) only for eligible projects on bridges on the NHS.*
 - (2) *The set-aside and obligation requirement for bridges on the NHS in a State in paragraph (a) of this section for a fiscal year shall remain in effect for each subsequent fiscal year until such time as less than 10 percent of the total deck area of bridges in the State on the NHS is located on bridges that have been classified as Structurally Deficient as determined by FHWA.*

Therefore, RhodeWorks forms the basis of RIDOT's strategy for conforming to FHWA's asset management requirements and meeting the 90 percent structural sufficiency target.

The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016

To meet the federal tolling requirements set forth in 23 U.S.C. § 129 the Rhode Island State Legislature passed, and the Governor signed into law, *The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016* (Act). Provisions within the Act establish RIDOT's authority to collect tolls and create a bridge replacement, reconstruction and maintenance fund, designate toll bridges, and address the amount of tolls and limitations on the use of the toll revenue. Pertinent provisions include:

- **RI Gen L § 42-13.1-4. Authority to collect tolls on large commercial trucks only.** –
 - (a) *The department is hereby authorized to fix, revise, charge, and collect tolls for the privilege of traveling on Rhode Island bridges to provide for replacement, reconstruction, maintenance and operation of Rhode Island bridges. The tolls shall be fixed after conducting a cost-benefit analysis and providing an opportunity for public comment. The tolls shall be collected on large commercial trucks only and shall not be collected on any other vehicle; provided, however, no vehicle shall be tolled other than a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers. No act authorizing tolls on passenger vehicles pursuant to this chapter shall take effect until it has been approved by the majority of those electors voting in a statewide referendum. The secretary of state shall certify the results of the statewide referendum. Tolls on large commercial trucks may be implemented utilizing all-electric toll collection methodologies on a cash-less basis, or utilizing any other methodologies determined by the department.*
 - (b) *Subject to §42-13.1-14, the department will establish a program to limit the assessment of the tolls upon the same individual large commercial truck using a RFID [Radio-frequency Identification] to once per toll facility, per day in each direction, or an equivalent frequency use program based upon individual large commercial truck use.*
 - (c) *Subject to §42-13.1-14, the total amount of tolls imposed upon the same individual large commercial truck using a RFID for making a border-to-border through trip on Route 95 Connecticut to Route 95 Massachusetts, or the reverse, shall not exceed twenty dollars (\$20.00).*
 - (d) *Subject to §42-13.1-14, the daily maximum amount of the tolls collected upon the same individual large commercial truck using a RFID shall not exceed forty dollars (\$40.00).*
 - (e) *Tolls shall not be subject to supervision or regulation by any commission, board, bureau, agency, or official of the state or any municipality or other political subdivision of the state except the department.*

- **RI Gen L § 42-13.1-6. Rhode Island bridge replacement reconstruction and maintenance fund established.** –
 - (a) *There is hereby created a special account in the intermodal surface transportation fund, as established in §31-36-20, to be known as the Rhode Island bridge replacement, reconstruction and maintenance fund ("the fund").*
 - (b) *The fund shall consist of all those monies received by the department under this chapter, including:*
 - (1) *The monies received through the collection of tolls on bridges in Rhode Island;*
 - (2) *Any fees, fines or penalties collected pursuant to this chapter; and*
 - (3) *Investment earnings on amounts credited to the fund.*
 - (c) *Unexpended balances and any earnings thereon shall not revert to the general fund but shall remain in the Rhode Island bridge replacement, reconstruction and maintenance fund. There shall be no requirement that monies received into the fund during any given calendar year or fiscal year be expended during the same calendar year or fiscal year.*

- **RI Gen L § 42-13.1-7. Designation of toll bridges.** -- *The director of the department [RIDOT] may designate any Rhode Island bridge on the National Highway System as a toll bridge in order to facilitate the financing of replacement, reconstruction, and maintenance of Rhode Island's system of bridge.*

- *RI Gen L § 42-13.1-8. Amount of tolls.* -- The department's authority to fix and adjust the amount of tolls shall be determined by the costs of replacement, reconstruction, maintenance, and operation of Rhode Island's system of bridges and/or any portion or portions thereof, including costs associated with the acquisition, construction, operation and maintenance of the toll facilities and administrative costs in connection therewith.
- *RI Gen L § 42-13.1-9. Limitations on the use of revenue.* -- All revenue collected pursuant to this chapter and deposited to the Rhode Island bridge replacement, reconstruction, and maintenance fund shall be used to pay the costs associated with the operation and maintenance of the toll facility, and the replacement, reconstruction, maintenance, and operation of Rhode Island bridges on the National Highway System or any other use permitted under 23 U.S.C. § 129.

Federal limits on the use of revenue as set forth in 23 U.S.C. § 129

(a) (3) Limitations on use of revenues.—

(A) In general.—A public authority with jurisdiction over a toll facility shall ensure that all toll revenues received from operation of the toll facility are used only for—

- (i) debt service with respect to the projects on or for which the tolls are authorized, including funding of reasonable reserves and debt service on refinancing;
- (ii) a reasonable return on investment of any private person financing the project, as determined by the State or interstate compact of States concerned;
- (iii) any costs necessary for the improvement and proper operation and maintenance of the toll facility, including reconstruction, resurfacing, restoration, and rehabilitation;
- (iv) if the toll facility is subject to a public-private partnership agreement, payments that the party holding the right to toll revenues owes to the other party under the public-private partnership agreement; and
- (v) if the public authority certifies annually that the tolled facility is being adequately maintained, any other purpose for which Federal funds may be obligated by a State under this title.

Chapter 2 Purpose and Need

2.1 Purpose

The purpose of the Project is to:

- Construct toll systems at Toll Locations 3, 4 & 6 through 13 (Ten Toll Locations); and
- Assess tolls on a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers travelling at the Ten Toll Locations.

Constructing the toll systems and allowing for the collection of tolls at the Ten Toll Locations will support funding repairs to the bridges listed in **Table 1-2**. Revenue from the toll systems will be deposited in the Rhode Island bridge replacement, reconstruction, and maintenance fund and used to pay the costs associated with the operation and maintenance of the toll facility, and the replacement, reconstruction, maintenance, and operation of Rhode Island bridges on the National Highway System or any other use permitted under 23 U.S.C. § 129.

Criteria for evaluating whether the Project's purpose is met include:

- Consistency with RIDOT's Asset Management Approach and FHWA's National Performance Measure Targets for Bridge Condition;
- Consistency with Rhode Island's Financial Forecasts and Planning Assumptions;
- Consistency with RhodeWorks Legislation; and
- Compliance with 23 U.S.C. § 129.

2.2 Need

The need for the Project is demonstrated by simultaneous challenges faced by RIDOT:

- Statewide backlog of infrastructure needs and structurally deficient bridges and the need to keep other bridges from becoming structurally deficient, including the bridges at the Ten Toll Locations;
- Bridges are critical functional elements in Rhode Island's transportation network, and a bridge's structural condition affects RIDOT's ability to provide for safe and efficient movement of people and goods in the state of Rhode Island;
- RIDOT must meet FHWA national performance measure targets for bridge condition or face funding flexibility penalties; and
- Insufficient revenue available from existing state and federal sources to fund the reconstruction or replacement of Rhode Island transportation infrastructure, including the funding needs for the bridges at the Ten Toll Locations.

Identification of Tolling Locations and Associated Bridges

The identification and ultimate selection of toll locations was accomplished by RIDOT through a screening process to identify the bridges that meet the tolling requirements of 23 U.S.C. § 129, including bridges that are in need of work that qualify for tolling revenue. The screening process is consistent with RIDOT's risk-based, data-driven, and cost effective asset management approach. The toll locations for the identified bridges were found to meet the above requirements while also generating the necessary revenue to support RhodeWorks, which is part of RIDOT's strategy to meet its funding gap and address its infrastructure needs.

23 U.S.C. § 129 allows for the reconstruction or replacement of a toll-free bridge and conversion of the bridge to a toll facility. Preliminary planning efforts by RIDOT examined over 100 locations for potential tolling, and identified 22 for further analysis. These initial 22 locations were selected by looking at the type and amount of bridge work needed to bring them into a state of good repair as well as the functional class of the infrastructure it supports and its compatibility with a tolling system. Eight of the 22 locations were eliminated in the Level 2 Traffic & Revenue Study (CDM Smith 2016) based on duplication, traffic diversions, revenue potential, and uncertainty over the permissibility of tolling bridges above interstate highways. No such overpass bridges are associated with the final toll locations.

All bridges at the tolling locations meet the following criteria:

- Risked Base Utility Value
- Obsolete Sufficiency Rating Value (OSRV)
- Qualify for Rehabilitation based on OSRV
- Meet requirements for Reconstruction and Rehabilitation

In summary, RIDOT must provide for the systematic preventative maintenance of bridges, and replacement and rehabilitation of deficient bridges through an overall asset management approach to transportation investment (23 U.S.C. § 144). As part of this overall approach, RIDOT used a data-driven, risk-based approach and cost-effective strategy in selecting the bridges for tolling.

Bridge Conditions at the Ten Toll Locations

Toll Location 3: There are two bridges associated with Toll Location 3 in Warwick. The Toll Gate Bridge (Bridge No. 068301) carries I-95 northbound (NB) and southbound (SB) over RI Route 115 (Toll Gate Road). The Centerville Road Bridge (Bridge No. 068401) carries I-95 northbound and southbound over RI Route 117 (Centerville Road). The Toll Gate Bridge is a rolled steel multi-beam bridge. It was built in 1965 and has an Average Daily Traffic (ADT) count of 174,731. Its deck condition is Satisfactory, the superstructure and substructure are Fair, with no load restrictions. The Centerville Road Bridge is a two-span multi-girder bridge consisting of a concrete deck component with steel beams. It was built in 1965 and has an ADT of 160,000. Its deck condition is Satisfactory, the superstructure and substructure are Fair and bridge rail is substandard. There are no load restrictions.

Toll Location 4: The bridge associated with Toll Location 4 in Providence is the Oxford Street Bridge (Bridge No. 065301) which carries I-95 northbound and southbound over Oxford Street. The

bridge has cast-in-place concrete box beams. Built in 1963, it has an ADT of 163,411. The superstructure is Fair, the substructure is Satisfactory, and the approach rail is substandard. There are no load restrictions.

Toll Location 6: The bridges associated with Toll Location 6 in Pawtucket are the Roosevelt Avenue Bridges (Bridge Nos. 056201 and 056221) which carry I-95 northbound and southbound over Roosevelt Avenue and the East Street Bridges (Bridge Nos. 056101 and 056121) which carry I-95 northbound and southbound over East Street. The Roosevelt Avenue Bridges are steel multi-girder bridges. They were built in 1964 and have an ADT of 42,554. Their deck condition is Good, superstructure is Fair and the substructure is Satisfactory with no load restrictions. The East Street Bridges are three span steel W-Beam bridges. They were built in 1964 and have an ADT of 42,554. Their deck condition, superstructure, and substructure are all Satisfactory with no load restrictions.

Toll Location 7: The bridges associated with Toll Location 7 in Cranston are the Aqueduct Bridges (Bridge Nos. 073001 and 073021) which carry I-295 northbound and southbound over the Water Supply Aqueduct and the Plainfield Pike Bridges (Bridge Nos. 073201 and 073221) which carry I-295 northbound and southbound over RI Route 14, Plainfield Pike. The Aqueduct Bridges are three span continuous steel multi-girder bridges. They were built in 1968 and have an ADT of 33,595. Their deck condition is generally Satisfactory (southbound deck is fair), the superstructure is Poor (southbound superstructure is Fair) and the substructure is Satisfactory with no load restrictions. The Plainfield Pike Bridges are steel multi-girder bridges. They were built in 1969 and have an ADT of 33,595. Their deck condition is Satisfactory, the superstructure is Poor and the substructure is Satisfactory. There are no load restrictions.

Toll Location 8: Several bridges are associated with Toll Location 8 in Johnston:

The Greenville Ave Bridges (Bridge Nos. 074001 and 074021) are steel plate girder bridges with a composite reinforced concrete deck. They carry I-295 northbound and southbound over RI Route 5 (Greenville Avenue). The bridges were built in 1970 and have an ADT of 38,435. Their deck condition is Satisfactory, the superstructure is Satisfactory (southbound superstructure is Poor) and the substructure is Fair. There are no load restrictions, but the bridge and approach rails are substandard.

The Hartford Pike Bridges (Bridge Nos. 075701 [one simple span steel rolled beams] and 075721 [two simple span steel rolled beams]) carry I-295 northbound and southbound over US 6A (Hartford Pike). Built in 1971, they have an ADT of 47,500 (southbound 30,000). Deck condition, superstructure, and substructure are Satisfactory. There are no load restrictions, but the approach rail is substandard.

The US 6 Bridges (Bridge Nos. 073701 and 073721) are steel continuous multi-girder bridges and carry I-295 northbound and southbound over US 6. Built in 1971, they have an ADT of 40,126. Deck condition is Fair (southbound deck is Satisfactory), the superstructure and substructure are Fair (southbound substructure is Satisfactory). There are no load restrictions.

Toll Location 9: The bridges associated with Toll Location 9 in Cumberland are the Scott Road Bridges (Bridge Nos. 075201 and 075221) with multi-steel rolled girders which carry I-295 over Scott Road and the Leigh Road Bridges (Bridge Nos. 075301 and 075321) with 3-span simply

supported rolled steel girders which carry I-295 northbound and southbound over Leigh Road. The Scott Road Bridges were built in 1965 and have an ADT of 27,875. Deck condition is Poor, and the superstructure and substructure are Fair (southbound is Satisfactory). There are no load restrictions, but approach rails are substandard.

Toll Location 10: The bridges associated with Toll Location 10 in Providence and East Providence are the Washington Bridge South (Bridge No. 020001) and Washington Bridge North (Bridge No. 700001) which carry I-195 over the Seekonk River. The Washington Bridge South is a steel continuous multi-girder bridge, built in 1930 and reconstructed in 2008, with an ADT of 170,767. Deck condition is Very Good, the superstructure is Very Good and the substructure is Satisfactory (southbound is satisfactory). There are no load restrictions but the approach rails are substandard. The Washington Bridge North is a steel multi-girder and pre-stressed concrete multi-girder bridge built in 1969 with an ADT of 76,700. Deck condition is Satisfactory, and the superstructure and substructure are Poor. There are no load restrictions but each approach rail is substandard.

Toll Location 11: The bridge associated with Toll Location 11 in Lincoln is the Louisquisset Pike Bridge (Bridge No. 027601) which carries RI Route 146 (Eddie Dowling Highway) over RI Route 116 (George Washington Highway). The bridge is a reinforced concrete rigid rib with carbon fiber-reinforced polymer composites (CFRP) built in 1942 with an ADT of 47,393. Deck is poor Superstructure is Poor and the substructure is Fair. The bridge is posted for load and the bridge rail and approach rails are substandard.

Toll Location 12: The bridges associated with Toll Location 12 in North Smithfield are the Farnum Pike Bridges (Bridge Nos. 044101 and 044121) which carry RI Route 146 northbound and southbound over RI Route 104 (Farnum Pike). The bridges are reinforced concrete rigid frame girders bridges built in 1958 and have an ADT of 16,797. The superstructure is Poor and the substructure is Satisfactory. There are no load restrictions but the bridge rail and approach rails are substandard.

Toll Location 13: The bridge associated with Toll Location 13 in Providence is the Woonasquatucket River Bridge (Bridge No. 060401) which carries US 6 over the Woonasquatucket River. The bridge is a pre-stressed AASHTO Type IV I-beams bridge with composite reinforced concrete deck and asphalt overlay. Built in 1969 it has an ADT of 59,930. Deck is Satisfactory, superstructure and substructure are satisfactory with no load restrictions.

Funding Gap to Support Necessary Bridge Improvements

Numerous studies and legislative commissions have identified a funding gap between the revenue needed to maintain bridges in Rhode Island in a state of good repair and the annual revenue generated by current dedicated revenue sources (RI 2008, and RIDOA 2016). The 10 year RhodeWorks program was originally projected to cost roughly \$5 billion, with about 10 percent of revenue coming from tolls. The proposed action would comprise part of that revenue.

All revenue from RhodeWorks will be deposited into the Rhode Island bridge replacement, reconstruction, and maintenance fund and used to pay the costs associated with the operation and maintenance of the toll facility, and the replacement, reconstruction, maintenance, and operation

of Rhode Island bridges on the National Highway System or any other use permitted under 23 U.S.C. § 129.

Revenue from tolling will allow for the completion of bridge projects and help RIDOT achieve its 90 percent sufficiency rating performance target within ten years. Without the toll revenue it would take significantly longer, and be costlier to complete critically needed bridge reconstructions and replacements.

Statewide Transportation Improvement Program

Each state is required under 49 U.S.C. 5304(g) to develop a statewide transportation improvement program. Rhode Island meets this requirement through the *State of Rhode Island Transportation Improvement Program FFY 2017-2025* (STIP), adopted September 8, 2016, and amended January 31, 2017. The STIP includes projects and activities for the federally required four-year period and includes additional information on activities through 2025. All the activities in the STIP are supported by state and federal revenue sources. Federal regulation requires that activities within the first four years of the STIP be fiscally constrained. This means that the list of STIP projects may not exceed the anticipated funding that can reasonably be available over the four-year time period (RIDOA 2016). Toll revenue was one of the funding sources assumed in the fiscally constrained STIP and was projected using data developed by RIDOT.

Federal Participation in Toll Roads

Federal participation in toll roads, including reconstruction or replacement of a toll-free bridge and conversion of the bridge to a toll facility is established in 23 U.S.C. § 129. Subject to the provisions of this section, federal participation is permitted on the same basis and in the same manner as construction of toll-free highways. Provisions outlined in 23 U.S.C. § 129 include authorization of federal participation, ownership requirements, limitation on use of toll revenues, loans, and compliance with other federal laws. Before commencing any activity authorized under 23 U.S.C. § 129, the State shall have a law that permits tolling. This provision was achieved with the passing of *The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016*.

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Chapter 3 Proposed Action

The Proposed Action involves two main components: (1) the construction of toll systems and (2) tolling operations, consisting of tolls on tractors or truck tractors as defined in 23 CFR 658.5, pulling a trailer or trailers at the associated bridges using all electronic tolling (AET).

3.1 Toll Systems

The Proposed Action includes construction of toll systems at Toll Locations 3, 4 & 6 through 13 as listed in **Table 3-1**.

Table 3-1. Toll Locations and Associated Communities and Roadways

Toll Location ^{1, 2}	Community	Roadway
3	Warwick	I-95
4	Providence	I-95
6	Pawtucket	I-95
7	Cranston	I-295
8	Johnston	I-295
9	Cumberland	I-295
10	Providence and East Providence	I-195
11	Lincoln	RI Rte. 146
12	North Smithfield	RI Rte. 146
13	Providence	US Rte. 6
<ol style="list-style-type: none"> 1. Toll Locations 1 and 2, in Hopkinton, Richmond and Exeter have been reviewed under a previous Environmental Assessment. 2. Toll Locations 5 and 14 are not included in this Environmental Assessment and will be subject to their own environmental review process in the future. 		

The toll system at each proposed toll location would be located within the existing highway ROW and approximately 15–20 feet from the existing edge of pavement. Each toll location would consist of one or more gantries (**Photo 3-1**) conduit for communication and electrical connections, a roadside cabinet on a concrete pad, and installation of additional guardrail. The cameras and detectors would be on the gantry that would span the roadway. **Figures 3-1** through **Figure 3-27** at the end of this chapter show the location and features of the Ten Toll Locations.

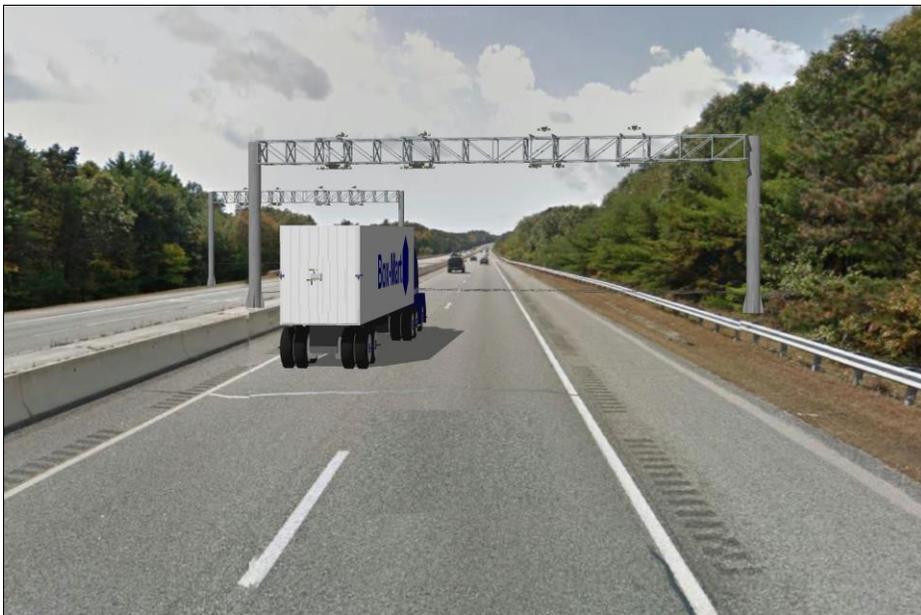


Photo 3-1. Image of Typical Toll Gantry in Urban and Rural Locations

Source: Google; Rendering: Jacobs.

The limit of disturbance (LOD) shown on the figures includes the area of direct impacts for any project-related work associated with construction of the tolling system, including paving, excavation, grading, trenching, staging, and utility connections at the two toll locations. Ground disturbance would be limited. The conduit would be installed either by direct bury methods or narrow trenching that would be back filled and seeded to match existing conditions. There would be a slight increase in impervious surface due to the concrete pad for the utility cabinets (approximately 50 square feet [SF] per toll location) and the gantry foundations (approximately 20 SF per gantry). Foundations for the gantries would be augured to minimize excavation and land disturbance, which would also minimize the potential for erosion. Compost Filter Socks (CFS) would provide erosion control and identify the LOD.

An approximate location to be used for staging has been identified on figures in this section. Grading or cutting of woody vegetation is not anticipated in these areas. These locations are within the roadway ROW and are open grassy areas that can be accessed from the adjacent roadway.

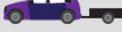
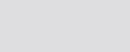
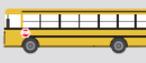
3.2 Tolling Operations

The AET system allows vehicles to pay the toll at highway speed. Tolls would not be paid with cash, but with RFID transponders (i.e., E-ZPass) or through video (i.e., license plate capture). As described in the *Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016*, tolls would be collected electronically on a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers. **Table 3-2** illustrates the vehicles subject to tolls.

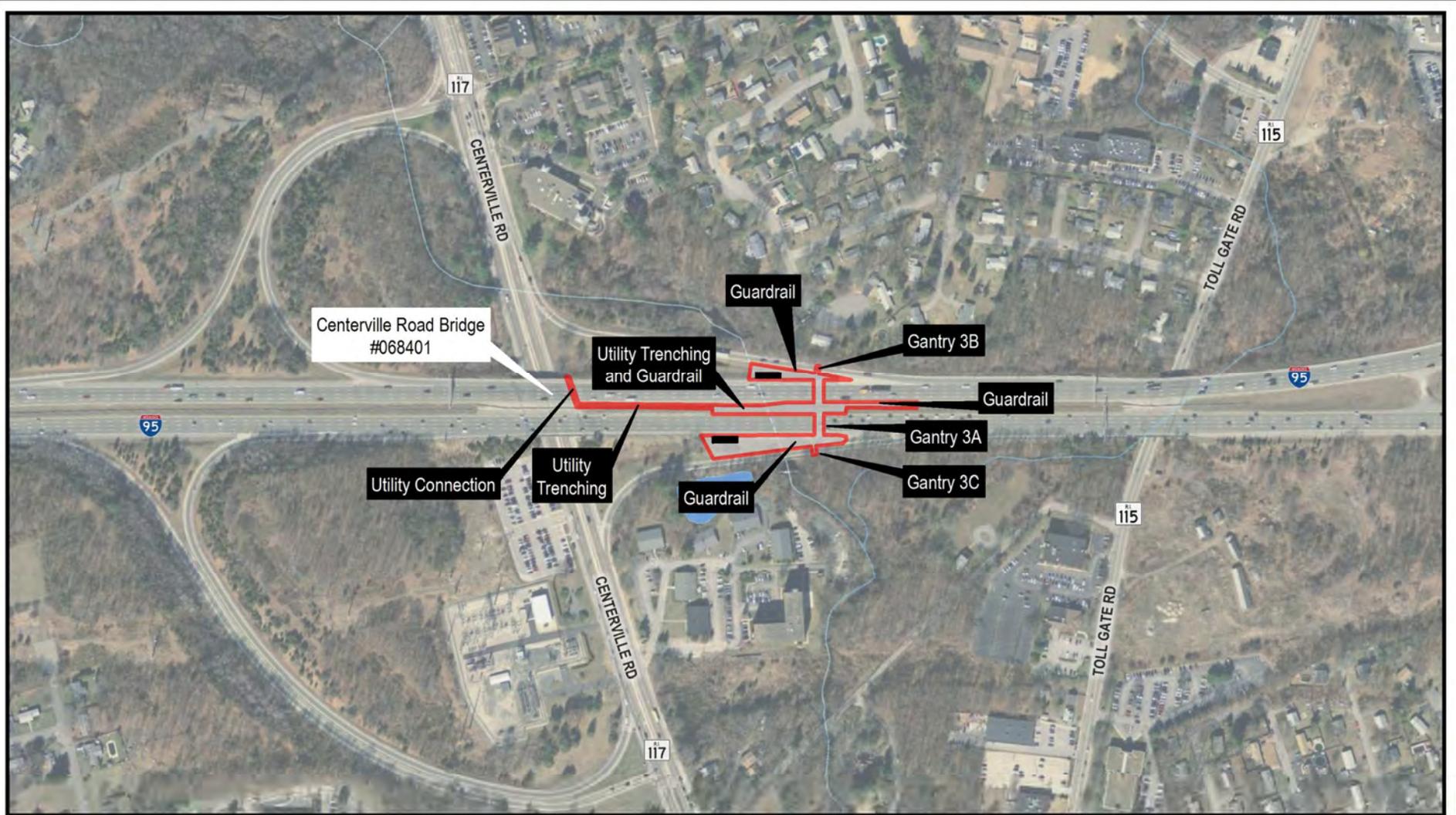
Although RIDOT has not approved specific toll rates at this time, for the purposes of this analysis, individual toll rates used in the *Truck Tolling Study* (Louis Berger 2018) were assumed. As required by the RhodeWorks legislation (RI Gen L § 42-13.1-4), the “tolls shall be fixed after conducting a cost-benefit analysis and providing an opportunity for public comment.” When determining toll rates for the Toll Locations 3, 4 & 6 through 13, RIDOT shall include the following limits on the assessments of tolls upon the same individual tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers using RFID which are established in the RhodeWorks legislation:

- Tolls are limited to once per toll facility, per day in each direction;
- Tolls are limited to a \$20.00 total for a border-to-border through trip on I-95 from Connecticut to Massachusetts; and
- Tolls will not exceed \$40.00 per day.

Table 3-2. Vehicles Subject to Tolls by FHWA Classification

GREY SHADING - NON TOLLED VEHICLES		WHITE SHADING - TOLLED VEHICLES	
CLASS 1 Motorcycles 	CLASS 5 Two Axle, Six Tire, Single Unit     	CLASS 8 Four or Less Axle, Single Trailer      	CLASS 10 Six or More Axle, Single Trailer  
CLASS 2 Passenger Cars    	CLASS 6 Three Axle Single Unit     	CLASS 9 5-Axle Tractor Semitrailer   	CLASS 11 Five or Less Axle, Multi-trailer  CLASS 12 Six Axle, Multi-trailer  
CLASS 3 Four Tire Single Unit     	CLASS 7 Four or More Axle Single Unit   	CLASS 13 Seven or More Axle, Multi-trailer   	
CLASS 4 Buses   			

Source: RIDOT



Prepared for:

 Driven to get you there

Prepared by:


Legend

-  Proposed Staging Areas
-  Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 250 500 Feet

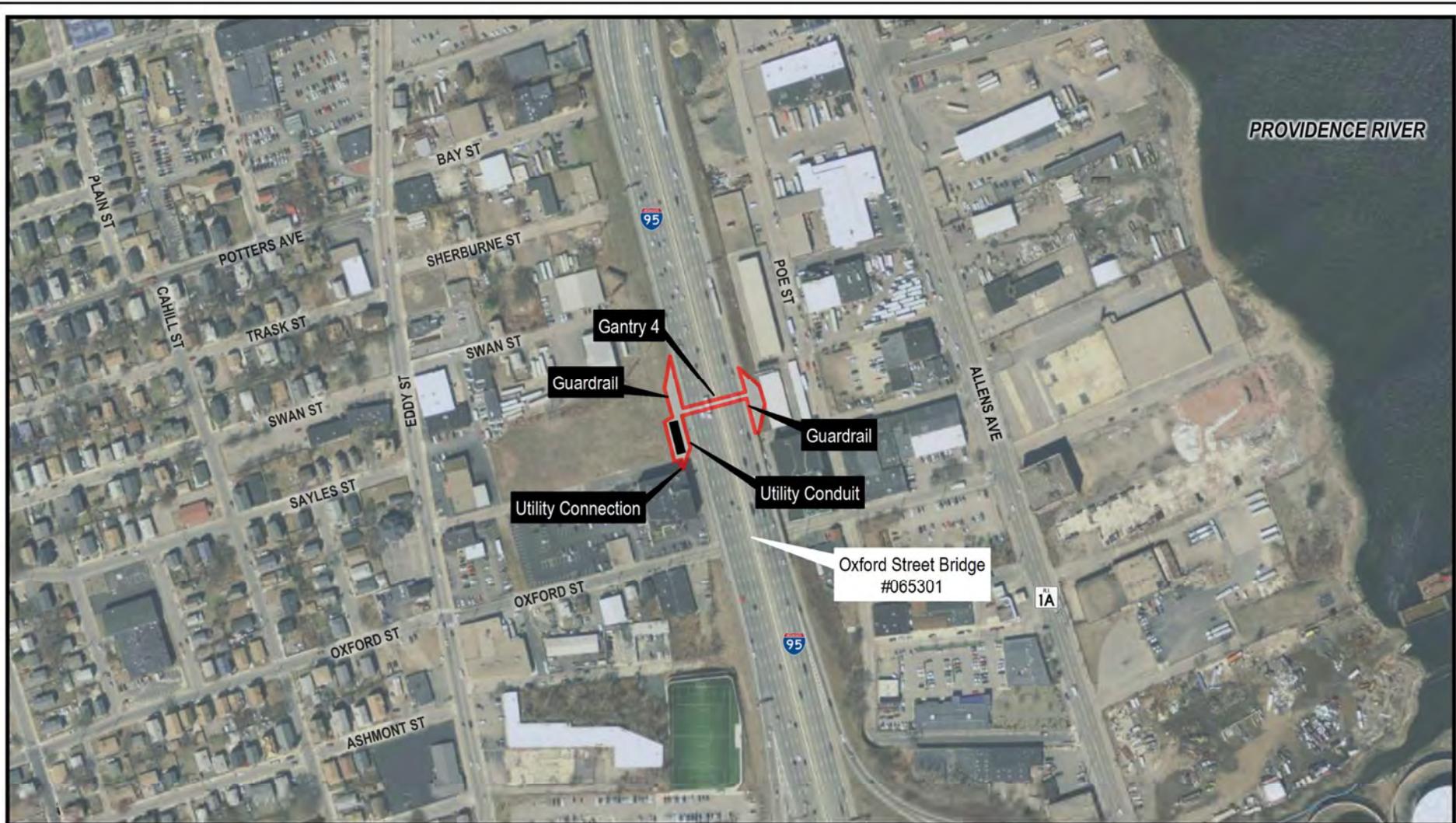


**TOLL LOCATION 3
 AND GANTRIES 3A, 3B, 3C**

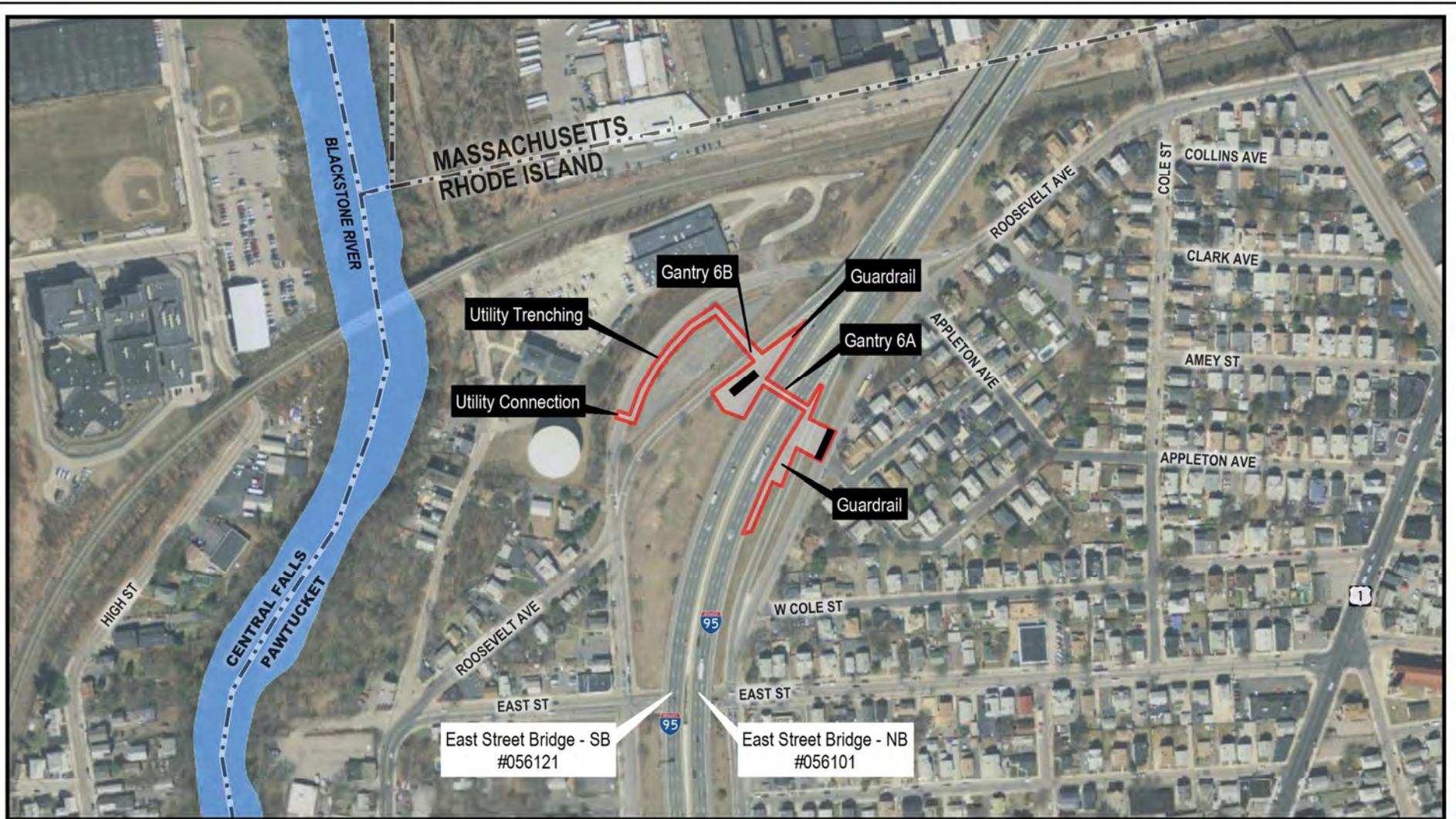
Warwick, RI

Project Details

FIGURE 3-1



<p>Prepared for:</p>  <p>Prepared by:</p> 	<p>Legend</p> <ul style="list-style-type: none"> Proposed Staging Area Limit of Disturbance 	<p align="center">TOLL LOCATIONS 3, 4 & 6-13 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p>	<p align="center">TOLL LOCATION 4 AND GANTRY 4</p> <p align="center">Providence, RI</p> <p align="center">Project Details</p> <p align="right">FIGURE 3-3</p>
<p>Data Sources: RIDOT, RIGIS, ESRI</p>		<p align="center">0 250 500 _____ Feet</p> 	



Prepared for:

 Prepared by:

Legend

- Proposed Staging Areas
- Limit of Disturbance
- Municipal Boundary

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

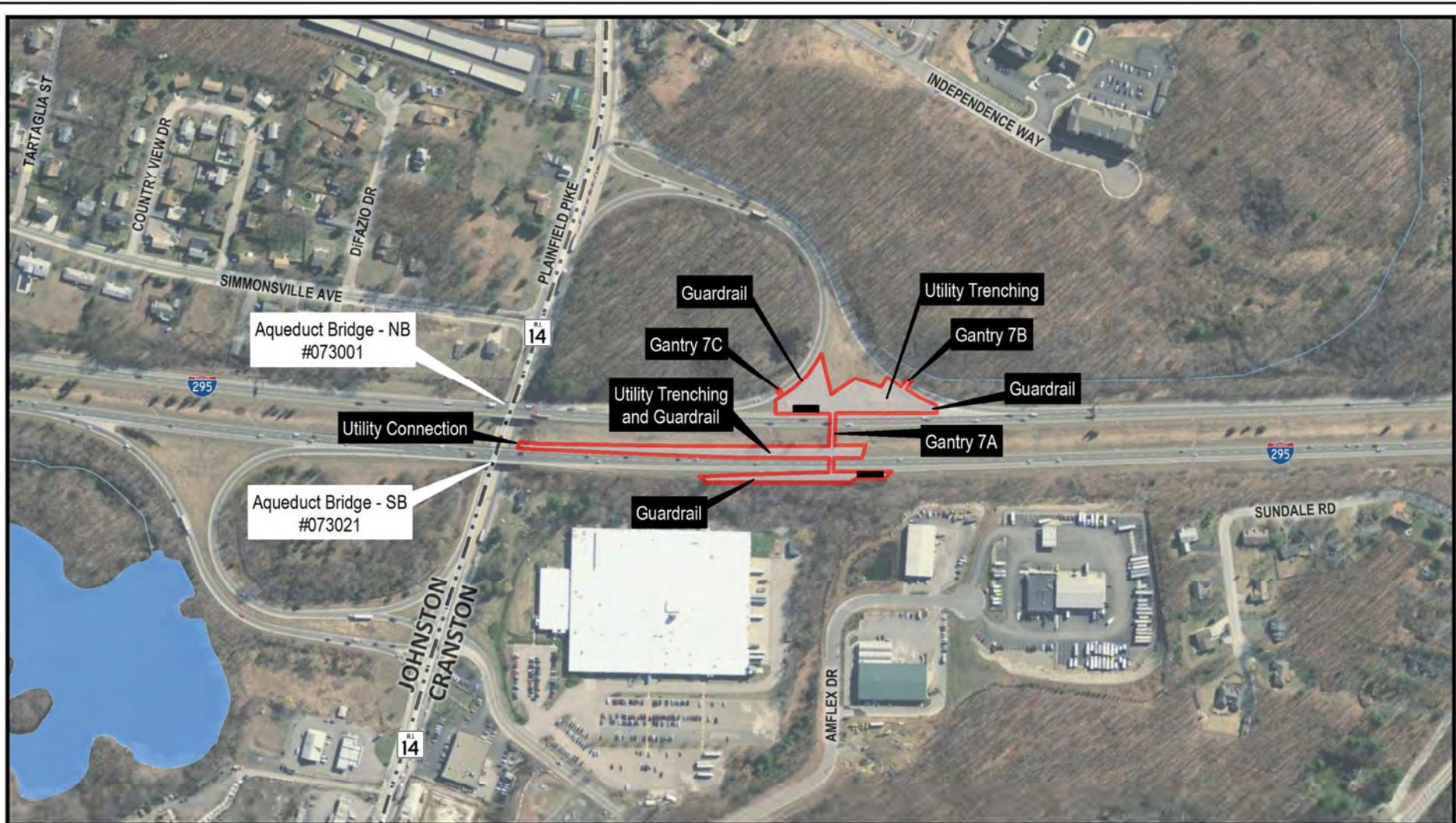
0 250 500
 Feet

**TOLL LOCATION 6
 AND GANTRIES 6A, 6B**

Pawtucket, RI

Project Details

FIGURE 3-5



Prepared for:

 Prepared by:


Legend
 Proposed Staging Areas
 Limit of Disturbance
 Municipal Boundary

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 250 500 Feet



**TOLL LOCATION 7
 AND GANTRIES 7A, 7B, 7C**

Cranston, RI

Project Details

FIGURE 3-7



Prepared for:



Prepared by:

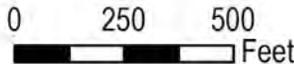


Legend

-  Proposed Staging Area
-  Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

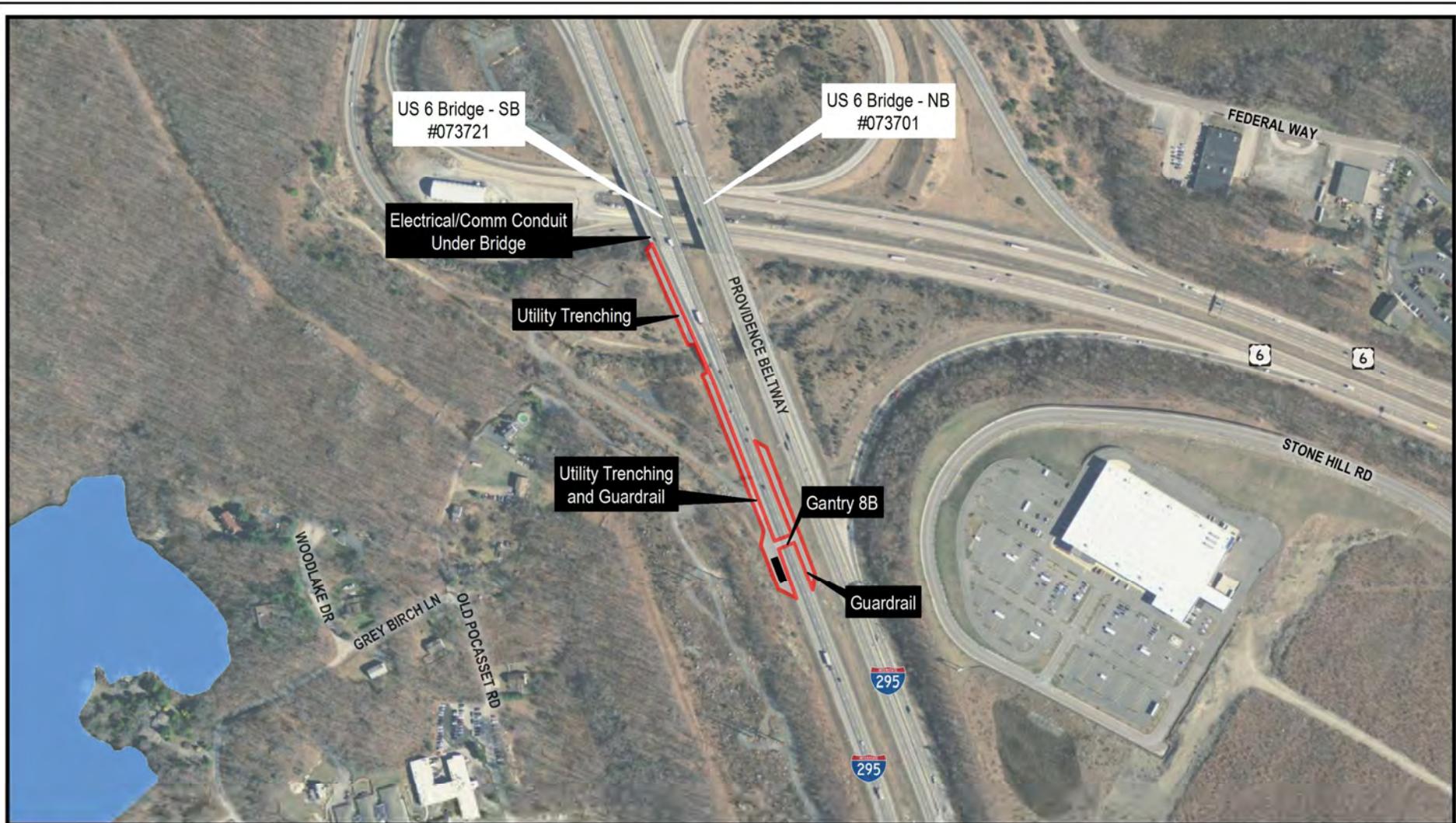



**TOLL LOCATION 8
 AND GANTRY 8A**

Johnston, RI

Project Details

FIGURE 3-9



Prepared for:

 Driven to get you there

Prepared by:


Legend

-  Proposed Staging Area
-  Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 250 500
 Feet

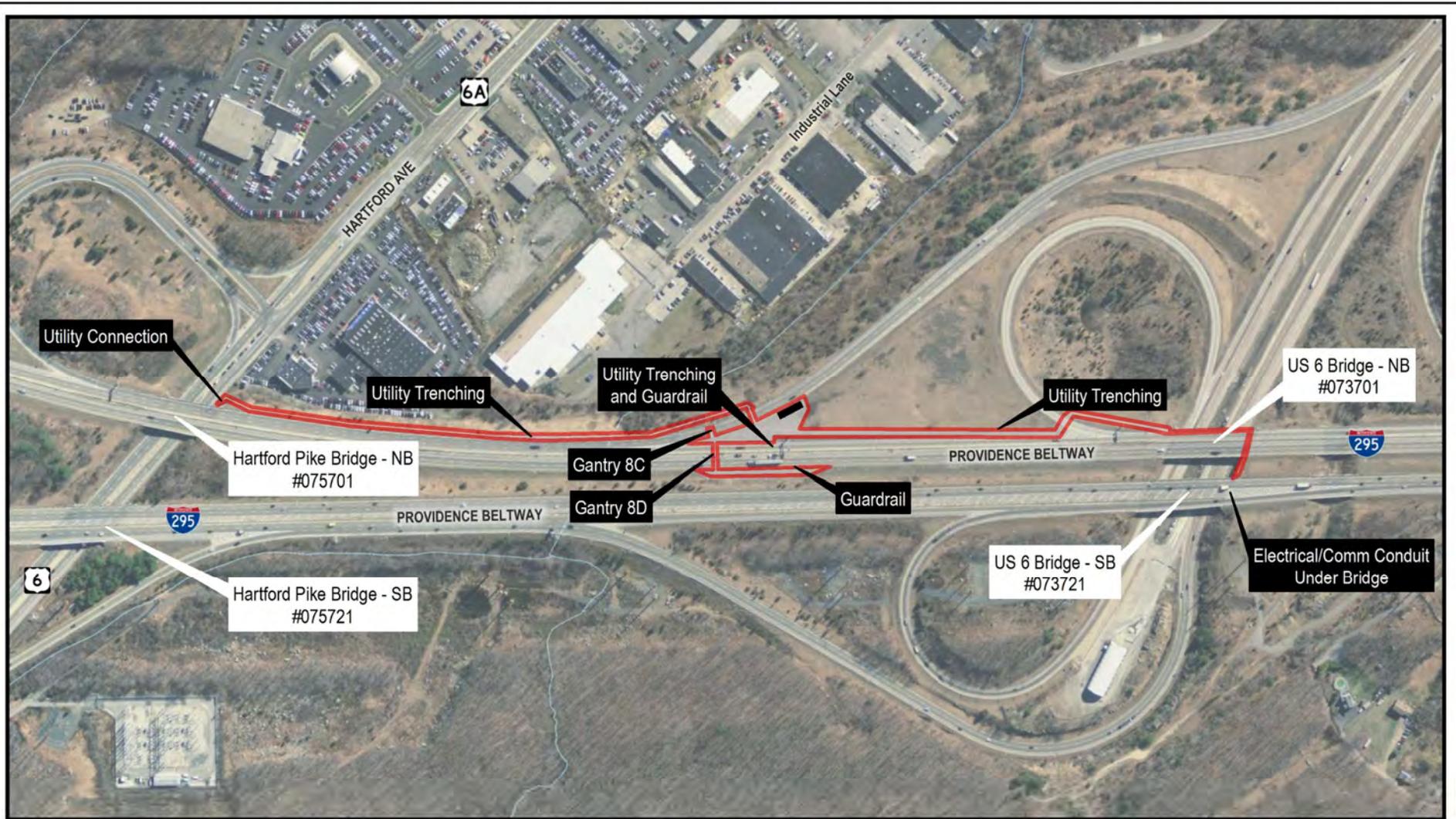


**TOLL LOCATION 8
 AND GANTRY 8B**

Johnston, RI

Project Details

FIGURE 3-11



Prepared for:

 Driven to get you there

Prepared by:


Legend

- Proposed Staging Area
- Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

0 250 500
 Feet

Data Sources:
 RIDOT, RIGIS, ESRI

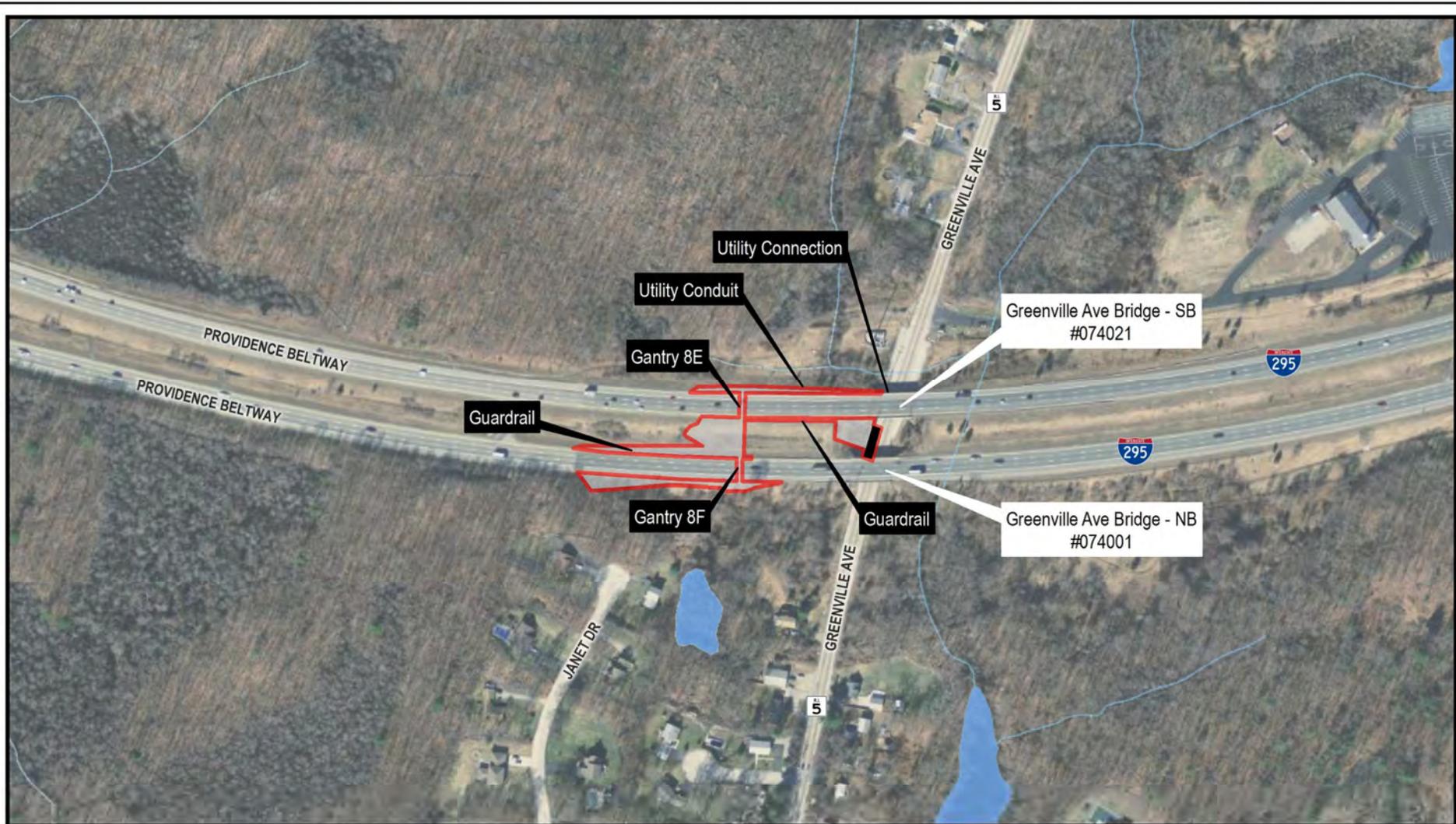


**TOLL LOCATION 8
 AND GANTRIES 8C, 8D**

Johnston, RI

Project Details

FIGURE 3-13



Prepared for:

 Driven to get you there

Prepared by:


Legend

-  Proposed Staging Area
-  Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 250 500 Feet

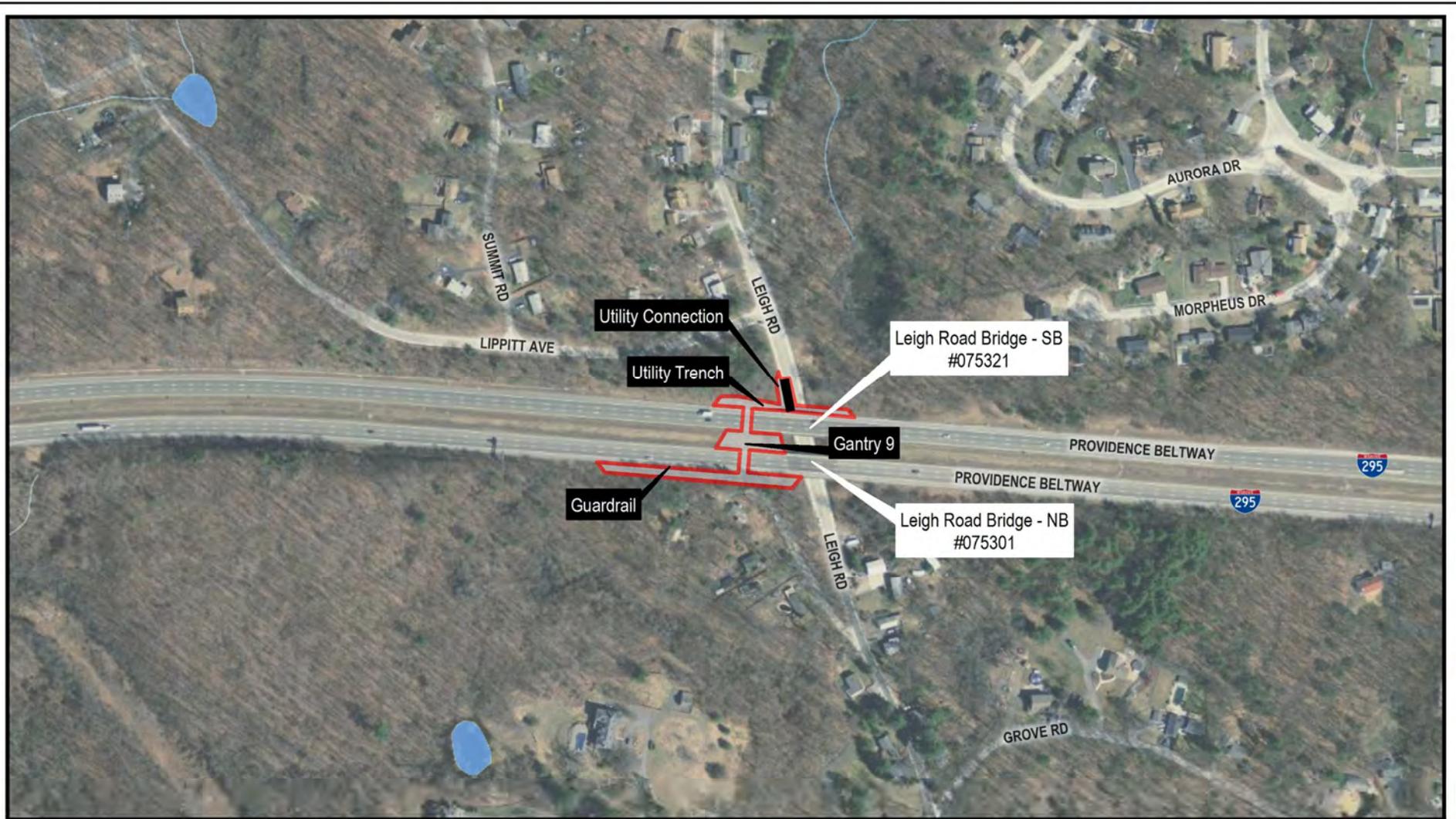


**TOLL LOCATION 8
 AND GANTRIES 8E, 8F**

Johnston, RI

Project Details

FIGURE 3-15



Prepared for:

 Prepared by:


Legend
 Proposed Staging Area
 Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

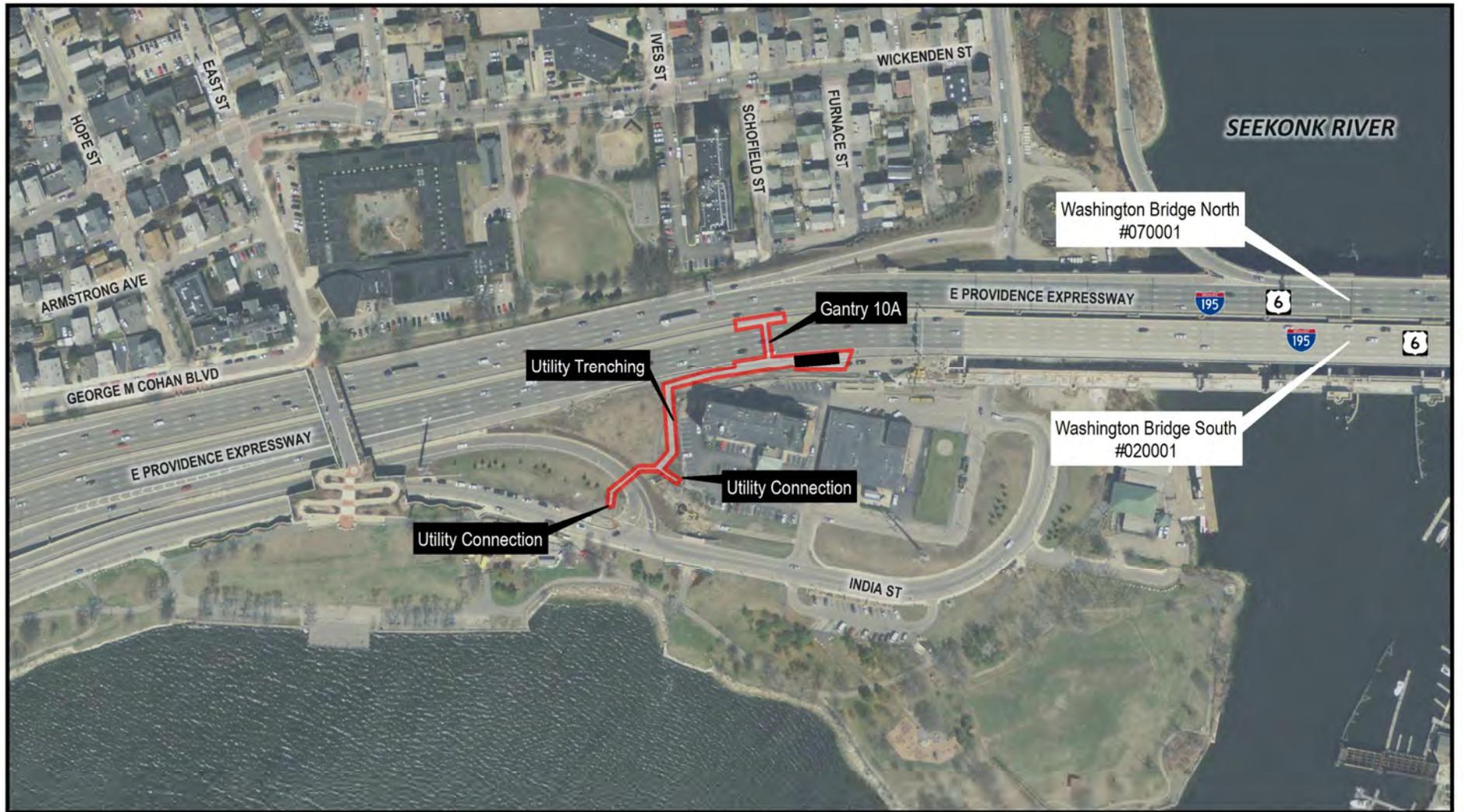
0 250 500 Feet 

**TOLL LOCATION 9
 AND GANTRY 9**

Cumberland, RI

Project Details

FIGURE 3-17



Prepared for:

 Prepared by:


Legend
 Proposed Staging Area
 Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 100 200
 Feet

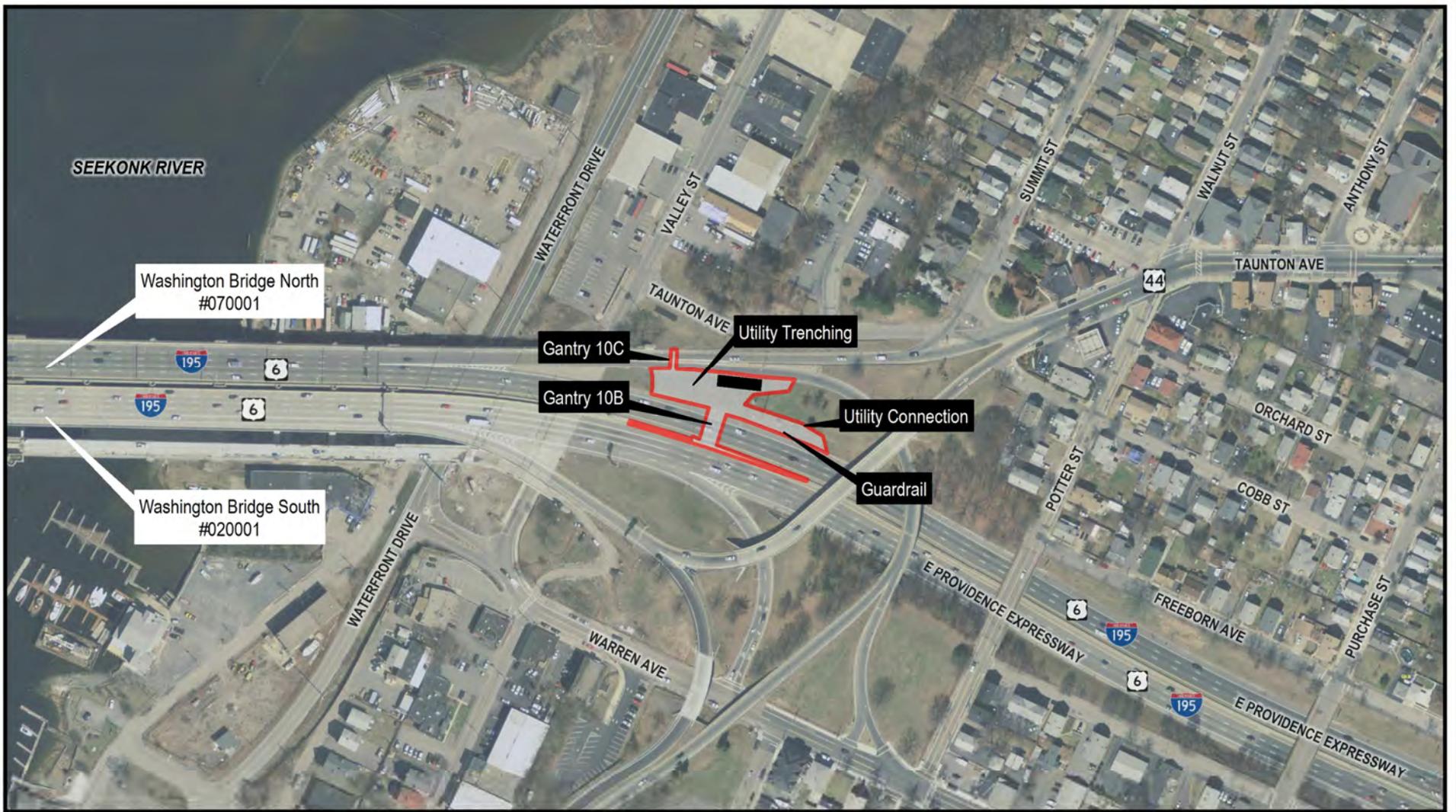


**TOLL LOCATION 10
 AND GANTRY 10A**

Providence, RI

Project Details

FIGURE 3-19



Prepared for:



Prepared by:



Legend

- Staging Area
- Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13

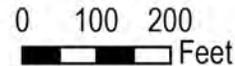
WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

**TOLL LOCATION 10
AND GANTRIES 10B, 10C**

East Providence, RI

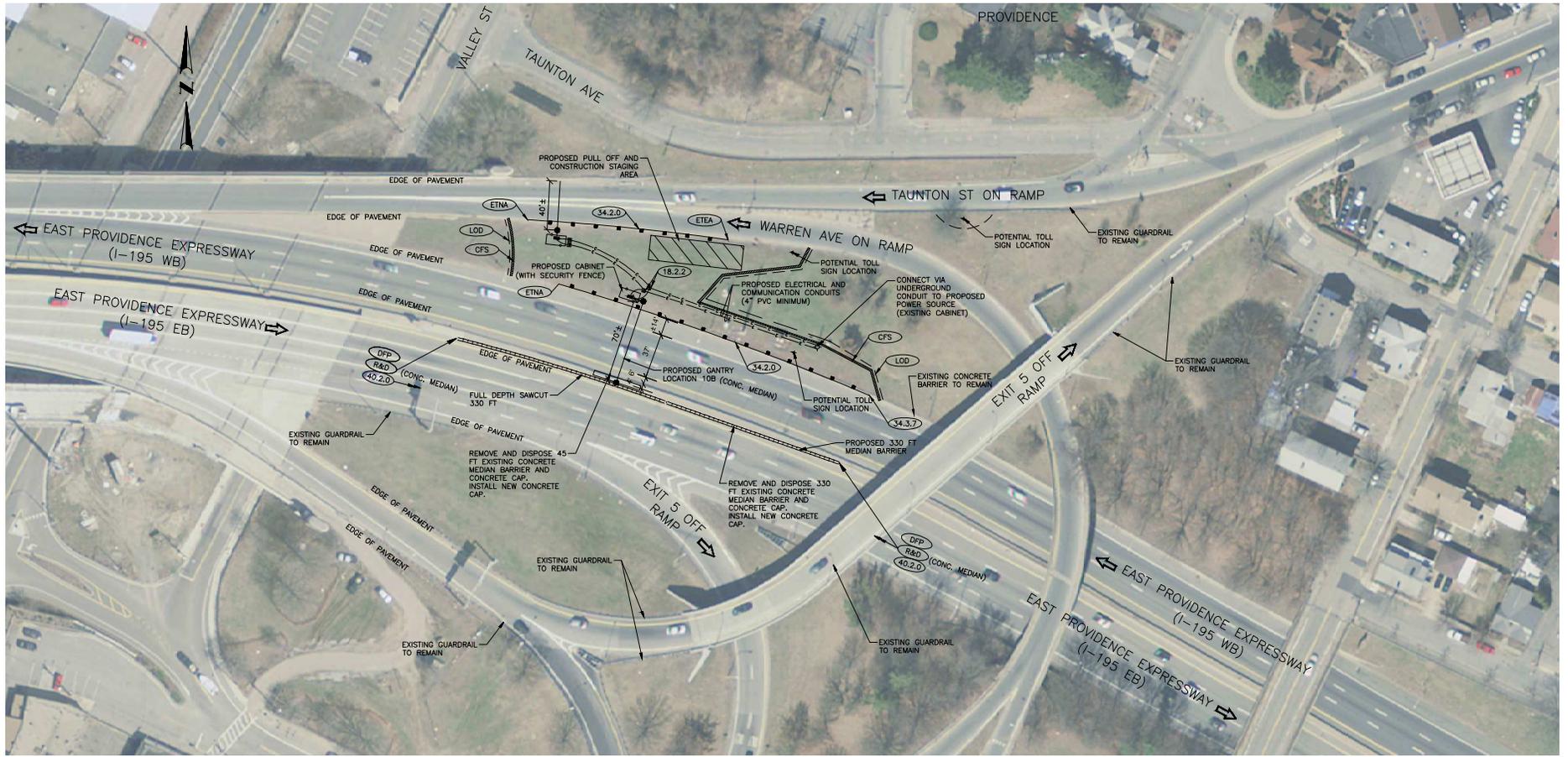
Project Details

FIGURE 3-21



Data Sources:
RIDOT, RIGIS, ESRI

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2017	15	20



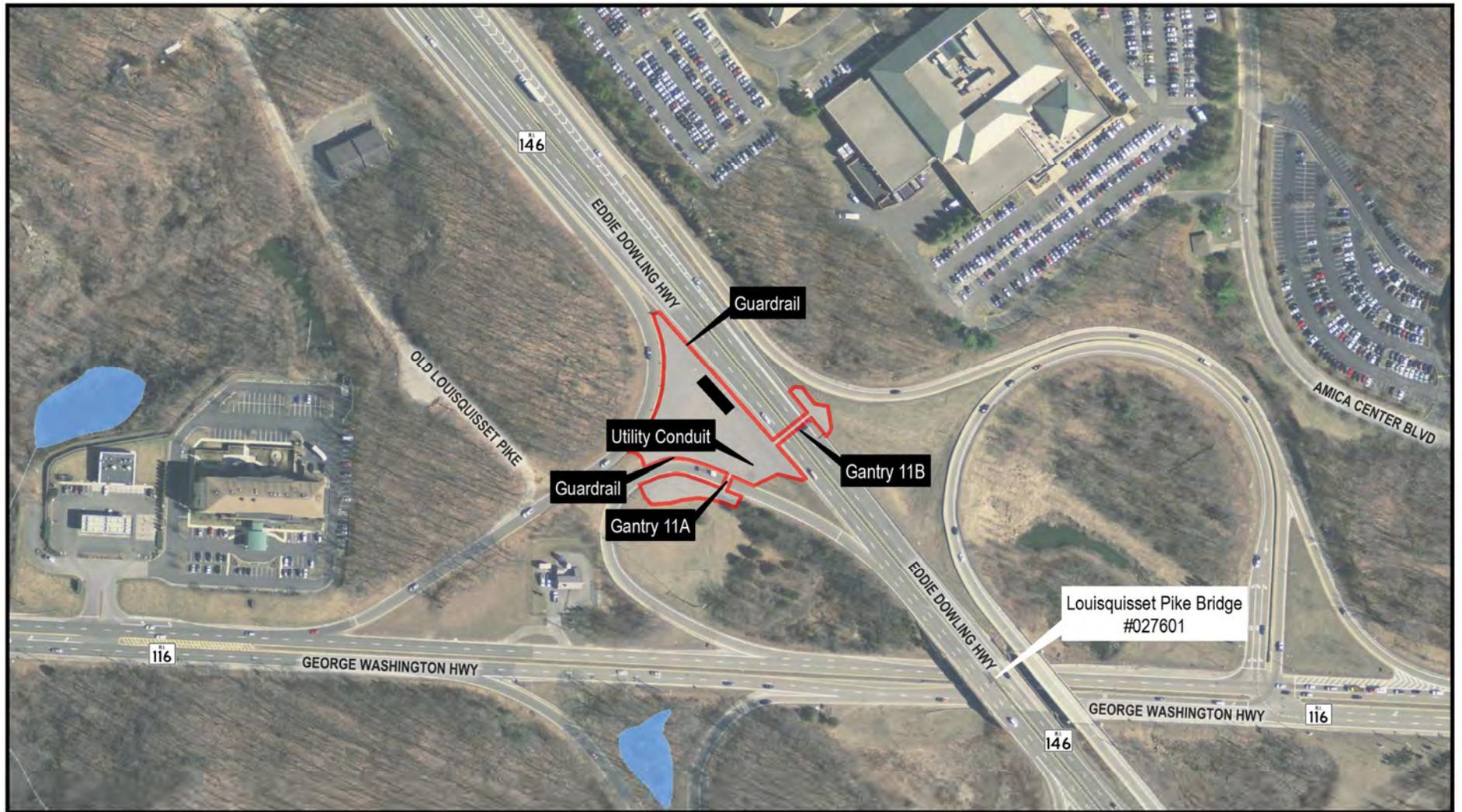
- NOTES:
1. FOR STANDARD PLANS SYMBOLS, AND STANDARD LEGEND, SEE SHEET NO. 2.
 2. GANTRY LENGTHS ARE APPROXIMATE.
 3. DRILLED SHAFT FOUNDATIONS ARE ANTICIPATED AT THIS LOCATION FOR THE GANTRIES. THE CONTRACTOR RESERVES THE RIGHT TO DETERMINE THE FOUNDATION TYPE ONCE THE BORING PROGRAM IS COMPLETED AND ENVIRONMENTAL IMPACTS ARE IDENTIFIED.
 4. PROPOSED GUARDRAIL LENGTHS ARE APPROXIMATE.

DRAFT

0 40 80
 FEET

REVISIONS			RHODE ISLAND DEPARTMENT OF TRANSPORTATION
NO.	DATE	BY	
			RHODEWORKS TOLL FACILITIES - DESIGN, BUILD, OPERATE AND MAINTAIN PROVIDENCE, RHODE ISLAND GENERAL PLAN LOCATION 10 (SHEET 2 OF 2)

CHECKED BY JMR DATE JAN 2017 SCALE AS SHOWN
 XXXXX_V1_T210_GENERAL



Prepared for:

 Prepared by:


Legend
 Proposed Staging Area
 Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 100 200
 Feet



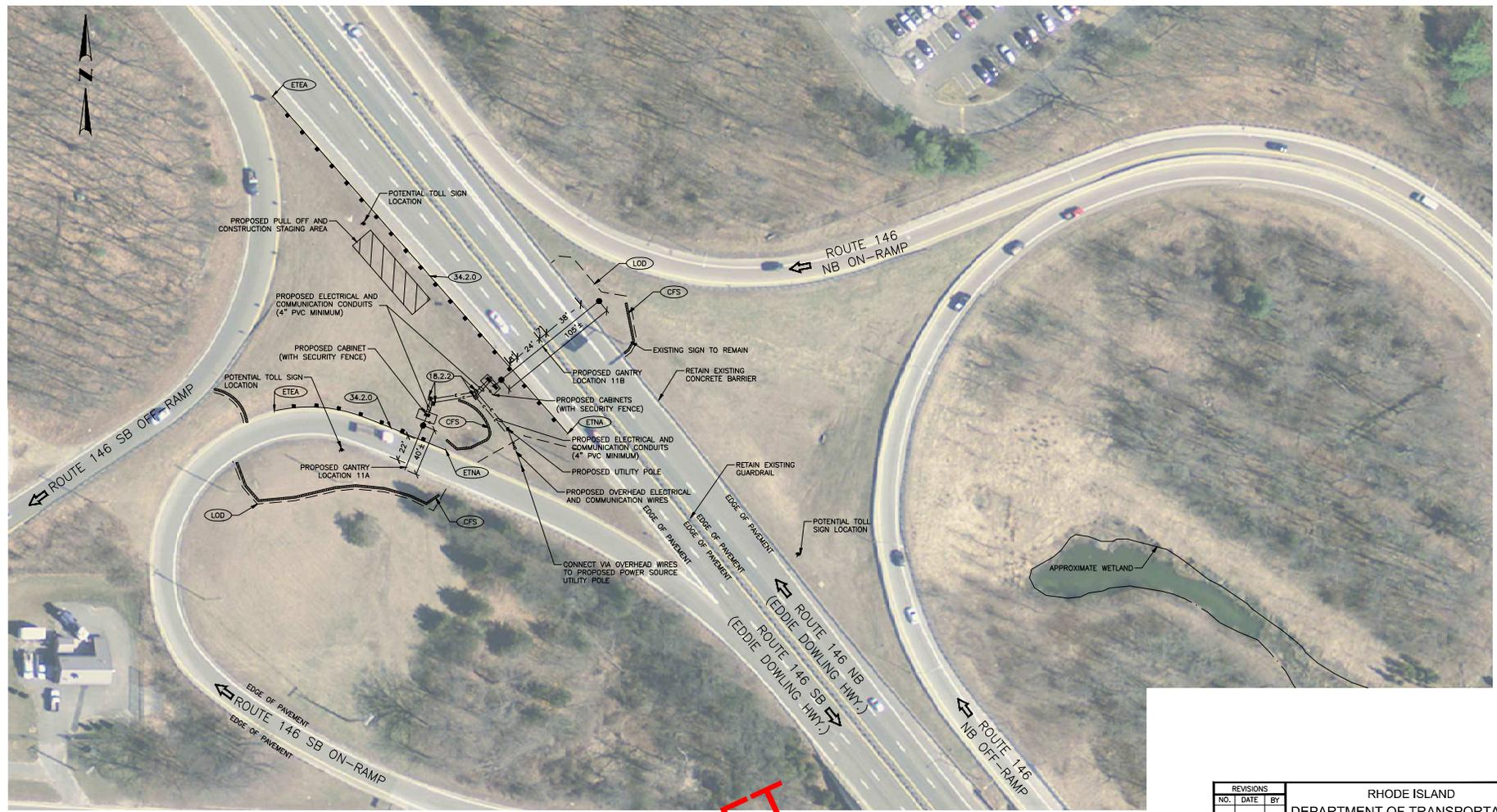
**TOLL LOCATION 11
 AND GANTRIES 11A, 11B**

Lincoln, RI

Project Details

FIGURE 3-23

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2017	16	20

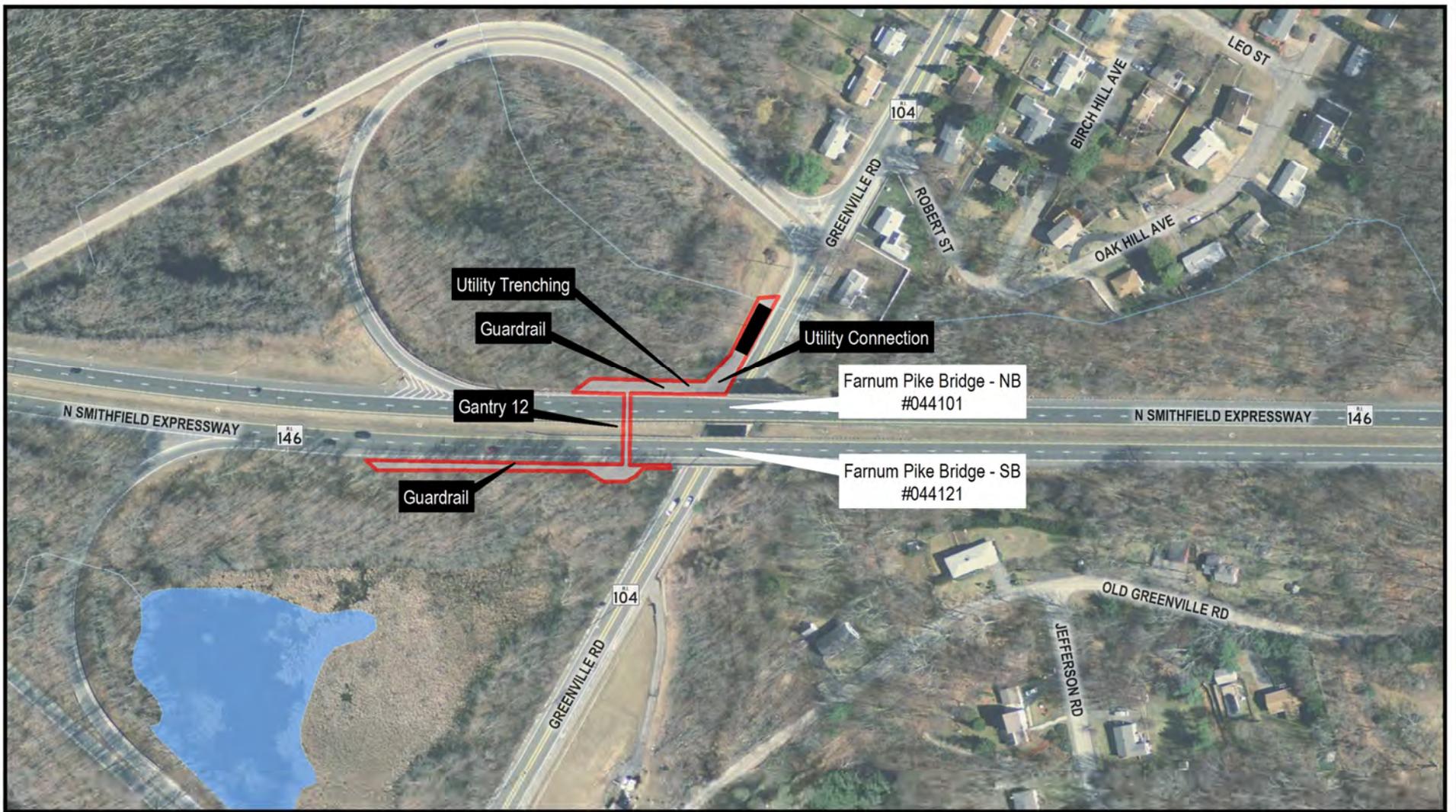


DRAFT

- NOTES:
1. FOR STANDARD PLANS SYMBOLS, AND STANDARD LEGEND, SEE SHEET NO. 2.
 2. GANTRY LENGTHS ARE APPROXIMATE.
 3. DRILLED SHAFT FOUNDATIONS ARE ANTICIPATED AT THIS LOCATION FOR THE GANTRIES. THE CONTRACTOR RESERVES THE RIGHT TO DETERMINE THE FOUNDATION TYPE ONCE THE BORING PROGRAM IS COMPLETED AND ENVIRONMENTAL IMPACTS ARE IDENTIFIED.
 4. PROPOSED GUARDRAIL LENGTHS ARE APPROXIMATE.



REVISIONS			RHODE ISLAND DEPARTMENT OF TRANSPORTATION
NO.	DATE	BY	
			RHODEWORKS TOLL FACILITIES - DESIGN, BUILD, OPERATE AND MAINTAIN LINCOLN, RHODE ISLAND
			GENERAL PLAN LOCATION 11
CHECKED BY <u>JMR</u> DATE <u>JAN 2017</u> SCALE <u>AS SHOWN</u>			



Prepared for:



Prepared by:



Legend

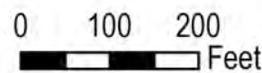
- Proposed Staging Area
- Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

**TOLL LOCATION 12
AND GANTRY 12**

North Smithfield, RI

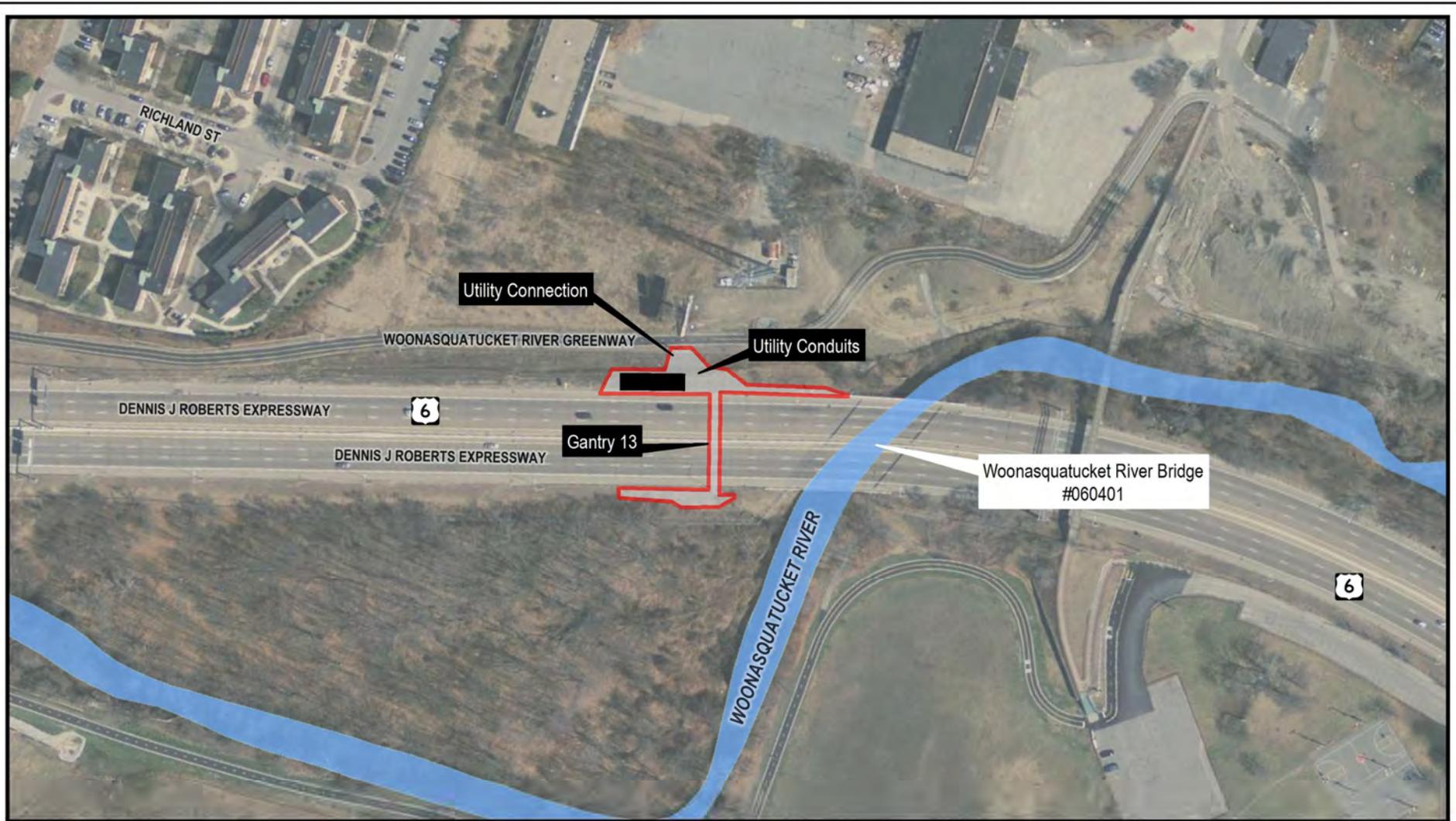


Data Sources:
RIDOT, RIGIS, ESRI



Project Details

FIGURE 3-25



Prepared for:

 Driven to get you there

Prepared by:


Legend

-  Proposed Staging Area
-  Limit of Disturbance

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, ESRI

0 100 200 Feet



**TOLL LOCATION 13
 AND GANTRY 13**

Providence, RI

Project Details

FIGURE 3-27

Chapter 4 Alternatives

This EA evaluates the No Action Alternative and the Proposed Action Alternative.

4.1 No Action Alternative

Description of No Action Alternative

Under the No Action Alternative, toll systems are not constructed at Toll Locations 3, 4 & 6 through 13 and the associated bridges are reconstructed or replaced without toll revenue. To evaluate the relative merits and consequences of the No Action Alternative, the criteria identified in Section 2.1 for evaluation of the project purpose were applied to the No Action Alternative and are discussed below.

Consistency with RIDOT's Asset Management Approach

The No Action Alternative is inconsistent with RIDOT's RhodeWorks program, which implements an asset management approach to achieving state of good repair in a cost effective manner that accounts for lifecycle costs, including the future costs of allowing assets to further deteriorate. The No Action Alternative is not consistent with RIDOT's approach to addressing FHWA's asset management requirements or meeting FHWA's national performance measure target of 90 percent structural sufficiency rating.

Consistency with Rhode Island's Financial Forecasts and Planning Assumptions

The No Action Alternative is inconsistent with the State's financial forecasts and planning assumptions. Tolling has been assumed as part of the financial forecasts in the planning process and as the basis for meeting fiscal constraints for programmed transportation improvements, including work on the bridges associated with the Ten Toll Locations.

Consistency with RhodeWorks Legislation

The No Action Alternative is inconsistent with RhodeWorks legislation and the intent of the Rhode Island Legislature and Governor to address the state's infrastructure needs and funding gap through the construction and operation of tolling systems.

Compliance with 23 U.S.C. § 129

The No Action Alternative would not require compliance with 23 U.S.C. § 129 since tolling would not be implemented.

Does Not Meet Purpose and Need of Project

The No Action Alternative does not meet the purpose and need of the Project. However, in accordance with NEPA, this EA carries it forward to provide a baseline from which to compare the relative merits and impacts of the Proposed Action Alternative.

4.2 Proposed Action Alternative

Description of the Proposed Action Alternative

The Proposed Action Alternative was previously described in Chapter 3. This section describes how the alternative was developed and how it meets the purpose and need identified in Chapter 2.

Alternative Development

Consistent with *American Association of State Highway and Transportation Officials Practitioner's Handbook No. 3: Managing the NEPA Process for Toll Lanes and Toll Roads* (AASHTO 2016), this EA may focus solely on a tolled alternative because:

- Tolling revenue is assumed in Rhode Island's state transportation planning process;
- Tolling revenue is the basis for meeting fiscal constraint of the STIP;
- Tolling is an element of the proposed Project's purpose and need; and
- Non-tolled alternatives were eliminated from consideration during the planning process.

The evaluation of alternative revenue sources to address Rhode Island's infrastructure needs has been previously evaluated during the process leading up to the passage of the RhodeWorks legislation. The revenue generated from the Ten Toll Locations would be used to support the funding of necessary reconstruction or replacement of the bridges listed in **Table 1-2** as intended in the RhodeWorks legislation, and within the allowances of 23 U.S.C. § 129.

Consistency with RIDOT's Asset Management Approach

The Proposed Action Alternative is consistent with RIDOT's RhodeWorks program, which implements an asset management approach to achieving state of good repair in a cost effective manner that accounts for lifecycle costs, including the future costs of allowing assets to further deteriorate. The Proposed Action Alternative is consistent with RIDOT's approach to addressing FHWA's asset management requirements and meeting FHWA's national performance measure target of 90 percent structural sufficiency rating.

Rhode Island used an asset management approach to identify and develop a structured sequence of preservation, repair, rehabilitation, and replacement actions that would achieve a state of good repair. An asset management-based system of planning increases the emphasis on preservation and maintenance to keep assets in good condition, avoiding more expensive long-term costs. The STIP includes a "surge" of bridge reconstruction and preservation projects in the first five years of the program (RIDOA 2016). Asset management focuses on making the best investment decisions that would result in the best long-term benefit for the state's entire transportation network.

Consistency with Rhode Island's Financial Forecasts and Planning Assumptions

The Proposed Action Alternative is consistent with the State's financial forecasts and planning assumptions. Tolling has been assumed as part of the financial forecasts in the planning process as the basis for meeting fiscal constraints.

Consistency with RhodeWorks Legislation

The Proposed Action Alternative is consistent with RhodeWorks legislation and the intent of the Rhode Island Legislature and Governor to address the State's infrastructure needs and funding gap through the construction and operation of toll systems, including at Toll Locations 3, 4, & 6 through 13.

Compliance with 23 U.S.C. § 129

The Proposed Action Alternative is compliant with 23 U.S.C. § 129, including its provisions regarding Federal participation, ownership, limitation on use of revenues, and compliance with Federal laws, amongst others.

Consistency with 23 CFR 771.111(f)

The Proposed Action Alternative was developed and evaluated for consistency with FHWA regulations regarding logical termini, independent utility, and the consideration of alternatives of other reasonably foreseeable transportation improvements (23 CFR 771.111[f]).

Logical Termini

Logical termini are the rational end points for a transportation improvement and the rational end points for a review of the environmental impacts. For the Proposed Action Alternative, the logical termini for transportation improvements are defined by the LOD of the toll systems at the Ten Locations. The termini for the review of environmental impacts include the LOD and the diversion route corridors. Although no improvements are proposed for the diversion routes, the routes and resources along the routes are evaluated for potential indirect impacts that may result from drivers avoiding the tolls at the Ten Toll Locations. The Louis Berger Team defined primary diversion routes by first identifying roadway links that were projected to have their tractor trailer volume increase by more than 150 vehicles on daily basis under the tolled scenario. The Louis Berger Team selected this threshold based on the generally observed daily pattern of tractor trailer traffic. Applying the generally observed hourly distribution of tractor trailer volumes to the 150 daily diversion threshold results in a peak hourly volume of approximately 10 vehicles per hour. Any increase in tractor trailer traffic below this cutoff was deemed to be negligible given the typical statistical noise of route choice models. Therefore, Diversion Routes 2 through 16 were identified as the primary diversion routes for truck traffic avoiding Toll Locations 3, 4, and 6 through 13 and their limits, along with the limits of the LODs of their associated Toll Locations were considered as the logical termini (rational end points) for the review of environmental impacts. See Table 1-3 for the Toll Locations and associated Diversion Routes.

Independent Utility

The Project must have independent utility or independent significance. A project is considered to have independent utility if it would be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Each toll location has independent utility and can be constructed and activated separately. The tolling software and gantry equipment can be activated and tolls can be collected at the Ten Toll Locations independent of one another, and independent of other toll locations. Sufficient toll revenue is projected to be generated at Toll Locations 3, 4, and 6 through 13 that they are usable and a reasonable expenditure even if no additional toll systems are constructed.

Not Restrict the Consideration of Alternatives for Other Transportation Improvements

Improvements associated with the Proposed Action Alternative are limited to toll system construction within the existing ROW at the Ten Toll Locations. Future and ongoing improvements to the bridges associated with these toll locations were considered in the design and location of the toll systems. The Proposed Action does not include any other improvements, including to infrastructure along the diversion routes, and therefore would not restrict the consideration of alternatives for any reasonably foreseeable transportation improvements, including the bridges and other infrastructure along the diversion routes.

Meets the Purpose and Need of Project

The Proposed Action Alternative meets the stated purpose and need of the Project. The Proposed Action implements tolling at the Ten Toll Locations as intended by the State Legislature; is consistent with RIDOT's asset management approach for addressing FHWA's asset management requirements and national performance measures for bridge condition, statewide financial forecasts, and planning assumptions; is compliant with 23 U.S.C. § 129; demonstrates logical termini and independent utility; and does not restrict the consideration of alternatives for other transportation improvements.

Chapter 5 Affected Environment and Direct Impacts of No Action and Proposed Action at Toll Locations

5.1 Introduction

This chapter describes the environment that could potentially be directly affected by construction of the Proposed Action. This information provides a baseline to assess permanent and temporary, direct impacts from implementation of the Proposed Action Alternative as compared with the No Action Alternative. The LOD includes the area of direct impacts from any project-related work associated with construction of the toll system, including paving, excavation, grading, trenching, staging, and utility connections at the Ten Toll Locations. For most environmental categories evaluated, the environmental study area equates with the LOD. For a few environmental categories (e.g., environmental justice, social, and air quality) the affected environment study area extends out from the LOD to match existing data sources and units of measurement and analysis.

The probable direct impacts of the No Action and Proposed Action are also discussed in this Chapter. Direct impacts are attributed to the construction of the toll systems and restricted to the LOD and a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers travelling across select bridges associated with the toll locations.

With the implementation of toll systems, it is expected that some trucks subject to tolling (as defined in Chapter 1.1) would divert to alternate routes to avoid the tolls. The affected environment and indirect impacts associated with traffic diversions from the Ten Toll Locations are described in **Chapter 6**.

Environmental categories to be considered for direct impacts in the EA were identified after a review of relevant FHWA guidance documents, literature searches, a review of environmental data through the Rhode Island Geographic Information System (RIGIS) and other community GIS data available online, and after coordination with RIDOT staff. Site investigations and interviews with town and community officials were also used to identify the affected environment.

Table 5-1 summarizes the resources that have been reviewed for the Toll Locations, whether the toll locations are within or near the resources, if they may be affected directly by the Project, and applicable regulations or policies.

Table 5-1. Summary of Resources and Potential for Direct Impacts at Toll Locations

Resource Category	Present	Potential for Direct Impacts¹	Applicable Regulations or Policies
Land Use	Y	N	Rhode Island Comprehensive Planning and Land Use Act of 1988, and other local land use and comprehensive plans; 14 CFR Part 77.9 (Notice of Proposed Construction or Alteration)
Transportation Network	Y	N	23 U.S.C. § 129, Rivers and Harbors Act Section 408
Farmland/Soils	Y	N	Farmland Protection Policy Act
Wetlands and Other Waters of the U.S. and State	Y	Y	Clean Water Act (Sections 401, 402, and 404), Rivers & Harbors Act Section 10, General Bridge Act, Executive Order 11990, Rhode Island Freshwater Wetlands Act
Coastal Zone	Y	N	Coastal Zone Management Act
Floodplains	Y	N	Executive Order 11988 and Executive Order 13690
Groundwater Resources, Aquifers, and Reservoirs	Y	Y	Safe Drinking Water Act, Chapter 42-35 pursuant to Chapters 46-12 and 42-17.1 of the Rhode Island General Laws of 1956, as amended
Open Space, Section 4(f), and Section 6(f) Properties	Y	N	23 CFR 774 (Section 4(f)), Land and Water Conservation Act, and applicable local plans
Wild, Scenic and Recreational Rivers	N	N	Wild and Scenic Rivers Act
Federal Threatened & Endangered Species, State Natural Heritage Species, and Migratory Birds	Y	Y	Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Magnuson Stevens Fisheries Conservation Management Act
Historic and Archeological Resources	Y	N	National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Executive Order 13175
Environmental Justice	Y	N	Executive Order 12988, FHWA Order 6640.23A

Resource Category	Present	Potential for Direct Impacts¹	Applicable Regulations or Policies
Social	Y	N	Uniform Relocation and Real Property Acquisition Act, 40 CFR 1502.1, 40 CFR 1508.27
Visual Resources	Y	N	Wild and Scenic Rivers Act
Air Quality	Y	N	Clean Air Act
Noise / Vibration	Y	N	FHWA Noise Policy (23 CFR 772)
Hazardous Materials	Y	Y	Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation, and Liability Act
1. The analysis is disclosed within this EA.			

5.2 Land Use

Rhode Island supports planning by cities and towns. Rhode Island’s 1988 Comprehensive Planning and Land Use Act recognizes that municipalities make most development and land use decisions within their jurisdiction. Rhode Island has a reciprocal system of land use planning in which the State sets broad goals and policies, and municipalities outline local goals in a community comprehensive plan. The goals and policies in local comprehensive plans must be consistent with the goals of the State.

Local comprehensive plans provide the basis for land use regulation and implementation in Rhode Island. Local comprehensive plans are reviewed by the State and, when approved, become binding on state agencies by requiring conformance of their programs and projects to the local comprehensive plan. Community planning reinforces the municipalities’ role in achieving the goals of the State. Municipalities must adopt plans that implement local goals and help implement goals identified in the State Guide Plan, and include small towns with populations between 6,400 and 8,200 according to the 2010 U.S. Census.

5.2.1 Affected Environment

The Project Area consists of linear transportation corridors spanning the central and north eastern portion of the state. Since land use in the corridor varies by geographic region, the corridor was divided into two sections (central and north) for the purposes of describing the characteristics of each region. The **Environmental Features Figures 5-1 through 5-14** at the end of this chapter illustrate the land use characteristics adjacent to the toll locations.

Central Section: Areas adjacent to the central toll locations (Warwick, Providence, Cranston, Pawtucket, Johnston and East Providence, which include Toll Locations 3, 4, 6, 7, 8, 10, and 13) are primarily commercial, industrial, institutional, and residential with some large undeveloped

areas. I-95, I-295, I-195 US 6, and RI 146 pass through urban residential and commercial neighborhoods in Warwick, Providence and East Providence and serve industrial, residential and low-density commercial locations in Warwick, Pawtucket, Cranston and Johnston. The 2010 population of the Central Section is 405,383, with Providence, the capital city, the most populous at 178,000. The other communities range in population from 82,672 (Warwick), 29,769 (Johnston) to 71,148 (Pawtucket) to 80,387 (Cranston).

North Section: Areas adjacent to the northern toll locations (Cumberland, Lincoln and North Smithfield, which include Toll Locations 9, 11 and 12) are a mix of industrial, residential and undeveloped areas. The 2010 population of the North Section is 66,578. Cumberland is the most populous of the three North Section communities with 33,506 residents. Lincoln has 21,105 residents and North Smithfield has 11,967.

Rhode Island supports planning by cities and towns. The Rhode Island's 1988 Comprehensive Planning and Land Use Act recognizes that municipalities make most development and land use decisions within their jurisdiction. Rhode Island has a reciprocal system of land use planning in which the State sets broad goals and policies, and municipalities outline local goals in a community comprehensive plan. The goals and policies in local comprehensive plans must be consistent with the goals of the State.

Local comprehensive plans provide the basis for land use regulation and implementation in Rhode Island. Local comprehensive plans are reviewed by the State, and when approved, become binding on State agencies by requiring conformance of their programs and projects to the local comprehensive plan. Community planning reinforces the municipalities' role in achieving the goals of the State. Municipalities must adopt plans that implement local goals and help implement goals identified in the State Guide Plan. All communities where toll systems will be constructed and operated have comprehensive plans, with 75% having prepared or updated their plans in the last six years.

The nearest airports to the Project are T.F. Green Airport in Warwick and North Central Airport in Smithfield. Toll Location 3 is within 2.2 miles of T.F. Green Airport

Toll Location 8, 9, 11 and 12 are within 5 miles of North Central Airport (4.8, 3.9, 1, and 3.8 miles) respectively. Toll Location 3 is more than 5 miles from Quonset Point Naval Air Station in North Kingstown (7.5 miles). Toll Location 10 which is the closest locations to New Bedford Regional in Massachusetts is 23.5 miles away.

5.2.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to land use because there would be no change to the existing environment.

The **Proposed Action Alternative** is located entirely within the ROW of I-95, I-295, I-195 US 6, and RI 146. There would be no change in access on any of the roadways that intersect with these highways. Therefore, the Project would not alter any existing or planned land use within or adjacent to the LOD and would have no direct impacts to land use.

Based on the Federal Aviation Administration's (FAA) Notice Criteria Tool, Toll Locations 3, 8, 9, 11, and 12 are in proximity to an airport as discussed above such that they could impact the assurance of navigation signal reception. To ensure no impacts will occur to navigation, Form 7460-1 (Notice of Proposed Construction or Alternation) will be submitted to the FAA prior to construction.

5.3 Transportation Network

This section describes the transportation network and infrastructure assets where the bridges associated with the Ten Toll Locations are located.

The toll locations for the Project are located along segments of five major highway corridors comprising parts of the Interstate Highway System, the US Highway System and the State of Rhode Island Highway System. Similar to Interstate Highway standards, all of the roadway segments are divided highways and have controlled access with no signals or at-grade intersections. Access on and off the roadways is provided by ramps at interchanges. The routes (I-95, I-195, I-295, US Route 6, and RI Route 146) and toll locations are identified in **Figure 1-1** in Chapter 1 and discussed below.

5.3.1 Affected Environment

I-95 is a limited-access highway which is part of the Interstate Highway System. Interstates are characterized by controlled access with no signals or at-grade intersections and access is provided by ramps at interchanges. I-95 runs north and south from Hopkinton at the Connecticut border to Pawtucket along the Massachusetts border. The southern stretch of I-95 has two travel lanes in each direction while the northern stretch varies between 3 and 4 lanes in each direction. Average Daily Traffic (ADT) on I-95 is between approximately 50,000 in the less developed southern areas to 200,000 in the northern urban areas. ADT is the average number of vehicles passing in both directions along a section of a roadway. There are five proposed toll locations on I-95: Toll Locations 3, 4 and 6 are subject of this EA.

I-195 is a multilane interstate highway with fully controlled access that runs east and west between I-95 in Rhode Island and I-495 in Massachusetts, connecting the cities of Providence, Fall River and New Bedford, Mass. The roadway typically has 4 lanes in each direction with an ADT of approximately 187,000 in the Providence/East Providence area. Proposed toll location 10 is located on I-195.

I-295 is a multilane interstate highway with fully controlled access that circumvents Providence, East Providence and Pawtucket and functions as a beltway/bypass from I-95 north of Providence in Massachusetts to I-95 south of Providence. There are three proposed toll locations on I-295. The roadway typically has 2 or 3 lanes in each direction in this location with an ADT that ranges between 67,000 and 228,800 along this stretch. Proposed Toll Locations 7, 8, 9, are located on I-295.

US Route 6 is part of the US Highway System. Within the Project Area, US Route 6 is a multilane highway with fully controlled access. US Route 6 has six travel lanes in each direction and runs generally east and west linking New Bedford, Massachusetts with Providence, RI, and Connecticut further to the west. ADT ranges from 63,500 to 155,200 along this stretch. There is one proposed toll location on US Route 6, Toll Locations 13.

RI Route 146 is part of the State Highway System. Within the Project Area, RI Route 146 is a multi-lane highway with fully controlled access. RI Route 146 has 4 travel lanes and runs north and south between Rhode Island and Massachusetts. ADT ranges from approximately 44,000 to 65,500 along this stretch. There are two proposed toll locations on RI Route 146, Toll Locations 11 and 12.

5.3.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to the roadway network or traffic operations on I-95, I-295, I-195 US 6, and RI 146 because there would be no change to the existing environment.

The **Proposed Action Alternative** would not increase the capacity of I-95, I-295, I-195 US 6, and RI 146. The Project would not widen the road, and would not change the lane or shoulder configuration where the Ten Toll Locations will be constructed. Vehicles would not have to slow down or stop at the toll locations. However, there would be short-term traffic impacts at the toll locations during construction. During construction, no detours are anticipated and there would be at least one lane open for traffic. Therefore, minor, short-term traffic impacts at the toll locations may occur, but with implementation of traffic management measures, direct impacts to the transportation network from the Proposed Action would be minor.

The potential for indirect impacts to the transportation network resulting from diversion traffic is assessed in Chapter 6.

5.4 Farmland/Soils

The U.S. Department of Agriculture-Natural Resources Conservation Service and the Rhode Island Department of Administration's Division of Planning have identified lands in Rhode Island that have a combination of physical and chemical features that make them best suited for farming. In addition, the Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency.

5.4.1 Affected Environment

Mapped Prime Farmland Soil and Statewide Important Soils are identified adjacent to some of the proposed toll locations. There are mapped prime farmlands or soils of statewide importance

adjacent or near to Toll Locations 3, 7, 8, 11 and 13 adjacent to the I-95, I-295, I-195, US 6, and RI 146 ROW.

The statewide mapped soil units are included on the **Environmental Features Figures 5-1 through 5-14** at the end of this chapter if present in the vicinity of a specific toll location.

5.4.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to farmland because there would be no change to the existing environment.

The **Proposed Action Alternative** is located entirely within the existing ROW of I-95, I-295, I-195, US 6, and RI 146. Therefore, the Proposed Action Alternative would have no impact to prime, unique, or statewide important farmland.

5.5 Wetlands and Other Waters of the U.S. and State

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill materials into waters of the U.S. As defined in 33 CFR 328.3, these waters generally include wetlands and other waters, such as intrastate lakes, rivers, streams, mudflats, and tributaries to those waters. The United States Environmental Protection Agency (USEPA) shares responsibility over waters of the U.S., with the USACE overseeing the Section 404 permit program. In addition, Executive Order 11990 directs federal agencies to observe a “no net loss” of wetlands in order to “minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.”

The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps of Rhode Island and RIGIS data files were used to initially locate potential wetland resources within or adjacent to the LOD. Federal and/or state jurisdictional wetland areas were then field delineated within a survey area comprised of the LOD and extending 200 feet beyond the LOD. The wetland delineation was conducted in accordance with the U.S. Army Corps of Engineers *Wetland Delineation Manual* (USACE 1987), the *Regional Supplement to the Manual Northcentral & Northeast Regions* (USACE 2012), and the *Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act* (RIDEM 2014). Some toll locations did not have state jurisdictional wetland areas within the LOD or within 200 feet of the LOD. Wetland Memos were prepared for the toll locations that had state jurisdictional wetlands (Jacobs 2016a, b, c, d, and e). There are no federal jurisdictional wetlands or waters of the U.S. within the LOD for any of the toll locations. A Section 404 permit is not required.

5.5.1 Affected Environment

Wetland resources within the survey area include both federal and state freshwater jurisdictional wetlands as well as several rivers. Within the LODs, only state jurisdictional wetlands were identified. A portion of the LOD for some toll locations is adjacent to or within state jurisdictional

50-foot Perimeter Wetland or 200-foot Riverbank Wetland. Wetland resource areas based on the RIGIS data layer are depicted on the **Environmental Features Figures 5-1 through 5-14**.

State jurisdictional wetland areas within the LOD generally consist of roadway shoulder and managed areas as illustrated in the Base Technical Concept plans in Chapter 3. Additional information on the field delineation of wetlands is provided in the wetland memos located in **Appendix B**.



Photo 5-1. I-95 SB Location 3b Gantry. Southbound on-ramp within typical Riverbank Wetland

Source: Jacobs

5.5.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to wetlands or other waters of the U.S. and State because there would be no change to the existing environment.

The **Proposed Action Alternative** would have no impacts to federal Waters of the U.S and therefore, no Section 404 permit is required. At several toll locations as listed in **Table 5-2**, the Proposed Action Alternative would impact state-jurisdictional, 100-foot and 200-foot Riverbank Wetlands. At these locations most of the impact is temporary and associated with trenching for the conduit. The 108,429 SF of temporary impact is proposed within portions of the wetland resources that are characterized as open grassy areas within the maintained roadway ROW. There is a total of 1,208 SF of permanent impacts associated with the foundations for the gantries and the cabinets with fenced areas within similar previously disturbed areas at Toll Locations 3, 7, 8, 12 and 13.

Table 5-2 Direct Wetland Impacts

Toll Location	Project Activity	Wetland Type	Total Area of Wetland within LOD (SF) ¹	Impacts (SF)	
				Temporary	Permanent
3	Foundations, trenching, cabinet with fencing, guardrail, staging.	200' RBW	40,572	40,099	473
7	Foundations, trenching, cabinet with fencing, guardrail, staging.	200' RBW	42,716	42,501	215
8	Foundations, trenching, guardrail.	100' RBW	12,176	12,076	100
10	Trenching	200' RBW	523	523	0
12	Foundations, trenching, cabinet with fencing.	100' RBW	6,906	6,806	100
		50' Perimeter Wetland	1,021	1,021	0
13	Foundations, trenching, cabinet with fencing, staging.	200' RBW	5,723	5,403	320
TOTAL		100' RBW	19,082	18,882	200
TOTAL		200' RBW	89,534	88,526	1,008
		50' Perimeter Wetland	1,021	1,021	0
	Grand Total		109,637	108,429	1,208
<ol style="list-style-type: none"> 1. Limit of Disturbance (LOD). 2. Square Feet (SF) amounts are approximate, based on Base Technical Concept plans. 3. RBW Riverbank Wetland. 4. Wetland impacts at Toll Locations 1 and 2 have been the subject of a separate Environmental Assessment. 5. Toll Locations 5 and 14 are not included in this EA and will be subject to their own environmental review process in the future. 					

To minimize impacts, conduit would be installed either by direct bury methods or narrow trenching that would be back filled and seeded to match existing conditions. All disturbed areas would be

stabilized and reseeded to restore them to existing conditions. CFS would be installed to limit sedimentation into the wetlands. With implementation of proposed minimization measures, impacts to state jurisdictional wetland resources from the Proposed Action Alternative would be mostly temporary and minor.

As discussed in Chapter 9, coordination has been carried out with RIDEM to identify required permits.

5.6 Floodplains

Executive Order 11988 requires federal actions to avoid or minimize impacts to the 100-year floodplain. Floodplain areas within or near the Project were determined by referencing the 2015 Federal Emergency Management Agency (FEMA) National Flood Hazard Layer from RIGIS (RIGIS 2017).

5.6.1 Affected Environment

Although floodplains are associated with rivers and streams that are crossed by several of the roadways where toll systems are proposed, the roadways are well above the floodplain elevation. Floodplains are present along Hardig Brook adjacent to Toll Location 3, and along the Seekonk River adjacent to Toll Location 10. As shown on the Environmental Features figures, the floodplain is not adjacent or near the proposed Toll Locations.

5.6.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to floodplains because there would be no change to the existing environment.

While portions of the Project are located within the FEMA-mapped floodplain, the **Proposed Action Alternative** would have no impact to floodplains because construction activities will take place above the flood elevation and will not alter the base flood elevation.

5.7 Groundwater Resources, Aquifers, and Reservoirs

Groundwater resources important for community and non-community drinking water are located throughout the state. The Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources administers programs that address groundwater protection. RIDEM classifies the state's groundwater resources and establishes groundwater quality standards for each class. Approximately two-thirds of the state's municipalities rely on groundwater to a significant degree as a source of drinking water. The USEPA has designated four sole source aquifers in Rhode Island: Block Island, Pawcatuck, Hunt-Annaquatucket-Pettaquamscutt, and Jamestown.

5.7.1 Affected Environment

Toll Locations 3, 4 and 6 through 13 are not located in any of the four sole source aquifers. There are no other sensitive groundwater resources with the area of the toll locations. No reservoirs are located within or near the Project Area.

Toll Location 8 is near but not within Wellhead Protection Areas (Non-Community).

5.7.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to groundwater resources, aquifers, or reservoirs because there would be no change to the existing environment.

The **Proposed Action Alternative** would result in an increase in impervious surface of 1,630 SF total for all ten locations through the construction of concrete pads for utility cabinets (approximately 50 SF per toll location) and gantry foundations (approximately 20 SF per gantry). This increase is distributed geographically and the increase at any one location is a maximum of 370 SF. Foundations for the gantries would be augured to minimize excavation and land disturbance, which would also minimize the potential for erosion. CFS would provide erosion control and identify the LOD. The minimal increase in impervious surface would not result in a measurable increase to stormwater runoff or an effect on groundwater recharge.

Table 5-3 New Impervious Surface

Toll Location	New Impervious (SF) ¹
3	160
4	70
6	140
7	260
8	370
9	70
10	210
11	140
12	140
13	70
TOTAL	1630 SF (0.037 acres)
1. Assumes 50 SF for each utility cabinet and 20 SF per gantry.	

Groundwater quality would be protected during construction with the implementation of standard erosion controls. The selected contractor would be required to maintain work sites and project equipment to prevent spills or erosion. LOD for trenching, which consists of managed roadway shoulders, would be stabilized and restored. With the implementation of standard best management practices, the Proposed Action Alternative would not impact groundwater resources, aquifers, or reservoirs.

5.8 Open Space, Section 4(f), and Section 6(f) Properties

Section 4(f) of the U.S. Department of Transportation Act of 1966 established the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. The law, now codified in 49 U.S.C. 303 and 23 U.S.C. 138, is implemented by FHWA through their regulations at 23 CFR 774. Section 4(f) properties include significant, publicly-owned parks, recreation areas, and wildlife or waterfowl refuges, or any publicly- or privately-owned historic site that is listed in or eligible for listing in the National Register of Historic Places (National Register).

Use of a Section 4(f) property occurs: (1) when land is permanently incorporated into a transportation facility; (2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or (3) when there is a constructive use (a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired). Use of a Section 4(f) property cannot be approved by FHWA unless the use is *de minimis* or FHWA determines there is no feasible and prudent alternative that completely avoids the property and the project includes all possible planning to minimize harm to the property.

For significant, publicly-owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites, a *de minimis* impact is one that would not adversely affect the activities, features, or attributes of the property. A *de minimis* impact determination does not require analysis to determine if avoidance alternatives are feasible and prudent, but consideration of avoidance, minimization, mitigation or enhancement measures should occur.

The Land and Water Conservation Fund (LWCF) Program provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. **Section 6(f)** of the Land and Water Conservation Act requires that the conversion of lands or facilities acquired with LWCF funds be coordinated with the Department of Interior. Usually replacement in kind is required. In 2015, Rhode Island received \$426,753 from the LWCF according to the National Park Service (NPS) LWCF website. According to RIDOT, the Snake Den State Park in Johnston has received LWC funds in the past. This park is more than a ½ mile from Toll Location 8.

5.8.1 Affected Environment

The Project is in the vicinity of, or adjacent to, several open space parcels. These areas are listed below and all parcels are identified on the **Environmental Features Figures 5-1 through 5-14**.

- The Blackstone River Conservation Land is located in Pawtucket, approximately 500 feet west of Toll Location 6;
- The Pascone Conservation Area in Johnston is north of US 6 several hundred feet from the gantries for Toll Location 8;
- The Lime Rock Nature Preserve in Lincoln is approximately 500 feet south of Toll Location 11;

- Merino and Riverside Parks associated with the Woonasquatucket River in Providence are located on either side of US 6 near Toll Location 13.

5.8.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to open space, Section 4(f), or Section 6(f) properties because there would be no change to the existing environment.

The **Proposed Action Alternative** would not result in any restrictions on activities and access to open space parcels and other parks, National Heritage Corridors, historic sites, or recreational areas during construction of the Project. The gantries and conduit connections would be within the ROW and within existing areas of high volume traffic and associated normal highway noise. Therefore, the Proposed Action Alternative would have no impact to open space or other recreational properties, and would not result in a use of a Section 4(f) property. No other Section 4(f) reviews or approvals are necessary.

5.9 National Heritage Area Program

National Heritage Areas (or Corridors) are designated by Congress. National Heritage Areas are places where historic, cultural, and natural resources combine to form cohesive, nationally important landscapes. Unlike national parks, National Heritage Areas are large lived-in landscapes. The Program currently includes 49 congressionally designated areas across the country. These 49 National Heritage Areas are coordinated by entities (‘coordinating entities’) that partner with the NPS. National Heritage Areas entities collaborate with communities to determine how to make heritage relevant to local interests and needs. National Heritage Areas are not national park units. NPS does not assume ownership of land inside the boundary of each National Heritage Area nor does the NPS impose land use controls as a result of National Heritage Area designation. Rather, NPS partners with, provides technical assistance, and distributes matching federal funds from Congress to National Heritage Area coordinating entities.

5.9.1 Affected Environment

The John H. Chafee Blackstone River Valley National Heritage Corridor (Corridor) was created by an act of Congress in 1986. The management entity for the Corridor is the Blackstone Heritage Corridor Inc. The Corridor is designed to preserve the industrial history and environmental resources of the Blackstone River Valley in Massachusetts and Rhode Island. The following Rhode Island communities are within the Corridor: Burrillville, Central Falls, Cumberland, East Providence, Glocester, Lincoln, North Smithfield, Pawtucket, Providence, Smithfield, and Woonsocket. In Massachusetts, the Corridor includes the bordering towns of Blackstone, Millville, Uxbridge, and Douglas.

All federal activities within the Corridor must be consistent with the Cultural Heritage and Land Management Plan established for the Corridor to the maximum extent practicable. Toll Locations 6, 9, 10a, 11, and 12 are on roadways within the boundary of the Corridor in Rhode Island.

5.9.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to the John H. Chafee Blackstone River Valley National Heritage Corridor because there would be no change to the existing environment.

The **Proposed Action Alternative** would not result in any restrictions on activities and access to the National Heritage Corridor during construction of the Project. The gantries and conduit connections would be within the ROW and within existing areas of high volume traffic and associated normal highway noise. Therefore, the Proposed Action Alternative would have no impact to this resource.

5.10 American Heritage Rivers Protection Program

The American Heritage Rivers Protection Program was authorized by Executive Order 13061. The American Heritage Rivers initiative has three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation. Agencies shall commit to a policy under which they will seek to ensure that their actions have a positive effect on the natural, historic, economic, and cultural resources of American Heritage River communities. The policy will require agencies to consult with American Heritage River communities early in the planning stages of Federal actions, take into account the communities' goals and objectives and ensure that actions are compatible with the overall character of these communities.

5.10.1 Affected Environment

On July 30, 1998 President Clinton designated the Woonasquatucket River as an American Heritage River. The Woonasquatucket is partnered with the Blackstone River for the purposes of this program.

The toll system proposed at Toll Location 13 is adjacent to the Woonasquatucket River.

5.10.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to the Woonasquatucket River because there would be no change to the existing environment.

The **Proposed Action Alternative** would not result in any restrictions on activities and access to the Woonasquatucket River during construction of the Project. The **Proposed Action Alternative** would result in a slight increase in impervious surface (160 SF total) through the construction of concrete pads for utility cabinets (approximately 50 SF per toll location) and gantry foundations (approximately 20 SF per gantry). Foundations for the gantries would be augured to minimize excavation and land disturbance, which would also minimize the potential for erosion. CFS would provide erosion control and identify the LOD. The minimal increase in impervious surface would not result in a measurable increase to stormwater runoff or an effect on groundwater recharge.

Groundwater quality would be protected during construction with the implementation of standard erosion controls. The selected contractor would be required to maintain work sites and project equipment to prevent spills or erosion. LOD for trenching, which consists of managed roadway

shoulders, would be stabilized and restored. With the implementation of standard best management practices, the Proposed Action Alternative would not impact the Woonasquatucket River.

5.11 Federal Threatened or Endangered Species, State Natural Heritage Species, and Migratory Birds

The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. Under Section 7 of the ESA, federal agencies, in consultation with the USFWS and/or the National Oceanic and Atmospheric Administration National Marine Fisheries Service, must ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes the "take" of any listed threatened or endangered species. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct."

Pursuant to the Migratory Bird Treaty Act (MBTA) of 1918, federal law prohibits the taking of migratory birds, their nests, or their eggs (16 U.S.C. 703). In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). The USFWS enforces the MBTA (16 U.S.C. 703–711).

RIDEM is responsible for approving lists of plant and animal species that are of conservation interest in Rhode Island. Natural Heritage Areas (NHA) are the estimated habitat and range of rare species and noteworthy natural communities in Rhode Island.

5.11.1 Affected Environment

Consultation with the USFWS was initiated through a request for an official species list using the *Information for Planning and Consultation* (IPaC), an on-line project planning tool. The official species list was provided by the New England Ecological Services Field Office in Concord, New Hampshire (**Appendix C**).

The only federally-listed species identified with the potential to occur within or near the Project is the northern long-eared bat (*Myotis septentrionalis*, [NLEB]), whose range covers the entire state of Rhode Island. Due to declines caused by white-nose syndrome and continued spread of the disease, the NLEB was listed as threatened under the ESA on April 2, 2015. No designated critical habitat is located within or near the Project.

No nest surveys have been conducted for migratory birds. Suitable habitat is likely to exist for migratory bird species near the Project, especially along riparian corridors such as those found along the Woonasquatucket and Blackstone Rivers. While habitat may exist near the Project, the LOD for the Project is regularly maintained through mowing and other maintenance activities, and is unlikely to have suitable high quality habitat.

Natural Heritage Areas (NHA) are mapped by RIDEM and indicate the potential presence of state species of conservation interest. Toll Location 3 is near to but not within NHA 106. Toll Location 8 is within NHA 64 and 69. Toll Locations 9 and 11 are within NHA 32

5.11.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to federally-listed species, State Natural Heritage Species, or migratory birds because there would be no change to the existing environment.

Under the **Proposed Action Alternative** the gantries and conduit connections would be within currently clear, mowed areas of the roadway ROW, and within existing areas of high volume traffic and associated normal highway noise.

With these limited impacts, the Project is not anticipated to adversely impact State Natural Heritage Species. In addition, a Consistency letter was generated under the December 15, 2016 “Revised Programmatic Biological Opinion for Transportation Projects within the Range of Indiana Bat and the Northern Long-eared Bat” (USFWS 2015). Based on the limited impacts of the Project, a determination of “may affect, not likely to adversely affect” was made. A Concurrence Verification was formally submitted by RIDOT on December 12, 2017. The USFWS has 14 calendar days to notify RIDOT if they do not concur. Documents generated by the IPaC consultation process are provided in **Appendix C**.

There is potential for limited construction-related impacts to migratory birds from the Project due to the minor vegetation trimming to construct the gantries and construction-related noise. However, the amount of vegetation removed or trimmed in comparison to the surrounding area and available habitat would be minimal. In addition, species that may currently nest near the roadway corridors are likely to be acclimated to the presence of human and vehicular activity.

5.12 Historic and Archeological Resources

Section 106 of the National Historic Preservation Act of 1966 as amended (Section 106) requires federal agencies to consider the effects of undertakings on historic properties listed in or eligible for inclusion in the National Register. At the state level, the Project is subject to the Rhode Island Historic Preservation Act of 1968. RIDOT and FHWA initiated the Section 106 consultation process.

The Public Archaeology Laboratory, Inc. (PAL) prepared a Technical Memorandum for each toll location (PAL 2017 b-k). The memoranda present the findings of a due diligence review. The purpose of the review was to identify known historic architectural properties and archeological sites, and to assess the potential for unidentified archeological sites that might be affected by the Project within the Area of Potential Effect (APE). The memoranda are provided in Appendix D.

In accordance with 36 CFR 800.16(d), the Project’s APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or

use of historic properties, if any such properties exist.” A historic property is defined as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior” (36 CFR 800.16[1]). The APE was defined for the Project based on the potential for effect, which may differ for aboveground resources (historic structures and landscapes) and subsurface resources (archeological sites). The APE established for the purposes of the identification effort was defined to provide information about the types, nature, and distribution of resources located within the vicinity of the Ten Toll Locations.

5.12.1 Affected Environment

Toll Location 3

For archaeological resources, the APE is defined as a 300-foot wide linear corridor centered on the guardrail in the median between I-95 northbound and southbound and extending north approximately 1,060 feet along I-95 from the Centerville Road Bridge No. 068401. The APE encompasses the area of proposed direct impacts associated with construction of the gantries, toll cabinets, installation of conduits along I-95, guardrail, and construction staging areas. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the proposed gantries, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The Rhode Island Historical Preservation & Heritage Commission (RIHPHC) inventory lists one aboveground historic property (William H. Taylor House/Whitehall) and two archaeological sites (RI 1836 and RI 1837) within the APEs. There are no historic cemeteries identified in the APEs. Whitehall, located at 740 Commonwealth Avenue, is a 2½-story, gabled roof dwelling built around 1850. RI 1836 and 1837 are Pre-Contact Period Native American archaeological sites described as artifact clusters/scatters that are potentially eligible for listing in the National Register of Historic Places. RI 1836 can be dated to the Late Woodland Period based on the recovery of a Levanna projectile point. The boundaries of these sites have not been defined. There are historic properties depicted on historical maps in the Project APEs. Several buildings of the Barber farmstead are located in the APEs on an 1895 map. The soils within the I-95 ROW are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. A review of historical aerial photographs depicts agricultural fields interspersed with wooded areas prior to the construction of I-95. The 1965 plans for the construction of I-95 in the vicinity of Toll Location 3 identify up to ten feet of fill at STA 295+00, the approximate location of Toll Location 3. A LiDAR Hillshade image of I-95 in the vicinity of Toll Location No. 3 depicts the extent of land modification associated with the construction of I-95 and the bridges over Centerville Road and Toll Gate Road.

Toll Location 4

For archaeological resources, the APE is defined as 260 feet wide by 260 feet long (centered on the existing median of I-95 at Toll Location 4). The APE encompasses the area of proposed direct impacts associated with construction of the gantry, toll cabinet, installation of conduits along I-95 southbound, guardrail, construction staging area and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the proposed

gantry, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory does not list any archaeological sites, aboveground districts or individual properties listed in, eligible, determined eligible, or potentially eligible for listing in the National Register within the APEs. The Providence Historic District Overlay lists four historic properties that are considered eligible for listing as State Register historic properties: Providence Teaming Company at 200 Allens Avenue, Scoville Manufacturing Company at 183 Public Street, Silverman Brothers Jewelers at 222-226 Public Street, and the George A. Rickard House at 865 Eddy Street. There are no historic cemeteries identified in the APEs. Historical maps and aerial photographs depict an urban environment prior to the construction of I-95. The soils within the I-95 ROW are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The 1962 general plans for the construction of I-95 and Oxford Street Bridge show approximately 10 feet of fill and major drainage work at STA 204+00, the approximate location of Toll Location 4. A LiDAR Hillshade image of I-95 at Toll Location 4 depicts the extent of land modification associated with the construction of I-95.

Toll Location 6

The APE for archaeological resources is approximately 520 feet wide by 520 feet long (centered on the infield between I-95 southbound and proposed gantries 6a and 6b) and encompasses the area of proposed direct impacts associated with construction of the gantries, installation of toll cabinets, conduits, guardrail, construction staging areas, and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the infield between proposed gantries 6a and 6c, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory lists three aboveground historic properties (Colvin-Woodcock-Kulik House, William J. Grover House, and George Salisbury House) that are potentially eligible for listing in the National Register of Historic Places. There are no archaeological sites or aboveground historic districts listed in, eligible, determined eligible, or potentially eligible for listing in the National Register within the APEs. There are no historic cemeteries identified in the APEs. The Colvin-Woodcock-Kulik House at 166 East Street is a 1½-story Queen Anne style gable-roofed cottage with a cross-gabled central pavilion constructed around 1852 and remodeled around 1880. The William J. Grover House at 145 East Street is a 1½-story, 5-bay gable-roofed cottage with bracketed doorway built around 1870. The George Salisbury House at 160 East Street is a 1½-story, end-gable bracketed cottage built around 1877. Historical maps depict a sparsely developed area while aerial photographs depict an urban environment prior to the razing of structures to create the transportation corridor for I-95. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The 1961 plans for the construction of I-95 show that Fountain Street and Roosevelt Avenue were realigned (including utilities) and many residential structures were removed. The Location and Profile Sheet shows a significant change in elevation between the existing conditions and proposed I-95. The LiDAR Hillshade

image of I-95 at Toll Location 6 depicts the extent of land modification associated with the construction of I-95.

Toll Location 7

The APE for archaeological resources is defined as a 400-foot wide by 1,225-foot long corridor centered on the northbound lane of I-295 and extending south from the Plainfield Pike Bridge, encompassing the area of proposed direct impacts associated with construction of the gantries, installation of conduits, tolling cabinets, guard rail, construction staging areas, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the proposed gantries, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory does not list any archaeological sites, aboveground districts or individual properties listed in, eligible, determined eligible, or potentially eligible for listing in the National Register within the APEs. There is one historic cemetery (CR18, the Fenner-Lawton Lot) in the APEs. Historical maps and aerial photographs depict a rural environment prior to the construction of I-295. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The profile sheets from the 1967 general plans for the construction of I-295 show significant filling in the vicinity of Gantry 7a, Gantry 7b, and Gantry 7c. A LiDAR Hillshade image of I-295 at Toll Location 7 depicts the extent of land modification associated with the construction of I-295 and the ramps to Plainfield Pike. Toll Location 7 is located on filled, elevated sections of I-295 and ramps.

Toll Location 8

For archaeological resources, the APE for Gantry 8a is defined as a 300-foot wide by 660-foot long corridor centered on the proposed gantry and I-295 southbound, north of Route 6A (Hartford Pike); for proposed Gantries 8b, 8c, and 8d as a corridor approximately 4,400 feet in length and 300 feet in width centered on I-295 northbound from Route 6A (Hartford Pike) south to Route 6 (Roberts Expressway) before shifting to I-295 southbound to Gantry 8b; for Gantries 8e and 8f as a corridor 800 feet long and 300 feet wide centered on median of I-295 south of Greenville Avenue/Route 5, encompassing the area of proposed direct impacts associated with construction of the gantries, installation of conduits, tolling cabinets, guardrail, construction staging areas, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on each proposed gantry, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory does not list any aboveground districts or individual properties listed in, eligible, determined eligible, or potentially eligible for listing in the National Register within the APEs. There is one Post-Contact Period archaeological site: RI 1923 (Woonasquatucket Valley Line) within the APEs for Gantry 8a and one Post-Contact Period archaeological site: RI 2604 (Boulder Field Quarry Site) within the APEs for Gantries 8e and 8f. There is one historic cemetery (JN68, Rhodes Cemetery) identified in the APEs for Gantries 8e and 8f. Historical maps and aerial

photographs depict a rural environment prior to the construction of I-295. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The 1969 and 1971 plans for the construction of I-295 reveal significant cutting and filling throughout the I-295 corridor in the vicinity of Gantry 8a, Gantry 8b, Gantries 8c and 8d and Gantries 8e and 8f. LiDAR Hillshade image of I-295 at Toll Location No. 8 depicts the extent of land modification associated with the construction of I-295.

Toll Location 9

The APE for archaeological resources is defined as a 275-foot wide by 600-foot long corridor centered on the median of I-295 at the gantry structure and extending west 350 feet and east 250 feet from the Leigh Road Bridge and 125 feet south and 150 north of the center of the median between I-295 northbound and southbound, encompassing the area of proposed direct impacts associated with construction of the gantry, installation of conduits, tolling cabinet, guard rail, construction staging area, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the proposed gantry, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory lists two potentially eligible historic properties: “Gray Rock” and the Jeremiah Wilkinson House, and one historic cemetery, the Wilkinson Lot (CU32) in the APes. Gray Rock, located at 160 Angell Road is described as a large, stone, country house built in 1920 by Squire Senior Nicholson, the owner of a chain of grocery stores in Pawtucket. The Jeremiah Wilkinson House, located at 140 Angell Road, was built around 1800 and is described as a 2½ story, five-bay Federal Period house with one center chimney and one end chimney and a central doorway with a wood fan. The Wilkinson’s were early settlers in this part of Cumberland and their various properties are depicted on historical maps in or near the Project area. Historical aerial photographs show predominantly undeveloped forest and open land prior to the construction of I-295. Before the construction of I-295, Lippitt Avenue diverged from Leigh Road and ran north, northwest and at Summit Road formed a T intersection with Lippitt Avenue.

The construction of I-295 required the relocation of a section of Lippitt Avenue, including the intersection with Summit Road, and the taking of numerous stone walls and five structures (four houses and an outbuilding). Existing Lippitt Avenue south of the I-295 corridor was dead ended and a new alignment and intersection with Leigh Road was constructed north of the I-295 corridor. The I-295 corridor is characterized by steep slopes composed of fill supporting the bridges carrying I-295 over Leigh Road. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The 1963 General Plans for the construction of Bridges 75301 and 75321 show the extent of cutting and filling. The proposed elevation of I-295 was achieved through cutting of the existing elevation west of Leigh Road and filling east of Leigh Road. The extent of cutting and filling is clear in a LiDAR Hillshade image of I-295 in the vicinity of Toll Location 9 and Leigh Road.

Toll Location 10

The APE for archaeological resources for Gantry 10a is defined as a 300-foot wide by 470-foot long corridor extending 145 feet east and 325 feet west along the I-195 corridor and extending 300 feet south from the median between I-195 eastbound and westbound, encompassing the area of proposed direct impacts associated with construction of the gantry, installation of conduits, tolling cabinet, guard rail, construction staging area, landscaping and any associated roadway foot wide by 400-foot long corridor centered on the infield between I-195 westbound and the Warren Avenue on ramp and extending 155 feet west and 245 feet east along the I-195 corridor and approximately 240 feet north from the median between I-195 eastbound and westbound, encompassing the area of proposed direct impacts associated with construction of the gantries, installation of conduits, tolling cabinets, guard rail, construction staging area, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on each proposed gantry, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory lists several aboveground resources within the APEs listed in, eligible, determined eligible, or potentially eligible for listing in the National Register. These resources are: College Hill Historic District (NHL) and Extension (NR-Listed), Providence; OddFellow's Hall at 63-67 Warren Avenue, East Providence (NR-Listed); Saint Mary's Episcopal Church at 83 Warren Avenue, East Providence (NR-Listed); Sacred Heart Roman Catholic Church at 118 Taunton Avenue (potentially eligible); Industrial Trust Company Building at 39 Warren Avenue, East Providence (potentially eligible); Stratford Oyster Company at 28 Water Street, East Providence (potentially eligible); and Veterans Memorial Parkway (potentially eligible). The existing Washington Bridge consists of three separate structures. Bridge No. 700, Washington Bridge North carries westbound traffic on I-195 and Bridge No. 200, Washington Bridge South carries eastbound traffic. The historic portion of Bridge No. 200 that was constructed in 1930 now serves as a pedestrian/bicycle crossing (George Redman Linear Park) and is no longer National Register eligible. There are no archaeological sites listed within the APEs. There are no historic cemeteries in the APEs. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. At Gantry 10a, the profile sheet from the plans for the reconstruction of Washington Bridge No. 200 depicts the existing ground surface at I-195 as significantly higher in elevation than the existing ground surface at Gano Street and the surrounding area. At Gantry 10b, the profile sheet depicts the existing ground surface at I-195 as higher than the existing ground surface of Valley Street. The difference in existing elevation between I-195 and the surrounding areas suggests that the construction of I-195 entailed significant amounts of fill. Aerial photographs depict a changing transportation corridor with the reconstruction of the Washington Bridge and associated ramps. A LiDAR Hillshade image of I-195 at Toll Location 10 depicts the extent of land modification associated with the construction of I-195.

Toll Location 11

For archaeological resources, the APE for Toll Location 11 is defined as a 350-foot wide by 400-foot long corridor that extends 100 feet east and 325 feet west along I-295 from proposed Gantry 11a and 75 feet north and 275 feet south from the center of the median between I-295 northbound

and southbound, encompassing the area of proposed direct impacts associated with construction of the gantries, installation of conduits, tolling cabinets, guard rail, construction staging area, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the gantries, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

Bridge (RIDOT Bridge No. 027601, built in 1942) that has been determined eligible for listing in the National Register. The bridge, which is largely unchanged from its original appearance and includes restrained Art Deco styling and ceramic identification tiles, appears to be the earliest remaining rigid-frame bridge that is not part of the Interstate System. The arched form of the bridge, while not structural, is typical of mid-20th century rigid frames. There are no historic cemeteries in the APEs. A number of archaeological investigations and aboveground surveys conducted prior to the reconfiguration of the Route 146/116 interchange identified Pre-Contact Period and Post-Contact Period archaeological sites within the interchange. There are three Pre-Contact Period archaeological sites: RI 1978, RI 1983, and RI 2208 (Find Spot) and four Post-Contact Period archaeological sites: RI 0551 (The Clover Leaf House Site), RI 0544 (Old Great Road), RI 545 (Old Louisquisset Pike), and RI 2209 (Aldrich-Guertin House Site, no longer extant) located within the APEs. The majority of these sites were impacted with the reconstruction of the interchange. RI 0544, the Great Road, is located north of Route 116 approximately 100 meters east of the Route 146 northbound on- and off-ramps to Route 116. RI 0544 was determined eligible for listing in the National Register of Historic Places by the Keeper of the National Register on August 7, 2000.

The 1870 map of Lincoln and the 1939 aerial photograph depict open space prior to the construction of the Route 146/116 interchange. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The 1940 plans for the construction of Louisquisset Pike in the vicinity of Toll Location 11 identify up to ten feet of fill at STA 311+00, the approximate location of Toll Location 11. The 1945 plan for the new interchange at Routes 146 and 116 show no structures in the vicinity of Toll Location 11. A LiDAR Hillshade image of Route 146 in the vicinity of Toll Location 11 depicts the extent of land modification associated with the construction of Route 146.

Toll Location 12

The APE for archaeological resources is defined as a 280-foot wide by 1,200-foot long corridor centered on the center median of Route 146 and Farnum Pike Bridge, encompassing the area of proposed direct impacts associated with construction of the gantries, installation of conduits, tolling cabinets, guardrail, construction staging area, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the gantries, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory includes one aboveground individual property within the APEs, the Farnum Pike Bridge (RIDOT Bridge Nos. 044101 and 044121) that has been determined eligible

for listing in the National Register. The bridge structures are two of six remaining original bridges from the upgrading of Route 146 to a four-lane divided highway in the late 1950s. Both structures consist of six parallel rigid-frame ribs, connected by cross braces underneath the deck. The rigid-frame technique where the horizontal and vertical members are connected by continuous reinforcement was a signature bridge design of parkways and other state-built divided highways in the 1930s. Also within the APEs is a remnant of the colonial-era Old Greenville Road and associated stone culvert, and a historic stone foundation identified during a recent due diligence review for the Farnum Pike Bridge. There are no recorded historic cemeteries in the APEs.

The 1870 map of Smithfield and the 1939 aerial photograph depict open space prior to the construction of the Route 146 and the Farnum Pike Bridge. The soils are identified as Udorthents-Urban land complex, soils that have been disturbed by extensive cutting and filling. The profile sheets from the general plans for the construction of Route 146 in the vicinity of Toll Location No. 12 show more than 20 feet of fill at Gantry 12A (STA 536+00) and Gantry 12B (STA 540+00). A LiDAR Hillshade image of Route 146 in the vicinity of Toll Location 12 depicts the extent of land modification associated with the construction of the Route 146 and the Farnum Pike Bridge.

Toll Location 13

The APE for archaeological resources is defined as a 200-foot wide by 300-foot long corridor extending 150 feet east and west along Route 6 from the proposed the gantry location and 120 feet north and 80 feet south from the jersey barrier separating Route 6 eastbound and westbound, encompassing the area of proposed direct impacts associated with construction of the gantry, installation of conduits, tolling cabinet, construction staging area, landscaping and any associated roadway improvements. For aboveground resources, the APE is a circle with a radius of 0.25 miles centered on the gantry, encompassing the limits of disturbance and visible portions of abutting properties to account for both direct and indirect (visual) potential effects.

The RIHPHC inventory lists three aboveground resources: Merino Mill Village Historic District (potentially eligible), the Atlantic and Riverside Mills (NR eligible), and the Atlantic Mill Worker Housing (NR eligible) and one Pre-Contact Period Native American archaeological site within the APEs. The Providence Planning Department's historic overlay identifies one historic property that is potentially eligible: The Rochambeau Worsted Company (NR-listed, 7/24/17). There are no historic cemeteries in the APEs. RI 1941 is described as a Woodland Period artifact cluster containing rhyolite, argillite, quartz, felsite, hornfels, and quartzite chipping debris as well as several projectile points. Historical maps and aerial photographs show that the Route 6 crossing of the Woonasquatucket River is in the same location as a crossing of the former Providence and Springfield Branch of the New York, New Haven, and Hartford Railroad (NYNHRR). The former ROW for the NYNHRR is now part of the Fred Lippitt Woonasquatucket River Greenway. The 1961 general plans for the construction of Route 6 are inconclusive, but the 1998 and 2002 drainage and utility plans) in the vicinity of Toll Location 13 depict drainage improvements and greater than 20 percent slopes (Figures 7 and 8). A LiDAR Hillshade image of Route 6 at Toll Location 13 depicts the extent of land modification associated with the construction of Route 6.

5.12.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to historic and archeological resources because there would be no change to the existing environment.

Under the **Proposed Action Alternative**, the gantries and conduit connections would be within currently managed areas of the roadway ROW. Based on available information assembled from archival sources, RIHPHC site files, a review of aerial photography, and a field review with RIHPHC staff, and in consideration of direct (vibration) and indirect (visual, noise, and air quality) effects, the Project will have no adverse effect on historic or archeological resources. A summary of resources is provided below by toll location. Section 106 due diligence technical memos and correspondence are provided in **Appendix D**.

Chapter 6 assesses the potential for impacts to historic or archeological resources from diversion traffic.

Toll Location 3

No historic resources will be adversely affected by the proposed construction of Toll Location 3. The archaeological sensitivity of the APE for archaeological resources at Toll Location 3 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-95 has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 3 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. The construction of Toll Location 3 will have no direct or indirect (visual) impacts on the William H. Taylor House/Whitehall as this property is outside of the construction limits of disturbance and will be shielded by vegetation, topography, and distance from Toll Location 3.

Toll Location 4

No historic resources will be adversely affected by the proposed construction of Toll Location 4. The archaeological sensitivity of the APE for archaeological resources at Toll Location 4 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-95 has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 4 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. There are four above-ground resources within the APE: Providence Teaming Company, Scoville Manufacturing Company, Silverman Brothers Jewelers, and the George A. Rickard House. The construction of Toll Location 4 will have no direct or indirect (visual) impacts on these properties as they are outside of the construction limits of disturbance and will be shielded by vegetation, topography, and distance.

Toll Location 6

No historic resources will be adversely affected by the proposed construction of Toll Location 6. The archaeological sensitivity of the APE for archaeological resources at Toll Location 6 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW

for I-95 has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 6 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. There are three above-ground resources within the APEs: Colvin-Woodcock-Kulik House, William J. Grover House, and George Salisbury House. Construction of Toll Location 6 will have no direct or indirect (visual) impacts on these properties as they are outside of the limits of disturbance and will be shielded by vegetation, structures, and distance.

Toll Location 7

No historic resources will be adversely affected by the proposed construction of Toll Location 7. The archaeological sensitivity of the APE for archaeological resources at Toll Location 7 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-295, Plainfield Pike Bridge and ramps has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 7 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. Construction of Toll Location 7 will have no direct or indirect (visual) impact on CR18, the Fenner-Lawton Lot, as this cemetery is outside of the limits of disturbance and will be shielded by vegetation, topography, and distance.

Toll Location 8

No historic resources will be adversely affected by the proposed construction of Toll Location 8. The archaeological resources: RI 1923 (Woonasquatucket Valley Line) and RI 2604 (Boulder Field Quarry Site) are outside of the limits of disturbance. The archaeological sensitivity of the APE for archaeological resources at Toll Location 8 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-295, the Route 6 and Route 6A interchanges and ramps, and the Greenville Avenue Bridge (RIDOT Bridge Nos 074001 and 074021) has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 8 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. The construction of Gantries 8e and 8f will have no direct or indirect (visual) impacts on JN68, Rhodes Cemetery, as this resource is outside of the limits of disturbance and will be shielded by vegetation, topography and distance. No other aboveground historic resources are located within the APEs.

Toll Location 9

No historic resources will be adversely affected by the proposed construction of Toll Location 9. The archaeological sensitivity of the APE for archaeological resources at Toll Location 9 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-295 and the Leigh Road Bridge has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 9 will have no impact on any archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. Toll Location 9 will

have no direct or indirect (visual) impacts on “Gray Rock”, the Jeremiah Wilkinson House, and CU32, the Wilkinson Lot, as these aboveground resources and historic cemetery are outside of the limits of disturbance and will be shielded by vegetation, topography, and distance.

Toll Location 10

No historic resources will be adversely affected by the proposed construction of Toll Location 10. The archaeological sensitivity of the APE for archaeological resources is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for I-195 over the Seekonk River and the interchanges to local streets has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 10 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. No direct impacts or indirect (visual) impacts to the aboveground resources are expected as each of the gantries is located within a transportation corridor characterized by overhead intrusions such as directional signage and lighting. The addition of another overhead transportation structure would not significantly alter the current visual setting.

Toll Location 11

No historic resources will be adversely affected by the proposed construction of Toll Location 11. No recorded archaeological sites are located within the limits of disturbance and the archaeological sensitivity of the APE for archaeological resources at Toll Location 11 is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for the Route 146 and Route 116 interchange has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 11 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. Construction of Toll Location 11 will have no direct or indirect (visual) impacts on the Louisquisset Pike Bridge (RIDOT Bridge NO. 027601) as this resource is located approximately 600 feet outside of the limits of disturbance of the Proposed Action Alternative. In addition, the Louisquisset Pike Bridge is slated for replacement as part of a separate undertaking and Section 106 review and therefore could not be adversely affected by the Proposed Action Alternative because it would no longer be extant.

Toll Location 12

No historic resources will be adversely affected by the proposed construction of Toll Location 12. The historic stone foundation identified within the APE’s is outside of the limits of disturbance and the archaeological sensitivity of the APE for archaeological resources at Toll Location 12 is assessed as low. The disturbance associated with the construction of the ROW for the Route 146 and Farnum Pike Bridge has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction Toll Location 12 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. Construction of Toll Location 12 will have no direct or indirect (visual) impacts on the Farnum Pike Bridge (RIDOT Bridge Nos. 044101 and 044121) or the remnant of Old Greenville Road and stone culvert as these resources are outside of the limits of disturbance and in the case of Old Greenville Road, separated from the gantries by

distance and vegetation. In addition, the Farnum Pike Bridge is slated for replacement as part of a separate undertaking and Section 106 review and would not be adversely affected by the Proposed Action Alternative because it would no longer be extant.

Toll Location 13

No historic resources will be adversely affected by the proposed construction of Toll Location 13. The archaeological sensitivity of the APE for archaeological resources is assessed as low or none. The disturbance associated with the clearing and construction of the ROW for Route 6 and the former NYNHRR has compromised the integrity of the soils. The potential for identifying archaeological resources in meaningful contexts is low and the construction of Toll Location 13 will have no impact on archaeological resources. If construction extends beyond the existing limits of disturbance, an archaeological survey may be warranted. The construction of Toll Location 13 will have no direct impacts or indirect (visual) impacts to Merino Mill Village Historic District, the Atlantic and Riverside Mills, Atlantic Mill Worker Housing, and Rochambeau Worsted Company as they are located outside of the limits of disturbance and will be shielded from the gantry by distance, vegetation, and structures.

5.13 Environmental Justice

Executive Order 12898 (EO 12898), *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, signed by the President on February 11, 1994, directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

RIDOT and FHWA's policy is to prevent discriminatory effects by actively administering programs, policies, and activities to ensure that social impacts are recognized early and continually throughout the transportation decision-making process. FHWA Order 6640.23A: *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (FHWA 2012) encourages full participation by potentially affected communities in the transportation decision-making process, all the way through implementation of projects. If the potential for discrimination is discovered, then action must be taken to eliminate the potential.

5.13.1 Affected Environment

The U.S. Census Bureau's five-year American Community Survey (ACS) 2012–2016 data were used to identify the presence of minority or low-income populations (U.S. Census Bureau 2018a). Environmental justice populations were inventoried using census block groups, which is the smallest geographic area that ACS provides estimates on income and housing data. These areas in the vicinity of the toll locations are provided on figures in this Chapter. The Environmental Justice Screening Analysis technical memo (Jacobs 2018d) is included in **Appendix F**. The Project bisects 355 block groups; therefore, the affected environmental study area was extended to match the extent of the 355 block groups and is considered the study area used for this analysis. The 355 Block Groups are illustrated as an Environmental Feature on Figures 5-1 through 5-14 for Toll

Locations 3, 4, and 6 through 13, and on the Community Facilities figures for diversion routes in Chapter 6.

RIDOT and the Rhode Island Statewide Planning Program’s “The State of Rhode Island’s Transportation Equity Benefit Analysis (2016),” address environmental justice issues at a state level. Its analysis of low-income populations used a different poverty threshold (ACS) than the one recommended by FHWA and used here. FHWA considers a “low-income” person as a person whose median household income is at, or below, the Department of Health and Human Services (HHS) poverty guideline. This is the poverty threshold used for this Project.

The 2016 total estimated population of the study area is 485,902, and the study area averages a 21 percent minority population (U.S. Census Bureau 2018d, 2018f). With the exception of Providence County, whose population is 27 percent minority, the study area’s population is comparable to the Project counties (15 percent minority or lower) and the state of Rhode Island (19 percent minority) (U.S. Census Bureau 2018f). Of the 355 block groups in the study area, 115 contain minority populations higher than the statewide average of 19.9 percent (U.S. Census Bureau 2018f). Of this, 45 block groups that are located in or around the cities of Central Falls, Cranston, Pawtucket, and Providence have a minority population of 50 percent or greater.

The average household size in the study area is three (U.S. Census Bureau 2018b). The HHS poverty guideline for a three-person household is \$20,420. The average median household income within the study area is \$61,060 (U.S. Census Bureau 2018c). Seven block groups, six located in downtown Providence and one in Newport, are below the poverty threshold with median household incomes ranging from \$8,634 to \$19,453 (U.S. Census Bureau 2018c).

Eleven block groups located within the state of Massachusetts were included in the analysis. With the exception of one block group which exceeded the Massachusetts state-wide average of 21 percent minority population, no other block groups in Massachusetts were identified as having minority or low-income populations.

5.13.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to environmental justice or other vulnerable populations because there would be no change to the existing environment.

The **Proposed Action Alternative** is located entirely within the existing ROW of I-95, I-295, I-195, US 6, and RI 146. The Project would not acquire ROW and would not alter access within the study area. The tolls would also not require stopping or slowing of trucks to collect tolls; therefore, no exposure to new or increased pollutant emissions is expected. In addition, no hazardous materials sites were identified within or adjacent to the LOD.

For these reasons, no direct impacts from the toll systems on minority or low-income populations within the study area would occur and there would be no disproportionately high and adverse impacts to these populations.

The potential for impacts to environmental justice and other vulnerable populations resulting from diversion traffic is assessed in Section 6.3.7.

5.14 Social

Council on Environmental Quality regulations (40 CFR 1502.1) state that federal agencies must fully and fairly discuss significant environmental impacts and the reasonable alternatives that avoid or minimize those effects on the human environment. In addition, 40 CFR 1508.27 requires federal agencies to consider the significance of the impacts from a proposed action by considering the intensity and context of the impacts. The assessment of community or social impacts includes the items of importance to people, such as mobility, safety, employment effects, relocation, isolation, and other community issues.

The social affected environment includes neighborhood and/or community cohesion and travel patterns. Transportation facilities can affect how social institutions operate, how neighborhoods function, and the ability of children, cyclists and pedestrians to get around.

5.14.1 Affected Environment

Social and Community Facilities

Comprehensive plans, RIGIS, individual community online GIS tools, interviews with local stakeholders, and Google Maps were used to identify community facilities that could be impacted by the Project. Impacts to social groups, community facilities, and access to and among community facilities as a result of the Project were examined, and potential direct impacts are considered in this Chapter. An inventory of community, public safety, and recreation facilities within the study area was created to help assess potential direct impacts.

A comprehensive review of community, public safety, and recreation facilities within one-half-mile of the proposed toll locations was done and is included in **Appendix E**. Because corridor characteristics vary across the state, a summary of the community facilities that could be impacted by construction of the gantry system is provided below by geographic sections (central and north). The north section (Cumberland, Lincoln and North Smithfield, covering Location 9, 11 and 12) has a mix of land uses (industrial, residential, undeveloped) with relatively few areas of social and community activity. The central section, however, (Warwick, Providence, Cranston, Pawtucket, Johnston and East Providence, covering Location 3, 4, 6, 7, 8, 10 and 13) is where the highways with the proposed toll locations are often very close to neighborhoods with many community and recreation facilities.

A summary by geographic section of facilities adjacent to the toll locations is below:

Central Section:

- Twenty-two recreation facilities
- Twenty-two public safety facilities
- Eight child care facilities
- Thirty-two places of worship
- Forty educational facilities

- Two libraries
- Two city/town hall buildings
- Five other community facilities

North Section:

- Two nature preserves
- One place of worship

Minority, low income, and other vulnerable populations:

The U.S. Census Bureau’s five-year American Community Survey (ACS) 2012–2016 data were used to identify the presence of traditionally underserved populations that could be affected by the Project. Due to the large geographic spread of the Project, these populations were inventoried using census blocks as previously discussed in Section 5.13.1. The Project bisects 355 block groups that comprise the study area used for this analysis.

Traditionally underserved populations include low-income, minorities, and others who face challenges in participating in transportation projects. The study area has a 2016 estimated population total of 485,902 and averages a 19 percent minority population (U.S. Census Bureau 2018d, 2018f). As previously discussed, this is comparable to the Project counties and the state of Rhode Island (see Section 5.13). Portions of the study area that contain minority populations exceeding the statewide average are located in Central Falls, Cranston, East Providence, Middletown, Newport, North Kingstown, Providence, and Pawtucket—with minority populations ranging from 23.9 percent to 98.8 percent (U.S. Census Bureau 2018f).

FHWA considers a “low-income” person as a person whose median household income is at, or below, the HHS poverty guideline. The average household size in the study area is three, and the HHS poverty guideline for a three-person household is \$20,420. The average median household income for the study area is \$61,060 (U.S. Census Bureau 2018c). Seven block groups, six located in downtown Providence and one in Newport, are below the poverty threshold with median household incomes ranging from \$8,634 to \$19,453 (U.S. Census Bureau 2018c).

In addition to minority and low-income populations, other vulnerable populations (i.e., limited-English proficiency and elderly populations) were considered. RIDOT defines limited-English proficiency as persons who speak English “less than very well.” By this definition, approximately 7 percent of the study area population has limited-English proficiency compared to the state, which has around 8 percent limited-English proficiency (U.S. Census Bureau 2018g). Portions within the study area contain a substantially higher percentage of persons with limited-English proficiency as compared to the state. In addition, the study area population is approximately 15 percent elderly, which is defined as over 65 years of age (U.S. Census Bureau 2018g). In comparison, Rhode Island as a whole has an elderly population of approximately 16 percent (U.S. Census Bureau 2018h).

5.14.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to communities, facilities, or vulnerable populations because there would be no change to the existing environment.

Under the **Proposed Action Alternative** toll systems would be constructed within the ROW of the 5 roadways with toll locations. No direct impacts from the toll systems on social or community resources, including vulnerable populations, are expected. Implementation of the Project would not disrupt access to or enjoyment of any community facility, would not directly impact vulnerable populations, and would not impact the numerous community facilities in the study area.

The potential for impacts to social or community resources resulting from diversion traffic is assessed in Section 6.3.7.

5.15 Visual Resources

NEPA requires federal agencies to undertake an assessment of the environmental effects of their proposed actions prior to making decisions. Visual impacts are included among those environmental effects. FHWA's *Guidelines for the Visual Impact Assessment of Highway Projects* (FHWA 2015) was reviewed and used to guide the visual impact analysis.

5.15.1 Affected Environment

The visual character of the LOD was evaluated as part of the due diligence review for historic architectural properties and archeological sites. Along all the roadway corridors there are existing vertical features such as overhead highway signs and cell phone towers.

Toll Location 3: The I-95 ROW at Toll Location 3 is within a suburban setting with overhead directional signing and adjacent to areas with thick vegetation

Toll Location 4: The I-95 ROW at Toll Location 4 is within a heavily developed urban environment characterized by commercial buildings and cleared grassy slopes.

Toll Location 6: The I-95 ROW at Toll Location 6 is within a heavily developed urban setting.

Toll Location 7: The I-295 ROW at Toll Location 7 is within a developed suburban setting surrounded by dense vegetation.

Toll Location 8: The I-295 ROW at Toll Location 8 is within a developed suburban setting.

Toll Location 9: The I-295 ROW at Toll Location 9 is within a developed suburban setting surrounded by dense vegetation.

Toll Location 10: The I-195 ROW at Toll Location 10 is within a developed suburban setting.

Toll Location 11: The RI Route 146 ROW at Toll Location 11 is in a rural setting characterized by roadway clear zones, ramps, residential development, and dense vegetation.

Toll Location 12: The RI Route 146 ROW at Toll Location 12 is in a rural setting characterized by roadway clear zones, ramps, residential development, and dense vegetation.

Toll Location 13: The US Route 6 ROW at Toll Location 13 is in an urban setting. The immediate surrounding area is populated with a cellular communications tower, billboards and vegetation with dense residential development and a park beyond the ROW.

5.15.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to visual resources because there would be no change to the existing environment.

The **Proposed Action Alternative** would construct gantries comparable to other vertical features in the vicinity of the transportation corridor, such as standard highway sign supports. The gantries used for tolling will not be required to utilize supplemental ambient lighting. Because the existing appearance of the roadways includes similar vertical elements and overhead highway signage, the Proposed Action Alternative would have no impact on visual resources. The potential for visual impacts to historic properties was also considered and is discussed in Section 5.12. The analysis concluded there are no indirect visual impacts from construction or operation of the gantries.

5.16 Air Quality

The Clean Air Act (CAA) as amended requires USEPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants. USEPA must designate areas as meeting (attainment) or not meeting (nonattainment) the standards. States are required to develop a general plan to attain and maintain the NAAQS in all areas of the country, and a specific plan to attain the standards for each area designated nonattainment for a NAAQS. If an area is designated as "nonattainment" (designated areas), states must develop a State Implementation Plan (SIP) that details the path to attain and maintain the NAAQS. Certain Northeast states, known as the Ozone Transport Region, must also submit a SIP for the pollutants that form ozone.

5.16.1 Affected Environment

The proposed project involves vehicular emissions and the criteria pollutants of concern are carbon monoxide (CO), fine particulate matter (PM_{2.5}), and the combination of volatile organic compounds and nitrogen oxides (VOC and NO_x) emissions. In addition to criteria pollutants, the emission of mobile source air toxics (MSAT) is also of concern as diesel PM emitted by trucks is the dominant component of MSAT emissions, making up 50 to 70 percent of priority MSAT pollutants.

The proposed Project is located in an air quality region designated by the USEPA as in attainment of CO and PM_{2.5} NAAQS which signifies that an impact analysis of these criteria pollutants is not warranted as no exceedances of national or state ambient air quality standards are present in Rhode Island. Furthermore, as documented in the Rhode Island 2017 Annual Monitoring Network

Plan, localized levels of ambient CO were measured at 80 percent to 90 percent below the eight-hour NAAQS while PM_{2.5} concentrations were measured at 30 percent below the 24-hour NAAQS. The formation of ground-level ozone in the state of Rhode Island, however, has been classified by the USEPA as in moderate nonattainment of the 2008 eight-hour ozone standard. As a result, the proposed Project is subject to SIP conformity provisions and related analysis requirements of the CAA for regional emissions of ozone precursor pollutants, VOC and NO_x.

5.16.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to air quality because there would be no change to the existing environment.

The **Proposed Action Alternative** would construct an electronic toll system and would not require the stopping or slowing of trucks to collect the tolls. Therefore, there would be no new or increased pollutant emissions, including MSAT emissions, above the No Action Alternative.

The potential for air quality impacts resulting from diversion traffic is assessed in Section 6.3.4.

5.17 Noise / Vibration

Noise

According to FHWA noise policy, Type III projects are those that do not meet the criteria of Type I or II projects and do not require a noise analysis. The Project does not meet the definition of a Type I project which generally involves adding capacity, construction of new through lanes or auxiliary lanes, changes in the horizontal or vertical alignment of the roadway, or exposure of noise sensitive land uses to a new or existing highway noise source. Expansion or new construction of weigh stations, rest stops, and toll plazas require analysis as Type I projects.

Vibration

Highway traffic projects do not typically have the potential for vibration impact. In fact, FHWA does not include any vibration impact assessment requirements in any of their guidance, and their regulations at 23 CFR 772, Appendix F, explicitly states:

There are no Federal requirements directed specifically to highway traffic induced vibration. All studies the highway agencies have done to assess the impact of operational traffic induced vibrations have shown that both measured and predicted vibration levels are less than any known criteria for structural damage to buildings. In fact, normal living activities (e.g., closing doors, walking across floors, operating appliances) within a building have been shown to create greater levels of vibration than highway traffic. Address vibration concerns on a case-by-case basis as deemed appropriate in the noise analysis or in a stand-alone vibration analysis report.

5.17.1 Affected Environment

The proposed Project would not add a new toll plaza due to the use of AET technology. Additionally, the Project does not include the construction of a highway on a new location, or the physical alteration of an existing highway where there is significant change in the horizontal or vertical alignment that would change the exposure to noise (Type I and II projects). Therefore, the Project is classified as a Type III project and no noise analysis is required by FHWA. The noise environment within the Project Area is typical of interstate and state highways with car and truck vehicle traffic.

Vibration levels from buses and trucks are typically about 63 vibration decibel (VdB) at a distance of 50 feet from the source. This vibration level is below the limit for vibration sensitive equipment (65 VdB). For the purpose of this Project a literature review was conducted and is provided in **Appendix F**.

5.17.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would not result in noise or vibration impacts because there would be no change to the existing environment.

The **Proposed Action Alternative** would not result in long-term noise impacts along the roadway corridors with proposed toll locations. The toll system is electronic and does not require the stopping or slowing of trucks to collect the tolls, so there would be no noise increases above existing conditions. The Project would temporarily elevate noise levels in the vicinity of the Project due to construction activities. Temporary noise from construction activities would depend on the different types of equipment used, the distance between construction noise sources and sensitive noise receptors, and the timing and duration of noise-generating activities.

Construction activities would be temporary and would mostly occur during normal daytime hours. Adjacent areas are not expected to be exposed to construction noise for a long duration and any extended disruption of normal daytime activities is not expected. If required, coordination would be conducted with local agencies to secure necessary construction permits which may include variances for any nighttime construction work and/or exceedance of any maximum thresholds specified in local ordinances.

The **Proposed Action Alternative** would not have vibratory impacts. Construction activities will occur within the existing ROW of the five major highway corridors and sufficiently distant from any vibration sensitive resources.

The potential for noise and vibration impacts resulting from diversion traffic is assessed in Section 6.3.5.

5.18 Hazardous Materials

Hazardous waste sites are regulated by the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act. In any given state, USEPA or the state's hazardous waste regulatory agency enforces hazardous waste laws.

5.18.1 Affected Environment

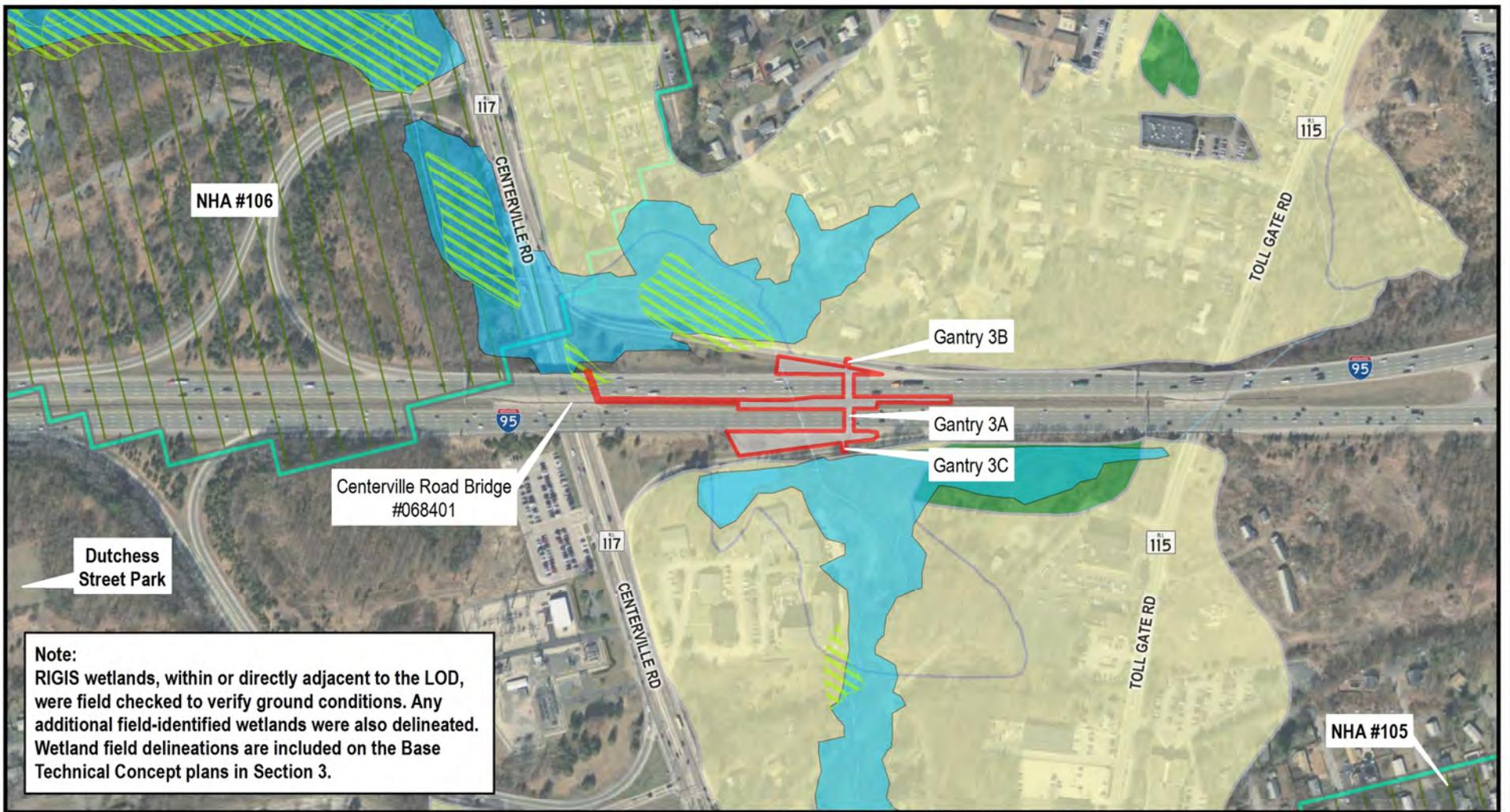
RIGIS databases that track USEPA Superfund sites, closed landfills, storage tanks (above and below ground), leaking underground storage tanks, and Site Investigation and Remediation sites were reviewed. None were identified within the ROWs of I-95, I-295, I-195, US 6, and RI Route 146, or adjacent to the LODs.

5.18.2 Direct Impacts of No Action and Proposed Action

The **No Action Alternative** would have no direct impacts to hazardous materials because there would be no change to the existing environment.

No hazardous materials sites were identified within or adjacent to the LODs. Therefore, the **Proposed Action Alternative** would have no impact on hazardous materials. The contract bid documents will require the contractor to properly dispose of any construction debris materials. If contaminated soils are encountered during construction, they will be disposed in accordance with all applicable regulations.

\\B05FL11\Data2\NNA_proj\RIDOT\2016\WYX19300 - RIDOT Tolling Facilities Consultant\600 Discipline Files\GIS - Enviro\Tolling Program EA Figures\Environmental Features Figures



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

Prepared for:

Prepared by:

Legend

- Limit of Disturbance
- Wetlands (RIGIS)
- Flood Zone AE
- Prime Farmland Soil
- Statewide Important Soil
- Natural Heritage Areas (NHA)

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

0 250 500
 Feet

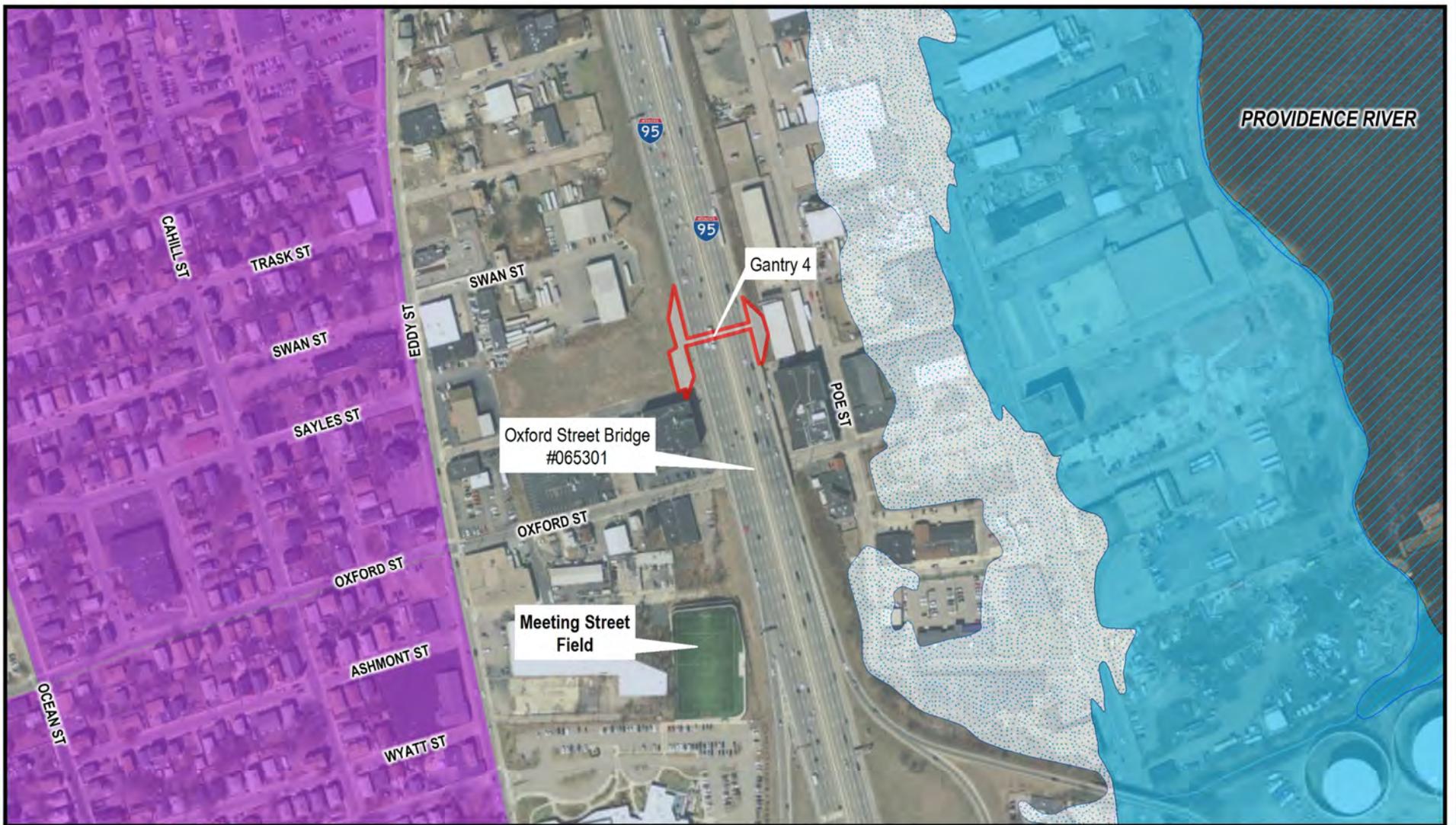
Data Sources:
 RIDOT, RIGIS, ESRI

**TOLL LOCATION 3
 AND GANTRIES 3A, 3B, 3C**

Warwick, RI

Environmental Features

FIGURE 5-1



Prepared for:



Prepared by:

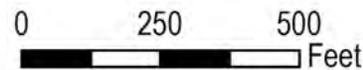


Legend

-  Limit of Disturbance
-  CRMC - Industrial Waterfronts and Commercial Navigation Channels
-  0.2% Annual Chance Flood Hazard
-  Flood Zone AE
-  Environmental Justice Areas

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND



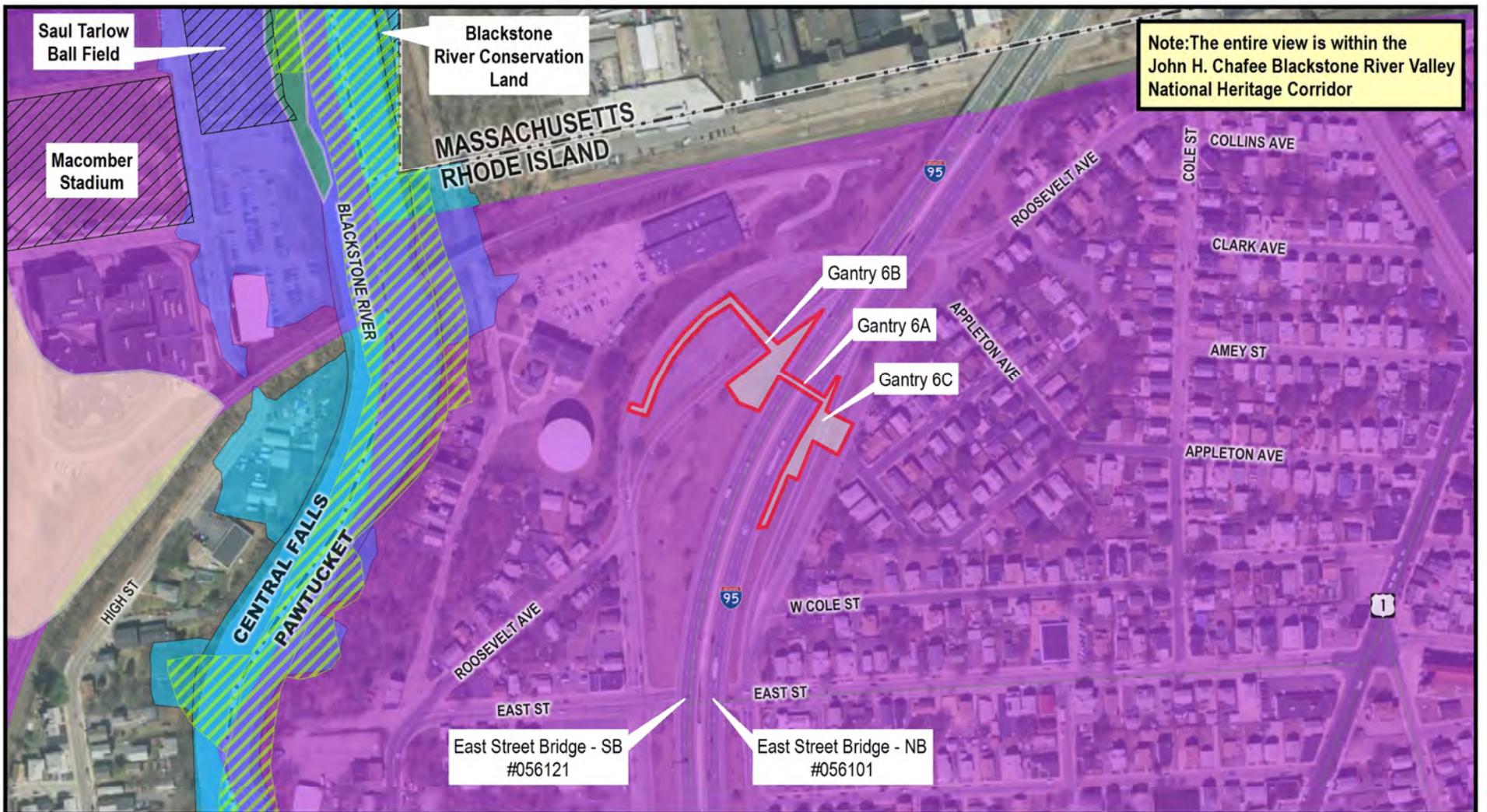
Data Sources:
RIDOT, RIGIS, RIDEM, ESRI

**TOLL LOCATION 4
AND GANTRY 4**

Providence, RI

Environmental Features

FIGURE 5-2



Prepared for:



Prepared by:



Legend

- Limit of Disturbance
- Wetlands (RIGIS)
- Local Conservation Land
- Prime Farmland Soil
- Statewide Important Soil
- Environmental Justice Areas
- Flood Zone AE
- Municipal Boundary

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

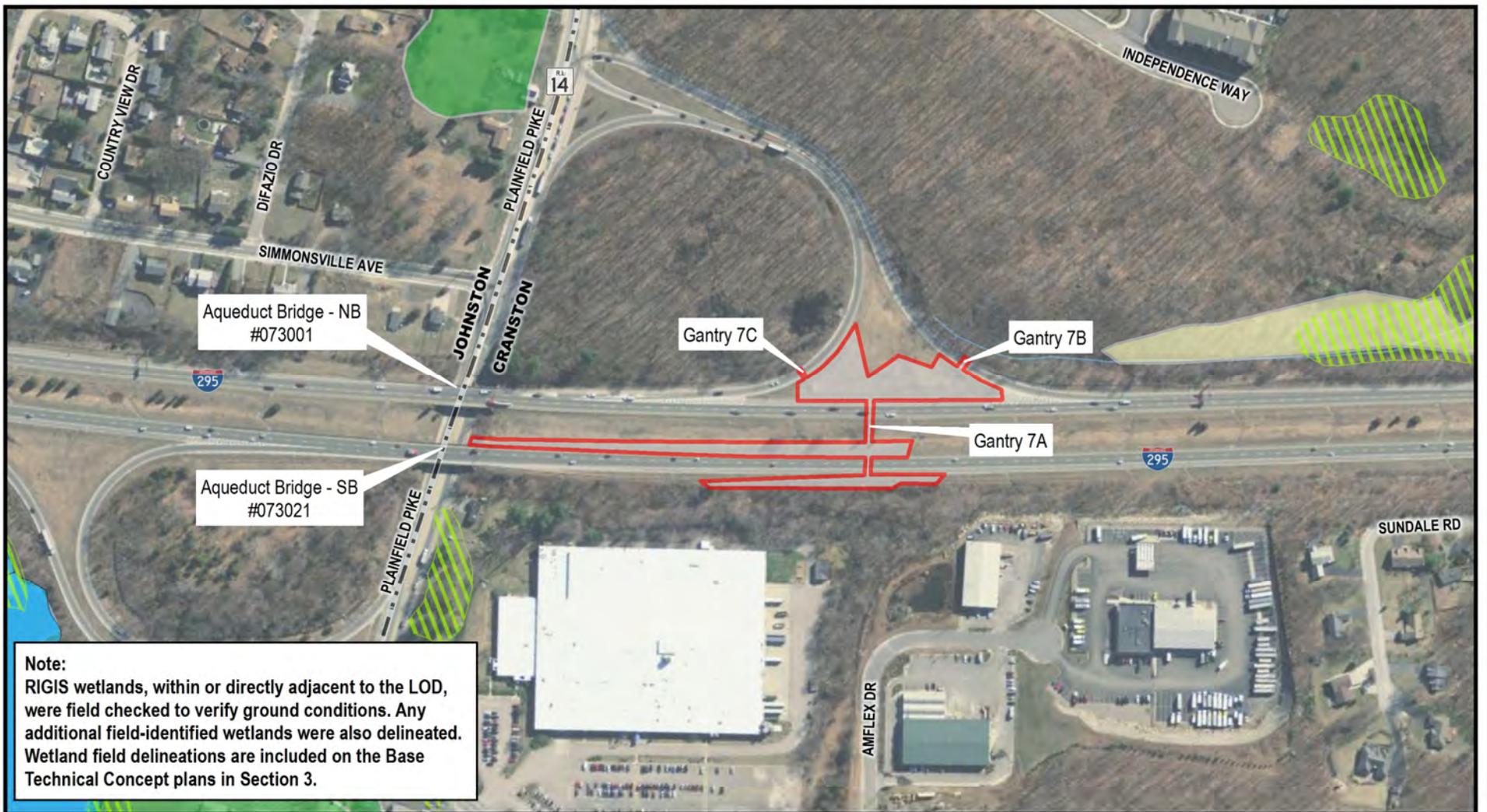
TOLL LOCATION 6 AND GANTRIES 6A, 6B, 6C

Pawtucket, RI
Environmental Features



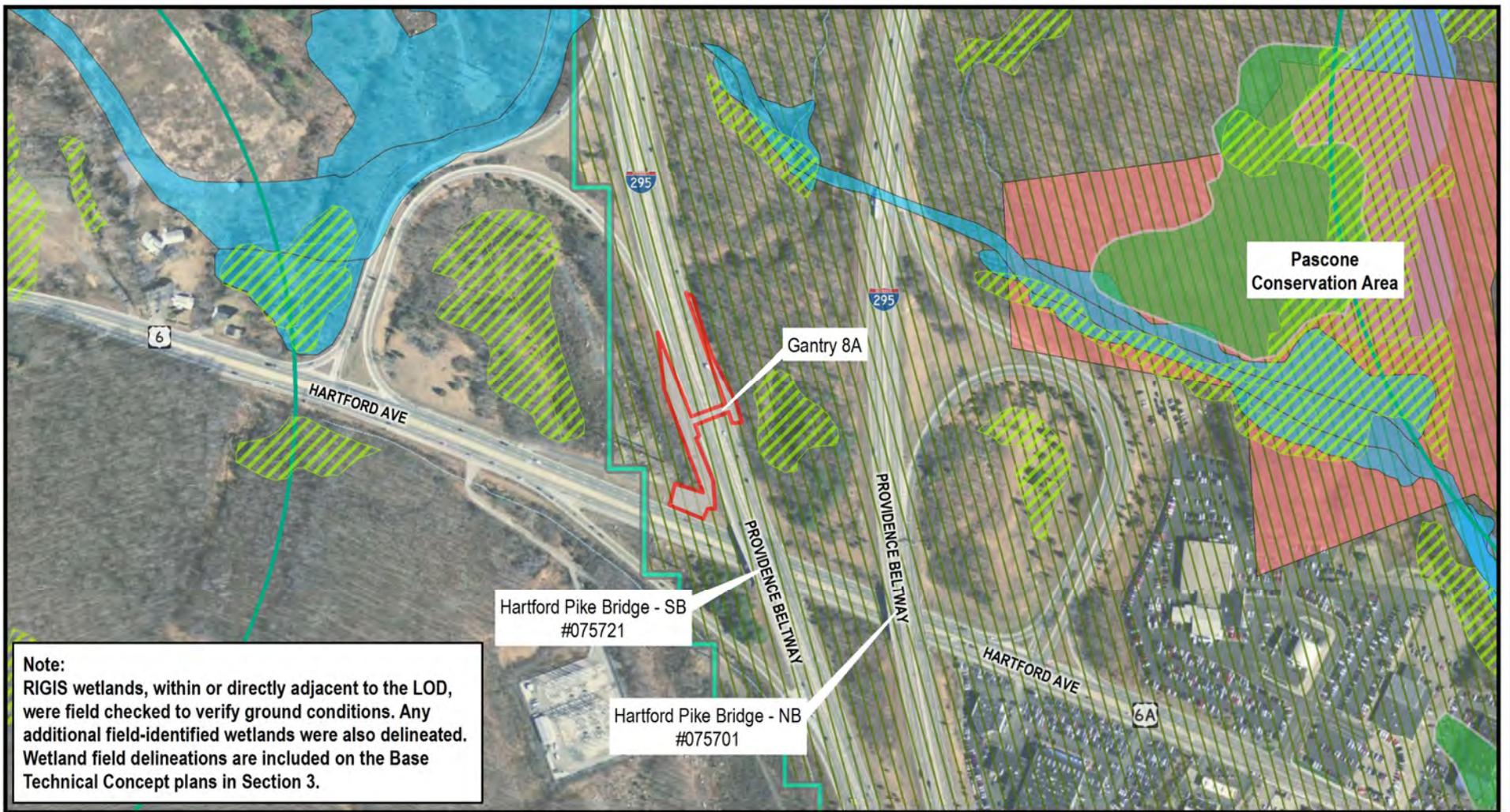
Data Sources:
RIDOT, RIGIS, RIDEM, ESRI

FIGURE 5-3



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

<p>Prepared for:</p>  <p>Prepared by:</p> 	<p>Legend</p> <ul style="list-style-type: none">  Limit of Disturbance  Wetlands (RIGIS)  Flood Zone AE  Prime Farmland Soil  Statewide Important Soil  Municipal Boundary 	<p align="center">TOLL LOCATIONS 3, 4 & 6-13</p> <p align="center">WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p>	<p align="center">TOLL LOCATION 7 AND GANTRIES 7A, 7B, 7C</p> <p align="center">Cranston, RI</p> <p align="center">Environmental Features</p> <p align="right">FIGURE 5-4</p>
		<p>Data Sources: RIDOT, RIGIS, RIDEM, ESRI</p> <p align="center">0 250 500 Feet</p> 	



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

Prepared for:

 Prepared by:


Legend

	Limit of Disturbance
	Wetlands (RIGIS)
	Wellhead Protection Area (Non-Community)
	Prime Farmland Soil
	Flood Zone AE
	Natural Heritage Area #64
	Conservation Land

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

0 250 500 Feet

Data Sources:
 RIDOT, RIGIS, RIDEM, ESRI

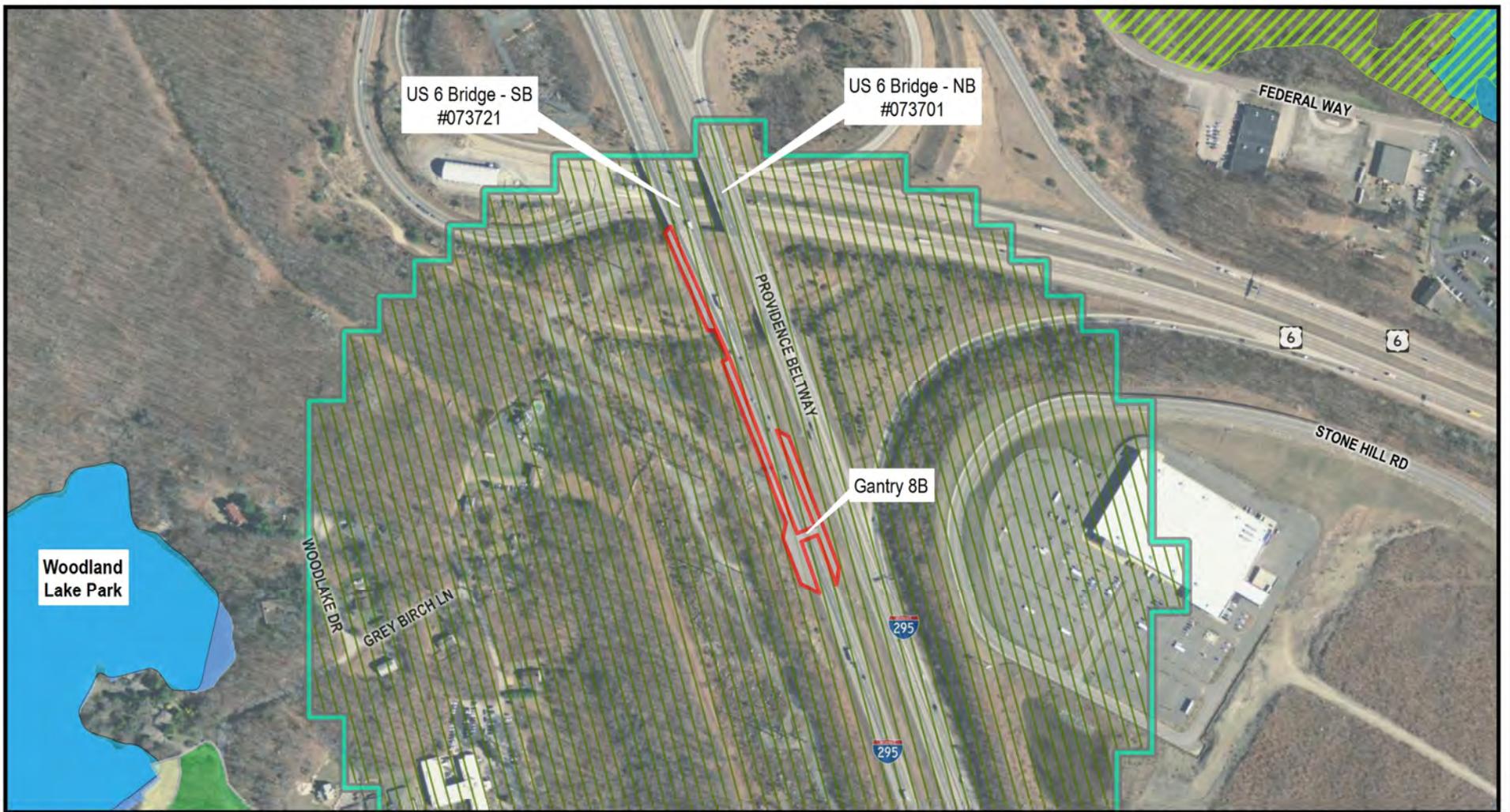


TOLL LOCATION 8 AND GANTRY 8A

Johnston, RI

Environmental Features

FIGURE 5-5



Woodland Lake Park

US 6 Bridge - SB #073721

US 6 Bridge - NB #073701

Gantry 8B

FEDERAL WAY

6

6

STONE HILL RD

WOODLAKE DR

GREY BIRCH LN

PROVIDENCE BELTWAY

295

295

Legend

-  Limit of Disturbance
-  Wetlands (RIGIS)
-  Prime Farmland Soil
-  Statewide Important Soil
-  Flood Zone AE
-  Natural Heritage Area #69

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

TOLL LOCATION 8 AND GANTRY 8B

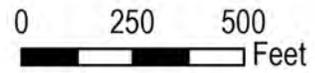
Johnston, RI

Environmental Features

Prepared for:

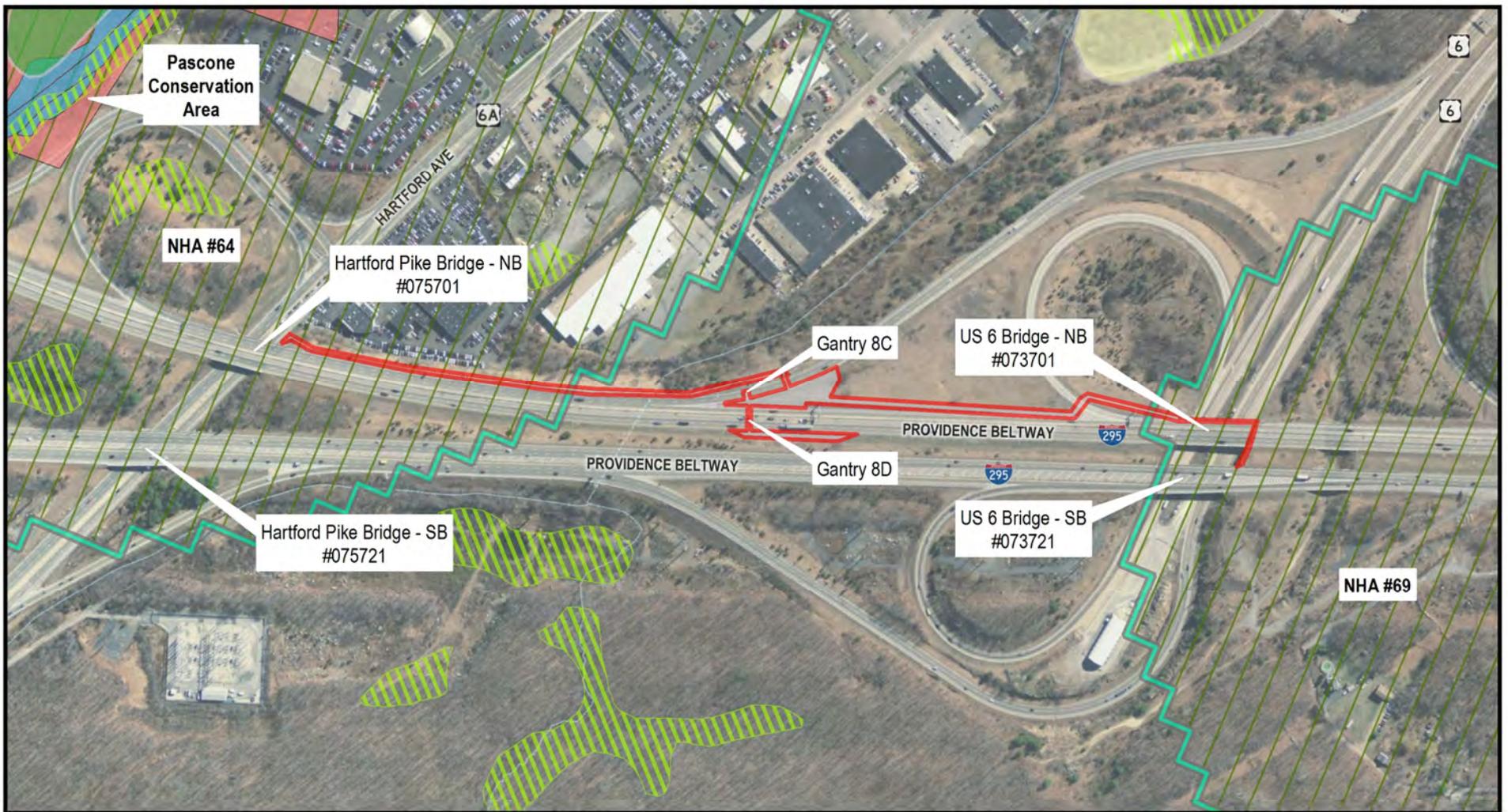


Prepared by:



Data Sources:
RIDOT, RIGIS, RIDEM, ESRI

FIGURE 5-6



Prepared for:



Prepared by:



Legend

- Limit of Disturbance
- Wetlands (RIGIS)
- Prime Farmland Soil
- Statewide Important Soil
- Flood Zone AE
- Natural Heritage Areas (NHA)
- Conservation Land

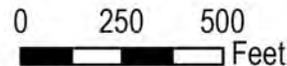
TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

**TOLL LOCATION 8
AND GANTRIES 8C, 8D**

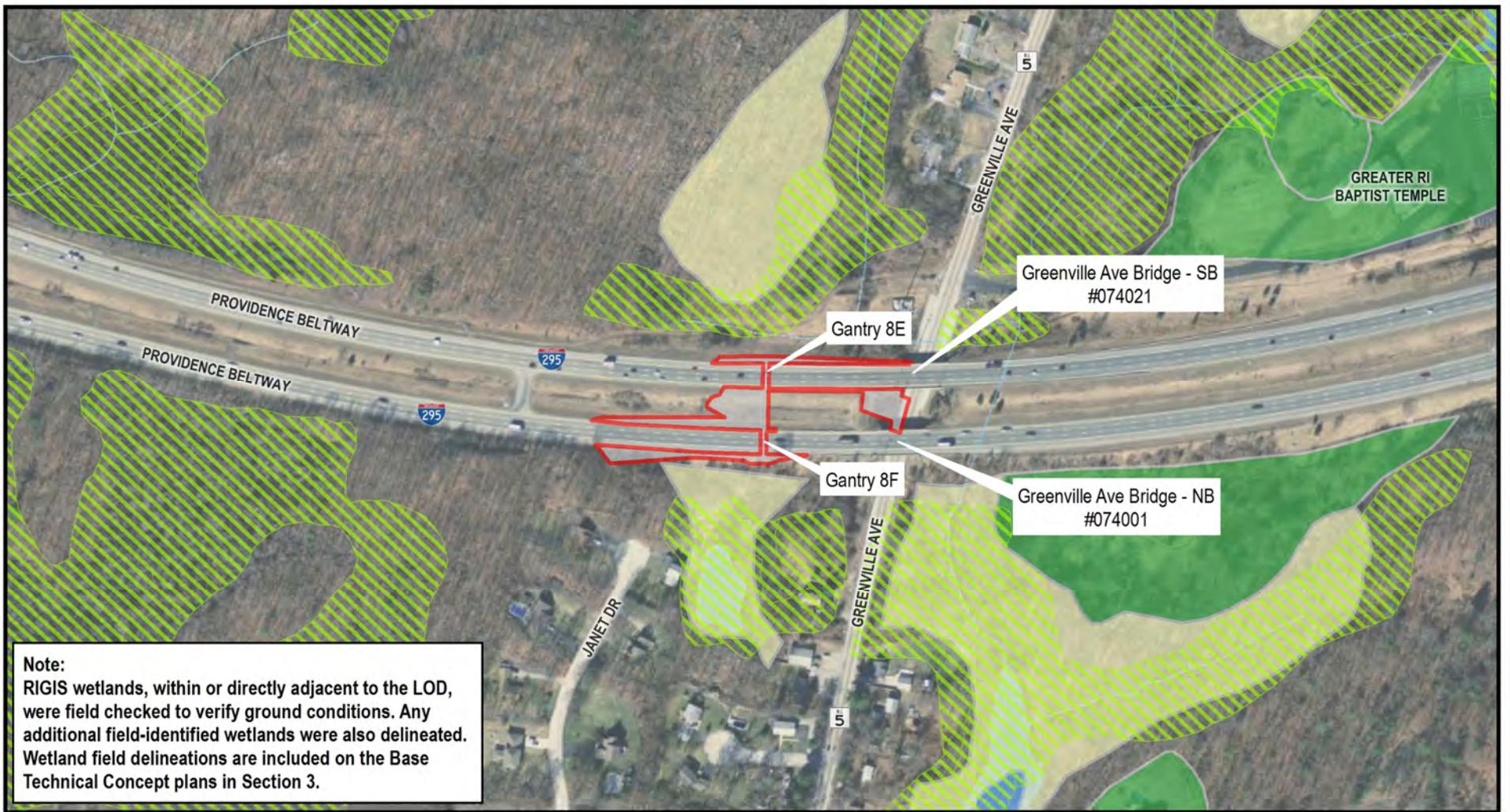
Johnston, RI

Environmental Features



Data Sources:
RIDOT, RIGIS, RIDEM, ESRI

FIGURE 5-7



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

Prepared for:



Prepared by:



Legend

-  Limit of Disturbance
-  Wetlands (RIGIS)
-  Prime Farmland Soil
-  Statewide Important Soil

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

0 250 500
 Feet

Data Sources:
 RIDOT, RIGIS, RIDEM, ESRI



**TOLL LOCATION 8
 AND GANTRIES 8E, 8F**

Johnston, RI

Environmental Features

FIGURE 5-8



Note: The entire view is within the John H. Chafee Blackstone River Valley National Heritage Corridor

Leigh Road Bridge - SB
#075321

Leigh Road Bridge - NB
#075301

Gantry 9

Prepared for:



Prepared by:



Legend

-  Limit of Disturbance
-  Wetlands (RIGIS)
-  Prime Farmland Soil
-  Natural Heritage Area #32

TOLL LOCATIONS 3, 4 & 6-13

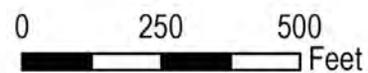
WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

TOLL LOCATION 9 AND GANTRY 9

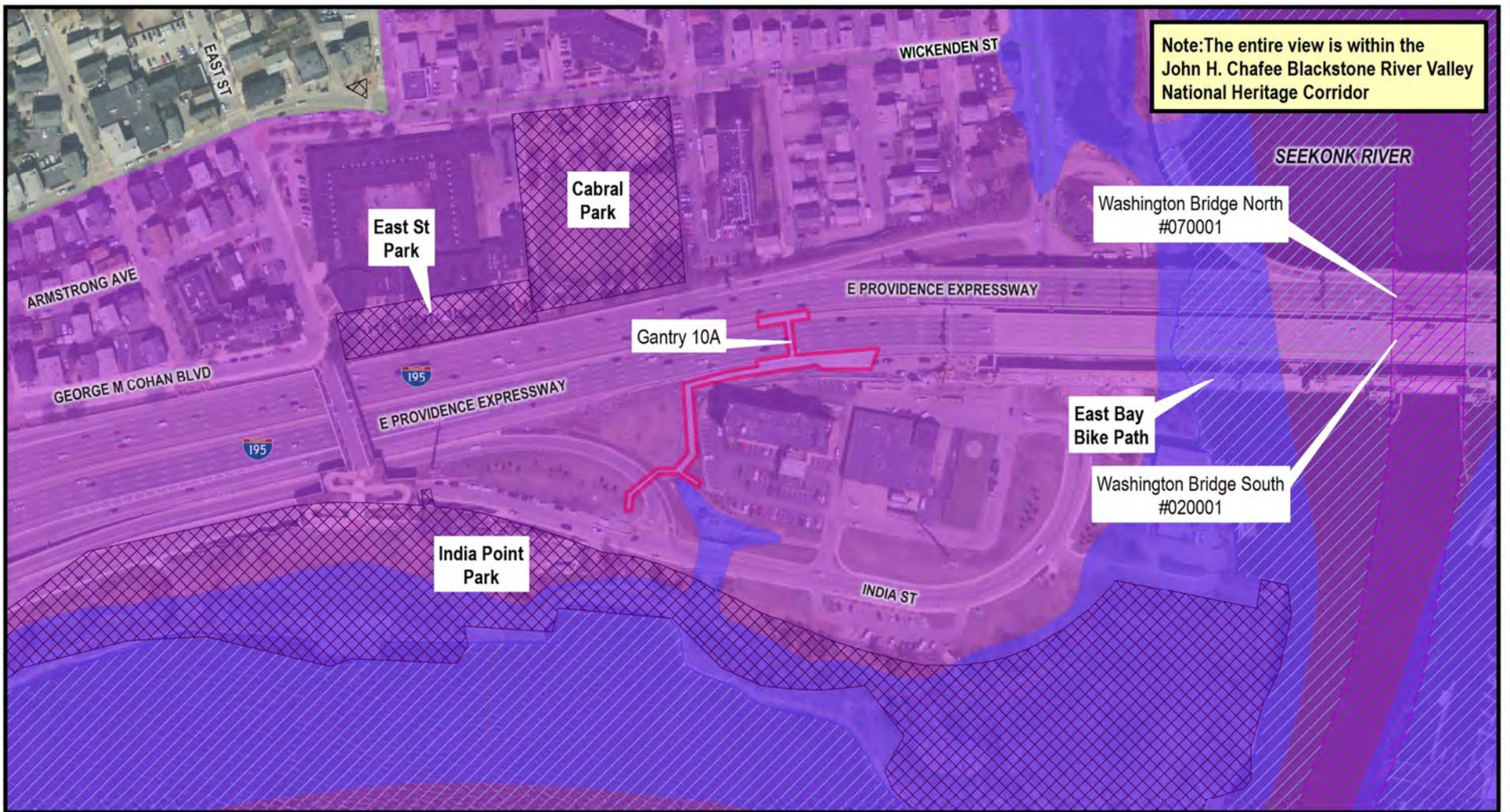
Cumberland, RI

Environmental Features

FIGURE 5-9



Data Sources:
RIDOT, RIGIS, RIDEM, ESRI



Prepared for:



Prepared by:



Legend

-  Limit of Disturbance
-  Environmental Justice Areas
-  City of Providence Parks
-  Flood Zone VE
-  CRMC - Industrial Waterfronts & Commercial Navigation Channels
-  CRMC - Multi-Purpose Water

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

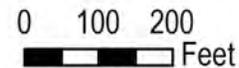
**TOLL LOCATION 10
 AND GANTRY 10A**

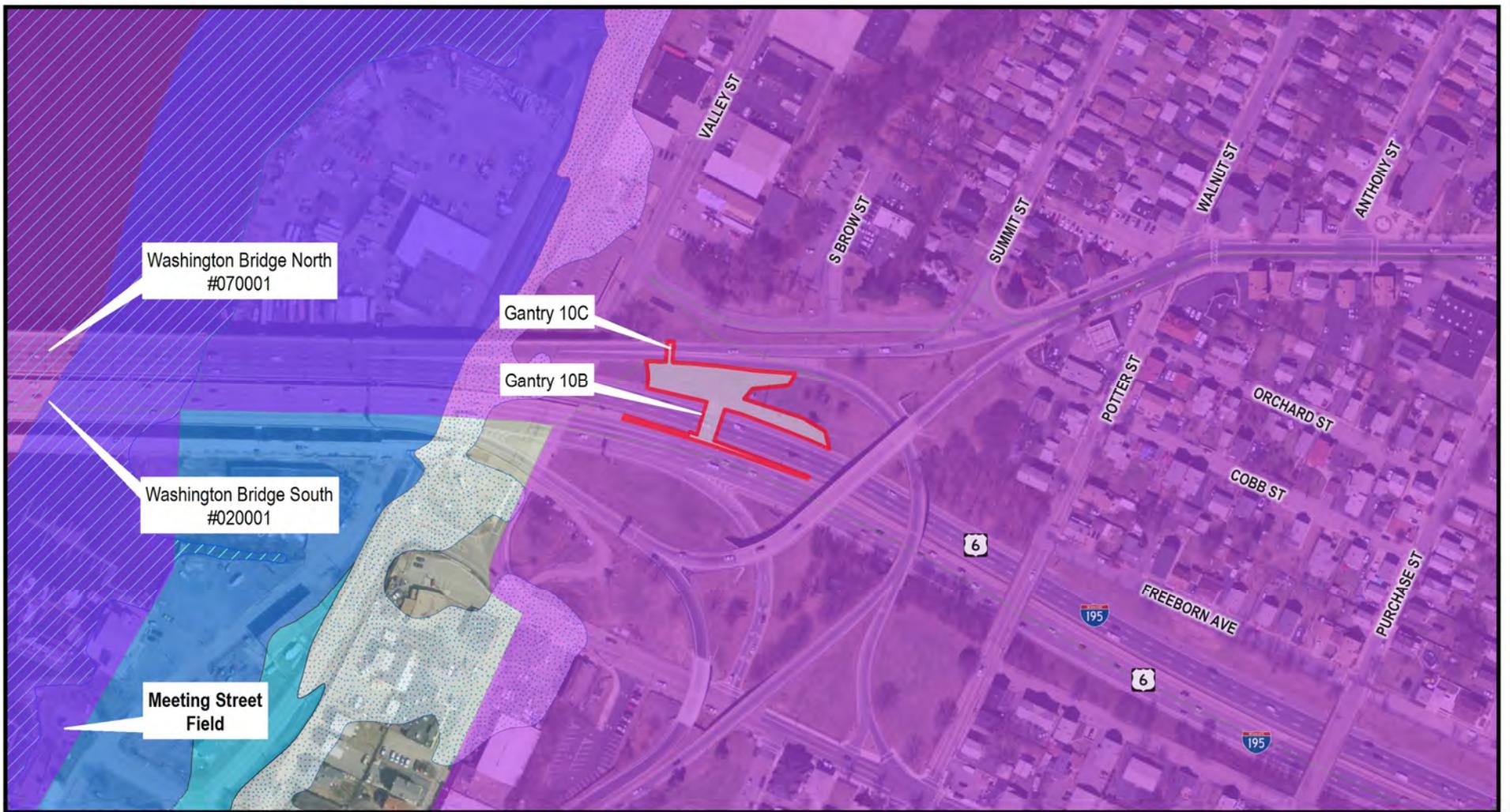
Providence, RI

**Environmental
 Features**

FIGURE 5-10

Data Sources:
 City of Providence,
 RIDEM, RIDOT, RIGIS, ESRI





Prepared for:

 Prepared by:


Legend

-  Limit of Disturbance
-  Environmental Justice Areas
-  CRMC - Multi-Purpose Water
-  Flood Zone AE
-  Flood Zone VE
-  0.2% Annual Chance Flood Hazard

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

0 250 500
 Feet

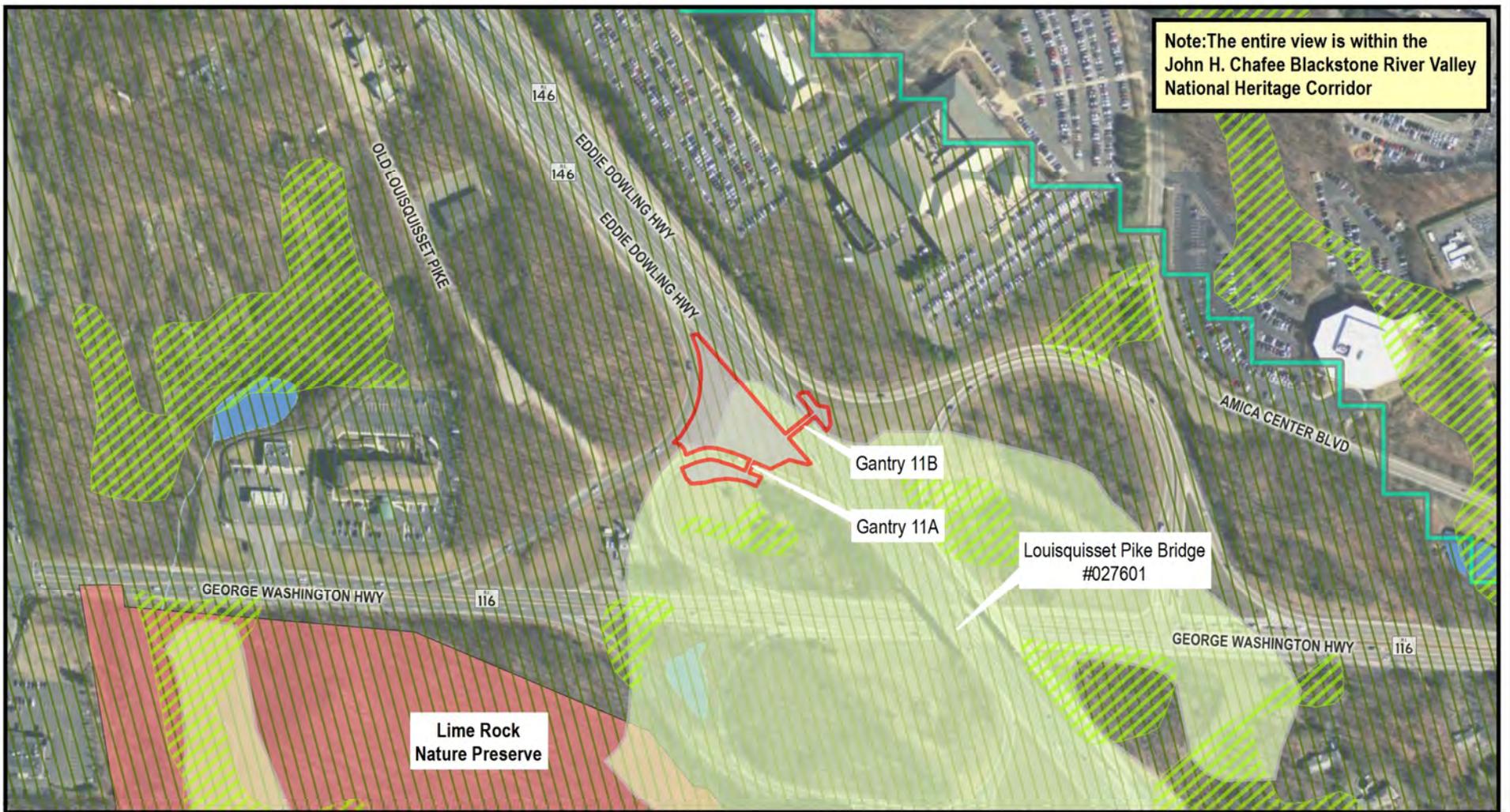
Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI



**TOLL LOCATION 10
 AND GANTRIES 10B, 10C**
 East Providence, RI

Environmental Features

FIGURE 5-11



Note: The entire view is within the John H. Chafee Blackstone River Valley National Heritage Corridor

Prepared for:

Prepared by:

Legend

- Limit of Disturbance
- Wetlands (RIGIS)
- Statewise Important Soil
- Conservation Land
- Natural Heritage Area #32

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

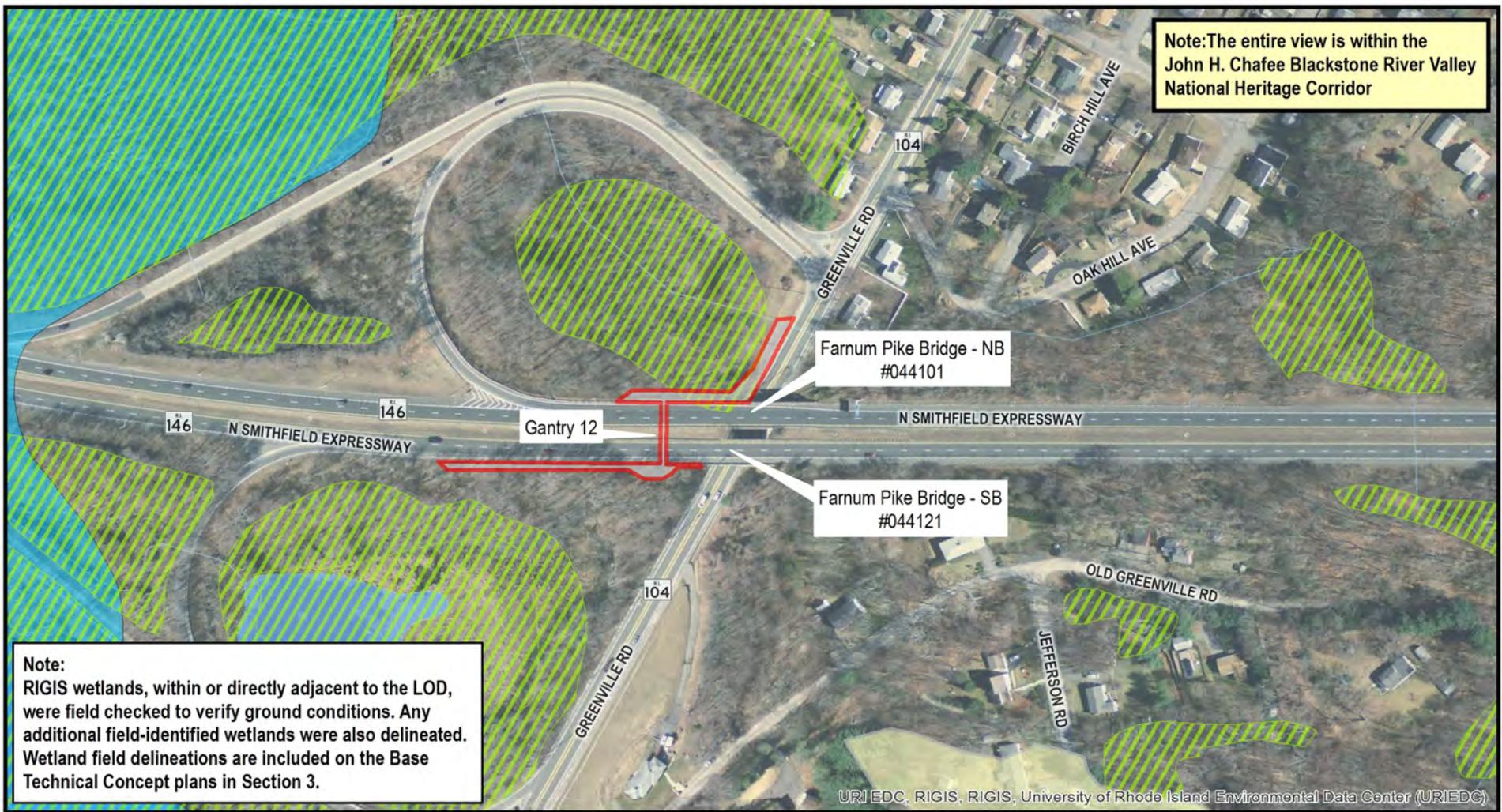
Data Sources:
 RIDOT, RIGIS, ESRI

**TOLL LOCATION 11
 AND GANTRIES 11A, 11B**

Lincoln, RI

Environmental Features

FIGURE 5-12



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

Note: The entire view is within the John H. Chafee Blackstone River Valley National Heritage Corridor

URI EDC, RIGIS, RIGIS, University of Rhode Island Environmental Data Center (URI EDC)

Prepared for:

Prepared by:

Legend

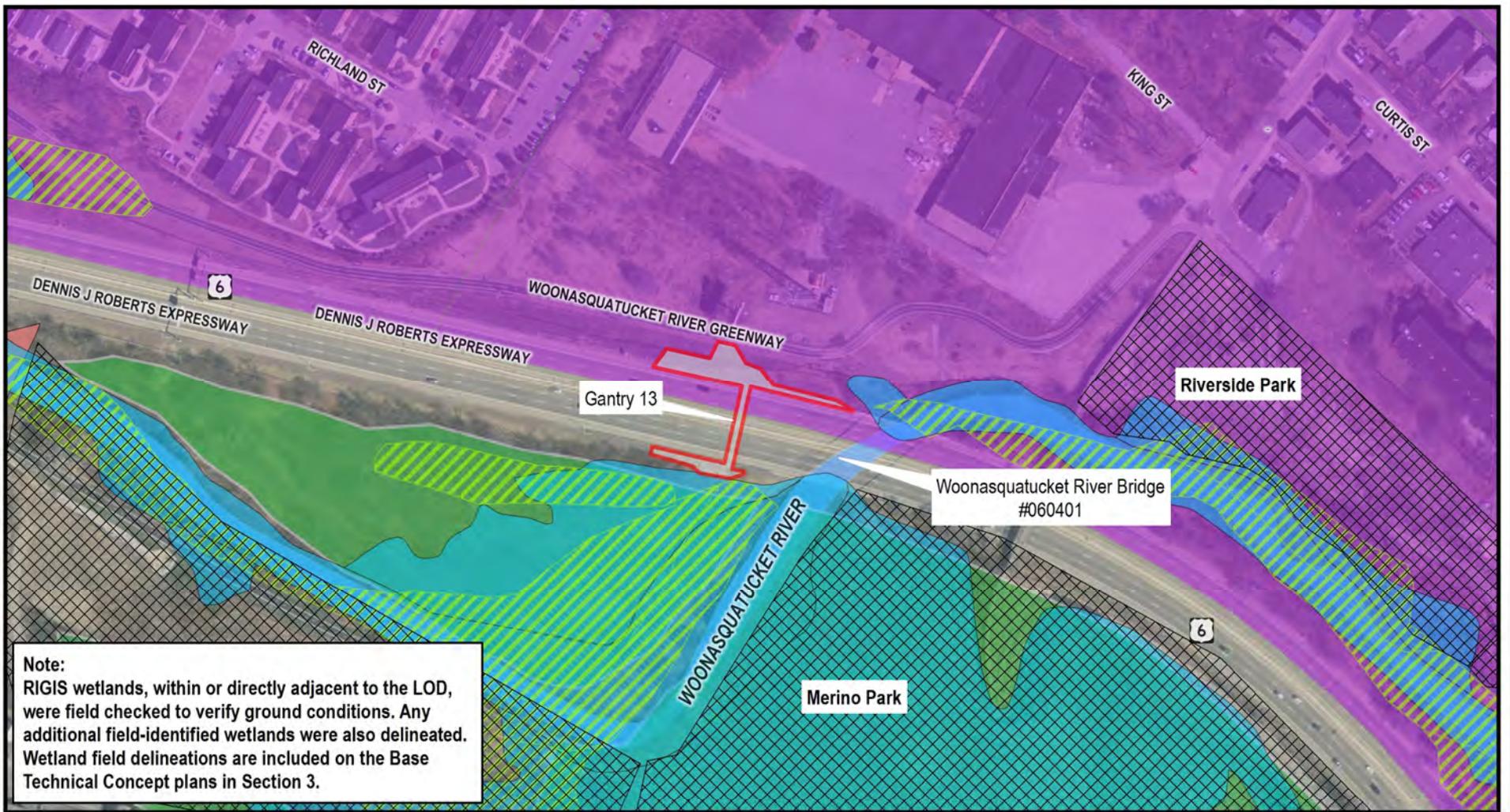
- Limit of Disturbance
- Wetlands (RIGIS)
- Flood Zone AE
- Statewide Important Soil

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

**TOLL LOCATION 12
 AND GANTRY 12**
 North Smithfield, RI
 Environmental Features
FIGURE 5-13

Data Sources:
 RIDOT, RIGIS, ESRI

0 100 200 Feet



Note:
 RIGIS wetlands, within or directly adjacent to the LOD, were field checked to verify ground conditions. Any additional field-identified wetlands were also delineated. Wetland field delineations are included on the Base Technical Concept plans in Section 3.

<p>Prepared for:</p>  <p>Prepared by:</p> 	<p>Legend</p> <ul style="list-style-type: none"> Limit of Disturbance City of Providence Parks Wetlands (RIGIS) Environmental Justice Areas Flood Zone AE Prime Farmland Soil Conservation Land 	<p>TOLL LOCATIONS 3, 4 & 6-13</p> <p>WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p>	<p>TOLL LOCATION 13 AND GANTRY 13</p> <p>Providence, RI</p> <p>Environmental Features</p> <p>FIGURE 5-14</p>
<p>Data Sources: City of Providence RIDOT, RIGIS, RIDEM, ESRI</p>		<p>0 100 200 Feet</p> 	

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Chapter 6 Affected Environment and Indirect Impacts on Diversion Routes

6.1 Introduction

This chapter compares the indirect and cumulative impacts of the No Action Alternative and the Proposed Action Alternative on resources within the Diversion Route corridors. The indirect impacts of the Project (Section 6.3) consider the effects of toll assessments and the consequential decision of some drivers seeking alternate routes to avoid tolls. Thus, the indirect impacts include the impacts from diversion truck traffic on the diversion routes. The cumulative impacts (Section 6.4) consider the impacts of the Project when added to other past, present, and reasonably foreseeable future projects.

Under the **No Action Alternative** toll systems are not constructed and tolls are not assessed at Toll Locations 3, 4, and 6 through 13. Under the **Proposed Action Alternative** toll systems are constructed and tolls are assessed on a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers travelling across select bridges associated with Toll Locations 3, 4, and 6 through 13.

6.2 Diversion Routes

Implementation of tolling on an existing roadway network can sometimes result in a shift of travel behavior wherein some drivers travel on a different route in order to avoid paying a toll. The potential shift of vehicles away from the tolled facilities is referred to as a “toll diversion.” The *Truck Tolling Study* (Louis Berger 2018) identified potential diversion routes associated with Toll Locations 3, 4, and 6 through 13.

The methodology used for the selection of diversion routes is described in the *Truck Tolling Study* which is provided in Appendix G. Readers should refer to Section 5.2.5.1 and Appendix C of the *Truck Tolling Study*. The Louis Berger Team (Team) evaluated the potential diversion routes to determine any potential truck restrictions such as posted bridges that might limit truck movements. The Team accessed RIDOT’s inventory of posted bridges to identify facilities with weight or height restrictions that may impact the ability of trucks to divert away from the toll facilities. In addition to identifying the potential limitations to truck movements, the Team also evaluated the diversion routes to note difficult turning movements, signalized intersections and other impediments that would influence the diversion decisions of heavy truck operators. Bus routes from the Rhode Island Public Transit Authority were used as part of this analysis to help determine the feasibility of turning movements. The impacted roadway segments were then used to map coherent and contiguous travel paths.

Louis Berger identified the number of diversions and possible diversion routes through the development of a Travel Demand Model. To facilitate the evaluation of potential impacts arising from the application of base case tolls, the Louis Berger Team applied post-processing adjustments to modeling outputs. The Team estimated the volume of trucks diverted on each route by first taking the diversions and assuming that 20 percent of diversions recorded at each location used other alternate routes outside of the 16 diversion routes described above.

The methodology and parameters used are provided in detail in the *Truck Tolling Study*. The parameters include but are not limited to assumptions for growth, time of day distribution, trip tables, value-of-time, vehicle operating costs, and model network adjustments. An excerpt from the Louis Berger *Truck Tolling Study - Section 6.2.3* which discusses post processing adjustments for enforcement is provided below. For further information regarding assumptions see *Appendix D* of the *Truck Tolling Study*.

The Louis Berger Team post processed the raw model outputs as part of the traffic and revenue forecast effort. Post processing of model outputs is typically performed in toll revenue forecasts to account for factors that cannot be practically incorporated into the traditional modeling tools and procedures. These factors, the methodology for post-processing, and key assumptions are discussed below.

As noted in the Level 2 Study, strict enforcement of regulations to promote the safe and efficient use of tractor trailers on local roadways can be expected to reduce the rate of diversions from the designated highway truck routes included in the Rhode Works toll program. Similar tractor trailer enforcement actions have been conducted in other states where public agencies have sought to minimize toll diversions and address public safety concerns related to truck use of alternate roads that are not well suited for heavy vehicle traffic. An increase by police in the frequency of vehicle stops and inspections, which result in fines and points assessed on driver's licenses for violations, has been known to provide a strong incentive for tractor trailers to stay on the designated highway toll corridor corridors and not divert to local routes that are more heavily policed. While many of the enforcement campaigns found in the literature are temporary in nature, the Louis Berger Team understands that significant resources have already been committed toward permanent enforcement efforts in Rhode Island: approximately half a million dollars have been dedicated to support police enforcement of non-local tractor trailer use under the RhodeWorks program.

While this enforcement is likely to have significant effects on diversions, quantifying its effect represents a significant challenge in the modeling process. Two examples of studies quantifying the effect of enforcement are instructive.

- In early 2004, Ohio stepped up enforcement against trucks on selected two-lane roads in an effort to force diverted traffic back onto the Turnpike and evidence from those and other traffic safety enforcement efforts indicate heavy commercial traffic on the turnpike increased by as much as 36 percent for class 8 vehicles.*
- The assumptions applied in a toll study for Interstate Route 80 in Wyoming implied that commercial vehicle diversions could increase by about 25 percent without enforcement actions. This Wyoming study therefore recommended a tolling enforcement zone along the 400-mile corridor with resources specifically dedicated towards this effort. Based on these examples the Louis Berger Team adjusted the raw model outputs to account for police enforcement of non-local heavy truck use of alternate local routes. The impact of these enforcement actions was assumed to reduce diversions by 50 percent. This assumption accounts for the fact that concentrated enforcement efforts are likely to be more effective in Rhode Island where the opportunity for diversion from the designated highway roadway network is not as*

extensive. Alternative assumptions for the effects of enforcement actions were also evaluated in sensitivity tests.

The other post processing adjustment applied to the forecast relates to multiple gantry use assumptions. As discussed in Section 6.2.1 [of the Truck Tolling Study], trucks with RFID devices that pass the same gantry multiple times in the same direction and the same 24-hour period will only be charged a toll for the first movement captured. Figure 6-3 provides an estimate of how much tolls at each location need to be reduced to account for multiple gantry use. However, reducing traffic estimates by these factors overstates the impact of multiple gantry use on toll revenue because the cost of paying a one-time toll for multiple use of gantry also reduces the 'effective toll rate' paid and should thereby reduce the incentives for trucks to divert away. As a result, the Louis Berger Team also reduced the percentage of repeat trips in Figure 6-3 [of the Truck Tolling Study] by 25 percent across all gantries. This reduction accounts for the lower 'effective toll rate' discount as well as the volume of trucks not equipped with E-ZPass transponders (28 percent – Table 4-9 [of the Truck Tolling Study]) that would pay tolls each time they used the same gantry in a 24-hour period.

Appendices in the *Truck Tolling Study* detail the diversion route methodology, results, and impact assessment. Jacobs used the diversion routes and peak period diversion volumes estimated in the *Truck Tolling Study* for the assessment of indirect impacts for the EA.

6.2.1 In-State Diversion Routes

The diversion routes are briefly described below, listed in **Table 6-1**, and shown in **Figure 1-2** in Chapter 1.

Diversion Route 2 avoids Toll Locations 3, 7, 8 and 12 and is located in West Greenwich, Coventry, Foster, Scituate, Glocester, Burrillville, and North Smithfield, Rhode Island, and Uxbridge, Massachusetts. The route extends between Exit 5 on I-95 in West Greenwich, Rhode Island, following RI Route 102 (Victory Highway, Plainfield Pike, Chompist Hill Road, Money Hill Road, Broncos Highway, and US Route 44 (Putnam Pike)), as well as RI Route 5 (Main Street), and Quaker Highway (146A) to Exit 1 of the Worcester-Providence Turnpike (Route 146) in Uxbridge, Massachusetts. Diversion Route 2 is shown in **Figures 6-1 and 6-2**.

Diversion Route 3 avoids Toll Location 3 and is located in North Kingstown, Warwick, and East Greenwich, Rhode Island. The route extends from RI Route 403 in North Kingstown, following US Route 1 (Post Road) to the T.F. Green Airport Connector Road, and from there onto I-95 at Exit 13 in Warwick. Diversion Route 3 is shown in **Figures 6-3 and 6-4**.

Diversion Route 4 avoids Toll Location 3 and is located in West Warwick and Warwick, Rhode Island. The route extends from Exit 8 on I-95 in Warwick/West Warwick, following RI Route 2 (Quaker Lane and Bald Hill Road) to its connection onto I-295 at Exit 2 in Warwick. Diversion Route 4 is shown in **Figures 6-5 and 6-6**.

Diversion Route 5 avoids Toll Locations 3, 7, and 8 and is located in West Greenwich, Coventry, and Scituate, Rhode Island. The route extends from I-95 at Exit 6 in West Greenwich, following RI Route 3, RI Route 33, and RI Route 116 (Nooseneck Hill Road, Tiogue Avenue, Sandy Bottom Road, Main Street, Knotty Oak Road and North Road) to its junction with Scituate Avenue (RI

Route 12) where Diversion Route 5 then splits into Diversion Route 6 and Diversion Route 15. Diversion Route 5 is shown in **Figures 6-7 and 6-8**.

Diversion Route 6 avoids Toll Locations 3, 7, and 8 and is located in Scituate, Cranston, Johnston, and Smithfield, Rhode Island. The route extends from the intersection in Scituate of East Road/RI Route 116, North Road/RI Route 116, and Scituate Avenue/RI Route 12, following RI Route 12 (Scituate Avenue, Phenix Avenue) to RI Route 5 (Atwood Avenue, Greenville Avenue, Cedar Swamp Road) and RI Route 116 (Pleasant View Avenue), eventually terminating at RI Route 104 (Farnum Pike) in Smithfield. Diversion Route 6 is shown in **Figures 6-9 and 6-10**.

Diversion Route 7 avoids Toll Locations 11, 12, and 13 and is located in Providence, North Providence, Smithfield, and North Smithfield, Rhode Island. The route extends from the intersection of Broadway and Westminster St in Providence, along Manton Avenue and Woonasquatucket Avenue to briefly on US Route 44 (Smith Street) in Providence, along RI Route 104 (Waterman Avenue, Farnum Pike, Greenville Road), RI Route 7 (Douglass Pike), eventually terminating at RI Route 146 in North Smithfield. Diversion Route 7 is shown in **Figures 6-11 and 6-12**.

Diversion Route 8 avoids Toll Locations 4 and 10 and is located in Providence and East Providence, Rhode Island. The route extends between Exit 6 on I-195 in East Providence, and Exit 18 on I-95 in Providence. Eastbound route follows Allens Avenue (US Route 1A), Eddy Street, Point Street, Wickenden Street, Ives Street, Pitman Street, Butler Avenue, South Angell Street, Henderson Bridge, Henderson Expressway, and North Broadway before re-entering I-195 at Exit 6 in East Providence. From Exit 6 on I-195, the westbound route follows North Broadway, Henderson Expressway, Henderson Bridge, South Angell Street, Butler Avenue, Pitman Street, Ives Street, Wickenden Street, Point Street, Eddy Street, and Thurbers Avenue to connect to Exit 18 on I-95. Diversion Route 8 is shown in **Figures 6-13 and 6-14**.

Diversion Route 9 avoids Toll Location 6 and is located in Pawtucket, Rhode Island, and Attleboro, Massachusetts. The route extends from Exit 2 on I-95 in Attleboro, Massachusetts, to Exit 29 of I-95 in Pawtucket, Rhode Island. The route follows Route 1A (Newport Avenue), Cottage Street, Central Avenue and US Route 1 (Broadway). Diversion Route 9 is shown in **Figures 6-15 and 6-16**.

Diversion Route 10 avoids Toll Location 6 and is located in Attleboro, Massachusetts and Pawtucket, Rhode Island. The route extends from Exit 1 on I-95 in Attleboro, Massachusetts, to Exit 30 in Pawtucket, Rhode Island. Depending on direction of travel, the route follows US Route 1 (Washington Street), Roosevelt Avenue, Fountain Street, Middle Street, or East Street. Diversion Route 10 is shown in **Figures 6-17 and 6-18**.

Diversion Route 11 avoids Toll Location 9 and is located entirely within Cumberland, Rhode Island. The Route extends from Exit 11 to Exit 10 on I-295 and follows RI Route 114 (Diamond Hill Road), RI Route 116 (Angell Road), and RI Route 122 (Mendon Road). Diversion Route 11 is shown in **Figures 6-19 and 6-20**.

Diversion Route 12 avoids Toll Location 6 and is located in Pawtucket, Central Falls, Lincoln, and Cumberland, Rhode Island. The route extends from the intersection of Capital Street and RI Route 122 (Lonsdale Avenue) in Pawtucket near I-95, follows RI Route 122 (Lonsdale Avenue, Mendon

Road), and terminates at the intersection of RI Route 122 (Mendon Road) and Angell Road in Cumberland. Diversion Route 12 is shown in **Figures 6-21 and 6-22**.

Diversion Route 13 avoids Toll Location 12 and is located in Woonsocket and North Smithfield, Rhode Island. The route follows Route 146A (Great Road, Smithfield Road, and Eddie Dowling Highway). Diversion Route 13 is shown in **Figures 6-23 and 6-24**.

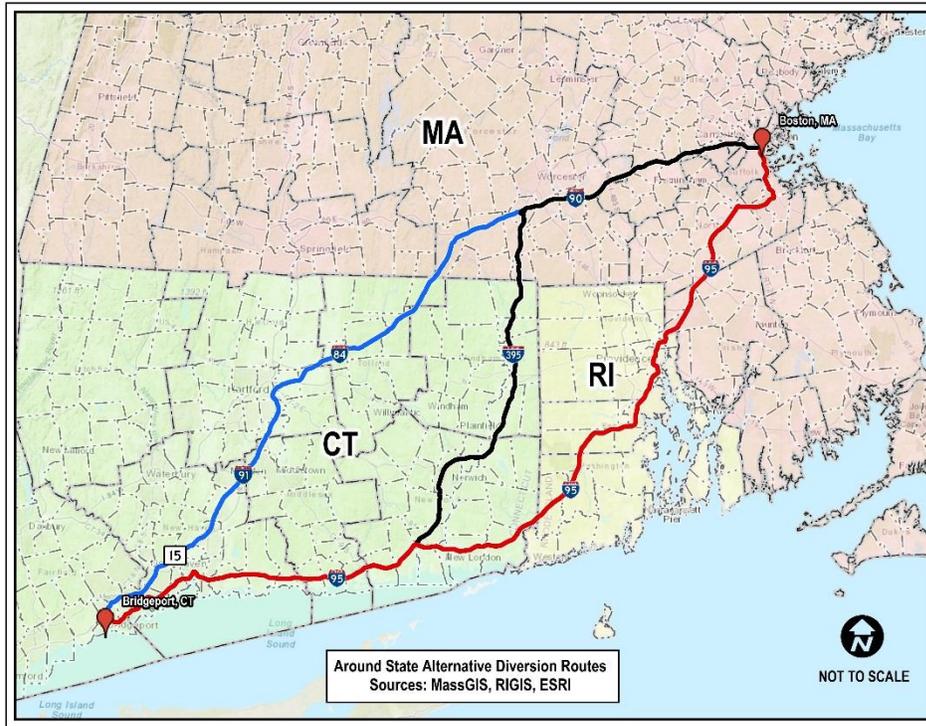
Diversion Route 14 avoids Toll Locations 3, 4 and 10 and is located in Exeter, North Kingstown, Jamestown, Newport, Middletown, and Portsmouth, Rhode Island. The extends from the intersection of RI Route 3 (Nooseneck Hill Road) and RI Route 102 (Victory Highway) in Exeter, along RI Route 102 (Victory Highway, Ten Rod Road) onto RI Route 4 (Colonel Rodman Highway), US Route 1 (Tower Hill Road), and RI Route 138 in North Kingstown, continuing on RI Route 138 into Jamestown and Newport (as Admiral Kalbfus Road and West Main Road), and then to RI Route 114 (West Main Road) in Middleton, and terminating in Portsmouth at the tie-in with RI Route 24. Diversion Route 14 is shown in **Figures 6-25 and 6-26**.

Diversion Route 15 avoids Toll Locations 3, 7, and 8 and is located in Scituate, Glocester, and Smithfield, Rhode Island. The route extends from the Diversion Route 6 terminus intersection in Scituate (East Road/RI Route 116, North Road/RI Route 116, Scituate Avenue/RI Route 12), and follows RI Route 116 (East Road, West Greenville Road, Smith Avenue) to US Route 44 (Putnam Pike), and then to I-295 at Exit 7 in Smithfield. Diversion Route 15 is shown in **Figures 6-27 and 6-28**.

Diversion Route 16 avoids Toll Locations 4 and 10 and is located in Cranston and Providence, Rhode Island. The route utilizes RI Route 10 from the interchange at Exit 16 in Cranston, to the I-95 interchange at Exit 22 in Providence. Diversion Route 16 is shown in **Figures 6-13 and 6-14**.

6.2.2 Around State Alternate Routes

The Louis Berger *Truck Tolling Study* identified two possible routes that trucks could use to avoid I-95 through Rhode Island if there were no in-state origin or destinations. These routes are illustrated in the following map image. The first route option (shown in blue) branches off I-95 (shown in red) at Bridgeport, CT and tracks along I-84 before connecting with the Massachusetts Turnpike (I-90), in Sturbridge, MA. The second option (shown in black) branches off I-95 at East Lyme, CT before connecting to I-90 in Auburn, MA. All three routes converge at the I-90/I-93 interchange in Boston.

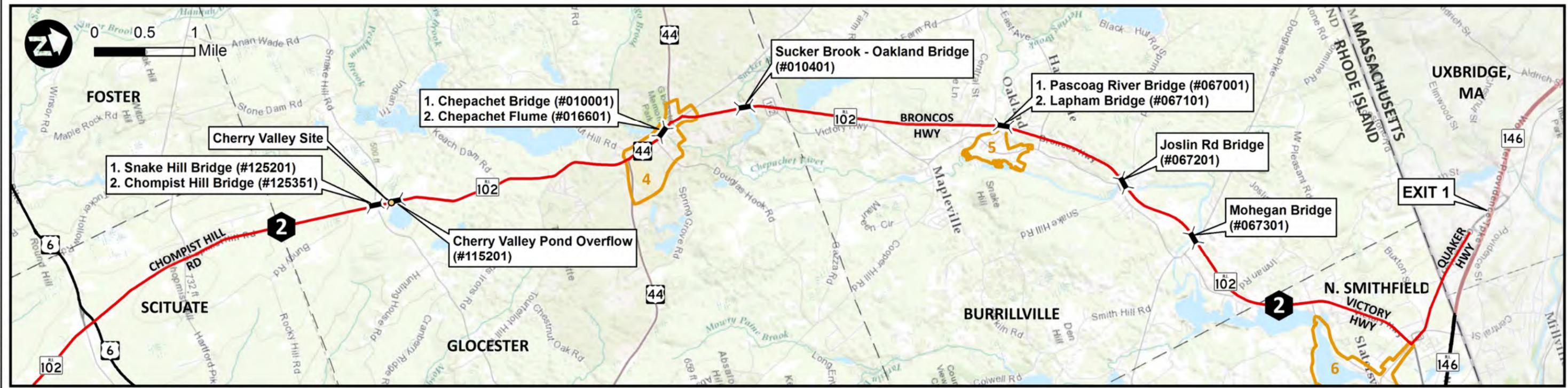
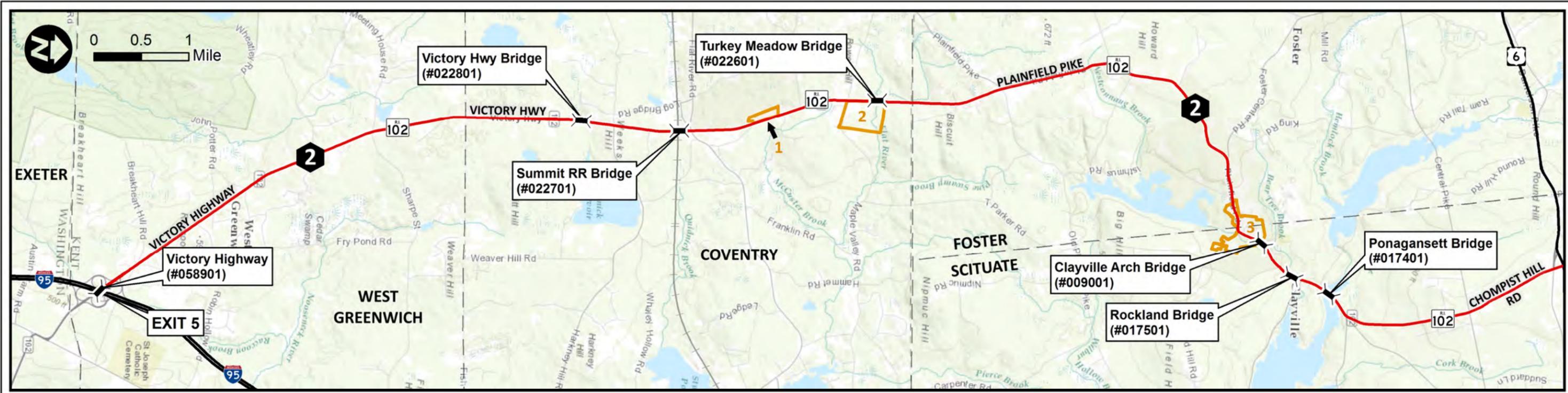


As taken from the analysis described in detail in the *Truck Tolling Study*, “Route I-84 has significant travel time advantages over both the I-95 and I-395 options in terms of travel costs converted into equivalent travel time. This finding combined with the typical range of travel time associated with this route implies that this route is essentially always faster once the total cost of travel has been taken into account. In fact, even with its current estimated toll of \$12.80 the Route I-84 option would still be notably faster than an untolled I-95 in terms of equivalent minutes. As a result, and based on the methodological approach the Louis Berger Team has applied in this forecast, this route is not considered a diversion alternative as tractor trailers should already be taking advantage of the route’s travel time benefit”.

The analysis also showed that I-95 is typically faster in the overnight and early morning time periods. The *Truck Tolling Study* assessed (presented in the *Truck Tolling Study* appendices) the difference between I-395/90 and I-95 by hour and calculated the resulting diversion potential. A total of 135 trips are estimated to divert around the state as a result of the introduction of tolls on I-95. This volume of diversions does not trigger a separate diversion impact analysis on this route based on the threshold set forth in the *Truck Tolling Study*.

Table 6-1 Potential Diversion Routes and Toll Locations Bypassed

Diversion Route	Tolls bypassed	City/Town with Diversion Route	Illustrated on Figures
2	3,7,8 and 12	West Greenwich, Coventry, Foster, Scituate, Glocester, Burrillville (Harrisville), No. Smithfield, Uxbridge, MA	Figures 6-1 and 6-2
3	3	West Warwick, Warwick, East Greenwich, No. Kingstown	Figures 6-3 and 6-4
4	3	West Warwick and Warwick	Figures 6-5 and 6-6
5	3, 7 and 8	West Greenwich, Coventry, and Scituate	Figures 6-7 and 6-8
6	3, 7 and 8	Scituate, Cranston, Johnston, and Smithfield	Figures 6-9 and 6-10
7	11, 12 and 13	Providence, North Providence, Smithfield, and North Smithfield	Figures 6-11 and 6-12
8	4 and 10	Providence, East Providence	Figures 6-13 and 6-14
9	6	Pawtucket, Rhode Island, and Attleboro, Massachusetts	Figures 6-15 and 6-16
10	6	Attleboro, Massachusetts and Pawtucket, Rhode Island	Figures 6-17 and 6-18
11	9	Cumberland	Figures 6-19 and 6-20
12	6	Pawtucket, Central Falls, Lincoln, and Cumberland	Figures 6-21 and 6-22
13	12	Woonsocket and North Smithfield	Figures 6-23 and 6-24
14	3, 4 and 10	Exeter, North Kingstown, Jamestown, Newport, Middletown, and Portsmouth	Figures 6-25 and 6-26
15	3, 7 and 8	Scituate, Glocester, and Smithfield	Figures 6-27 and 6-28
16	4 and 10	Cranston and Providence	Figures 6-13 and 6-14



Prepared For:

Prepared By:

Legend

- Bridges on Diversion Routes
- Potential Diversion Routes
- Routes with Toll Locations
- National Register Historic Districts

Notes:

- The only historic features shown are located adjacent to - or near - the Potential Diversion Route.
- No toll locations are located within the area shown on this figure.

Historic Districts

Map ID	HD Name
1	William Waterman
2	Isaac Bowen
3	Clayville
4	Chepachet Village
5	Oakland
6	Slatersville

TOLL LOCATIONS 3, 4 & 6-13

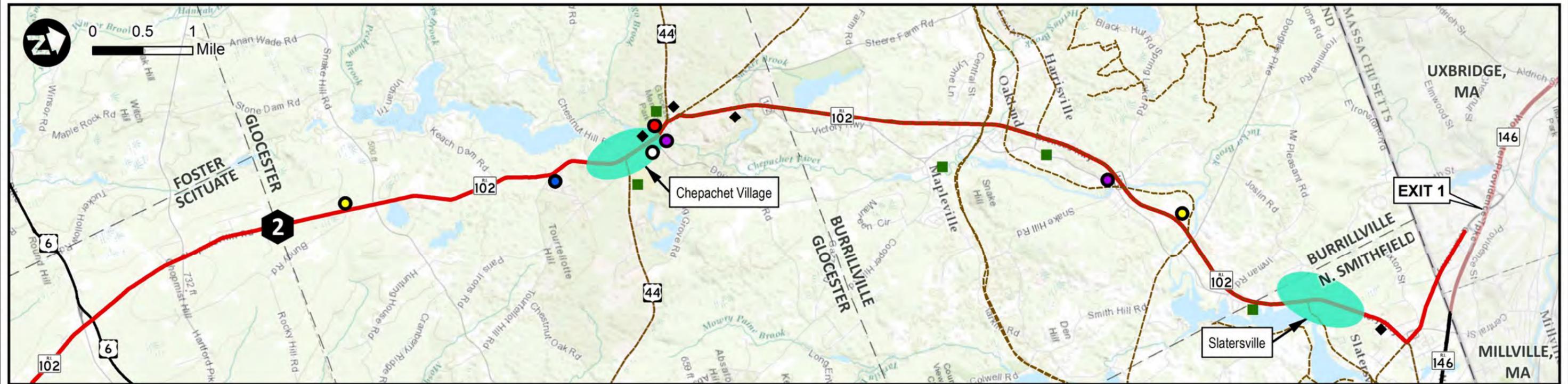
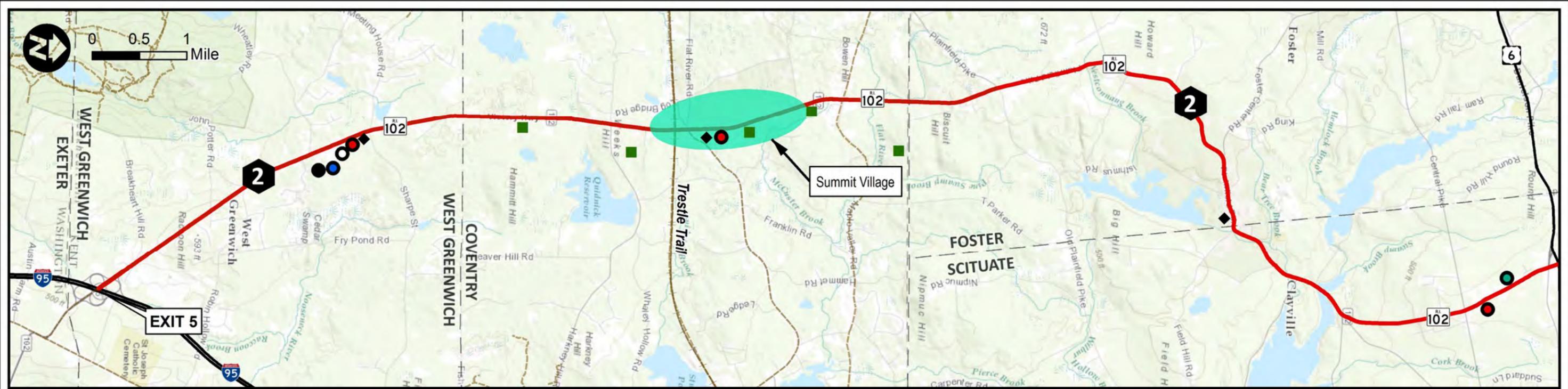
WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
RIDOT, RIGIS, ESRI,
National Register of Historic Places

POTENTIAL DIVERSION ROUTE 2

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-1



Prepared For:

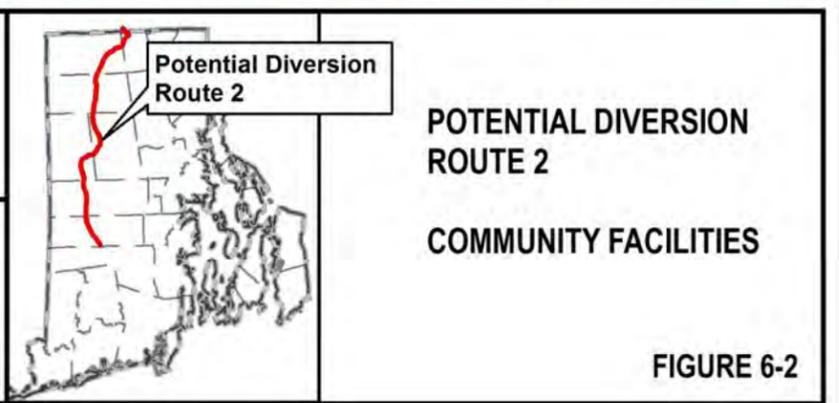
 Prepared By:

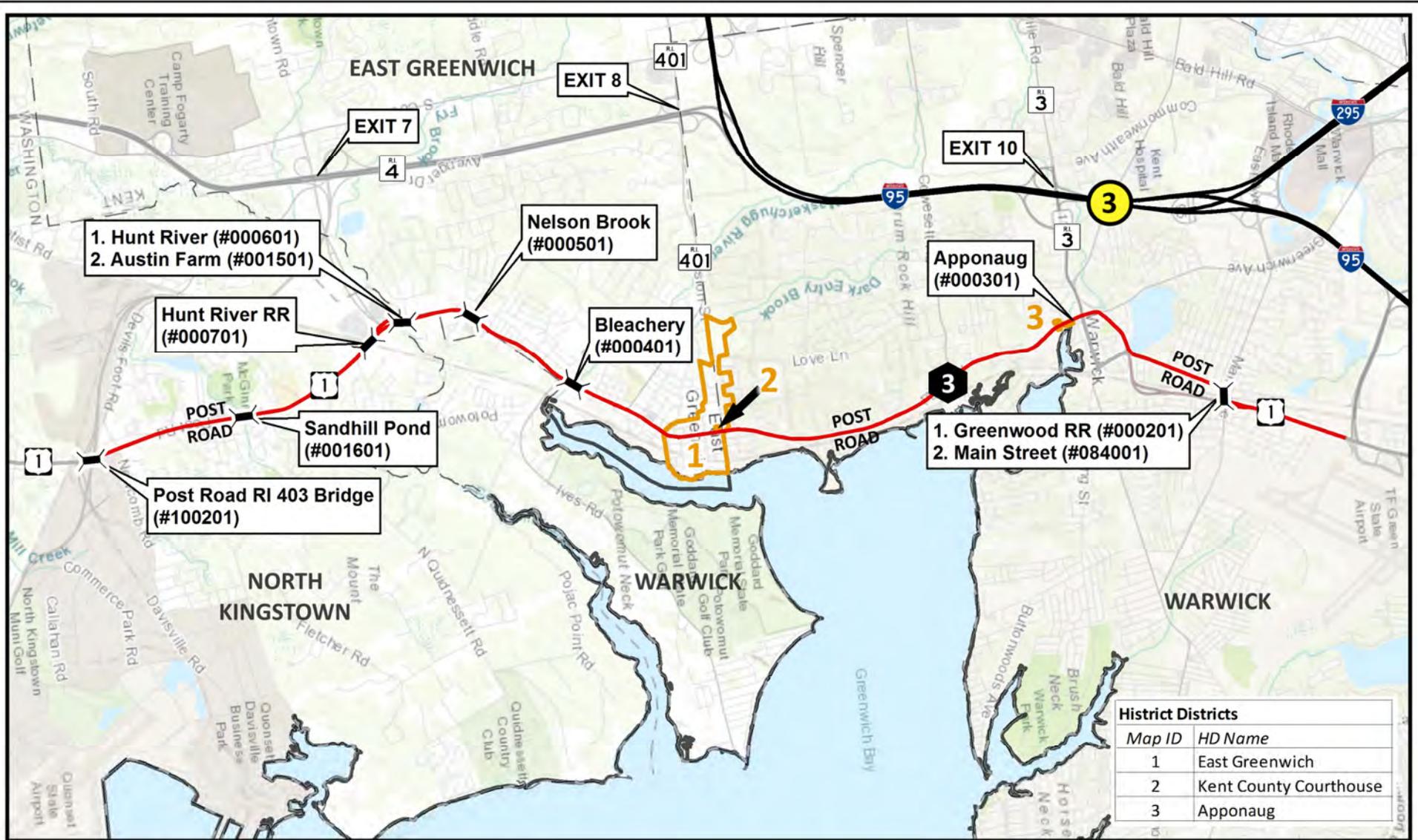

Legend	
● City or Town Hall	● School
● Health Care	■ Environmental Justice Areas
● Fire Station	■ Village District
● Law Enforcement	--- Bikeways and Trails
○ Library	⬢ Potential Diversion Routes
■ Park/Recreation	⬢ Routes with Toll Locations
◆ Place of Worship	
● Post Office	

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Notes:
 1. The only facilities shown are located adjacent to - or near - the Potential Diversion Route
 2. No toll locations are located within the area shown on this figure.

Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI, Google





Prepared For:

Prepared By:

Legend

- Bridges on Diversion Route
- Routes with Toll Locations
- Potential Diversion Route
- National Register Historic District

Note: Historic features identified are within 25 feet of the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
RIDOT, RIGIS, National Register
of Historic Places, ESRI

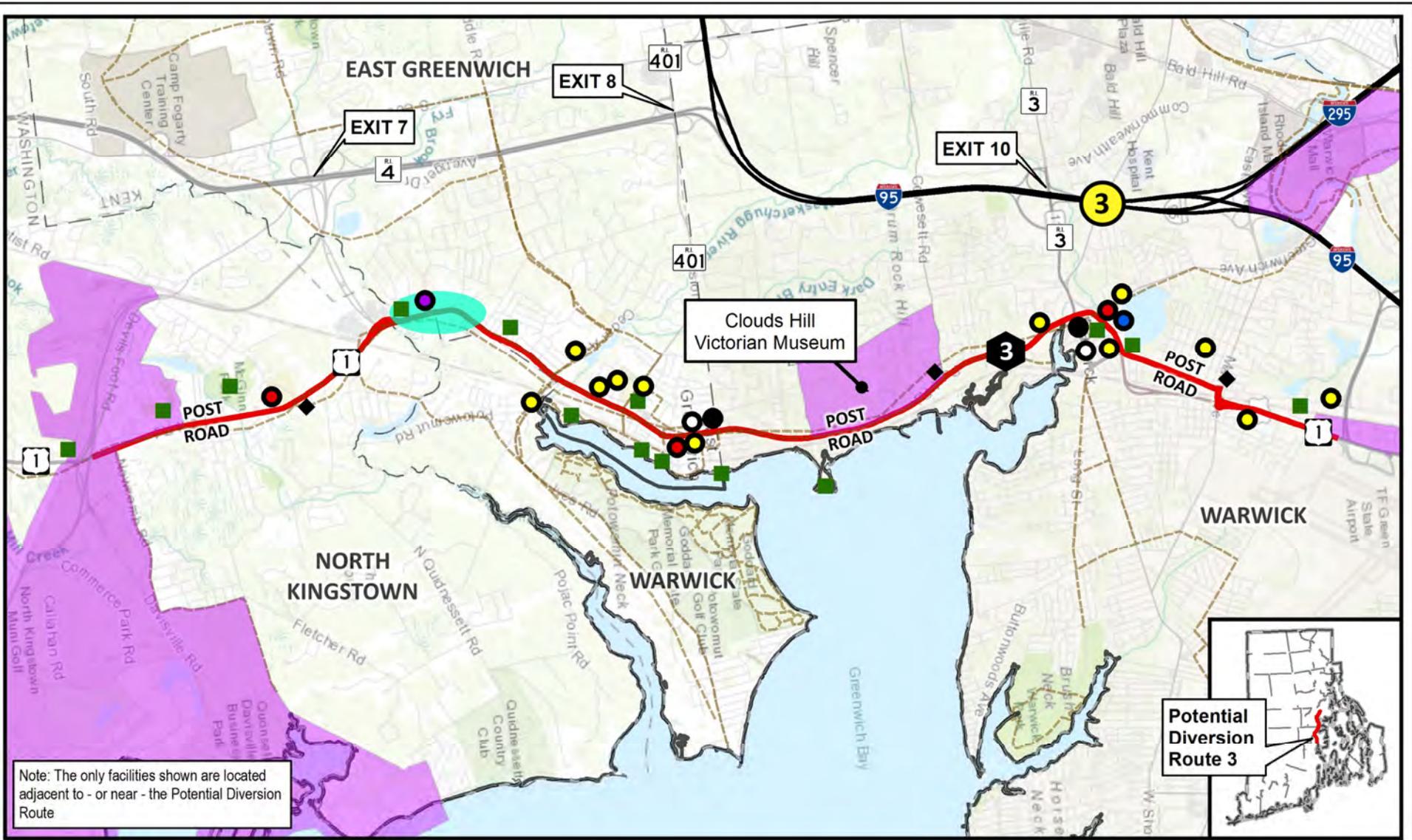
0 0.5 1
Mile



**POTENTIAL
DIVERSION
ROUTE 3**

**HISTORIC FEATURES
AND INFRASTRUCTURE**

FIGURE 6-3



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

Prepared For:



Prepared By:

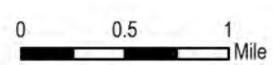


Legend

City or Town Hall	Post Office
Health Care	School
Fire Station	Environmental Justice Areas
Law Enforcement	Village District
Library	Bikeways and Trails
Park/Recreation	Potential Diversion Route
Place of Worship	Routes with Toll Locations

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

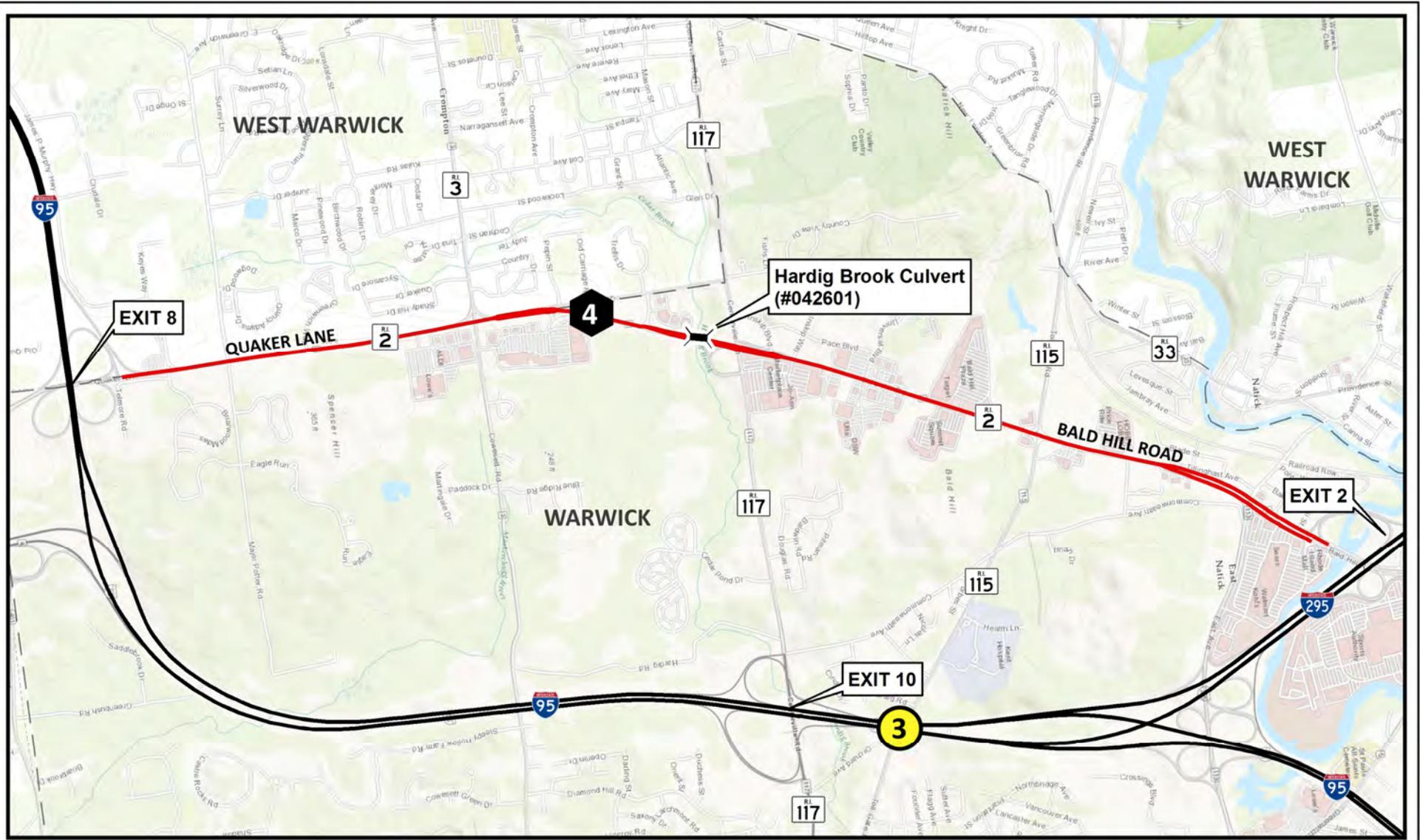
Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI,
 Google




POTENTIAL DIVERSION ROUTE 3

COMMUNITY FACILITIES

FIGURE 6-4



Prepared For:

 Prepared By:


Legend

-  Bridges on Diversion Route
-  Potential Diversion Route
-  Routes with Toll Locations

Note: No historic features were identified adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDOT, RIGIS, National Register of Historic Places, ESRI

0 0.25 0.5
 Mile

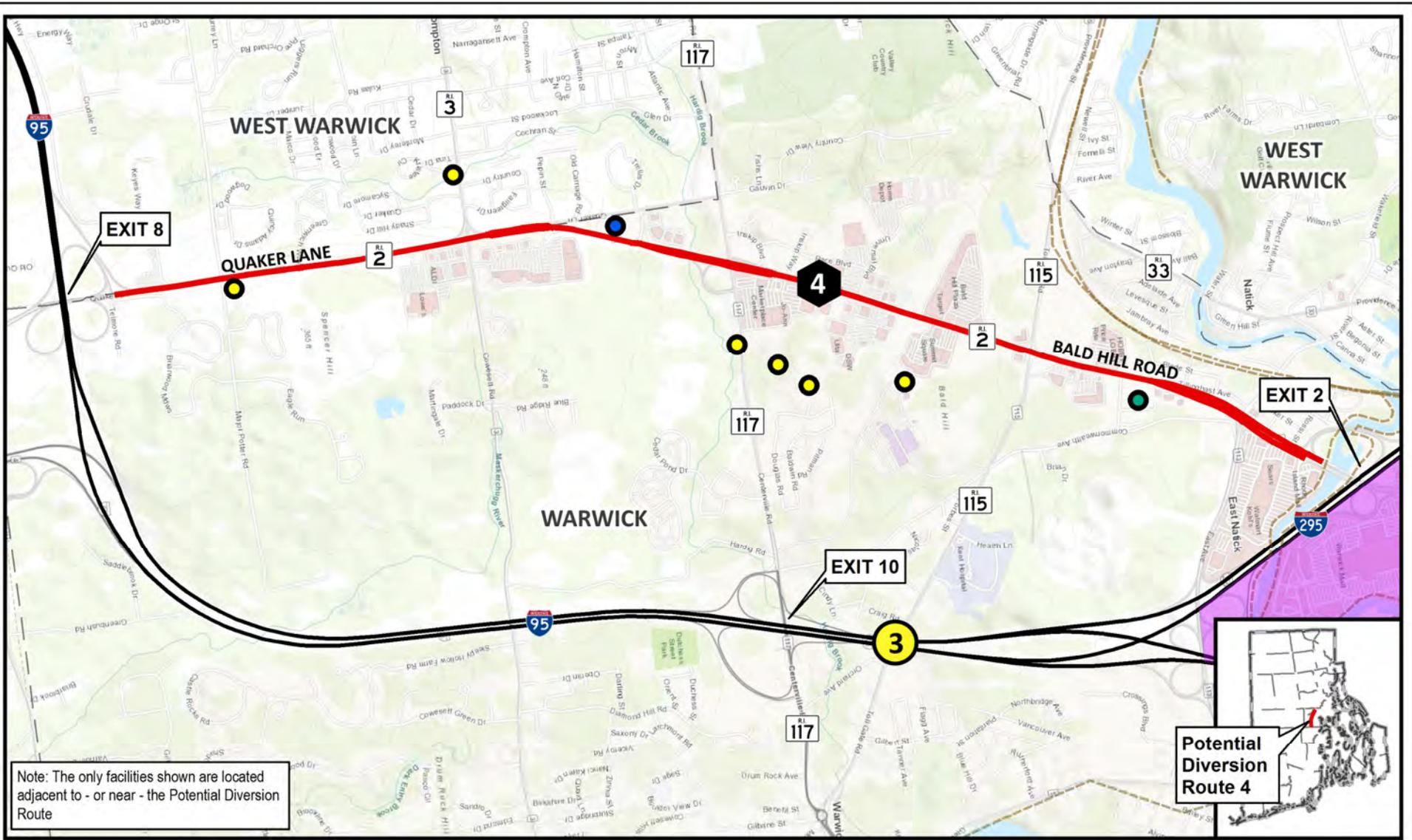




POTENTIAL DIVERSION ROUTE 4

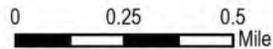
HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-5

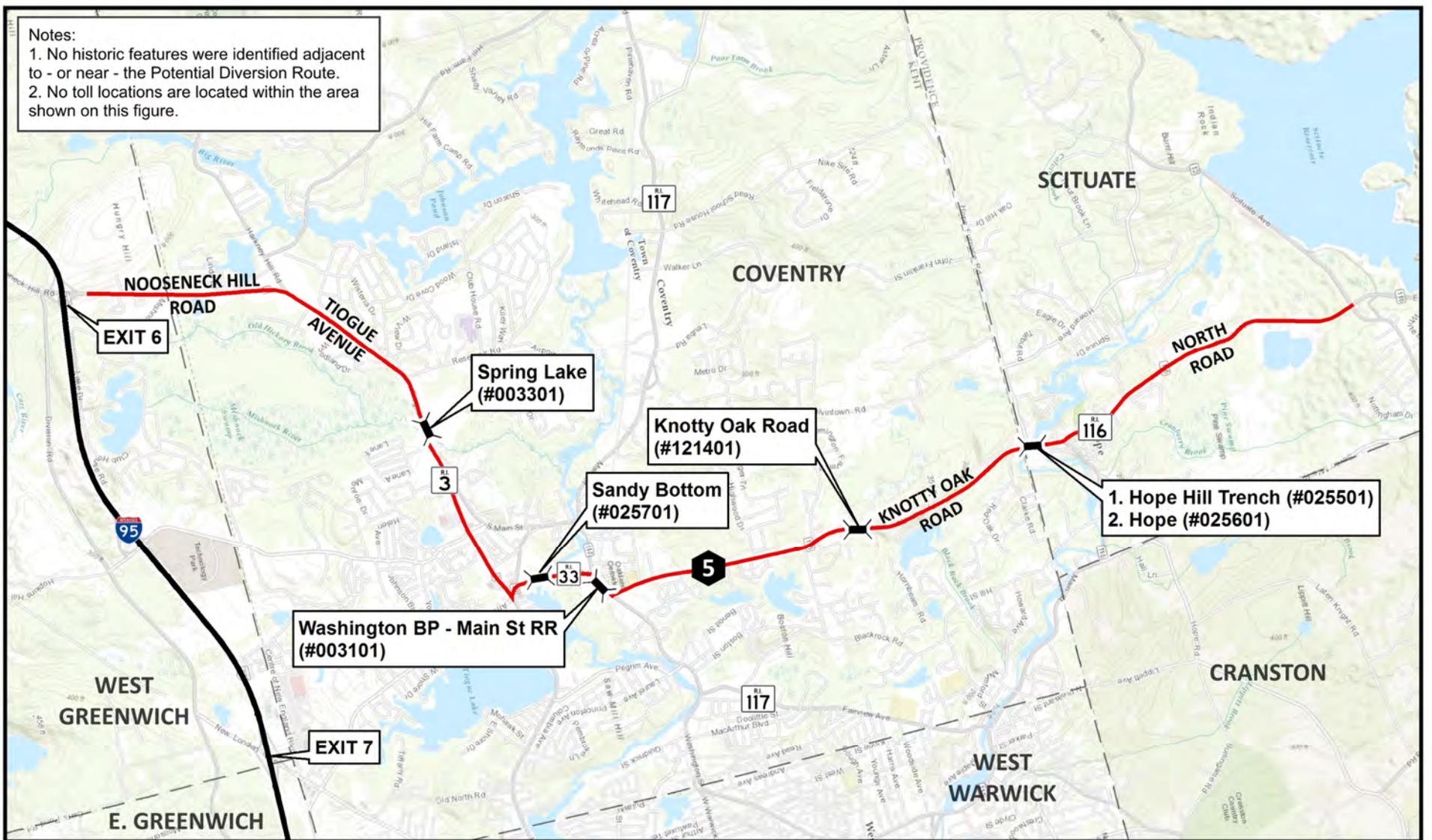


Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

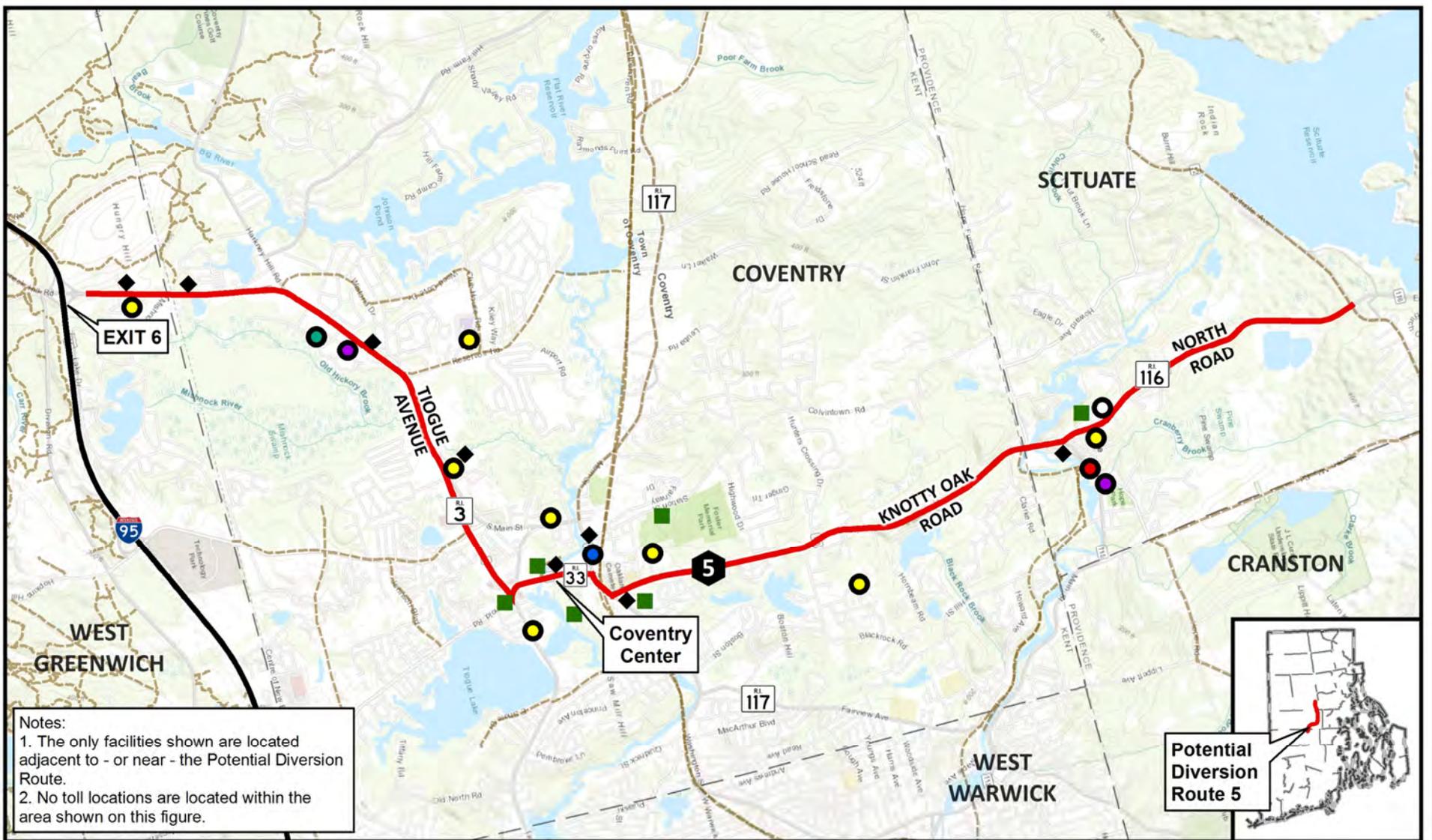


<p>Prepared For:</p>  <p>Prepared By:</p> 	<p>Legend</p> <ul style="list-style-type: none"> City or Town Hall Health Care Fire Station Law Enforcement Library Park/Recreation Place of Worship Post Office School Environmental Justice Areas Bikeways and Trails Routes with Toll Locations Potential Diversion Route 	<p style="text-align: center;">TOLL LOCATIONS 3, 4 & 6-13 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p> <p>Data Sources: RIDEM, RIDOT, RIGIS, ESRI, Google</p> <div style="text-align: right;">   </div>	<p style="text-align: center;">POTENTIAL DIVERSION ROUTE 4</p> <p style="text-align: center;">COMMUNITY FACILITIES</p> <p style="text-align: center;">FIGURE 6-6</p>
--	---	---	---

Notes:
 1. No historic features were identified adjacent to - or near - the Potential Diversion Route.
 2. No toll locations are located within the area shown on this figure.



<p>Prepared For:</p>  <p>Prepared By:</p> 	<p>Legend</p> <ul style="list-style-type: none">  Bridges on Diversion Route  Potential Diversion Route  Routes with Toll Locations 	<p align="center">TOLL LOCATIONS 3, 4 & 6-13</p> <p align="center">WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p> <p>Data Sources: RIDOT, RIGIS, National Register of Historic Places, ESRI</p> <p align="center">0 0.5 1 Mile</p> 	 <p align="center">Potential Diversion Route 5</p>	<p align="center">POTENTIAL DIVERSION ROUTE 5</p> <p align="center">HISTORIC FEATURES AND INFRASTRUCTURE</p> <p align="right">FIGURE 6-7</p>
--	--	---	--	---



Notes:
 1. The only facilities shown are located adjacent to - or near - the Potential Diversion Route.
 2. No toll locations are located within the area shown on this figure.

Prepared For:

 Prepared By:


Legend

	City or Town Hall		Post Office
	Health Care		School
	Fire Station		Environmental Justice Areas
	Law Enforcement		Bikeways and Trails
	Library		Potential Diversion Route
	Park/Recreation		Routes with Toll Locations
	Place of Worship		

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI,
 Google

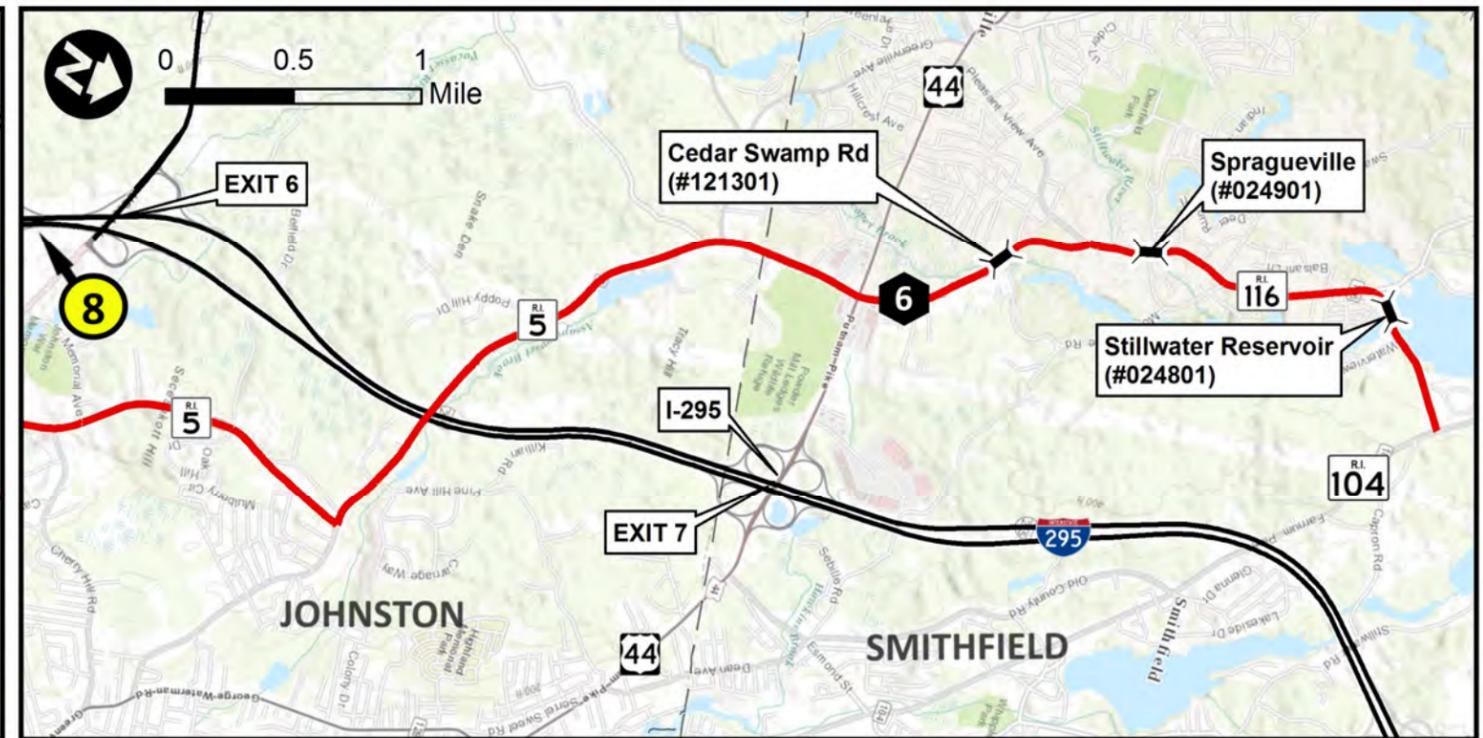
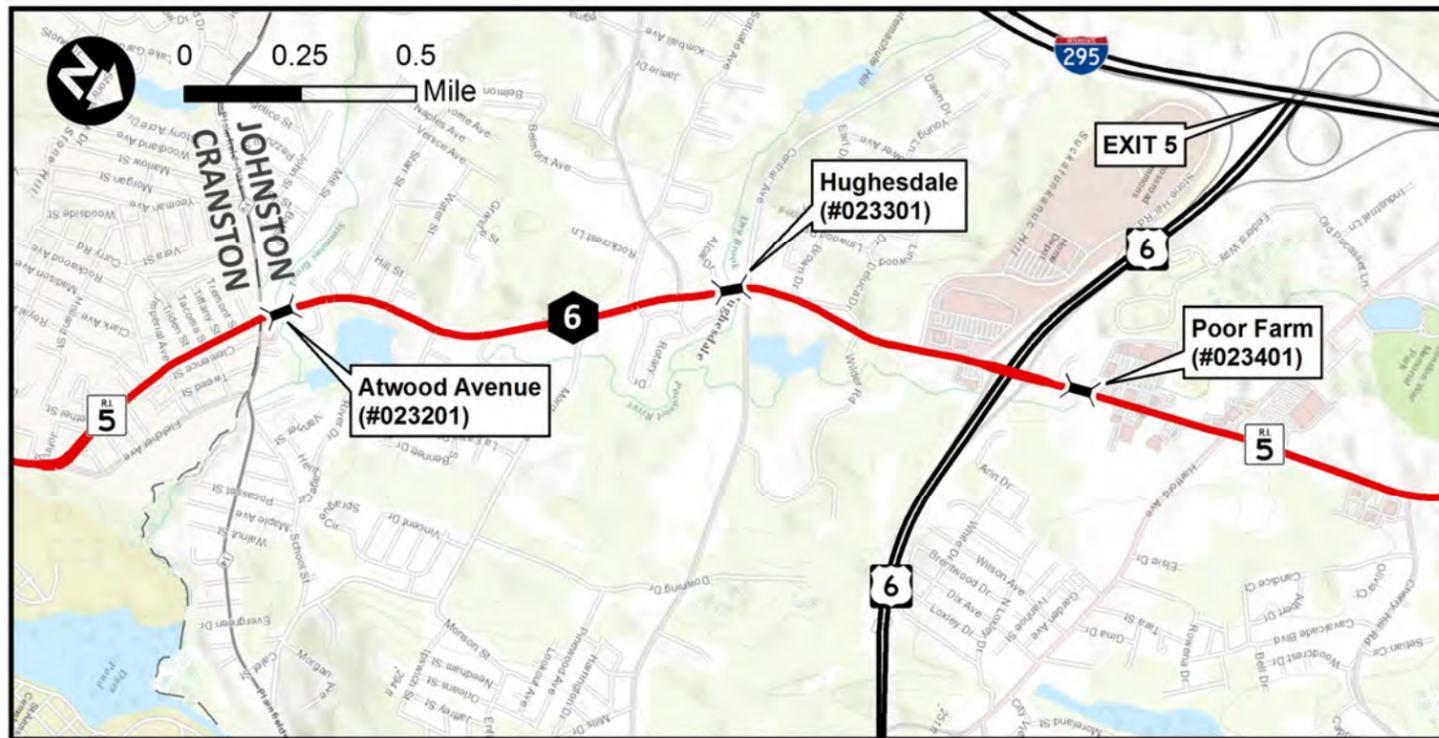
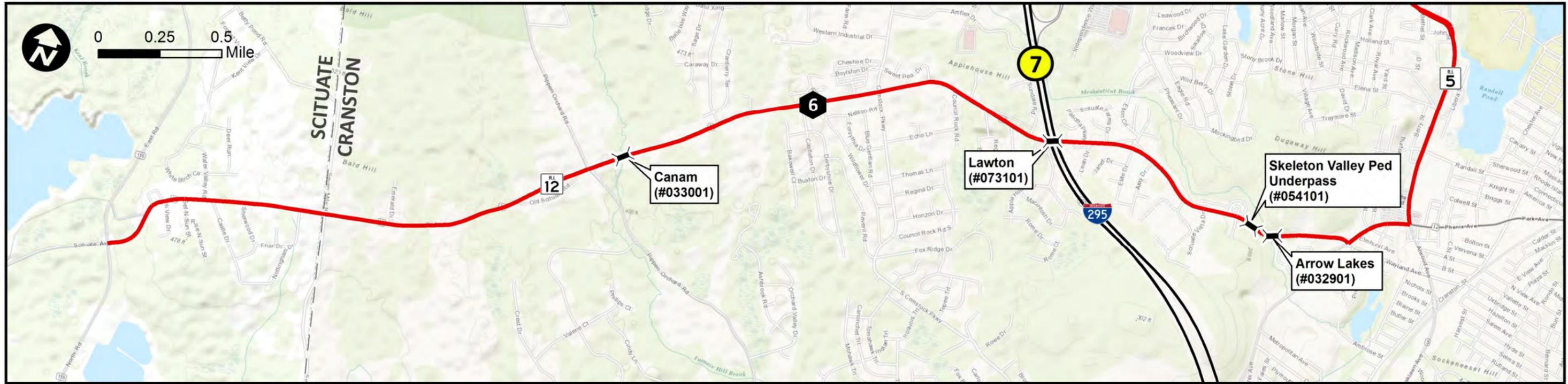
0 0.5 1 Mile



POTENTIAL DIVERSION ROUTE 5

COMMUNITY FACILITIES

FIGURE 6-8



Prepared For:

 Prepared By:


Legend

-  Bridges on Diversion Route
-  Potential Diversion Route
-  Routes with Toll Locations

Note: No historic features were identified adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

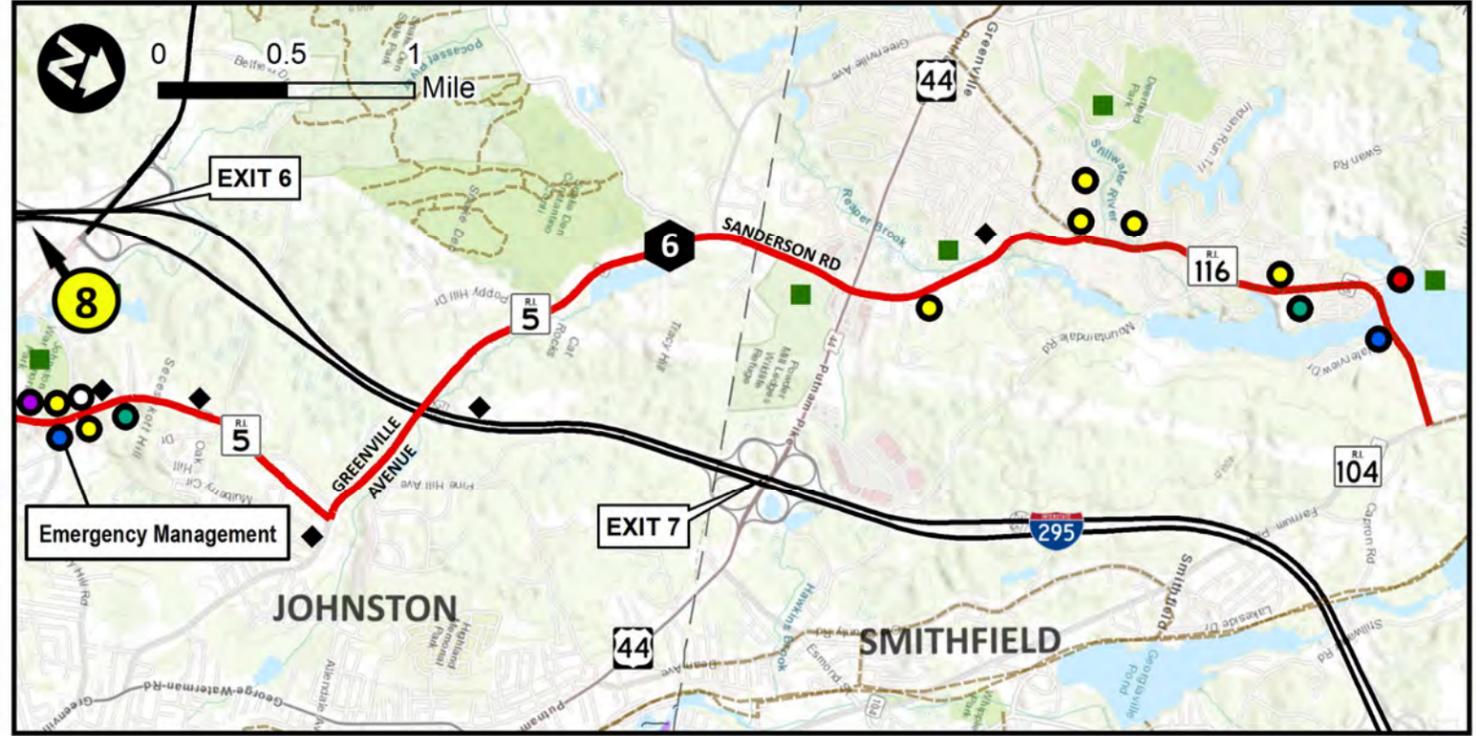
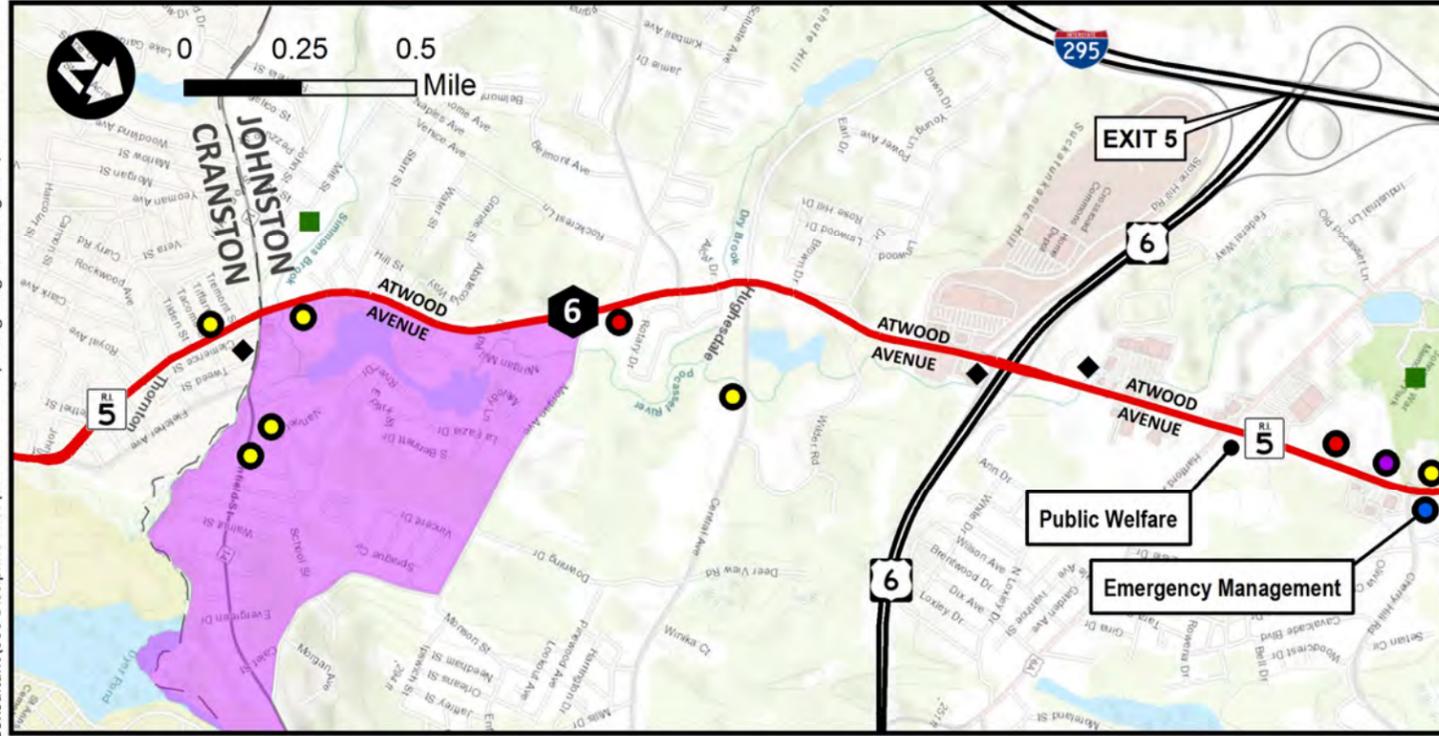
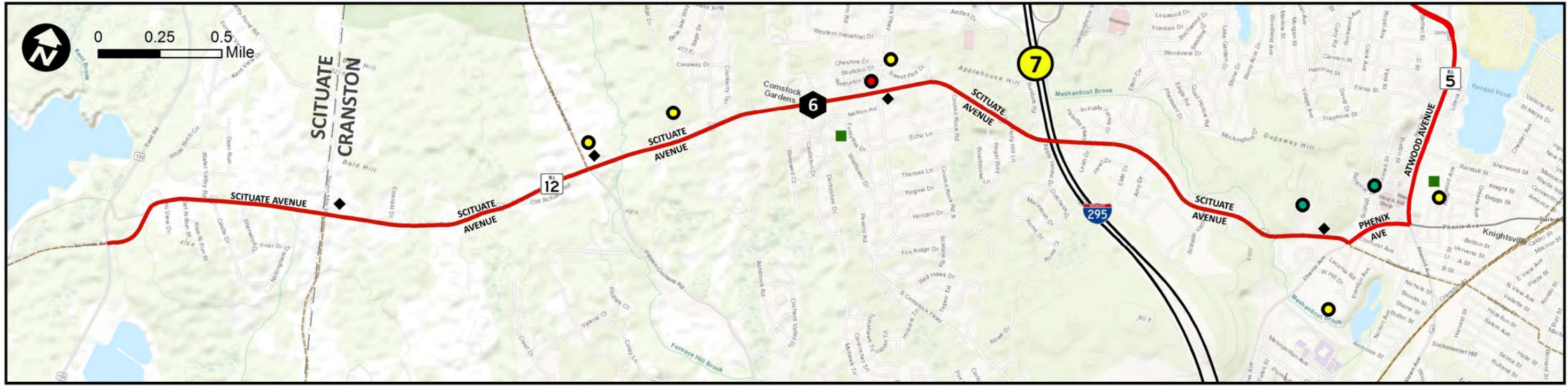
Data Sources:
 RIDOT, RIGIS, ESRI



POTENTIAL DIVERSION ROUTE 6

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-9



Prepared For:

 Driven to get you there

Prepared By:


Legend

	City or Town Hall		Post Office
	Health Care		School
	Fire Station		Environmental Justice Areas
	Law Enforcement		Bikeways and Trails
	Library		Potential Diversion Route
	Park/Recreation		Routes with Toll Locations
	Place of Worship		

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

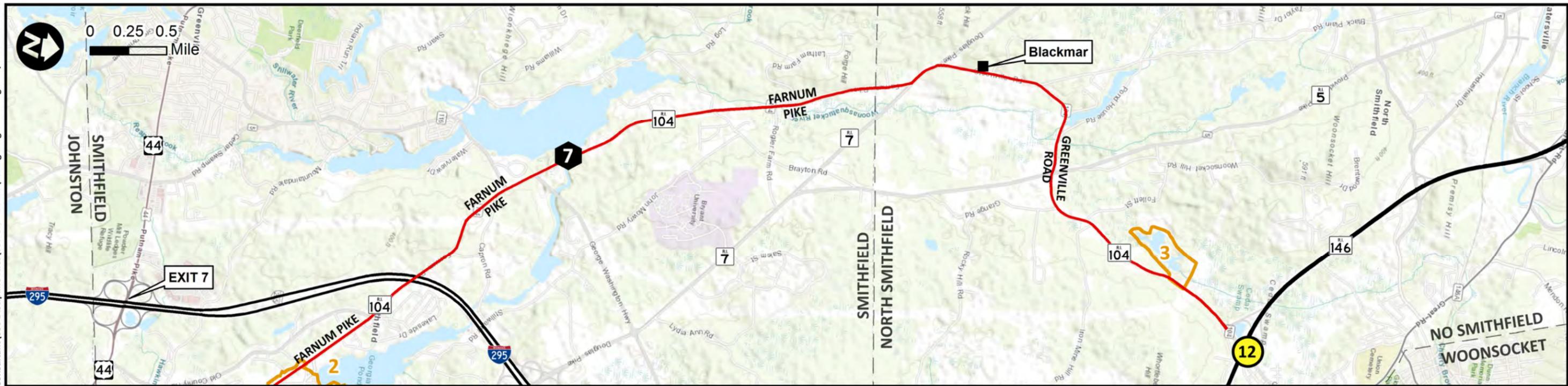
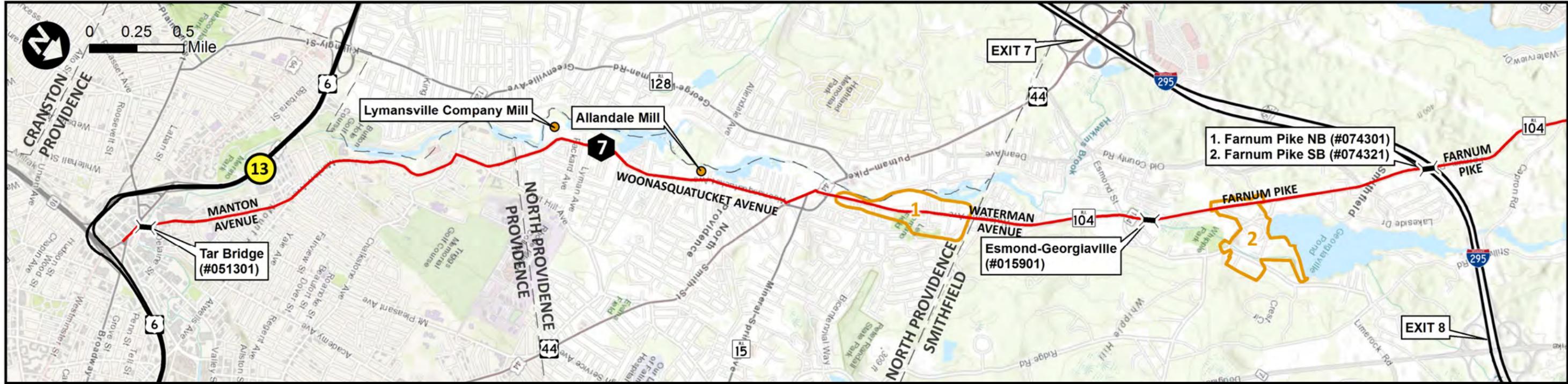
Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI, Google



**POTENTIAL DIVERSION
 ROUTE 6**

COMMUNITY FACILITIES

FIGURE 6-10



P:\RIDOT\2016\WFTX19300 - RIDOT Tolling Facilities Consultant\600 Discipline Files\607 GIS - Enviro\Tolling Program EA Figures\Diversion Routes

Prepared For:



Prepared By:
JACOBS

Legend

- Bridges on Diversion Route
- Historic Cemeteries
- Potential Diversion Route
- Routes with Toll Locations
- National Register Historic Districts

Note: The only historic features shown are located adjacent to - or near - the Potential Diversion Route.

Histrict Districts

Map ID	HD Name
1	Greystone
2	Georgiaville
3	Todd Farm

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

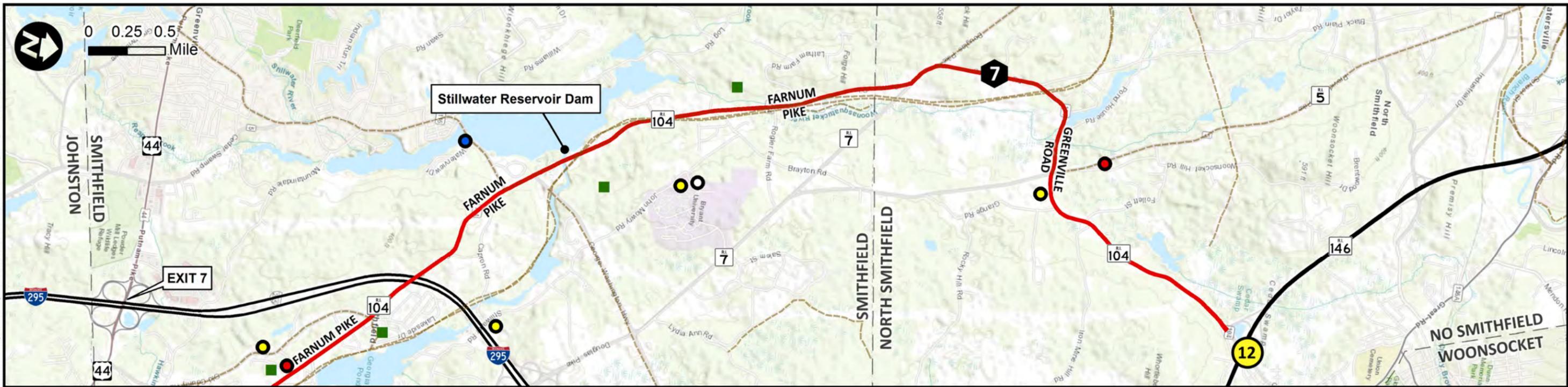
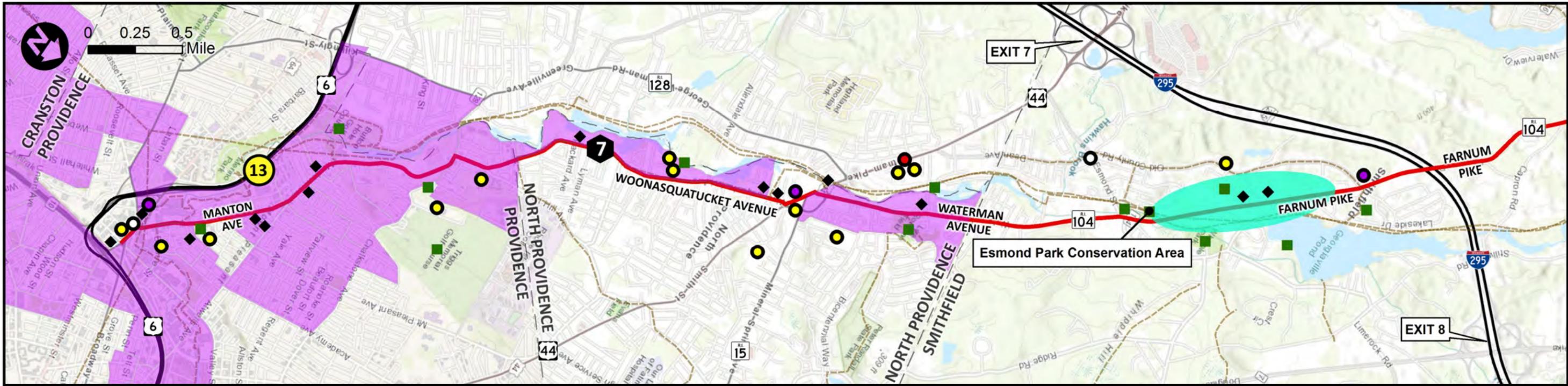
Data Sources:
RIDOT, RIGIS, ESRI, Town of North Providence
National Register of Historic Places



POTENTIAL DIVERSION ROUTE 7

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-11



P:\RIDOT\2016\WTVT9300 - RIDOT Tolling Facilities Consultant\600 Discipline Files\607 GIS - Enviro\Tolling Program EA Figures\Diversion Routes

Prepared For:



Prepared By:
JACOBS

Legend

- City or Town Hall
- Health Care
- Fire Station
- Law Enforcement
- Library
- Park/Recreation
- ◆ Place of Worship
- Post Office
- School
- Environmental Justice Areas
- Village District
- Bikeways and Trails
- #— Potential Diversion Route
- #— Routes with Toll Locations

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

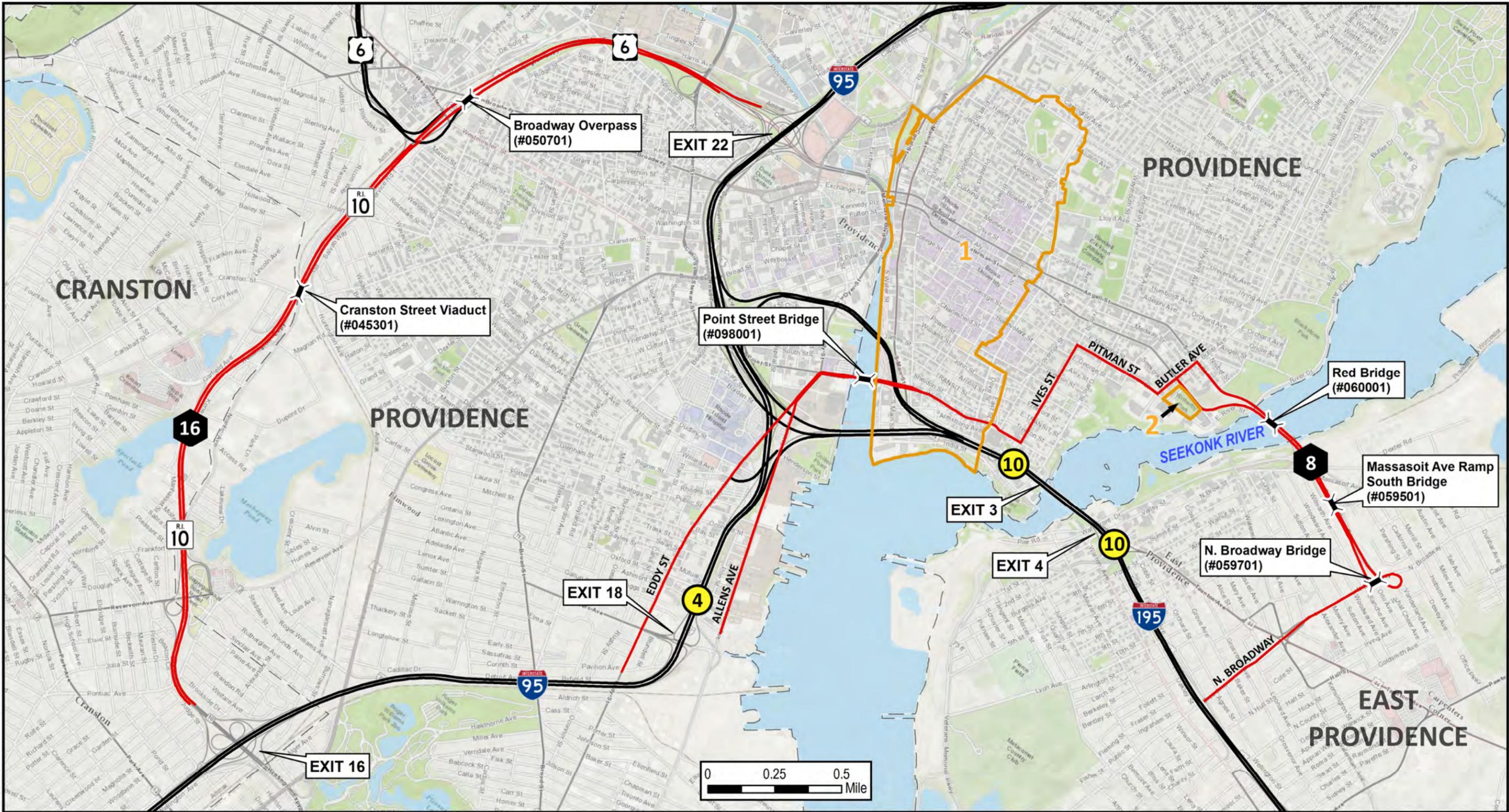
Data Sources:
RIDEM, RIDOT, RIGIS, ESRI, Google



**POTENTIAL DIVERSION
ROUTE 7**

COMMUNITY FACILITIES

FIGURE 6-12



Prepared For:



Prepared By:



Legend

-  Bridges on Diversion Routes
-  National Register Historic Districts
-  Potential Diversion Routes
-  Routes with Toll Locations

Historic Districts	
Map ID	HP Name
1	College Hill
2	Constance Witherby

Note: The only historic features shown are located adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

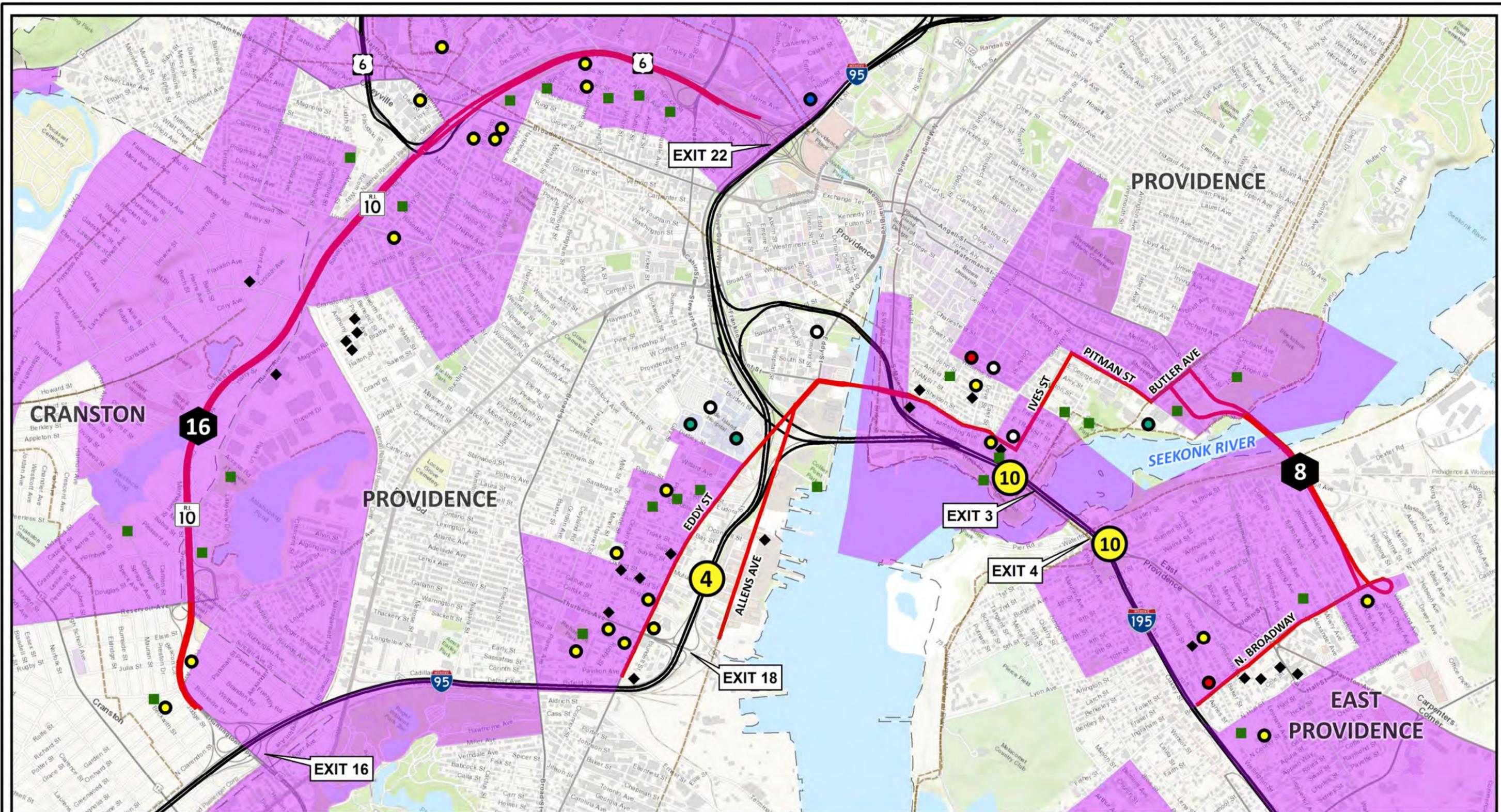
Data Sources: RIDOT, RIGIS, National Register of Historic Places, ESRI




POTENTIAL DIVERSION ROUTES 8 & 16

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-13



Prepared For:

 Prepared By:


Legend					
	City or Town Hall		Park/Recreation		Bikeways and Trails
	Health Care		Place of Worship		Potential Diversion Routes
	Fire Station		Post Office		Routes with Toll Locations
	Law Enforcement		School		
	Library		Environmental Justice Areas		

TOLL LOCATIONS
 I-95, I-195, 1-295, US RTE 6, RI RTE 146

Notes: The only facilities shown are located adjacent to - or near - the Potential Diversion Route.

Data Sources: RIDEM, RIDOT, RIGIS, ESRI, Google

0 0.25 0.5 Mile




POTENTIAL DIVERSION ROUTES 8 & 16

COMMUNITY FACILITIES

FIGURE 6-14



Prepared For:



Prepared By:



Legend

-  Bridges on Diversion Route
-  Potential Diversion Route
-  Routes with Toll Locations

Note: No historic features were identified adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

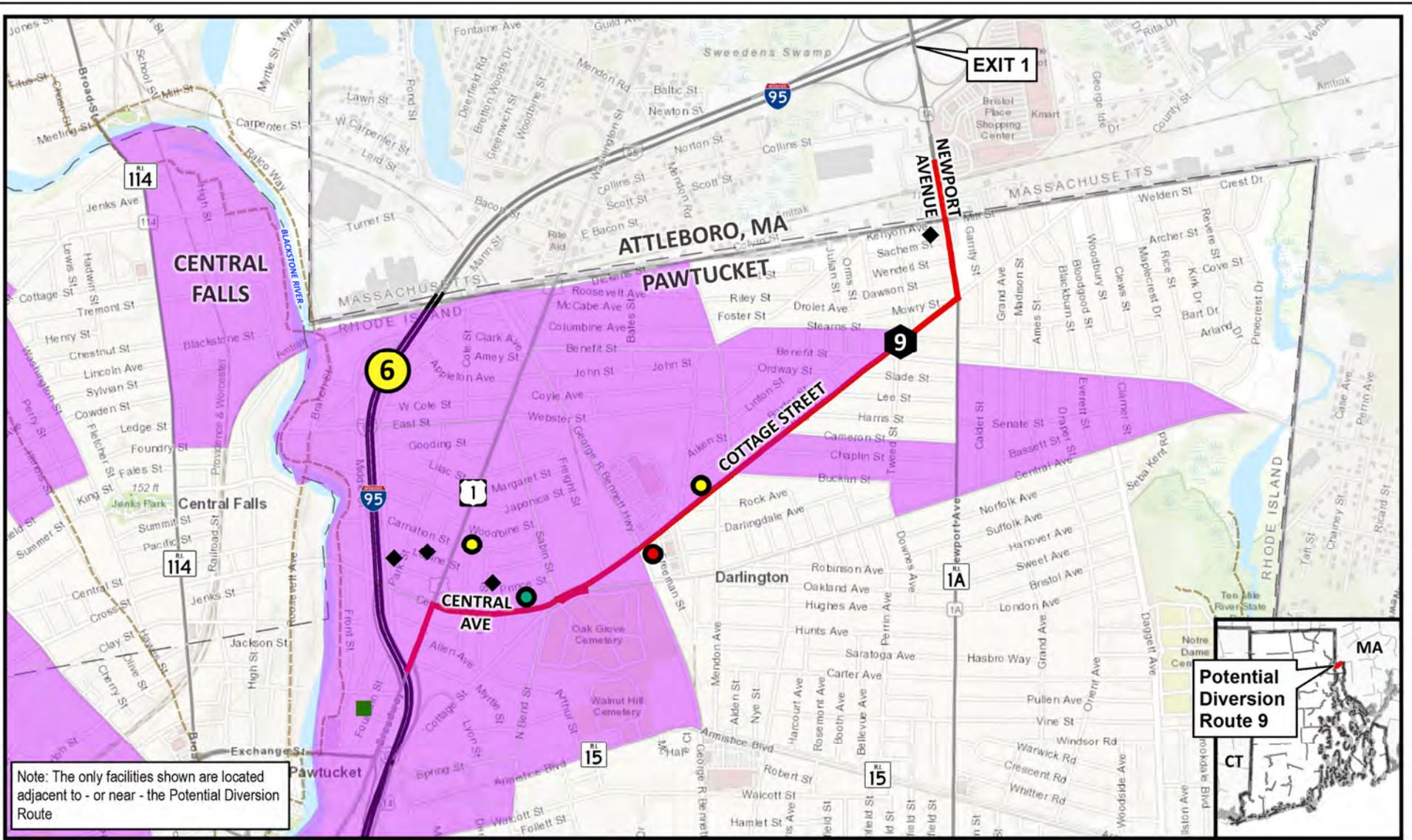
Data Sources:
MassGIS, RIGIS, RIGIS, ESRI,
National Register of Historic Places




POTENTIAL DIVERSION ROUTE 9

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-15



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

Prepared For:



Prepared By:



Legend

	City or Town Hall		Post Office
	Health Care		School
	Fire Station		Environmental Justice Areas
	Law Enforcement		Bikeways and Trails
	Library		Potential Diversion Route
	Park/Recreation		Routes with Toll Locations
	Place of Worship		

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 MassGIS, RIDEM, RIDOT,
 RIGIS, ESRI, Google

0 0.25 0.5
 Mile



POTENTIAL DIVERSION ROUTE 9

COMMUNITY FACILITIES

FIGURE 6-16





Prepared For:



Prepared By:



Legend

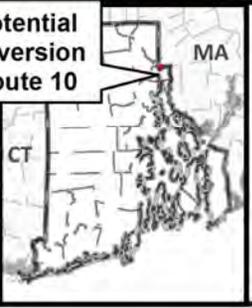
-  Bridges on Diversion Route
-  MHC Historic Inventory
-  Potential Diversion Route
-  Routes with Toll Locations
-  National Register Historic District

Note: No historic districts were identified adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

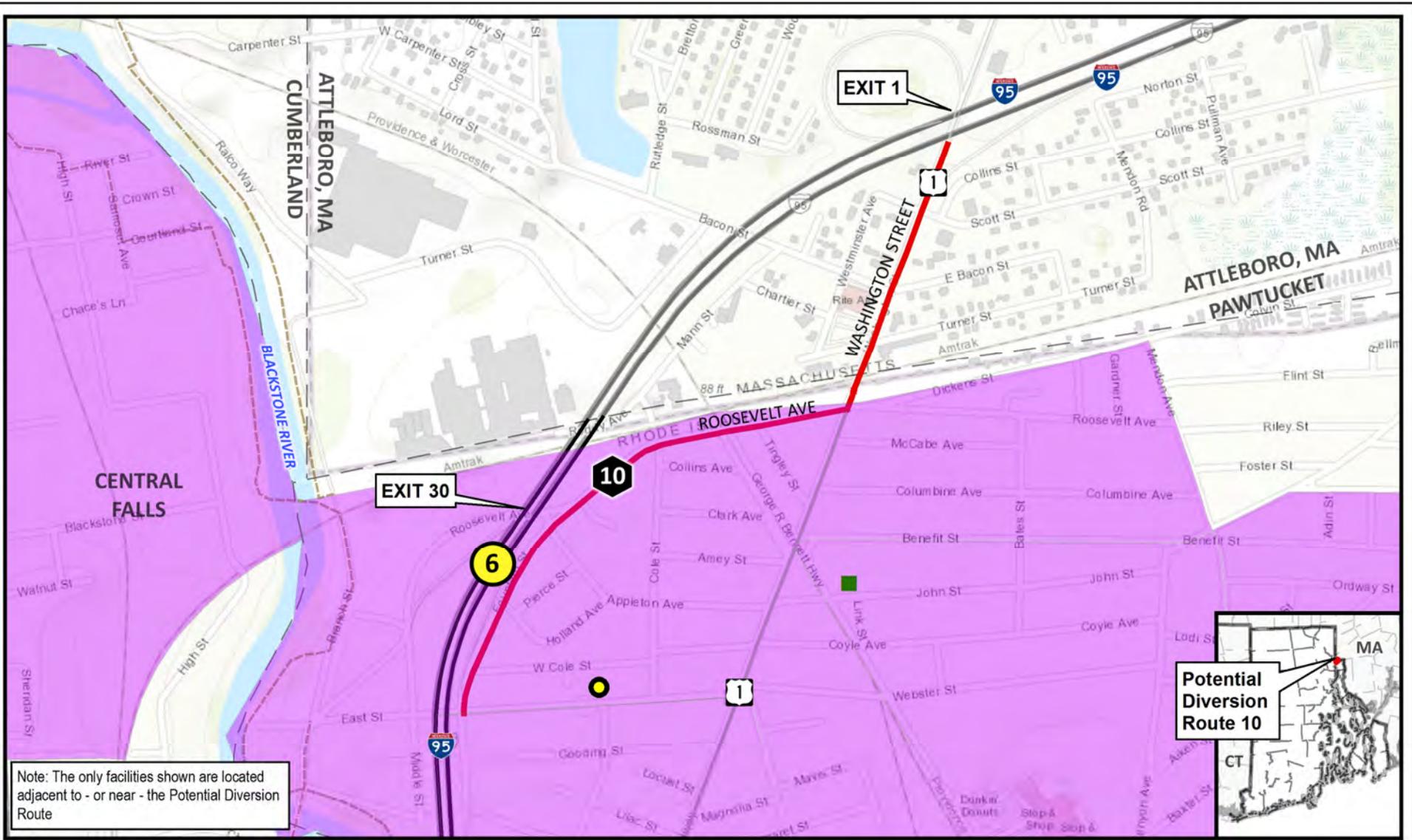
Data Sources:
MassGIS, RIGIS, RIGIS, ESRI,
National Register of Historic Places

POTENTIAL DIVERSION ROUTE 10

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-17



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

Prepared For:



Prepared By:

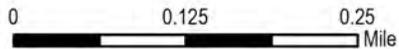


Legend			
	City or Town Hall		Post Office
	Health Care		School
	Fire Station		Environmental Justice Areas
	Law Enforcement		Bikeways and Trails
	Library		Potential Diversion Route
	Park/Recreation		Routes with Toll Locations
	Place of Worship		

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

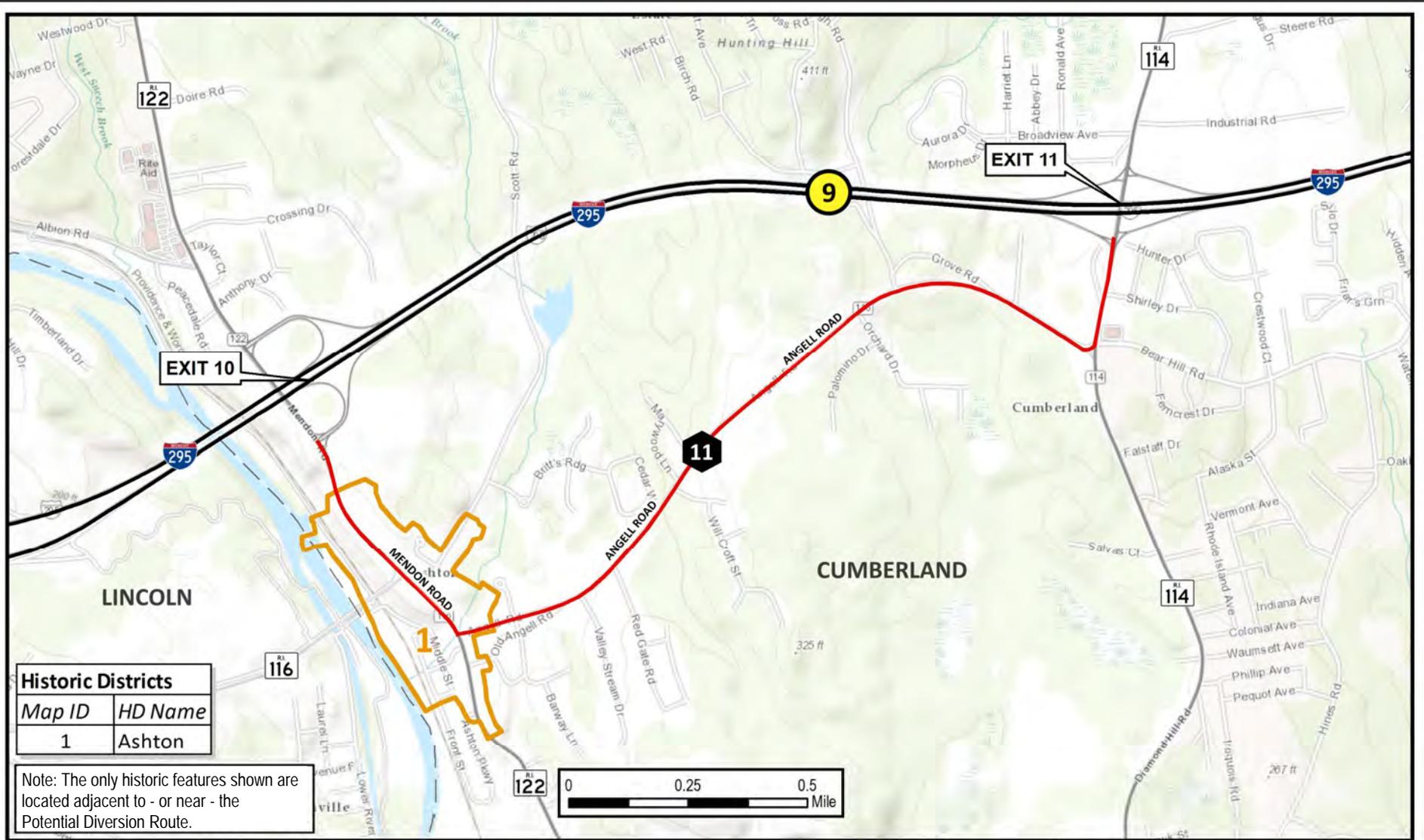
Data Sources:
MassGIS, RIDEM, RIDOT,
RIGIS, ESRI, Google




POTENTIAL DIVERSION ROUTE 10

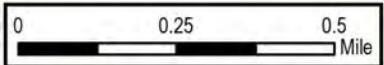
COMMUNITY FACILITIES

FIGURE 6-18



Historic Districts	
Map ID	HD Name
1	Ashton

Note: The only historic features shown are located adjacent to - or near - the Potential Diversion Route.



Prepared For:

Prepared By:

Legend

- Bridges on Diversion Route
- Potential Diversion Route
- Routes with Toll Locations
- National Register Historic District

Note: No bridges are located on this potential diversion route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

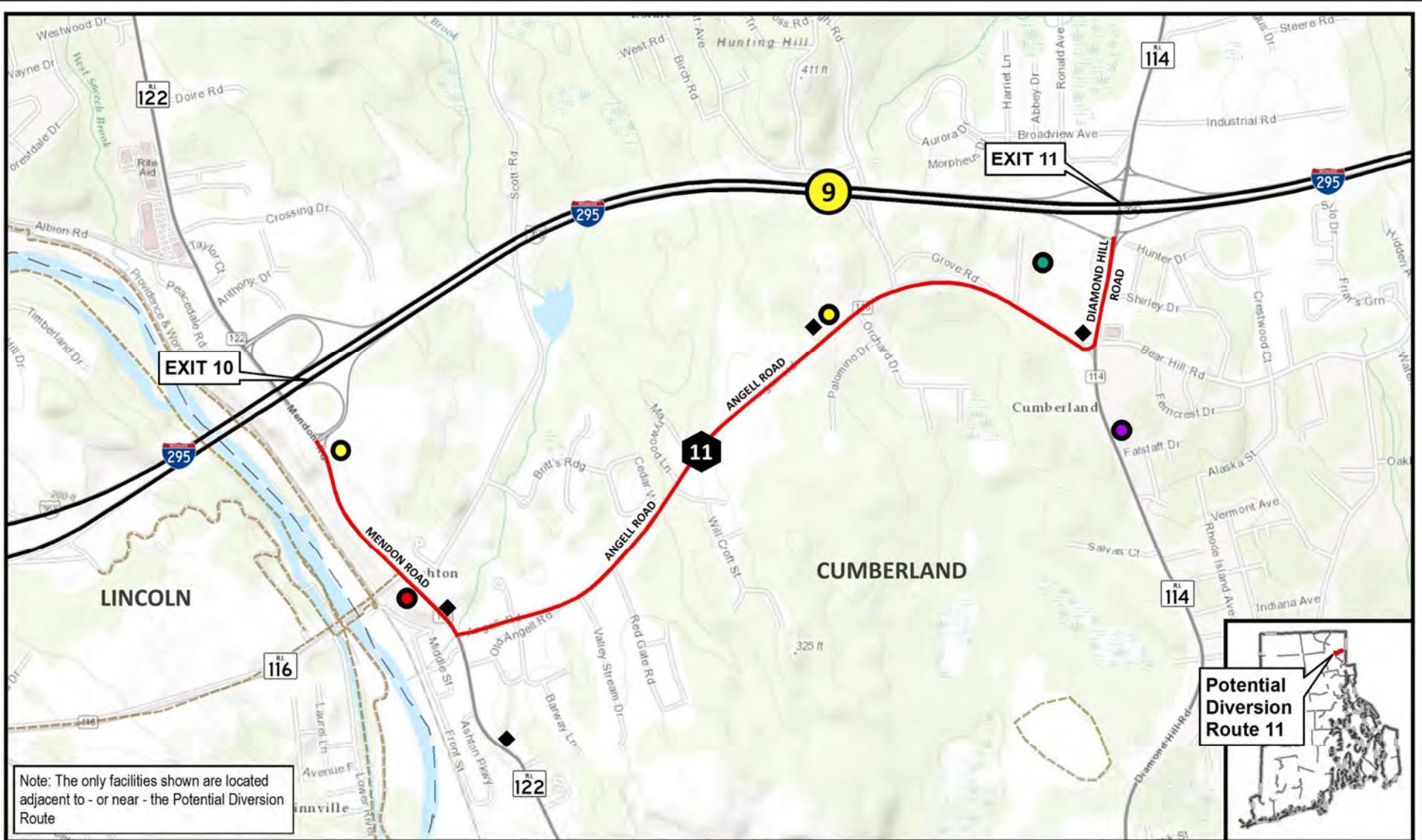
Data Sources:
 RIGIS, RIGIS, ESRI,
 National Register of Historic Places

Potential Diversion Route 11

POTENTIAL DIVERSION ROUTE 11

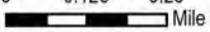
HISTORIC FEATURES AND INFRASTRUCTURE

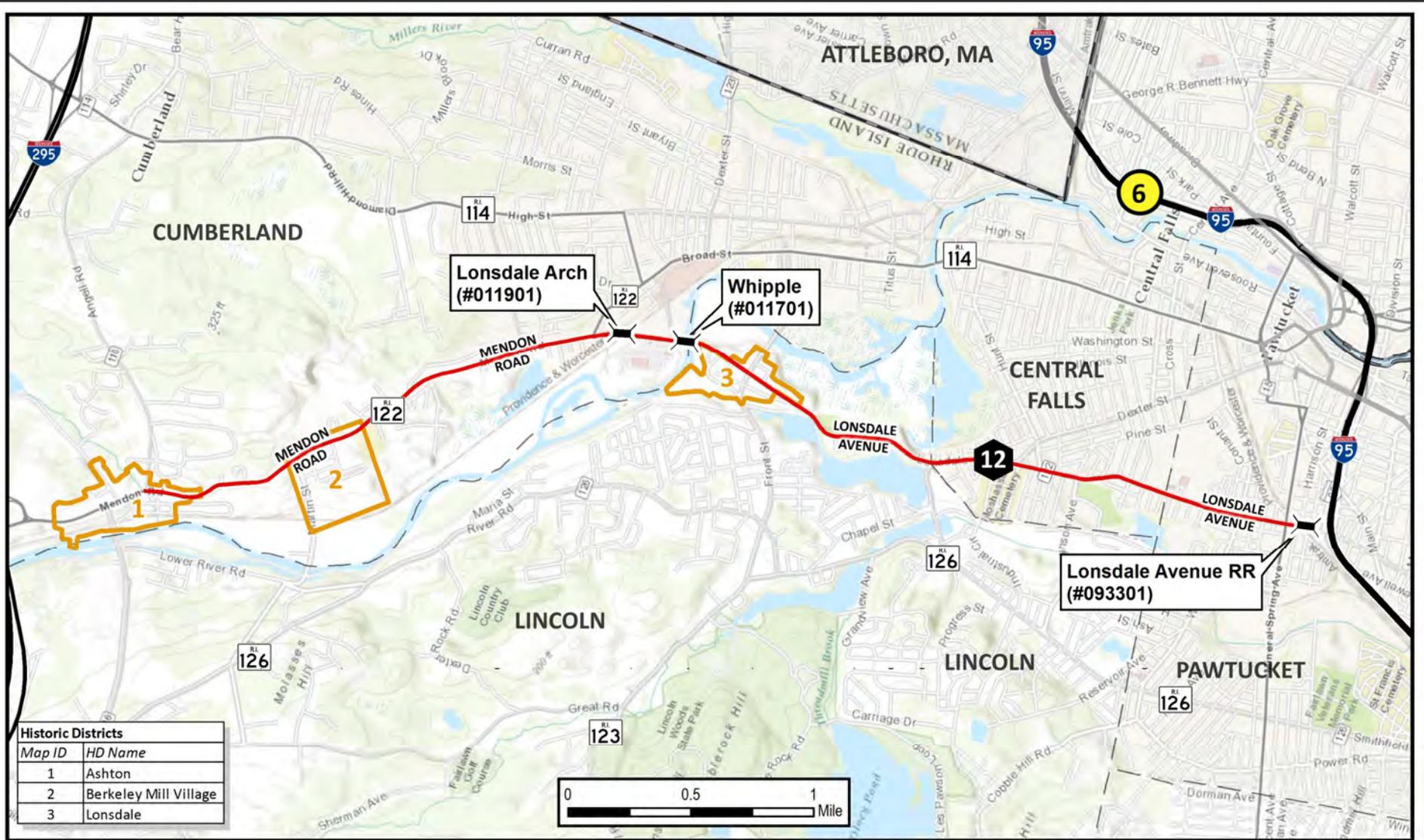
FIGURE 6-19



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route



<p>Prepared For:</p>  <p>Prepared By:</p> 	<p>Legend</p> <ul style="list-style-type: none"> City or Town Hall Health Care Fire Station Law Enforcement Library Park/Recreation Place of Worship Post Office School Environmental Justice Areas Bikeways and Trails Potential Diversion Route Routes with Toll Locations 	<p>TOLL LOCATIONS 3, 4 & 6-13 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p>	<p>POTENTIAL DIVERSION ROUTE 11</p> <p>COMMUNITY FACILITIES</p> <p>FIGURE 6-20</p>	
		<p>Data Sources: RIDEM, RIDOT, RIGIS, ESRI, Google</p>	<p>0 0.125 0.25 Mile</p> 	



Historic Districts	
Map ID	HD Name
1	Ashton
2	Berkeley Mill Village
3	Lonsdale

Prepared For:



Prepared By:



Legend

- Bridges on Diversion Route
- National Register Historic District
- Potential Diversion Route
- Routes with Toll Locations

Note: The only historic features shown are located adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 MassGIS, RIGIS, RIGIS, ESRI,
 National Register of Historic Places



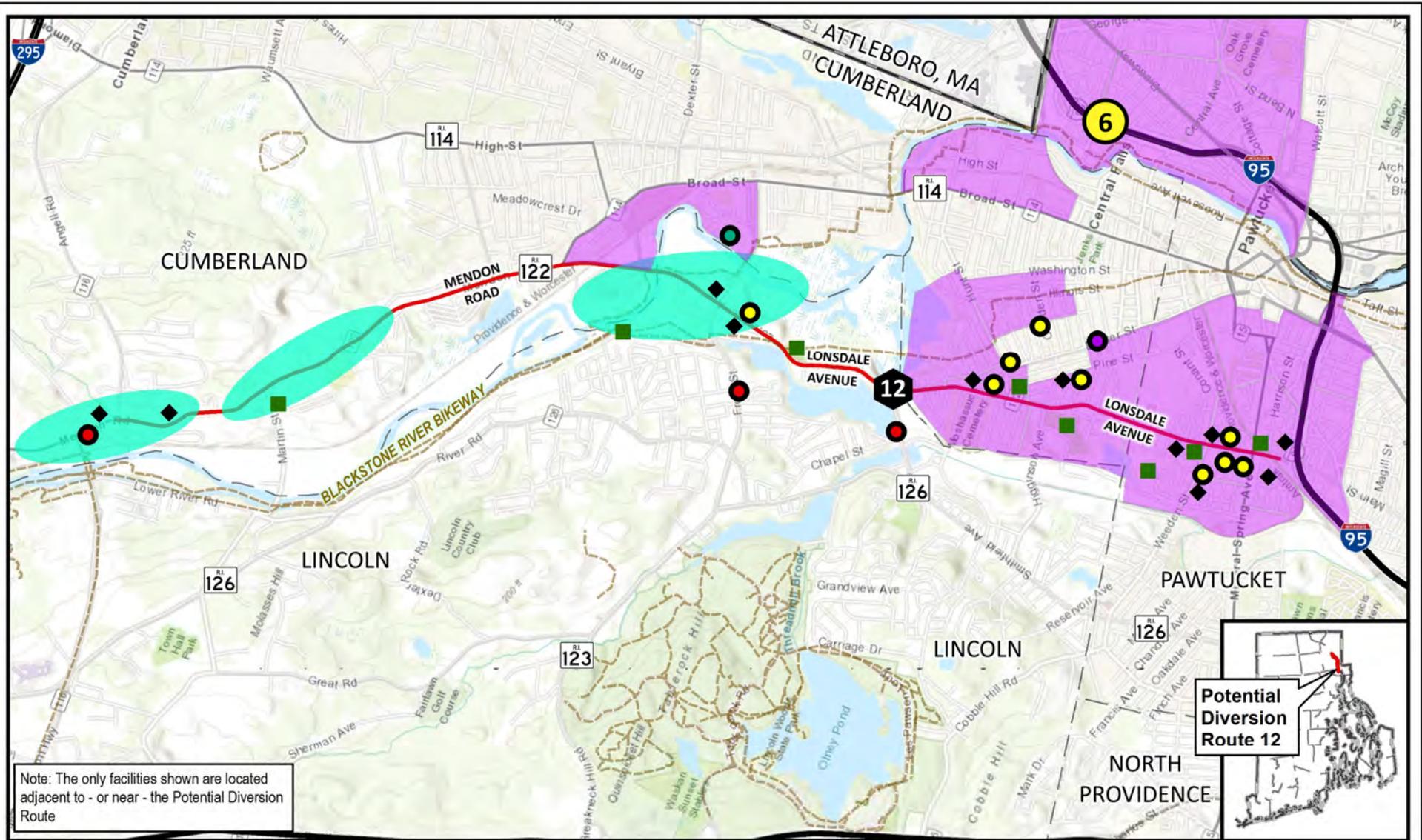
Potential Diversion Route 12



POTENTIAL DIVERSION ROUTE 12

HISTORIC FEATURES AND INFRASTRUCTURE

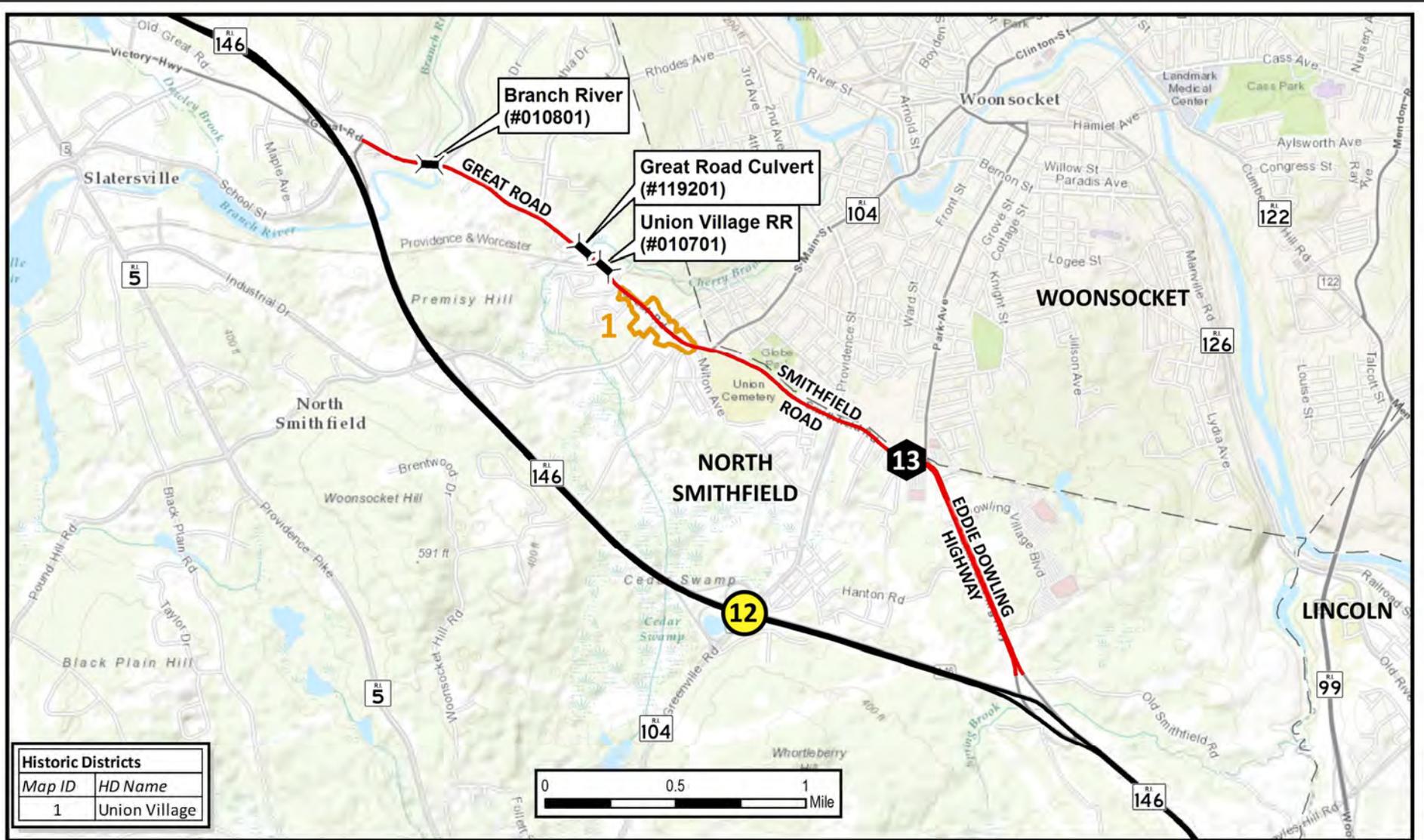
FIGURE 6-21



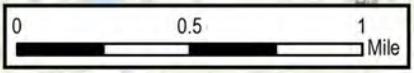
Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route



<p>Prepared For:</p>  <p>Prepared By:</p> 	<p>Legend</p> <ul style="list-style-type: none">  City or Town Hall  Health Care  Fire Station  Law Enforcement  Library  Park/Recreation  Place of Worship  Post Office  School  Environmental Justice Areas  Village District  Bikeways and Trails  Potential Diversion Route  Routes with Toll Locations 	<p style="text-align: center;">TOLL LOCATIONS 3, 4 & 6-13 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND</p> <p>Data Sources: MassGIS, RIDEM, RIDOT, RIGIS, ESRI, Google</p> <p style="text-align: center;">0 0.5 1 Mile</p> 	<p style="text-align: center;">POTENTIAL DIVERSION ROUTE 12</p> <p style="text-align: center;">COMMUNITY FACILITIES</p> <p style="text-align: right;">FIGURE 6-22</p>
--	--	---	---



Historic Districts	
Map ID	HD Name
1	Union Village



Prepared For:

Prepared By:

Legend

- Bridges on Diversion Route
- National Register Historic District
- Potential Diversion Route
- Routes with Toll Locations

Note: The only historic features shown are adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

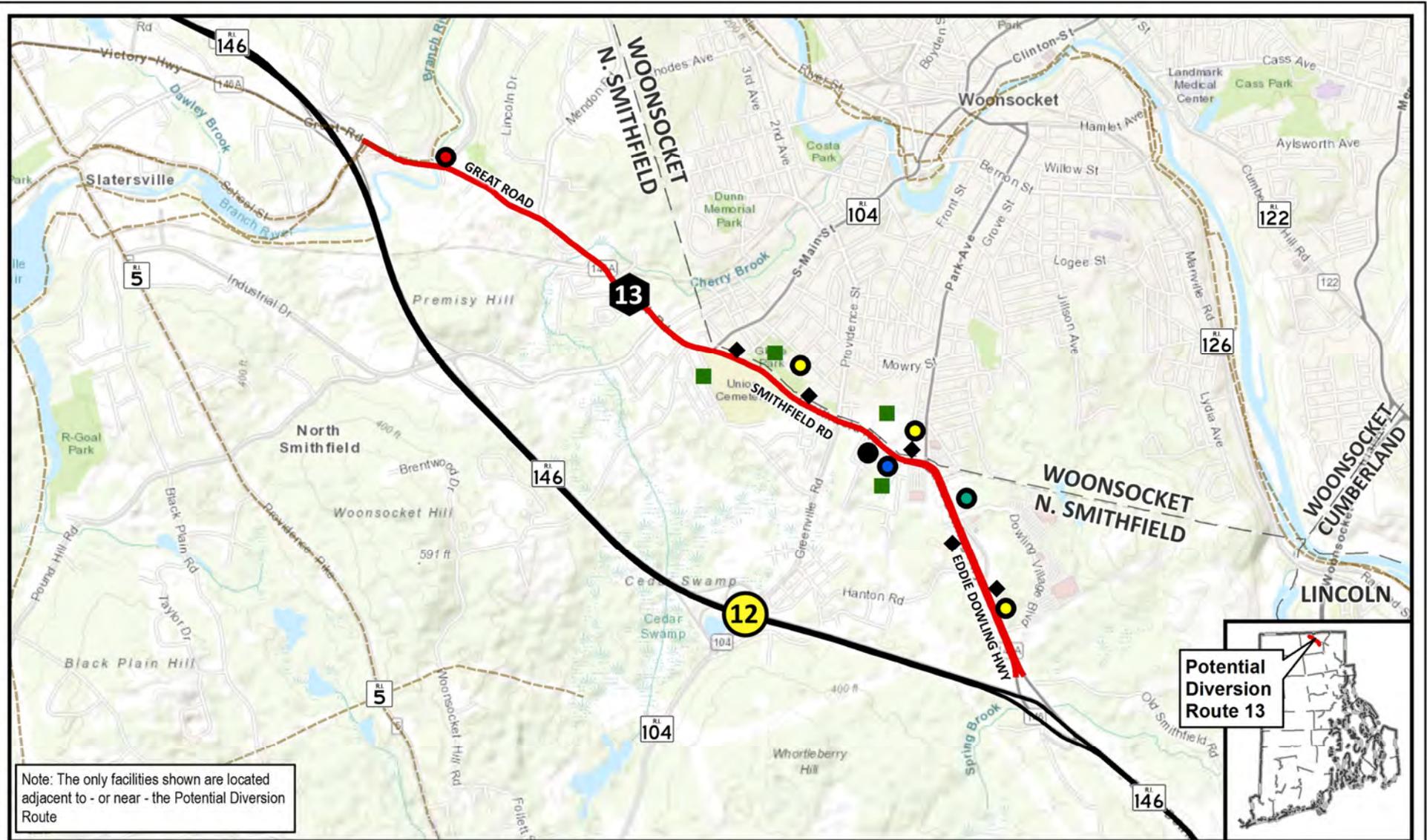
Data Sources:
 RIGIS, RIGIS, ESRI,
 National Register of Historic Places



POTENTIAL DIVERSION ROUTE 13

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-23



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

Prepared For:

 Prepared By:


Legend

City or Town Hall	Post Office
Fire Station	School
Health Care	Environmental Justice Areas
Law Enforcement	Bikeways and Trails
Library	Potential Diversion Route
Park/Recreation	Routes with Toll Locations
Place of Worship	

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI,
 Google

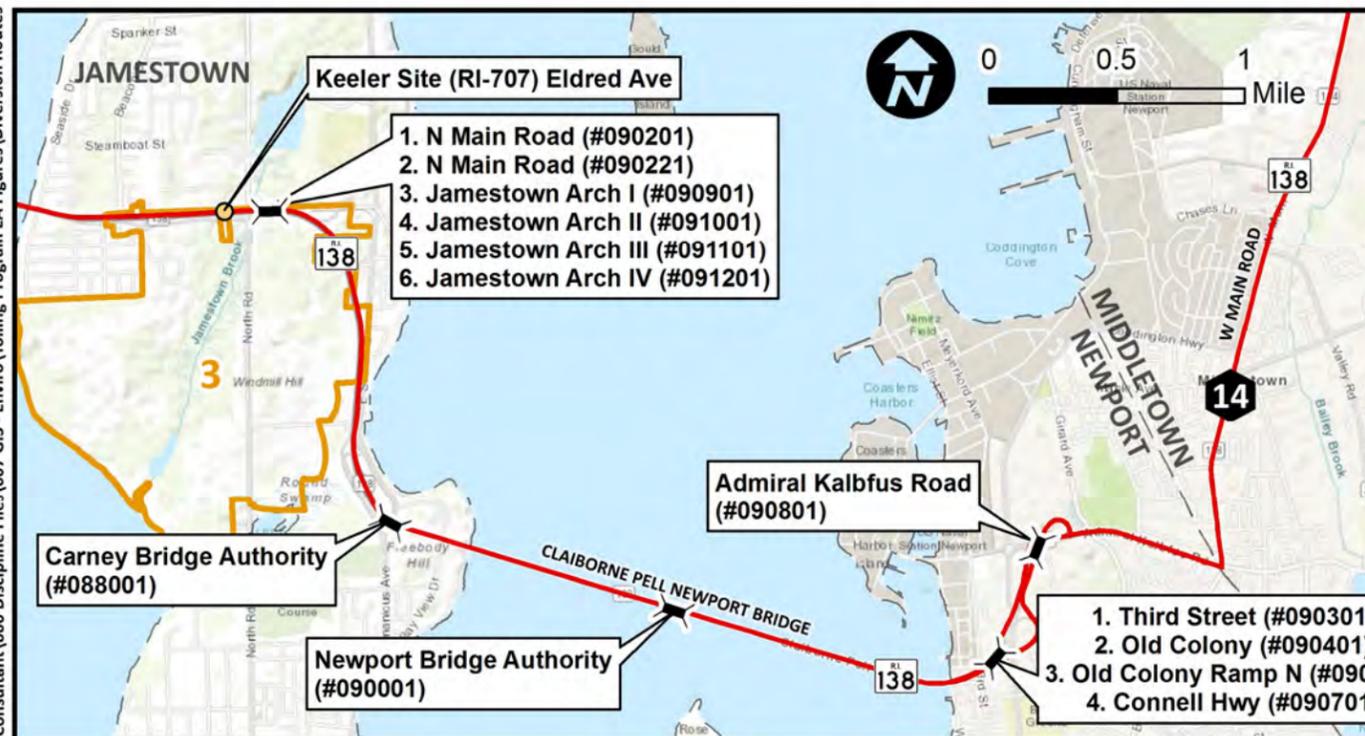
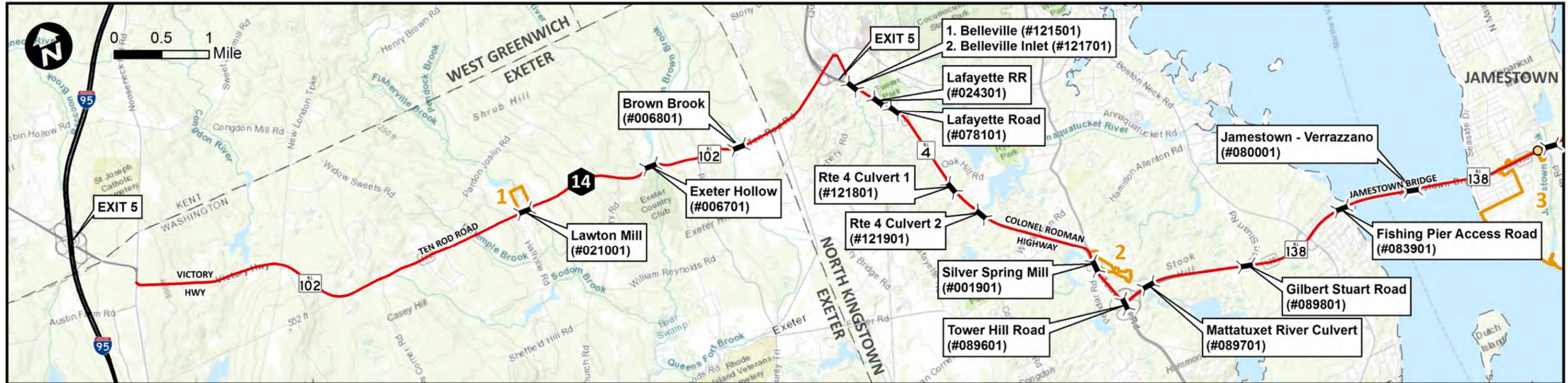
0 0.25 0.5
 Mile



POTENTIAL DIVERSION ROUTE 13

COMMUNITY FACILITIES

FIGURE 6-24



Prepared For:

Prepared By:

Legend

- Bridges on Diversion Route
- National Register Historic District
- Potential Diversion Route
- Routes with Toll Locations

Notes:

- The only historic features shown are located adjacent to - or near - the Potential Diversion Route.
- No toll locations are located within the area shown on this figure.

Histrict Districts

Map ID	HD Name
1	Lawton's Mill
2	Shady Lee
3	Windmill Hill
4	Prescott Farm
5	Battle of RI Main Battlefield

TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
RIDOT, RIGIS, ESRI,
National Register of Historic Places

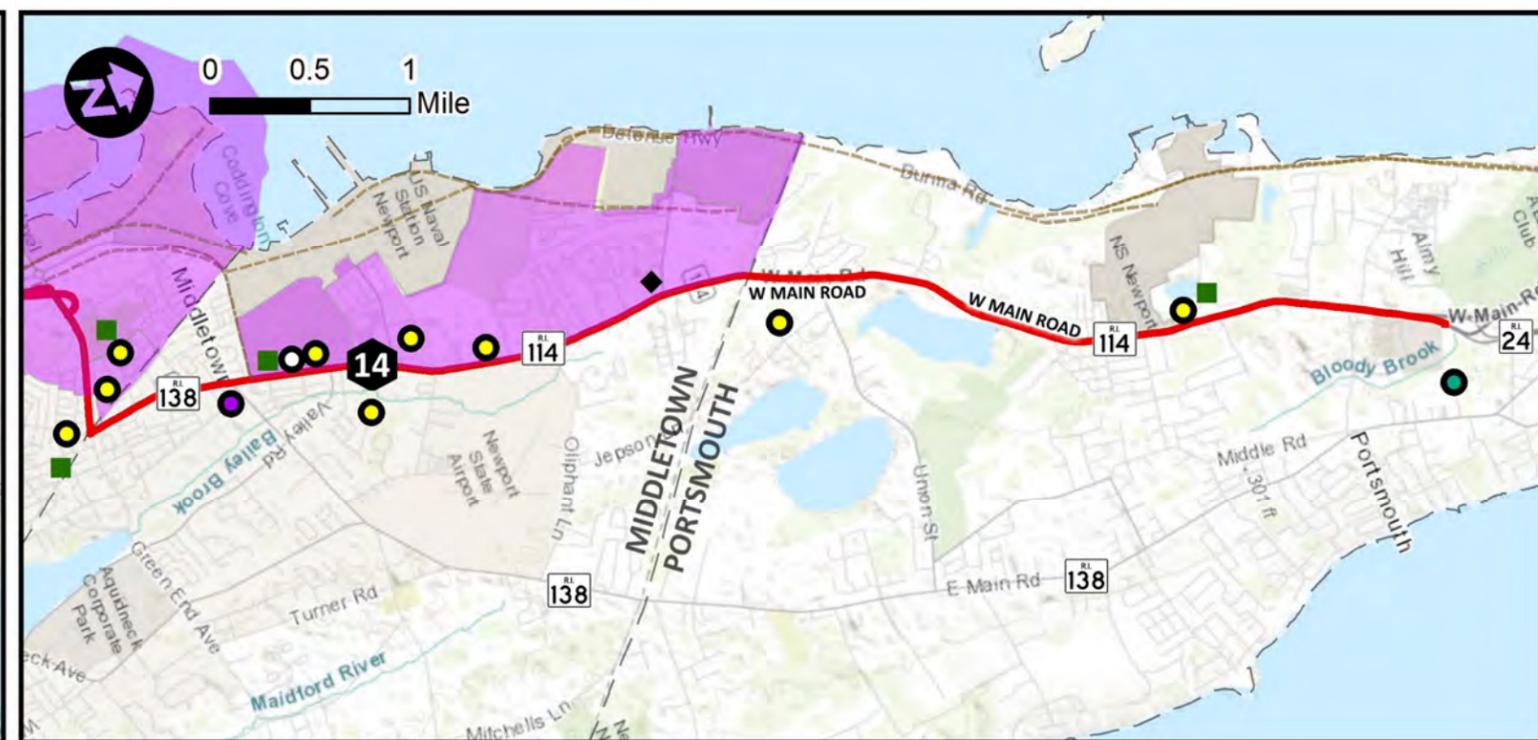
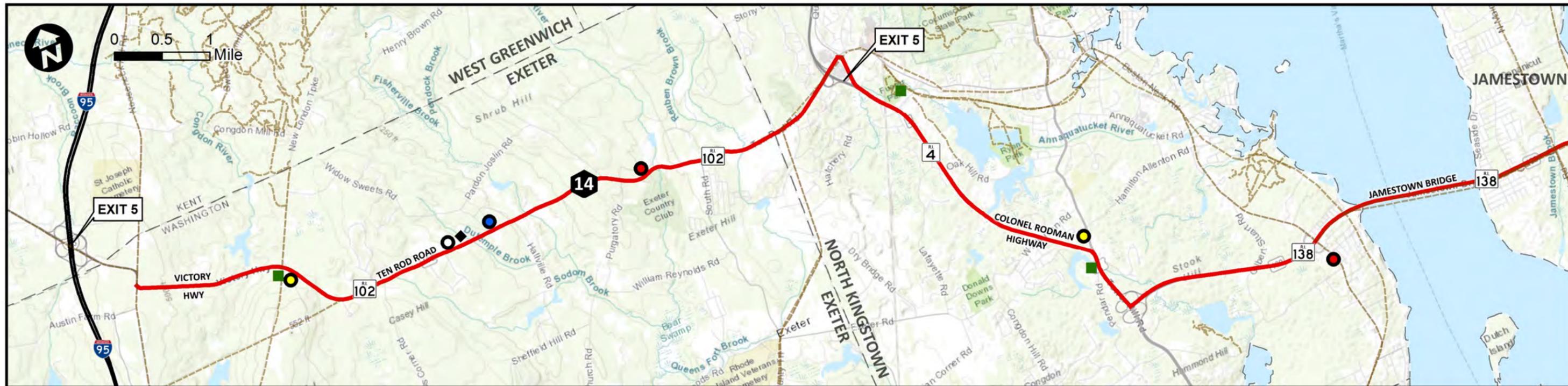


POTENTIAL DIVERSION ROUTE 14

HISTORIC FEATURES AND INFRASTRUCTURE

Potential Diversion Route 14

FIGURE 6-25



P:\RIDOT\2016\WYTY\9300 - RIDOT Tolling Facilities Consultant\600 Discipline Files\607 GIS - Enviro\Tolling Program EA Figures\Diversion Routes

Prepared For:



Prepared By:
JACOBS

Legend

- City or Town Hall
- Fire Station
- Health Care
- Law Enforcement
- Library
- Park/Recreation
- ◆ Place of Worship
- Post Office
- School
- Environmental Justice Areas
- Bikeways and Trails
- Ⓜ Potential Diversion Route
- Ⓜ Routes with Toll Locations

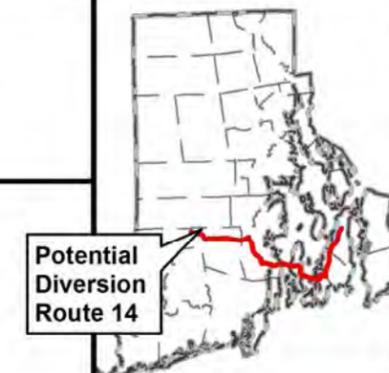
TOLL LOCATIONS 3, 4 & 6-13

WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
NORTH SMITHFIELD, RHODE ISLAND

Notes:

1. The only facilities shown are located adjacent to - or near - the Potential Diversion Route
2. No toll locations are located within the area shown on this figure.

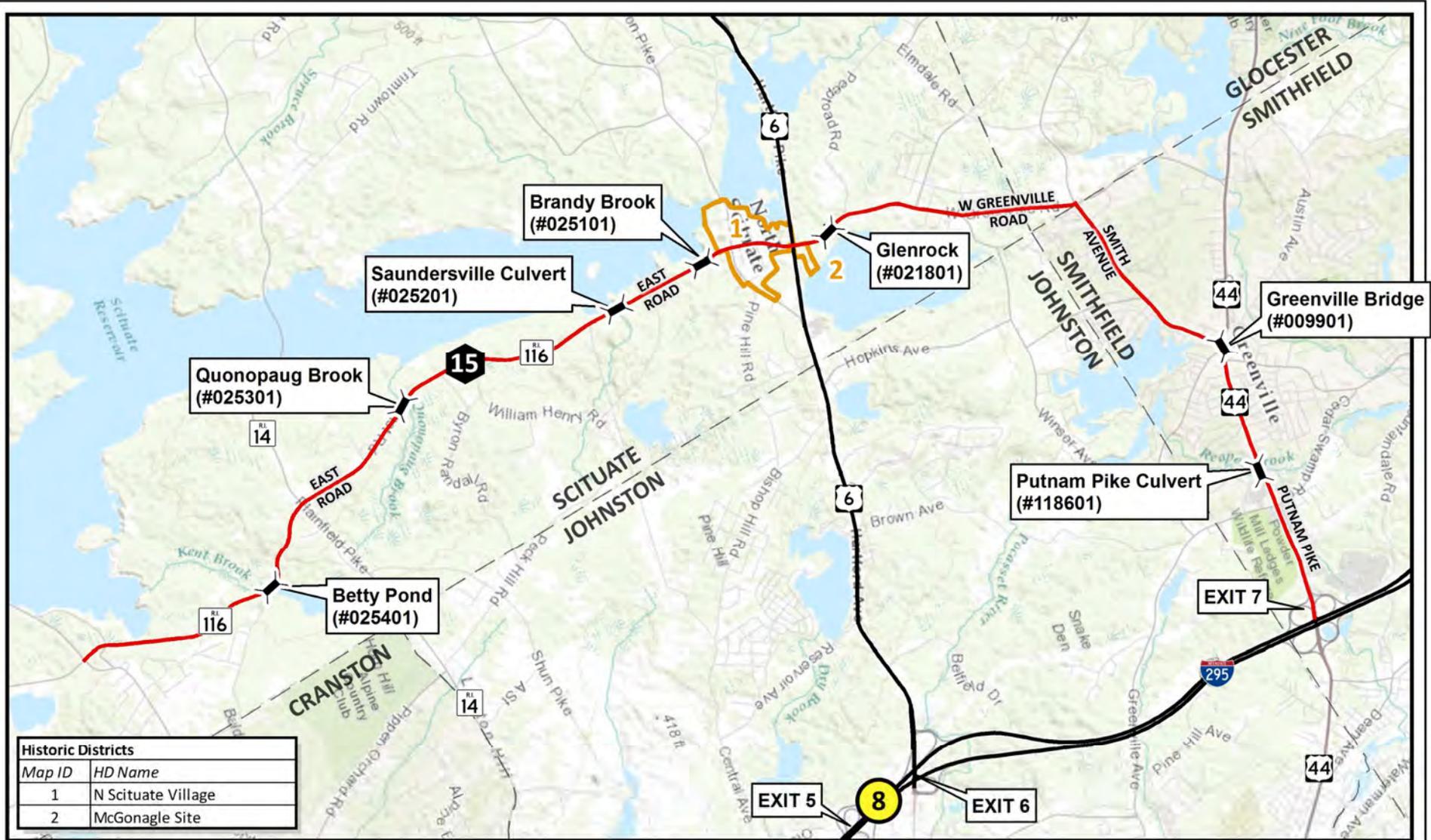
Data Sources:
RIDEM, RIDOT, RIGIS, ESRI, Google



**POTENTIAL DIVERSION
ROUTE 14**

COMMUNITY FACILITIES

FIGURE 6-26



Historic Districts	
Map ID	HD Name
1	N Scituate Village
2	McGonagle Site

Prepared For:



Prepared By:



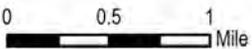
Legend

- Bridges on Diversion Route
- National Register Historic District
- Potential Diversion Route
- Routes with Toll Locations

Note: The only historic features shown are located adjacent to - or near - the Potential Diversion Route.

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON, JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN, NORTH SMITHFIELD, RHODE ISLAND

Data Sources: RIGIS, RIGIS, ESRI, National Register of Historic Places

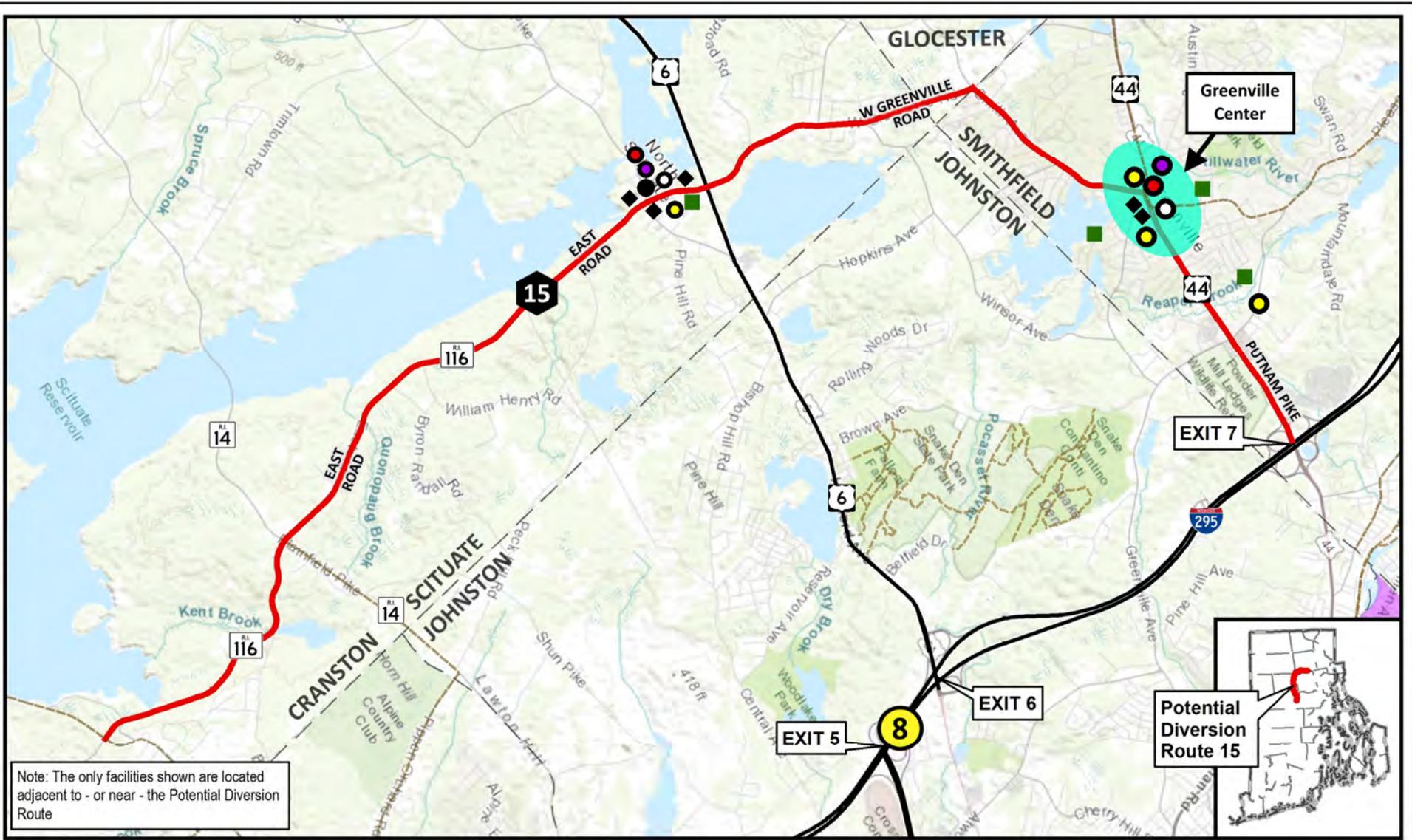




POTENTIAL DIVERSION ROUTE 15

HISTORIC FEATURES AND INFRASTRUCTURE

FIGURE 6-27



Note: The only facilities shown are located adjacent to - or near - the Potential Diversion Route

Prepared For:



Prepared By:

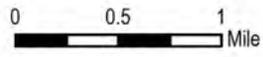


Legend

City or Town Hall	Post Office
Fire Station	School
Health Care	Environmental Justice Areas
Law Enforcement	Village District
Library	Bikeways and Trails
Park/Recreation	Potential Diversion Route
Place of Worship	Routes with Toll Locations

TOLL LOCATIONS 3, 4 & 6-13
 WARWICK, PROVIDENCE, PAWTUCKET, CRANSTON,
 JOHNSTON, CUMBERLAND, EAST PROVIDENCE, LINCOLN,
 NORTH SMITHFIELD, RHODE ISLAND

Data Sources:
 RIDEM, RIDOT, RIGIS, ESRI,
 Google




POTENTIAL DIVERSION ROUTE 15

COMMUNITY FACILITIES

FIGURE 6-28

6.3 Indirect Impacts

6.3.1 Introduction

Indirect impacts are those caused by the Project but occur later in time or farther removed in distance but are still reasonably foreseeable. Indirect impact categories evaluated for this project include traffic and related effects on air, noise, and community cohesion.

The affected environment and potential indirect impacts resulting from traffic diversions are discussed in this section and include the transportation network; local infrastructure; air quality; noise and vibration; social resources; historic and archeological resources; open space, Section 4(f), and Section 6(f) properties; and toll assessments.

The **No Action Alternative** has no traffic diversions and, therefore, would have no indirect impacts.

6.3.2 Traffic Impacts of Diversions on Transportation Network

The following section presents the analyses of potential traffic impacts resulting from truck traffic diverting to the potential diversion routes identified and associated with Toll Locations 3, 4 and 6 through 13. Routes for potential diversion (Diversion Routes) were identified in the *Truck Tolling Study* (Louis Berger 2018). As discussed previously, Louis Berger identified the number of diversions and possible diversion routes through the development of a Travel Demand Model. The methodology and parameters used are provided in detailed in the *Truck Tolling Study*. The parameters include but are not limited to: assumptions for growth, time of day, trip tables, value-of-time, vehicle operating costs, and model network adjustments. Appendices in the *Truck Tolling Study* detail the diversion route methodology, results, and impact assessment. Jacobs used the diversion routes and diversion volumes estimated in the *Truck Tolling Study* for the assessment of indirect impacts for the EA.

For ease of analysis, the Diversion Routes were numbered from 1 through 16. Analysis of Diversion Route 1 associated with Toll Locations 1 and 2 was previously evaluated. This section provides a summary discussion of the overall methodology, analyses and results of an additional 15 Diversion Routes (Diversion Routes 2 through 16). Detailed analyses and results for each Diversion Route are presented separately by Diversion Route pairing in the memorandum titled *Traffic Impact Screening Analyses for Toll Locations 3, 4, and 6 through 13* (Jacobs 2018a), located in **Appendix F**.

To assess potential truck diversions along each Diversion Route, Jacobs identified those segments of parallel roadway(s) that had the potential for traffic diversion as a result of proximity to the Toll Locations and entry and exit points along the tolled routes. These segments, referred to as “Segment Locations”, are shown in

Table 6-2, which lists the Diversion Routes and their corresponding affected roadway segments. The majority (seven) of the Diversion Routes contained four segments each, with a range of 1 to 5 segments per Diversion Route. Jacobs also identified major signalized intersections and stop-controlled intersections within those segments and analyzed those as well. Eleven of the 15

Diversion Routes had signalized intersections, as shown in **Table 6-3**, and only five Diversion Routes had stop controlled intersections, as shown in **Table 6-4**.

Table 6-2. Diversion Routes with Detailed Segment Locations for Analyses

Diversion Route	Analyzed Segment Location
2	RI Route 102 between I-95 and RI Route 117
	RI Route 102 between RI Route 117 and N. Scituate Bypass (RI Route 6)
	RI Route 102 between N. Scituate Bypass (RI Route 6) and Putnam Pike (RI Route 44)
	RI Route 102 between Putnam Pike (RI Route 44) and N. Main St. (Route 5)
3	Post Rd. (RI Route 1) between RI Route 403 and RI Route 401
	Post Rd. (RI Route 1) between RI Route 401 and RI Route 117
	Post Rd. (RI Route 1) between RI Route 117 and Airport Connector
4	Bald Hill Rd. (RI Route 2) between I-95 and East Rd. (RI Route 113)
5	Tiogou Ave. (RI Route 3) between I-95 and Sandy Bottom Rd. (RI Route 33)
	Sandy Bottom Rd. (RI Route 33) between Tiogou Ave. (RI Route 3) and Main St. (RI Route 33/117)
	Main St. (RI Route 33/117) between Sandy Bottom Rd. (RI Route 33) and Knotty Oak Rd. (RI Route 116)
	Knotty Oak Rd. (RI Route 116) between Main St. (RI Route 33/117) and Scituate Ave. (RI Route 12)
6	Scituate Ave. (RI Route 12) between Knotty Oak Rd. (RI Route 116) and Phenix Ave. (RI Route 12)
	Phenix Ave. (RI Route 12) between Scituate Ave. (RI Route 12) and Atwood Ave. (RI Route 5)
	Atwood Ave. (RI Route 5) between Phenix Ave. (RI Route 12) and Greenville Ave. (RI Route 5)
	Greenville Ave./Sanderson Rd. between Atwood Ave. (RI Route 5) and Putnam Pike (RI Route 44)
	Putnam Pike (RI Route 44) between Sanderson Rd. (RI Route 5) and I-295
7	Manton Ave./Woonasquatucket Ave. between RI Route 10 and Centerdale Bypass
	Waterman Ave./Farnum Pike between Centerdale Bypass and Douglas Pike (RI Route 7)
	Douglas Pike (RI Route 7) between Farnum Pike (RI Route 5) and Farnum Pike (RI Route 104)
	Farnum Pike (RI Route 104) between Douglas Pike (RI Route 7) and RI Route 146
8E	Allens Ave. between I-95 and Point St.
	Wickenden St. between Eddy St. and Governor St.
	Waterman St./Henderson Bridge between Butler Ave. and N. Broadway
	N. Broadway between Henderson Expressway and I-195
8W	N. Broadway between I-195 and Henderson Expressway

Diversion Route	Analyzed Segment Location
	S. Angell St./Henderson Bridge between N. Broadway and Wayland Ave.
	Wickenden St. between Governor St. and Eddy St.
	Eddy St. between I-95 and Point St.
9	Broadway (RI Route 1) between Central Ave. and I-95
	Central Ave. between Cottage St. and Broadway (RI Route 1)
	Cottage St. between Newport Ave. (RI Route 1A) and Central Ave.
	Newport Ave. (RI Route 1A) between I-95 and Cottage St.
10	Washington St. (RI Route 1) between Roosevelt Ave. and I-95
11	Mendon Rd. (RI Route 122) between I-295 and Angell Rd. (RI Route 116)
	Angell Rd. (RI Route 116) between Mendon Rd. (RI Route 122) and Diamond Hill Rd. (RI Route 114)
	Diamond Hill Rd. (RI Route 114) between Angell Rd. (RI Route 116) and I-295
12	RI Route 122 between I-95 and Dexter St.
	RI Route 122 between Dexter St. and Broad St.
	RI Route 122 between Broad St. and RI Route 116
13	RI Route 146A between RI Route 146 and S. Main St.
	RI Route 146A between S. Main St. and School St.
14	Victory Hwy./Ten Rod Rd. (RI Route 102) between Nooseneck Hill Rd. (RI Route 3) and RI Route 4
	RI Route 4 between Victory Hwy./Ten Rod Rd. (RI Route 102) and RI Route 138
	RI Route 138/138A between RI Route 4 and Admiral Kalbfus Rd.
	Admiral Kalbfus Rd. between RI Route 138A and W. Main Rd.
15	W. Greenville Rd. (RI Route 116) between N. Scituate Ave. (RI Route 12) and Hartford Pike (RI Route 6)
	W. Greenville Rd. (RI Route 116) between Hartford Pike (RI Route 6) and Snake Hill Rd.
	Snake Hill Rd. between Smith Ave. (RI Route 116) and Putnam Pike (RI Route 44)
	Putnam Pike (RI Route 44) between Snake Hill Rd. and I-295
16	RI Route 10 between I-95 and RI Route 6
	RI Route 10 between RI Route 6 and I-95

Table 6-3. Diversion Routes' Signalized Intersections Analyzed

Diversion Route	Signalized Intersection Analyzed
2	N. Scituate Bypass (RI Route 6) at Chopmist Hill Rd. (RI Route 102)
	Putnam Pike (RI Route 44) at Victory Hwy. (RI Route 102)
	Broncos Hwy. (RI Route 102) at Douglas Tpke (Route 7)
	Victory Hwy. (RI Route 102) at N. Main St. (RI Route 5)
3	Post Rd. (RI Route 1) at Gate Rd
	Post Rd. (RI Route 1) at Airport Connector Exit Ramp
	Post Rd. (RI Route 1) at Airport Connector Entrance Ramp
4	Bald Hill Rd. (RI Route 2) at East Rd. (RI Route 113)
5	Tiogue Ave. (RI Route 3) at Sandy Bottom Rd. (RI Route 33)/Arnold Rd.
	Main St. (RI Route 33/117) at Sandy Bottom Rd. (RI Route 33)
	Washington St. (RI Route 33/117) at Knotty Oak Rd. (RI Route 116)
6	Scituate Ave. (RI Route 12)/Wayland Ave. at Phenix Ave.
	Phenix Ave. (RI Route 12) at Atwood Ave. (RI Route 5)
	Greenville Ave. at Atwood Ave. (RI Route 5)
	Putnam Pike (Route 44) at Cedar Swamp Rd./Sanderson Rd. (RI Route 5)
7	Centerdale Bypass at Waterman Ave.
8	Thurbers Ave. at Eddy St.
	Allens Ave. at Thurbers Ave.
	Point St. at Eddy St.
	Waterman St. at Butler Ave.
	S. Angell St. at Butler Ave.
	Henderson Expressway EB Exit Ramp at N. Broadway
9	Central Ave. at Broadway (RI Route 1)
	Cottage St. at Newport Ave. (RI Route 1A)
11	Mendon Rd. (RI Route 122) at I-295 EB Entrance/Exit Ramp
	Mendon Rd. (RI Route 122) at Angell Rd. (Route 116)
	Angell St. (RI Route 116)/Bear Hill Rd. at Diamond Hill Rd. (RI Route 114)
14	Victory Hwy./Ten Rod Rd. (RI Route 102) at Quaker Ln. (RI Route 2)/Col. Rodman Hwy. Ramps
	Victory Hwy./Ten Rod Rd (RI Route 102) at Quaker Ln (RI Route 2)/Col Rodman Hwy Ramps
	Admiral Kalbfus Rd. at J.T. Connell Hwy. (RI Route 238)/Claiborne Pell Newport Bridge (RI Route 138) Exit Ramp
15	Admiral Kalbfus Rd./Miantonomi Ave. at W. Main St. (RI Route 138)/ Broadway
	Hartford Pike (RI Route 6) at W. Greenville Rd. (RI Route 116)

Table 6-4. Diversion Routes’ Stop-Controlled Intersections Analyzed

Diversion Route	Stop-Controlled Intersection Analyzed
5	Scituate Ave. (RI Route 12) at Knotty Oak Rd. (RI Route 116)
7	Farnum Pike (RI Route 5) at Douglas Pike (RI Route 7)
	Farnum Pike (RI Route 104) at Douglas Pike (RI Route 7)
	Farnum Pike (RI Route 104) at 146 SB Exit Ramp
	Farnum Pike (RI Route 104) at 146 NB Entrance/Exit Ramp
8	Ives St. at Pitman St.
9	Broadway (RI Route 1) at I-95 NB Exit Ramp
15	Snake Hill Rd. at W. Greenville Rd.

To analyze traffic impacts relating to Level of Service (LOS), speeds, and delays on the identified Diversion Routes due to potential truck diversions after the implementation of tolling, the following factors were reviewed and evaluated:

- Peak Traffic Flow Rates. Peak rates of traffic flow are related to hourly traffic volumes through the use of the peak-hour factor. This factor is defined as the ratio of total hourly volume to the peak rate of flow within the hour.
- Volume to Capacity. The volume to capacity (V/C) ratio is the ratio of current traffic flow rate to the traffic capacity of the facility. It is an indicator of the quality of the operations at an intersection. The delay encountered by a traveler at a signalized intersection constitutes an intersection control delay.
- Levels of Service. The analysis of existing and future operating characteristics of a facility is also measured using LOS to provide an indication of the ability of the facility to satisfy both existing and future travel demand. LOS is a quantitative measure of the quality of service of a transportation facility. The LOS measure is stratified into six letter grades, “A” through “F” with “A” being the best and “F” being the worst. Each roadway facility type has a defined method for assessing capacity and level of service, which is based on a set of performance measures. Travel speed and density on freeways, delay at signalized intersections, and speed and ability to pass on a rural two-lane highways are examples of performance measures that characterize the conditions of a facility.

Tables 6-5 through **Table 6-9** present the Highway Capacity Manual (*HCM 2010*) criteria used to evaluate the LOS for signalized intersections, arterial street class II segments, multi-lane highways, and freeway segments.

Table 6-5. Level of Service (LOS) Criteria to Evaluate Signalized Intersections

Level of Service	Average Control Delay Per Vehicle (seconds)
A	0 - 10
B	10 - 20
C	20 - 35
D	35 - 55
E	55 - 80
F	>80

Source: *HCM 2010* (Transportation Research Board, 2010).

Table 6-6. Level of Service (LOS) Criteria to Evaluate Unsignalized Intersections; Delays

Level of Service	Average Control Delay Per Vehicle (seconds)
A	0 - 10
B	10 - 15
C	15 - 25
D	25 - 35
E	35 - 50
F	>50

Source: *HCM 2010* (Transportation Research Board, 2010).

Table 6-7. Level of Service (LOS) Criteria to Evaluate Arterial Street Class II; Speeds

Level of Service	Average Travel Speed (miles/hour)
A	>28
B	>22 ≤ 28
C	>17 ≤ 22
D	>13 ≤ 17
E	>10 ≤ 13
F	≤10

Source: *HCM 2010* (Transportation Research Board, 2010).

Table 6-8. Level of Service (LOS) Criteria to Evaluate Multi-lane Highway*

LOS	Free-Flow Speed (mi/h)	Density (pc/mi/ln)
A	All	>0-11
B	All	>11-18
C	All	>18-26
D	All	>26-35
E	60	>35-40
	55	>35-41
	50	>35-43
	45	>35-45
Demand Exceeds Capacity		
F	60	>40
	55	>41
	50	>43
	45	>45

Note: Multi-lane Highway LOS Criteria was used only for analysis of Diversion Route 14 highway segments.

Note: pc/mi/ln = passenger cars per mile per lane.

Source: *HCM 2010*, (Transportation Research Board, 2010).

Table 6-9. Level of Service (LOS) Criteria to Evaluate Freeways

LOS	Density (pc/mi/ln)
A	≤11
B	>11-18
C	>18-26
D	>26-35
E	>35-45
F	Demand Exceeds Capacity
	>45

Note: Freeway LOS Criteria was used only for analysis of Diversion Route 16 freeway segments. Source: *HCM 2010*, (Transportation Research Board, 2010).

The analysis included compiling and evaluating traffic volume data, fleet mix data, and signal timing data, where applicable, for each corresponding Diversion Route. Data were collected from various sources, including RIDOT, *Truck Tolling Study* (Louis Berger 2018), and independent traffic count and turning movement count data collection efforts for this specific analysis.

Traffic Impact Methodology

For the analysis of traffic impacts, Jacobs compiled and evaluated traffic and signal timing data, where applicable, for each Toll Location and the corresponding Diversion Route. These data were collected from various sources, including RIDOT, *Truck Tolling Study* (Louis Berger 2018), and

independent traffic count and turning movement count data collection efforts for this specific analysis.

The 2016 traffic data served as the base data and base year for this analysis. The traffic impact analysis compared Base Year 2016 traffic conditions along the Diversion Route to a pro forma tolled condition (as if truck tolling were implemented) in 2016. An analysis was also made for future year 2040 traffic, both without tolling (Future No Toll 2040) and with truck tolling implemented (Future Tolled 2040). Separate analyses were, therefore, made for the following:

- Base Year 2016 – No Toll
- Pro Forma Tolled 2016– Tolled
- Future No Toll 2040 – No Toll
- Future Tolled 2040 – Tolled

Based on the intersection controls along the study corridor, along with the actual traffic data and the roadway facility type and roadway characteristics (number of lanes, speed limits, etc.), Diversion Routes were divided into major roadway segments. Each roadway segment analyzed adequately represents the character of its entire roadway segment. Analyses were made for each of the major roadway segments.

The analysis included compiling and evaluating traffic and signal timing data, where applicable, for each Segment Location within each Diversion Route. Data were collected from various sources, including RIDOT, *Truck Tolling Study* (Louis Berger 2018), and independent data collection of traffic counts and turning movement counts. Jacobs used this data to prepare an existing daily traffic flow profile along each Diversion Route for the Base Year 2016 – No Toll scenario. Jacobs then applied the 2016 potential truck diversion volumes from the *Truck Tolling Study* to the Base Year 2016 – No Toll scenario to create the Pro Forma Tolled 2016 traffic scenario. To project Future No Toll 2040 traffic impacts, Jacobs applied growth rates to the Base Year 2016 – No Toll scenario. Potential truck diversions from the *Truck Tolling Study* were then applied to create the Future Tolled 2040 scenario.

Traffic Impact Analyses

The 2016 and 2040 conditions analyses were conducted using Highway Capacity Software (HCS2010) and Synchro 10, which are industry-standard and acceptable in accordance with HCM 2010 procedures. The segment conditions were evaluated using ARTPLAN 2012, MULTILANE, and FREEWAY (Basic Freeway Segment), the LOS measurement tools for roadway facilities that are included in the HCS 2010 software suite. Synchro 10 was used to analyze signalized and un-signalized intersections along each Diversion Route.

Existing and Future Estimated Traffic

In an effort to further verify existing traffic conditions, Jacobs commissioned an independent 24-hour traffic count and turning movement count for Diversion Route Segment Locations. These traffic counts were compared to RIDOT 2015 traffic counts and were then used as a basis for the analyses for the 2016 existing conditions.

A growth rate for each diversion route was calculated based on Base Year 2016 and 2040 Average Annual Daily Traffic (AADT) volumes contained in the Truck Tolling Study. The 2040 volumes were developed by incorporating the information contained within the Base Year 2016 dataset and comparing the Truck Tolling Study estimates of total non-toll AADT for 2016 versus 2040. Jacobs applied the projected percent growth to the diversion analyses of the Base Year 2016 to create the dataset for the 2040 non-toll diversion analyses.

Estimated Truck Diversion

To analyze the maximum number of truck diversions, Jacobs identified the peak hour for travel for each Diversion Route segment. Peak hours varied based on location and direction of travel, but generally fell between 4 p.m. to 5 p.m. for most segments. The peak hour for estimated truck diversions, as presented in Appendix C (Tables C-4 and C-5) of the *Truck Tolling Study* (Louis Berger 2018), and hourly traffic counts, were used in the analyses.

In order to analyze the operational impacts relating to LOS, speeds, and delays on the study corridor, the 2016 and 2040 directional peak hour diverted truck traffic volumes were added to the Base Year 2016 and Future No Toll 2040 volumes, respectively. The diverted trucks were added to the non-tolled scenarios to estimate Pro Forma Tolled 2016 and Future Tolled 2040 volumes. **Table 6-10** shows the traffic and truck volumes that were analyzed under the tolled and non-tolled scenarios for the peak hour of traffic.

Table 6-10 Toll and Non-toll Truck Peak Hour Volumes on Diversion Routes

Diversion Route	Diversion Route Segment	1-Way Peak Direction Traffic											
		2016						2040					
		No Toll			With Toll			No Toll			With Toll		
Total Veh.	Trucks	Truck %	Total Veh.	Trucks	Truck %	Total Veh.	Trucks	Truck %	Total Veh.	Trucks	Truck %		
2	1	342	17	5%	345	20	6%	348	17	5%	350	19	5%
	2	225	16	7%	228	19	8%	229	16	7%	231	18	8%
	3	209	10	5%	212	13	6%	213	11	5%	215	13	6%
	4	342	14	4%	345	17	5%	348	14	4%	350	16	5%
3	1	670	27	4%	672	29	4%	682	27	4%	683	28	4%
	2	610	12	2%	612	14	2%	622	12	2%	623	13	2%
	3	850	26	3%	852	28	3%	866	26	3%	867	27	3%
4	1	1,177	35	3%	1,180	38	3%	1,198	36	3%	1,200	38	3%
5	1	901	18	2%	912	29	3%	1,015	20	2%	1,025	30	3%
	2	865	35	4%	876	46	5%	975	39	4%	985	49	5%
	3	1,129	11	1%	1,140	22	2%	1,272	13	1%	1,282	23	2%
	4	434	17	4%	445	28	6%	489	20	4%	499	30	6%
6	1	224	9	4%	229	14	6%	229	9	4%	234	14	6%
	2	679	7	1%	684	12	2%	691	7	1%	696	12	2%
	3	899	54	6%	904	59	7%	915	55	6%	920	60	7%
	4	93	7	8%	98	12	12%	95	8	8%	100	13	13%
	5	1,188	48	4%	1,198	58	5%	1,255	50	4%	1,265	60	5%
7	1	378	8	2%	381	11	3%	392	8	2%	394	10	3%
	2	378	8	2%	381	11	3%	392	8	2%	394	10	3%
	3	601	24	4%	604	27	4%	624	25	4%	626	27	4%
	4	611	18	3%	614	21	3%	635	19	3%	637	21	3%
8	1A	650	20	3%	653	23	4%	662	20	3%	664	22	3%
	1B	1,146	80	7%	1,149	83	7%	1,167	82	7%	1,169	84	7%
	2	1,228	25	2%	1,231	28	2%	1,250	25	2%	1,252	27	2%
	3	1,422	43	3%	1,425	46	3%	1,448	43	3%	1,450	45	3%
	4	1,156	35	3%	1,159	38	3%	1,177	35	3%	1,179	37	3%
9	1	547	27	5%	548	28	5%	559	28	5%	559	28	5%
	2	254	13	5%	255	14	5%	260	13	5%	260	13	5%
	3	458	9	2%	459	10	2%	468	9	2%	468	9	2%
	4	1,249	62	5%	1,250	63	5%	1,276	64	5%	1,276	64	5%
10	1	494	20	4%	496	22	4%	517	21	4%	518	22	4%
11	1	661	33	5%	676	48	7%	780	39	5%	791	50	6%
	2	248	7	3%	259	18	7%	292	9	3%	300	17	6%
	3	709	21	3%	720	32	4%	836	25	3%	844	33	4%
12	1	563	28	5%	567	32	6%	587	29	5%	590	32	5%
	2	570	17	3%	574	21	4%	594	18	3%	597	21	4%
	3	602	18	3%	606	22	4%	627	19	3%	630	22	3%
13	1	504	5	1%	509	10	2%	555	6	1%	558	9	2%
	2	815	16	2%	820	21	3%	899	18	2%	902	21	2%
14	1	404	24	6%	405	25	6%	412	25	6%	413	26	6%
	2	2,186	109	5%	2,187	110	5%	2,226	111	5%	2,227	112	5%
	3	1,496	90	6%	1,497	91	6%	1,523	91	6%	1,524	92	6%
	4	770	8	1%	771	9	1%	784	8	1%	785	9	1%
	5	789	8	1%	790	9	1%	803	8	1%	804	9	1%
15	1	232	19	8%	237	24	10%	240	24	10%	250	25	10%
	2	348	14	4%	353	19	5%	356	19	5%	373	20	5%
	3	433	17	4%	438	22	5%	441	22	5%	462	23	5%
	4	1,188	48	4%	1,198	58	5%	1,255	50	4%	1,265	60	5%
16	1	3,771	38	1%	3,775	42	1%	3,840	38	1%	3,843	41	1%
	2	4,714	47	1%	4,718	51	1%	4,799	48	1%	4,802	51	1%

Results

A detailed discussion of the results for the roadway segment analyses and the intersection analyses along all diversion routes is included in the *Traffic Impacts Screening Analysis for Toll Locations 3, 4, and 6 through 13* (Jacobs 2018a) and provided in **Appendix F**. A summary of those results is provided below.

**Environmental Assessment
Toll Locations 3, 4 & 6 through 13**

The roadway segment analysis results show an insignificant change in average speeds (reduction between 0.0 and 2.0 mph) for all segments, such that they would be imperceptible to the drivers. This is shown below in **Table 6-11**.

Table 6-11 Roadway Segment Analyses Results

Diversion Route	Analyzed Segment Location	Existing Condition 2016				Future Condition 2040			
		No Toll		With Toll		No Toll		With Toll	
		Speed (mph)	LOS	Speed (mph)	LOS	Speed (mph)	LOS	Speed (mph)	LOS
2	RI Route 102 between I-95 and RI Route 117	36.0	A	35.8	A	35.8	A	35.6	A
	RI Route 102 between RI Route 117 and N. Scituate Bypass (RI Route 6)	47.2	A	47.1	A	47.1	A	47.1	A
	RI Route 102 between N. Scituate Bypass (RI Route 6) and Putnam Pike (RI Route 44)	47.1	A	47.1	A	47.0	A	47.0	A
	RI Route 102 between Putnam Pike (RI Route 44) and N. Main St. (Route 5)	44.3	A	43.9	A	43.8	A	43.4	A
3	Post Rd. (RI Route 1) between RI Route 403 and RI Route 401	36.8	A	36.8	A	36.8	A	36.8	A
	Post Rd. (RI Route 1) between RI Route 401 and RI Route 117	33.5	A	33.0	A	33.3	A	33.1	A
	Post Rd. (RI Route 1) between Route 117 and Airport Connector	35.5	A	35.5	A	35.5	A	35.5	A
4	Bald Hill Rd. (RI Route 2) between I-95 and East Rd. (RI Route 113)	35.7	A	35.7	A	35.5	A	35.5	A
5	Tiogue Ave. (RI Route 3) between I-95 and Sandy Bottom Rd. (RI Route 33)	45.7	A	45.4	A	45.4	A	45.1	A
	Sandy Bottom Rd. (RI Route 33) between Tiogue Ave. (RI Route 3) and Main St. (RI Route 33/117)	28.0	A	27.2	B	27.9	B	27.3	B
	Main St. (RI Route 33/117) between Sandy Bottom Rd. (RI Route 33) and Knotty Oak Rd. (RI Route 116)	15.9	D	15.5	D	15.6	D	15.3	D
	Knotty Oak Rd. (RI Route 116) between Main St. (RI Route 33/117) and Scituate Ave. (RI Route 12)	38.7	A	38.6	A	38.7	A	38.7	A
6	Scituate Ave. (RI Route 12) between Knotty Oak Rd. (RI Route 116) and Phenix Ave. (RI Route 12)	47.3	A	47.1	A	47.2	A	47.1	A
	Phenix Ave. (RI Route 12) between Scituate Ave. (RI Route 12) and Atwood Ave. (RI Route 5)	18.5	C	17.6	C	17.8	C	16.9	D
	Atwood Ave. (RI Route 5) between Phenix Ave. (RI Route 12) and Greenville Ave.	30.5	A	30.4	A	30.2	A	30.1	A
	Greenville Ave./Sanderson Rd. between Atwood Ave. (RI Route 5) and Putnam Pike (RI Route 44)	42.3	A	42.2	A	42.3	A	42.2	A
	Putnam Pike (RI Route 44) between Sanderson Rd. (RI Route 5) and I-295	32.5	A	31.2	A	31.2	A	29.2	A
7	Manton Ave./Woonasquatucket Ave. between RI Route 10 and Centerdale Bypass	28.2	A	28.1	A	28.2	A	28.1	A
	Waterman Ave./Farnum Pike between Centerdale Bypass and Douglas Pike (RI Route 7)	41.1	A	40.9	A	41.0	A	40.8	A
	Douglas Pike (RI Route 7) between Farnum Pike (RI Route 5) and Farnum Pike (RI Route 104)	25.8	B	25.7	B	25.7	B	25.7	B
	Farnum Pike (RI Route 104) between Douglas Pike (RI Route 7) and RI Route 146	43.1	A	43.0	A	43.0	A	42.9	A
8E	Allens Ave. between I-95 and Point St.	27.6	B	27.6	B	27.6	B	27.6	B
	Wickenden St. between Eddy St. and Governor St.	23.5	B	23.3	B	23.4	B	23.3	B
	Waterman St./Henderson Bridge between Butler Ave. and N. Broadway	36.8	A	36.6	A	36.7	A	36.6	A
	N. Broadway between Henderson Expressway and I-195	25.8	B	25.7	B	25.7	B	25.6	B
8W	N. Broadway between I-195 and Henderson Expressway	24.7	B	24.4	B	24.4	B	24.0	B
	S. Angell St./Henderson Bridge between N. Broadway and Wayland Ave.	33.9	A	34.1	A	33.9	A	34.1	A
	Wickenden St. between Governor St. and Eddy St.	19.9	C	19.2	C	19.5	C	19.1	C
	Eddy St. between I-95 and Point St.	17.3	C	17.1	C	17.2	C	17.1	C
9	Broadway (RI Route 1) between Central Ave. and I-95	24.8	B	24.8	B	24.7	B	24.7	B
	Central Ave. between Cottage St. and Broadway (RI Route 1)	26.3	B	24.7	B	24.8	B	24.7	B
	Cottage St. between Newport Ave. (RI Route 1A) and Central Ave.	25.8	B	25.7	B	25.7	B	25.7	B
	Newport Ave. (RI Route 1A) between I-95 and Cottage St.	16.8	D	16.7	D	16.3	D	16.3	D
10	Washington St. (RI Route 1) between Roosevelt Ave. and I-95	26.7	B	26.7	B	26.5	B	26.5	B

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11	Mendon Rd. (RI Route 122) between I-295 and Angell Rd. (RI Route 116)	28.6	A	28.3	A	27.2	B	27.0	B
	Angell Rd. (RI Route 116) between Mendon Rd. (RI Route 122) and Diamond Hill Rd. (RI Route 114)	41.5	A	41.5	A	41.4	A	40.1	A
	Diamond Hill Rd. (RI Route 114) between Angell Rd. (RI Route 116) and I-295	14.5	D	13.3	D	9.7	F	9.0	F
12	RI Route 122 between I-95 and Dexter St.	35.0	A	34.9	A	34.7	A	34.6	A
	RI Route 122 between Dexter St. and Broad St.	35.8	A	35.6	A	35.5	A	35.4	A
	RI Route 122 between Broad St. and RI Route 116	35.5	A	35.4	A	35.1	A	35.0	A
13	RI Route 146A between RI Route 146 and S. Main St.	34.9	A	34.7	A	34.5	A	34.4	A
	RI Route 146A between S. Main St. and School St.	32.4	A	31.7	A	31.2	A	30.8	A
14	Victory Hwy./Ten Rod Rd. (RI Route 102) between Nooseneck Hill Rd. (RI Route 3) and RI Route 4	40.6	A	40.5	A	40.4	A	40.3	A
	RI Route 4 between Victory Hwy./Ten Rod Rd. (RI Route 102) and RI Route 138	SEE FOLLOWING TABLE							
	RI Route 138/138A between RI Route 4 and Admiral Kalbfus Rd.	SEE FOLLOWING TABLE							
	Admiral Kalbfus Rd. between RI Route 138A and W. Main Rd.	25.0	B	24.9	B	24.6	B	24.6	B
W. Main Rd. (RI Route 138) between Admiral Kalbfus Rd. and RI Route 24	27.6	B	27.6	B	27.5	B	27.5	B	
15	W. Greenville Rd. (RI Route 116) between N. Scituate Ave. (RI Route 12) and Hartford Pike (RI Route 6)	41.3	A	41.1	A	41.1	A	41.0	A
	W. Greenville Rd. (RI Route 116) between Hartford Pike (RI Route 6) and Snake Hill Rd.	33.1	A	31.2	A	32.3	A	30.9	A
	Snake Hill Rd. between Smith Ave. (RI Route 116) and Putnam Pike (RI Route 44)	25.9	B	25.8	B	25.8	B	25.5	B
	Putnam Pike (RI Route 44) between Snake Hill Rd. and I-295	32.5	A	31.2	A	31.2	A	29.2	A
16	RI Route 10 between I-95 and RI Route 6	SEE FOLLOWING TABLE							
	RI Route 10 between RI Route 6 and I-95	SEE FOLLOWING TABLE							

The signalized intersection analysis results show that only one signalized intersection (Phenix Avenue at Atwood Avenue) on Diversion Route 6 is estimated to have a change in LOS due to the addition of diverted truck traffic. While there is estimated to be a change in the LOS, this change is estimated to be only 0.5 seconds of additional delay in 2016. This slight increase in delay would be imperceptible to the drivers of the route. This is shown in **Table 6-12** below.

Table 6-12 Signalized Intersection Analyses Results

Diversion Route	Signalized Intersection	Peak Period											
		Total Average Delay (sec)								V/C (max)			
		2016				2040				2016		2040	
		No Toll		Tolled		No Toll		Tolled		No Toll	Tolled	No Toll	Tolled
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS				
2	N. Scituate Bypass (RI Route 6) at Chopmist Hill Rd. (RI Route 102)	17.7	B	17.7	B	17.9	B	17.9	B	0.61	0.61	0.62	0.62
	Putnam Pike (RI Route 44) at Victory Hwy. (RI Route 102)	27.5	C	27.8	C	31.2	C	31.4	C	0.87	0.87	0.89	0.89
	Broncos Hwy. (RI Route 102) at Douglas Tpke (Route 7)	22.3	C	22.5	C	24.8	C	24.8	C	0.82	0.82	0.86	0.86
	Victory Hwy. (RI Route 102) at N. Main St. (RI Route 5)	23.6	C	23.7	C	26.0	C	26.0	C	0.89	0.89	0.93	0.93
3	Post Rd. (RI Route 1) at Gate Rd	6.5	A	6.5	A	6.5	A	6.6	A	0.58	0.58	0.58	0.58
	Post Rd. (RI Route 1) at Airport Connector Exit Ramp	15.9	B	16.0	B	16.1	B	16.2	B	0.69	0.69	0.69	0.69
	Post Rd. (RI Route 1) at Airport Connector Entrance Ramp	9.5	A	9.7	A	9.7	A	9.8	A	0.76	0.76	0.76	0.76
4	Bald Hill Rd. (RI Route 2) at East Rd. (RI Route 113)	40.6	D	40.6	D	44.6	D	44.7	D	0.93	0.93	0.94	0.94
5	Tiogoe Ave. (RI Route 3) at Sandy Bottom Rd. (RI Route 33)/Arnold Rd.	33.4	C	34.1	C	34.5	C	34.7	C	0.82	0.86	0.83	0.84
	Main St. (RI Route 33/117) at Sandy Bottom Rd. (RI Route 33)	20.9	C	22.6	C	24.4	C	25.6	C	0.88	0.91	0.93	0.95
	Washington St. (RI Route 33/117) at Knotty Oak Rd. (RI Route 116)	27.6	C	29.0	C	33.4	C	34.7	C	0.89	0.89	0.94	0.95
6	Scituate Ave. (RI Route 12)/Wayland Ave. at Phenix Ave.	29.2	C	29.6	C	29.8	C	30.3	C	1.00	1.00	0.99	0.98
	Phenix Ave. (RI Route 12) at Atwood Ave. (RI Route 5)	34.9	C	35.4	D	37.2	D	37.6	D	0.90	0.90	0.93	0.93
	Greenville Ave. at Atwood Ave. (RI Route 5)	12.7	B	12.9	B	12.9	B	13.1	B	0.47	0.49	0.50	0.51
	Putnam Pike (Route 44) at Cedar Swamp Rd./Sanderson Rd. (RI Route 5)	32.0	C	32.7	C	33.4	C	34.1	C	0.84	0.86	0.88	0.89
7	Centerdale Bypass at Waterman Ave.	17.1	B	17.2	B	17.5	B	17.6	B	0.69	0.69	0.70	0.70
8	Thurbers Ave. at Eddy St.	24.7	C	24.8	C	25.8	C	25.8	C	0.79	0.79	0.82	0.82
	Allens Ave. at Thurbers Ave.	20.3	C	20.3	C	20.6	C	20.6	C	0.86	0.86	0.86	0.86
	Point St. at Eddy St.	34.0	C	34.5	C	35.7	D	35.7	D	0.93	0.94	0.95	0.95
	Waterman St. at Butler Ave.	50.7	D	51.5	D	54.1	D	54.6	D	1.00	1.00	1.02	1.02
	S. Angell St. at Butler Ave.	17.2	B	17.2	B	17.5	B	17.6	B	0.71	0.71	0.73	0.73
	Henderson Expressway EB Exit Ramp at N. Broadway	19.7	B	20.0	B	21.0	C	21.1	C	0.87	0.87	0.88	0.88
9	Central Ave. at Broadway (RI Route 1)	18.0	B	18.1	B	18.3	B	18.3	B	0.76	0.76	0.76	0.76
	Cottage St. at Newport Ave. (RI Route 1A)	16.2	B	16.3	B	16.8	B	16.8	B	0.90	0.91	0.91	0.91
11	Mendon Rd. (RI Route 122) at I-295 EB Entrance/Exit Ramp	28.7	C	30.9	C	37.3	D	40.5	D	0.89	0.91	0.97	0.99
	Mendon Rd. (RI Route 122) at Angell Rd. (Route 116)	11.6	B	12.4	B	19.8	B	21.2	C	0.62	0.65	0.83	0.85
	Angell St. (RI Route 116)/Bear Hill Rd. at Diamond Hill Rd. (RI Route 114)	37.3	D	39.8	D	51.2	D	53.9	D	0.82	0.91	0.97	0.99
14	Victory Hwy./Ten Rod Rd. (RI Route 102) at Quaker Ln. (RI Route 2)/Col. Rodman Hwy. Ramps	10.5	B	10.6	B	12.4	B	12.5	B	0.66	0.66	0.71	0.71
	Victory Hwy./Ten Rod Rd (RI Route 102) at Quaker Ln (RI Route 2)/Col Rodman Hwy Ramps	23.0	C	23.0	C	24.8	C	24.8	C	0.80	0.80	0.83	0.83
	Admiral Kalbfus Rd. at J.T. Connell Hwy. (RI Route 238)/Claiborne Pell Newport Bridge (RI Route 138) Exit Ramp	18.2	B	18.2	B	18.8	B	18.8	B	0.73	0.73	0.75	0.75
	Admiral Kalbfus Rd./Miantonomi Ave. at W. Main St. (RI Route 138)/ Broadway	21.3	C	21.3	C	22.6	C	22.6	C	0.84	0.84	0.86	0.86
15	Hartford Pike (RI Route 6) at W. Greenville Rd. (RI Route 116)	28.7	C	29.1	C	33.1	C	33.8	C	0.88	0.88	0.93	0.93
	Putnam Pike (RI Route 44) at Smith Ave. (RI Route 116)	22.6	C	24.0	C	30.0	C	31.3	C	0.96	0.97	1.01	1.01

The stop-controlled analyses results show that there are no changes estimated in LOS for the stop-controlled intersections. This is presented in Table 6-13 below.

Table 6-13 Stop-Controlled Intersection Analysis Results

Diversion Route	Stop-Controlled Intersection	Peak Period											
		Max Average Approach Delay (sec)								V/C (max)			
		2016				2040				Existing		Future	
		No Toll		Tolled		No Toll		Tolled		No Toll	Tolled	No Toll	Tolled
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS				
5	Scituate Ave. (RI Route 12) at Knotty Oak Rd. (RI Route 116)	109.6	F	138.6	F	167.7	F	201.8	F	1.07	1.15	1.23	1.31
7	Farnum Pike (RI Route 5) at Douglas Pike (RI Route 7)	38.3	E	40.0	E	46.1	E	46.9	E	0.72	0.73	0.78	0.79
	Farnum Pike (RI Route 104) at Douglas Pike (RI Route 7)	27.3	D	28.4	D	40.9	E	42.6	E	0.49	0.50	0.64	0.66
	Farnum Pike (RI Route 104) at 146 SB Exit Ramp	14.1	B	14.0	B	14.5	B	14.6	B	0.20	0.20	0.22	0.22
	Farnum Pike (RI Route 104) at 146 NB Entrance/Exit Ramp	23.2	C	23.6	C	25.7	D	25.9	D	0.35	0.35	0.39	0.39
8	Ives St. at Pitman St.	8.3	A	8.7	A	8.5	A	8.6	A	0.19	0.19	0.20	0.20
9	Broadway (RI Route 1) at I-95 NB Exit Ramp	11.2	B	11.3	B	11.3	B	11.3	B	0.32	0.32	0.32	0.32
15	Snake Hill Rd. at W. Greenville Rd.	18.3	C	19.4	C	21.3	C	23.5	C	0.65	0.67	0.71	0.73

Based on the findings presented above, the **Proposed Action Alternative** would not result in indirect traffic impacts on Diversion Routes for Toll Locations 3, 4, and 6 through 13. This is based on the road segment analysis, signalized intersection analysis, and unsignalized intersection analysis documented in *Traffic Impacts Screening Analysis for Toll Locations 3, 4, and 6 through 13* (Jacobs 2018a) and provided in **Appendix F**.

6.3.3 Impacts of Diversions on Local Infrastructure

Diversions are anticipated to occur on existing routes currently used by trucks. The potential for indirect impacts to infrastructure (roads and bridges) resulting from increases in truck volumes was considered. Truck traffic that diverts to avoid tolls at Toll Locations 3, 4, and 6 through 13 would use existing infrastructure that currently allow for these classes of truck. The diversion routes discussed in this EA are shown on **Figure 1-2**. According to inspection reports, the condition of the bridges along the diversion routes ranges from Poor to Good, with the majority evaluated as being in Fair condition. Planned treatment for these bridges varies from minor maintenance and preservation activities, to major rehabilitation and full replacement. As described in Section 6.3.2, the peak hour volume of truck traffic estimated to divert to any given diversion route during the peak hour would result in an insignificant increase in traffic on said diversion route. The types, weights, and speeds of the diversion traffic are consistent with existing conditions. The diversion traffic is not expected to accelerate the deterioration of bridges or roadways along Diversion Routes 2 - 16, nor require the acceleration of their scheduled repairs and maintenance. For these reasons, the Proposed Action Alternative would not result in indirect impacts to local infrastructure.

6.3.4 Impacts of Diversions on Air Quality

An air quality screening analysis was performed to screen regional indirect air quality impacts resulting from toll diversions (Jacobs 2018b). Air quality impacts may stem from both direct and indirect pollutant emission sources. While direct pollutant emissions occur at the same time or place as a proposed project, indirect emissions occur at a different time or place. This air quality screening analysis assessed reasonably foreseeable changes to indirect emission sources stemming from the Project. Although the proposed Project would not affect total regional traffic volumes, a portion of truck traffic may divert from Toll Locations 3, 4, and 6 through 13 to alternate non-tolled routes. Indirect pollutant emissions from these traffic diversions were assessed by capturing reasonably foreseeable changes to real-world vehicle operation activities (e.g., idling, braking and acceleration) and the total vehicle miles traveled (VMT) as a result of the Project. These factors combine to affect the rate at which vehicles emit air pollutants. Through the use of the latest available vehicle emissions modeling system, this analysis developed pollutant emission inventories to quantify the extent of effects the proposed Project would have on regional ambient air quality.

This analysis includes a qualitative assessment of the expected effects on MSAT emissions per USEPA and FHWA guidance in the context of changes to VMT and travel speed distribution in response to the proposed Project.

Methodology

All projects that affect criteria pollutant emissions and are proposed within maintenance or nonattainment areas must demonstrate conformity with emission targets established in the controlling SIP. As the proposed Project would not expand transportation network capacity in Rhode Island, conformity with the SIP would be demonstrated under the General Conformity rule established in 40 CFR 93.153 for nonattainment areas located inside an ozone transport region. By demonstrating that project-related emissions would not exceed the *de minimis* criteria of 50 tons for VOC and 100 tons for NO_x in the year during which emissions from the Project is expected to be greatest on an annual basis, a SIP conformity determination may be made to ensure that the proposed Project would neither delay timely attainment nor create new violations of the NAAQS.

To demonstrate that indirect air quality effects from the proposed Project would conform to the SIP, annual vehicular pollutant inventories were developed to represent the change in VOC and NO_x emissions between the future No Toll and future Toll scenarios. Although the calculation of annual pollutant inventories is not required by the General Conformity rule for criteria pollutants that are in attainment of the NAAQS, CO and PM inventories have also been developed and included in this memo for comparison purposes. In addition, this analysis provides a qualitative assessment of the expected effects on MSAT emissions per USEPA and FHWA guidance in the context of changes to VMT and travel speed distribution. As the proposed Project would affect only the regional distribution of existing truck traffic without adding any new capacity to the transportation network, the proposed project would have low potential MSAT effects and result in no appreciable difference in overall MSAT emissions.

The latest state-of-the-science and USEPA-approved Motor Vehicle Emission Simulator (MOVES version 2014a) was used to calculate the annual pollutant emission inventories for both the future No Toll and future Toll scenarios. The MOVES model calculates emission inventories by performing a series of calculations that reflect real-world seasonal variability and vehicle operating

processes in order to estimate total exhaust and evaporative (i.e. fuel system permeation, age-related tank leaks and fuel vapor loss) emissions for all on-road vehicles including cars, trucks, motorcycles, and buses. Contextual MOVES data specific to the Rhode Island highway network—including vehicle fleet age and roadway travel speed distribution, VMT assignment timeframes, drive-activity cycles, formulation and market share of fuel types—are consistent with the latest county-level planning assumptions developed by the Rhode Island Department of Environmental Management (RIDEM) for SIP conformity determinations in Providence, Kent and Washington counties where the proposed Project and potential diversions would be located.

The *Truck Tolling Study* (Louis Berger 2018) identifies the potential size of the truck population that may choose to divert away from each proposed tolling location. Based on the population size identified in that study, the total weekday vehicle miles traveled (VMT) by trucks corresponding to truck diversions from the proposed toll locations to the un-tolled local roadway network was estimated and annualized for input into MOVES. County-level MOVES input data provided by RIDEM were then applied in the model to account for monthly, daily and hourly VMT patterns, travel speed variations as well as seasonal temperature adjustments that affect the rate of vehicle pollutant emissions. The resulting No Toll and Toll scenario MOVES outputs effectively isolate the total annual criteria pollutant emissions corresponding to potential truck diversions in response to the proposed tolling program.

In order to facilitate a worst-case assessment of potential future air quality impacts, year 2016 population size estimates for diverted trucks and year 2016 vehicle emission rates were used in the MOVES model to maximize the total diversion VMT and, correspondingly, the pollutant emission potential of the proposed Project. Details on year 2016 population size data for diverted trucks are presented in the *Traffic Screening Analysis Technical Memorandum* (Jacobs 2018a). It is expected that the population of trucks diverting to local roadways would be largest in year 2016 as natural traffic growth would lead to more congestion on the local roadway network, thereby discouraging diversion away from the proposed tolled bridges where travel times would be faster. Similarly, due to the implementation of the joint United States Department of Transportation and USEPA fuel economy and emissions regulations for medium and heavy duty vehicles, the year 2016 pollutant emission rates would be greater than those of vehicles manufactured in subsequent years which would be subjected to more stringent standards and become slowly integrated into the truck fleet over time.

Analysis of Future Pollutant Inventories

Table 6-14 below summarizes the anticipated change in VMT through each tolled location described in the traffic screening analysis (Jacobs 2018). Total trip lengths in the No Toll scenario were estimated by segmenting the five major highway corridors (I-95, I-195, and I-295, US Route 6, and RI Route 146) by the location of each proposed tolling facility. The total trip length for each of the diversion routes in the Toll scenario were derived from the *Truck Tolling Study* (Louis Berger 2018).

Table 6-14. Project Traffic Assumptions and MOVES Modeling Inputs

Diversion Route	Daily Truck Diversion Population*	No Toll Scenario		Toll Scenario	
		Trip Length (miles)	Annual VMT*	Trip Length (miles)	Annual VMT*
1**	276	9.4	766,645	9.1	742,178
2	176	41.7	2,091,672	33.5	1,680,360
3	122	11.7	415,373	9.1	323,068
4	182	5.3	280,699	3.8	201,256
5	702	7.2	1,443,874	9.2	1,844,950
6	351	7.2	740,470	16.4	1,686,625
7	240	14.9	1,025,120	14.1	970,080
8	216	3.5	222,642	4.9	311,699
9	33	2.5	24,173	1.8	17,404
10	61	3	53,619	0.8	14,298
11	561	1.9	298,452	2.2	345,576
12	187	8.4	457,103	5.1	277,527
13	241	3.9	265,992	3.4	231,890
14	94	39.8	1,097,419	30	827,200
15	351	7.2	740,470	10.7	1,100,420
16	278	4.2	343,858	3.7	302,923
Total	4,071	171.8	10,267,579	157.8	10,877,454

*Based on traffic year 2016 weekday diversion population estimates and annualization factors in *Truck Tolling Study* (Louis Berger 2018).

** Diversion Route 1 is carried forward into the Air Quality Screening Analysis for Diversion Routes 2 – 16 in order to better evaluate pollutant inventories for all potential diversion routes as required by *de minimis* assessment methodology per the General Conformity rule established in 40 CFR 93.153. Initially studied for the *Environmental Assessment for Toll Locations 1 and 2, Hopkinton, Richmond, and Exeter, Rhode Island* (RIDOT and FHWA, 2017) the projected truck diversion population for Diversion Route 1 has since been lowered in the *Truck Tolling Study* (Louis Berger 2018) which provided the population numbers, resulting in correspondingly lower pollutant emissions than initially stated in the Environmental Assessment for Toll Locations 1 and 2.

Based on the above input project parameters, year 2016 annual emission inventories were developed for each criteria pollutant in the MOVES model and summarized in **Table 6-15** below. Since pollutant emissions generally increase as average vehicle travel speed decreases, the change in emissions between the No Toll and Toll scenarios is mainly due to the differences in vehicle

operation activities. The MOVES model takes this into account by incorporating drive-cycle and travel speed assumptions developed by RIDEM for each county based on roadway type. Whereas the majority of trips made by the truck diversion population in the No Toll scenario take place on restricted-access highways at predominantly free-flow speeds, the same vehicle trips diverted to unrestricted local roadways in the Toll scenario would be characterized by increased congestion resulting from more frequent occurrences of vehicle acceleration and deceleration activities at near-idling speeds that increase criteria pollutant emissions. Although total emissions from the diverted truck population in the Toll scenario would be slightly higher than in the No Toll scenario for all criteria pollutants, the increases would be insignificant, ranging from one to less than 13 percent of General Conformity *de minimis* emission thresholds.

Table 6-15. Comparison of Predicted Emission Inventories and *De Minimis* Emission Thresholds

Criteria Pollutant	General Conformity <i>De Minimis</i> Emissions Threshold (tons/year)	Total Emissions from Truck Diversion Population (tons/year)		Magnitude of Toll Emissions per <i>De Minimis</i> Threshold
		No Toll Scenario	Toll Scenario	
CO	100	6.3	7.3	7.3%
PM _{2.5}	100	0.5	0.7	0.7%
NO _x	100	9.8	12.6	12.6%
VOC	50	0.9	1.1	2.1%

The amount of MSAT emitted by the proposed Project would be proportional to VMT in the Toll scenario, which would increase by six percent over the No Toll scenario as shown in **Table 6-16** above. This increase in VMT would lead to higher MSAT emissions in the Toll scenario along diversion roadway corridors, along with a corresponding decrease in MSAT emissions at the proposed toll locations. Regardless of the increased VMT, MSAT emissions will likely be lower than present levels in later years as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050 (Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016.) Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates as well as local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions are likely to be lower in future years at virtually all locations. As there may be localized areas where VMT would increase and other areas where VMT would decrease, it is possible that localized increases and decreases in MSAT emissions may occur. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of USEPA's vehicle and fuel regulations.

Summary of Findings

The proposed Project would indirectly affect emissions of criteria air pollutants in the region due to potential truck traffic diverting from the proposed toll locations on predominately restricted-access highways to the local unrestricted-access roadway network. Based on worst case MOVES modeling of diverted truck emissions per pollutant inventories developed to assess the corresponding change in vehicle speed and operation activities (e.g., idling, braking and acceleration) and VMT, the total annual pollutant emissions related to the Toll scenario of the proposed Project would be below *de minimis* annual emission limits established by 40 CFR 93.153 General Conformity requirements for all criteria pollutants of concern.

Total pollutant emissions in the Toll scenario in year 2016, which is the year during which total emissions from the Project is expected to be the greatest on an annual basis, are predicted to be less than 13 percent of *de minimis* emission thresholds. As such, the proposed Project would not cause or contribute to new violations of any CO and PM_{2.5} NAAQS, nor worsen the existing violation of the 2008 eight-hour ozone NAAQS. For future MSAT emissions in the Toll scenario, it is expected there would be reduced MSAT emissions in the immediate area of potential diversion routes due to USEPA's MSAT reduction programs. As such, the proposed Project would have no adverse effect on ambient air quality and would conform to all regional air quality attainment goals and commitments expressed in the Rhode Island SIP.

Although local inhalable PM, CO, and dust concentrations stemming from construction activities related to toll gantries may be of concern, any increase in emissions as a result of construction activities are only temporary and would be self-correcting once the project is completed. Air quality conformity requirements do not apply to effects from short-term construction activities. Therefore, modeling analyses of short-term elevated emissions are not warranted and the temporary effects of project construction on local and regional air quality would not be significant. During the construction phase of the project, effective control measures to limit airborne PM and dust during construction would be taken including the wetting of exposed soil, covering of trucks and other dust sources, and other best practices as practicable.

6.3.5 Impacts of Diversions on Noise and Vibration

Analysis of Noise Impacts

A noise screening analysis was conducted to determine whether noise impacts would occur along the potential diversion routes (Diversion Routes 2 through 16) as a result of increased truck traffic created by trucks potentially avoiding tolls at Toll Locations 3, 4, and 6 through 13 (Jacobs 2018c). Sound from roadway traffic is generated primarily by the tires, engine, and exhaust system of vehicles. Sound is measured in sound pressure levels. The most common unit of measurement is a decibel, dB. For the purposes of environmental studies, the A-weighted scale on a common sound level instrument is used since this scale closely approximates the range of frequencies an average human ear can detect. The A-weighted noise levels are defined as dBA.

In typical urban, suburban and highway environments, changes in noise of 1 dBA to 2 dBA are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dBA in these environments. Further, a 5 dBA increase is generally perceived as a distinctly noticeable increase, and a 10 dBA increase is generally perceived as a doubling of loudness. However, a doubling of loudness is not the same as doubling the volume of

traffic on a highway. If traffic volumes were to double on a highway, it is generally accepted that this would result in a 3 dBA increase in sound and would generally be perceived as barely detectable.

Traffic sound levels can vary due to changing number, type, and speed of vehicles. Therefore, traffic noise is typically measured as a single value and used to represent the average or equivalent sound level expressed as Leq.

Sound that reaches a receptor can be affected by divergence which is the spreading of sound waves from a sound source. Generally, sound levels for a point source (construction activities) and line source (continuous traffic) will decrease by 6 dBA and 3 dBA for each doubling of distance, respectively.

The noise screening analysis used the FHWA Traffic Noise Model (TNM) 2.5 to predict traffic noise levels with implementation of the proposed tolling and without. The noise model inputs included roadways and receptors based on flat ground, traffic volume projections, fleet mix, and vehicular speeds. Site characteristics such as topography were not included in the model since most diversion routes are generally flat. Representative receptor points (based on various distances) were modelled to determine noise level contours. The purpose of a basic flat model was to develop noise contours based on peak hour truck diversion to screen for potential noise impacts instead of conducting detailed noise modelling along each diversion route.

For each diversion route, all roadway segments were modelled to show where noise levels vary depending on traffic volumes, truck percentages, roadway types, and posted speeds. However, where traffic and roadway characteristics were similar, one segment was selected as a worst-case scenario. The diversion route segments were modelled using the peak hour directional traffic volumes during the time when diversion of trucks is highest. This traffic data was applied to both directions of travel for a worst-case scenario.

Analysis of 2040 noise levels was not conducted since 2040 diversion volumes are lower than 2016 diversion volumes. Therefore, since diversion volumes are higher in 2016, this would be the worst-case analysis year.

Traffic Data

Jacobs conducted a traffic analysis for Toll Locations 3, 4 and 6 through 13 and the corresponding potential diversion routes (Diversion Routes 2 through 16). To assess the potential of diversion along each diversion route, Jacobs identified those segments of parallel roadway(s) that had the potential for traffic diversion as a result of proximity to the toll locations and entry and exit points along the tolled routes. These segments are referred to as “Segment Locations”. The highest peak hour (PM peak) and peak direction was selected for the traffic analysis using information (including amount of diverting trucks) from various sources including RIDOT, the *Truck Tolling Study* (Louis Berger 2018) as well as independent traffic count and turning movement count data collected for the traffic analysis. More detailed information on traffic can be found in the *Traffic Impact Screening Analyses for Toll Locations 3, 4, and 6 through 13 Technical Memorandum* (Jacobs 2018a).

Although the traffic analysis focused on the highest peak hour (PM peak), the peak hour during the time when the diversion of trucks is highest was used for this noise screening analysis because noise level increases are generally higher with a higher volume of truck traffic diverting. The highest diversion of trucks was added to the highest peak hour of overall traffic volumes. Therefore, the AM peak hour was used for diverting trucks and the PM peak hour was used for the highest overall traffic volume to represent a worst-case scenario. **Table 6-16** below summarizes the traffic data used for the noise screening analysis. The table shows the peak hour directional traffic volumes including the diversion of trucks. As noted above, although this table shows the traffic volume in the peak hour direction, both directions were modeled for the noise analysis as a worst-case scenario.

Table 6-16. 2016 Peak Hour Directional Traffic and Posted Speed Limits

<u>Diversion Route Segment</u>	<u>Total Number of Travel Lanes</u>	<u>Posted Speed Limit (mph)</u>	<u>2017 No Toll</u>		<u>2017 Toll</u>	
			<u>Peak Direction Only</u>			
			<u>Automobiles</u>	<u>Truck (%)</u>	<u>Automobiles</u>	<u>Truck (%)</u>
Diversion Route 2						
Segment 1 – RI Route 102 between I-95 and RI Route 117	2 Lanes Undivided	35	496	26 (5%)	496	33 (6%)
Segment 2 - RI Route 102 between RI Route 117 and N. Scituate Bypass (RI Route 6)	2 Lanes Undivided	45	330	25 (7%)	330	32 (9%)
Diversion Route 3						
Segment 1 – Post Road (RI Route 1) between RI Route 403 and RI Route 401	4 Lanes Undivided	35	927	39 (4%)	927	45 (5%)
Segment 2 – Post Road (RI Route 1) between RI Route 401 and RI Route 117	2 Lanes Undivided	35	552	11 (2%)	552	17 (3%)
Diversion Route 4						
Segment 1 – Bald Hill Road (RI Route 2) between I-95 and East Road (RI Route 113)	4 Lanes Undivided	35	1,142	35 (3%)	1,142	45 (4%)
Diversion Route 5						
Segment 1 – Tiogue Avenue (RI Route 3) between I-95 and Sandy Bottom Road (RI Route 33)	4 Lanes Undivided	45	942	19 (2%)	942	48 (5%)
Segment 3 Main Street (RI Route 33/117) between Sandy Bottom Road (RI Route 33) and Knotty Oak Road (RI Route 116)	2 Lanes Undivided	35	864	9 (1%)	864	38 (4%)
Segment 4 – Knotty Oak Road (RI Route 116) between Main Street (RI	2 Lanes Undivided	35	467	19 (4%)	467	48 (9%)

**Environmental Assessment
Toll Locations 3, 4 & 6 through 13**

<u>Diversion Route Segment</u>	<u>Total Number of Travel Lanes</u>	<u>Posted Speed Limit (mph)</u>	<u>2017 No Toll</u>		<u>2017 Toll</u>	
			<u>Peak Direction Only</u>			
			<u>Automobiles</u>	<u>Truck (%)</u>	<u>Automobiles</u>	<u>Truck (%)</u>
Route 33/117) and Scituate Avenue (RI Route 12)						
Diversion Route 6						
Segment 1 - (RI Route 12) between Knotty Oak Road (RI Route 116) and Phenix Avenue (RI Route 12)	2 Lanes Undivided	45	713	30 (4%)	713	44 (6%)
Segment 2 – RI Route 12) between Scituate Avenue (RI Route 12) and Atwood Avenue (RI Route 5)	2 Lanes Undivided	25	677	7 (1%)	677	21 (3%)
Segment 3 Atwood Avenue (RI Route 5) between Phenix Avenue (RI Route 12) and Greenville Avenue	2 Lanes Undivided	30	774	49 (6%)	774	63 (8%)
Segment 4 - Greenville Ave./Sanderson Road between Atwood Avenue (RI Route 5) and Putnam Pike (RI Route 44)	2 Lanes Undivided	40	457	40 (8%)	457	54 (11%)
Segment 5 - Putnam Pike (RI Route 44) between Sanderson Road (RI Route 5) and I-295	4 Lanes Undivided	35	1151	48 (4%)	1151	76 (6%)
Diversion Route 7						
Segment 1 – Manton Avenue/Woonasquatucket Avenue between RI Route 10 and Centerdale Bypass	2 Lanes Undivided	25	442	9 (2%)	442	16 (3%)
Segment 3 – Douglas Pike (RI Route 7) between Farnum Pike (RI Route 5) and Farnum Pike (RI Route 104)	2 Lanes Undivided	35	740	31 (4%)	740	38 (5%)
Diversion Route 8						
Segment 1a - N. Broadway between I-195 and Henderson Expressway	2 Lanes Undivided	25	630	20 (3%)	630	28 (4%)
Segment 1b - Allens Ave. between I-95 and Point Street 1A) to Point Street	4 Lanes Undivided	25	1,066	80 (7%)	1,066	88 (8%)
Segment 3 - Waterman St./Henderson Bridge between Butler Avenue and N. Broadway	4 Lanes Undivided	35	1,379	43 (3%)	1,379	51 (4%)

**Environmental Assessment
Toll Locations 3, 4 & 6 through 13**

<u>Diversion Route Segment</u>	<u>Total Number of Travel Lanes</u>	<u>Posted Speed Limit (mph)</u>	<u>2017 No Toll</u>		<u>2017 Toll</u>	
			<u>Peak Direction Only</u>			
			<u>Automobiles</u>	<u>Truck (%)</u>	<u>Automobiles</u>	<u>Truck (%)</u>
Diversion Route 9						
Segment 1 – Broadway (RI Route 1) between Central Avenue and I-95	4 Lanes Undivided	25	561	30 (5%)	561	32 (5%)
Segment 2 – Central Avenue between Cottage Street and Broadway (RI Route 1)	2 Lanes Undivided	25	311	16 (5%)	311	18 (5%)
Segment 3 – Cottage Street between Newport Avenue (RI Route 1A) and Central Avenue	2 Lanes Undivided	25	589	12 (2%)	589	14 (2%)
Diversion Route 10						
Washington Street (RI Route 1) between Roosevelt Avenue and I-95	2 Lanes Undivided	25	473	20 (4%)	473	23 (5%)
Diversion Route 11						
Segment 1 Mendon Road (RI Route 122) between I-295 and Angell Road (RI Route 116)	2 Lanes Undivided	35	877	46 (5%)	877	70 (7%)
Segment 2 - Angell Road (RI Route 116) between Mendon Road (RI Route 122) and Diamond Hill Road (RI Route 114)	2 Lanes Undivided	40	449	14 (4%)	449	33 (7%)
Diversion Route 12						
Segment 1 – RI Route 122 between I-95 and Dexter Street	2 Lanes Undivided	35	528	28 (5%)	528	33 (6%)
Diversion Route 13						
RI Route 146A between RI Route 146 and S. Main Street	2 Lanes Undivided	35	474	5 (1%)	474	12 (2%)
Diversion Route 14						
Segment 1 - Victory Highway/Ten Rod Road (RI Route 102) between Nooseneck Hill Road (RI Route 3) and RI Route 4	2 Lanes Undivided	40	531	34 (6%)	531	44 (8%)
Segment 3 - RI Route 138/138A between RI Route 4 and Admiral Kalbfus Road	4 lanes divided	55	1,391	89 (6%)	1,391	99 (7%)
Segment 4 - Admiral Kalbfus Road between RI Route 138A and W. Main Road	2 Lanes Undivided	25	747	8 (1%)	747	18 (2%)

<u>Diversion Route Segment</u>	<u>Total Number of Travel Lanes</u>	<u>Posted Speed Limit (mph)</u>	<u>2017 No Toll</u>		<u>2017 Toll</u>	
			<u>Peak Direction Only</u>			
			<u>Automobiles</u>	<u>Truck (%)</u>	<u>Automobiles</u>	<u>Truck (%)</u>
Diversion Route 15						
Segment 1 - W. Greenville Road (RI Route 116) between N. Scituate Ave. (RI Route 12) and Hartford Pike (RI Route 6)	2 Lanes Undivided	40	328	29 (8%)	328	43 (12%)
Segment 3 - Snake Hill Rd. between Smith Avenue (RI Route 116) and Putnam Pike (RI Route 44)	2 Lanes Undivided	25	559	23 (4%)	559	37 (6%)
Segment 4 - Putnam Pike (RI Route 44) between Snake Hill Road and I-295	4 Lanes Undivided	35	1,225	51 (4%)	1,225	76 (5%)
Diversion Route 16						
Segment 1 - Putnam Pike (RI Route 44) between Snake Hill Road and I-295	4 lanes divided	55	4,214	43 (1%)	4,214	53 (1%)

Noise Screening Analysis Results

The results of the noise screening analysis for both no-toll and toll conditions along Diversion Routes 2 through 16 are provided in **Appendix F**. Noise levels are anticipated to increase as a result of potential diversions of trucks due to the implementation of the proposed tolling at Toll Locations 3, 4, and 6 through 13.

Diversion Routes 5 and 6 would have the highest diversion of trucks and noise levels would minimally exceed the 3 dBA threshold at approximately 100 feet and 400 feet or more along Segments 3 and 4 of Diversion Route 5 and at approximately 400 feet or more along Segment 2 of Diversion Route 6. Segment 3 of Diversion Route 5 has an existing low truck percentage and may experience an increase of up to 29 trucks. Segment 4 of Diversion Route 5 has an existing low traffic volume and may experience an increase up to 29 trucks. Because of this large increase in trucks in the context of the current low volumes and truck percentages, noise levels would exceed 3 dBA by approximately 0.4 to 1.3 dBA (3.4 – 4.3 dBA) between 100 to 400 feet from the roadway along Segment 3. In addition, noise levels would exceed 3 dBA by approximately 0.1 dBA (3.1 dBA) at approximately 400 feet along Segment 4. However, noise levels are likely to be lower than what was predicted based on worst-case traffic assumptions as discussed above. In addition, shielding by other intervening objects within the propagation path, as discussed above, has not been accounted for in the model. Given the distance from the roadway to the receptors that would experience an increase above 3 dBA (400 feet or more), noise levels would likely be lower due to intervening objects and potential changes in topography.

Similarly, Segment 2 of Diversion Route 6 currently has low truck percentage and may also experience an increase up to 28 trucks as a result of implementation of the tolling systems. This would also result in noise levels exceeding 3 dBA by approximately 0.1 dBA (3.1 dBA) at approximately 400 feet or more along Segment 2 of Diversion Route 6. Shielding by other

intervening objects within the propagation path, as discussed above has not been accounted for in the model. Given the distance from the roadway to the receptors that would experience an increase above 3 dBA (400 feet or more), noise levels would likely be lower due to intervening objects and potential changes in topography.

Significant noise impacts are not anticipated as a result of construction and operation of the toll systems at Toll Locations 3, 4 and 6 through 13. Therefore, more detailed analysis of noise impacts is not recommended at this time.

Analysis of Vibration Impacts

Although there are no federal requirements directed specifically to highway traffic induced vibration, a literature review was performed in response to concerns regarding the potential for vibration impacts to historic structures. The following analysis of vibration impacts was performed utilizing the Federal Transit Administration's (FTA) vibration guidance set forth in *Transit Noise and Vibration Impact Assessment* (FTA 2006). Because this Project is associated with tractors or truck tractor as defined in 23 CFR 658.5, the FTA construction criteria was used to assess the potential for both operational and construction vibration impacts. **Table 6-17** shows the construction vibration damage criteria from the FTA *Noise and Vibration Impact Assessment* manual.

Potential Vibration Damage

The FTA manual also sets forth vibration limits for potential vibration damage to neighboring buildings. These limits are also included in **Table 6-17** for various types of buildings, and shows that the most stringent vibration level that could potentially cause damage to a building is 90 VdB.

Table 6-17. Construction Vibration Damage Criteria

Building Category	PPV, in/sec	Approximate L_v^*
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

* Root-mean-square (RMS) velocity in decibels, VdB re 1 micro-in/sec
Source: FTA 2006

Typical measured vibration levels from construction equipment are presented below in **Table 6-18** which shows that loaded construction trucks have a vibration level of 86 VdB at a distance of 25 feet from the source. This level is below the most stringent criteria for potential structural damage of 90 VdB. Additionally, the vibration levels from loaded construction trucks are conservative when compared to trucks that typically operate on the interstate highway. Therefore, operational vibration levels would be even lower.

Table 6-18. Vibration Source Levels for Construction Equipment

Equipment		Peak Particle Velocity at 25 ft, in/sec	Approximate Lv* at 25 ft
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.17	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

* Root-mean-square velocity levels in decibels, VdB re 1 micro-in/sec
Source: FTA 2006

Based on this research, there is no potential for vibration damage to any buildings as a result of the **Proposed Action Alternative**.

6.3.7 Impacts of Diversions on Social Resources (including Environmental Justice Populations)

As described in Section 5.13 and Section 5.14, the study area contains numerous social and community resources, as well as low-income, minority, and other vulnerable populations. Figures in this Chapter 6 identify environmental justice areas along the diversion routes. The Environmental Justice Screening Analysis technical memo (Jacobs 2018c) is included in **Appendix F**. Indirect impacts on community resources, property values, local mobility, pedestrian and cyclist mobility, and community cohesion typically are the result of new or relocated roads, new destinations attracting significant traffic, relocated interchanges and ramps, or other major changes in accessibility. Construction of the Project would not alter accessibility, change land use patterns, widen or modify roads or intersections, or take property.

The intersection and segment analyses discussed in Section 6.3.2 indicated an insignificant change in average speeds (reduction between 0.0 and 2.0 mph) such that they would be imperceptible to the drivers. Only one signalized intersection (Phenix Avenue at Atwood Avenue) on Diversion Route 6 is estimated to have a change in LOS due to the addition of diverted truck traffic. While there is estimated to be a change in the LOS, this change is estimated to be only 0.5 seconds of additional delay in 2016. This slight increase in delay would be imperceptible to the drivers of the route. There are no changes estimated in LOS for the stop-controlled intersections that would affect social resources.

In addition, while some diversion routes may experience greater volumes of truck traffic, no adverse effect on ambient air quality would occur (see Section 6.3.4) and substantial noise impacts are not anticipated (see Section 6.3.5). Therefore, operation of the toll systems and potential use

of the diversion routes are not expected to expose vulnerable populations or other community facilities to measurable adverse noise or air quality conditions.

Overall, the volume of truck traffic (existing and diverted) would not affect access to community facilities; would not cause any displacement; would not result in disproportionate high and adverse impacts to low-income, minority, or other vulnerable populations; would have no effect on property values; and would not be numerous enough to negatively impact the enjoyment of pedestrians and cyclists using these routes. For these reasons, the **Proposed Action Alternative** would not result in measurable impacts to social resources.

6.3.8 Impacts of Diversions on Historic and Archeological Resources

As discussed in the due diligence memorandum prepared for potential diversion routes (PAL 2017a), included in **Appendix D**, there are numerous historic properties listed, determined eligible, or potentially eligible, for listing in the National Register that are located along Diversion Routes 2 - 16 that may be affected by the increase in diversion truck traffic. However, based on the available information assembled from RIHPHC site files and the field review, any potential increase in truck traffic on Diversion Routes 2 - 16 would have no adverse effect on the historic properties, historic cemeteries, or resources that have not been evaluated and may be eligible for listing in the National Register. All potential Diversion Routes are currently used by trucks and any potential increase in truck traffic is not expected to result in an increase in direct (vibration) or indirect (noise, visual, air quality) impacts to these resources.

This conclusion is based on the review prepared for each diversion route and supported by the analyses and findings of the traffic, noise, vibration, visual, and air quality sections of this EA. Detailed traffic analyses was conducted and results for each Diversion Route are presented in the memorandum titled *Traffic Impact Screening Analyses for Toll Locations 3, 4, and 6 through 13* (Jacobs 2018a), located in Appendix F. The roadway segment analysis and intersection results show an insignificant change in average speeds, level of service and delay such that it will be imperceptible to drivers along the route and would not result in indirect traffic impacts on Diversion Routes for Toll Locations 3, 4 and 6 through 13. Technical analysis and findings for noise, vibration and air quality are also included in Appendix F. As an example of how the supporting technical analysis was used, Section 5.17 and 6.3.5 concluded there will be no potential for vibration damage to vibration sensitive buildings which would include historic buildings. Because the noise impacts from the increase in truck traffic is imperceptible to minor, it can be derived that the function and setting of historic properties would not be adversely affected by any increase in noise. Therefore, the **Proposed Action Alternative** would have no adverse effect on historic or archeological resources.

6.3.9 Impacts of Diversions on Open Space, Section 4(f), and Section 6(f) Properties

All potential Diversion Routes are located on existing roadways currently used by trucks. The potential for indirect impacts to open space resources, including Section 4(f) properties and conservation land and recreation areas, from increases in truck volumes was considered.

As shown in the traffic analyses, the volume of truck traffic likely to divert is small. This limited increase in truck traffic along Diversion Routes 2 through 16 would not increase, limit, or change access to any open space parcel. As previously discussed, there may be negligible to minor increases in noise and air emissions from the small increase in truck traffic. However, no physical

encroachment on open space, Section 4(f) properties, or other conservation or recreation areas would occur. For these reasons, the **Proposed Action Alternative** would not substantially impair the activities, features, or attributes that qualify Section 4(f) properties for protection and are located along Diversion Routes 2 through 16. No other Section 4(f) reviews or approvals are necessary. In addition, the Project would not result in adverse, indirect impacts to open space or other conservation land and recreation areas.

6.3.10 Impact of Diversions on Trucks Assessed with Tolls

This section discusses the impacts to drivers of trucks that choose to avoid the assessment of tolls at Toll Locations 3, 4, and 6 through 13.

There are numerous routes that run roughly parallel to I-95, I-195, and I-295, US Route 6, and RI Route 146, and in some cases the distances of the potential diversion routes are similar to these major highways. However, these major highway corridors are all designed for interstate commerce and the efficient movement of goods. Data collected on Diversion Routes 2 through 16 and these major highways (*Truck Tolling Study* [Louis Berger 2018]), indicate that diversion traffic will experience increases in travel time ranging from as low as one minute upwards of 21 minutes. The amount of additional time is based on time of day, length of route, and other factors such as number of signalized intersections and turning movements. The toll rates assigned to Toll Locations 3, 4, and 6 through 13 will be fixed in recognition of the diversion travel time and the trucker's value of time (VOT) and expenses. Therefore, the impact of the **Proposed Action Alternative** on truckers seeking to use Diversion Routes 2 through 16 would be minor increases in time to their routes and at their own discretion.

The cumulative impact of tolling on trucks is discussed below in Section 6.4.

6.3.11 Economic Impact on Trucks Assessed with Tolls

To evaluate the **Proposed Action Alternative** for economic impacts, this section focuses on the economic impact of the tolls assessed on tractors or truck tractors as defined in 23 CFR 658.5, pulling a trailer or trailers travelling across select bridges associated with Toll Locations 3, 4, and 6 through 13 (trucks subject to tolls). Although RIDOT has not approved specific toll rates at this time, for the purposes of this analysis, toll rates used in the *Truck Tolling Study* (Louis Berger 2018) were assumed. As required by the RhodeWorks legislation (RI Gen L § 42-13.1-4), the "tolls shall be fixed after conducting a cost-benefit analysis and providing an opportunity for public comment." When determining toll rates for the Ten Toll Locations, RIDOT shall include the following limits on the assessments of tolls upon the same individual tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers using RFID which are established in the RhodeWorks legislation:

- Tolls are limited to once per toll facility, per day in each direction;
- Tolls are limited to a \$20 total for a border-to-border through trip on I-95 from Connecticut to Massachusetts; and
- Tolls will not exceed \$40 per day.

Based on these factors, the minimum assessment of tolls would range from \$2.00 to \$10.00 if passing through only one toll location, in the same direction and in the same day, and would range upwards to the \$20.00 or \$40.00 maximum depending on route and if passing through multiple

toll locations, or in both directions in the same day. As part of the *Truck Tolling Study*, a stated preference (SP) survey was conducted. Using discrete choice modeling techniques, the resulting SP data was then used to understand truck drivers' (VOT) or willingness-to-pay (WTP) for any potential travel time savings and other benefits of not diverting. If a driver perceived that the impacts of the tolls are too severe, they would seek alternate routes to avoid the tolls and would experience the impact of increased time as noted above in Section 6.3.10.

Based on this analysis, although tolls implemented by the Proposed Action Alternative would add an additional expense for drivers, the rates have been formulated to balance a driver's VOT and expenses to reduce potential diversions such that sufficient revenue is generated, and yet no substantial impact to truck drivers would occur. In addition, the Rhodeworks legislation has placed daily maximums on individual trucks to limit the economic impact on trucks assessed tolls.

6.4 Cumulative Impacts

This section analyzes the cumulative impacts of the Proposed Action Alternative when added to other past, present, and reasonably foreseeable future actions.

To determine the overall health of each resource within the cumulative study area, information was reviewed from RIDOT, the RIGIS database, Environmental Systems Research Institute, community coordination, available community GIS databases, literature searches, and site investigations, as well as input received from agencies and stakeholders, and actions taken by others. The environmental impacts of other past, present, and reasonably foreseeable projects and plans (which includes the No Action Alternative) were considered in light of the impacts of the Proposed Action Alternative to determine whether cumulative impacts could occur. Ultimately, a resource was only considered for cumulative impact analysis if the Proposed Action's incremental contribution to cumulative impacts on a resource was deemed to be substantial enough to potentially affect the overall health of the resource such that a significant cumulative impact may result.

The following resources are present within either the LOD of Toll Locations 3, 4, and 6 through 13, or within the corridors of Diversion Routes 2 through 16, but would experience either no impact or negligible impacts from the Proposed Action Alternative and, therefore, would add no measurable contribution to cumulative impacts and are not considered further in the cumulative impact analysis: land use; transportation network; farmland/soils; wetlands and other waters of the U.S. and State; floodplains; groundwater resources, aquifers and reservoirs; open space, Section 4(f), and Section 6(f) properties; wild, scenic, and recreational rivers; federal threatened and endangered species, state natural heritage species, and migratory birds; historic and archeological resources; environmental justice populations; social resources; visual resources; noise/vibration; and hazardous materials.

Due to the nature of these resources and the methods for assessing impacts upon them, the prior assessment of direct and indirect impacts has already considered and accounted for cumulative effects on these resources. For example, the *Truck Tolling Study* (Louis Berger 2018) was developed using a customized version of the Rhode Island Statewide Model (RISM). RISM is a four-step travel demand model developed and maintained by the Rhode Island Statewide Planning Program that covers the state of Rhode Island plus bordering communities in Connecticut and Massachusetts. RISM includes population and household forecasts based on statewide and municipal population projections, as well as employment forecasts developed specifically for the RISM. Therefore, the assumptions which form the basis for the impact analysis on traffic, air quality, and noise for example, are founded on regional socioeconomic and demographic data, and rely on a travel demand model (with adjustment and customization) that reflects current and future conditions.

Cumulative Impacts of Proposed Action

The principal document used to support the cumulative impact analysis is the *Truck Tolling Study*, from which several observations can be drawn. As previously discussed in Section 6.3.11 a SP survey was conducted as part of the study. Using discrete choice modeling techniques, the resulting SP data was used to understand truck drivers' VOT or WTP for any potential travel time savings

and other benefits of not diverting to a non-tolled roadway. The potential effect of long distance through movement diversions around the state of Rhode Island was also evaluated, and it was determined that no alternative route provides a competitive advantage over the tolled I-95 route through Rhode Island. Fifty-eight percent of the SP survey respondents used a tolled road or bridge as part of their current trip. The SP survey also indicated that the median driver income is estimated at approximately \$74,000 (implying an hourly wage of approximately \$35 an hour), and 18 percent of drivers reported incomes of at least \$100,000. The *Truck Tolling Study* (Louis Berger 2018) indicates that 55.8 percent of truck trips are entirely within Rhode Island, 38.5 percent have only one trip end in Rhode Island, and 5.5 percent are through trips that have neither trip end in Rhode Island.

There are several financial variables that frame the parameters for assessing the cumulative impacts of the toll assessments, including:

- Toll rates at Toll Locations 1 and 2 are assumed to range from \$3.50 to \$4.50;
- Tolls are limited to once per toll facility, per day in each direction;
- Tolls are limited to a \$20.00 total for a border-to-border through trip on I-95 from Connecticut to Massachusetts; and
- Tolls will not exceed \$40.00 per day.

From these variables and observations, the following conclusions can be drawn. The existing (baseline) economic impact of existing tolls on a tractor or truck tractor as defined in 23 CFR 658.5, pulling a trailer or trailers is difficult to assess since the specific origins, destinations, and intermediate routes of all trucks passing through Rhode Island are unknown. However, the SP survey indicated that over 50 percent of these drivers are already paying tolls in other states and would therefore experience cumulative impacts from the Proposed Action Alternative. As discussed in Section 6.2.16, the impact of the Proposed Action Alternative would range from a minimum of \$2.00 per day to the same individual truck, to a cumulative maximum impact to these same trucks using RFID technology of \$20.00 for through trips on I-95, and \$40.00 maximum per day in Rhode Island.

Tolls will not be assessed at Toll Locations 3, 4, and 6 through 13 under the **No Action Alternative**. However, existing toll assessments at other toll locations outside the state of Rhode Island and at Toll Locations 1 and 2 within Rhode Island will continue to be paid tractors or truck tractors as defined in 23 CFR 658.5, pulling a trailer or trailers.

The **Proposed Action Alternative** would add an additional expense for drivers, many of whom are already paying tolls at other locations. However, the toll rates at Toll Locations 3, 4, and 6 through 13 have been formulated to balance a drivers' VOT and expenses, including the consideration of tolls at other locations, such that no significant economic impact to drivers of tractors or truck tractors as defined in 23 CFR 658.5, pulling a trailer or trailers would occur.

Chapter 7 Public Involvement

A Public Involvement Plan (PIP) identifies outreach goals and objectives for public involvement and is developed for the specific circumstances of a given transportation project. The PIP that has been developed for this Project focuses on information exchange and education. It has been prepared by RIDOT in cooperation with FHWA pursuant to RI Gen L § 24-8-1.7 and in accordance with FHWA regulations governing coordination, public involvement and project development found in 23 CFR 771.111. The PIP is provided in **Appendix E** and builds off the public involvement process and input received from the public preceding the passing of *The Rhode Island Bridge Replacement, Reconstruction and Maintenance Fund Act of 2016*.

Key activities of the PIP include:

- Project Notification Letters. Project notification and early coordination to solicit initial comments and information regarding the Project.
- Stakeholder Interviews. Outreach via telephone was made with town planners or other local officials focusing on reconnaissance and understanding stakeholder issues and concerns.
- Project Web Page. RIDOT's RhodeWorks website was expanded to include a page dedicated to the Project and include key facts about the Project, proposed schedule, a comment form, and instructions on how to sign up for updates and keep up to date.
- Fact Sheet. A Fact Sheet with key information about the Project is available on the website. The Fact Sheet will continue to be disseminated to interested parties if requested.
- Public and Agency Review of EA. The EA will be made available for agency and public review and comment.
- Public Hearing. During the public comment period on the EA, RIDOT and FHWA will conduct a public hearing to provide elected officials, agencies, stakeholders, and the public an opportunity to comment on the EA.

Public and Agency Review of EA

In coordination with the FHWA, the RIDOT circulated a Notice of Availability of the July 6, 2018 EA to all appropriate agencies, departments, commissions, and other branches of government at the federal, state, and local level. The notice advised recipients of where and how the EA can be viewed (in electronic or hard copy format), how to submit written comments on the EA and its contents, and included notification of the public hearing. Copies of the notification letters are included in **Appendix H**.

The RIDOT also notified the general public of availability of the EA through newspaper advertisements (placed in the *Providence Journal* (English and Spanish), *Westerly Sun*, *Valley Breeze* (English and Spanish), *Cranston Herald*, *the Warwick Beacon*, and *Attleboro Sun Chronicle*) and on the Department's official website (where the EA was also made available for viewing or download). Members of the public were invited to submit written comments on the EA by email, comment form, or letter. Notification of the public hearing was also provided in the notice. The notices were published on July 12, July 18, August 2, and August 16, 2018 (included in Appendix H).

The RIDOT accepted comments from stakeholders and the general public for a 30-day period following publication of the EA through August 24, 2018. Documentation of the comments received during the review period and RIDOT responses are included in Appendix H.

Public Hearing

During the public comment period for the EA, RIDOT held public hearings and workshops to provide agencies, stakeholders, and the public an opportunity to comment on the EA. The hearings were held on June 27, 2018 and August 21, 2018, 6:00PM at Toll Gate High School in Warwick, RI; Mount Pleasant High School in Providence, RI; and Central Falls High School in Central Falls, RI. Notice of the Hearings were included in the Notice of Availability of the EA and Public Hearing/Workshop letter sent to all appropriate agencies, departments, commissions, and other branches of government at the federal, state, and local level, and published for the general public in the *Providence Journal* (English and Spanish), *Westerly Sun*, *Valley Breeze* (English and Spanish), *Cranston Herald*, *the Warwick Beacon*, and *Attleboro Sun Chronicle*. (Appendix H).

The public workshops preceded the public hearings and consisted of a presentation, display graphics on easels (available in **Appendix H**). A full copy of the EA was also made available. The workshops were presented by RIDOT staff.

The Public Hearings were opened after the workshop and administered by RIDOT staff. All comments were transcribed formally. The transcripts, sign in sheets, and RIDOT responses are included in **Appendix H**.

Chapter 8 Public and Agency Coordination

Project coordination was carried out with federal, state, and tribal entities, communities with toll locations and/or diversion routes, and organizations during the preparation of the EA (see coordination list below).

Project Notification

Project Notification letters were sent in accordance with the National Environmental Policy Act of 1969 regarding project notification and early coordination to solicit initial comments and information regarding the Project. Comments received related to traffic, toll rates, historical properties, visual and environmental justice populations.

Section 106 Consultation

Letters for the Section 106 consultation process were sent to RIHPHC, Massachusetts Historical Commission, Tribal Historic Preservation Officers (THPOs) for four Native American Tribes, and the communities with toll locations and/or diversion routes. These letters, comments received and response letters to consulting parties are provided in **Appendix D**.

Notice of Availability

Notice of Availability (NOA) letters were mailed to elected officials, federal, state, and tribal entities, and communities with toll locations and/or diversion routes, and organizations. NOA was also published in several newspapers as listed in Chapter 10.

Public Hearing

RIDOT held public hearings and workshops to provide agencies, stakeholders, and the public an opportunity to comment on the EA. The hearings were held on June 27, 2018 and August 21, 2018, 6:00PM at Toll Gate High School in Warwick, RI; Mount Pleasant High School in Providence, RI; and Central Falls High School in Central Falls, RI. Notice of the Hearings were included in the Notice of Availability of the EA and Public Hearing/Workshop letter sent to all appropriate agencies, departments, commissions, and other branches of government at the federal, state, and local level, and published for the general public in the *Providence Journal* (English and Spanish), *Westerly Sun*, *Valley Breeze* (English and Spanish), *Cranston Herald*, *the Warwick Beacon*, and *Attleboro Sun Chronicle*. (**Appendix H**).

The public workshops preceded the public hearings and consisted of a presentation, display graphics on easels (available in **Appendix H**). A full copy of the EA was also made available. The workshops were presented by RIDOT staff.

The Public Hearings were opened after the workshop and administered by RIDOT staff. All comments were transcribed formally. The transcripts, sign in sheets, and RIDOT responses are included in **Appendix H**.

Coordination List

The following list includes federal, state, and tribal entities, communities with toll locations and/or diversion routes, and organizations that receive one or all of the various notifications/consultation relative to the EA.

State and Federal Elected Officials

Federal Agencies

FHWA Headquarters and Rhode Island Division
NPS
USEPA REGION 1
USFWS
USACE –NE Region
USDA Natural Resources Conservation Services

Native American Tribes

Mashantucket Pequot THPO
Narragansett THPO
Wampanoag Tribe of Gay Head/Aquinnah THPO
Mashpee Wampanoag Tribe THPO

State Agencies

RI Department of Environmental Management
RI Historical Preservation and Heritage Commission
RI Public Utilities Commission
RI Public Transit Authority
RI Statewide Planning Program
RI League of Cities and Towns
RI Coastal Resources Management Council
RI Dept. of Administration

Massachusetts Historical Commission
Massachusetts Department of Transportation
Connecticut Department of Transportation

Rhode Island Communities with Toll Location and/or Potential Diversion Routes

Burrillville
Central Falls
Coventry
Cranston
Cumberland
East Greenwich
East Providence

Exeter
Foster
Glocester
Jamestown
Johnston
Lincoln
Middletown
Newport
North Kingstown
North Providence
North Smithfield
Pawtucket
Portsmouth
Providence
Scituate
Smithfield
Warwick
West Greenwich
West Warwick
Woonsocket

Massachusetts Communities with Potential Diversion Routes

Attleboro, MA
Uxbridge, MA

Organizations and Associations

Blackstone Heritage Corridor Inc.
Blackstone River Watershed Council
Woonasquatucket River Watershed Council
Wood-Pawcatuck Watershed Association
Audubon Society of Rhode Island

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Chapter 9 Permitting and Regulatory Review

This chapter identifies the federal and state environmental permits, regulatory reviews, and approvals that apply to the Project. A discussion of the requirements and the status of Project compliance are provided.

9.1 National Historic Preservation Act Section 106 Consultation

Section 106 of the National Historic Preservation Act (Section 106) requires federal agencies to consider the effects of undertakings on historic properties listed in or eligible for inclusion in the National Register. Section 106 is implemented through a consultation process between federal and state agencies and other parties assessing effects of projects on historic properties.

RIDOT's Resources Oversight Program, Office of Historic & Cultural Review in coordination with FHWA, prepared the Section 106 documentation for this Project based on technical reports prepared by PAL. Section 106 consultation letters were sent to RIHPHC (the State Historic Preservation Officer in Rhode Island), Massachusetts Historical Commission (MHC) which is the State Historical Preservation Officer in Massachusetts, THPOs, and other consulting parties. FHWA will make a Section 106 finding of effect for the undertaking (Project) and request concurrence from the RIHPHC and comments from the THPOs and other consulting parties prior to finalizing the NEPA determination for this Project. To date, concurrence has been received from RIHPHC and MHC. Concurrence letters were also received from East Providence HDC, and East Greenwich. A number of communities stated that at this time they are not aware of resources that would be impacted by the project but that they reserved the right to comment further during the EA process. Gloucester Heritage Society, Gloucester Historic District Commission, and Foster Preservation Society, raised concerns regarding the possible impacts of vibration from an increase in trucks on the diversion routes would cause adverse effects on historic properties/districts. RIDOT provided written responses to consulting parties noting the finding that any potential increase in truck traffic on diversion routes will have "no adverse effect" on historic properties per 36 CFR 800.5 (b) -*Assessment of adverse effect*. RIDOT also responded that the EA will provide additional information on impact analysis methodologies and results regarding traffic, noise, vibration, social and community facilities. Section 106 written correspondence and technical memos are provided in **Appendix D**.

During the EA public comment period Gloucester, Smithfield and Pawtucket raised concerns regarding the possibility of increased truck traffic on diversion routes. Responses to these comments are included in **Appendix H**. In summary the response notes that based on the conclusions of our traffic analysis in Chapter 6.3 of the EA, any potential increase in truck traffic on any of the potential Diversion Routes is not expected to have an adverse effect on infrastructure, historic properties, historic cemeteries, or resources that may be eligible for listing in the National Register. The roadways comprising the various Diversion Routes are now used by trucks and any potential increase in truck traffic is not expected to result in an increase in direct (vibration) or indirect (noise, visual, air quality) impacts to these resources. The response also states that RIDOT will monitor the truck traffic volumes on diversion routes after the toll's implementation and work

directly with communities should any issues arise. Correspondence from the Mashantucket Pequot Tribal Historic Preservation Office was also received during the public comment period of the EA. The letter asked if PAL recommended further archaeology for these locations. The response is included in **Appendix H**.

9.2 Endangered Species Act Section 7 Consultation

A species list was obtained pursuant to Section 7 of the ESA which fulfills the requirement for federal agencies to “request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action”. The Official Species List was provided by the New England Ecological Services Field Office in Concord, New Hampshire. The list identified the NLEB as the only species within the area of the proposed Project. There are no critical habitats within or near the Project.

A Consistency letter was generated under the December 15, 2016 “Revised Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and the Northern Long-eared Bat.” Based on the Project information, a determination of “may affect, not likely to adversely affect” was made. RIDOT formally submitted a Concurrence Verification on December 11, 2017 as required. The USFWS had 14 calendar days to notify the lead federal agency if they do not concur. USFWS did not notify the lead federal agency and RIDOT may proceed with the proposed action. Documents generated by the IPaC consultation process are provided in **Appendix C**.

9.3 Clean Water Act

Section 401

The Section 401 program is responsible for ensuring compliance with the State Water Quality Regulations for projects that impact inland & coastal waters by fulfilling the requirements of Section 401 of the Clean Water Act which requires the State to certify all Projects that involve dredge, fill, or flow alterations.

Coordination has been carried out with the RIDEM Office of Water Resources and the Coastal Resources Management Council (CRMC) regarding permit requirements for the Project as discussed in Section 9.6.

Section 404

Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

There are no federal jurisdictional wetlands or waters of the United States within the LOD for the toll locations. A Section 404 permit is not required.

9.4 Title VI of the Civil Rights Act and Executive Order 12898

Title VI prohibits discrimination in federally-assisted programs and requires that no person in the United States of America shall, on the grounds of race, color, or national origin (including limited-English proficiency), be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance.

EO 12898 directs agencies to avoid disproportionately high health or environmental impacts in minority and low-income neighborhoods.

The PIP and other Project information products developed for the Project are in compliance with Title VI and EO 12898.

9.5 National Pollution Discharge Elimination System (NPDES)

The NPDES permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the U.S. The NPDES stormwater program requires permits for discharges from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development or sale.

The contractor will be responsible for preparing necessary documents and obtaining the NPDES permit if necessary.

9.6 Rhode Island Fresh Water Wetlands Act

The Rhode Island Fresh Water Wetlands Act authorizes RIDEM, Office of Water Resources to preserve and regulate the freshwater wetlands of the State for the public benefits that they provide. “Freshwater wetlands in the vicinity of the coast” are regulated by the CRMC.

Wetland resources, as defined in the *Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act (2014)*, are located either adjacent to or within 200 feet of the LOD for some of the toll locations. A Request for Regulatory Applicability (RRA) was submitted to RIDEM and/or CRMC for each of the Ten Toll Locations. The RRA process does not include a field site visit by RIDEM. The LOD for Toll Locations 3, 12, and 13 is within the state jurisdictional 100-foot or 200-foot Riverbank Wetland. RIDEM has determined that a Request for Preliminary Determination (RPD) is required for these locations. At these locations most of the impact is temporary and associated with trenching for the conduit within the roadway shoulder and managed areas. These areas would be restored to existing conditions. A Request for Preliminary Determination (RPD) will be submitted during the final design phase so that a site visit can be conducted to verify the resource boundary and the nature of the impacts. Determinations regarding permitting are summarized in **Table 9-1** and provided in **Appendix B**.

Table 9-1. Wetland Permitting

Toll Location ¹.	RIDEM/ CRMC RRA Determination	Status
3	Further application (RPD ²) required. Gantry foundations are in jurisdictional wetland and are not exempt.	To be Submitted
4	Permit not required. Freshwater Wetland Rules are not applicable.	Permitting Complete
6	Permit not required. Freshwater Wetland Rules are not applicable.	Permitting Complete
7	Permit not required. Utility connection which is exempt per Rule 6.10. Gantry Gantries are not exempt but will not alter character of wetland.	Permitting Complete
8	Permit not required. Work in wetland associated with utility connection which is exempt per Rule 6.10.	Permitting Complete
9	Permit not required. Freshwater Wetland Rules are not applicable.	Permitting Complete
10 a	Permit not required per CRMC. Determined the Finding of No Significant Impact on coastal resources.	Permitting Complete.
10 b, c	Permit not required. Freshwater Wetland Rules are not applicable.	Permitting Complete
11	Permit not required. Freshwater Wetland Rules are not applicable.	Permitting Complete
12	Further application (RPD ²) required. Clearing proposed in Riverbank Wetland is not exempt.	To be Submitted
13	Further application (RPD ²) required. Alteration proposed within jurisdictional wetland.	To be Submitted

1. Toll Location 1 and 2 have completed RIDEM review.
2. RPD: Request for Preliminary Determination

Chapter 10 EA Distribution

The EA was made available in all libraries and town/city halls of communities listed below. Copies were also available at the RIDOT and FHWA offices. The EA was posted on the RIDOT website. Notice of Availability letters were sent out as discussed in Chapter 8. Notice of the Public Hearing and availability of the EA was made by public notice in the *Providence Journal* (English and Spanish), *Westerly Sun*, *Valley Breeze* (English and Spanish), *Cranston Herald*, *Warwick Beacon*, and *Attleboro Sun Chronicle*.

Communities with Toll Locations and Potential Diversions Routes

Warwick
Providence
Pawtucket
Cranston
Johnston
Cumberland
East Providence
Lincoln
North Smithfield

Communities with Potential Diversion Routes Only

Burrillville
Glocester
Exeter
Foster
Scituate
Coventry
West Greenwich
West Warwick
East Greenwich
Smithfield
Central Falls
North Providence
North Kingstown
Jamestown
Newport
Middletown
Portsmouth
Woonsocket
Attleboro, MA
Uxbridge, MA

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APPENDICES – (VOLUMES 2 - 4)

- Appendix A Memoranda of Understanding (MOUs) for Bridges at Toll Locations 3, 4 & 6-13**
- Appendix B Wetland Memos and Permitting Determinations**
- Appendix C Section 7 Consultation Documents**
- Appendix D Section 106 Due Diligence Technical Memos and Correspondence**
- Appendix E Public Involvement Plan**
- Appendix F Diversion Analysis Technical Memos**
- Appendix G Rhode Island Department of Transportation Investment-Grade Truck Tolling Study**
- Appendix H Notice of Availability, Public Hearing/Workshop, Comments and Responses**

